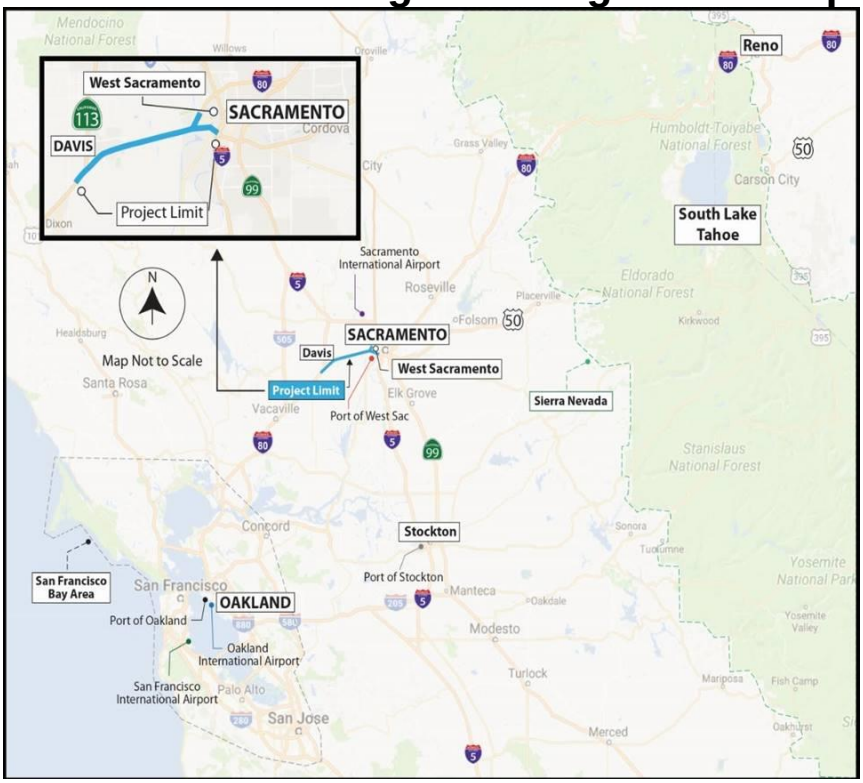
Yolo 80 Corridor Improvements Project

Caltrans District 3
703 B St, Marysville, CA 95901
04-SOL-80-40.7/R44.7; 03-YOL-80-0.00/R11.72; 03-YOL-50-0.00/3.12; 03-SAC-50-0.00/L0.617; 03-SAC-80-M0.00/M1.36
EA 03-3H900/EFIS 0318000085

Final Environmental Impact Report / Environmental Assessment with Finding of No Significant Impact



Prepared by the
State of California, Department of Transportation

The environmental review, consultation, and any other actions required by applicable Federal environmental laws for this project are being, or have been, carried out by Caltrans pursuant to 23 USC 327 and the Memorandum of Understanding dated December 23, 2016, and executed by Federal Highway Administration and Caltrans.

April 2024

General Information about This Document

What's in this document:

The California Department of Transportation (Caltrans), as assigned by the Federal Highway Administration (FHWA), has prepared this Environmental Impact Report/Complex Environmental Assessment (EIR/EA), which examines the potential environmental impacts of the alternatives being considered for the proposed Yolo 80 Corridor Improvements Project (project) located in Solano, Yolo, and Sacramento Counties, California. Caltrans is the lead agency under the National Environmental Policy Act (NEPA) and the California Environmental Quality Act (CEQA). The document explains why the project is being proposed, what alternatives Caltrans considered for the project, potential effects to the environment resulting from the project, potential impacts of each of the alternatives, and proposed avoidance, minimization, and/or mitigation measures (all measures are listed in Appendix C). The Draft EIR/EA was circulated to the public for 61 days between November 13, 2023, and January 12, 2024. Comments received during this period are included in Chapter 4. Elsewhere throughout this document, a vertical line in the margin indicates a change made since draft document circulation. Minor editorial changes and clarifications have not been so indicated. Additional copies of this document and the related technical studies are available for review at the following locations:

Mary L. Stephens – Davis Branch Library
315 E. 14th Street
Davis, CA 95616

California Department of Transportation, District 3
703 B Street, Marysville, CA 95901

Arthur F. Turner Community Library
1212 Merkley Avenue
West Sacramento, CA 95691

Alternative formats:

For individuals with sensory disabilities, this document can be made available in Braille, in large print, or in digital format. To obtain a copy in one of these alternate formats, please call or write to Department of Transportation, Attn: Stacie Gandy, EEO/Safety Office, 703 B Street, Marysville, CA 95901; (530) 218-0632 (Voice) or use the California Relay Service (800) 735-2929 (TTY to Voice), (800) 735-2922 (Voice to TTY) or 711.

SCH# 2021060117
04-SOL-80-40.7/R44.7; 03-YOL-80-0.00/R11.72; 03-YOL-50-0.00/3.12; 03-SAC-50-0.00/L0.617; 03-SAC-80-M0.00/M1.36
EA 03-3H900/EFIS 0318000085

Construct improvements consisting of a High Occupancy Toll (HOT) 3+ lane in each direction with direct connectors, pedestrian/bicycle facilities, park-n-ride, and Intelligent Transportation Systems (ITS) elements. On I-80 between post miles (PMs) 40.7 and R44.7 in Solano County, between PMs 0.00 and R11.72 in Yolo County, and between PMs M0.00 and M1.36 in Sacramento County; on the US-50 corridor between PMs 0.00 and 3.12 in Yolo County and between PMs 0.00 and L0.617 in Sacramento County.

FINAL ENVIRONMENTAL IMPACT REPORT/ENVIRONMENTAL ASSESSMENT WITH FINDING OF NO SIGNIFICANT IMPACT

Submitted Pursuant to: (State) Division 13, California Public Resources Code
(Federal) 42 United States Code (USC) 4332(2)(C)

THE STATE OF CALIFORNIA

Department of Transportation

Cooperating agencies: US Fish and Wildlife Service, Federal Highway Administration, National Marine Fisheries Service, US Army Corps of Engineers, US Environmental Protection Agency

Responsible Agencies: California Transportation Commission, Central Valley Regional Water Quality Control Board, California Department of Fish and Wildlife, State Historic Preservation Officer, Central Valley Flood Protection Board

April 30, 2024
Date

Suzanne Melim
Chief, North Region Environmental
California Department of Transportation
CEQA and NEPA Lead Agency

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CALIFORNIA DEPARTMENT OF TRANSPORTATION
FINDING OF NO SIGNIFICANT IMPACT (FONSI)

FOR

Yolo 80 Corridor Improvements Project (EA: 03-3H900)

The California Department of Transportation (Caltrans) has determined that Alternative 4b (add a high-occupancy toll lane in each direction for free use by vehicles with three or more riders [HOT 3+] and build an I-80 managed lane direct connector) will have no significant impact on the human environment. This FONSI is based on the attached Environmental Assessment (EA) and associated technical studies which has been independently evaluated by Caltrans and determined to adequately and accurately discuss the need, environmental issues, and impacts of the proposed project and appropriate mitigation measures. It provides sufficient evidence and analysis for determining that an Environmental Impact Statement is not required. Caltrans takes full responsibility for the accuracy, scope, and content of the attached EA and associated technical studies.

The environmental review, consultation, and any other actions required by applicable Federal environmental laws for this project are being, or have been, carried out by Caltrans pursuant to 23 USC 327 and the Memorandum of Understanding dated May 27, 2022, and executed by FHWA and Caltrans.

Suzanne Melim

April 30, 2024
Date

Suzanne Melim
Chief, North Region Environmental
California Department of
Transportation

SUMMARY

NEPA Assignment

California participated in the “Surface Transportation Project Delivery Pilot Program” (Pilot Program) pursuant to 23 USC 327, for more than five years, beginning July 1, 2007, and ending September 30, 2012. MAP-21 (P.L. 112-141), signed by President Obama on July 6, 2012, amended 23 USC 327 to establish a permanent Surface Transportation Project Delivery Program. As a result, the Department entered into a Memorandum of Understanding pursuant to 23 USC 327 (NEPA Assignment MOU) with FHWA. The NEPA Assignment MOU became effective October 1, 2012, and was renewed on May 27, 2022, for a term of ten years. In summary, the Department continues to assume FHWA responsibilities under NEPA and other federal environmental laws in the same manner as was assigned under the Pilot Program, with minor changes. With NEPA Assignment, FHWA assigned, and the Department assumed all of the United States Department of Transportation (USDOT) Secretary's responsibilities under NEPA. This assignment includes projects on the State Highway System and Local Assistance Projects off the State Highway System within the State of California, except for certain categorical exclusions that FHWA assigned to the Department under the 23 USC 326 CE Assignment MOU, projects excluded by definition, and specific project exclusions.

Introduction

The California Department of Transportation (Caltrans or Department), in collaboration with stakeholders, proposes to construct improvements consisting of managed lanes, pedestrian/bicycle facilities, and Intelligent Transportation System (ITS) elements along Interstate 80 (I-80) and U.S. Route 50 (US-50) from Kidwell Road near the eastern Solano County boundary (near Dixon), through Yolo County, and to West El Camino Avenue on I-80 and Interstate 5 (I-5) on US-50 in Sacramento County.

Caltrans, as assigned by the Federal Highway Administration (FHWA), is the lead agency under the National Environmental Policy Act (NEPA) for the Caltrans EA 03-3H900 Yolo 80 Corridor Improvements Project (project). Caltrans is also the lead agency under the California Environmental Quality Act (CEQA).

The project is programmed in the State Transportation Improvement Program (STIP), Regional Surface Transportation Program, and Congestion Management and Air Quality Improvement Program.

Overview of Project Area

CORRIDOR OVERVIEW

The project consists of a stretch of the I-80 corridor that passes through parts of Solano, Yolo, and Sacramento counties. Specifically, the project would extend from Kidwell Road and the Solano/Yolo County line, the Solano/Yolo County line to the Yolo/Sacramento County line, and from the Yolo/Sacramento County line to West El Camino Avenue. In addition, the project

includes a stretch of the US-50 corridor between the I-80/I-50 interchange and the Yolo/Sacramento County line, and between the Yolo/Sacramento County line and the US-50/I-5 interchange. The total project length is approximately 20.8 miles.

Purpose and Need

The purpose of the proposed project is to:

- Ease congestion and improve overall person throughput[1]
- Improve freeway operation on the mainline, ramps, and at system interchanges
- Support reliable transport of goods and services throughout the region
- Improve modality[2] and travel time reliability
- Provide expedited traveler information and monitoring systems.

The proposed project is needed for the following reasons:

- Recurring congestion during the morning and afternoon peak periods exceeds current design capacity limiting person throughput.

- Operational inefficiencies lead to the formation of bottlenecks due to short weaving and merging areas and lane drops.

- Inefficient movement of goods and services impedes regional and interstate economic sustainability.

- The corridor users rely heavily on single-occupancy vehicles with limited multi-modal options such as transit, carpool, bicycle, and pedestrian facilities, resulting in unreliable travel times.

- Lack of real-time traveler information and coordinated traffic communication systems impedes timely response to roadway incidents resulting in secondary collisions and increased non-recurring congestion.

Proposed Action

The project would add managed lanes on I-80 and US-50 by a combination of lane conversion, restriping, and shoulder and median reconstruction with a concrete barrier. Drainage modifications would be required due to median reconstruction in the locations to which sheet flow currently drains. The existing Intelligent Transportation System, (ITS) elements and infrastructure would be expanded and modified and would include ramp meters, fiber-optic conduit and cables, and overhead signs. Utility relocation would also occur as further described below.

[1] Throughput is the number of people moving efficiently through a region.
[2] Modality is the variety in modes of transportation. This includes access and multiple options for the movement of people and goods. Examples include access to transit, carpool, bicycle, and pedestrian facilities.

PROJECT ALTERNATIVES

This section describes alternatives developed to meet the project's purpose and need. The No Build Alternative is Alternative 1. Build Alternatives 2a, 3a, 4a, 5a, and 6a propose the same geometric footprint, but would incorporate different managed lane types. Build Alternatives 2b, 3b, 4b, 5b, and 6b propose the same geometric footprint, include an I-80 managed lane direct connector, but would incorporate different managed lane types. Build Alternatives 7a and 7b would not construct new lanes but would repurpose an existing lane instead; however, Build Alternative 7b would include the I-80 managed lane direct connector.

- Build Alternative 2a: Add a high-occupancy vehicle lane in each direction for use by vehicles with two or more riders (HOV 2+).
- Build Alternative 2b: Add a high-occupancy vehicle lane in each direction for use by vehicles with two or more riders (HOV 2+) and build an I-80 managed lane direct connector.
- Build Alternative 3a: Add a high-occupancy toll lane in each direction for free use by vehicles with two or more riders (HOT 2+). Single-occupied vehicles would pay a fee for lane usage.
- Build Alternative 3b: Add a high-occupancy toll lane in each direction for free use by vehicles with two or more riders (HOT 2+) and build an I-80 managed lane direct connector. Single-occupied vehicles would pay a fee for lane usage.
- Build Alternative 4a: Add a high-occupancy toll lane in each direction for free use by vehicles with three or more riders (HOT 3+). Vehicles with less than three riders would pay a fee for lane usage.
- Build Alternative 4b: Add a high-occupancy toll lane in each direction for free use by vehicles with three or more riders (HOT 3+) and build an I-80 managed lane direct connector. Vehicles with less than three riders would pay a fee for lane usage.
- Build Alternative 5a: Add an express lane in each direction (i.e., everyone would pay a fee to use the lane, regardless of the number of riders).
- Build Alternative 5b: Add an express lane in each direction (i.e., everyone would pay a fee to use the lane, regardless of number of riders), and build an I-80 managed lane direct connector.
- Build Alternative 6a: Add a transit-only lane in each direction.
- Build Alternative 6b: Add a transit-only lane in each direction and build an I-80 managed lane direct connector.
- Build Alternative 7a: Repurpose the current number one general-purpose lane for use by vehicles with two or more riders (HOV 2+); no new lanes would be constructed.

- Build Alternative 7b: Repurpose the current number one general-purpose lane for use by vehicles with two or more riders (HOV 2+); no new lanes would be constructed. Build an I-80 managed lane direct connector.

This project contains several standardized project features, which are employed on most, if not all, Caltrans projects and were not developed in response to any specific environmental impact resulting from the proposed project. These measures are addressed in more detail in the Environmental Consequences sections found in Chapter 2 and included as Appendix E.

Alternatives 2a, 2b, 7a, and 7b include HOV lane alternatives. If a HOT lane alternative is chosen as the preferred alternative (Build Alternatives 3a, 3b, 4a, and 4b), then additional advanced HOT lane signs will need to be placed from I-80/El Camino Avenue to I-80/Truxel Road and between US-50/I-5 and US-50/SR-99 (Sac 80 PM M1.4/3.64 and SAC 50 PM L0.60/R0.20). If necessary, the Environmental Document and the Utility Certification will be revalidated during the PS&E phase.

The Build Alternatives consist of the following three geographic segments:

Segment 1: Segment 1 stretches from Kidwell Road in Eastern Solano County through Davis to the Eastern end of the Yolo Causeway east of Enterprise Boulevard in West Sacramento. Segment 1 consists of three sub-segments:

- *Segment 1a* is from Kidwell Road to Solano County/Yolo County Line.
- *Segment 1b* is from the Solano/Yolo County Line to the west end of the Yolo Causeway.
- *Segment 1c* is from the start of the Yolo Causeway to east of Enterprise Boulevard.

Segment 2: Segment 2 starts just east of Enterprise Boulevard and continues north on I-80 to West El Camino Avenue.

Segment 3: Segment 3 starts at the I-80/US-50 Separation and continues east along US-50 to I-5 near downtown Sacramento. Segment 3 consists of two sub-segments:

- *Segment 3a* is the I-80/US-50 Separation to Jefferson Boulevard Undercrossing.
- *Segment 3b* is the Jefferson Boulevard Undercrossing to just east of I-5.

Identification of a Preferred Alternative

Build Alternative 4B (HOT 3+ with managed lane connector ramp) is the preferred alternative for meeting the project's purpose and need. While Build Alternatives 2–6 offer similar results in terms of impacts on the environment and vehicle miles traveled, Build Alternative 4B provides the highest benefit with respect to revenue generation while still meeting the project's purpose and need to reduce congestion and improve mobility across the corridor. Further, Build Alternative 4B is consistent with local government transportation goals and the project's partner agency's (Yolo Transportation District) declaration of HOT 3+ with connector ramp as their preferred alternative.

Joint California Environmental Quality (CEQA) Act/National Environmental Policy Act (NEPA) Documentation

The proposed project is a joint project by the California Department of Transportation (Department) and the Federal Highway Administration (FHWA) and is subject to state and federal environmental review requirements. Project documentation, therefore, was prepared in compliance with both the California Environmental Quality Act (CEQA) and the National Environmental Policy Act (NEPA). The Department is the lead agency under NEPA. Caltrans is the lead agency under CEQA. In addition, FHWA's responsibility for environmental review, consultation, and any other actions required by applicable Federal environmental laws for this project are being, or have been, carried out by Caltrans pursuant to 23 United States Code Section 327 (23 USC 327) and the Memorandum of Understanding dated May 27, 2022, and executed by FHWA and Caltrans.

Some impacts determined to be significant under CEQA may not lead to a determination of significance under NEPA. Because NEPA is concerned with the significance of the project as a whole, often a "lower level" document is prepared for NEPA. One of the most common joint document types is an Environmental Impact Report/Environmental Assessment (EIR/EA).

After receiving comments from the public and reviewing agencies, this Final EIR/EA was prepared. The Final EIR/EA includes responses to comments received on the Draft EIR/EA and identifies the preferred alternative. If the decision is made to approve the project, a Notice of Determination will be published for compliance with CEQA, and the Department will decide whether to issue a Finding of No Significant Impact (FONSI) or require an Environmental Impact Statement (EIS) for compliance with NEPA. A Notice of Availability (NOA) of the FONSI will be sent to the affected units of federal, state, and local government, and to the State Clearinghouse in compliance with Executive Order 12372.

Potential Environmental Consequences and Avoidance, Minimization, and/or Mitigation Measures

Project impacts would potentially occur in the following resource areas: aesthetics, air quality, biological resources, cultural resources, hazardous materials, energy and greenhouse gases, hydrology and water quality, noise, paleontology, transportation, and utilities and service systems. The project would not contribute to cumulatively considerable effects to the resources analyzed. Project effects under NEPA are discussed fully in Chapter 2, *Affected Environment, Environmental Consequences, and Avoidance, Minimization, and/or Mitigation Measures*. Table S-1 summarizes the impacts of the project under NEPA. Chapter 3, *California Environmental Quality Act Evaluation*, and Table S-2 addresses impacts under CEQA.

Coordination with Other Public Agencies

NOTICE OF PREPARATION

Caltrans filed a Notice of Preparation (NOP) of an EIR with the State Clearinghouse on June 7, 2021. An NOP memorandum was filed with the State Clearinghouse on June 6, 2021, which

was revised on August 17, 2021, to notify that the scoping meeting was rescheduled. Caltrans accepted scoping comments until September 24, 2021. A revised NOP was also distributed on October 17, 2022, that included clarification of the proposed managed lane strategies and Build Alternatives. A copy of the NOP is included in Appendix G.

Agency consultation and public participation for the Yolo 80 Corridor Improvements Project have been accomplished through a variety of formal and informal methods, including project development team meetings, interagency coordination meetings, and correspondence with other interested parties.

Comments from the public that were submitted during the meeting included questions regarding proposed bicycle facilities, project funding, projects in the nearby area, project timing, proposed lane configuration, proposed sound wall locations, and proposed work within the Yolo causeway. In addition, written comment letters included requests to consider potential air quality effects to sensitive receptors, increased flood risks, potential fish passage impacts, Native American Tribal consultation, utility relocation, etc.

PERMITS AND APPROVALS NEEDED

Table S-3 details the permits, licenses, agreements, and certifications required for project construction.

Table S-1 Comparison of Alternatives – Impacts Summary (NEPA)

Impact	No Build Alternative 1	Build Alternatives 2a and 2b	Build Alternatives 3a and 3b	Build Alternatives 4a and 4b	Build Alternatives 5a and 5b	Build Alternatives 6a and 6b	Build Alternatives 7a and 7b	Avoidance, Mitigation, and/or Minimization Measures (AMMs)
Land Use								
Existing and Future Land Use	No effect	Construction and operation of Build Alternatives 2a and 2b would have no effect on existing or future land uses.	Same as effects described under Build Alternatives 2a and 2b.	Same as effects described under Build Alternatives 2a and 2b.	Same as effects described under Build Alternatives 2a and 2b.	Same as effects described under Build Alternatives 2a and 2b.	Same as effects described under Build Alternatives 2a and 2b.	None
Conflict with any land use plan, policy, or regulation	No effect	Consistent or partially consistent.	Consistent or partially consistent.	Consistent or partially consistent.	Consistent or partially consistent, some inconsistent.	Consistent or partially consistent, some inconsistent.	Consistent or partially consistent, some inconsistent.	None
Parks and Recreational Facilities								
Parks and Recreational Facilities	No effect	Construction and operation of Build Alternatives 2a and 2b may result in temporary traffic delays and ramp closures that could cause temporary delays in access to recreational facilities. None of the temporary construction-related impacts would adversely affect the activities, features, or attributes of the park. Build Alternatives 2a and 2b would not require acquisition of a park or recreational facilities.	Same as effects described under Build Alternatives 2a and 2b.	Same as effects described under Build Alternatives 2a and 2b.	Same as effects described under Build Alternatives 2a and 2b.	Same as effects described under Build Alternatives 2a and 2b.	Same as effects described under Build Alternatives 2a and 2b.	None
Farmlands								
Effects on farmland	No effect	Build Alternatives 2a and 2b would occur almost entirely within the Caltrans ROW and would not result in the conversion of any important farmland or Williamson Act land to non-agricultural uses. Therefore, Build Alternatives 2a and 2b would have no effect on farmland or Williamson Act land in the project area.	Same as effects described under Build Alternatives 2a and 2b.	Same as effects described under Build Alternatives 2a and 2b	Same as effects described under Build Alternatives 2a and 2b	Same as effects described under Build Alternatives 2a and 2b	Same as effects described under Build Alternatives 2a and 2b	None
Growth								
Growth	No effect	Build Alternatives 2a and 2b would not remove an impediment to growth, provide an entirely new public facility, or provide new access to previously unserved areas. Build Alternatives 2a and 2b would not directly increase development of residential land uses, encourage growth outside of existing growth boundaries, or alter existing access to residential and employment areas; therefore, no adverse effect associated with population growth would be anticipated with implementation of Alternatives 2a and 2b.	Same as effects described under Build Alternatives 2a and 2b.	Same as effects described under Build Alternatives 2a and 2b.	Same as effects described under Build Alternatives 2a and 2b.	Build Alternative 6a and 6b would not improve US-50 corridor traffic performance compared to the No-Build Alternative, so they would not accommodate planned growth. No adverse effects associated with growth would be anticipated.	Build Alternatives 7a and 7b would not improve US-50 corridor traffic performance compared to the No-Build Alternative, so they would not accommodate planned growth. No adverse effects associated with growth would be anticipated.	None

Impact	No Build Alternative 1	Build Alternatives 2a and 2b	Build Alternatives 3a and 3b	Build Alternatives 4a and 4b	Build Alternatives 5a and 5b	Build Alternatives 6a and 6b	Build Alternatives 7a and 7b	Avoidance, Mitigation, and/or Minimization Measures (AMMs)
Community Impacts								
Effects on community character, population, and cohesion	No effect	Build Alternatives 2a and 2b would not alter the zoning, layout, or access within the community. Build Alternatives 2a and 2b would not divide an existing neighborhood or result in additional barriers within the Community Study Area.	Same as effects described under Build Alternatives 2a and 2b.	Same as effects described under Build Alternatives 2a and 2b.	Same as effects described under Build Alternatives 2a and 2b.	Same as effects described under Build Alternatives 2a and 2b.	Same as effects described under Build Alternatives 2a and 2b.	None
Effects on relocation and real property acquisition	No effect	Build Alternatives 2a and 2b would require two permanent right-of-way easements. No displacement of any residences or businesses would be required.	Same as effects described under Build Alternatives 2a and 2b.	Same as effects described under Build Alternatives 2a and 2b.	Same as effects described under Build Alternatives 2a and 2b.	Same as effects described under Build Alternatives 2a and 2b.	Same as effects described under Build Alternatives 2a and 2b.	None
Effects on environmental justice populations	No effect	The expected increases of environmental justice community travel would be like the increases in non-environmental justice community travel and would, therefore, would not cause disproportionately high and adverse direct effects on environmental justice travelers.	Construction effects would be the same as Build Alternatives 2a and 2b. Although the congestion relief and enhanced accessibility would benefit all I-80/US-50 travelers, environmental justice travelers may not realize the equivalent benefit from Build Alternatives 3a and 3b as non-environmental justice travelers due to the tolling.	Construction effects would be the same as described under Build Alternatives 2a and 2b. As Build Alternatives 4a and 4b are toll-based alternatives, effects on environmental justice travelers would be like Build Alternatives 3a and 3b.	Construction effects would be the same as described under Build Alternatives 2a and 2b. Build Alternatives 5a and 5b would involve adding an Express Lane in each direction. As Build Alternatives 5a and 5b are also toll-based alternatives, effects on Environmental Justice Travelers would be like Build Alternatives 3a and 3b, respectively. However, there would be no reduced payment option from carpooling or high vehicle occupancy.	Construction effects would be the same as described under Build Alternatives 2a and 2b. While improved traffic flow and movement of persons on I-80/US-50 within the project limits would benefit a wide range of communities including those defined as environmental justice communities, with a transit-only alternative, the projected increases of environmental justice community travel are less than the projected increases of non-environmental justice community travel	Build Alternatives 7a and 7b would not cause disproportionately high and adverse direct effects on environmental justice communities during construction. There would be an expected increase of environmental justice community travel that is similar the increases in non-environmental justice community travel and would, therefore, not cause disproportionately high and adverse direct effects on environmental justice travelers since the benefits of these alternatives would be equally shared by travelers from all income levels.	Caltrans would implement AMM EJ-1, EJ-2, and EJ-3 for Build Alternatives 3a, 3b, 4a, 4b, 5a, and 5b.
Equity	No effect	Would not substantially affect community character or quality of life in underserved communities in the study area. The Build alternatives would not exacerbate air pollutant conditions and associated health disparities or affect socioeconomic conditions. Residents in these neighborhoods may be initially challenged by the toll-related signage and the process for obtaining toll transponders.	Like effects described under Build Alternatives 2a and 2b. Build Alternatives 3a and 3b may present challenges to linguistically isolated households.	Like effects described under Build Alternatives 2a and 2b. Build Alternatives 4a and 4b may present challenges to linguistically isolated households.	Like effects described under Build Alternatives 2a and 2b. Build Alternatives 5a and 5b may present challenges to linguistically isolated households.	A transit lane would be added in each direction, which would benefit underserved communities using public transit.	Same as effects described under Build Alternatives 2a and 2b.	None

Impact	No Build Alternative 1	Build Alternatives 2a and 2b	Build Alternatives 3a and 3b	Build Alternatives 4a and 4b	Build Alternatives 5a and 5b	Build Alternatives 6a and 6b	Build Alternatives 7a and 7b	Avoidance, Mitigation, and/or Minimization Measures (AMMs)
Utilities/Emergency Services								
Effects on public and private utilities	No effect	Planned or accidental temporary service interruptions during relocation of utilities will occur during construction.	Same as effects described under Build Alternatives 2a and 2b.	Same as effects described under Build Alternatives 2a and 2b.	Same as effects described under Build Alternatives 2a and 2b.	Same as effects described under Build Alternatives 2a and 2b.	Same as effects described under Build Alternatives 2a and 2b.	None
Effects on police, fire, and emergency service providers	No effect	Temporary traffic delays and ramp closures on I-80 and US-50 will occur during construction.	Same as effects described under Build Alternatives 2a and 2b.	Same as effects described under Build Alternatives 2a and 2b.	Same as effects described under Build Alternatives 2a and 2b.	Same as effects described under Build Alternatives 2a and 2b.	Same as effects described under Build Alternatives 2a and 2b.	None
Traffic and Transportation/Pedestrian and Bicycle Facilities								
Existing (2018) operations	No effect	Temporary traffic delays and ramp closures on I-80 and US-50 will occur during construction.	Same as effects described under Build Alternatives 2a and 2b.	Same as effects described under Build Alternatives 2a and 2b.	Same as effects described under Build Alternatives 2a and 2b.	Same as effects described under Build Alternatives 2a and 2b.	Same as effects described under Build Alternatives 2a and 2b.	None, although VMTs are expected to be reduced by implementing the measures in Table 2.1.27.
Opening Year (2029) operations	No effect	Congestion would be eliminated in some areas under Alternatives 2a and 2b. However, congestion in other areas would extend outside the peak period. Alternative 2b (Add HOV with Median Ramps) would have less upstream congestion on I-80 in comparison to Alternative 2a.	Alternative 3a (Add HOT2+) would not perform as well as Alternatives 2a, 4a, and 5a because more vehicles would be eligible for the managed lane than in the alternatives, so congestion would be higher where vehicles are entering and leaving the managed lane. Alternative 3b (Add HOT2+ with Direct Connector) would have less upstream congestion on I-80 in comparison to Alternative 3a.	Alternative 4a (Add HOT3+) would perform well, except for increased VMT. Alternative 4b (Add HOT3+ with Direct Connector) would have less upstream congestion on I-80 in comparison to Alternative 4a.	Same as effects described under Build Alternatives 2a and 2b.	Alternative 6a (Add Transit) would not perform well compared to the other alternatives. Passenger vehicle volume would be constrained by the network capacity resulting in performance like Alternative 1 (No Build) Alternative 6b (Add Transit with Direct Connector) would have less upstream congestion on I-80 in comparison to Alternative 6a.	Alternative 7a would have worse congestion extending into downtown Sacramento on US 50 than the other Build Alternatives. Alternative 7b would have less upstream congestion on I-80 in comparison to Alternative 7a.	None, although VMTs are expected to be reduced by implementing the measures in Table 2.1.27.
Horizon Year (2049) operations	Peak hour demand volume is expected to increase. By horizon year 2049, I-80 and US 50 in the project area would become so congested that travelers would seek longer paths to have a lower travel time.	Under alternatives 2a and 2b, congestion at the Yolo Causeway bottleneck would be lower, but a new bottleneck would form at the lane drop after the US 50 off-ramp. The combined congested area would extend outside the peak period and extend upstream to Harbor Boulevard on US 50. Alternative 2b (Add HOV with Median Ramps) would have the least upstream congestion on both US 50 and I-80 with the additional capacity provided by the median ramp from I-80 and the reduced volume in the weaving section on I-80 between US 50 and West Capitol Avenue.	Alternative 3a (Add HOT2+) would not perform as well as Alternatives 2a, 4a, and 5a because more vehicles would be eligible for the managed lane than in the alternatives, so congestion would be higher where vehicles are entering and leaving the managed lane. Alternative 3b (Add HOT2+ with Direct Connector) would have	Alternative 4a (Add HOT3+) would perform well, except for increased VMT. Alternative 4b (Add HOT3+ with Direct Connector) would have less upstream congestion on US 50 and I-80 in comparison to Alternative 4a.	Same as effects described under Build Alternatives 2a and 2b.	Alternative 6a (Add Transit) would not perform well compared to the other alternatives. Passenger vehicle volume would be constrained by the network capacity resulting in performance similar to Alternative 1 (No Build) Alternative 6b (Add Transit with Direct Connector) would have less upstream congestion on US 50 and	Alternative 7a would have worse congestion extending into downtown Sacramento on US 50 than the other Build Alternatives. Alternative 7b would have less upstream congestion on US 50 and I-80 in comparison to Alternative 7a.	None, although VMTs are expected to be reduced by implementing the measures in Table 2.1.27.

Impact	No Build Alternative 1	Build Alternatives 2a and 2b	Build Alternatives 3a and 3b	Build Alternatives 4a and 4b	Build Alternatives 5a and 5b	Build Alternatives 6a and 6b	Build Alternatives 7a and 7b	Avoidance, Mitigation, and/or Minimization Measures (AMMs)
			less upstream congestion on US 50 and I-80 in comparison to Alternative 3a.			I-80 in comparison to Alternative 6a.		
Visual/Aesthetics								
Effects on scenic resources, visual character, and visual quality	No effect	Overall visual impacts for Build Alternative 2a and 2b would be moderate-low but would range from very low to moderate-high.	Overall visual impacts would be moderate but would range from low to high.	Overall visual impacts would be moderate but would range from low to high.	Overall visual impacts would be moderate but would range from low to high.	Overall visual impacts would be moderate but would range from very low to moderate-high.	Overall visual impacts would be moderate but would range from very low to moderate-high.	AMM AES-1, AMM AES-2, AMM AES-3, AMM AES-4, AMM AES-5
Cultural Resources								
Effects on cultural resources	No effect	Project construction would create subsurface disturbances that could result in damage to or destruction of previously undiscovered subsurface archaeological deposits or unmarked burials.	Same as effects described under Build Alternatives 2a and 2b.	Same as effects described under Build Alternatives 2a and 2b.	Same as effects described under Build Alternatives 2a and 2b.	Same as effects described under Build Alternatives 2a and 2b.	Same as effects described under Build Alternatives 2a and 2b.	None
Water Quality								
Hydrology and floodplain	No effect	Caltrans would need an encroachment permit from the CVFPB and a Section 408 permit from the USACE prior to construction of Build Alternatives 2a and 2b. Build Alternatives 2a and 2b would not promote incompatible development within the floodplain and would not contribute to adverse effects to floodplains. AMM HF-1 will require installation of a detention basin riser to tie into existing storm drains on the upstream side at two locations in the city of Davis—one detention basin rise inlet is proposed at the storm drain crossing on Mace Boulevard south of I-80 and the other will be at the WB I-80 off-ramp to Chiles Road.	Same as effects described under Build Alternatives 2a and 2b.	Same as effects described under Build Alternatives 2a and 2b.	Same as effects described under Build Alternatives 2a and 2b.	Same as effects described under Build Alternatives 2a and 2b.	Same as effects described under Build Alternatives 2a and 2b.	Caltrans will implement AMM HF-1 for all Build Alternatives
Water Quality and Stormwater Runoff	No effect	Potential for short-term discharges of sediments, oil, grease, and chemical pollutants into nearby storm drains generated during construction; Potential long-term impacts from increased impervious area, operation, and maintenance activities. Construction and operation would not adversely affect water quality.	Same as effects described under Build Alternatives 2a and 2b.	Same as effects described under Build Alternatives 2a and 2b.	Same as effects described under Build Alternatives 2a and 2b.	Same as effects described under Build Alternatives 2a and 2b.	Same as effects described under Build Alternatives 2a and 2b.	None
Geology/Soils/Seismicity/Topography								
Surface Conditions	No effect	Potential construction and operation effects on erosion, siltation, and runoff would be minimal under Build Alternatives 2a and 2b. Once construction is completed, operation	Same as effects described under Build Alternatives 2a and 2b.	Same as effects described under Build Alternatives 2a and 2b.	Same as effects described under Build Alternatives 2a and 2b.	Same as effects described under Build Alternatives 2a and 2b.	Same as effects described under Build Alternatives 2a and 2b.	Caltrans would implement AMM GEO-1, AMM GEO-2, and AMM GEO-3for all Build Alternatives.

Impact	No Build Alternative 1	Build Alternatives 2a and 2b	Build Alternatives 3a and 3b	Build Alternatives 4a and 4b	Build Alternatives 5a and 5b	Build Alternatives 6a and 6b	Build Alternatives 7a and 7b	Avoidance, Mitigation, and/or Minimization Measures (AMMs)
		of Build Alternatives 2a and 2b would not result in in significant disruptions, displacements, compaction or overcrowding of on-site soils, or change in topography or ground surface features						
Subsurface Conditions and Groundwater	No effect	Groundwater is not anticipated to be encountered during culvert replacement excavation but may be encountered during excavation of footings for the connector ramp under Build Alternative 2b. Build Alternatives 2a and 2b would construct five new culverts and replace or improve 21 existing culverts located beneath the roadway, fill, and embankments at depths unlikely to encounter groundwater.	Same as effects described under Build Alternatives 2a and 2b.	Same as effects described under Build Alternatives 2a and 2b.	Same as effects described under Build Alternatives 2a and 2b.	Same as effects described under Build Alternatives 2a and 2b.	Same as effects described under Build Alternatives 2a and 2b.	Caltrans would implement AMM GEO-1, AMM GEO-2, and AMM GEO-3 for all Build Alternatives.
Seismic Hazards	No effect	Liquefaction is expected to be high in the project area due to ground shaking. However, Build Alternatives 2a and 2b would be designed in accordance with Caltrans' Standard Specifications and current Seismic Design Criteria. Construction would have no adverse effect on the geology and soils present at the project site.	Same as effects described under Build Alternatives 2a and 2b.	Same as effects described under Build Alternatives 2a and 2b.	Same as effects described under Build Alternatives 2a and 2b.	Same as effects described under Build Alternatives 2a and 2b.	Same as effects described under Build Alternatives 2a and 2b.	Caltrans would implement AMM GEO-1, AMM GEO-2, and AMM GEO-3for all Build Alternatives.
Paleontology								
Damage to paleontological resources	No effect	Build Alternatives 2a and 2b would require excavations greater than 4 feet for installation of retaining, signs, and sound walls. In addition, foundation work for signs, structures, underground utilities, and culvert/drainage installations could also encounter sensitive paleontological resources. Build Alternative 2b proposes pile driving during construction for installation of connector ramp footings to about 40 feet deep. Such activities would be deep enough to reach potentially unknown sensitive paleontological resources.	Same as effects described under Build Alternatives 2a and 2b.	Same as effects described under Build Alternatives 2a and 2b.	Same as effects described under Build Alternatives 2a and 2b.	Same as effects described under Build Alternatives 2a and 2b.	Same as effects described under Build Alternatives 2a and 2b.	Caltrans would implement AMM PALEO-1, AMM PALEO-2, and AMM PALEO-3 for all Build Alternatives.
Hazardous Waste and Materials								
Exposure to hazardous materials to humans or the environment	No effect	Build Alternatives 2a and 2b would not affect known hazardous sites. Lead containing paint, asbestos-containing materials, aerially deposited lead, and treated wood waste could be encountered during Project construction. Construction would involve the use and storage of fuels, lubricants, solvents, and other possible contaminants with the potential to spill. No adverse effect would occur.	Same as effects described under Build Alternatives 2a and 2b.	Same as effects described under Build Alternatives 2a and 2b.	Same as effects described under Build Alternatives 2a and 2b.	Same as effects described under Build Alternatives 2a and 2b.	Same as effects described under Build Alternatives 2a and 2b.	None

Impact	No Build Alternative 1	Build Alternatives 2a and 2b	Build Alternatives 3a and 3b	Build Alternatives 4a and 4b	Build Alternatives 5a and 5b	Build Alternatives 6a and 6b	Build Alternatives 7a and 7b	Avoidance, Mitigation, and/or Minimization Measures (AMMs)
Air Quality								
Project-level conformity CO	No effect	Build Alternatives 2a and 2b would have similar effects on conformity	Same as effects described under Build Alternatives 2a and 2b.	Same as effects described under Build Alternatives 2a and 2b.	Same as effects described under Build Alternatives 2a and 2b.	Same as effects described under Build Alternatives 2a and 2b.	Same as effects described under Build Alternatives 2a and 2b.	None
Project-level conformity PM2.5	No effect	The effects would be like those of Build Alternative 1.	Same as effects described under Build Alternatives 2a and 2b.	Same as effects described under Build Alternatives 2a and 2b.	Effects would be slightly less than described under Build Alternatives 2a and 2b,	Effects would be slightly less than described under Build Alternatives 2a and 2b,	Effects would be slightly less than described under Build Alternatives 2a and 2b,	None
Roadway Vehicle Emissions/Criteria Pollutant Emissions	No effect	The effects would be like those of Build Alternative 1.	Same as effects described under Build Alternatives 2a and 2b.	Same as effects described under Build Alternatives 2a and 2b.	Same as effects described under Build Alternatives 2a and 2b.	Same as effects described under Build Alternatives 2a and 2b.	Same as effects described under Build Alternatives 2a and 2b.	None
Noise								
Operational noise and vibration	No effect	The noise level increases from existing conditions are not considered substantial per the Caltrans Noise Analysis Protocol for New Highway Construction	Same as effects described under Build Alternatives 2a and 2b.	Same as effects described under Build Alternatives 2a and 2b.	Same as effects described under Build Alternatives 2a and 2b.	Same as effects described under Build Alternatives 2a and 2b.	Same as effects described under Build Alternatives 2a and 2b.	None
Construction noise and vibration	No effect	No adverse noise impacts from construction are anticipated for Build Alternative 2a or 2b because construction would be conducted in accordance with Caltrans Standard Specifications Section 14-8.02. Build Alternative 2b alternatives would have greater noise and vibration impacts because of the use of pile drivers for the ramp construction.	Construction effects would be like effects described under Build Alternatives 2a and 2b.	Construction effects would be like effects described under Build Alternatives 2a and 2b.	Construction effects would be like effects described under Build Alternatives 2a and 2b.	Construction effects would be like effects described under Build Alternatives 2a and 2b.	Construction effects would be like effects described under Build Alternatives 2a and 2b.	Caltrans would implement AMM NOI-1 for all Build Alternatives.
Energy								
Energy demands	No effect	Build Alternatives 2a and 2b would consume energy and fuel for construction and would generate new vehicular traffic trips, as it would involve construction of additional managed lanes causing increased vehicle miles traveled (VMT). When balancing energy used during construction and operation against energy saved by relieving congestion and other transportation efficiencies, the project would not have substantial energy effects. Therefore, no adverse permanent effects are anticipated.	Construction effects would be like effects described under Build Alternatives 2a and 2b. Permanent effects would be slightly less than described under Build Alternatives 2a and 2b.	Construction effects would be like effects described under Build Alternatives 2a and 2b. Permanent effects would be slightly less than described under Build Alternatives 2a and 2b.	Construction effects would be like effects described under Build Alternatives 2a and 2b. Permanent effects would be slightly less than described under Build Alternatives 2a and 2b.	Construction effects would be like effects described under Build Alternatives 2a and 2b. Permanent effects would be slightly less than described under Build Alternatives 2a and 2b.	Construction effects would be like effects described under Build Alternatives 2a and 2b. Permanent effects would be slightly less than described under Build Alternatives 2a and 2b.	Caltrans would implement AMM Energy-1 for all Build Alternatives.
Natural Communities								
Natural Communities	No effect	Build Alternatives 2a and 2b would result in the temporary impacts of up to 2.12 acres of riparian habitat. Minimal permanent effects.	Same as effects described under Build Alternatives 2a and 2b.	Same as effects described under Build Alternatives 2a and 2b.	Same as effects described under Build Alternatives 2a and 2b.	Same as effects described under Build Alternatives 2a and 2b.	Same as effects described under Build Alternatives 2a and 2b.	Caltrans would implement AMM BIO-1 for all Build Alternatives.

Impact	No Build Alternative 1	Build Alternatives 2a and 2b	Build Alternatives 3a and 3b	Build Alternatives 4a and 4b	Build Alternatives 5a and 5b	Build Alternatives 6a and 6b	Build Alternatives 7a and 7b	Avoidance, Mitigation, and/or Minimization Measures (AMMs)
Wetland and Other Waters								
Effects on Wetlands and Other Waters	No effect	Project construction would result in the temporary disturbance of 0.006 acre (15.70 linear feet) and the permanent impact of 0.079 acre (377.97 linear feet) of jurisdictional waters.	Same as effects described under Build Alternatives 2a and 2b.	Same as effects described under Build Alternatives 2a and 2b.	Same as effects described under Build Alternatives 2a and 2b.	Same as effects described under Build Alternatives 2a and 2b.	Same as effects described under Build Alternatives 2a and 2b.	Caltrans would implement AMMs BIO-2 through BIO-4 for all Build Alternatives.
Plant Species								
Effects on Special-Status Plants	No effect	Build Alternatives 2a and 2b may result in the reduction in habitat suitability and quality from the introduction or spread of non-native plant species should Bolander's water-hemlock and wooly rose mallow occur.	Same as effects described under Build Alternatives 2a and 2b.	Same as effects described under Build Alternatives 2a and 2b.	Same as effects described under Build Alternatives 2a and 2b.	Same as effects described under Build Alternatives 2a and 2b.	Same as effects described under Build Alternatives 2a and 2b.	None
Animal Species								
Animal species	No effect	15 non-listed special status wildlife species were identified as potentially occurring in the project region. Project construction could result in the temporary or permanent loss of special status species habitat, displacement of individuals, or disturbance.	Same as effects described under Build Alternatives 2a and 2b.	Same as effects described under Build Alternatives 2a and 2b.	Same as effects described under Build Alternatives 2a and 2b.	Same as effects described under Build Alternatives 2a and 2b.	Same as effects described under Build Alternatives 2a and 2b.	Caltrans would implement AMM BIO-5 through BIO-15 for all Build Alternatives.
Effects on Migratory Birds	No effect	Tree and vegetation removal would result in a temporary loss of nesting and foraging habitat for raptors, nesting birds, and migratory birds. Effects would be temporary and minimal.	Same as effects described under Build Alternatives 2a and 2b.	Same as effects described under Build Alternatives 2a and 2b.	Same as effects described under Build Alternatives 2a and 2b.	Same as effects described under Build Alternatives 2a and 2b.	Same as effects described under Build Alternatives 2a and 2b.	Caltrans would implement AMM BIO-6 through AMM BIO-11 for all Build Alternatives.
Threatened and Endangered Species								
Effects on threatened and endangered species	No effect	29 threatened or endangered species were identified as potentially occurring in the project region. Project construction could result in the temporary or permanent loss of special status species habitat, displacement of individuals, or disturbance.	Same as effects described under Build Alternatives 2a and 2b.	Same as effects described under Build Alternatives 2a and 2b.	Same as effects described under Build Alternatives 2a and 2b.	Same as effects described under Build Alternatives 2a and 2b.	Same as effects described under Build Alternatives 2a and 2b.	Caltrans would implement AMM BIO-6, AMM BIO-16 through BIO-28 for all Build Alternatives.
Invasive Species								
Introduction and spread of invasive plant species	No effect	Build Alternative 2 could contribute to the spread or introduction of invasive species.	Same as effects described under Build Alternatives 2a and 2b.	Same as effects described under Build Alternatives 2a and 2b.	Same as effects described under Build Alternatives 2a and 2b.	Same as effects described under Build Alternatives 2a and 2b.	Same as effects described under Build Alternatives 2a and 2b.	None

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Table S-2 SUMMARY OF CALIFORNIA ENVIRONMENTAL QUALITY ACT (CEQA) IMPACTS

Environmental Topic	No Build Alternative 1	Build Alternatives 2a and 2b	Build Alternatives 3a and 3b	Build Alternatives 4a and 4b	Build Alternatives 5a and 5b	Build Alternatives 6a and 6b	Build Alternatives 7a and 7b
Aesthetics							
a) Have a substantial adverse effect on a scenic vista.	No Impact	Less than significant impact.	Less than significant impact.	Less than significant impact.	Less than significant impact.	Less than significant impact.	Less than significant impact.
b) Substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a state scenic highway?	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact
c) In non-urbanized areas, would the project substantially degrade the existing visual character or quality of public views of the site and its surroundings? (Public views are those that are experienced from a publicly accessible vantage point). If the project is in an urbanized area, would the project conflict with applicable zoning and other regulations governing scenic quality?	No Impact	Less than significant impact.	Less than significant impact.	Less than significant impact.	Less than significant impact.	Less than significant impact.	Less than significant impact.
d) Would the project create a new source of substantial light or glare that would adversely affect day or nighttime public views?	No Impact	Less than significant impact.	Less than significant impact.	Less than significant impact.	Less than significant impact.	Less than significant impact.	Less than significant impact.

Environmental Topic	No Build Alternative 1	Build Alternatives 2a and 2b	Build Alternatives 3a and 3b	Build Alternatives 4a and 4b	Build Alternatives 5a and 5b	Build Alternatives 6a and 6b	Build Alternatives 7a and 7b
Agriculture and Forest Resources							
Agriculture and Forest Resources	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact
Air Quality							
a) Conflict with or obstruct implementation of the applicable air quality plan?	No Impact	Less than significant impact.	Less than significant impact.	Less than significant impact.	Less than significant impact.	Less than significant impact.	Less than significant impact.
b) Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non- attainment under an applicable federal or state ambient air quality standard?	No Impact	Less than significant impact.	Less than significant impact.	Less than significant impact.	Less than significant impact.	Less than significant impact.	Less than significant impact.
c) Expose sensitive receptors to substantial pollutant concentrations?	No Impact	Less than significant impact.	Less than significant impact.	Less than significant impact.	Less than significant impact.	Less than significant impact.	Less than significant impact.
d) Result in other emissions (such as those leading to odors) adversely affecting a substantial number of people?	No Impact	Less than significant impact.	Less than significant impact.	Less than significant impact.	Less than significant impact.	Less than significant impact.	Less than significant impact.

Environmental Topic	No Build Alternative 1	Build Alternatives 2a and 2b	Build Alternatives 3a and 3b	Build Alternatives 4a and 4b	Build Alternatives 5a and 5b	Build Alternatives 6a and 6b	Build Alternatives 7a and 7b
Biological Resources							
a) Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Game or U.S. Fish and Wildlife Service?	No Impact	Less-than-significant impact with mitigation.	Less-than-significant impact with mitigation.	Less-than-significant impact with mitigation.	Less-than-significant impact with mitigation.	Less-than-significant impact with mitigation.	Less-than-significant impact with mitigation.
b) Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations or by the California Department of Fish and Game or US Fish and Wildlife Service?	No Impact	Less than significant impact.	Less than significant impact.	Less than significant impact.	Less than significant impact.	Less than significant impact.	Less than significant impact.
c) Have a substantial adverse effect on federally protected wetlands as defined by Section 404 of the Clean Water Act (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means?	No Impact	Less than significant impact.	Less than significant impact.	Less than significant impact.	Less than significant impact.	Less than significant impact.	Less than significant impact.

Environmental Topic	No Build Alternative 1	Build Alternatives 2a and 2b	Build Alternatives 3a and 3b	Build Alternatives 4a and 4b	Build Alternatives 5a and 5b	Build Alternatives 6a and 6b	Build Alternatives 7a and 7b
d) Interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites?	No Impact	Less-than-significant impact with mitigation.	Less-than-significant impact with mitigation.	Less-than-significant impact with mitigation.	Less-than-significant impact with mitigation.	Less-than-significant impact with mitigation.	Less-than-significant impact with mitigation.
e) Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance?	No Impact	Less than significant impact.	Less than significant impact.	Less than significant impact.	Less than significant impact.	Less than significant impact.	Less than significant impact.
f) Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan?	No Impact	Less-than-significant impact with mitigation.	Less-than-significant impact with mitigation.	Less-than-significant impact with mitigation.	Less-than-significant impact with mitigation.	Less-than-significant impact with mitigation.	Less-than-significant impact with mitigation.
Cultural Resources							
a) Cause a substantial adverse change in the significance of a historical resource pursuant to in §15064.5?	No Impact	Less-than-significant impact.	Less-than-significant impact.	Less-than-significant impact.	Less-than-significant impact.	Less-than-significant impact.	Less-than-significant impact.
b) Cause a substantial adverse change in the significance of an archaeological resource pursuant to §15064.5? or	No Impact	Less-than-significant impact.	Less-than-significant impact.	Less-than-significant impact.	Less-than-significant impact.	Less-than-significant impact.	Less-than-significant impact.
c) Disturb any human remains, including those interred outside of dedicated cemeteries?	No Impact	Less-than-significant impact.	Less-than-significant impact.	Less-than-significant impact.	Less-than-significant impact.	Less-than-significant impact.	Less-than-significant impact.

Environmental Topic	No Build Alternative 1	Build Alternatives 2a and 2b	Build Alternatives 3a and 3b	Build Alternatives 4a and 4b	Build Alternatives 5a and 5b	Build Alternatives 6a and 6b	Build Alternatives 7a and 7b
Energy							
a) Result in potentially significant environmental impact due to wasteful, inefficient, or unnecessary consumption of energy resources, during project construction or operation?	No Impact	Less-than-significant impact with mitigation.	Less-than-significant impact with mitigation.	Less-than-significant impact with mitigation.	Less-than-significant impact with mitigation.	Less-than-significant impact with mitigation.	Less-than-significant impact with mitigation.
b) Conflict with or obstruct a state or local plan for renewable energy or energy efficiency?	No Impact	Less-than-significant impact.	Less-than-significant impact.	Less-than-significant impact.	Less-than-significant impact.	Less-than-significant impact.	Less-than-significant impact.
Geology and Soils							
a) Directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury, or death involving: i) Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault? Refer to Division of Mines and Geology Special Publication 42.	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact
ii) Strong seismic ground shaking?	No Impact	Less-than-significant impact.	Less-than-significant impact.	Less-than-significant impact.	Less-than-significant impact.	Less-than-significant impact.	Less-than-significant impact.
iii) Seismic-related ground failure, including liquefaction?	No Impact	Less-than-significant impact with mitigation.	Less-than-significant impact with mitigation.	Less-than-significant impact with mitigation.	Less-than-significant impact with mitigation.	Less-than-significant impact with mitigation.	Less-than-significant impact with mitigation.

Environmental Topic	No Build Alternative 1	Build Alternatives 2a and 2b	Build Alternatives 3a and 3b	Build Alternatives 4a and 4b	Build Alternatives 5a and 5b	Build Alternatives 6a and 6b	Build Alternatives 7a and 7b
iv) Landslides?	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact
b) Result in substantial soil erosion or the loss of topsoil?	No Impact	Less-than-significant impact.	Less-than-significant impact.	Less-than-significant impact.	Less-than-significant impact.	Less-than-significant impact.	Less-than-significant impact.
c) Be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction or collapse?	No Impact	Less-than-significant impact with mitigation.	Less-than-significant impact with mitigation.	Less-than-significant impact with mitigation.	Less-than-significant impact with mitigation.	Less-than-significant impact with mitigation.	Less-than-significant impact with mitigation.
d) Be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (1994), creating substantial direct or indirect risks to life or property?	No Impact	Less-than-significant impact.	Less-than-significant impact.	Less-than-significant impact.	Less-than-significant impact.	Less-than-significant impact.	Less-than-significant impact.
e) Have soils incapable of adequately supporting the use of septic tanks or alternative waste water disposal systems where sewers are not available for the disposal of waste water?	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact
f) Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?	No Impact	Less-than-significant impact with mitigation.	Less-than-significant impact with mitigation.	Less-than-significant impact with mitigation.	Less-than-significant impact with mitigation.	Less-than-significant impact with mitigation.	Less-than-significant impact with mitigation.

Environmental Topic	No Build Alternative 1	Build Alternatives 2a and 2b	Build Alternatives 3a and 3b	Build Alternatives 4a and 4b	Build Alternatives 5a and 5b	Build Alternatives 6a and 6b	Build Alternatives 7a and 7b
Greenhouse Gas Emissions							
a) Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment?	No Impact	Less-than-significant impact.	Less-than-significant impact.	Less-than-significant impact.	Less-than-significant impact.	Less-than-significant impact.	Less-than-significant impact.
b) Conflict with an applicable plan, policy or regulation adopted for the purpose of reducing the emissions of greenhouse gases?	No Impact	Less-than-significant impact.	Less-than-significant impact.	Less-than-significant impact.	Less-than-significant impact.	Less-than-significant impact.	Less-than-significant impact.
Hazards and Hazardous Materials							
a) Create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials?	No Impact	Less-than-significant impact.	Less-than-significant impact.	Less-than-significant impact.	Less-than-significant impact.	Less-than-significant impact.	Less-than-significant impact.
b) Create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment?	No Impact	Less-than-significant impact.	Less-than-significant impact.	Less-than-significant impact.	Less-than-significant impact.	Less-than-significant impact.	Less-than-significant impact.
c) Emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school?	No Impact	Less-than-significant impact.	Less-than-significant impact.	Less-than-significant impact.	Less-than-significant impact.	Less-than-significant impact.	Less-than-significant impact.

Environmental Topic	No Build Alternative 1	Build Alternatives 2a and 2b	Build Alternatives 3a and 3b	Build Alternatives 4a and 4b	Build Alternatives 5a and 5b	Build Alternatives 6a and 6b	Build Alternatives 7a and 7b
d) Be located on a site which is included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5 and, as a result, would it create a significant hazard to the public or the environment?	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact
e) For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project result in a safety hazard or excessive noise for people residing or working in the project area?	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact
f) Impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan?	No Impact	Less-than-significant impact.	Less-than-significant impact.	Less-than-significant impact.	Less-than-significant impact.	Less-than-significant impact.	Less-than-significant impact.
g) Expose people or structures, either directly or indirectly, to a significant risk of loss, injury or death involving wildland fires?	No Impact	Less-than-significant impact with mitigation.	Less-than-significant impact with mitigation.	Less-than-significant impact with mitigation.	Less-than-significant impact with mitigation.	Less-than-significant impact with mitigation.	Less-than-significant impact with mitigation.
Hydrology and Water Quality							
a) Violate any water quality standards or waste discharge requirements or otherwise substantially degrade surface or ground water quality?	No Impact	Less-than-significant impact.	Less-than-significant impact.	Less-than-significant impact.	Less-than-significant impact.	Less-than-significant impact.	Less-than-significant impact.

Environmental Topic	No Build Alternative 1	Build Alternatives 2a and 2b	Build Alternatives 3a and 3b	Build Alternatives 4a and 4b	Build Alternatives 5a and 5b	Build Alternatives 6a and 6b	Build Alternatives 7a and 7b
b) Substantially decrease groundwater supplies or interfere substantially with groundwater recharge such the project may impede sustainable groundwater management of the basin?	No Impact	Less-than-significant impact.	Less-than-significant impact.	Less-than-significant impact.	Less-than-significant impact.	Less-than-significant impact.	Less-than-significant impact.
c) Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river or through the addition of impervious surfaces, in a manner which would: i) result in substantial erosion or siltation on- or off-site; ii) substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or off-site; iii) create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff; or	No Impact	Less-than-significant impact with mitigation.	Less-than-significant impact with mitigation.	Less-than-significant impact with mitigation.	Less-than-significant impact with mitigation.	Less-than-significant impact with mitigation.	Less-than-significant impact with mitigation.
iv) impede or redirect flood flows?	No Impact	Less-than-significant impact.	Less-than-significant impact.	Less-than-significant impact.	Less-than-significant impact.	Less-than-significant impact.	Less-than-significant impact.
d) In flood hazard, tsunami, or seiche zones, risk release of pollutants due to project inundation?	No Impact	Less-than-significant impact.	Less-than-significant impact.	Less-than-significant impact.	Less-than-significant impact.	Less-than-significant impact.	Less-than-significant impact.

Environmental Topic	No Build Alternative 1	Build Alternatives 2a and 2b	Build Alternatives 3a and 3b	Build Alternatives 4a and 4b	Build Alternatives 5a and 5b	Build Alternatives 6a and 6b	Build Alternatives 7a and 7b
e) Conflict with or obstruct implementation of a water quality control plan or sustainable groundwater management plan?	No Impact	Less-than-significant impact.	Less-than-significant impact.	Less-than-significant impact.	Less-than-significant impact.	Less-than-significant impact.	Less-than-significant impact.
Land Use and Planning							
a) Physically divide an established community?	No Impact	Less-than-significant impact.	Less-than-significant impact.	Less-than-significant impact.	Less-than-significant impact.	Less-than-significant impact.	Less-than-significant impact.
b) Cause a significant environmental impact due to a conflict with any land use plan, policy, or regulation adopted for the purpose of avoiding or mitigating an environmental effect?	No Impact	Less-than-significant impact.	Less-than-significant impact.	Less-than-significant impact.	Less-than-significant impact.	Less-than-significant impact.	Less-than-significant impact.
Mineral Resources							
a) Result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the state?	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact
b) Result in the loss of availability of a locally-important mineral resource recovery site delineated on a local general plan, specific plan or other land use plan?	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact

Environmental Topic	No Build Alternative 1	Build Alternatives 2a and 2b	Build Alternatives 3a and 3b	Build Alternatives 4a and 4b	Build Alternatives 5a and 5b	Build Alternatives 6a and 6b	Build Alternatives 7a and 7b
Noise							
a) Generation of a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?	No Impact	Less-than-significant impact with mitigation	Less-than-significant impact with mitigation	Less-than-significant impact with mitigation	Less-than-significant impact with mitigation	Less-than-significant impact with mitigation	Less-than-significant impact with mitigation.
b) Generation of excessive groundborne vibration or groundborne noise levels?	No Impact	Less-than-significant impact.	Less-than-significant impact.	Less-than-significant impact.	Less-than-significant impact.	Less-than-significant impact.	Less-than-significant impact.
c) For a project located within the vicinity of a private airstrip or an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project expose people residing or working in the project area to excessive noise levels?	No Impact	Less-than-significant impact.	Less-than-significant impact.	Less-than-significant impact.	Less-than-significant impact.	Less-than-significant impact.	Less-than-significant impact.
Population and Housing							
a) Induce substantial unplanned population growth in an area, either directly (for example, by proposing new homes and businesses) or indirectly (for example, through extension of roads or other infrastructure)?	No Impact	Less than significant impact.	Less than significant impact.	Less than significant impact.	Less than significant impact.	Less than significant impact.	Less than significant impact.

Environmental Topic	No Build Alternative 1	Build Alternatives 2a and 2b	Build Alternatives 3a and 3b	Build Alternatives 4a and 4b	Build Alternatives 5a and 5b	Build Alternatives 6a and 6b	Build Alternatives 7a and 7b
b) Displace substantial numbers of existing people or housing, necessitating the construction of replacement housing elsewhere?	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact
Public Services							
a) Would the project result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times or other performance objectives for any of the public services: Fire protection? Police protection? Schools? Parks? Other public facilities?	No Impact	Less-than-significant impact.	Less-than-significant impact.	Less-than-significant impact.	Less-than-significant impact.	Less-than-significant impact.	Less-than-significant impact.
Recreation							
a) Would the project increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated?	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact

Environmental Topic	No Build Alternative 1	Build Alternatives 2a and 2b	Build Alternatives 3a and 3b	Build Alternatives 4a and 4b	Build Alternatives 5a and 5b	Build Alternatives 6a and 6b	Build Alternatives 7a and 7b
b) Does the project include recreational facilities or require the construction or expansion of recreational facilities which might have an adverse physical effect on the environment?	No Impact	Less-than-significant impact.	Less-than-significant impact.	Less-than-significant impact.	Less-than-significant impact.	Less-than-significant impact.	Less-than-significant impact.
Transportation							
a) Conflict with program, plan, ordinance or policy addressing the circulation system, including transit, roadway, bicycle and pedestrian facilities	No Impact	Less-than-significant impact.	Less-than-significant impact.	Less-than-significant impact.	Less-than-significant impact.	Less-than-significant impact.	Less-than-significant impact.
b) Conflict or be inconsistent with CEQA Guidelines section 15064.3, subdivision (b)	No Impact	Significant and unavoidable	Significant and unavoidable	Significant and unavoidable	Significant and unavoidable	Significant and unavoidable	Significant and unavoidable
c) Substantially increase hazards due to a geometric design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment)	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact
d) Result in inadequate emergency access	No Impact	Less-than-significant impact.	Less-than-significant impact.	Less-than-significant impact.	Less-than-significant impact.	Less-than-significant impact.	Less-than-significant impact.

Environmental Topic	No Build Alternative 1	Build Alternatives 2a and 2b	Build Alternatives 3a and 3b	Build Alternatives 4a and 4b	Build Alternatives 5a and 5b	Build Alternatives 6a and 6b	Build Alternatives 7a and 7b
Tribal Cultural Resources							
Would the project cause a substantial adverse change in the significance of a tribal cultural resource, defined in Public Resources Code section 21074 as either a site, feature, place, cultural landscape that is geographically defined in terms of the size and scope of the landscape, sacred place, or object with cultural value to a California Native American tribe, and that is: a) Listed or eligible for listing in the California Register of Historical Resources, or in a local register of historical resources as defined in Public Resources Code section 5020.1(k),	No Impact	Less-than-significant impact.	Less-than-significant impact.	Less-than-significant impact.	Less-than-significant impact.	Less-than-significant impact.	Less-than-significant impact.
b) A resource determined by the lead agency, in its discretion and supported by substantial evidence, to be significant pursuant to criteria set forth in subdivision (c) of Public Resources Code Section 5024.1. In applying the criteria set forth in subdivision (c) of Public Resource Code Section 5024.1, the lead agency shall consider the significance of the resource to a California Native American tribe.	No Impact	Less-than-significant impact.	Less-than-significant impact.	Less-than-significant impact.	Less-than-significant impact.	Less-than-significant impact.	Less-than-significant impact.

Environmental Topic	No Build Alternative 1	Build Alternatives 2a and 2b	Build Alternatives 3a and 3b	Build Alternatives 4a and 4b	Build Alternatives 5a and 5b	Build Alternatives 6a and 6b	Build Alternatives 7a and 7b
Utilities and Service Systems							
a) Require or result in the relocation or construction of new or expanded water, wastewater treatment or stormwater drainage, electric power, natural gas, or telecommunications facilities, the construction or relocation of which could cause significant environmental effects?	No Impact	Less-than-significant impact.	Less-than-significant impact.	Less-than-significant impact.	Less-than-significant impact.	Less-than-significant impact.	Less-than-significant impact.
b) Have sufficient water supplies available to serve the project and reasonably foreseeable future development during normal, dry and multiple dry years?	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact
c) Result in a determination by the wastewater treatment provider which serves or may serve the project that it has adequate capacity to serve the project's projected demand in addition to the provider's existing commitments?	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact
d) Generate solid waste in excess of State or local standards, or in excess of the capacity of local infrastructure, or otherwise impair the attainment of solid waste reduction goals?	No Impact	Less-than-significant impact.	Less-than-significant impact.	Less-than-significant impact.	Less-than-significant impact.	Less-than-significant impact.	Less-than-significant impact.
e) Comply with federal, state, and local management and reduction statutes and regulations related to solid waste?	No Impact	Less-than-significant impact.	Less-than-significant impact.	Less-than-significant impact.	Less-than-significant impact.	Less-than-significant impact.	Less-than-significant impact.

Environmental Topic	No Build Alternative 1	Build Alternatives 2a and 2b	Build Alternatives 3a and 3b	Build Alternatives 4a and 4b	Build Alternatives 5a and 5b	Build Alternatives 6a and 6b	Build Alternatives 7a and 7b
Wildfire							
If located in or near state responsibility areas or lands classified as very high fire hazard severity zones, would the project: a) Substantially impair an adopted emergency response plan or emergency evacuation plan?	No Impact	Less-than-significant impact.	Less-than-significant impact.	Less-than-significant impact.	Less-than-significant impact.	Less-than-significant impact.	Less-than-significant impact.
b) Due to slope, prevailing winds, and other factors, exacerbate wildfire risks, and thereby expose project occupants to, pollutant concentrations from a wildfire or the uncontrolled spread of a wildfire?	No Impact	Less-than-significant impact.	Less-than-significant impact.	Less-than-significant impact.	Less-than-significant impact.	Less-than-significant impact.	Less-than-significant impact.
c) Require the installation or maintenance of associated infrastructure (such as roads, fuel breaks, emergency water sources, power lines or other utilities) that may exacerbate fire risk or that may result in temporary or ongoing impacts to the environment?	No Impact	Less-than-significant impact.	Less-than-significant impact.	Less-than-significant impact.	Less-than-significant impact.	Less-than-significant impact.	Less-than-significant impact.
d) Expose people or structures to significant risks, including downslope or downstream flooding or landslides, as a result of runoff, post-fire slope instability, or drainage changes?	No Impact	Less-than-significant impact.	Less-than-significant impact.	Less-than-significant impact.	Less-than-significant impact.	Less-than-significant impact.	Less-than-significant impact.

Environmental Topic	No Build Alternative 1	Build Alternatives 2a and 2b	Build Alternatives 3a and 3b	Build Alternatives 4a and 4b	Build Alternatives 5a and 5b	Build Alternatives 6a and 6b	Build Alternatives 7a and 7b
Mandatory Findings of Significance							
a) Does the project have the potential to substantially degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, substantially reduce the number or restrict the range of a rare or endangered plant or animal or eliminate important examples of the major periods of California history or prehistory?	No Impact	Less-than-significant impact.	Less-than-significant impact.	Less-than-significant impact.	Less-than-significant impact.	Less-than-significant impact.	Less-than-significant impact.
b) Does the project have impacts that are individually limited, but cumulatively considerable? ("Cumulatively considerable" means that the incremental effects of a project are considerable when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects)? [confirmation pending]	No Impact	Less-than-significant impact.	Less-than-significant impact.	Less-than-significant impact.	Less-than-significant impact.	Less-than-significant impact.	Less-than-significant impact.
c) Does the project have environmental effects which will cause substantial adverse effects on human beings, either directly or indirectly? [confirmation pending]	No Impact	Less-than-significant impact.	Less-than-significant impact.	Less-than-significant impact.	Less-than-significant impact.	Less-than-significant impact.	Less-than-significant impact.

Table S-3. Permits, Reviews, and Approvals Anticipated to be Required for Project Construction

Agency	Permits, Licenses, Agreements, and Certifications	Status
Federal Highway Administration	Air Quality Conformity Determination	Regional will be met by listing in the Regional Transportation Plan and its associated regional emissions analysis.
United States Fish and Wildlife Service	Endangered Species Act, Section 7 Biological Opinion for Valley Elderberry Longhorn Beetle	Issued April 12, 2024
United States Army Corps of Engineers	Clean Water Act Section 404 Permit/408 Permit	Permit application will be submitted if required after the environmental document is approved.
California Department of Fish and Wildlife	1602 Agreement for Streambed Alteration	Permit application and consultation will be submitted and initiated after the environmental document is approved.
	California Endangered Species Act Consultation for Giant Garter Snake	Consultation will be submitted and initiated after the environmental document is approved.
	Incidental Take Permit (ITP) for active Swainson's hawk nest(s)	If needed, an ITP will be obtained prior to initiation of any activities that are likely to result in take.
Central Valley Regional Water Quality Control Board	Clean Water Act Section 401 Water Quality Certification	Permit application will be submitted if required after the environmental document is approved.
	Construction General Permit	Issued during the final design phase
Central Valley Flood Protection Control Board	Encroachment Permit	Issued during the final design phase
Federal Highway Administration	Air Quality Conformity Determination	FHWA determined not a POAQC on October 18, 2021; reaffirmed by IAC 4/26/2024
State Historic Preservation Officer (SHPO)	Concurrence on Eligibility Determinations/Finding of Effect	SHPO concurred with the findings on January 12, 2022. As such, the undertaking would not result in any Section 4(f) use or de minimis finding to any historic properties or historical resources, regardless of alternative.

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Final
Environmental Impact Report / Environmental Assessment

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Chapter 1 Proposed Project

1.1 Introduction

The California Department of Transportation (Caltrans or Department), in collaboration with stakeholders, proposes to construct improvements consisting of managed lanes, pedestrian/bicycle facilities, and intelligent transportation system (ITS) elements along Interstate 80 (I-80) and U.S. Route 50 (US-50) from Kidwell Road near the eastern Solano County boundary (near Dixon), through Yolo County to West El Camino Avenue near the I-80/Interstate 5 (I-5) interchange, and to the US-50/I-5 interchange in Sacramento County (Figure 1.1-1).

Caltrans, as assigned by the Federal Highway Administration (FHWA), is the lead agency under the National Environmental Policy Act (NEPA) for the Caltrans EA 03-3H900 Yolo 80 Corridor Improvements Project (project). Caltrans is also the lead agency under the California Environmental Quality Act (CEQA).

The project is programmed in the State Transportation Improvement Program, Regional Surface Transportation Program, Congestion Management and Air Quality Improvement Program, and California Transportation Commission Trade Corridor Enhancement Program.

1.1.1 Project Background

1.1.1.1 Corridor Overview

The project is in Solano, Yolo, and Sacramento Counties on the I-80 corridor between Kidwell Road and the Solano/Yolo County line, between the Solano/Yolo County line and the Yolo/Sacramento County line, and between the Yolo/Sacramento County line and West El Camino Avenue[1]. In addition, the project is located on the US-50 corridor between the I-80/I-50 interchange and the Yolo/Sacramento County line and between the Yolo/Sacramento County line and the US-50/I-5 interchange. The total project length is approximately 20.8 miles.

Interstate 80

I-80 is a critical link to regional and interregional traffic as the only freeway connection between the San Francisco Bay Area and the Sacramento Metropolitan region. The route also links the Bay Area with recreational destinations in the Sierra Nevada and Northern California via Interstate 505 to I-5 north.

[1] The project is located in Solano, Yolo, and Sacramento counties on the I-80 corridor between PM 40.7 and PM 44.7 in Solano County, between PM 0.00 and PM 11.72 in Yolo County, and between PM 0.00 and PM 1.36 in Sacramento County; and US-50 between PM 0.00 and PM 3.12 in Yolo County and between PM 0.00 and PM 0.617 in Sacramento County.

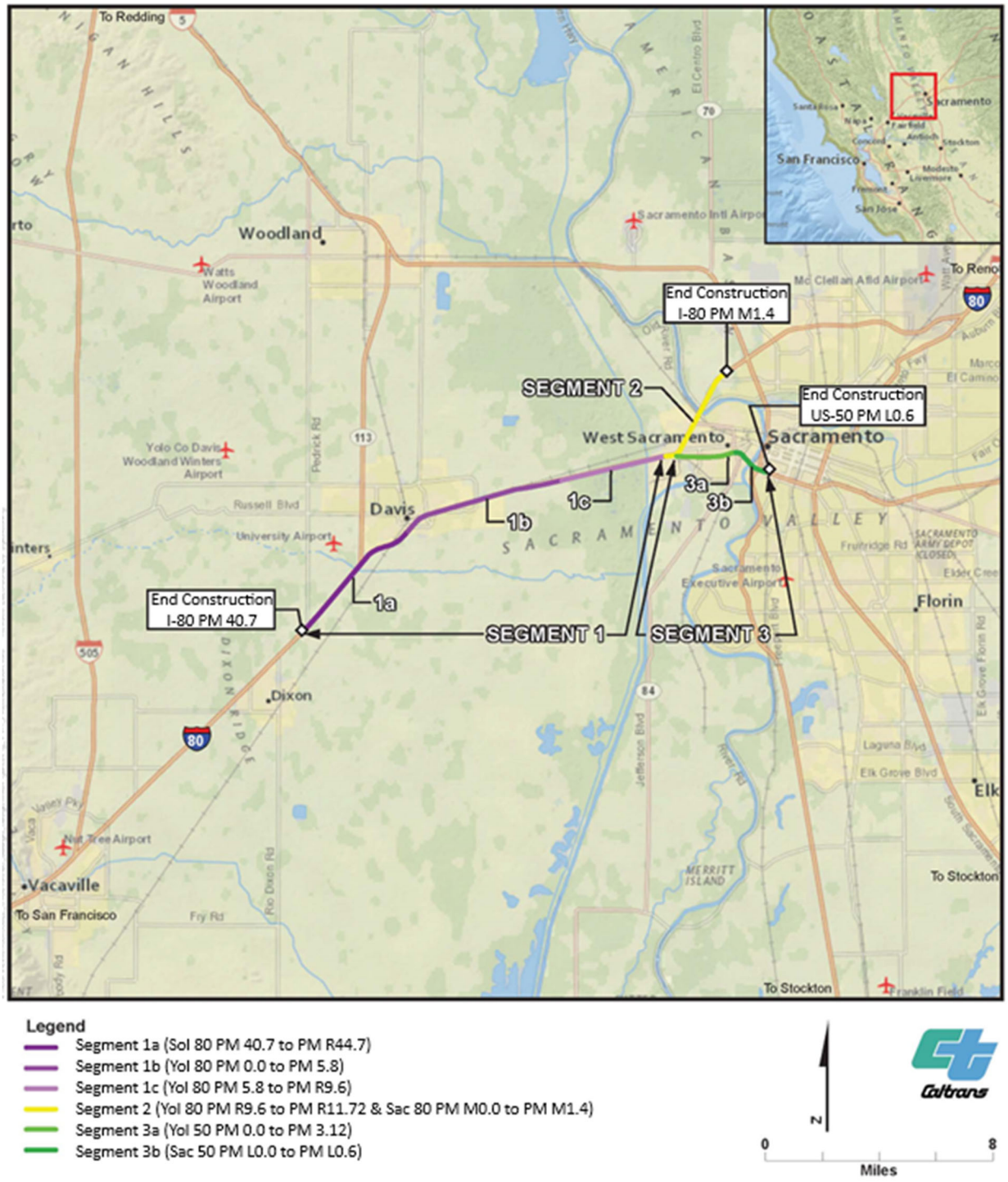


Figure 1.1-1
Project Location and Vicinity

Yolo 80 Corridor Improvements Project
Solano, Yolo, and Sacramento Counties, California

04-SOL-80-40.7/R44.7;
03-YOL-80-0.00/R11.72; 03-YOL-50-0.00/3.12;
03-SAC-50-0.00/L0.617; 03-SAC-80-M0.00/M1.36
EA 03-3H900/EFIS 0318000085

Service Layer Credits:
ESRI, National Geographic, DigitalGlobe, GeoEye

In Solano County within the project limits, I-80 varies from three to four eastbound and westbound lanes with a standard shoulder, separated by a 20- to 35-foot-wide paved and/or unpaved center median with a guardrail or concrete barrier. In Yolo County within the project limits, I-80 is a six-lane freeway with three lanes in the eastbound and westbound directions.

I-80 has variable 10- to 15-foot-wide outside shoulders in each direction. The corridor travels through the cities of Davis and West Sacramento. County Road (CR) 32A is located north of I-80 and east of the Mace Boulevard interchange and acts as a frontage road to the Yolo Bypass where I-80 becomes a causeway.

In Sacramento County within the project limits, I-80 is a six-lane freeway with three eastbound and three westbound lanes separated by a variable 35- to 60-foot paved center median with concrete and/or guardrail center median barriers. Travel lanes are roughly 12 feet wide, and each direction of travel has variable 10- to 15-foot-wide paved outside shoulders.

Primary providers of bus and rail transit include Amtrak, Fairfield/Suisun Transit, Solano Express Bus, Yolobus, Unitrans, Sacramento Regional Transit, and Greyhound Bus. Bicycle and pedestrian accessibility are provided via the surrounding arterial network.

Within the Sacramento region, I-80 serves local and commute traffic, traffic to and from the Bay Area, recreational traffic to and from the Lake Tahoe Basin, and is a primary corridor for goods movement. Within the corridor, the Yolo Bypass Wildlife Area and floodplain limits east–west linkages, funneling many modes and forms of transportation into the narrow I-80 corridor between the cities of Davis and West Sacramento. I-80/US-50 is also an essential part of the goods movement system, connecting major ports from the Bay Area/Sacramento region to the eastern United States.

I-80 provides direct linkages between agricultural and manufacturing industries in the Central Valley, the Bay Area, and major ports (e.g., Oakland, Richmond, Stockton, West Sacramento). Freight trucks travel through and throughout the region 24 hours a day, seven days a week, transporting large quantities of goods. The tonnage of goods expected to travel via the I-80 corridor is expected to increase over time.

The segment of I-80 within the project limits is a primary access route to the Sacramento International Airport and other large distribution centers.

U.S. Route 50

US-50 serves as a primary connection to I-80 for east–west travel in Solano, Yolo, and Sacramento Counties and provides north–south connections to I-5 and State Route (SR) 99 in Sacramento County.

In Yolo County within the project limits, US-50 is an eight-lane highway between post mile (PM) 0.0 and PM 2.2, where it then reduces to a six-lane highway to approximately the Sacramento County line. Each direction of travel splits the total number of lanes evenly (either three or four) in each direction of travel. The travel directions are separated by an approximately 30-foot-wide

paved center median with a concrete center median barrier. Each travel lane is roughly 12 feet wide in each direction and has an approximately 10-foot-wide outside shoulder.

In Sacramento County, within the project limits, US-50 is an eight-lane highway with four eastbound and four westbound lanes along elevated and separated viaduct structures that cross the Sacramento River and extend east to the end of the project limits.

1.1.1.2 State/Regional Planning

State

Solutions for Congested Corridor Program (SCCP), Congested Corridor Plans (CCPs) represent a cooperative commitment to developing a corridor management vision for state-owned and operated facilities. According to the California Transportation Commission (CTC), the purpose of the SCCP is to provide funding to achieve a balanced set of transportation, environmental, and community access improvements to reduce congestion throughout the state. Accordingly, the I-80 East CCP identifies the future conditions of the corridor as an 8- to 12-lane freeway with high-occupancy vehicle (HOV)/high-occupancy toll (HOT) lanes.

Regional

The Sacramento Area Council of Governments (SACOG) Metropolitan Transportation Improvement Program/Sustainable Communities Strategy (MTIP/SCS) 2020 update prioritizes multiple transportation options to connect people with places. As a result, the plan forecasts less time spent in congestion, cleaner air, fewer greenhouse gas (GHG) emissions per capita, a modernized, more productive transit system, and more ways for residents to choose walking or cycling for some of their daily trips. SACOG considers managed lanes to be a critical component of the regional strategy to raise revenue sufficient to build and maintain the region's transportation system, provide mobility benefits to residents, manage traffic and congestion, and help to achieve the state mandated GHG reduction targets. The full scope of the Yolo County portion of the project is included in the 2020 MTIP/SCS and is identified as requiring capital improvements in the Corridor System Management Plans, the Sacramento Region Managed Lane Network Vision, and the I-5 Transit Corridor Report.

The Solano County portion of the project is in the Solano County Metropolitan Transportation Commission (MTC) area. The 2017 Solano County Regional Transportation Plan (RTP) does not include managed lanes between the Kidwell Road interchange and the Yolo County line. Accordingly, Caltrans continues to coordinate with Caltrans District 4 and Solano County MTC to include the Solano County portion of the project in their RTP update.

1.2 Purpose and Need

1.2.1 Purpose

The purpose of the proposed project is to:

- Ease congestion and improve overall person throughput[2]
- Improve freeway operation on the mainline, ramps, and at system interchanges
- Support reliable transport of goods and services throughout the region
- Improve modality[3] and travel time reliability
- Provide expedited traveler information and monitoring systems

1.2.2 Need

The proposed project is needed for the following reasons:

- Recurring congestion during the morning and afternoon peak periods exceeds current design capacity limiting person throughput.

- Operational inefficiencies lead to the formation of bottlenecks due to short weaving and merging areas and lane drops.

- Inefficient movement of goods and services impedes regional and interstate economic sustainability.

- The corridor users rely heavily on single-occupancy vehicles with limited multi-modal options such as transit, carpool, bicycle, and pedestrian facilities, resulting in unreliable travel times.

- Lack of real-time traveler information and coordinated traffic communication systems impedes timely response to roadway incidents resulting in secondary collisions and increased non-recurring congestion.

1.2.2.1 Roadway Deficiencies

The I-80/US-50 corridor experiences heavy congestion during commute periods due to high vehicular demand. The corridor has infrastructure deficiencies, such as short weaving and merging areas, lane drops that create bottlenecks, incomplete ramp metering and auxiliary lane systems, and inadequate ITS elements. The corridor also experiences heavy recreational traffic, leading to heavy congestion on weekends and holidays.

The Yolo Bypass Causeway is the only direct route connecting the Davis area to West Sacramento and beyond. Heavy congestion and stop-and-go traffic have contributed to increased vehicle emissions, travel costs, emergency response times, and reduced travel time

[2] Throughput is the number of people moving efficiently through a region.
[3] Modality is the variety in modes of transportation. This includes access and multiple options for the movement of people and goods. Examples include access to transit, carpool, bicycle, and pedestrian facilities.

reliability. The congestion has been created by multiple factors, including high traffic volumes, short weaving and merging areas, lane drops, limited sight distances, and incomplete bus and carpool lanes, ramp metering, and auxiliary lane networks.

Motorists traveling on I-80/US-50 experience delays throughout the day, with congestion at its maximum during the afternoon peak period. Data analysis shows that in the eastbound direction, the peak hour occurs during the 4:00 p.m. to 5:00 p.m. hour, with the peak period starting from 3:00 p.m. and lasting to 7:00 p.m. through Davis, and travel being impacted by bottlenecks at Richards Boulevard and Mace Boulevard. Significant morning delays on westbound I-80 occur between 8:00 a.m. to 10:00 a.m., with a severe bottleneck forming at the I-80/US-50 interchange when travel demand volumes are at their peak because of commute-related trips. Westbound US-50 frequently experiences congestion due to queue spillback of traffic at the I-80/US-50 interchange bottleneck. Peak congestion on eastbound US-50 within the project limits occurs during the afternoon peak period, from 4:00 p.m. to 6:00 p.m. The I-80/US-50 corridor primarily operates at Level of Service (LOS)[4] F during the morning and afternoon peak hours within the project limits. The LOS F conditions are anticipated to worsen due to the projected traffic growth in the area.

The existing Yolo 80 bikeway on the north side of the existing Yolo Causeway is underutilized by bicycle riders due to lack of connectivity. Currently, there are three entrance and exit points to the Yolo 80 bikeway. The configuration of the eastern terminus requires that east/west bicycle and pedestrian traffic traverse around the back of two gas stations to avoid several driveways of ingress and egress for automobile and commercial truck traffic. Bicycle and pedestrian traffic must then cross four lanes of traffic to proceed eastbound on West Capitol Avenue.

1.2.3 Independent Utility and Logical Termini

FHWA regulations (23 Code of Federal Regulations [CFR] 771.111 [f]) require that the action evaluated to achieve the following:

- Connect logical termini and be of sufficient length to address environmental matters on a broad scope
- Have independent utility or independent significance (be usable and be a reasonable expenditure even if no additional transportation improvements in the area are made)
- Not restrict consideration of alternatives for other reasonably foreseeable transportation improvements

Logical termini for project development are defined as follows: (1) rational end points for a transportation improvement, and (2) rational end points for a review of the environmental impacts (FHWA 1993). The points at which the project begins and ends are logical in their placement, and environmental impacts studied within and/or adjacent to the project are broad enough to encompass the project. The project limits were proposed to close the gap of HOV lanes on I-80 from the Yolo/Solano County line to the existing HOV lane on I-80 at West El

[4] LOS is a measure used to described quality of motor vehicle traffic service such as delay and congestion.

Camino Avenue, and on US-50 with the existing managed lane project in construction from the US-50/I-5 interchange to US-50 at Watt Avenue (EA 03-0H08U).This project would not require the completion of other projects to be a functioning and a stand-alone project; therefore, the project has independent utility. The project does not conflict with other reasonably foreseeable transportation projects in these segments of I-80 or US-50.

1.3 Project Description

This section describes the proposed action and the project alternatives developed to meet the purpose and need of the project while avoiding or minimizing environmental impacts. Caltrans proposes to make improvements on I-80 and US-50 from Kidwell Road near the eastern Solano County boundary (near Dixon), through Yolo County, and to West El Camino Avenue on I-80 and on US-50 to I-5 in Sacramento County.[5] The project would add managed lanes on I-80 and US-50 by a combination of lane conversion, restriping, and shoulder and median reconstruction with a concrete barrier. Drainage modifications would be required due to median reconstruction in the locations to which sheet flow currently drains. Existing ITS elements and infrastructure would be modified, and new ITS elements would be added, including ramp meters, fiber-optic conduit and cables, and overhead signs.

1.3.1 Project Alternatives

This section describes alternatives developed to meet the project's purpose and need. No Build Alternative 1 is described in Section 1.3.1.6. Build Alternatives 2a, 3a, 4a, 5a, and 6a propose the same geometric footprint, but would incorporate different managed lane types (Figure 1.3-1). Build Alternatives 2b, 3b, 4b, 5b, and 6b propose the same geometric footprint, include an I-80 managed lane direct connector (to provide a direct connection of the HOV 2+ managed lane by flying over US-50 at the I-80/US-50 Interchange) but would incorporate different managed lane types (Figure 1.3-2). Build Alternatives 7a and 7b would not construct new lanes but would repurpose an existing lane instead; however, Build Alternative 7b would include the I-80 managed lane direct connector (Figures 1.3-1 and 1.3-2, respectively, located at the end of this chapter.)

- Build Alternative 2a: Add a high-occupancy vehicle lane in each direction for use by vehicles with two or more riders (HOV 2+).

- Build Alternative 2b: Add a high-occupancy vehicle lane in each direction for use by vehicles with two or more riders (HOV 2+) and build an I-80 managed lane direct connector.

- Build Alternative 3a: Add a high-occupancy toll lane in each direction for free use by vehicles with two or more riders (HOT 2+). Single-occupied vehicles would pay a fee for lane usage.

[5] I-80 corridor between PM 40.7 and PM 44.7 in Solano County, between PM 0.00 and PM 11.72 in Yolo County, and between PM 0.00 and PM 1.36 in Sacramento County; and US-50 between PM 0.00 and PM 3.12 in Yolo County and between PM 0.00 and PM 0.617 in Sacramento County.

- Build Alternative 3b: Add a high-occupancy toll lane in each direction for free use by vehicles with two or more riders (HOT 2+) and build an I-80 managed lane direct connector. Single-occupied vehicles would pay a fee for lane usage.

- Build Alternative 4a: Add a high-occupancy toll lane in each direction for free use by vehicles with three or more riders (HOT 3+). Vehicles with less than three riders would pay a fee for lane usage.

- Build Alternative 4b: Add a high-occupancy toll lane in each direction for free use by vehicles with three or more riders (HOT 3+) and build an I-80 managed lane direct connector. Vehicles with less than three riders would pay a fee for lane usage.

- Build Alternative 5a: Add an express lane in each direction (i.e., everyone would pay a fee to use the lane, regardless of the number of riders).

- Build Alternative 5b: Add an express lane in each direction (i.e., everyone would pay a fee to use the lane, regardless of number of riders), and build an I-80 managed lane direct connector.

- Build Alternative 6a: Add a transit-only lane in each direction.

- Build Alternative 6b: Add a transit-only lane in each direction and build an I-80 managed lane direct connector.

- Build Alternative 7a: Repurpose the current number one general-purpose lane for use by vehicles with two or more riders (HOV 2+); no new lanes would be constructed.

- Build Alternative 7b: Repurpose the current number one general-purpose lane for use by vehicles with two or more riders (HOV 2+); no new lanes would be constructed. Build an I-80 managed lane direct connector.

This project contains several Standard Measures, which are employed on most, if not all, Caltrans projects. They were not developed in response to any specific environmental impact resulting from the project. These measures are addressed in more detail in the Environmental Consequences sections found in Chapter 2 and included as Appendix E.

If a HOT lane alternative is chosen as the preferred alternative (Build Alternatives 4A, 4B. 5A, 5B, 6A, or 6B), then additional advanced HOT lane signs will need to be placed from I-80/El Camino Avenue to I-80/Truxel Road and between US-50/I-5 and US-50/SR-99 (Sac 80 PM M1.4/3.64 and SAC 50 PM L0.60/R0.20).

The Build Alternatives consist of the following three geographic segments:

- **Segment 1:** Segment 1 stretches from Kidwell Road in Eastern Solano County through Davis to the Eastern end of the Yolo Causeway east of Enterprise Boulevard in West Sacramento. Segment 1 consists of three sub-segments:

    - *Segment 1a* is from Kidwell Road to Solano County/Yolo County Line.

- *Segment 1b* is from the Solano/Yolo County Line to the west end of the Yolo Causeway.
- *Segment 1c* is from the start of the Yolo Causeway to east of Enterprise Boulevard.

- **Segment 2:** Segment 2 starts just east of Enterprise Boulevard and continues north on I-80 to West El Camino Avenue.
- **Segment 3:** Segment 3 starts at the I-80/US-50 Separation and continues east along US-50 to I-5 near downtown Sacramento. Segment 3 consists of two sub-segments:
  - *Segment 3a* is the I-80/US-50 Separation to Jefferson Boulevard Undercrossing.
  - *Segment 3b* is the Jefferson Boulevard Undercrossing to just east of I-5.

1.3.1.1 Common Design Features of the Build Alternatives

Common design features and standardized measures are shared among the Build Alternatives.

Managed Lanes

Managed lanes are highway facilities, or a set of lanes, where operational strategies are implemented to manage overall traffic congestion or in response to changing conditions (FHWA 2008). Managed lanes can include pricing, vehicle eligibility, or access control concepts. The lanes have flexibility to be used by different types of vehicles, depending on the need, and can be actively managed to accommodate peak travel demands. Managed lanes would be designated using a striping pattern to distinguish between the mixed-flow lanes as further described in Section 1.3.1.2, Unique Features of the Build Alternatives.

Intelligent Transportation System/Transportation Management Systems

Each of the Build Alternatives would include placement of ramp meters and other ITS/Transportation Management Systems (TMS) such as closed-circuit television (CCTV) and changeable message signs. Several maintenance pullouts are proposed adjacent to I-80 on-ramps to accommodate an electrical cabinet for proposed ramp meters or other ITS/TMS infrastructure.

Table 1.3-1 includes a summary of proposed ITS elements. Proposed ITS elements would be installed on a new pole foundation; some existing ITS infrastructure in these locations would be abandoned or replaced. Accordingly, it is assumed that each ITS pole foundation would have up to a 6-foot radius permanent footprint with up to 10-foot radius temporary area for construction.

Table 1.3-1. Intelligent Transportation System Improvements for All Build Alternatives

No.	Improvement	Freeway	Post Mile	Direction	Location
1	Closed captioning television	I-80	41.776	EB	Kidwell Road
2	Changeable message signs	I-80	41.817	EB	Kidwell Road
3	Emergency management system	I-80	41.983	WB	Kidwell Road
4	Emergency management system	I-80	42.081	WB	Kidwell Road
5	Closed captioning television	I-80	42.669	WB	Junction I-80/SR-113
6	Transportation management system	I-80	42.669	WB	Junction I-80/SR-113
7	Ramp meter	I-80	43.259	EB	SB SR-113 to EB I-80 freeway to freeway connector ramp
8	Ramp meter	I-80	43.636	EB	Old Davis Road to EB I-80 slip on-ramp
9	Changeable message signs	I-80	44.557	WB	Just west of Richards Boulevard
10	Automatic vehicle classification	I-80	0.002	WB	Solano/Yolo County Line
11	Closed captioning television	I-80	0.235	WB	Richards Boulevard
12	Ramp meter	I-80	0.369	EB	Richards Boulevard
13	Changeable message signs	I-80	0.776	WB	Olive Drive
14	Closed captioning television	I-80	0.793	WB	Olive Drive
15	Transportation management system	I-80	1.25	EB	East of Pole Line Road
16	Transportation management system	I-80	1.997	EB	I-80 WB at Mace Boulevard
17	Ramp meter	I-80	2.506	WB	Mace Boulevard to WB I-80 slip on-ramp
18	Traffic signal	I-80	2.593	EB	Yolo I-80 EB at Chiles Road
19	Ramp meter	I-80	2.604	EB	SB Mace Boulevard to EB I-80 loop on-ramp
20	Traffic signal	I-80	2.662	WB	Yolo I-80 WB at Mace Boulevard
21	Closed captioning television	I-80	2.7	EB	Mace Boulevard
22	Ramp meter	I-80	2.762	EB	NB Mace Boulevard to EB I-80 slip on-ramp
23	Transportation management system	I-80	3.502	EB	East of Mace Boulevard
24	Transportation management system	I-80	3.986	EB	West of CR-105D
25	Closed captioning television	I-80	4.313	EB	Chiles Road (100 feet west of existing changeable message sign)
26	Changeable message signs	I-80	4.361	WB	Chiles Road
27	Changeable message signs	I-80	4.365	EB	Chiles Road
28	Transportation management system	I-80	4.484	EB	East of CR-105D
29	Closed captioning television	I-80	0.366	MEDIAN	Bryte Bend Bridge
30	Changeable message signs	I-80	0.606	WB	West El Camino Avenue
31	Closed captioning television	I-80	1.358	WB	West El Camino Avenue
32	Ramp meter	I-50	2.614	EB	Jefferson Boulevard
33	Ramp meter	I-50	2.869	EB	South River Road

Key:
EB = eastbound; NB = northbound; SB = southbound; WB = westbound

Structure Modifications

As summarized in Table 1.3-2, Build Alternatives would add improvements to existing structures to accommodate proposed managed lanes. The Yolo Causeway would not be structurally modified.

Table 1.3-2. Structure Modifications

Structure Name	Structure Number	Route	Post Mile	Alternative	Structure Work
South Fork Putah Creek	23-0054 R	Sol 80	42.36	All Build Alternatives	Place fiber-optic conduit
Old Davis Road Undercrossing	23-0155R	Sol 80	R43.5	All Build Alternatives	Place fiber-optic conduit
South Davis Overhead	23-0156R	Sol 80	R43.93	All Build Alternatives	Place fiber-optic conduit
Putah Creek Pedestrian Undercrossing	22-0194	Yol 80	0.01	All Build Alternatives	Place fiber-optic conduit
Richards Boulevard Overcrossing RW NO. 3	TBD	Yol 80	0/0.60	All Build Alternatives	Retaining wall at abutment along eastbound I-80 off-ramp to Richards Boulevard
I-80 Managed Lane Direct Connector	TBD	Yol 80	9.5/10.0	Build Alternatives 2b, 3b, 4b, 5b, 6b, 7b	Proposed managed lane connector retaining wall #1; Proposed managed lane connector retaining wall #2. For Alterative 2B to 7B, The Enterprise Blvd Undercrossing would need to be widened approximately 10 feet on each side due to proposed Director Connect. On the WB, RW #3 would be needed to support roadway widening between Enterprise Blvd Undercrossing and W Capitol loop on-ramp. On the EB, outside roadway widening will need to be supported at east of Enterprise Blvd. RW #4 with SW is proposed to be built at location of existing SW by remove portion of existing SW and replace with new SW on RW# 4.”

Source: Caltrans Draft Project Report (July 2021)

Ramp Modifications

Within Segment 2, eastbound ramp modifications would be constructed at I-80 eastbound on-ramp from Richards Boulevard to accommodate realignment within the right-of-way. In addition,

ramp modifications would occur at the westbound I-80 off-ramp to CR-32A/Chiles Road to accommodate additional bicycle/pedestrian pathway within the right-of-way.

Bicycle/Pedestrian Facilities

The Build Alternatives would replace the existing bicycle pathway pavement behind the gas station located north of West Capitol Avenue from PM 9.15 to PM 9.35. The existing bicycle pathway would be rerouted during repaving activities for up to two months, but repaving activities may occur at nighttime to minimize access disruption. To maintain access, bicycles traveling westbound would be redirected along West Capitol Avenue. Bicycles traveling eastbound would be redirected along a short segment of sidewalk on West Capitol Avenue and use the crosswalk at the West Capitol Avenue/westbound I-80 off-ramp intersection[6]. Bicyclists would then continue eastbound along West Capitol Avenue using the existing bicycle lane. Caltrans would add crosswalk pavement marking across the westbound I-80 off-ramp to West Capitol Avenue and near the existing West Capitol Avenue crosswalk. In addition, Caltrans would add advanced warning signs to alert the motorists traveling on the westbound I-80 off-ramp to West Capitol Avenue before reaching the proposed crosswalk. Caltrans would place signage as part of the traffic management plan to note the access updates and identify the bicycle/pedestrian detours.

The Build Alternatives would also replace the existing bicycle pathway pavement from PM 9.1 to the Yolo Causeway bridge deck approach at approximately PM 8.9. While the existing Class I bicycle pathway is closed, a temporary bicycle pathway with K-rail barrier would be placed along the I-80 westbound on-ramp from West Capitol Avenue. Up to 100 linear feet of existing barrier near PM 8.9 would be removed and realigned to allow bicycles to rejoin the existing Class I bicycle pathway along Yolo Causeway. The existing Class I bicycle pathway along the Yolo Causeway would not require closure during construction activities.

The Build Alternatives would extend the westernmost limit of the existing Class I bicycle pathway from I-80 along Yolo Causeway to connect to CR-32A. The pathway extension would be adjacent to the westbound I-80 off-ramp to CR-32A and about 12 feet wide. The area surrounding the pathway extension would be graded to comply with the Americans with Disabilities Act of 1990 (ADA) regulations. A concrete barrier would separate the pathway extension from westbound off-ramp vehicular traffic. Once construction of the pathway extension along westbound I-80 off-ramp is complete, the Build Alternatives would conduct pavement rehabilitation on the western Yolo Causeway levee, from the Yolo Causeway bridge to from CR-32A to Levee Road. During pavement rehabilitation activities, Levee Road would be closed. Bicycles would be redirected along the newly constructed pathway extension on westbound I-80 off-ramp to access the existing Class I bicycle pathway along Yolo Causeway, which would be built prior to rehabilitation activities on Levee Road. These proposed components are depicted in Figure 1.3-1 and Figure 1.3-2.

[6] City of West Sacramento Municipal Code 10.32.020 states that bicycles are permitted on the public sidewalk but shall yield to any pedestrian.

Park-and-Ride Facility

Within Segment 2 of each build alternative, a Park-and-Ride Facility (also known as a Mobility Hub) would be built on the east side of Enterprise Boulevard in a 4.5-acre lot and would provide about 300 parking spaces. Users of the Park-and-Ride Facility would have the option to park their cars for the day and connect to several county and regional transit services. The facility would be located partially within the existing Caltrans right-of-way and partially outside the existing Caltrans right-of-way. Landscaping and nighttime lighting are proposed at the Park-and-Ride Facility.

Signage

The Build Alternatives would include roadside signs and overhead changeable message signs (CMS) (I.e., symbolic or text messages) that would guide and warn motorists and regulate the flow of traffic. Some of the signs would have hours of operation that restrict certain classes of vehicles during peak periods. Other signs would have information for motorists of the conditions or hazards that they are approaching.

Roadside signs would include regulatory and warning signs, route shields, and guide signs. These signs would be on wood or metal posts. Wood posts would be approximately 6-inches by 6-inches while metal posts would be approximately 2.5-inches by 2.5-inches. Roadside signs would be mounted on the freeway concrete median barrier or placed adjacent to the edge of the travel way up to 30 feet. However, placement of roadway signs would avoid environmentally sensitive areas.

Overhead signs would be mounted on versatile truss structures spanning above the travel lanes. The total height of the overhead sign structure (including the sign) would depend on the type of sign being mounted but would not likely exceed 40 feet in height. Overhead sign structures would have a concrete foundation of up to 6.5 feet diameter and would either be supported on a cast-in-drilled-hole pile foundation or supported by a structure.

Lighting

Street lighting would be added near CR-32A at the proposed bicycle pathway extension adjacent to the westbound off-ramp. Within Segment 2, bridge deck lighting with Type 21 Barrier-Rail-Mounted Lighting Standards would be constructed. Additional street lighting would be added to the Bryte Bend Bridge (I-80 Sacramento River Bridge Overhead), but it may also be added at proposed auxiliary lane locations if determined necessary during the design phase. Nighttime lighting would be installed at the Park-and-Ride Facility. During construction, temporary nighttime lighting would be in used in construction areas. Signage would use reflective lettering.

Road Cut/Fill

Some locations would require full structural section reconstruction, and other locations would require cut or fill of the embankment due to road widening.

Grinding

Cold planing, the process of removing part of the surface of a paved area, would be required throughout the project limits. Cold planing would be required for ramp conforms at all ramps and may be required at other locations along the travel way wherever hot mix asphalt is currently in place. A mill (cold planing) and fill operation may be proposed to repair roadway surface scarring that occurs during temporary restriping associated with some stage construction operations.

Site Preparation

Site preparation would include delineating construction work areas, installing environmentally sensitive area fencing around sensitive habitats and cultural resource areas, installing wildlife exclusion fencing around staging areas, installing best management practices in accordance with the project's Stormwater Pollution Prevention Plan, and removing vegetation, as summarized in Appendix E.

Utilities

Build Alternatives 2a, 3a, 4a, 5a, 6a, and 7a would not result in potential conflicts with existing utilities that are present along the I-80/US-50 corridor utility companies would require verification of facilities and involvement in construction plans. Accordingly, prior to construction, an estimated 15 test hole sites would be drilled at eight separate locations for natural gas lines running transversely underneath I-80, the Yolo Causeway, and West Capitol Avenue in Sacramento where the new managed lane would be constructed with retaining walls and columns. Positive findings would verify whether the gas line would require relocation or how to redesign the project components to avoid conflicts with existing utilities.

Under all Build Alternatives, removal of an existing overhead sign near Westacre Park, within Caltrans right-of-way, would require an overhead electrical distribution line to be temporarily de-energized. Under Build Alternatives 2b, 3b, 4b, 5b, 6b, and 7b, up to four 115-kilovolt overhead utility towers may be relocated or tower height increased near the new I-80 managed lane direct connector at the I-80/US-50 separation in West Sacramento.

Fiber-Optic Cable

The Build Alternatives would install a fiber-optic cable and associated fiber-optic splice boxes within the roadbed at the eastbound outside shoulder of I-80 from west of Kidwell Road in Solano County at PM 40.7 to PM 4.35 in Yolo County. Cut and cover or trenching would be the primary construction method and would require excavation of up to 42 inches deep to install within a 12-foot buffer surrounding the running line. Fiber-optic cable may also be placed via directional borings to avoid conflicts with existing utilities.

Right-of-Way and Temporary Construction Easements

As depicted on Figures 1.3-1 and 1.3-2, the Build Alternatives would require Caltrans to acquire two private fee parcels to construct the proposed Park-and-Ride Facility at Enterprise Boulevard (2.8 acres). Five temporary construction easements (TCEs) would be required along the project

alignment totaling 12.24 acres. No displacement of any residences or businesses would be required.

Staging Areas

As depicted on Figures 1.3-1 and 1.3-2, staging areas would be located at the I-80/West El Camino Avenue interchange, South River Road, I-80/Richards Boulevard interchange, the I-80 and SR-113 interchange, West Capitol Avenue, and along Kidwell Road. These areas total 53.31 acres and would be used for equipment maintenance and storage of equipment, construction materials, fuels, lubricants, solvents, and other possible contaminants during construction.

Traffic Management during Construction

Various Transportation Management Plan (TMP) elements such as portable CMS and the California Highway Patrol Construction Zone Enhanced Enforcement Program would be used to minimize delays for the traveling public. Flaggers would be used to divert traffic. Prior to construction, a detailed TMP would be prepared.

Ramp closures are anticipated at all ramp locations adjacent to proposed widening or proposed mainline paving. Traffic would be detoured to the next interchange. Caltrans would also place signage as part of the TMP to note the access updates and identify the bicycle/pedestrian detours. Caltrans would install a crosswalk at the westbound I-80 off-ramp across right turn movement to West Capitol Avenue and a temporary flashing beacon upstream.

Build Alternatives 2b, 3b, 4b, 5b, 6b, and 7b may require a temporary, full closure on westbound US-50 for construction of the direct connector structure. Full closures would occur during the hours of the lowest volume of traffic (e.g., nighttime), although they could also occur during daytime and/or during a continuous 24- or 48-hour operation, as needed to accommodate construction. The anticipated closure would occur for up to three nights to install falsework and then three additional nights to remove falsework for construction of the direct connector structure. The primary detour for westbound US-50 traffic would be to use northbound I-5 to westbound I-80. Local traffic would use other interchanges in the area.

Vegetation and Tree Removal

Vegetation clearing would be required and would be confined to the area within the project footprint, including construction access routes. Vegetation removal and clearing would be completed with hand tools where possible. Chainsaws, grinders, and excavators would be used for vegetation that cannot be removed by hand. All vegetation would be removed within proposed cut and fill lines as well as within temporary impact lines where ITS components would be constructed. Within areas of temporary impact, vegetation removal would be avoided to the extent possible.

Construction Equipment

The equipment used for the proposed work of the Build Alternatives would be similar among the Build Alternatives. Center median work would use excavators, scrapers, motor graders, loaders,

backhoes, pavers, concrete barrier slip form pavers, truck-mounted cranes, 18-wheel trucks, dump trucks, and water trucks. Reconstruction and modification of ramps/gores/shoulder embankments would use excavators, motor graders, loaders, backhoes, pavers, 18-wheel trucks, dump trucks, and water trucks. Road surfacing work, including placement for sensors in the road surface, would use core drillers, trailers containing and dispersing sealant, and water trucks.

Construction of the I-80 managed lane direct connector under Build Alternatives 2b, 3b, 4b, 5b, 6b, and 7b would require pile driving to install the footings to a depth of up to 40 feet. Equipment would also include a crane (for pile driving), excavator, dozer, loader, manlift, articulated 4x4 forklift, truck, dump truck, trailer unit air compressor, and water truck. This construction equipment would also be used for structural sign mounts along with a truck-mounted crane for all Build Alternatives. A truck-mounted auger would be used for installing roadside signs.

Ground Disturbance

The depth of ground disturbance would vary throughout the project limits. At locations where CMS, sign structures, or piles would be installed, disturbance could be up to 30 feet deep. As described, construction of the I-80 managed lane direct connector under Build Alternatives 2b, 3b, 4b, 5b, 6b, and 7b would require pile driving to install the footings to a depth of up to 40 feet. At locations of culverts, depth of ground disturbance could vary from 3 feet to 10 feet (i.e., the estimated depth to the bottom of a culvert or inlet). At locations of linear electrical facilities such as fiber-optic and conduit installations, the ideal depth is typically 4 feet, assuming 42 inches of cover; however, depth could be increased to avoid conflicts with existing or proposed drainage or existing utilities.

Site Cleanup and Post-Construction Activities

All construction materials and debris would be removed from the construction work areas and recycled or properly disposed of off-site. Caltrans would restore all areas temporarily disturbed by project activities, such as staging areas and access roads, to near or better than preconstruction conditions in accordance with applicable permits and Caltrans requirements.

1.3.1.2 Unique Features of the Build Alternatives

The Build Alternatives are depicted on Figure 1.3-1 and Figure 1.3-2. More detailed engineering figures and detailed maps showing the locations of proposed right-of-way acquisitions are included in Appendix I.

Build Alternatives 2a and 2b: HOV 2+ Managed Lane

Lane Configuration – Build Alternatives 2a and 2b

Build Alternatives 2a and 2b would begin at the Solano/Yolo County Line west of Davis to West El Camino Avenue on I-80 and end at I-5 on US-50 in Sacramento County. Build Alternatives 2a and 2b would include an HOV 2+ managed lane in the eastbound and westbound direction. This would be accomplished by constructing the median from the Solano/Yolo County line to west of

the Yolo Causeway and continuing eastward by restriping to West El Camino Avenue on I-80 and to I-5 on US-50 in Sacramento County.

Build Alternative 2b would involve construction of an I-80 managed lane direct connector and construction activities planned for Build Alternative 2a. The I-80 managed lane direct connector would provide a direct connection of the HOV 2+ managed lane by flying over US-50 at the I-80/US-50 Interchange as depicted in Figure 1.3-2. The connector would include a retaining wall on either side and would travel underneath the existing eastbound connector from I-80 to US-50. The proposed managed lane direct connector would be constructed of columns and include concrete barrier type 842 railings.

Segment 1 (Kidwell Road, Solano County to Enterprise Boulevard, West Sacramento)

Segments 1a, 1b, and 1c would be restriped with 6-inch thermoplastic traffic stripes for three mixed-flow lanes and one managed lane in each direction, westbound and eastbound.

Within Segment 1b, from just west of the Solano/Yolo County Line to the west end of the Yolo Causeway, the project would involve replacement of the existing inside shoulders and construction of the eastbound and westbound median from around Richards Boulevard to 1.5 miles east of Mace Boulevard to accommodate managed lanes in the eastbound and westbound directions. The new shoulders and construction areas would be asphalt concrete material. The median barriers would be upgraded from a metal beam guard rail to a reinforced concrete barrier.

Segment 2 (Enterprise Boulevard to West El Camino Avenue, West Sacramento)

Within Segment 2, the Bryte Bend Bridge would be restriped to accommodate the HOV 2+ managed lane in each direction. Reducing lane and shoulder widths would accommodate a fourth lane on the Bryte Bend Bridge. The bridge striping would change from three lanes (two 12-foot lanes and one 11.5-foot lane) to four lanes (four 11-foot lanes) with 1-foot inside and 2.5-foot outside shoulders.

Segment 3 (I-80/US-50 to Jefferson Boulevard Undercrossing, and Jefferson Boulevard to I-5/US-50 Interchange, West Sacramento)

Within Segment 3a, from I-80/US-50 Separation to Jefferson Boulevard Undercrossing, the pavement would be restriped to convert one mixed-flow lane in each direction to managed lanes.

Within Segment 3b, from the Jefferson Boulevard Undercrossing to just east of I-5, the Jefferson Boulevard Undercrossing (Br. No. 22-0106 L/R), and the Sacramento River viaduct (Br. No. 24-0014 R/L) between Jefferson Boulevard and the I-5/US-50 interchange would be restriped to add an additional managed lane in each direction.

Lane Access – Build Alternatives 2a and 2b

An HOV lane is a type of managed lane that allows qualified users, who meet the minimum number of passengers, to use the managed lane. The number of vehicle occupants required to

qualify can vary depending on location. Under Build Alternatives 2a and 2b, vehicles with two or more occupants would be permitted to access the HOV lane, and all other vehicles would be prohibited from using those lanes. The HOV lanes would be designated using a striping pattern and a diamond marking to distinguish them from mixed-flow lanes and would operate only during peak commute hours.

Signage – Build Alternatives 2a and 2b

Approximately 45 overhead signs would be replaced or proposed within the project area. Several existing overhead signs would be removed and not replaced. In addition, 311 roadside signs would be replaced, and 221 roadside signs are proposed within the median or the shoulder. Proposed signage would be the same for Build Alternatives 2a and 2b. Overhead and roadside signs are described in more detail in Section 1.3.1.1, Common Design Features of the Build Alternatives and shown on Figure 1.3-1 and Figure 1.3-2.

Drainage/Culverts – Build Alternatives 2a and 2b

Anticipated work includes extending existing culverts through existing unpaved medians, extending existing culverts at locations where construction may occur outside the existing edge of pavement lining, and possibly abandoning existing culverts where median construction would occur in crowned sections of the roadway. New drainage inlets and culverts are proposed to be replaced or repaired to accommodate areas where existing shoulders are being narrowed, to accommodate additional runoff due to the increased pavement area, or to perpetuate existing drainage patterns. The linings of one pipe would occur using cast-in-place-pipe lining (CIPP). CIPP is a method to repair pipes without needing to trench by inserting a liner inside the existing culvert pipe.

Build Alternative 2a and Build Alternative 2b would construct 5 new culverts and replace or improve 21 existing culverts. As described, many of the proposed drainage features would be located within the construction footprint of the median for the new HOV 2+ managed lane. In addition, proposed culverts would traverse beneath the freeway to convey drainage to a new outlet. In these instances, the freeway would be trenched using an excavator and the barrel would be installed. Once the barrel is installed, the trench would be backfilled and compacted back to preconstruction conditions. Trenching across the freeway travel lanes would occur in segments during low peak (nighttime) traffic hours to maintain access. Construction of each new or replaced culvert would occur over approximately two nights; however, construction of several culverts could occur concurrently as further described in the construction schedule. It is assumed each of these culvert repair or replacement areas would have a 20-foot by 20-foot temporary construction impact footprint, not to exceed the roadway right-of-way. Proposed drainage features for the I-80 managed lane direct connector, under Build Alternative 2b, would occur within the construction footprint of the I-80 managed lane direct connector.

Construction Schedule – Build Alternatives 2a and 2b

Construction of Build Alternative 2a is anticipated to take approximately 443 construction working days over 22 months. Construction of Build Alternative 2b is anticipated to take approximately 732 construction working days over 36 months. Construction would potentially

commence in Spring 2025. Due to high daytime traffic volumes, nighttime work would be expected. Both daytime and nighttime work should be anticipated throughout the project duration.

Build Alternatives 3a and 3b: HOT 2+ Managed Lane

Build Alternatives 3a and 3b would be the same as Build Alternatives 2a and 2b, respectively, but would include an HOT 2+ managed lane instead of an HOV 2+ lane. Build Alternative 3b would involve construction of the I-80 managed lane direct connector and construction activities planned for Build Alternative 3a.

The HOT managed lane would allow vehicles with a minimum two-person occupancy to use the lane for free, while single-occupied vehicles would pay for the lane usage. All other project components would be the same as Build Alternatives 2a and 2b, respectively, except signage locations.

Approximately 79 overhead signs would be replaced or proposed within the project area. Several existing overhead signs would be removed and not replaced. In addition, 311 roadside signs would be replaced, and 373 roadside signs are proposed within the median or the shoulder. Overhead and roadside signs are described in more detail in Section 1.3.1.1, Common Design Features of the Build Alternatives and shown on Figure 1.3-1 and Figure 1.3-2.

Build Alternatives 4a and 4b: HOT 3+ Managed Lane

Build Alternatives 4a and 4b would be the same as Build Alternatives 2a and 2b, respectively, but would include an HOT 3+ managed lane instead of an HOV 2+ lane. Build Alternative 4b would involve construction of the I-80 managed lane direct connector and construction activities planned for Build Alternative 4a.

The HOT managed lane would allow vehicles with a minimum three-person occupancy to use the lane for free. Vehicles with less than three riders would pay for the lane usage. Vehicles with two passengers may pay reduced or full tolls to travel within the HOT lane. `1 All other project components would be the same as Build Alternatives 2a and 2b, respectively, except signage locations.

Proposed signage for Build Alternatives 4a and 4b would be the same as Build Alternatives 3a and 3b, respectively. Overhead and roadside signs are described in more detail in Section 1.3.1.1, Common Design Features of the Build Alternatives and shown on Figure 1.3-1 and Figure 1.3-2.

Build Alternatives 5a and 5b: Express Managed Lane

Build Alternatives 5a and 5b would be the same as Build Alternatives 2a and 2b, respectively, but would include an express lane instead of an HOV 2+ lane. Build Alternative 5b would involve construction of the I-80 managed lane direct connector in addition to the construction activities planned for Build Alternative 5a. An express lane is a managed lane that allows vehicles of any occupancy to access a dedicated lane once a toll is paid. All other project

components would be the same as Build Alternatives 2a and 2b, respectively, except signage locations.

Proposed signage for Build Alternatives 5a and 5b would be the same as Build Alternatives 3a and 3b, respectively. Overhead and roadside signs are described in more detail in Section 1.3.1.1, Common Design Features of the Build Alternatives and shown on Figure 1.3-1 and Figure 1.3-2.

Build Alternatives 6a and 6b: Transit-Only Managed Lane

Build Alternatives 6a and 6b would be the same as Build Alternatives 2a and 2b, respectively, but would include transit-only managed lanes instead of HOV 2+ lanes. Build Alternative 6b would involve construction of the I-80 managed lane direct connector in addition to the construction activities planned for Build Alternative 6a. A transit-only lane is a managed lane that allows only approved public transit vehicles, such as bus services, to access a dedicated lane. All other project components would be the same as Build Alternatives 2a and 2b, including the proposed signage for Build Alternatives 6a and 6b, respectively. Overhead and roadside signs are described in more detail in Section 1.3.1.1, Common Design Features of the Build Alternatives and shown on Figure 1.3-1 and Figure 1.3-2.

Build Alternatives 7a and 7b: Repurpose Lanes to HOV 2+ Managed Lane

Build Alternatives 7a and 7b would repurpose the current number one general-purpose lanes to HOV 2+ managed lanes. No new lanes would be constructed. Build Alternative 7b would involve construction of the I-80 managed lane direct connector in addition to the construction activities planned for Build Alternative 7a.

Lane Configuration–Build Alternatives 7a and 7b

Build Alternatives 7a and 7b would maintain the existing median pavement delineation, unpaved median, and add an HOV 2+ lane by repurposing an existing mixed-flow lane (lane number one). As a result, Build Alternatives 7a and 7b would not shift the edge of travel way into the median or require barrier beam removal within the median.

Lane Access–Build Alternatives 7a and 7b

Vehicles with two or more occupants would be permitted to access the HOV 2+ lane, and all other vehicles would be prohibited from using them. The HOV 2+ lanes would be designated using a striping pattern and a diamond marking to distinguish them from mixed-flow lanes. HOV 2+ lanes would only operate during peak commute hours.

Signage – Build Alternatives 7a and 7b

Proposed signage for Build Alternatives 7a and 7b would be the same for Build Alternatives 2a and 2b, respectively. Overhead and roadside signs are described in more detail in Section 1.3.1.1, Common Design Features of the Build Alternatives and shown on Figure 1.3-1 and Figure 1.3-2.

Drainage/Culverts – Build Alternatives 7a and 7b

Build Alternatives 7a and 7b would repurpose the current number one general-purpose lanes to HOV 2+ managed lanes. Therefore, culvert construction associated with Build Alternative 7a would only be related to replacements or improvements to 18 existing culverts. Build Alternative 7b would construct 5 new culverts associated with the I-80 managed lane direct connector. Construction methods would be the same as Build Alternative 2a and 2b, respectively. The lining of one pipe would also occur using CIPP. As stated earlier, CIPP is a method to repair pipes without needing to trench by inserting a liner inside the existing culvert pipe.

Construction Schedule – Build Alternatives 7a and 7b

Construction of Build Alternative 7a is anticipated to take approximately 180 construction working days over 10 months. Construction of Build Alternative 7b is anticipated to take 732 construction working days over 36 months to complete. Construction would potentially commence in Spring 2025. Due to high daytime traffic volumes, nighttime work would be expected. Both daytime and nighttime work should be anticipated throughout the project duration.

1.3.1.3 Transportation Demand Management and Transportation System Management Alternatives

System management strategies increase the efficiency of existing facilities; they are actions that increase the number of vehicle trips a facility can carry without increasing the number of through lanes. Examples of Transportation System Management (TSM) strategies include the following: ramp metering, auxiliary lanes, turning lanes, reversible lanes, and traffic signal coordination. TSM also promotes automobile, public, and private transit, ridesharing programs, and bicycle and pedestrian improvements as elements of a unified urban transportation system. Modal alternatives integrate multiple forms of transportation modes, such as pedestrian, bicycle, automobile, rail, and mass transit. Although TSM measures alone could not satisfy the purpose and need of the project, the TSM strategies that have been incorporated into the Build Alternatives include the Park-and-Ride Facility at Enterprise Avenue (all Build Alternatives), the proposed bicycle path improvements (all Build Alternatives), and the ITS elements included in Table 1.3-1.

Transportation Demand Management (TDM) focuses on regional means of reducing the number of vehicle trips and miles traveled and increasing vehicle occupancy. It facilitates higher vehicle occupancy or reduces traffic congestion by expanding the traveler's transportation options in terms of travel method, travel time, travel route, travel costs, and the quality and convenience of the travel experience. A typical activity would be providing funds to regional agencies that are actively promoting ridesharing, maintaining rideshare databases, and providing limited rideshare services to employers and individuals. Increased vehicle occupancy reduces traffic volumes during peak commuting periods; however, without the construction of the improvements described above, successful implementation of a TDM alternative would not substantially improve the safety and operation of the freeway. A TDM alternative by itself would not satisfy the purpose of the project.

1.3.1.4 Reversible Lanes

Effective January 1, 2017, Assembly Bill 2542 amended the California Streets and Highways Code to require that Caltrans or a regional transportation planning agency demonstrate that reversible lanes were considered when submitting a capacity-increasing project or a major street or highway lane realignment project to the CTC for approval (California Streets and Highways Code, Section 100.015). Caltrans considered reversible lanes during project initiation but determined that they would not be compatible with the proposed Build Alternatives.

1.3.1.5 Access to Navigable Rivers

California Streets and Highways Code Section 84.5 states that during the design hearing process relating to state highway projects that include the construction by Caltrans of a new bridge across a navigable river, there shall be included full consideration of and a report on the feasibility of providing a means of public access to the navigable river for public recreational purposes. The project would involve improvements of the existing Bryte Bend Bridge over Sacramento River. The Sacramento River is a navigable river; however, the bridge exists, and the project would not construct a new bridge over the Sacramento River. Public access to the Sacramento River for public recreational purposes is discussed in Section 2.1.3, Parks and Recreational Facilities.

1.3.1.6 No Build Alternative 1

No Build Alternative 1 would maintain the existing conditions, and no work would be conducted to relieve current traffic congestion to improve traffic flow, mobility, and travel time reliability while at the same time reducing vehicle emissions and travel costs. No Build Alternative 1 would not provide a transportation facility that functions for all users, including bicyclists, pedestrians, local transit services, and freight. Recurring travel demand would continue to exceed the highway's current design capacity, resulting in severe traffic congestion and impaired mobility. Additionally, the transportation network would not include adequate facilities for all modes of transportation.

No Build Alternative 1 assumes programmed and planned improvements to the current corridor. While there are numerous planned or programmed transportation projects within the region that can impact future travel patterns, this section focuses only on those future baseline improvements that directly impact the project area. The baseline improvement projects within the project area are listed in Table 1.3-3 and described in further detail in Section 2.4.

Table 1.3-3. List of Reasonably Foreseeable Future Actions

Project ID	Project Name	Jurisdiction	Location	Project Description	Status
Transportation Projects					
T-1	Yolo Pavement Rehabilitation Project 03-4F650	Caltrans District 3	Yolo 80 PM 4.3/R11.4 and Yolo 50 PM 0.0/2.5	This project proposes constructing the median on the I-80 West Capitol Avenue Undercrossing and the I-80 Reed Avenue UC bridges to accommodate stage construction. Additionally, the 03-4F650 project proposes improvements for critical bridge locations within the corridor to upgrade deck surfaces, approach slabs, and slope paving. The proposed median improvement occurs throughout most of the project to accommodate for stage construction. The median concrete barrier will remain in place at other locations, and the median restriped as part of the 3H900 project to provide managed lanes, with one managed lane in each direction. The project proposes new fiber-optic lines throughout, along with some ramp metering and upgrades to other existing roadway features. These fiber-optic lines will improve the ITS monitoring capability within the corridor.	Planned construction March 2023 to December 2027.
T-2	Sac River Bridge Over Head Bryte Bend Bridge Rehabilitation 03-0F250	Caltrans District 3	Yolo 80 PM R11.1/R11.7 and Sac 80 PM M0.0/M0.5: In Yolo and Sacramento Counties and near West Sacramento from 0.1 mile west of Reed Avenue UC to 0.1 mile east of Bryte Bend Bridge.	This project rehabilitated the Sacramento River Bridge and Overhead (BOH), Br.# 22-0026 L/R, on I-80 at the Yolo/Sacramento County Line in West Sacramento about three miles west of I-5. The project included replacing the bridge rail, replacing the deck drain system, building barrier pedestals for future electroliers, and installing conduits.	Construction completed January 2023.
T-3	US-50 ICM Infrastructure 03-3H330	Caltrans District 3	US-50 in El Dorado County from the El Dorado County/ Sacramento County line to Stateline Avenue in the City of South Lake Tahoe.	This project is on US-50 in and near the cities of Sacramento, Rancho Cordova, and Folsom, from the Yolo/Sacramento County line to Folsom Boulevard; and in Yolo County in West Sacramento along US-50, from the I-80/US-50 interchange to the Yolo/Sacramento County line (PM 0.0 to 3.156), and on I-80 from Enterprise Boulevard to US-50 (PM 9.2 to R9.552). Installation of TMS field elements.	Planned construction September 2021 to December 2023.

Project ID	Project Name	Jurisdiction	Location	Project Description	Status
T-4	Sac 50 Design-Build 03-0H08U	Caltrans District 3	Sacramento, Sacramento River bridge, Airport Boulevard, SR-99, I-80, US-50	In Sacramento County on US-50 from PM L0.20 to PM R6.10, from the I-5 Junction to Watt Avenue. The project proposes to construct managed lanes and rehabilitate the pavement.	Construction anticipated to be complete in December 2024.
T-5	Richards Boulevard / Olive Drive Circulation Improvements 03-0H360	City of Davis	Sol 80 PM 44.5/44.7 and Yolo 80 PM 0.0/0.5	Davis, in cooperation with Caltrans, has completed a Project Study Report-Project Development Support and will be circulating Draft Project Report/Environmental Document in Early 2022 that evaluates the safety and operational functions of the interchange at Richards Boulevard and I-80. The Davis project proposes to reconfigure the westbound I-80 on-ramp and off-ramp to a tight diamond; construct additional turn lanes to the eastbound I-80 on-ramp; eliminate the westbound I-80 slip off-ramp to Olive Drive; construct a two-way shared use path on the west side of Richards Boulevard that will pass under the westbound I-80 on-ramp from Richards Boulevard and cross over I-80.	Planned construction December 2023 to June 2025.
T-6	US-50 Metal Beam Guardrail Upgrade 03-1H870	Yolo County	US-50 from PM 0.0 to 3.0 and on I-80 from PM 9.0 to R10.7	The project replaced the guardrail and placed vegetation control.	Construction completed December 2021.
T-7	Sac/Placer 80 Fiber-Optics 03-0H540	Sacramento County	Sac PM M0.3/18.0 & Placer 80 PM 0.0/0.7	Installed fiber-optic conduit, cable and pull boxes, replaced sign panels, transition railing, modified ramp metering systems. limited proposed fiber-optic conduits and pull boxes along the I-80 median and eastbound I-80 outside shoulder, along westbound I-80 diagonal and loop on-ramps from West El Camino Ave, along eastbound I-80 off-ramp to West El Camino Ave and eastbound I-80 loop on-ramp from West El Camino Ave.	Construction completed August 2022.
T-8	Yolo 80 Olive Drive Bike/Ped Connection 03-4H260	City of Davis	PM 0.841/0.851	Bike/Ped structure from Olive Drive to Pole Line Road overcrossing bridge. Closure of eastbound I-80 off-ramp to Olive Drive.	Planned construction January 2021 to June 2023.
T-9	Yolo 80 Davis 80 Rehabilitation Project 03-2J260	City of Davis	PM 0.0/4.40	Remove portion of pavement and replace with RHMA-G and RHMA-O for I-80 mainline and Mace Blvd ramps. Upgrade Mace Blvd drainage facilities, metal beam guard rail, cross walks, ADA ramps, and pedestrian push buttons. Install HOV ramp metering systems at Mace Blvd eastbound on-ramps to I-80. Project Initiation Document was signed December 2022.	Planned construction May 2027 to May 2028.

Project ID	Project Name	Jurisdiction	Location	Project Description	Status
T-10	Sac 5/50 Interchange Painting 03-1H100	City of Sacramento	Sacramento River Viaduct (Pioneer Bridge) to 4th Street; also, on I-5 from 0.2 mile south of Broadway to S Street (PM 22.15 to PM 22.91).	Painting at interchange on Sacramento River Viaduct and on I-5.	Construction was completed February 2023.
T-11	Sycamore Trail Pedestrian Overcrossing 03-3H840	City of West Sacramento	City of West Sacramento	City of West Sacramento plans to construct a trail and pedestrian crossing over US-50 that will extend south from the newly developed pedestrian and bicycle trail at Joseph "Joey" Lopes Park to Westmore Oaks Elementary School. The project site is between Evergreen Avenue and Stone Boulevard along the Sacramento Regional County Sanitation District lower northwest interceptor sewer easement. The width of the overcrossing would be either 16 or 22 feet.	Planned construction March 2023 to April 2024.
T-12	Yolo Rail Relocation	City of Davis, along with City of West Sacramento, City of Woodland and Yolo County	City of Davis, City of West Sacramento, City of Woodland, and Yolo County	The Yolo Rail Realignment Project proposes to relocate the existing rail access from the Union Pacific Railroad mainline current alignment along the eastern edge of West Sacramento to a new location west of the I-80/US-50 split. The project will allow for the West Sacramento riverfront to fully realize its redevelopment potential, alleviate significant traffic impact from the existing freight rail alignment, and provide for the opportunity to expand freight rail service to West Sacramento's industrial areas with minimum community impact. It has been proposed to combine a new railroad overhead under I-80 as part of the combined projects 03-4F650 and 03-3H900 between the Yolo Causeway and Enterprise Boulevard to tie into existing tracks leading to/from the Port of West Sacramento.	Planning phase
T-13	County Road 32A Crossing	Yolo County	CR-32A is located north of I-80 and east of the Mace Boulevard interchange	CR-32A to improve bike path connectivity between CR-105 (just east of Davis) and the western terminus of the proposed new Class I bicycle/pedestrian facility of the Managed Lanes Project (03-3H900) that will connect with CR-32A, just west of the westbound CR-32A Off-Ramp. The County recently completed a Project Study Report and is seeking funding for this project.	Planning Phase

Project ID	Project Name	Jurisdiction	Location	Project Description	Status
T-14	Bridge Preventive Maintenance on Route 505 at Horse Creek Bridge and on Route 80 at McCune Creek Bridge	Caltrans District 4 SHOPP Projects	Vacaville (Solano I-505 and I-80)	In and near Vallejo, Dixon, and Vacaville, at I-80/SR-29 Separation Bridge (No. 23-008), McCune Creek Bridge (No. 23-0084L/R) and Horse Creek Bridge (No. 23-0077L). Bridge preventive maintenance.	Environmental analysis completed in December 2020.
T-15	SOL SR 37, 80 & 780 RRFB 0P760; SOL-Var. 2020 SHOPP	Caltrans District 4 SHOPP Projects	Solano County, Various post markers	Install rectangular rapid flashing beacons in Solano County on various routes (Routes 37, 80, and 780) at various locations.	Construction anticipated to begin in 2022/2023
T-16	SOL-VAR; 2020 SHOPP	Caltrans District 4 SHOPP Projects	Solano County, Various post markers	Install best management practices (stormwater mitigation) at Routes 37, 80, 780, 101, and 121.	Construction anticipated to begin 2023/2024
T-17	I-5 Corridor Improvement Project 03-4H580	Caltrans D3	SAC 5 22.4-34.4	Caltrans proposes to make improvements on I-5 between PM 22.4 and 34.4 in Sacramento County. The proposed action would address mobility on I-5 from the I-5/SR-50 Interchange (south of downtown Sacramento) to the Yolo County line, including Airport Boulevard, providing a vital link to Sacramento International Airport (SMF). This mobility improvement would be accomplished with northbound and southbound managed lane strategies. The project would help relieve current traffic congestion, which would result in improved traffic flow, mobility, travel time, and reliability. In addition, the project would improve transit access and reduce vehicle emissions and travel costs. Ramps, shoulders and gores would be reconstructed at various locations in the project area. Some widening of or replacement of existing structures in the project area would be required. Drainage modifications would be required due to median reconstruction where sheet flow currently drains. Addition of (or modification of existing) intelligent transportation system elements and infrastructure including ramp meters, fiber-optic conduit and cables, and overhead signs would be part of the scope of work. Utility relocation is expected.	Project Approval and Environmental Document Phase, anticipated to be complete late 2023

Project ID	Project Name	Jurisdiction	Location	Project Description	Status
Bicycle and Pedestrian Facility Projects					
BP-1	Mace Boulevard Corridor Project	City of Davis	City of Davis	Addition of green bicycle lane conflict markings where each westbound freeway ramp intersects with Mace Boulevard. Provision of bicycle intersection crossing markings at the signalized intersection of the I-80 westbound ramps and Mace Boulevard and addition of green bike lane conflict markings where each eastbound freeway ramp intersects with Mace Boulevard.	Planning phase; community meeting to be held on January 20, 2022.
BP-3	Jefferson Boulevard interchange area	City of West Sacramento	City of West Sacramento	Addition of Class II bicycle lanes. The pavement on Jefferson under the US-50 interchange structure was not widened for bicycle lanes. The pavement was recently rehabilitated as part of the West Capitol Avenue Safety Enhancement and Road Rehabilitation project.	Project construction complete.
BP-4	S. River Road interchange area	City of West Sacramento	City of West Sacramento	The widening of 5th Street for Class II bicycle lanes through the US-50 interchange area will be constructed as part of the Riverfront Street Extension / Fifth Street Widening project.	Construction to begin soon.
I-80 Corridor Major Developments/General Plans/Specific Plans					
D-1	Olive Drive	City of Davis	City of Davis	The project would develop existing single-family homes into high density multi-family apartments.	Environmental documents approved in November 2019
D-2	University Mall/ University Commons Redevelopment Project	City of Davis	City of Davis	Transit-oriented infill project, commercial.	Final City Council Approval granted on August 25th, 2020
D-3	UC Davis West Village Expansion	UC Davis	City of Davis	200-acre mixed-use neighborhood integrating student, faculty, and staff housing and educational and research facilities, all centered on a civic village square.	Under construction, anticipated completion in fall of 2021
D-4	West Sacramento Corporation Yard Relocation Project	City of West Sacramento	City of West Sacramento	West Sacramento proposes to construct a new Municipal Corporation Yard Facility at 4300 West Capitol Avenue, a parcel which the city anticipates purchasing from the Port of West Sacramento.	Phase I of the project is complete.

Project ID	Project Name	Jurisdiction	Location	Project Description	Status
D-5	West Capitol Avenue–Road Rehabilitation and Safety Enhancement Project	City of West Sacramento	City of West Sacramento	West Capitol Avenue is envisioned as the West Sacramento's downtown: a central core with a vibrant main street that takes advantage of its prime location; providing an attractive setting for a variety of land uses including the Civic Center, Community Center, Transit Hub; and providing residential, commercial, and urban parks that are accessible via multiple modes of transportation. The primary goals are to repair deteriorating pavement; complete scalloped street sections; install drainage improvements, sidewalks, access ramps, signal modifications, separated/buffered bike lanes, street lighting, high-visibility crosswalks for safer pedestrian crossings; and reduce unnecessary vehicular travel lanes.	Construction is complete.
D-6	Upper Westside Specific Plan	Sacramento County	Sacramento County	The project will be a transportation-oriented development due to its location and proximity to transportation infrastructure and major employment regions in the region. It will also incorporate many "complete streets" aspects such as pedestrian- and bicycle-friendly infrastructure, transit services, and some compact housing to encourage alternative modes of transportation within the area. The project area is currently zoned for agricultural use, but a general plan amendment is underway to alter the land use designations for the Upper Westside Plan area.	Application accepted on February 26th, 2019. Environmental analysis in progress.
D-7	The Core Natomas 300-unit Apartments	City of Sacramento	City of Sacramento	This project provides a 300-unit apartment complex with 506 parking spaces (including 203 garage types), two accesses (orchard and via planned cul-de-sac).	Construction completed in 2020.
D-8	River Oaks Phase 2–591 Single Family	City of Sacramento	City of Sacramento	This project provides 591 single family lots on 83.3 acres of vacant land within the River Oaks planned unit development.	Planning phase; environmental documents submitted in 2018.

Project ID	Project Name	Jurisdiction	Location	Project Description	Status
D-9	Bell Avenue Warehouses Project	City of Sacramento	City of Sacramento	The proposed project would include development of the project site with two warehouse structures totaling approximately 339,549 sf as well as various other site improvements related to internal vehicle circulation, stormwater management, and landscaping. The warehouse on the eastern parcel would be about 259,749 sf and contain two depressed loading docks on the western face of the building. The warehouse on the western parcel would be about 79,800 square feet and contain two depressed loading docks on the building's western face. On-site parking would be provided by 277 proposed parking spaces.	Planning phase; environmental documents submitted in February 2020.
D-10	Rivers Oaks Marketplace	City of Sacramento	City of Sacramento	There is a plan amendment for four new commercial structures on a 3.91-acre parcel in the C-2-PUD (General Commercial-Park El Camino) Zone. This requires a Commission-level review for site plan and design review, conditional use permits, a tentative map, and a planned unit development Schematic Plan Amendment.	Project construction would last about 16 months, starting in April 2022 and concluding in July 2022. Construction would proceed in a single phase.
D-11	Parke Bridge Phase 4	City of Sacramento	City of Sacramento	The project proposes to construct 108 new detached, single-unit dwellings with four house plans on approximately 22 acres in the Parke Bridge planned unit development.	Subdivision is currently under development
D-12	Bretton Woods	City of Davis	City of Davis	Davis is annexing land from Yolo County and rezoning land from agricultural intensive to medium density residential, high density residential, residential greenspace overlay, urban agriculture transition area, and mixed-use. This will pave the way for 325 single family homes, 260 of which are for senior citizens, and an additional 150 are affordable senior apartments. The project also includes an approximately 3-acre activity and wellness center. The project is on a site north of Covell Boulevard and west of SR-113, at the intersection of Shasta Drive and West Covell Boulevard.	Currently undergoing planning review of the subdivision phases.

Project ID	Project Name	Jurisdiction	Location	Project Description	Status
D-13	UC Davis Long Range Development Plan	University of California, Davis	Sacramento, located off US-50 near the SR-99/I-80 Business interchange	The 2020 LRDP Update proposes general types of campus development and land uses to support projected campus population growth and enable expanded and new program initiatives. The proposed Aggie Square Phase I project consists of approximately 1,384,500-gross square feet of building space for education, research, residential and commercial uses, and parking structure space.	Planning phase; environmental documents submitted in November 2020.
D-14	Woodland Research & Technology Park Specific Plan	City of Woodland	City of Woodland	Woodland is pursuing a specific plan detailing a commercial mixed-use town center with 2.15 million square feet of non-residential building space for approximately 6,100 employees and 1,600 housing units. The project is in the southern portion of Woodland's planning area, adjacent to the existing city limits, bound by Farmers Central Road to the north, CR-101 to the east, SR-113 to the west, and CR-25A to the south.	Environmental analysis in progress.
D-15	The Promenade - 2023 (Formerly NISHI Housing Site)	City of Davis	City Davis	The City of Davis is processing a planning application for The Promenade, previously known as Nishi Student Apartments. The project creates a new neighborhood adjacent to the UC Davis campus and close to downtown Davis. It is located on 46.9 acres with 2,200 beds across 700 units, with a mix of studio, 2-bedroom and 4-bedroom floorplans ranging in size from 480 to 1,565 square feet.	Planning phase in progress.

Key:
Ave = = Avenue
Blvd = Boulevard
CCTV = closed-circuit television
CMS = changeable message signs
CR = County Road
I-80 = Interstate 80
LRDP = long range development plan
OC = overcrossing
sf = square feet
SHOPP = State Highway Operation and Protection Program
SR = State Route
TCE = temporary construction easement
TMS = transportation management system
UC Davis = University of California, Davis

1.4 Comparison of Alternatives

After the public circulation period, all comments were considered; and Caltrans identified a preferred alternative and made the final determination of the project's effect on the environment.

1.4.1 Identification of a Preferred Alternative

Build Alternative 4B (HOT 3+ with managed lane connector ramp) is the preferred alternative for meeting the project's purpose and need. Alternative 4B would best ease congestion and improve freeway operations to support reliable transport of goods/service throughout the region, improve freeway operation on the mainline ramps and at system interchanges, improve modality and travel time reliability, and lastly provide expediated traveler information and monitoring systems.

While Build Alternatives 2–6 offer similar results in terms of impacts on the environment and vehicle miles traveled, Build Alternative 4B provides the highest benefit with respect to revenue generation while still meeting the project's purpose and need to reduce congestion and improve mobility across the corridor. Further, Build Alternative 4B is consistent with local government transportation goals and the project's partner agency's (Yolo Transportation District) declaration of HOT 3+ with connector ramp as their preferred alternative.

1.5 Alternatives Considered but Eliminated from Further Discussion Prior to Draft EIR/EA

The following alternatives were considered during the Project Initiation Document (PID) phase, documented in the Project Study Report-Project Development Support (PSR-PDS) and were considered and eliminated by the Project Development Team in the Project Approval and Environmental Document phase.

1.5.1 Alternative 1A

This alternative proposed to construct approximately 21 miles of managed lanes in both directions from the Kidwell Road overcrossing in Solano County to the US-50/I-5 and I-80/West El Camino Avenue interchanges in Sacramento County to alleviate bottlenecks and address an increase in travel demand. The managed lanes in Solano County under Alternative 1A would have converted an existing general-purpose lane to a managed lane. This alternative also proposed to construct a new separate bicycle/pedestrian structure adjacent to and north of the existing Yolo Causeway structure. The proposed separate bicycle/pedestrian structure, as proposed in the PID document with a 12-foot width, lacked access in case of emergency and regular maintenance.

The Solano County portion of the project is in the Solano County MTC area and Caltrans District 4. The 2017 Solano County RTP does not include managed lanes between the Kidwell Road interchange and the Yolo County line. Caltrans District 4 has indicated that they will coordinate with these organizations and Solano Transportation Authority to amend the Solano County

bus/carpool lane section of the MTC's Management Transportation Plan (MTP) and possibly add an HOV lane in Solano County on a different and future District 4 project.

The proposed separate Yolo Causeway bike bridge was determined not to be a viable alternative due to a low benefit-to-cost ratio. The current bicycle usage is generally low and environmental studies previously conducted by Caltrans have revealed that there would be impacts to the existing plants and wildlife due to the construction of a separate bicycle bridge. Accordingly, this alternative was also rejected due to the anticipated environmental impacts and environmental mitigation required.

1.5.2 Alternative 1B

This alternative is similar to Alternative 1A except the bicycle and pedestrian access across the Yolo Bypass would have occurred by either widening the existing Yolo Causeway structures or attaching a lightweight structure to them. This option would be more expensive than the structure in Alternative 1A due to the need to seismically retrofit the existing Yolo Causeway. This alternative would have less environmental impact in the Yolo Bypass wetland area and would address the safety, security, and emergency access concerns. Additional earthwork would be needed on the westbound side of I-80 in the berm area within the Yolo Bypass between the two causeway structures, which would impact existing environmental features.

Alternative 1B was rejected because it would require widening each side of the existing Yolo Causeway structures. Seismic upgrades to the existing Yolo Causeway structures would have been more expensive than building a new independent and separate structure.

1.5.3 Alternative 1C

This alternative proposed a managed lane in each direction and a new I-80 HOV connector ramp/bridge at the I-80/US-50 interchange to provide direct connectivity between the proposed managed lanes on I-80. Outside widening was proposed from Yolo I-80 PM 0.0 to the Yolo Causeway, and adjacent to the I-80/US-50 interchange for the I-80 managed lane connector.

This alternative is the same as Alternative 1A except riders would use the existing Yolo Causeway bicycle/pedestrian facility and the Yolo Causeway would be restriped with managed lanes in each direction.

Alternative 1C was rejected for the same reasons as Alternative 1A in that the 2017 Solano County RTP does not include managed lanes between the Kidwell Road interchange and the Yolo County line. In addition, there would be right-of-way costs and environmental impacts with the proposed outside widening of the corridor.

1.5.4 Alternative 1D

This alternative proposed widening into the median in Solano County to add managed lanes. It was different from Alternative 1A in that it proposed converting an existing general-purpose lane into a managed lane.

This was rejected for the same reason as Alternative 1A. It is included in the MTC listing but is not supported by Caltrans District 4 at this time.

1.5.5 Alternative 2

This alternative proposed an interim eastbound reversible lane from just west of the Yolo County line to Enterprise Boulevard. It would convert mixed-flow lanes to managed lanes on US-50 to the I-5 interchange.

Reversible Lanes were evaluated using the 2018 High Occupancy Vehicle Guidelines referenced in section 2 of the Interim Guidance on AB 2542 Reversible Lane Requirement. Section 2.1 of the 2018 High Occupancy Vehicle Guidelines states that:

> *"When a metropolitan area largely consists of a central business district with weekday commuter traffic from outlying areas, often referred to as a "radial" geographical area, the traffic demands on each corridor normally would indicate definite directional peaks during the morning and afternoon commute periods. If traffic in the off-peak direction is light (35 percent or less of the total freeway traffic during the peak periods) and is forecast to remain light during the design life of the project, then a reversible HOV operation may be appropriate."*

The existing and projected "off-peak" directional split of the total freeway transportation is less than 35 percent, with almost equal directional splits in some segments of the project area during the PM peak period. Therefore, based on existing guidance, transportation data, and projected traffic growth, a reversible HOV lane would not be an appropriate alternative to consider for this project.

1.5.6 Alternative 4

This alternative proposed an interim project to stripe managed lanes on the I-80/Bryte Bend bridge. This alternative was rejected because it would not meet the purpose and need of providing adequate operational improvements for the entire corridor.

1.5.7 Alternative 5

This alternative is similar to Alternative 1A, except managed lanes would be exclusively for transit vehicles.

This alternative was rejected due to the anticipated difficult merging required to get from the freeway on-ramps adjacent to the outside shoulders and then transit drivers would have to merge to the median transit lane, then merge to the outside lane again to exit the ramps to bus stops.

This alternative is a modified version of Alternative 6 but has a larger impact area like the Alternative 1A footprint. Alternative 6 is based on the smaller general impact area or similar to Alternative 3 footprint.

It was determined that this alternative was not a viable alternative, but possible Part Time Lane Use or Bus on Shoulder options may be studied further in the design phase.

1.5.8 Alternative 6

This alternative is similar to Alternative 1A except that it proposed to construct two managed lanes in each direction. This is a modified version of Alternative 5, and it was eliminated from further discussion because it would have a bigger environmental footprint and require extensive right-of-way acquisition. This alternative would require replacing or widening all the bridges throughout the I-80 and US-50 Corridor. It is anticipated that there would be merging and weaving issues for traffic merging onto and out of the two managed lanes. This alternative was rejected due to the extensive right-of-way and environmental impacts.

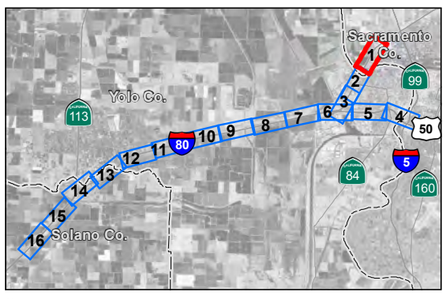
1.6 Permits and Approvals Needed

Table 1.6-1 details the permits, licenses, agreements, and certifications required for project construction.

Table 1.6-1. Permits and Approvals

Agency	Permits, Licenses, Agreements, and Certifications	Status
United States Fish and Wildlife Service	Biological Opinion	Issued April 12, 2024
United States Army Corps of Engineers	Section 404 Permit/Section 408	Issued during the final design phase
California Department of Fish and Wildlife	1602 Agreement for Streambed Alteration	Issued during the final design phase
Central Valley Regional Water Quality Control Board	Section 401 Certification	Issued during the final design phase
Central Valley Regional Water Quality Control Board	Construction General Permit	Issued during the final design phase
California Department of Fish and Wildlife (CDFW)	Incidental Take Permit	If needed, issued during the final design phase
Central Valley Flood Protection Control Board	Encroachment Permit	Issued during the final design phase
Federal Highway Administration	Air Quality Conformity Determination	FHWA determined project not a POAQC on October 18, 2021; reaffirmed by IAC 4/26/2024
State Historic Preservation Officer	Concurrence on Eligibility Determinations/Finding of Effect	SHPO concurred with the findings on January 12, 2022





Notes
1. Coordinate System: NAD 1983 StatePlane California II FIPS 0402 Feet
2. Data Sources: CalTrans, Stantec, 2021
3. Background: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

R/W
ESL
Post Mile
Intelligent Transportation System Improvement
Intelligent Transportation System Improvement Disturbance Area
Staging Area
County Line

Signage and Read Point Locations
All Alternatives
Alternatives 3a, 4a, and 5a only
Read Point (Alternatives 3a, 4a, and 5a only)

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Feet

Note: The project design components depicted in this figure are preliminary. Proposed surface treatments such as striping are not included.

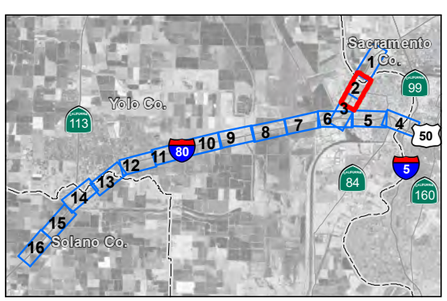
Figure 1.3-1
Project Design: Build Alternatives 2a, 3a, 4a, 5a, 6a, 7a

Yolo 80 Corridor Improvement Project
EA 03-3H900
Solano, Yolo, and Sacramento Counties, California

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- R/W
- ESL
- Post Mile
- County Line

Signage and Read Point Locations

- Alternatives 3a, 4a, and 5a only
- Read Point (Alternatives 3a, 4a, and 5a only)

Notes

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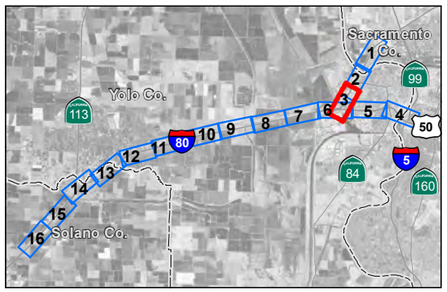
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Project Design: Build Alternatives 2a, 3a, 4a, 5a, 6a, 7a
Yolo 80 Corridor Improvement Project
EA 03-3H900
Solano, Yolo, and Sacramento Counties, California

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- R/W
- ESL
- Post Mile
- Culvert Work Area
- Temporary Construction Easement

Signage and Read Point Locations

- Alternatives 2a, 6a, and 7a only
- Alternatives 3a, 4a, and 5a only
- Read Point (Alternatives 3a, 4a, and 5a only)

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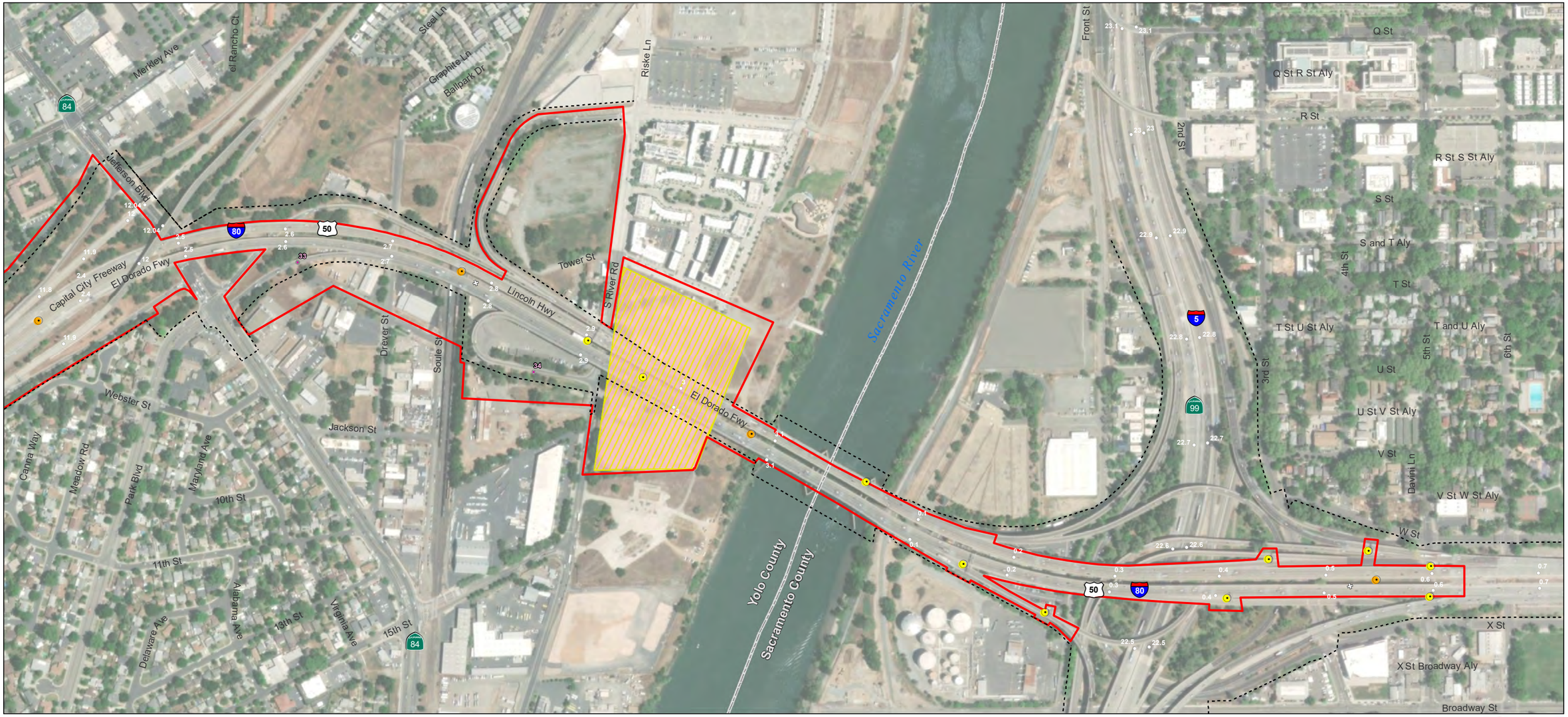
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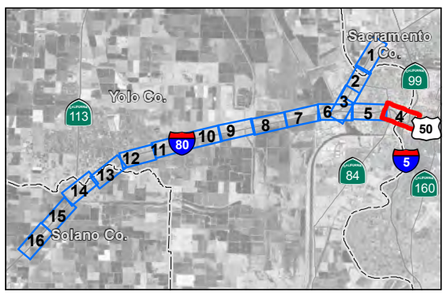
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Project Design: Build Alternatives 2a, 3a, 4a, 5a, 6a, 7a
Yolo 80 Corridor Improvement Project
EA 03-3H900
Solano, Yolo, and Sacramento Counties, California

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- R/W
- ESL
- Post Mile
- Intelligent Transportation System Improvement
- Intelligent Transportation System Improvement Disturbance Area
- Staging Area
- Temporary Construction Easement
- County Line

Signage and Read Point Locations
- All Alternatives
- Alternatives 3a, 4a, and 5a only
- Read Point (Alternatives 3a, 4a, and 5a only)

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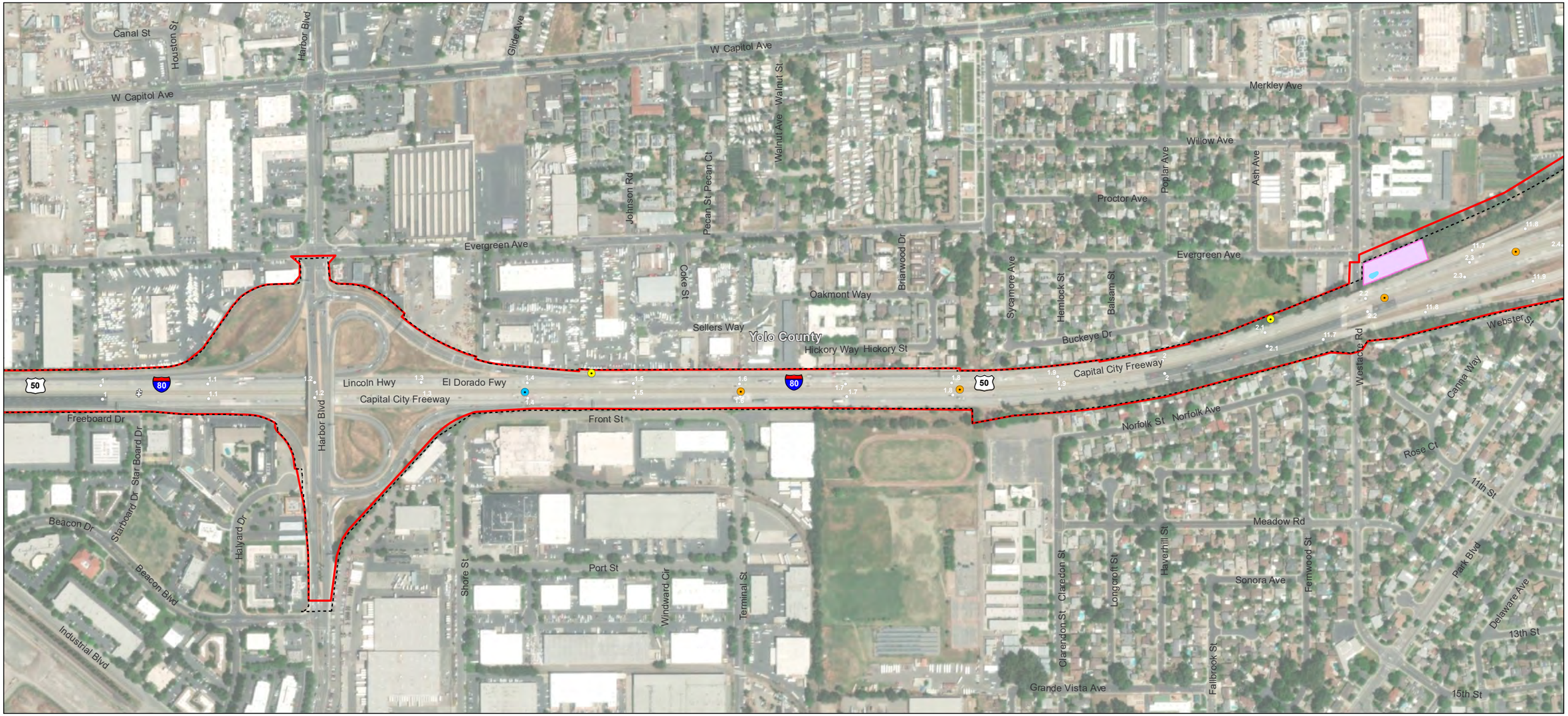
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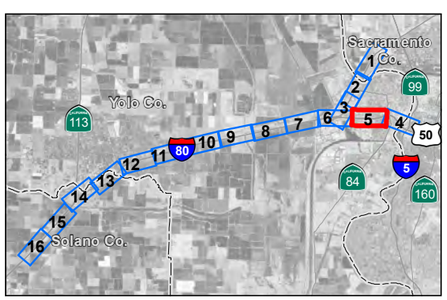
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Yolo 80 Corridor Improvement Project
EA 03-3H900
Solano, Yolo, and Sacramento Counties, California

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- R/W
- ESL
- Post Mile
- Trash Rack

Signage and Read Point Locations

- All Alternatives
- Alternatives 2a, 6a, and 7a only
- Alternatives 3a, 4a, and 5a only
- Read Point (Alternatives 3a, 4a, and 5a only)

Culverts and Drainage

- All Alternatives

Notes

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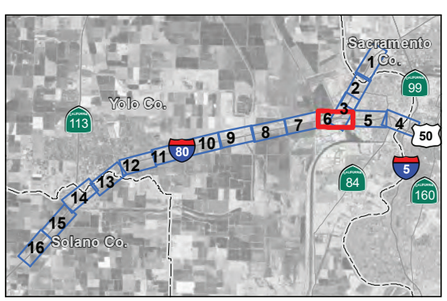
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Solano, Yolo, and Sacramento Counties, California

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Notes
1. Coordinate System: NAD 1983 StatePlane California II FIPS 0402 Feet
2. Data Sources: CalTrans, Stantec, 2021
3. Background: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

- R/W
- ESL
- Post Mile
- Proposed Park & Ride Lot
- Permanent Easement
- Temporary Disturbance
- Culvert Work Area
- Temporary Construction Easement
- Existing Class I Bikeway
- Temporary Bike Detour
- Temporary Bike Detour (eastbound only)

Bike path work is expected to occur at night. However, if work occurs during daytime hours, a temporary bike detour will be provided.

Signage and Read Point Locations
- Alternatives 2a, 6a, and 7a only
- Alternatives 3a, 4a, and 5a only
- Read Point (Alternatives 3a, 4a, and 5a only)

Note: The project design components depicted in this figure are preliminary. Proposed surface treatments such as striping are not included.

N

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Feet

Caltrans

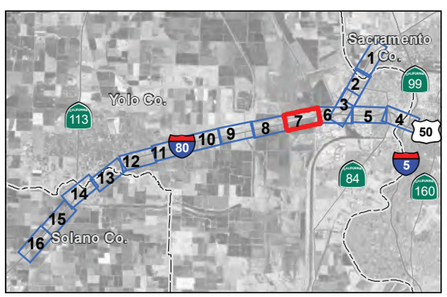
Figure 1.3-1
Project Design: Build Alternatives 2a, 3a, 4a, 5a, 6a, 7a

Yolo 80 Corridor Improvement Project
EA 03-3H900
Solano, Yolo, and Sacramento Counties, California

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Notes
1. Coordinate System: NAD 1983 StatePlane California II FIPS 0402 Feet
2. Data Sources: CalTrans, Stantec, 2021
3. Background: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

- R/W
- ESL
- Post Mile
- Temporary Disturbance
- Existing Class I Bikeway
- Temporary Bike Detour
- Yolo Bypass Wildlife Area

Bike path work is expected to occur at night. However, if work occurs during daytime hours, a temporary bike detour will be provided.

Signage and Read Point Locations
- Alternatives 2a, 6a, and 7a only
- Alternatives 3a, 4a, and 5a only
- Read Point (Alternatives 3a, 4a, and 5a only)

Note: The project design components depicted in this figure are preliminary. Proposed surface treatments such as striping are not included.

N

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Feet

Caltrans

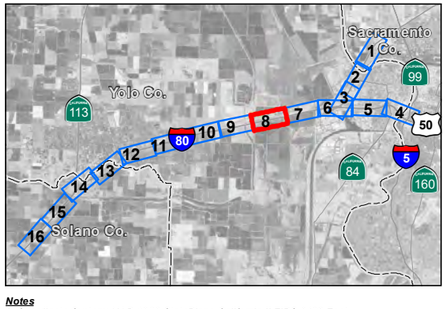
Figure 1.3-1
Project Design: Build Alternatives 2a, 3a, 4a, 5a, 6a, 7a

Yolo 80 Corridor Improvement Project
EA 03-3H900
Solano, Yolo, and Sacramento Counties, California

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- R/W
- ESL
- Post Mile
- Existing Class I Bikeway
- Yolo Bypass Wildlife Area

Signage and Read Point Locations

- Alternatives 3a, 4a, and 5a only
- Read Point (Alternatives 3a, 4a, and 5a only)

0 1,000
Feet

Notes

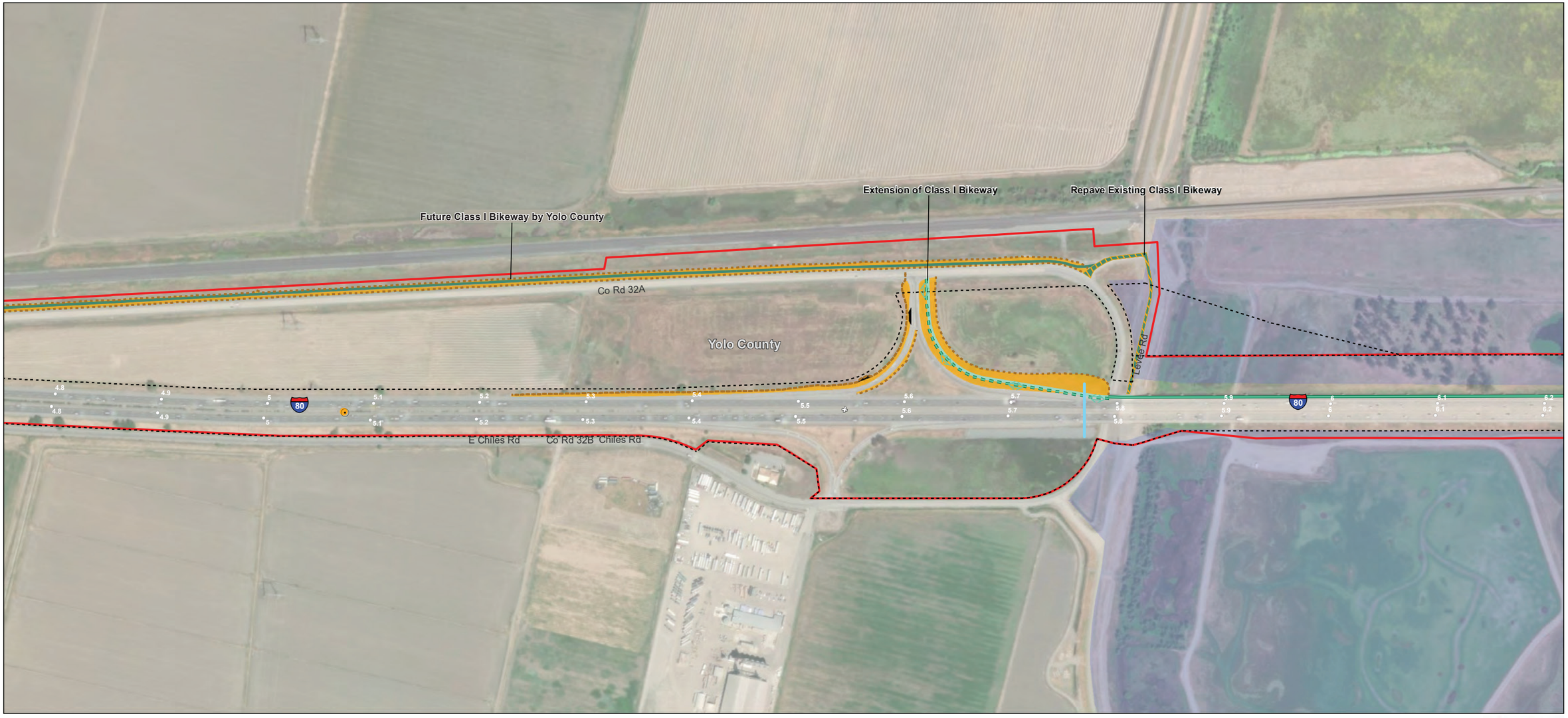
1. Coordinate System: NAD 1983 StatePlane California II FIPS 0402 Feet
2. Data Sources: CalTrans, Stantec, 2021
3. Background: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

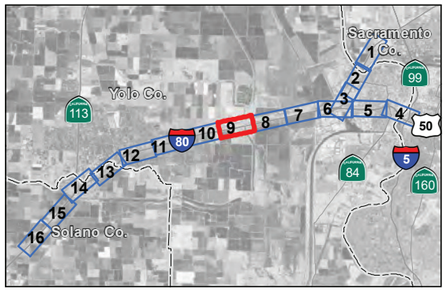
Note: The project design components depicted in this figure are preliminary. Proposed surface treatments such as striping are not included.

Figure 1.3-1
Project Design: Build Alternatives 2a, 3a, 4a, 5a, 6a, 7a
Yolo 80 Corridor Improvement Project
EA 03-3H900
Solano, Yolo, and Sacramento Counties, California

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Notes
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2. Data Sources: CalTrans, Stantec, 2021
3. Background: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

- R/W
- ESL
- Post Mile
- Temporary Disturbance
- Cut-Fill
- Cut-Fill Disturbance Area
- Existing Class I Bikeway
- Extension of Class I and Class II Bikeway
- Extension of Class I Bikeway
- Temporary Bike Detour
- Yolo Bypass Wildlife Area
- Pullout

Signage and Read Point Locations
- Alternatives 3a, 4a, and 5a only
- Read Point (Alternatives 3a, 4a, and 5a only)

Culverts and Drainage
- All Alternatives

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Feet

Note: The project design components depicted in this figure are preliminary. Proposed surface treatments such as striping are not included.

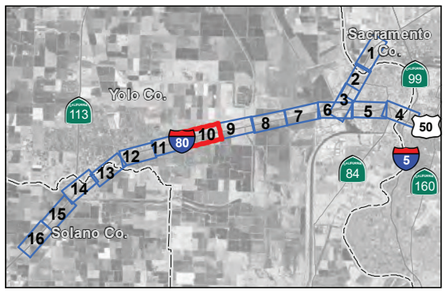
Figure 1.3-1
Project Design: Build Alternatives 2a, 3a, 4a, 5a, 6a, 7a

Yolo 80 Corridor Improvement Project
EA 03-3H900
Solano, Yolo, and Sacramento Counties, California

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- R/W
- ESL
- Post Mile
- Intelligent Transportation System Improvement
- Intelligent Transportation System Improvement Disturbance Area
- Fiber Optic Cable
- Fiber Optic Cable Disturbance Area
- Cut-Fill
- Cut-Fill Disturbance Area
- Widening - Median (Does not apply to Alternative 7a)
- Extension of Class I and Class II Bikeway
- Yolo Bypass Wildlife Area

Signage and Read Point Locations

- Read Point (Alternatives 3a, 4a, and 5a only)

Culverts and Drainage

- All Alternatives
- Alternatives 2a-6a

Notes

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2. Data Sources: CalTrans, Stantec, 2021
3. Background: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

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Figure 1.3-1
Project Design: Build Alternatives 2a, 3a, 4a, 5a, 6a, 7a

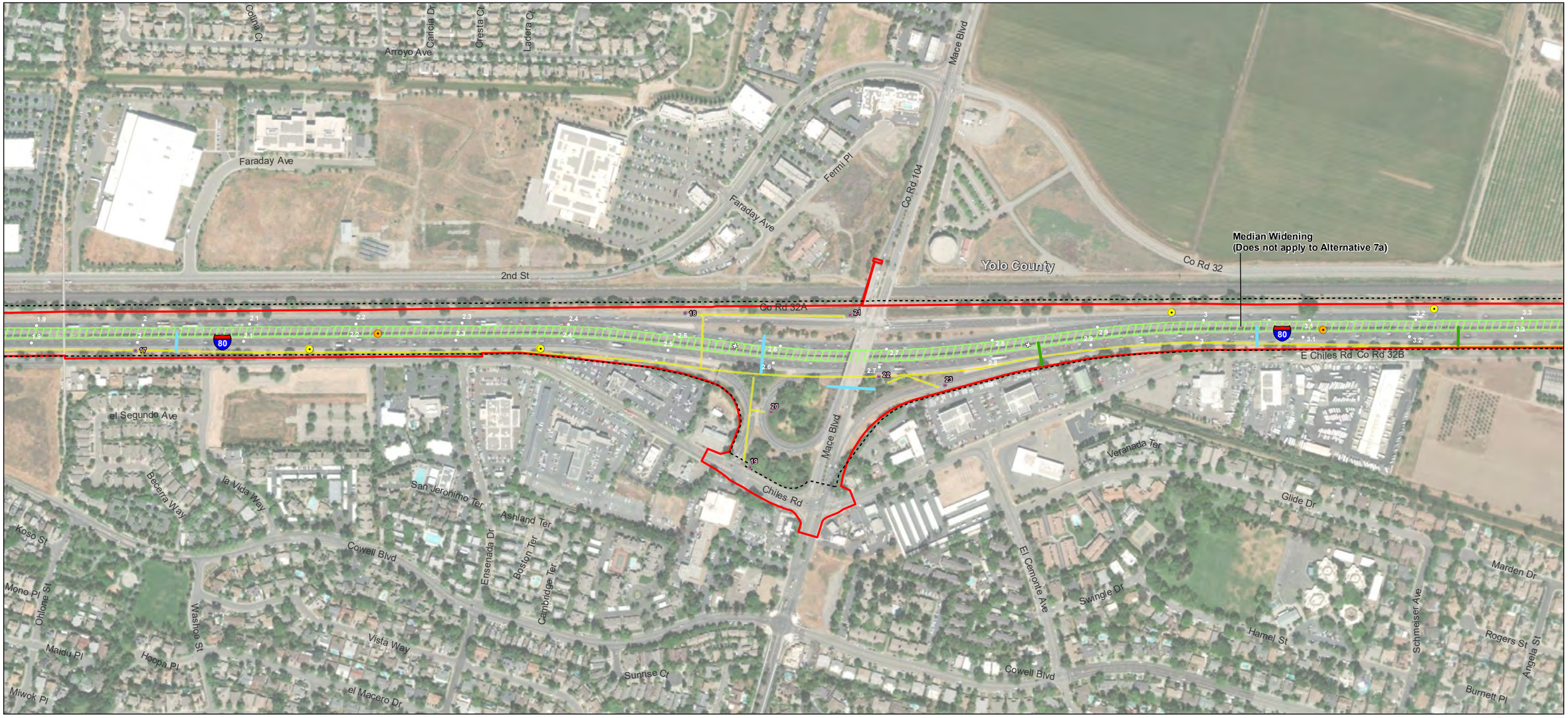
Yolo 80 Corridor Improvement Project

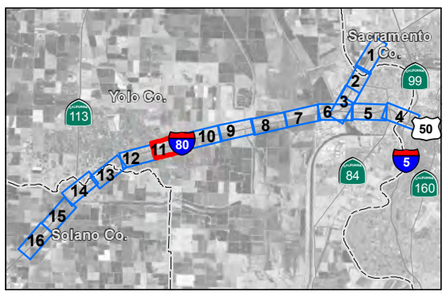
EA 03-3H900

Solano, Yolo, and Sacramento Counties, California

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- R/W
- ESL
- Post Mile
- Intelligent Transportation System Improvement
- Intelligent Transportation System Improvement Disturbance Area
- Fiber Optic Cable
- Fiber Optic Cable Disturbance Area
- Widening - Median (Does not apply to Alternative 7a)

Signage and Read Point Locations

- All Alternatives
- Alternatives 3a, 4a, and 5a only
- Read Point (Alternatives 3a, 4a, and 5a only)

Culverts and Drainage

- All Alternatives
- Alternatives 2a-6a

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Notes

1. Coordinate System: NAD 1983 StatePlane California II FIPS 0402 Feet
2. Data Sources: CalTrans, Stantec, 2021
3. Background: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

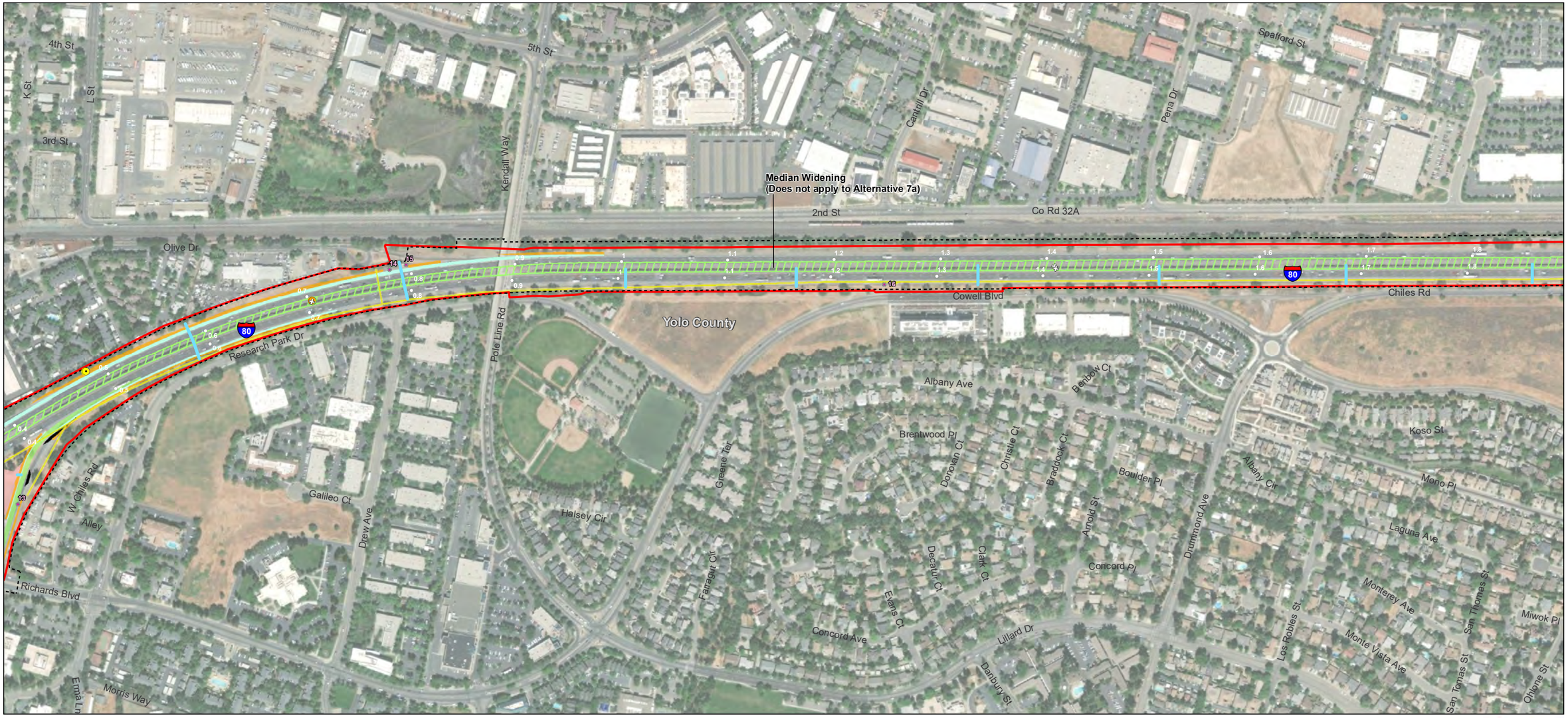
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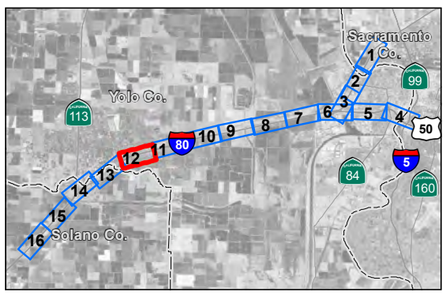
Figure 1.3-1
Project Design: Build Alternatives 2a, 3a, 4a, 5a, 6a, 7a

Yolo 80 Corridor Improvement Project
EA 03-3H900
Solano, Yolo, and Sacramento Counties, California

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Notes
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2. Data Sources: CalTrans, Stantec, 2021
3. Background: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

- R/W
- ESL
- Post Mile
- Intelligent Transportation System Improvement
- Intelligent Transportation System Improvement Disturbance Area
- Fiber Optic Cable
- Fiber Optic Cable Disturbance Area
- Cut-Fill Disturbance Area
- Staging Area
- Widening - Outside Lanes/Shoulder
- Widening - Median (Does not apply to Alternative 7a)
- Realigned Richards Blvd On-ramp
- Pullout

Signage and Read Point Locations
- All Alternatives
- Alternatives 3a, 4a, and 5a only
- Read Point (Alternatives 3a, 4a, and 5a only)

Culverts and Drainage
- All Alternatives

Note: The project design components depicted in this figure are preliminary. Proposed surface treatments such as striping are not included.

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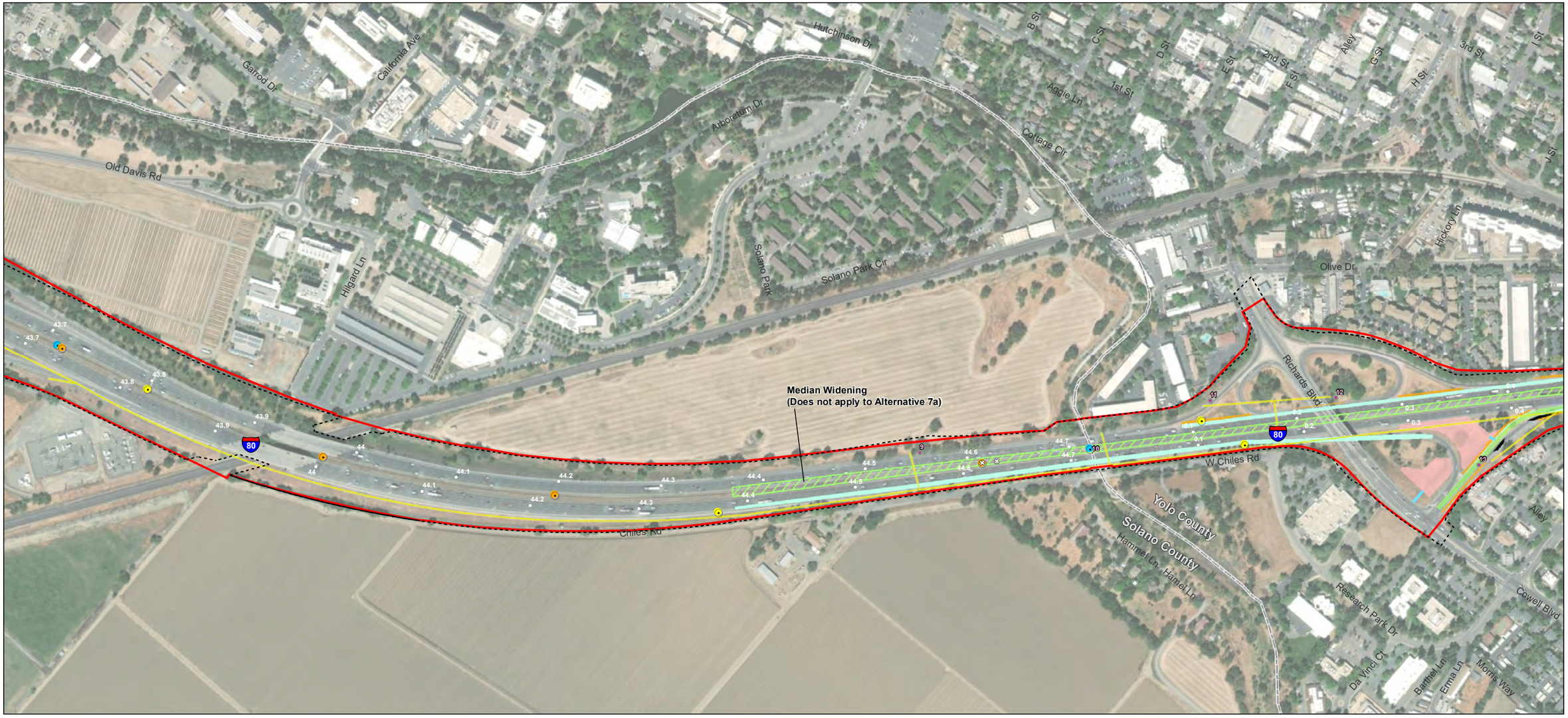
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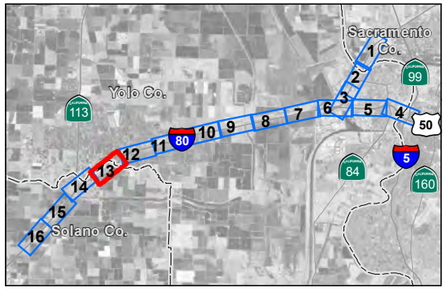
Figure 1.3-1
Project Design: Build Alternatives 2a, 3a, 4a, 5a, 6a, 7a

Yolo 80 Corridor Improvement Project
EA 03-3H900
Solano, Yolo, and Sacramento Counties, California

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Notes
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2. Data Sources: CalTrans, Stantec, 2021
3. Background: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

- R/W
- ESL
- Post Mile
- Intelligent Transportation System Improvement
- Intelligent Transportation System Improvement Disturbance Area
- Fiber Optic Cable
- Fiber Optic Cable Disturbance Area
- Cut-Fill Disturbance Area
- Staging Area
- Widening - Outside Lanes/Shoulder
- Widening - Median (Does not apply to Alternative 7a)
- Realigned Richards Blvd On-ramp
- Pullout
- County Line

Signage and Read Point Locations
- All Alternatives
- Alternatives 2a, 6a, and 7a only
- Alternatives 3a, 4a, and 5a only
- Read Point (Alternatives 3a, 4a, and 5a only)

Culverts and Drainage
- All Alternatives

Note: The project design components depicted in this figure are preliminary. Proposed surface treatments such as striping are not included.

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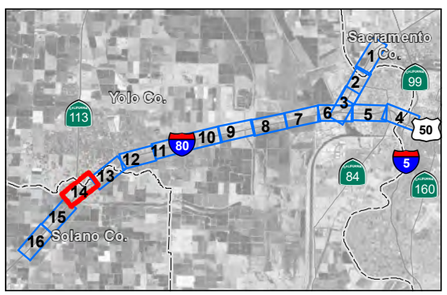
Figure 1.3-1
Project Design: Build Alternatives 2a, 3a, 4a, 5a, 6a, 7a

Yolo 80 Corridor Improvement Project
EA 03-3H900
Solano, Yolo, and Sacramento Counties, California

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- R/W
- ESL
- Post Mile
- Intelligent Transportation System Improvement
- Intelligent Transportation System Improvement Disturbance Area
- Fiber Optic Cable
- Fiber Optic Cable Disturbance Area
- Staging Area
- Pullout
- County Line

Signage and Read Point Locations

- All Alternatives
- Alternatives 2a, 6a, and 7a only
- Alternatives 3a, 4a, and 5a only

Notes

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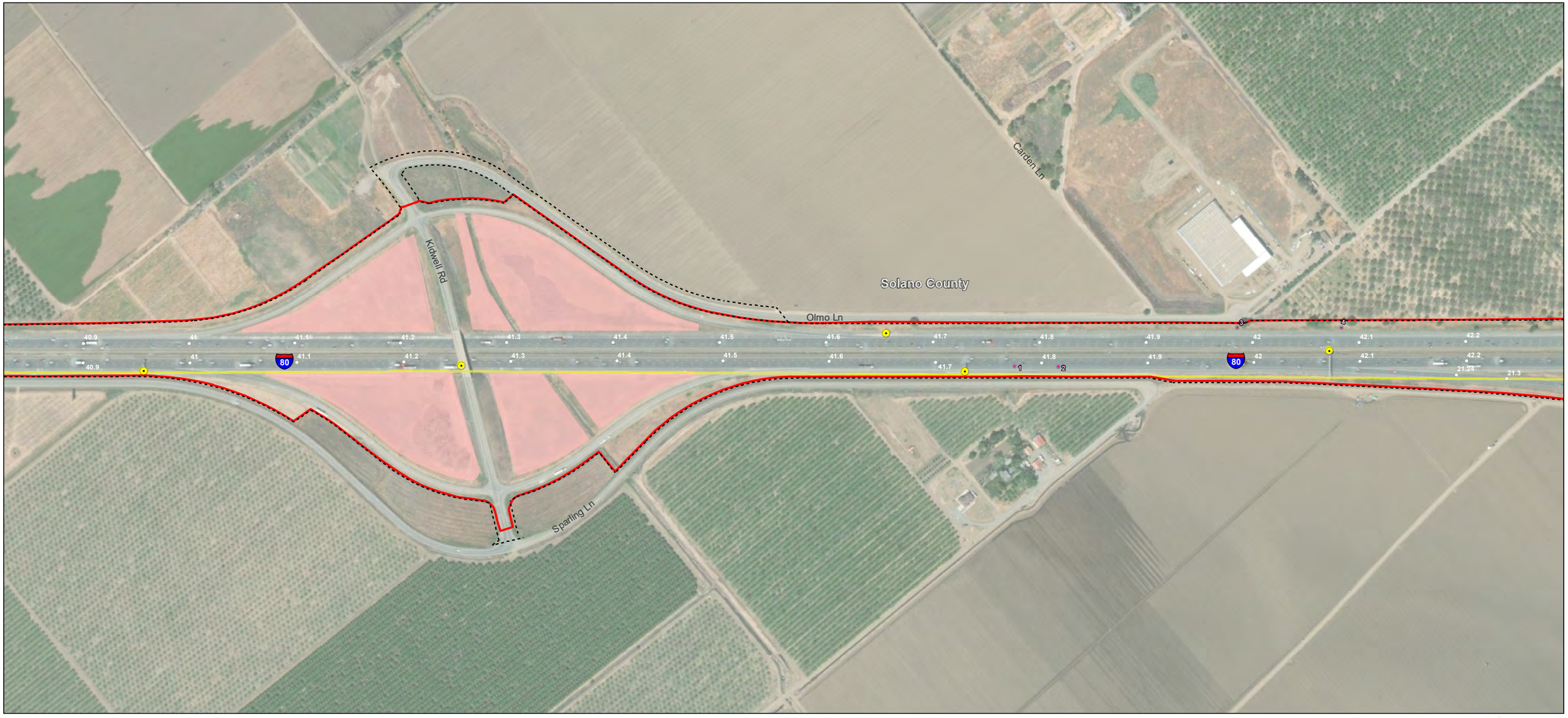
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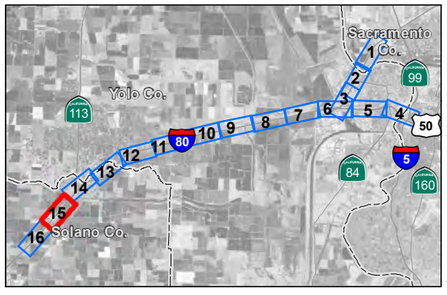
Figure 1.3-1
Project Design: Build Alternatives 2a, 3a, 4a, 5a, 6a, 7a

Yolo 80 Corridor Improvement Project
EA 03-3H900
Solano, Yolo, and Sacramento Counties, California

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- R/W
- ESL
- Post Mile
- Intelligent Transportation System Improvement
- Intelligent Transportation System Improvement Disturbance Area
- Fiber Optic Cable
- Fiber Optic Cable Disturbance Area
- Staging Area

Signage and Read Point Locations

- All Alternatives

Notes

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2. Data Sources: CalTrans, Stantec, 2021
3. Background: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

N

0 1,000

Feet

Note: The project design components depicted in this figure are preliminary. Proposed surface treatments such as striping are not included.

Figure 1.3-1
Project Design: Build Alternatives 2a, 3a, 4a, 5a, 6a, 7a

Yolo 80 Corridor Improvement Project

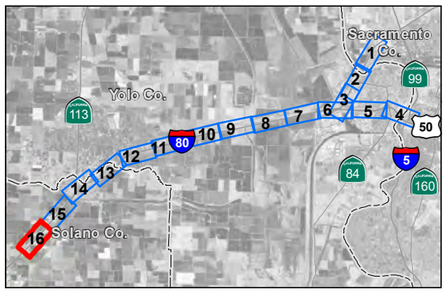
EA 03-3H900

Solano, Yolo, and Sacramento Counties, California

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- R/W
- ESL
- Post Mile
- Fiber Optic Cable
- Fiber Optic Cable Disturbance Area

0 1,000 Feet

Notes
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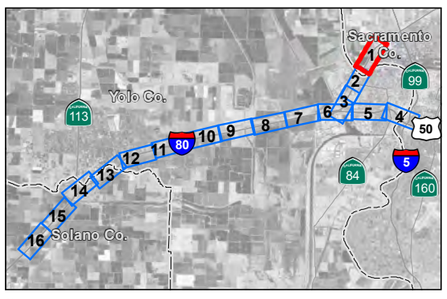
Note: The project design components depicted in this figure are preliminary. Proposed surface treatments such as striping are not included.

Figure 1.3-1
Project Design: Build Alternatives 2a, 3a, 4a, 5a, 6a, 7a
Yolo 80 Corridor Improvement Project
EA 03-3H900
Solano, Yolo, and Sacramento Counties, California

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Notes
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3. Background: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

- R/W
- ESL
- Post Mile
- Intelligent Transportation System Improvement
- Intelligent Transportation System Improvement Disturbance Area
- Staging Area
- County Line

Signage and Read Point Locations
- All Alternatives
- Alternatives 3b, 4b, and 5b only
- Read Point (Alternatives 3b, 4b, and 5b only)

Note: The project design components depicted in this figure are preliminary. Proposed surface treatments such as striping are not included.

N

0 1,000
Feet

Caltrans

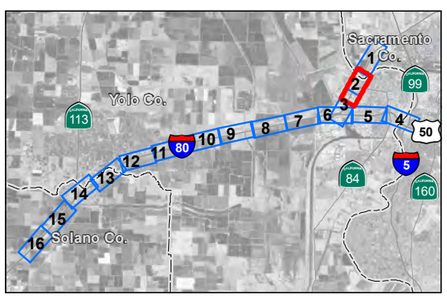
Figure 1.3-2
Project Design: Build Alternatives 2b, 3b, 4b, 5b, 6b, 7b

Yolo 80 Corridor Improvement Project
EA 03-3H900
Solano, Yolo, and Sacramento Counties, California

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R/W
ESL
Post Mile
County Line

Signage and Read Point Locations

Alternatives 3b, 4b, and 5b only
Read Point (Alternatives 3b, 4b, and 5b only)

N

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Feet

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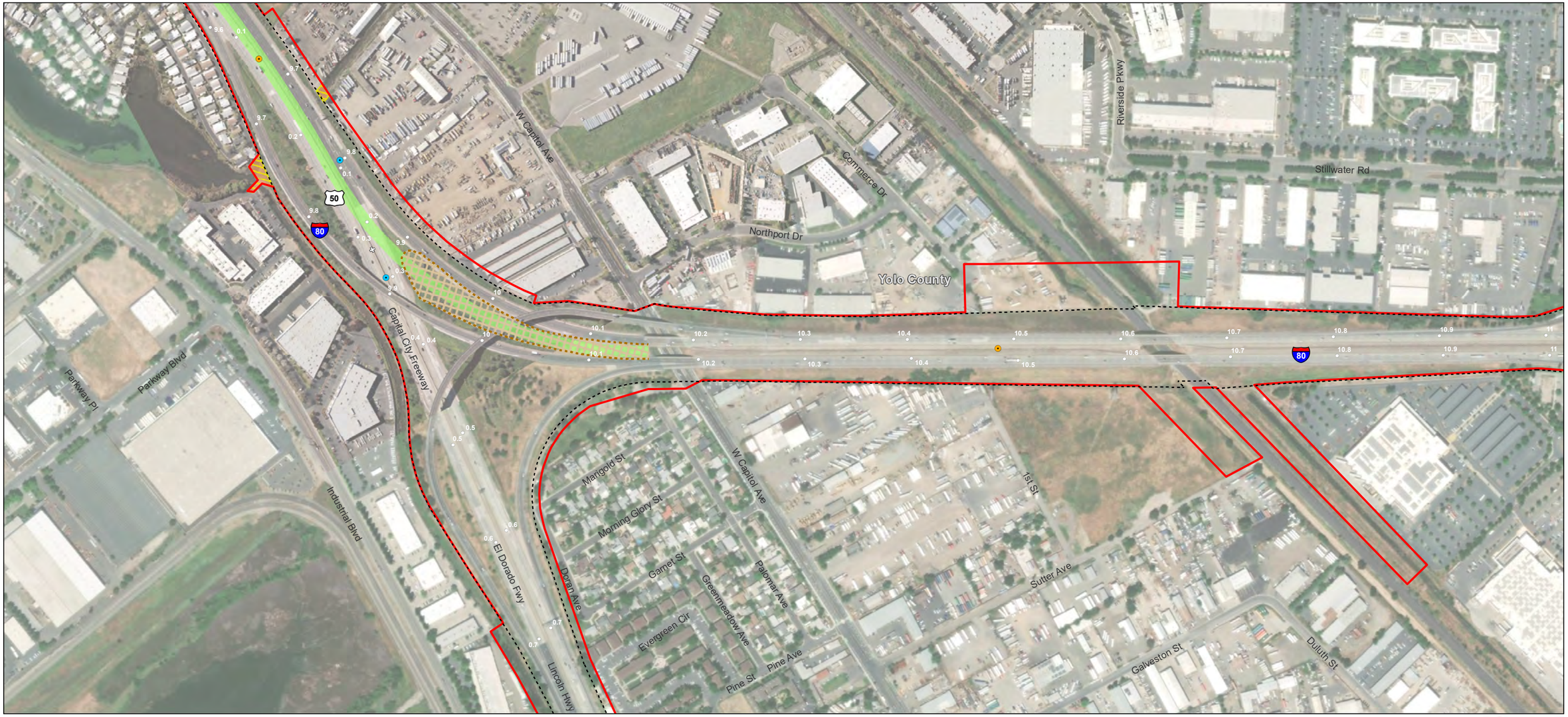
Notes
1. Coordinate System: NAD 1983 StatePlane California II FIPS 0402 Feet
2. Data Sources: CalTrans, Stantec, 2021
3. Background: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

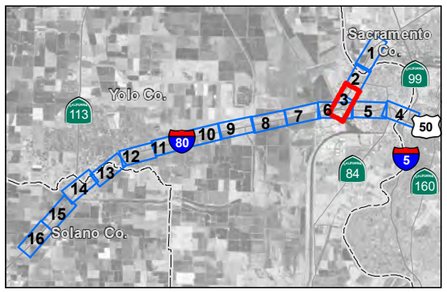
Note: The project design components depicted in this figure are preliminary. Proposed surface treatments such as striping are not included.

Figure 1.3-2
Project Design: Build Alternatives 2b, 3b, 4b, 5b, 6b, 7b
Yolo 80 Corridor Improvement Project
EA 03-3H900
Solano, Yolo, and Sacramento Counties, California

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Notes
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2. Data Sources: CalTrans, Stantec, 2021
3. Background: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

- R/W
- ESL
- Post Mile
- Culvert Work Area
- Cut-Fill
- Temporary Construction Easement
- I-80 Connector Structure
- Cut-Fill Disturbance Area

Signage and Read Point Locations
- Alternatives 2b, 6b, and 7b only
- Alternatives 3b, 4b, and 5b only
- Read Point (Alternatives 3b, 4b, and 5b only)

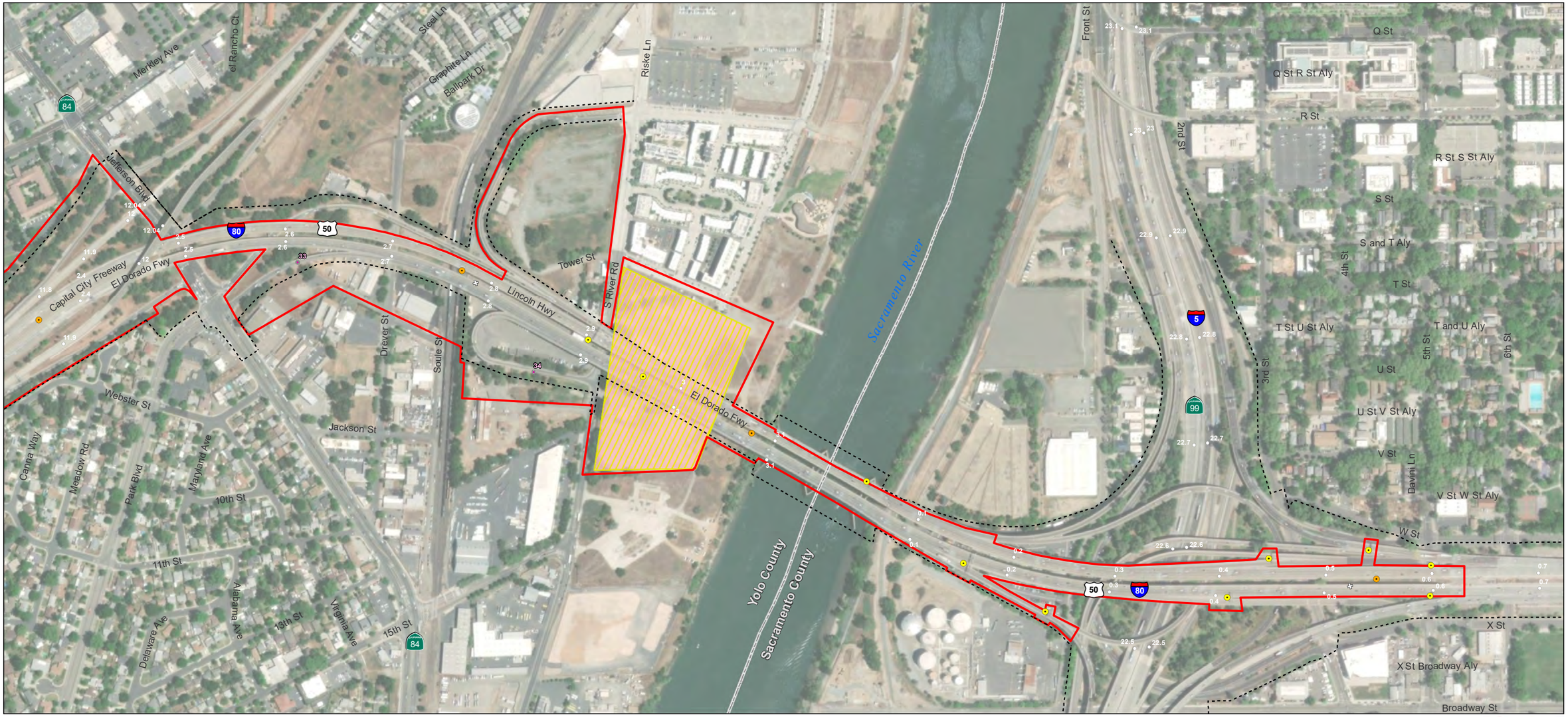
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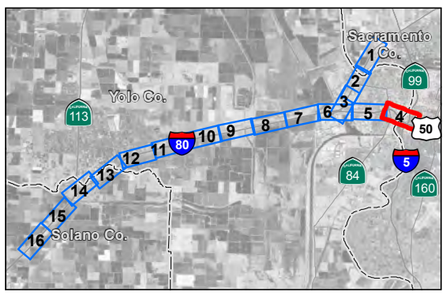
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Figure 1.3-2
Project Design: Build Alternatives 2b, 3b, 4b, 5b, 6b, 7b
Yolo 80 Corridor Improvement Project
EA 03-3H900
Solano, Yolo, and Sacramento Counties, California

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Notes
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3. Background: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

- R/W
- ESL
- Post Mile
- Intelligent Transportation System Improvement
- Intelligent Transportation System Improvement Disturbance Area
- Staging Area
- Temporary Construction Easement
- County Line

Signage and Read Point Locations
- All Alternatives
- Alternatives 3b, 4b, and 5b only
- Read Point (Alternatives 3b, 4b, and 5b only)

Note: The project design components depicted in this figure are preliminary. Proposed surface treatments such as striping are not included.

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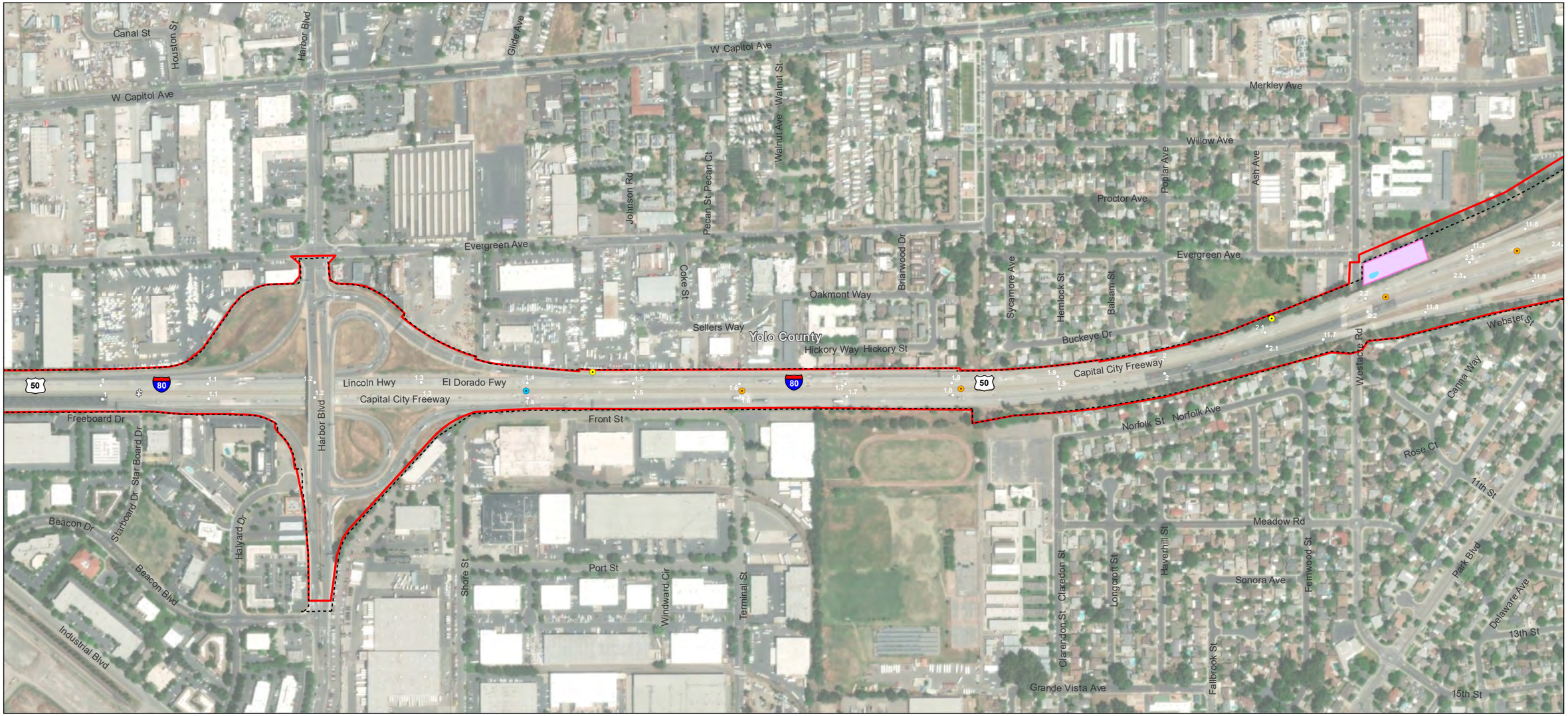
Caltrans

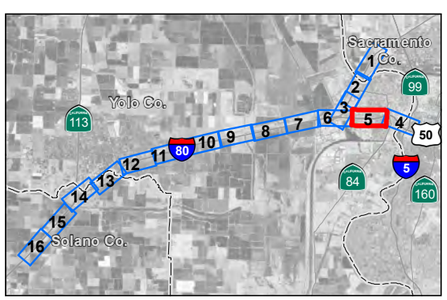
Figure 1.3-2
Project Design: Build Alternatives 2b, 3b, 4b, 5b, 6b, 7b

Yolo 80 Corridor Improvement Project
EA 03-3H900
Solano, Yolo, and Sacramento Counties, California

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R/W
ESL
Post Mile
Trash Rack

Signage and Read Point Locations
- All Alternatives
- Alternatives 2b, 6b, and 7b only
- Alternatives 3b, 4b, and 5b only
- Read Point (Alternatives 3b, 4b, and 5b only)

Culverts and Drainage
- All Alternatives

Notes
1. Coordinate System: NAD 1983 StatePlane California II FIPS 0402 Feet
2. Data Sources: CalTrans, Stantec, 2021
3. Background: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

Note: The project design components depicted in this figure are preliminary. Proposed surface treatments such as striping are not included.

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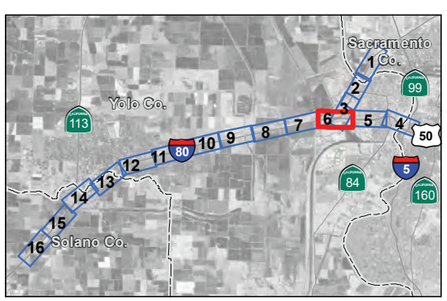
Caltrans

Figure 1.3-2
Project Design: Build Alternatives 2b, 3b, 4b, 5b, 6b, 7b
Yolo 80 Corridor Improvement Project
EA 03-3H900
Solano, Yolo, and Sacramento Counties, California

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2. Data Sources: CalTrans, Stantec, 2021
3. Background: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

- R/W
- ESL
- Post Mile
- Proposed Park & Ride Lot
- Permanent Easement
- Temporary Disturbance
- Culvert Work Area
- Cut-Fill
- Temporary Construction Easement
- I-80 Connector Structure
- Cut-Fill Disturbance Area

- Existing Class I Bikeway
- Temporary Bike Detour
- Temporary Bike Detour (eastbound only)

Signage and Read Point Locations
- Alternatives 2b, 6b, and 7b only
- Alternatives 3b, 4b, and 5b only
- Read Point (Alternatives 3b, 4b, and 5b only)

Bike path work is expected to occur at night. However, if work occurs during daytime hours, a temporary bike detour will be provided.

Note: The project design components depicted in this figure are preliminary. Proposed surface treatments such as striping are not included.

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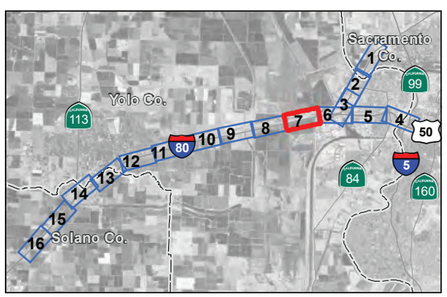
Figure 1.3-2
Project Design: Build Alternatives 2b, 3b, 4b, 5b, 6b, 7b

Yolo 80 Corridor Improvement Project
EA 03-3H900
Solano, Yolo, and Sacramento Counties, California

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- R/W
- ESL
- Post Mile
- Temporary Disturbance
- Existing Class I Bikeway
- Temporary Bike Detour
- Yolo Bypass Wildlife Area

Bike path work is expected to occur at night. However, if work occurs during daytime hours, a temporary bike detour will be provided.

Signage and Read Point Locations
- Alternatives 2b, 6b, and 7b only
- Alternatives 3b, 4b, and 5b only
- Read Point (Alternatives 3b, 4b, and 5b only)

Note: The project design components depicted in this figure are preliminary. Proposed surface treatments such as striping are not included.

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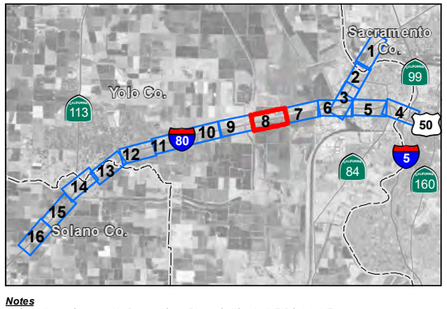
Caltrans

Figure 1.3-2
Project Design: Build Alternatives 2b, 3b, 4b, 5b, 6b, 7b
Yolo 80 Corridor Improvement Project
EA 03-3H900
Solano, Yolo, and Sacramento Counties, California

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- R/W
- ESL
- Post Mile
- Existing Class I Bikeway
- Yolo Bypass Wildlife Area

Signage and Read Point Locations

- Alternatives 3b, 4b, and 5b only
- Read Point (Alternatives 3b, 4b, and 5b only)

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Notes

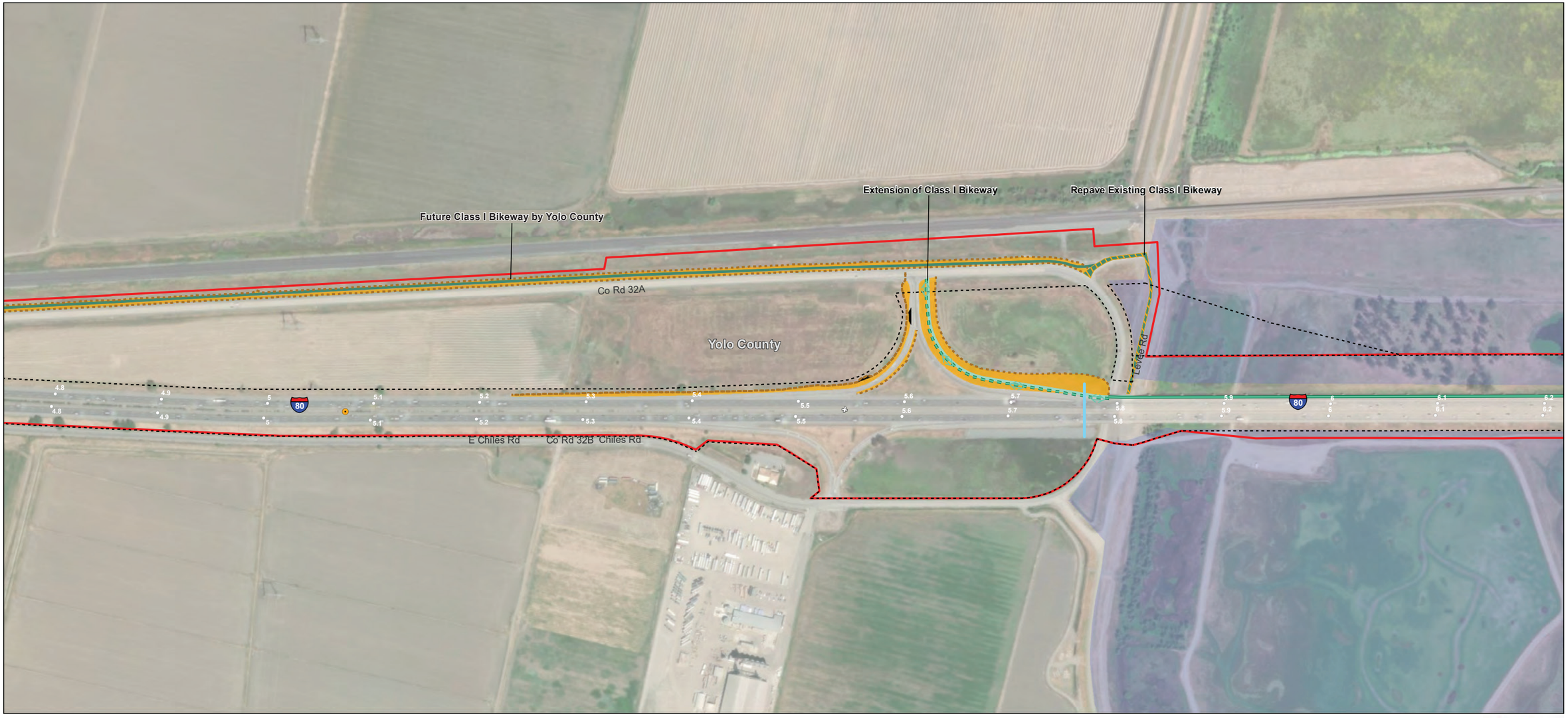
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2. Data Sources: CalTrans, Stantec, 2021
3. Background: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

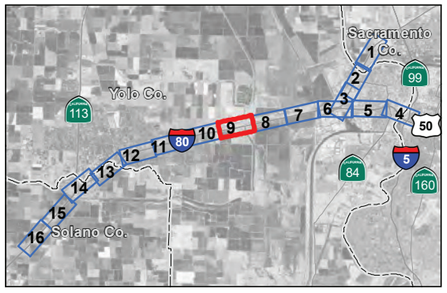
Note: The project design components depicted in this figure are preliminary. Proposed surface treatments such as striping are not included.

Figure 1.3-2
Project Design: Build Alternatives 2b, 3b, 4b, 5b, 6b, 7b
Yolo 80 Corridor Improvement Project
EA 03-3H900
Solano, Yolo, and Sacramento Counties, California

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- R/W
- ESL
- Post Mile
- Temporary Disturbance
- Cut-Fill
- Cut-Fill Disturbance Area
- Existing Class I Bikeway
- Extension of Class I and Class II Bikeway
- Extension of Class I Bikeway
- Temporary Bike Detour
- Yolo Bypass Wildlife Area
- Pullout

Signage and Read Point Locations
- Alternatives 3b, 4b, and 5b only
- Read Point (Alternatives 3b, 4b, and 5b only)

Culverts and Drainage
- All Alternatives

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Note: The project design components depicted in this figure are preliminary. Proposed surface treatments such as striping are not included.

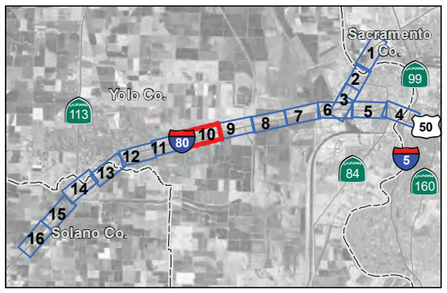
Figure 1.3-2
Project Design: Build Alternatives 2b, 3b, 4b, 5b, 6b, 7b

Yolo 80 Corridor Improvement Project
EA 03-3H900
Solano, Yolo, and Sacramento Counties, California

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- R/W
- ESL
- Post Mile
- Intelligent Transportation System Improvement
- Intelligent Transportation System Improvement Disturbance Area
- Fiber Optic Cable
- Fiber Optic Cable Disturbance Area
- Cut-Fill
- Cut-Fill Disturbance Area
- Widening - Median (Does not apply to Alternative 7b)
- Extension of Class I and Class II Bikeway
- Yolo Bypass Wildlife Area

Signage and Read Point Locations
- Read Point (Alternatives 3b, 4b, and 5b only)

Culverts and Drainage
- All Alternatives
- Alternatives 2b-6b

Note: The project design components depicted in this figure are preliminary. Proposed surface treatments such as striping are not included.

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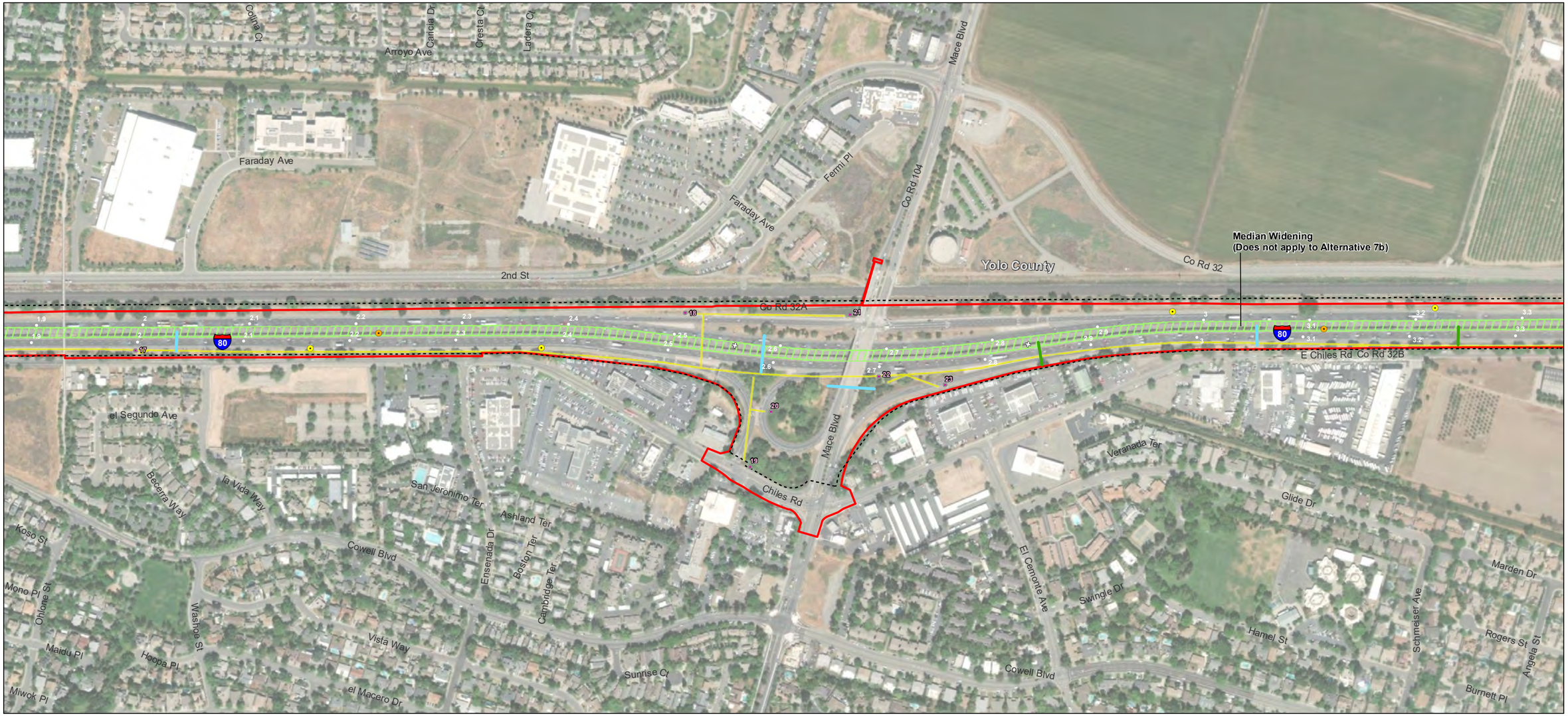
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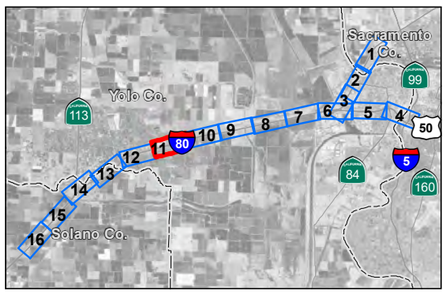
Figure 1.3-2
Project Design: Build Alternatives 2b, 3b, 4b, 5b, 6b, 7b

Yolo 80 Corridor Improvement Project
EA 03-3H900
Solano, Yolo, and Sacramento Counties, California

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- R/W
- ESL
- Post Mile
- Intelligent Transportation System Improvement
- Intelligent Transportation System Improvement Disturbance Area
- Fiber Optic Cable
- Fiber Optic Cable Disturbance Area
- Widening - Median (Does not apply to Alternative 7b)

Signage and Read Point Locations
- All Alternatives
- Alternatives 3b, 4b, and 5b only
- Read Point (Alternatives 3b, 4b, and 5b only)

Culverts and Drainage
- All Alternatives
- Alternatives 2b-6b

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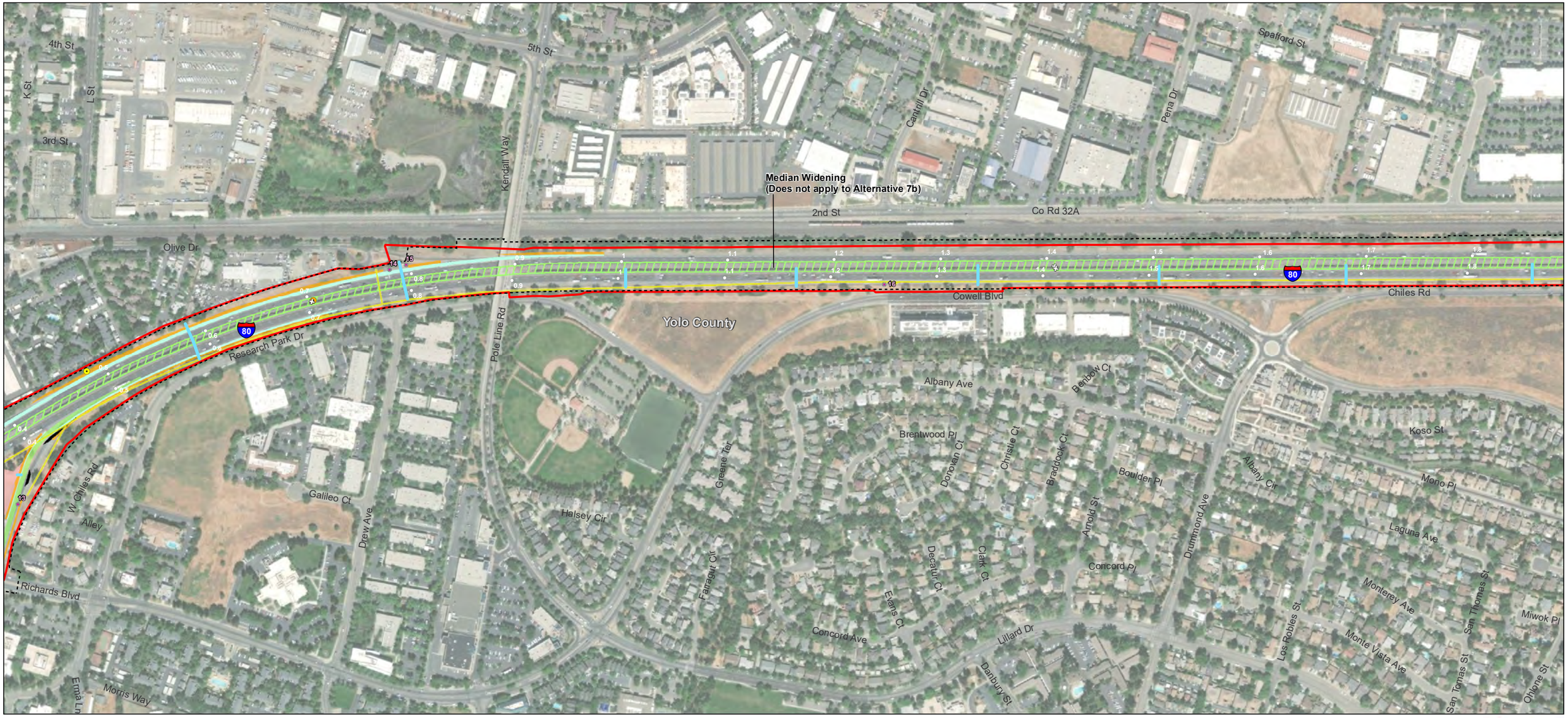
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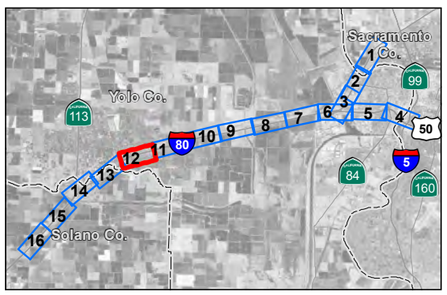
Figure 1.3-2
Project Design: Build Alternatives 2b, 3b, 4b, 5b, 6b, 7b

Yolo 80 Corridor Improvement Project
EA 03-3H900
Solano, Yolo, and Sacramento Counties, California

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Notes
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- R/W
- ESL
- Post Mile
- Intelligent Transportation System Improvement
- Intelligent Transportation System Improvement Disturbance Area
- Fiber Optic Cable
- Fiber Optic Cable Disturbance Area
- Cut-Fill Disturbance Area
- Staging Area
- Widening - Outside Lanes/Shoulder
- Widening - Median (Does not apply to Alternative 7b)
- Realigned Richards Blvd On-ramp
- Pullout

Signage and Read Point Locations
- All Alternatives
- Alternatives 3b, 4b, and 5b only
- Read Point (Alternatives 3b, 4b, and 5b only)

Culverts and Drainage
- All Alternatives

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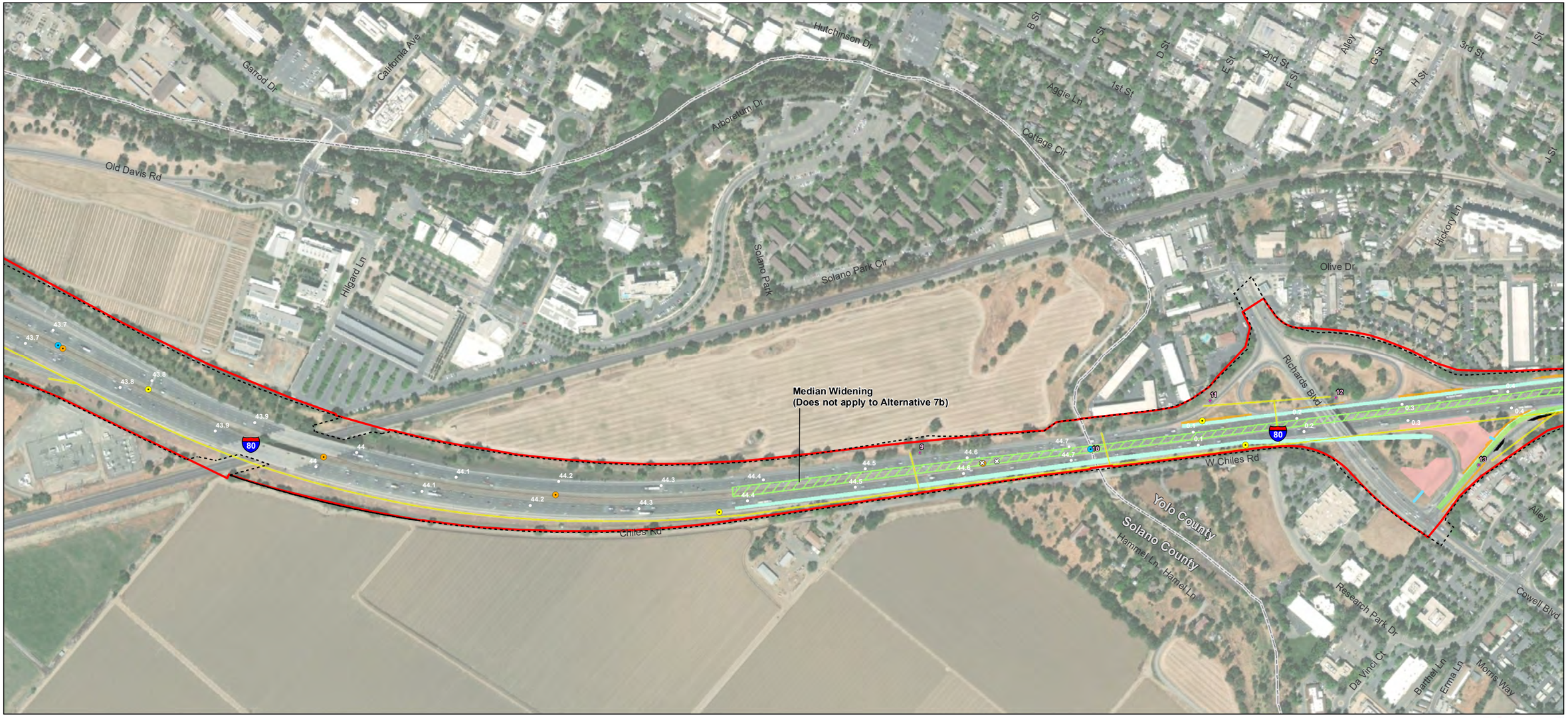
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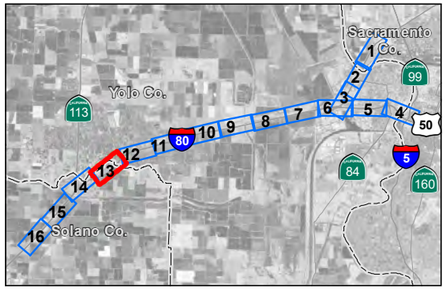
Figure 1.3-2
Project Design: Build Alternatives 2b, 3b, 4b, 5b, 6b, 7b

Yolo 80 Corridor Improvement Project
EA 03-3H900
Solano, Yolo, and Sacramento Counties, California

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- R/W
- ESL
- Post Mile
- Intelligent Transportation System Improvement
- Intelligent Transportation System Improvement Disturbance Area
- Fiber Optic Cable
- Fiber Optic Cable Disturbance Area
- Cut-Fill Disturbance Area
- Staging Area
- Widening - Outside Lanes/Shoulder
- Widening - Median (Does not apply to Alternative 7b)
- Realigned Richards Blvd On-ramp
- Pullout
- County Line

Signage and Read Point Locations
- All Alternatives
- Alternatives 2b, 6b, and 7b only
- Alternatives 3b, 4b, and 5b only
- Read Point (Alternatives 3b, 4b, and 5b only)

Culverts and Drainage
- All Alternatives

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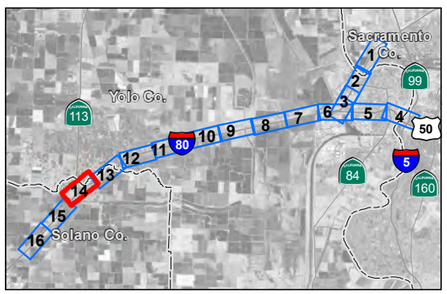
Figure 1.3-2
Project Design: Build Alternatives 2b, 3b, 4b, 5b, 6b, 7b

Yolo 80 Corridor Improvement Project
EA 03-3H900
Solano, Yolo, and Sacramento Counties, California

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- R/W
- ESL
- Post Mile
- Intelligent Transportation System Improvement
- Intelligent Transportation System Improvement Disturbance Area
- Fiber Optic Cable
- Fiber Optic Cable Disturbance Area
- Staging Area
- Pullout
- County Line

Signage and Read Point Locations

- All Alternatives
- Alternatives 2b, 6b, and 7b only
- Alternatives 3b, 4b, and 5b only

Notes

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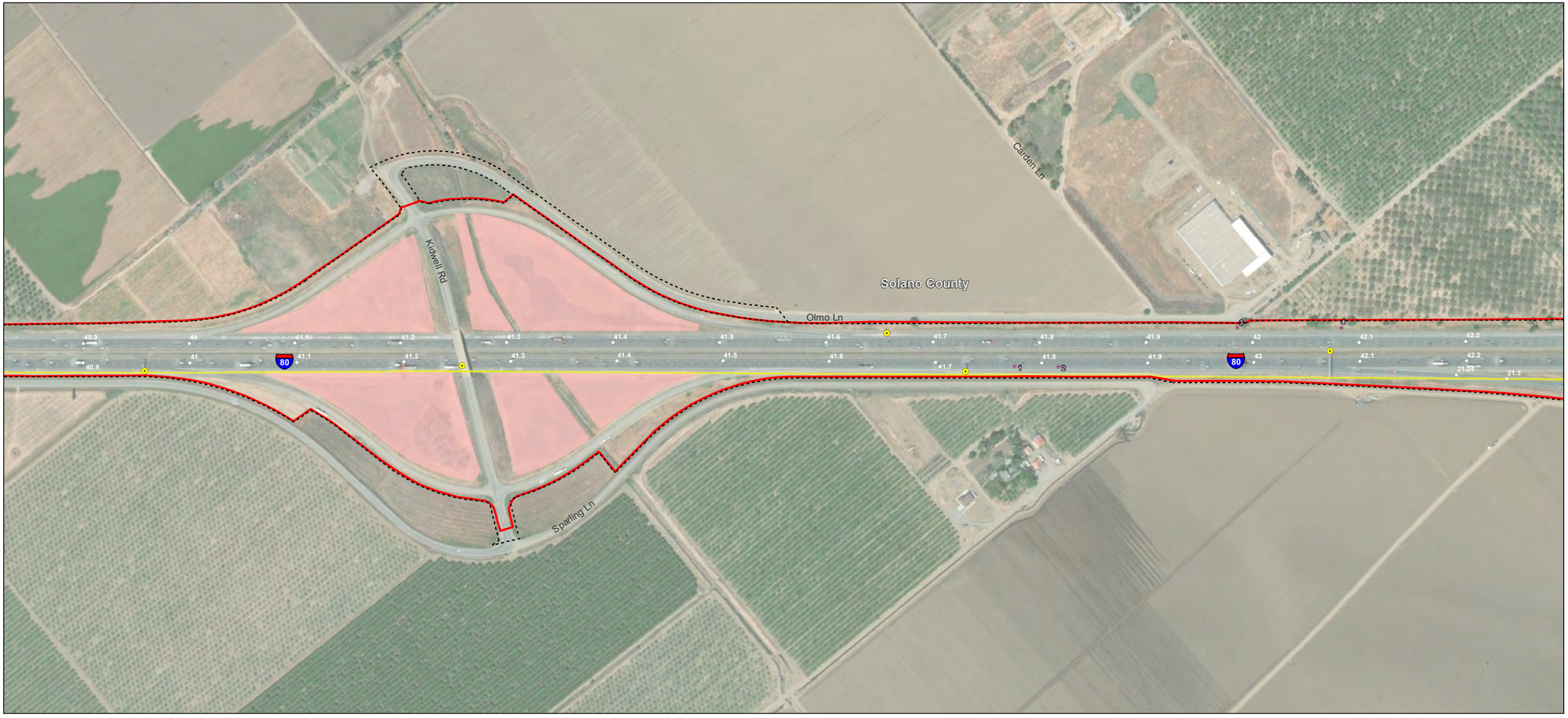
Note: The project design components depicted in this figure are preliminary. Proposed surface treatments such as striping are not included.

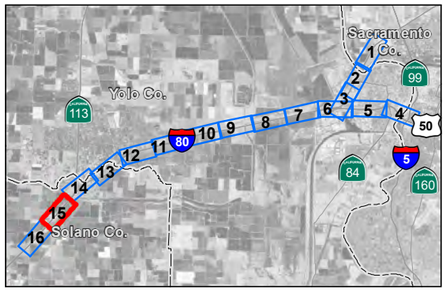
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Figure 1.3-2
Project Design: Build Alternatives 2b, 3b, 4b, 5b, 6b, 7b
Yolo 80 Corridor Improvement Project
EA 03-3H900
Solano, Yolo, and Sacramento Counties, California

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- R/W
- ESL
- Post Mile
- Intelligent Transportation System Improvement
- Intelligent Transportation System Improvement Disturbance Area
- Fiber Optic Cable
- Fiber Optic Cable Disturbance Area
- Staging Area

Signage and Read Point Locations

- All Alternatives

Notes

1. Coordinate System: NAD 1983 StatePlane California II FIPS 0402 Feet
2. Data Sources: CalTrans, Stantec, 2021
3. Background: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

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Note: The project design components depicted in this figure are preliminary. Proposed surface treatments such as striping are not included.

Figure 1.3-2
Project Design: Build Alternatives 2b, 3b, 4b, 5b, 6b, 7b

Yolo 80 Corridor Improvement Project

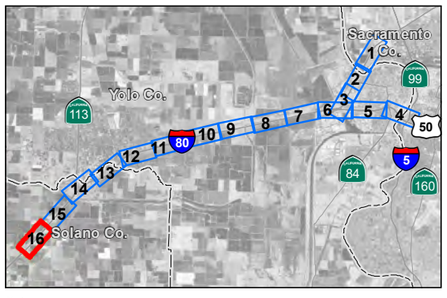
EA 03-3H900

Solano, Yolo, and Sacramento Counties, California

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- R/W
- ESL
- Post Mile
- Fiber Optic Cable
- Fiber Optic Cable Disturbance Area

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Feet

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Project Design: Build Alternatives 2b, 3b, 4b, 5b, 6b, 7b
Yolo 80 Corridor Improvement Project
EA 03-3H900
Solano, Yolo, and Sacramento Counties, California

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Chapter 2 Affected Environment, Environmental Consequences, and Avoidance, Minimization, and/or Mitigation Measures

The chapter discusses potential environmental impacts of the Yolo 80 Corridor Improvements Project (project) and recommended avoidance and minimization measures (AMMs), and mitigation measures (MMs). The proposed AMMs and MMs are also summarized in Appendix C. A list of references is available in Appendix D, a list of Standard Measures is included in Appendix E, a list of abbreviations used in this document is available in Appendix F, and the list of technical studies prepared for this project is available in Appendix H. This chapter also addresses issues of concern pursuant to the California Environmental Quality Act (CEQA) and the National Environmental Policy Act (NEPA). Please see Chapter 3 for the CEQA analysis.

Topics Considered but Determined Not to Be Relevant

As part of the scoping and environmental analysis carried out for the project, the following environmental issues were considered, but no adverse impacts were identified. As a result, there is no further discussion about the following issues in this document.

- **Coastal Zone** – The project is not located within the California Coastal Zone. As such, no coastal resources would be affected by construction or operation of the project.
- **Timberlands** – The project area is not located near timberlands. Therefore, the project would not convert timberlands to a non-timberland use or otherwise affect timberlands.
- **Wild and Scenic Rivers** – The project area does not traverse any rivers designated as part of the National Wild and Scenic Rivers System or the California Wild and Scenic Rivers Act. As such, no wild or scenic rivers would be affected by construction or operation of the project.
- **Relocations and Real Property Acquisition –** The project would be constructed primarily within the existing Caltrans right-of-way. No property acquisitions are needed, and no residents or businesses would be relocated.

2.1 Human Environment

2.1.1 Existing and Future Land Use

Information in this section is based on the Community Impact Assessment (CIA) prepared for the project (Caltrans 2023a).

The project is in Solano, Yolo, and Sacramento counties on the I-80/US-50 corridor, with a total project length of approximately 20.8 miles. To evaluate effects on land use, the Land Use Study Area is defined as the physical areas directly surrounding I-80/US-50 in the project area that have the potential to experience direct effects associated with the project. The Land Use Study Area includes the project area, plus a 1,000-foot buffer. The Land Use Study Area includes the population most likely to experience direct effects associated with the project's direct physical improvements.

2.1.1.1 Affected Environment

The Land Use Study Area extends through multiple jurisdictions; therefore, there are various plans that guide development, land use, and transportation policies within the Land Use Study Area. Figure 2.1-1 shows designated land uses within the Land Use Study Area.

The western segment of the Land Use Study Area is located within unincorporated Solano County and is surrounded by agricultural and commercial land use designations. These agricultural areas are also mapped by Solano County with an Agricultural Reserve Overlay.

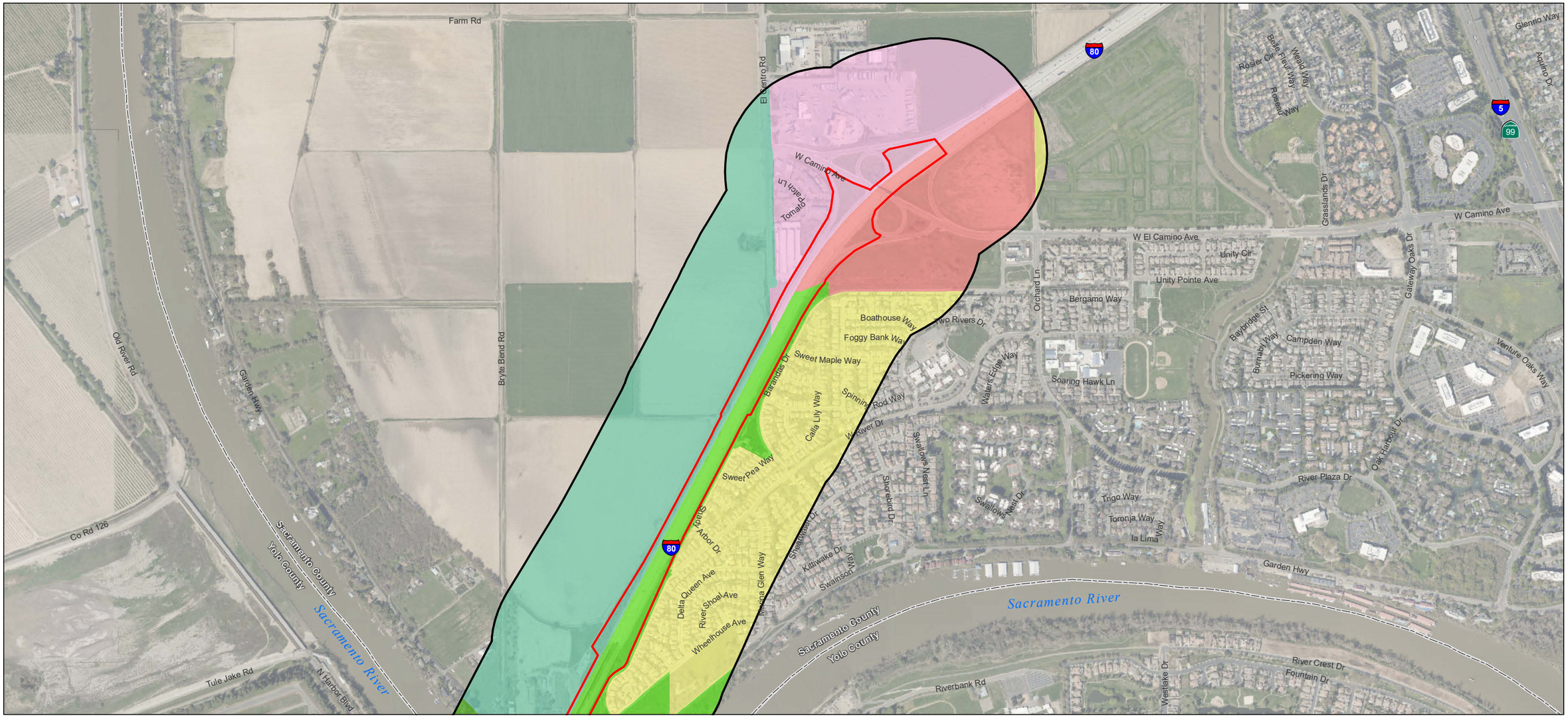
Once I-80 crosses into Yolo County, it is surrounded by the UC Davis campus, with land uses designated as public/quasi-public and agriculture. East of UC Davis, the Land Use Study Area passes through a mix of residential, industrial, open space, parks and recreation, mixed use, and commercial land uses in the city of Davis. It also passes through the City of Davis' Gateway Olive Drive Specific Plan (City of Davis 2018), which guides development in a 165-acre area north of I-80 near the Richards Boulevard Interchange.

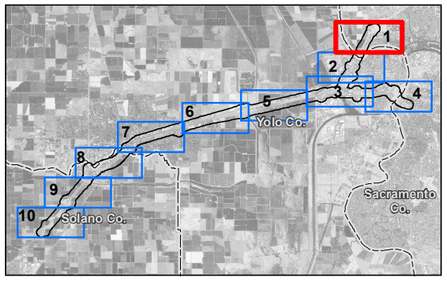
East of the city of Davis, I-80 crosses the Yolo Causeway and links the cities of Davis and West Sacramento across the Yolo Bypass floodway. These portions of the Land Use Study Area are designated by Yolo County as agriculture and open space.

In West Sacramento, I-80 passes through mostly commercial and industrial land uses, with some residential and public/quasi-public areas. After I-80 crosses the Sacramento River, the northeastern portion of the Land Use Study Area includes agricultural land uses within unincorporated Sacramento County, and residential, mixed use, and commercial areas within the city of Sacramento.

East of Harbor Boulevard, US-50 passes through residential, commercial, and mixed-use areas in the city of West Sacramento, including the Bridge District Specific Plan area, which provides the framework for mixed-use urban redevelopment areas along the Sacramento River. After crossing the Pioneer Bridge over the Sacramento River, US-50 enters the city of Sacramento, with land uses designated as parks and recreation, commercial/employment, public/quasi-public, and residential.

In addition to existing land uses, there are projects and developments within the existing and future I-80/US-50 travelshed and a large geographic catchment. The baseline transportation and development improvement projects that are planned and proposed for locations within the project area are listed in Chapter 1.





Land Use Study Area
ESL
County Line

Land Use
- Agriculture
- Commercial/Employment
- Industrial
- Mixed Use
- Open Space
- Parks and Recreation
- Public/Quasi-Public
- Residential - Low Density
- Residential - Medium Density
- Residential - High Density

N

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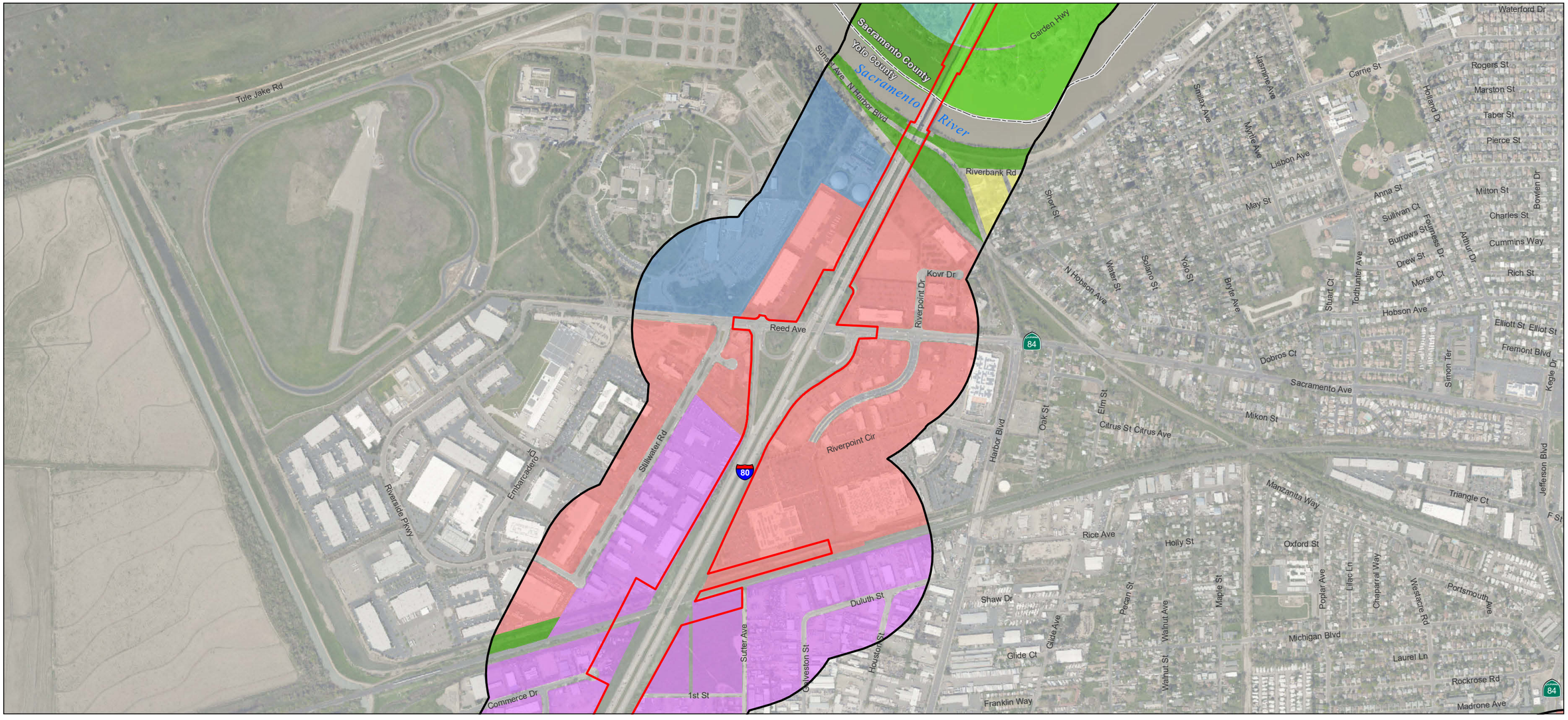
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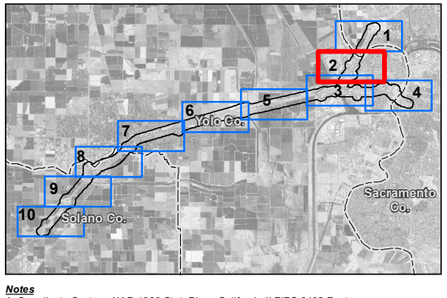
Notes
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2. Data Sources: CalTrans, Stantec, 2021
3. Background: Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Figure 2.1-1
Land Uses in the Land Use Study Area
Yolo 80 Corridor Improvement Project
EA 03-3H900
Solano, Yolo, and Sacramento Counties, California

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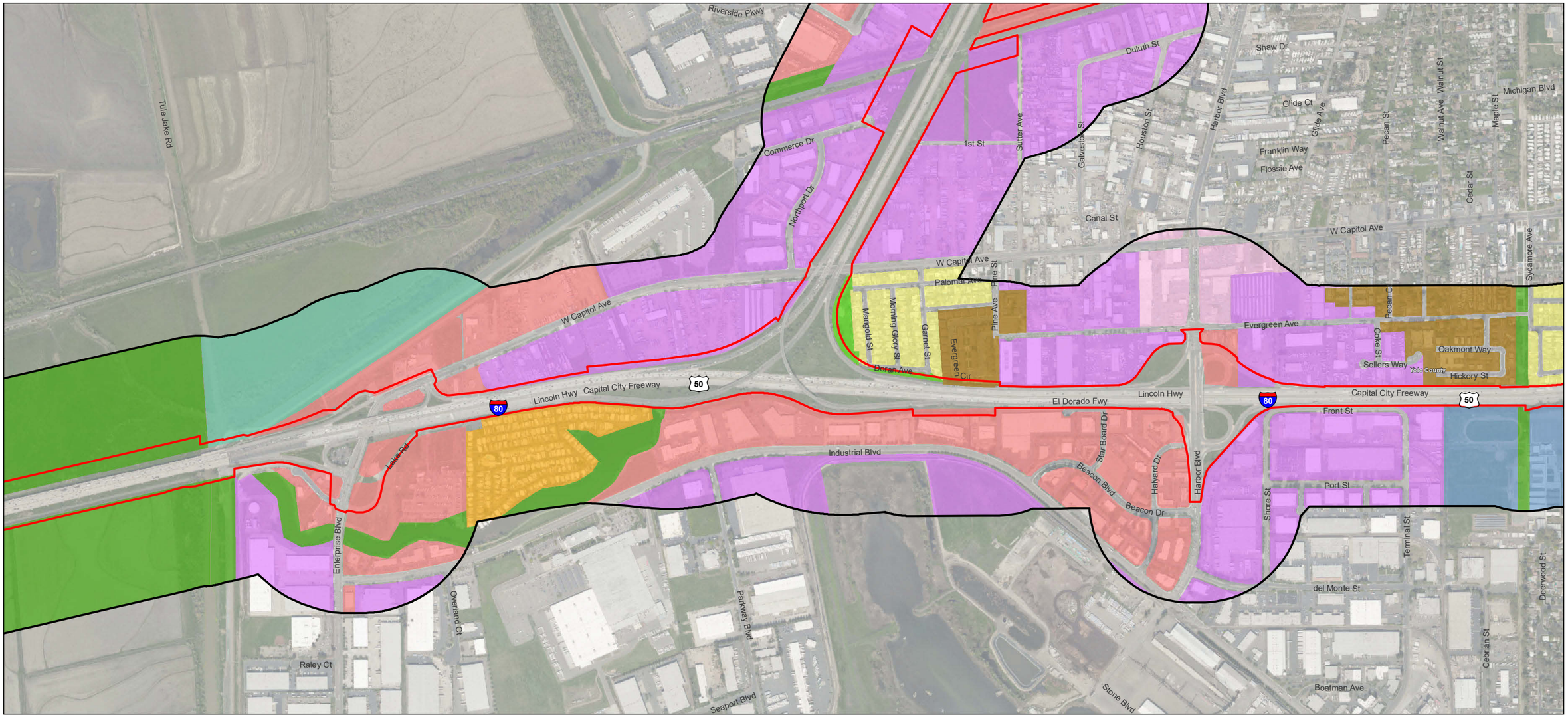
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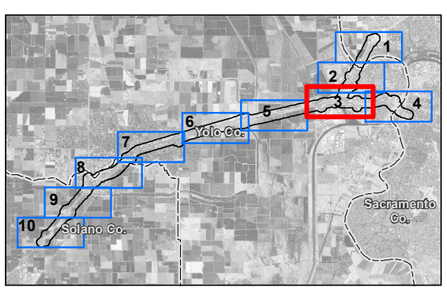
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EA 03-3H900
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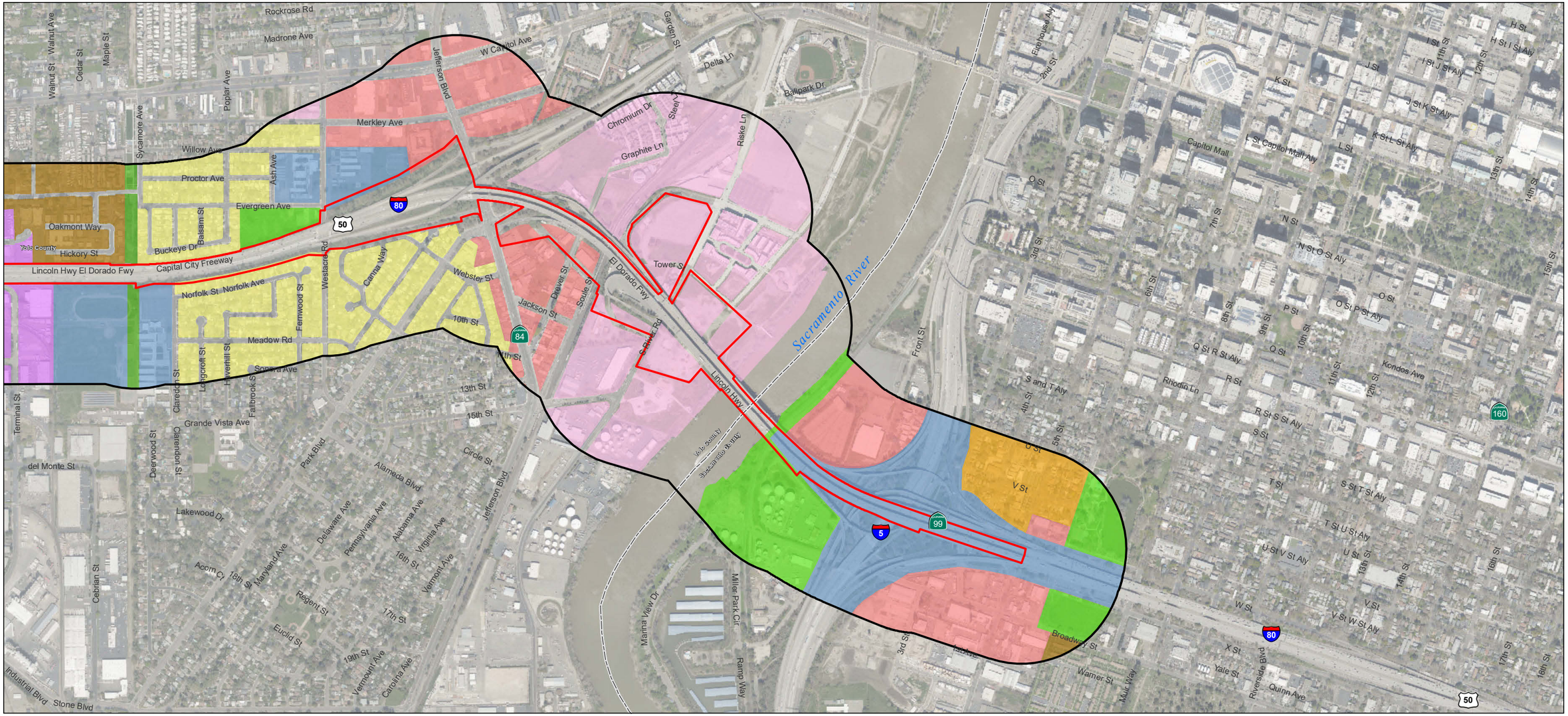
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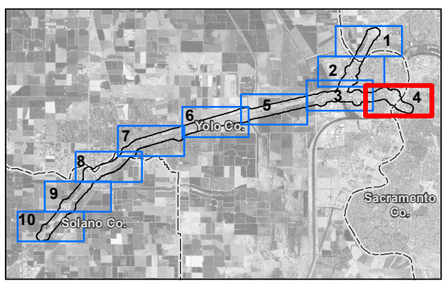
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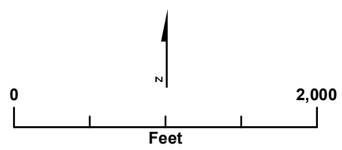
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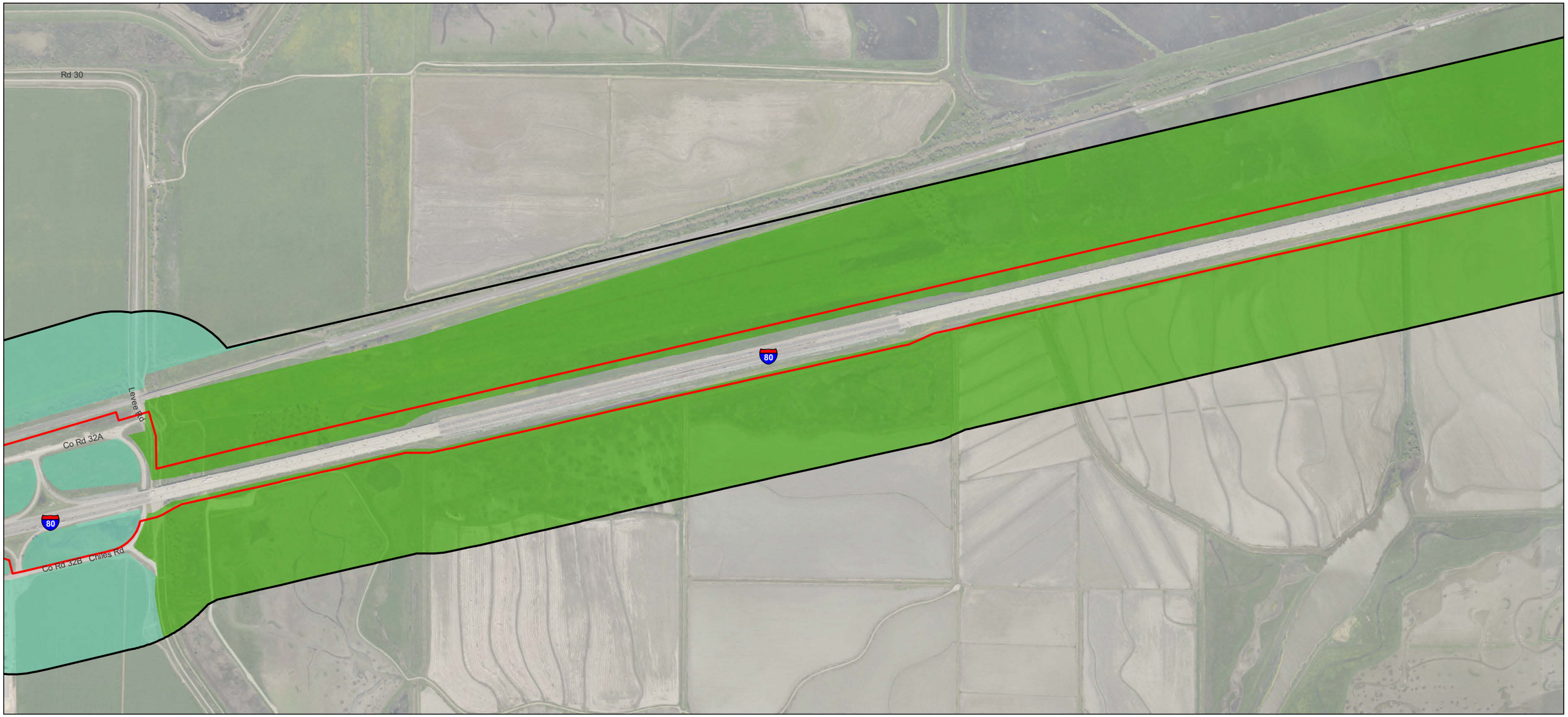
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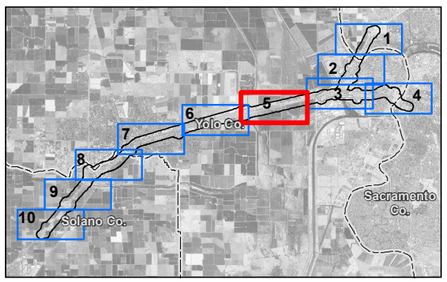
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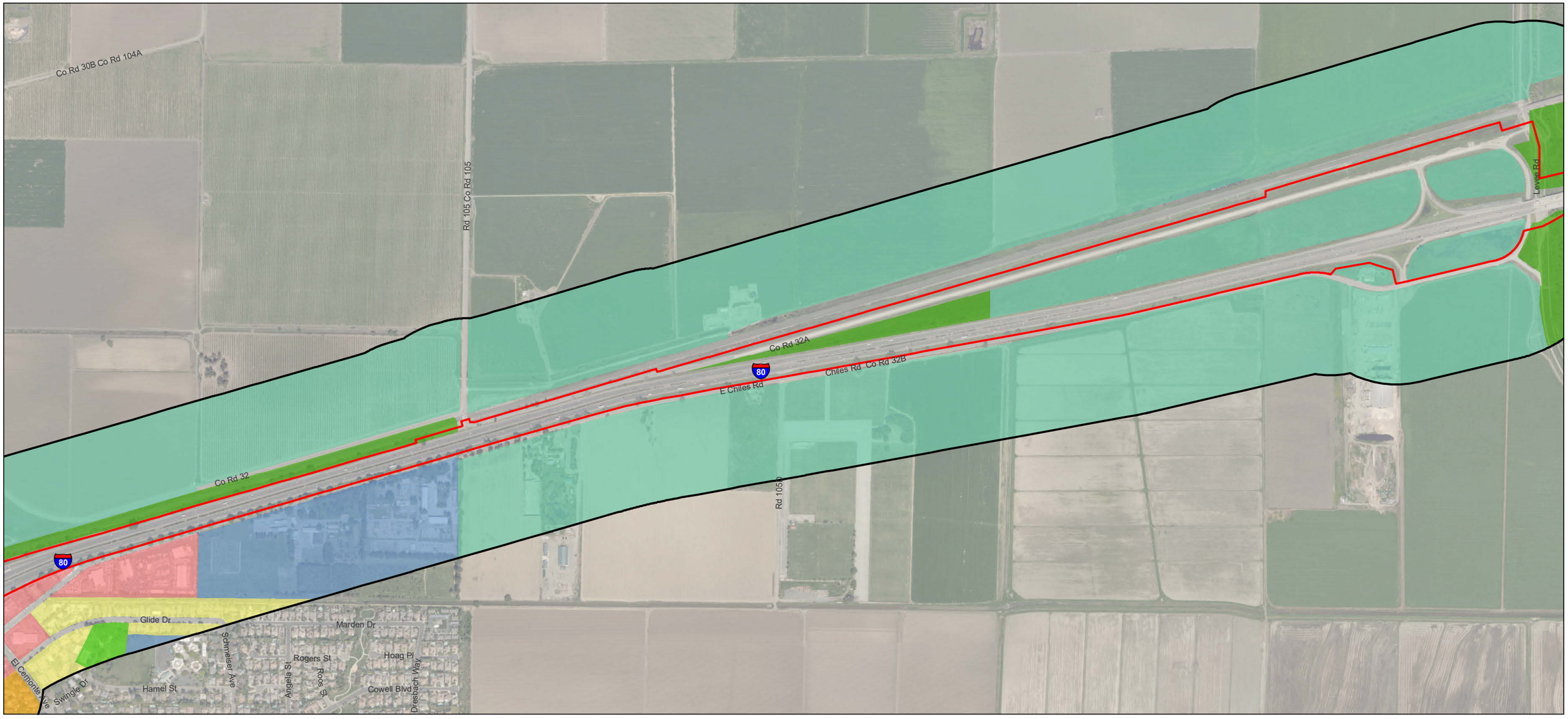
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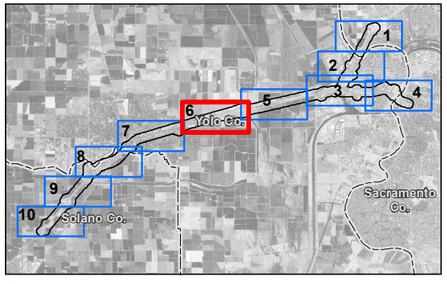
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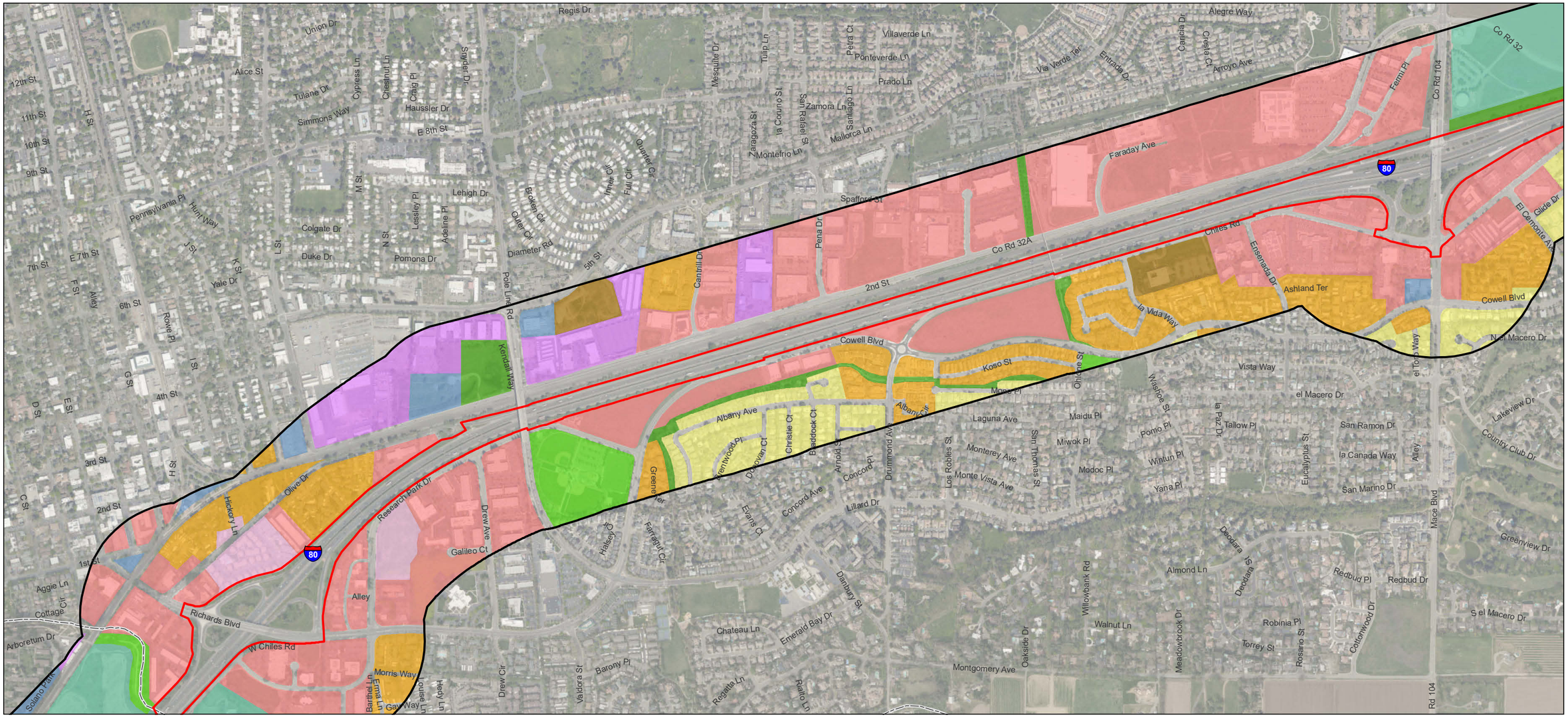
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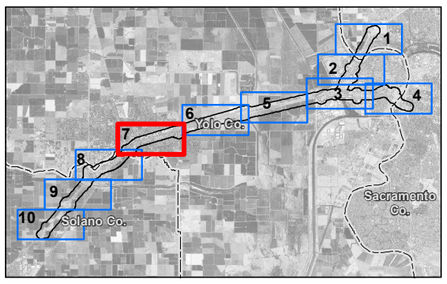
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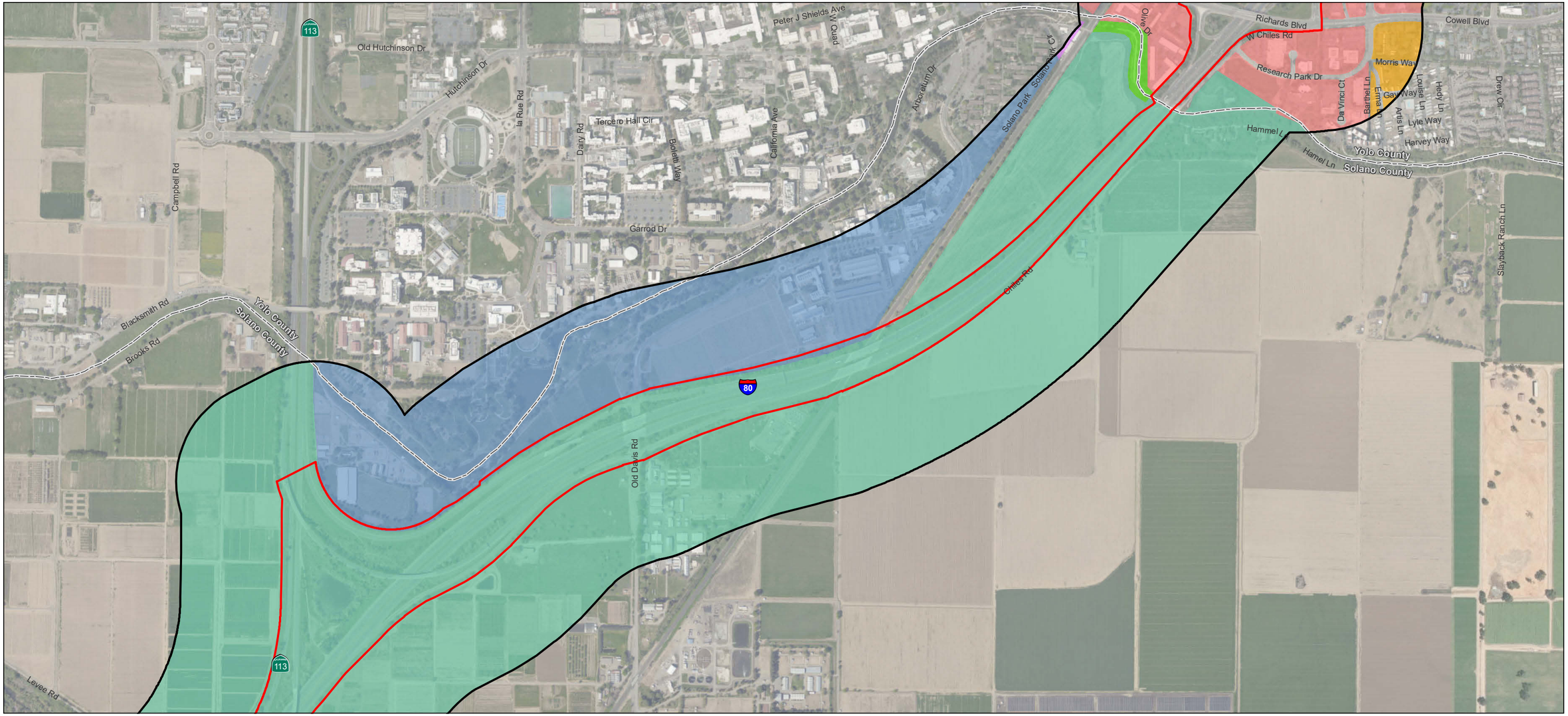
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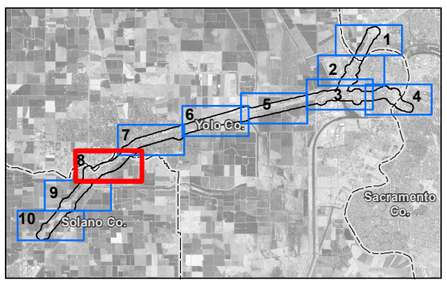
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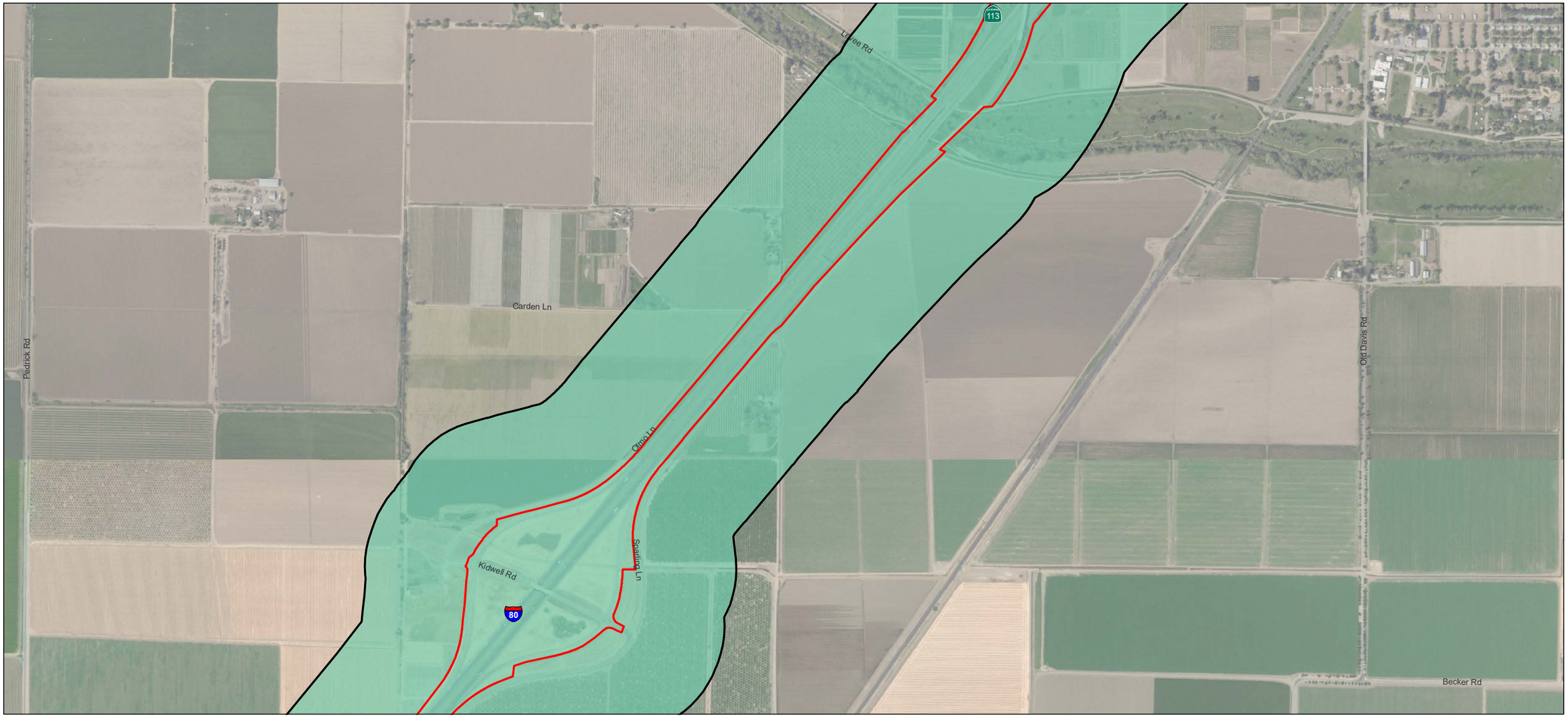
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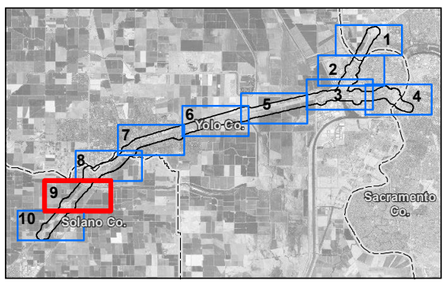
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Solano, Yolo, and Sacramento Counties, California

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Land Use Study Area
ESL

Land Use
- Agriculture
- Commercial/Employment
- Industrial
- Mixed Use
- Open Space
- Parks and Recreation
- Public/Quasi-Public
- Residential - Low Density
- Residential - Medium Density
- Residential - High Density

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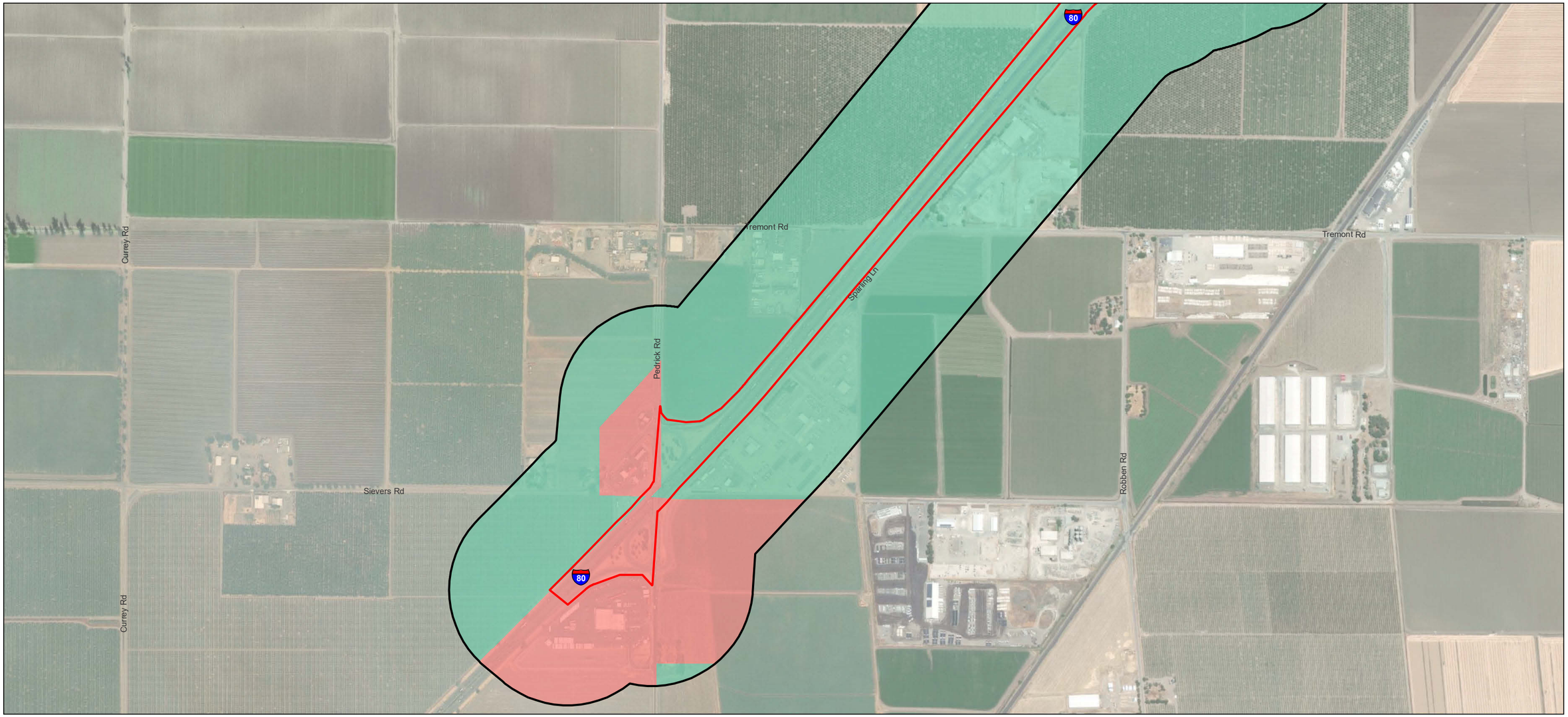
Caltrans

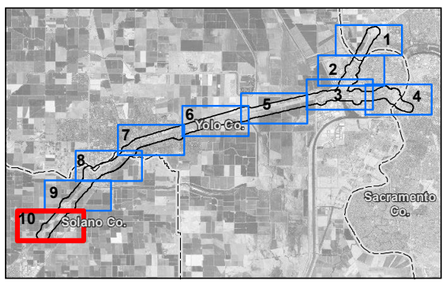
Notes
1. Coordinate System: NAD 1983 StatePlane California II FIPS 0402 Feet
2. Data Sources: CalTrans, Stantec, 2021
3. Background: Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Figure 2.1-1
Land Uses in the Land Use Study Area
Yolo 80 Corridor Improvement Project
EA 03-3H900
Solano, Yolo, and Sacramento Counties, California

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Caltrans

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2.1.1.2 Environmental Consequences

Indirect changes to land use can include changes in development patterns, rates, and densities, which may be influenced by changes in traffic patterns and highway capacity. The rate and location of regional growth and land use change can be influenced by travel time and travel cost for residents and workers. Improvements in access, traffic conditions, and lower travel costs can influence the attractiveness of some areas over others for future development.

As mentioned in the Fehr and Peers VMT Mitigation Estimates Technical Memo (Caltrans 2024b), the methodology utilized for calculating VMT reduction for each mitigation measure is based on modeling techniques using two different modeling strategies. The modeling strategies (SACSIM and TDM+) put forth each mitigation measure for analysis on VMT effects. As each mitigation measure was analyzed with a modeling tool, each output was then put towards equations from the California Air Pollution Control Officers Association (CAPCOA) 2021 to calculate VMT reduction. Each mitigation measure's VMT reduction is calculated and listed in the Technical Memo (Caltrans 2024b), as well as the VMT Mitigation Plan (Caltrans 2024a). Further, each mitigation measure was either part of SACOG's MTP/SCS or its own environmental review analysis. SACOG's MTP/SCS has a completed Environmental Impact Report, which incapsulates each project in the mitigation plan that is associated with the MTP/SCS.

The addition of three roundtrip train services on the Capitol Corridor route from Oakland to Sacramento would reduce VMT, as mentioned in the VMT Mitigation Plan (Caltrans 2024a). The calculations and basis for the VMT reduction is based on a Traffic Congestion Relief Program (TCRP) equation, that utilizes a direct effect and indirect effect of train services. In this case, the three additional roundtrips saves 6.3 million passenger miles, which is then multiplied by 2 to obtain the VMT reduction. Hence, the VMT reduction number of 12.6 million is shown in the VMT Mitigation Plan (Caltrans 2024a).

No Build Alternative 1

Construction and Operation

Under No Build Alternative 1, managed lanes and transportation improvements would not be constructed or operated. Therefore, the overall number of lanes in the project area would not change. As such, the No Build Alternative 1, would have no effect on existing and future land uses.

Build Alternatives 2a and 2b

Construction

Build Alternatives 2a and 2b would involve adding an HOV 2+ lane in each direction. Build Alternatives 2a and 2b would replace existing inside shoulders, construct a new median, construct pedestrian/bicycle improvements, install ITS elements, and other improvements. Build Alternative 2b would also install an I-80 connector structure. Most of the project work would occur entirely within the existing Caltrans right-of-way; however, construction would require a

temporary construction easement (TCE) and some staging areas located outside the Caltrans right-of-way. The TCE would be required to accommodate construction activities; however, such activities would not result in conversion of existing land uses adjacent to the project. No impact on existing or future land uses would occur. Therefore, Build Alternatives 2a and 2b would have no effect on existing and future land uses during construction. However, there will be impacts to Vehicle Miles Traveled (VMT), where the build alternatives will induce VMT through the project scope. As part of mitigation, the project will reduce VMT through VMT mitigation efforts.

As mentioned in the Fehr and Peers VMT Mitigation Estimates Technical Memo (Caltrans 2024b), the methodology utilized for calculating VMT reduction for each mitigation measure is based on modeling techniques using two different modeling strategies. The modeling strategies (SACSIM and TDM+) put forth each mitigation measure for analysis on VMT effects. As each mitigation measure was analyzed with a modeling tool, each output was then put towards equations from the California Air Pollution Control Officers Association (CAPCOA) 2021 to calculate VMT reduction. Each mitigation measure's VMT reduction is calculated and listed in the Technical Memo (Caltrans 2024b), as well as the VMT Mitigation Plan (Caltrans 2024a). Further, each mitigation measure was either part of SACOG's MTP/SCS or its own environmental review analysis. SACOG's MTP/SCS has a completed Environmental Impact Report, which incapsulates each project in the mitigation plan that is associated with the MTP/SCS.

The addition of three roundtrip train services on the Capitol Corridor route from Oakland to Sacramento would also reduce VMT, as mentioned in the VMT Mitigation Plan (Caltrans 2024a). The calculations and basis for the VMT reduction is based on a Traffic Congestion Relief Program (TCRP) equation, that utilizes a direct effect and indirect effect of train services. In this case, the three additional roundtrips save 6.3 million passenger miles, which is then multiplied by 2 to obtain the VMT reduction. Hence, the VMT reduction number of 12.6 million is shown in the VMT Mitigation Plan (Caltrans 2024a).

Operation

Build Alternatives 2a and 2b would involve acquisition of one permanent right-of-way easement for the proposed park-and-ride facility. No displacement of residences or businesses would be required.

By increasing freeway capacity and reducing travel costs, Build Alternatives 2a and 2b could change the rate of development expected compared to the No-Build condition. Since I-80 is a key link between the Sacramento and Bay Area, and homes in the Sacramento area are typically more affordable than homes in the Bay Area, the improved travel times on I-80 in the Project corridor could influence more Bay Area residents to move east to the Sacramento area and commute to job centers. However, other bottlenecks on I-80 and other highways into the Bay Area west of the Project (e.g., I-680, I-580, I-880, SR-37, SR-4) may deter commuters from Sacramento and outlying areas to the Bay Area. Within the Community Study Area, planned development at UC Davis and West Sacramento may benefit from the transportation improvement provided under the project, making these areas more attractive and changing the rate at which planned development would occur along the corridor. Improving travel times and capacity along I-80 is not expected to stimulate growth into areas where development is not

planned, as other impediments to growth (e.g., floodplain conditions, long-term wildlife refuge and agricultural preserves, and built-out conditions in city limits), market conditions, and local land use policies are a greater influence on land use change than roadway capacity.

The proposed Park-and-Ride Facility with approximately 300 parking spaces would be located on the east side of Enterprise Boulevard. The facility would total 4.5 acres, located partially within existing Caltrans right-of-way and partially outside the existing Caltrans right-of-way, requiring 2.8 acres of additional permanent easement acquisition. This additional right-of-way would be within an undeveloped area designated by the City of West Sacramento as "Highway-Service Commercial" land use, which provides for restaurants, service stations, hotels and motels, and other retail uses oriented principally to highway and through traffic, public and quasi-public uses, and similar and compatible uses (City of West Sacramento 2016). The construction of a park-and-ride facility is compatible with this land-use designation.

Furthermore, Build Alternatives 2a and 2b propose an extension of the Yolo Causeway Class I bicycle path along Levee Road (option A) or along the westbound off-ramp alignment (option B) to connect with County Road (CR-) 32A. This work would be completed in coordination with Yolo County, would be entirely within the Yolo County right-of-way, and would be performed through an encroachment permit acquired by Caltrans from Yolo County. Therefore, operation of Build Alternatives 2a and 2b would have no effect on existing and future land uses.

Build Alternatives 3a and 3b

Construction and Operation

Build Alternatives 3a and 3b propose similar project components within the same project area as Build Alternatives 2a and 2b, respectively. Therefore, the effects would be the same as effects described under Build Alternatives 2a and 2b.

Build Alternatives 4a and 4b

Construction and Operation

Build Alternatives 4a and 4b propose similar project components within the same project area as Build Alternatives 2a and 2b, respectively. Therefore, the effects would be the same as effects described under Build Alternatives 2a and 2b.

Build Alternatives 5a and 5b

Construction and Operation

Build Alternatives 5a and 5b propose similar project components within the same project area as Build Alternatives 2a and 2b, respectively. Therefore, the effects would be the same as effects described under Build Alternatives 2a and 2b.

Build Alternatives 6a and 6b

Construction and Operation

Build Alternatives 6a and 6b propose similar project components within the same project area as Build Alternatives 2a and 2b, respectively. Therefore, the effects would be the same as effects described under Build Alternatives 2a and 2b.

Build Alternatives 7a and 7b

Construction and Operation

Build Alternatives 7a and 7b would involve repurposing the current number 1 general purpose lane to HOV 2+. No new lanes would be constructed. Build Alternatives 7a and 7b propose similar project components within the same project area as Build Alternatives 2a and 2b, respectively. Therefore, the effects would be the same as effects described under Build Alternatives 2a and 2b.

2.1.1.3 Avoidance, Minimization, and/or Mitigation Measures

No AMMs or MMs are required.

2.1.2 Consistency with Regional, and Local Plans and Programs

2.1.2.1 Affected Environment

This section identifies state, regional, and local plans and programs, and describes how the project would be consistent with or conform to relevant plan and program elements (Table 2.1-1).

The segments of the I-80/US-50 corridor in the project area extend through multiple jurisdictions and are subject to the policies of several plans and programs that guide development and transportation policies within the Land Use Study Area. Regional and local plans discussed below include the SACOG Metropolitan Transportation Plan (MTP)/Sustainable Communities Strategy (SCS), the Solano County General Plan, City of Davis General Plan, Yolo County Revised Draft 2030 Countywide General Plan, City of West Sacramento General Plan, City of Sacramento 2035 General Plan, and Sacramento County 2030 General Plan.

Sacramento Area Council of Governments (SACOG) 2020 Metropolitan Transportation Plan (MTP)/Sustainable Communities Strategy (SCS)

The 2020 MTP/SCS prepared by SACOG serves as a transportation and land use strategy for the SACOG Planning Area. The overall focus for the 2020 update is to develop strategies to support access to jobs and economic opportunity, transportation options, and affordable housing in a manner that improves air quality, preserves open space, and reduces greenhouse gas (GHG) emissions. SACOG is looking at Caltrans-managed lane projects to lead efforts at transportation revenue and pricing. SACOG sees pricing mechanisms as a critical component of the regional strategy to raise revenue sufficient to build and maintain the region’s transportation

system, provide mobility benefits to residents, manage traffic and congestion, and help to achieve the state-mandated GHG reduction targets (Caltrans 2023a).

Solano County General Plan

A small part of the project area is located within unincorporated Solano County, largely within an area characterized by agricultural land use. The Transportation and Circulation chapter of the Solano County General Plan (Solano County 2008) sets forth the policy framework to shape circulation within Solano County.

The Solano County portion of the project is located within the Solano County Metropolitan Transportation Commission (MTC) area. The 2017 Solano County Regional Transportation Plan (RTP) does not include managed lanes between the Kidwell Road interchange and the Yolo County line. Although the Solano County portion of work for this project is not currently included in MTC's recently initiated RTP update, Caltrans District 4 will discuss this portion of work with the Solano County Transportation Authority. The project's scope of work for tolling facilities within Solano County is limited to advance warning signs, rather than any actual tolling facilities. The only tolling facility relations between this project and Solano County/District 4 would be if District 4 initiated its own tolling/managed lanes project from the end of the Yolo Bypass project's limits further into Solano County on I-80. Accordingly, Caltrans will continue to coordinate with Caltrans District 4, Solano County MTC, and Solano County Transportation Authority to include the Solano County portion of the project in their RTP update.

City of Davis General Plan

The City of Davis General Plan (Amended 2007) includes a transportation element that establishes goals, performance objectives, and policies to guide the evolution and development of the Davis transportation system to year 2035.

University of California, Davis 2018 Long-Range Development Plan

The UC Davis LRDP (2018) provides the growth policies for the main Davis campus and Russell Ranch research lands, totaling about 5,300 acres in Yolo and Solano counties.

Yolo County Revised Draft 2030 Countywide General Plan

Yolo County's Revised Draft 2030 Countywide General Plan (Yolo County 2009) determines land use planning throughout the unincorporated portions of the county and includes a circulation element that focuses on mobility and is correlated with the land uses in the Yolo County General Plan Land Use Element. The goals and policies emphasize multiple modes of travel and encourage non-vehicular trips.

City of West Sacramento General Plan

In 2016, the City of West Sacramento approved their General Plan 2035, which guides how the city should develop over time; specifies locations for various land uses, transportation improvements, new parks and open spaces, and other public infrastructure; and includes a

Mobility Element containing policies for developing a connected, efficient, multi-modal system (City of West Sacramento 2016).

City of Sacramento 2035 General Plan

The City of Sacramento 2035 General Plan identifies the vision, themes, and organization of the City of Sacramento. The Plan's goals, policies, and implementation programs are meant to provide a guide for future development and preservation of resources. Part 2 of the General Plan, *Citywide Goals and Policies*, includes a Mobility Element that describes Sacramento's goals and policies related to transportation.

The City of Sacramento is updating its general plan and anticipates adopting the 2040 General Plan in 2023. On January 19, 2021, the 2040 General Plan Draft Land Use Map, proposed roadway changes, and other key strategies were presented to the Sacramento City Council. The key strategies include substantial policy changes, including permitting a greater variety of housing types in single-unit neighborhoods, such as duplexes, triplexes, and fourplexes. These new policies may allow for greater density development in traditionally single-family residential neighborhoods (City of Sacramento 2022a). The goals and policies for the draft 2040 General Plan are still under review by the community through August 2023 and would be adopted in early 2024, so they are not presented in this consistency evaluation. Nevertheless, the proposed Build Alternatives would not conflict with the new housing and climate change policies proposed in the 2040 General Plan draft.

Sacramento County 2030 General Plan

The Sacramento County 2030 General Plan serves as a guide for growth and development within unincorporated Sacramento County. The plan focuses on economic growth and environmental sustainability, addressing the issues and needs of existing communities and establishing a framework for accommodating the growth of new communities. The Sacramento County General Plan includes a new growth management strategy, a stronger focus on addressing existing communities and revitalizing aging commercial corridors, a new economic development element, and strategies to reduce GHG emissions consistent with state law.

The Circulation Element of the Sacramento County General Plan was amended on October 6, 2020. Sacramento County supports the development of a regional network of Bus/Carpool lanes, including along I-80 and US-50 in the project area.

Table 2.1-1. Consistency with State, Regional and Local Plans and Programs

Policy	No Build Alternative 1	Build Alternatives 2a and 2b	Build Alternatives 3a and 3b	Build Alternatives 4a and 4b	Build Alternatives 5a and 5b	Build Alternatives 6a and 6b	Build Alternatives 7a and 7b
Sacramento Area Council of Governments Metropolitan Transportation Plan/Sustainable Communities Strategy							
Policy 12: Take steps to implement tolling or pricing of specific lanes on major facilities, such as freeways, to improve traffic management, reliability, and operations of those facilities and to help raise funding for the cost of building and maintaining large capital investments.	**Inconsistent.** The No Build Alternative does not involve tolling or pricing strategies.	**Partially Consistent**. Although Build Alternatives 2a and 2b would not implement tolling or pricing strategies, they would take steps to allow future tolling or pricing.	**Consistent.** Build Alternatives 3a and 3b would implement tolling or pricing strategies.	**Consistent.** Same as Build Alternatives 3a and 3b, respectively.	**Consistent.** Same as Build Alternatives 3a and 3b, respectively.	**Partially Consistent.** Build Alternatives 6a and 6b would not include tolling or pricing strategies. Further, due to underuse of the proposed transit lane, these alternatives would not improve traffic operations in the project corridor compared to the No-Build Alternative 1.	**Partially Consistent.** Build Alternatives 7a and 7b would not include tolling or pricing strategies. Further, due to lanes repurposed for HOVs, these alternatives would not improve traffic operations in the project corridor compared to the No-Build Alternative1.
Policy 13: All new major expansion projects on the region's freeways and expressways should be planned for eventual deployment of pricing options to both manage demand and provide a financing mechanism for capital costs. Any pricing strategy pursued should be sensitive to changes in roadway demand during different parts of the day (peak/off-peak) with the objective of managing demand and providing travel choice.	**Inconsistent.** The No Build Alternative does not involve development of a transportation improvement project.	**Partially Consistent**. Although Build Alternatives 2a and 2b would not implement tolling or pricing strategies, they would take steps to allow future tolling or pricing. Managed lanes would be operational during peak demand periods only.	**Consistent.** Build Alternatives 3a and 3b would implement tolling or pricing strategies.	**Consistent.** Same as Build Alternatives 3a and 3b, respectively.	**Consistent.** Same as Build Alternatives 3a and 2b, respectively.	**Inconsistent.** Build Alternatives 6a and 6b would not include tolling or pricing strategies. Further, due to underuse of the proposed transit lane, these alternatives would not improve traffic operations in the project corridor compared to the No-Build Alternative 1. Build Alternatives 6a and 6b would manage lanes for transit during peak hours.	**Inconsistent.** Built Alternatives 7a and 7b would not include tolling or pricing strategies. Further, due to lanes being repurposed for HOVs, these alternatives would not improve traffic operations in the project corridor compared to the No-Build Alternative 1. Build Alternatives 7a and 7b would manage lanes for HOV use during peak hours.
Policy 14: Revenues generated from facility-based pricing should be used to build and maintain a regional network of paid express lanes and, where surplus revenue is available, on strategic transit services (e.g., express buses) or other mobility solutions that can reduce vehicle miles traveled and provide multiple travel options along priced corridors.	**Inconsistent.** The No Build Alternative does not involve development of a transportation improvement project.	**Partially Consistent**. Although Build Alternatives 2a and 2b would not implement tolling or pricing strategies, they would take steps to allow future tolling or pricing.	**Consistent.** Build Alternatives 3a and 3b would implement tolling or pricing strategies.	**Consistent.** Same as Build Alternatives 3a and 2b, respectively.	**Consistent.** Same as Build Alternatives 3a and 3b, respectively.	**Inconsistent.** Build Alternative 6a and 6b would not include tolling or pricing strategies. Further, due to underuse of the proposed transit lane, these alternatives would not improve traffic operations in the project corridor compared to the No-Build Alternative 1.	**Inconsistent.** Build Alternative 7a and 7b would not include tolling or pricing strategies. Further, due to lanes being repurposed for HOVs, these alternatives would not improve traffic operations in the project corridor compared to the No-Build Alternative 1.
Policy 16: When implementing pricing strategies, both paid express lanes and mileage-based fees/PayGo, the region should make every effort to avoid negatively impacting lower-income and rural households. For regional implementation of PayGo, explore innovative options for setting fees, such as including offsetting incentives for non-vehicular travel, offsets to fees for disadvantaged households, and keying fee rates to maintenance and fix-it-first goals.	**Inconsistent.** The No Build Alternative does not involve development of a transportation improvement project.	**Partially consistent.** Build Alternatives 2a and 2b would not implement tolling or pricing strategies and the benefits to all communities would be equal. However, they would take steps to allow future tolling or pricing by adding or repurposing lanes for HOVs.	**Partially consistent.** Build Alternatives 3a and 3b would implement tolling or pricing strategies. It would benefit all travelers using the I-80/US-50 corridor, including environmental justice communities. While they would not negatively affect lower-income or rural households, these alternatives may have proportionally smaller benefits to lower-income and rural households who may be less able to pay fees for the use of managed lanes.	**Partially consistent.** Same as Build Alternatives3a and 3b, respectively.	**Partially consistent.** Same as Build Alternatives 3a and 3b, respectively.	**Partially consistent.** Build Alternatives 6a and 6b would add a transit lane in each direction. Although it would not include tolling or pricing strategies, it could potentially provide proportionally larger benefits to lower-income households using transit.	**Partially consistent.** Same as Build Alternatives 2a and 2b, respectively.

Policy	No Build Alternative 1	Build Alternatives 2a and 2b	Build Alternatives 3a and 3b	Build Alternatives 4a and 4b	Build Alternatives 5a and 5b	Build Alternatives 6a and 6b	Build Alternatives 7a and 7b
Policy 18: System expansion investments that are not directly paid for by new development should be focused on fixing major bottlenecks that exist today, and/or incentivize development opportunities in infill areas.	**Inconsistent.** The No Build Alternative does not involve development of a transportation improvement project.	**Consistent.** Build Alternatives 2a and 2b would address key existing bottleneck locations on I-80/US-50 in the project area.	**Consistent.** Same as Build Alternatives 2a and 2b, respectively.	**Consistent.** Same as Build Alternatives 2a and 2b, respectively.	**Consistent.** Same as Build Alternatives 2a and 2b, respectively.	**Inconsistent.** Due to underuse of the proposed transit lane, these alternatives would not improve existing bottlenecks compared to the No-Build Alternative 1.	**Inconsistent.** Due to lanes being repurposed for HOVs, these alternatives would not improve existing bottlenecks compared to the No-Build Alternative 1.
Policy 22: Invest in bicycle and pedestrian infrastructure to encourage healthy, active transportation trips and provide recreational opportunities for residents and visitors.	**Inconsistent.** The No Build Alternative does not involve development of a transportation improvement project.	**Consistent.** Build Alternatives 2a and 2b would extend the westernmost limit of the existing Class I bicycle pathway along I-80 at the Yolo Causeway to connect to CR-32A.	**Consistent.** Same as Build Alternatives 2a and 2b, respectively.	**Consistent.** Same as Build Alternatives 2a and 2b, respectively.	**Consistent.** Same as Build Alternatives 2a and 2b, respectively.	**Consistent.** Same as Build Alternatives 2a and 2b, respectively.	**Consistent.** Same as Build Alternatives 2a and 2b, respectively.
Policy 23: Prioritize and incentivize transportation investments that benefit environmental justice communities.	**Inconsistent.** The No Build Alternative does not involve development of a transportation improvement project.	**Partially consistent.** Build Alternatives 2a and 2b would add or repurpose lanes for HOVs. The benefits to all communities would be equal, including environmental justice communities.	**Partially consistent.** Build Alternatives 3a and 3b would benefit all travelers using the I-80/US-50 corridor, including environmental justice communities. However, this alternative may have proportionally smaller benefits to environmental justice communities who may be less able to pay fees for use of HOT or express lanes.	**Partially consistent.** Same as Build Alternatives 3a and 3b, respectively.	**Partially consistent.** Same as Build Alternatives 3a and 3b, respectively.	**Consistent.** Build Alternatives 6a and 6b would add a transit lane in each direction, which could potentially provide proportionally larger benefits to environmental justice communities.	**Partially consistent.** Same as Build Alternatives 2a and 2b.
Policy 24: Invest in transportation improvements that improve access to major economic assets and job centers.	**Inconsistent.** The No Build Alternative does not involve development of a transportation improvement project.	**Consistent.** Build Alternatives 2a and 2b would improve circulation on I-80/US-50 in the project area, which would improve access to major economic assets and job centers.	**Consistent.** Same as Build Alternatives 2a and 2b, respectively.	**Consistent.** Same as Build Alternatives 2a and 2b, respectively.	**Consistent.** Same as Build Alternatives 2a and 2b, respectively.	**Inconsistent.** Due to underuse of the proposed transit lane, these alternatives would not improve peak-hour circulation in the project corridor compared to the No-Build Alternative 1.	**Inconsistent.** Due to lanes being repurposed for HOVs, these alternatives would not improve peak-hour circulation in the project corridor compared to the No-Build Alternative 1.
Solano County General Plan							
Policy TC.P-1: Maintain and improve current transportation systems to remedy safety and congestion issues and establish specific actions to address these issues when they occur.	**Inconsistent.** The No Build Alternative does not involve development of a transportation improvement project.	**Consistent.** Build Alternatives 2a and 2b would include managed lanes to improve traffic operations on I-80/US-50 in the project area.	**Consistent.** Same as Build Alternatives 2a and 2b, respectively.	**Consistent.** Same as Build Alternatives 2a and 2b, respectively.	**Consistent.** Same as Build Alternatives 2a and 2b, respectively.	**Inconsistent.** Due to underuse of the proposed transit lane, these alternatives would not improve peak-hour circulation in the project corridor compared to the No-Build Alternative 1.	**Inconsistent.** Due to lanes being repurposed for HOVs, these alternatives would not improve peak-hour circulation in the project corridor compared to the No-Build Alternative 1.
Policy TC.P-8: Actively participate with Caltrans, Solano Transportation Authority, cities, and other agencies to plan for any proposed future realignments of current interregional routes.	**Inconsistent.** The No Build Alternative does not involve development of a transportation improvement project.	**Consistent.** Build Alternatives 2a and 2b would include managed lanes to improve traffic operations on I-80/US-50 in the project area and this is being coordinated with other transportation planning agencies.	**Consistent.** Same as Build Alternatives 2a and 2b, respectively.	**Consistent.** Same as Build Alternatives 2a and 2b, respectively.	**Consistent.** Same as Build Alternatives 2a and 2b, respectively.	**Consistent.** Same as Build Alternatives 2a and 2b, respectively.	**Consistent.** Same as Build Alternatives 2a and 2b, respectively.

Policy	No Build Alternative 1	Build Alternatives 2a and 2b	Build Alternatives 3a and 3b	Build Alternatives 4a and 4b	Build Alternatives 5a and 5b	Build Alternatives 6a and 6b	Build Alternatives 7a and 7b
Policy TC.P-18: Encourage the development of transit facilities and operations along major corridors to connect the county with surrounding activity centers and regional destinations.	**Inconsistent.** The No Build Alternative does not involve development of a transportation improvement project.	**Consistent.** Build Alternatives 2a and 2b would include managed lanes to improve traffic operations on I-80/US-50 in the project area and development of a new Park-and-Ride Facility.	**Consistent.** Same as Build Alternatives 2a and 2b, respectively.	**Consistent.** Same as Build Alternatives 2a and 2b, respectively.	**Consistent.** Same as Build Alternatives 2a and 2b, respectively.	**Consistent.** Same as Build Alternatives 2a and 2b, respectively.	**Consistent.** Same as Build Alternatives 2a and 2b, respectively.
City of Davis General Plan							
Policy 1.2: Transportation access, accommodations, and circulation should contribute to creating a supportive environment for economic development in the downtown for both residents and visitors.	**Inconsistent.** The No Build Alternative does not involve development of a transportation improvement project.	**Consistent.** Build Alternatives 2a and 2b would improve traffic operations on I-80/US-50 in the project area, including around downtown Davis interchanges.	**Consistent.** Same as Build Alternatives 2a and 2b, respectively.	**Consistent.** Same as Build Alternatives 2a and 2b, respectively.	**Consistent.** Same as Build Alternatives 2a and 2b, respectively.	**Inconsistent.** Due to underuse of the proposed transit lane, these alternatives would not improve peak-hour circulation in the project corridor compared to the No-Build Alternative 1.	**Inconsistent.** Due to lanes being repurposed for HOVs, these alternatives would not improve peak-hour circulation in the project corridor compared to the No-Build Alternative 1.
Policy 6.3: Address Davis' transportation needs as a major regional destination. Regularly coordinate with SACOG to ensure Davis transportation needs and priorities are appropriately considered. Coordinate with Yolo County, Solano County, and UC Davis to improve multi-modal access and connectivity between major intercity destinations. Coordinate with Yolobus, SACOG, UC Davis, and other relevant entities to provide direct public transportation service from Davis to Sacramento International Airport. Coordinate with Caltrans regarding highway corridor planning for segments that are within or may affect those within the Davis city limits related to: Highway lane widenings HOV lanes HOT lanes Interchange improvements or additions Bicycle connectivity	**Inconsistent.** The No Build Alternative does not involve development of a transportation improvement project.	**Consistent.** Build Alternatives 2a and 2b would improve traffic operations on I-80/US-50 in the project area.	**Consistent.** Same as Build Alternatives 2a and 2b, respectively.	**Consistent.** Same as Build Alternatives 2a and 2b, respectively.	**Consistent.** Same as Build Alternatives 2a and 2b, respectively.	**Inconsistent.** Due to underuse of the proposed transit lane, these alternatives would not improve peak-hour circulation in the project corridor compared to the No-Build Alternative 1.	**Inconsistent.** Due to lanes being repurposed for HOVs, these alternatives would not improve peak-hour circulation in the project corridor compared to the No-Build Alternative 1.
UC Davis 2018 Long Range Development Plan							
Provide Land for Remote Parking Facility: Reserve land for a remote 'park n bike' facility west of Old Davis Road, near the exit ramp for I-80; consider additional multi-modal transportation and clean energy features, such as the layering of renewable energy production atop surface parking lots; facilitation of regional transit access and high-speed charging stations for electric vehicles.	**Inconsistent.** The No Build Alternative does not involve development of a transportation improvement project.	**Consistent**. Build Alternatives 2a and 2b would include managed lanes to promote multi-modal transportation options and improve traffic operations on I-80/US-50 in the project area.	**Consistent.** Same as Build Alternatives 2a and 2b, respectively.	**Consistent.** Same as Build Alternatives 2a and 2b, respectively.	**Consistent.** Same as Build Alternatives 2a and 2b, respectively.	**Consistent.** Same as Build Alternatives 2a and 2b, respectively.	**Consistent.** Same as Build Alternatives 2a and 2b, respectively.

Policy	No Build Alternative 1	Build Alternatives 2a and 2b	Build Alternatives 3a and 3b	Build Alternatives 4a and 4b	Build Alternatives 5a and 5b	Build Alternatives 6a and 6b	Build Alternatives 7a and 7b
Preserve and Enhance the Bicycle and Pedestrian Infrastructure: Preserve, enhance, and expand bicycle and pedestrian infrastructure; expand bicycle pathways and increase bicycle parking areas throughout the campus; improve bicycle safety through educational programs; reduce bicycle and pedestrian conflicts; provide more designated areas for pedestrians; provide safe and gracious walkways for pedestrians throughout campus.	**Inconsistent.** The No Build Alternative does not involve development of a transportation improvement project.	**Partially consistent.** Build Alternatives 2a and 2b would extend the westernmost limit of the existing Class I bicycle pathway along I-80 at the Yolo Causeway to connect to CR-32A.	**Partially Consistent.** Same as Build Alternatives 2a and 2b, respectively.	**Partially Consistent.** Same as Build Alternatives 2a and 2b, respectively.	**Partially Consistent.** Same as Build Alternatives 2a and 2b, respectively.	**Partially Consistent.** Same as Build Alternatives 2a and 2b, respectively.	**Partially Consistent.** Same as Build Alternatives 2a and 2b, respectively.
Foster A Healthier Transportation Ecosystem: Enhance and expand travel services and programs to meet the daily mobility needs of the campus community and create a healthier transportation ecosystem; promote more sustainable travel choices to improve health of the individual, the environment, and the institution.	**Inconsistent.** The No Build Alternative does not involve development of a transportation improvement project.	**Consistent.** Build Alternatives 2a and 2b would include managed lanes to promote multi-modal transportation options and improve traffic operations on I-80/US-50 in the project area.	**Consistent.** Same as Build Alternatives 2a and 2b, respectively.	**Consistent.** Same as Build Alternatives 2a and 2b, respectively.	**Consistent.** Same as Build Alternatives 2a and 2b, respectively.	**Consistent.** Same as Build Alternatives 2a and 2b, respectively.	**Consistent.** Same as Build Alternatives 2a and 2b, respectively.
Enhance Transit Service: Preserve and enhance transit service; continue to prioritize and improve transit access to the core campus area; consider improvements to the Hutchison Drive corridor for Unitrans buses and for safely mixing buses, bikes, and pedestrians.	**Inconsistent.** The No Build Alternative does not involve development of a transportation improvement project.	**Consistent.** Build Alternatives 2a and 2b would include managed lanes to promote multi-modal transportation options and improve traffic operations on I-80/US-50 in the project area.	**Consistent.** Same as Build Alternatives 2a and 2b, respectively.	**Consistent.** Same as Build Alternatives 2a and 2b, respectively.	**Consistent.** Same as Build Alternatives 2a and 2b, respectively.	**Consistent.** Build Alternatives 6a and 6b would add a transit lane in each direction, which could improve public transit options and reduce SOVs.	**Consistent.** Same as Build Alternatives 2a and 2b, respectively.
Invest In Programs Before Parking: Invest in transportation programs before constructing additional parking infrastructure; offer programs and services that promote more sustainable travel choices and minimize impacts to overall parking supply; balance adequate parking supply with the campus objective to reduce GHG emissions.	**Inconsistent.** The No Build Alternative does not involve development of a transportation improvement project.	**Consistent.** Build Alternatives 2a and 2b would include managed lanes to promote multi-modal transportation options and improve traffic operations on I-80/US-50 in the project area.	**Consistent.** Same as Build Alternatives 2a and 2b, respectively.	**Consistent.** Same as Build Alternatives 2a and 2b, respectively.	**Consistent.** Same as Build Alternatives 2a and 2b, respectively.	**Consistent.** Same as Build Alternatives 2a and 2b, respectively.	**Consistent.** Same as Build Alternatives 2a and 2b, respectively.
Promote Ride Sharing: Promote carpools and vanpools as viable transportation options that reduce parking demand for the campus community; monitor the utilization of ride-hailing services and proactively manage campus circulation network to promote walking, biking, and busing as preferred travel modes.	**Inconsistent.** The No Build Alternative does not involve development of a transportation improvement project.	**Partially consistent.** The managed lanes under Build Alternatives 2a and 2b would incentivize increased vehicle occupancy, ride sharing, and/or transit use.	**Partially consistent.** Same as Build Alternatives 2a and 2b, respectively.	**Partially consistent.** Same as Build Alternatives 2a and 2b, respectively.	**Partially consistent.** Same as Build Alternatives 2a and 2b, respectively.	**Consistent.** Build Alternatives 6a and 6b would add a transit lane in each direction, which could improve public transit options.	**Partially consistent.** Same as Build Alternatives 2a and 2b, respectively.

Policy	No Build Alternative 1	Build Alternatives 2a and 2b	Build Alternatives 3a and 3b	Build Alternatives 4a and 4b	Build Alternatives 5a and 5b	Build Alternatives 6a and 6b	Build Alternatives 7a and 7b
Single Occupancy Vehicle Reduction: Per the University of California Policy on Sustainable Practices, strive to reduce the percentage of employees and students commuting by single occupancy vehicles (SOV) in 2025 by 10 percent relative to 2015-16 SOV commute rate. By 2050, strive to have no more than 40 percent of employees and no more than 30 percent of all employees and students commuting by SOV.	**Inconsistent.** The No Build Alternative does not involve development of a transportation improvement project.	**Partially consistent.** The managed lanes under Build Alternatives 2a and 2b would incentivize increased vehicle occupancy and/or transit use, thereby reducing SOV.	**Partially consistent.** Same as Build Alternatives 2a and 2b, respectively.	**Partially consistent.** Same as Build Alternatives 2a and 2b, respectively.	**Partially consistent.** Same as Build Alternatives 2a and 2b, respectively.	**Consistent.** Build Alternatives 6a and 6b would add a transit lane in each direction, which could improve public transit options and reduce SOVs.	**Partially consistent.** Same as Build Alternatives 2a and 2b, respectively.
Yolo County Revised Draft 2030 Countywide General Plan							
Policy CI-1.4: Continue to work with Caltrans, SACOG, cities, and other regional agencies to achieve timely construction of freeway, interchange, highway, and County Road improvements that are consistent with this General Plan. The County shall assist Caltrans in implementing improvements to State Highway facilities that are required due to new growth and are consistent with this General Plan.	**Inconsistent.** The No Build Alternative does not involve development of a transportation improvement project.	**Consistent.** Build Alternatives 2a and 2b would include managed lanes to improve traffic operations on I-80/US-50 in the project area.	**Consistent.** Same as Build Alternatives 2a and 2b, respectively.	**Consistent.** Same as Build Alternatives 2a and 2b, respectively.	**Consistent.** Same as Build Alternatives 2a and 2b, respectively.	**Consistent.** Same as Build Alternatives 2a and 2b, respectively.	**Consistent.** Same as Build Alternatives 2a and 2b, respectively.
Policy CI-1.10: Coordinate with appropriate entities to maintain the following as primary routes for emergency evacuation from Yolo County: I-80 – East into Sacramento and west toward Solano County and the San Francisco Bay Area.	**Inconsistent.** The No Build Alternative does not involve development of a transportation improvement project.	**Consistent.** Build Alternatives 2a and 2b would include managed lanes to improve traffic operations on I-80/US-50 in the project area.	**Consistent.** Same as Build Alternatives 2a and 2b, respectively.	**Consistent.** Same as Build Alternatives 2a and 2b, respectively.	**Consistent.** Same as Build Alternatives 2a and 2b, respectively.	**Consistent.** Same as Build Alternatives 2a and 2b, respectively.	**Consistent.** Same as Build Alternatives 2a and 2b, respectively.
Policy CI-2.1: When constructing or modifying roadways, plan for use of the roadway space by all users, including automobiles, trucks, alternative energy vehicles, agricultural equipment, transit, bicyclists, and pedestrians, as appropriate to the road classification and surrounding land uses.	**Inconsistent.** The No Build Alternative does not involve development of a transportation improvement project.	**Partially consistent.** Build Alternatives 2a and 2b would incentivize increased vehicle occupancy and/or transit use. They would also extend the westernmost limit of the existing Class I bicycle pathway along I-80 at the Yolo Causeway to connect to CR-32A.	**Partially consistent.** Same as Build Alternatives 2a and 2b, respectively.	**Partially consistent.** Same as Build Alternatives 2a and 2b, respectively.	**Partially consistent.** Same as Build Alternatives 2a and 2b, respectively.	**Partially consistent.** Build Alternatives 6a and 6b would add a transit lane in each direction, which could improve the attractiveness of riding transit. It would also extend the westernmost limit of the existing Class I bicycle pathway along I-80 at the Yolo Causeway to connect to CR-32A.	**Partially consistent.** Same as Build Alternatives 2a and 2b, respectively.
Policy CI-2.3: Ensure that, wherever feasible, public transit and alternative mode choices are a viable and attractive alternative to the use of single occupant motor vehicles.	**Inconsistent.** The No Build Alternative does not involve development of a transportation improvement project.	**Partially consistent.** The managed lanes under Build Alternatives 2a and 2b would incentivize increased vehicle occupancy and/or transit use.	**Partially consistent.** Same as Build Alternatives 2a and 2b, respectively.	**Partially consistent.** Same as Build Alternatives 2a and 2b, respectively.	**Partially consistent.** Same as Build Alternatives 2a and 2b, respectively.	**Consistent.** Build Alternatives 6a and 6b would add a transit lane in each direction, which could improve public transit options.	**Partially consistent.** Same as Build Alternatives 2a and 2b, respectively.

Policy	No Build Alternative 1	Build Alternatives 2a and 2b	Build Alternatives 3a and 3b	Build Alternatives 4a and 4b	Build Alternatives 5a and 5b	Build Alternatives 6a and 6b	Build Alternatives 7a and 7b
Policy CI-3.1: Maintain Level of Service (LOS) C or better for roadways and intersections in the unincorporated county. In no case shall land use be approved that would either result in worse than LOS C conditions or require additional improvements to maintain the required level of service, except as specified below. The intent of this policy is to consider level of service as a limit on the planned capacity of the County's roadways. I-80 (Davis City Limit to West Sacramento City Limit) – LOS F is acceptable to the County. LOS F is anticipated by Caltrans according to the Interstate 80 and Capital City Freeway Corridor System Management Plan (Caltrans 2009, as cited in Yolo County 2009).	**Inconsistent.** The No Build Alternative does not involve development of a transportation improvement project.	**Consistent.** Build Alternatives 2a and 2b would improve traffic operations on I-80/US-50 in the project area. The "b" alternative would further improve operations by providing a direct connection of the managed lanes by flying over US-50 at the I-80/US-50 interchange.	**Consistent.** Same as Build Alternatives 2a and 2b, respectively.	**Consistent.** Same as Build Alternatives 2a and 2b, respectively.	**Consistent.** Same as Build Alternatives 2a and 2b, respectively.	**Inconsistent.** Due to underuse of the proposed transit lane, these alternatives would not improve peak-hour circulation in the project corridor compared to the No-Build Alternative 1.	**Inconsistent.** Due to lanes being repurposed for HOVs, these alternatives would not improve peak-hour circulation in the project corridor compared to the No-Build Alternative 1.
Policy CI-3.3: CEQA review for subsequent projects will analyze project traffic and circulation impacts using both the Yolo County General Plan policies and Caltrans policies as applicable. A. Consider the following objectives, following consultation with Caltrans, when making decisions to expand or modify the State highway system in Yolo County: 1. Minimize impacts to the environment. 2. Minimize increases in GHGs and air pollutants. 3. Minimize increases in VMT. 4. Minimize long-distance commute trips. 5. Fully utilize existing capacity while maintaining stable flows and speeds. 6. Provide facilities for all users including pedestrians, bicyclists, carpool users, and transit riders.	**Inconsistent.** The No Build Alternative does not involve development of a transportation improvement project.	**Partially consistent.** Build Alternatives 2a and 2b would incentivize increased vehicle occupancy and/or transit use, which could minimize increases in VMT and would provide facilities for carpool users and transit riders. Build Alternatives 2a and 2b would also improve an existing facility for bicyclists by extending the westernmost limit of the existing Class I bicycle pathway along I-80 at the Yolo Causeway to connect to CR-32A.	**Partially consistent.** Same as Build Alternatives 2a and 2b, respectively.	**Partially consistent.** Same as Build Alternatives 2a and 2b, respectively.	**Partially consistent.** Same as Build Alternatives 2a and 2b, respectively.	**Partially consistent.** Same as Build Alternatives 2a and 2b, respectively.	**Partially consistent.** Same as Build Alternatives 2a and 2b, respectively.
Policy CI-1.14: Encourage inter- and intra-regional traffic to use State and federal interstates and highways. The primary role of County Roads is to serve local and agricultural traffic.	**Inconsistent.** The No Build Alternative does not involve development of a transportation improvement project.	**Consistent.** Build Alternatives 2a and 2b would include managed lanes to improve traffic operations on I-80/US-50 in the project area, which could encourage inter- and intra-regional traffic to use these routes, rather than county roads.	**Consistent.** Same as Build Alternatives 2a and 2b, respectively.	**Consistent.** Same as Build Alternatives 2a and 2b, respectively.	**Consistent.** Same as Build Alternatives 2a and 2b, respectively.	**Consistent.** Same as Build Alternatives 2a and 2b, respectively.	**Consistent.** Same as Build Alternatives 2a and 2b, respectively.

Policy	No Build Alternative 1	Build Alternatives 2a and 2b	Build Alternatives 3a and 3b	Build Alternatives 4a and 4b	Build Alternatives 5a and 5b	Build Alternatives 6a and 6b	Build Alternatives 7a and 7b
Policy CI-4.3: Reduce dependence upon fossil fuels through: Reduction of vehicle trips and VMT by requiring compact, infill and mixed-use development. Use of alternatives to the drive-alone automobile, including walking, bicycling, and public transit. Promotion of ride sharing and car sharing programs.	**Inconsistent.** The No Build Alternative does not involve development of a transportation improvement project.	**Partially consistent.** Build Alternatives 2a and 2b would incentivize increased vehicle occupancy and/or transit use, which could promote the use of alternatives to the drive-alone automobile. They would also improve an existing facility for bicyclists.	**Partially consistent.** Same as Build Alternatives 2a and 2b, respectively.	**Partially consistent.** Same as Build Alternatives 2a and 2b, respectively.	**Partially consistent.** Same as Build Alternatives 2a and 2b, respectively.	**Partially consistent.** Same as Build Alternatives 2a and 2b, respectively.	**Partially consistent.** Same as Build Alternatives 2a and 2b, respectively.
City of West Sacramento General Plan							
Policy M-1.1: Connectivity. The City shall strive to develop a comprehensive, safe, and fully integrated multimodal transportation system that connects residents, visitors, and employees to the city and region through all available modes including connected vehicles, car/bikeshare, and autonomous modes.	**Inconsistent.** The No Build Alternative does not involve development of a transportation improvement project.	**Consistent.** Build Alternatives 2a and 2b would improve traffic operations on I-80/US-50 in the project area. The "b" alternative would further improve operations by providing a direct connection of the managed lanes by flying over US-50 at the I-80/US-50 interchange.	**Consistent.** Same as Build Alternatives 2a and 2b, respectively.	**Consistent.** Same as Build Alternatives 2a and 2b, respectively.	**Consistent.** Same as Build Alternatives 2a and 2b, respectively.	**Inconsistent.** Due to underuse of the proposed transit lane, these alternatives would not improve peak-hour circulation in the project corridor compared to the No-Build Alternative 1.	**Inconsistent.** Due to lanes being repurposed for HOVs, these alternatives would not improve peak-hour circulation in the project corridor compared to the No-Build Alternative 1.
Policy M-1.2: Multi-modal Corridors. The City shall establish multi-modal corridors and hubs within and between urban centers and along major corridors.	**Inconsistent.** The No Build Alternative does not involve development of a transportation improvement project.	**Consistent.** Build Alternatives 2a and 2b would improve traffic operations and multi-modal opportunities on I-80/US-50 in the project area. The alternatives would include a new Park-and-Ride Facility in West Sacramento.	**Consistent.** Same as Build Alternatives 2a and 2b, respectively.	**Consistent.** Same as Build Alternatives 2a and 2b, respectively.	**Consistent.** Same as Build Alternatives 2a and 2b, respectively.	**Consistent.** Same as Build Alternatives 2a and 2b, respectively.	**Consistent.** Same as Build Alternatives 2a and 2b, respectively.
Policy M-1.3: Reduce Vehicle Miles Traveled. The City shall endeavor to reduce VMT and dependence on fossil fuels by continuing to develop a comprehensive multi-modal transportation system and compact, mixed-use development that includes more transit, bicycle, and pedestrian routes.	**Inconsistent.** The No Build Alternative does not involve development of a transportation improvement project.	**Partially consistent**. Build Alternatives 2a and 2b would incentivize increased vehicle occupancy and/or transit use. However, reduction in travel time with these alternatives would induce demand and increase VMT compared to the No-Build Alternative 1. They would also extend the westernmost limit of the existing Class I bicycle pathway along I-80 at the Yolo Causeway to connect to CR-32A.	**Partially consistent.** Same as Build Alternatives 2a and 2b, respectively.	**Partially consistent.** Same as Build Alternatives 2a and 2b, respectively.	**Partially consistent.** Same as Build Alternatives 2a and 2b, respectively.	**Partially consistent.** Build Alternatives 6a and 6b would add a transit lane in each direction, which could improve the attractiveness of riding transit. It would also increase VMT compared to the No-Build Alternative 1 and extend the westernmost limit of the existing Class I bicycle pathway along I-80 at the Yolo Causeway to connect to CR-32A.	**Partially consistent.** Same as Build Alternatives 2a and 2b, respectively. Build Alternative 7 would have the lowest increase in VMT.
Policy M-1.4: Public Involvement. The City shall continue to involve the public, especially those traditionally underserved by transportation services, and seek public input on transportation issues, projects, and processes from the early stage of the planning process.	**Inconsistent.** The No Build Alternative does not involve development of a transportation improvement project.	**Consistent.** Caltrans and other stakeholders have coordinated extensive public feedback on Build Alternatives 2a and 2b.	**Consistent.** Same as Build Alternatives 2a and 2b, respectively.	**Consistent.** Same as Build Alternatives 2a and 2b, respectively.	**Consistent.** Same as Build Alternatives 2a and 2b, respectively.	**Consistent.** Same as Build Alternatives 2a and 2b, respectively.	**Consistent.** Same as Build Alternatives 2a and 2b, respectively.

Policy	No Build Alternative 1	Build Alternatives 2a and 2b	Build Alternatives 3a and 3b	Build Alternatives 4a and 4b	Build Alternatives 5a and 5b	Build Alternatives 6a and 6b	Build Alternatives 7a and 7b
Policy M-1.8: Overcoming Barriers to Accessibility. The City shall strive to remove and minimize the effects of natural and manmade barriers, such as the Capital City Freeway, railways, Sacramento River, and the Deep Water Ship Channel, on accessibility between and within existing neighborhoods and districts.	**Inconsistent.** The No Build Alternative does not involve development of a transportation improvement project.	**Consistent.** Build Alternatives 2a and 2b would not change existing barriers or decrease accessibility between and within existing neighborhoods and districts.	**Consistent.** Same as Build Alternatives 2a and 2b, respectively.	**Consistent.** Same as Build Alternatives 2a and 2b, respectively.	**Consistent.** Same as Build Alternatives 2a and 2b, respectively.	**Consistent.** Same as Build Alternatives 2a and 2b, respectively.	**Consistent.** Same as Build Alternatives 2a and 2b, respectively.
Policy M-2.2: Connecting and Balance. The City shall preserve and continue to develop a comprehensive, integrated, and connected network of streets that balance walking and bicycling with public transit, automobiles, and trucks.	**Inconsistent.** The No Build Alternative does not involve development of a transportation improvement project.	**Consistent.** Build Alternatives 2a and 2b would improve traffic operations and multi-modal opportunities on I-80/US-50 in the project area.	**Consistent.** Same as Build Alternatives 2a and 2b, respectively.	**Consistent.** Same as Build Alternatives 2a and 2b, respectively.	**Consistent.** Same as Build Alternatives 2a and 2b, respectively.	**Consistent.** Same as Build Alternatives 2a and 2b, respectively.	**Consistent.** Same as Build Alternatives 2a and 2b, respectively.
Policy M-2.5: Street Amenities. The City shall require public transit, bicycle, and pedestrian amenities in street design to promote the walking, bicycling, and public transit use and complement the context of nearby centers, corridors, and neighborhoods.	**Inconsistent.** The No Build Alternative does not involve development of a transportation improvement project.	**Partially consistent.** Build Alternatives 2a and 2b would incentivize increased vehicle occupancy and/or transit use. It would also extend the westernmost limit of the existing Class I bicycle pathway along I-80 at the Yolo Causeway to connect to CR-32A.	**Partially consistent.** Same as Build Alternatives 2a and 2b, respectively.	**Partially consistent.** Same as Build Alternatives 2a and 2b, respectively.	**Partially consistent.** Same as Build Alternatives 2a and 2b, respectively.	**Partially consistent.** Build Alternatives 6a and 6b would add a transit lane in each direction, which could improve the attractiveness of riding transit. It would also extend the westernmost limit of the existing Class I bicycle pathway along I-80 at the Yolo Causeway to connect to CR-32A.	**Partially consistent.** Same as Build Alternatives 2a and 2b, respectively.
Policy M-3.4: Multi-modal Roadway Level of Service. The City shall develop, maintain, and implement multi-modal LOS roadway standards to measure trade-offs among modes and/or create a more balanced transportation system. The City shall endeavor to achieve levels of service for bikeways, pedestrian ways, and public transit that are at least as efficient as the automobile LOS.	**Inconsistent.** The No Build Alternative does not involve development of a transportation improvement project.	**Partially consistent.** The managed lanes under Build Alternatives 2a and 2b may improve the public transit LOS. They may also improve LOS for bikeways by extending the westernmost limit of the existing Class I bicycle pathway along I-80 at the Yolo Causeway to connect to CR-32A.	**Partially consistent.** Same as Build Alternatives 2a and 2b, respectively.	**Partially consistent.** Same as Build Alternatives 2a and 2b, respectively.	**Partially consistent.** Same as Build Alternatives 2a and 2b, respectively.	**Consistent.** Build Alternatives 6a and 6b would add a transit lane in each direction, which would improve the LOS for public transit. It may also improve LOS for bikeways by extending the westernmost limit of the existing Class I bicycle pathway along I-80 at the Yolo Causeway to connect to CR-32A.	**Partially consistent.** Due to underuse of the lanes being repurposed for HOVs, this alternative would not improve peak-hour circulation for transit in the project corridor compared to the No-Build Alternative 1. It may improve LOS for bikeways by extending the westernmost limit of the existing Class I bicycle pathway along I-80 at the Yolo Causeway to connect to CR-32A.
Policy M-3.13: Emergency Service Coordination. The City shall coordinate development and maintenance of all transportation facilities with emergency service providers to ensure continued emergency service operation and service levels.	**Inconsistent.** The No Build Alternative does not involve development of a transportation improvement project.	**Consistent.** Build Alternatives 2a and 2b would implement a TMP during construction to maintain emergency service operations and response times. Improved peak-hour traffic operations on I-80/US-50 in the project area with Build Alternatives 2 through 5 would improve long-term emergency service operation.	**Consistent.** Same as Build Alternatives 2a and 2b, respectively.	**Consistent.** Same as Build Alternatives 2a and 2b, respectively.	**Consistent.** Same as Build Alternatives 2a and 2b, respectively.	**Consistent.** Same as Build Alternatives 2a and 2b, respectively.	**Consistent.** Same as Build Alternatives 2a and 2b, respectively.

Policy	No Build Alternative 1	Build Alternatives 2a and 2b	Build Alternatives 3a and 3b	Build Alternatives 4a and 4b	Build Alternatives 5a and 5b	Build Alternatives 6a and 6b	Build Alternatives 7a and 7b
Policy M-4.1: Access to Public Transit. The City shall strive to ensure that all residents have access to adequate and safe public transit options that reduce dependence on fossil fuels and increase physical activity.	**Inconsistent.** The No Build Alternative does not involve development of a transportation improvement project.	**Partially consistent.** The managed lanes under Build Alternatives 2a and 2b would incentivize increased vehicle occupancy and/or transit use.	**Partially consistent.** Same as Build Alternatives 2a and 2b, respectively.	**Partially consistent.** Same as Build Alternatives 2a and 2b, respectively.	**Partially consistent.** Same as Build Alternatives 2a and 2b, respectively.	**Consistent.** Build Alternatives 6a and 6b would add a transit lane in each direction, which could improve public transit options.	**Partially consistent.** Same as Build Alternatives 2a and 2b.
Policy M-4.2: Affordable Public Transit. The City shall work with the Yolo County Transit District (Yolobus) to provide adequate and affordable public transit choices, including expanded bus routes and service.	**Inconsistent.** The No Build Alternative does not involve development of a transportation improvement project.	**Partially consistent.** The managed lanes under Build Alternatives 2a and 2b would incentivize increased vehicle occupancy and/or transit use.	**Partially consistent.** Same as Build Alternatives 2a and 2b.	**Partially consistent.** Same as Build Alternatives 2a and 2b.	**Partially consistent.** Same as Build Alternatives 2a and 2b, respectively.	**Consistent**. Build Alternatives 6a and 6b would add a transit lane in each direction, which could improve public transit options.	**Partially consistent.** Same as Build Alternatives 2a and 2b, respectively.
Policy M-4.3: Transit Priority. The City shall consider the use of transit preferential measures, such as signal priority, bypass lanes, and queue jumps, to improve transit service reliability.	**Inconsistent.** The No Build Alternative does not involve development of a transportation improvement project.	**Partially consistent.** The managed lanes under Build Alternatives 2a and 2b could improve transit service reliability.	**Partially consistent.** Same as Build Alternatives 2a and 2b, respectively.	**Partially consistent.** Same as Build Alternatives 2a and 2b, respectively.	**Partially consistent.** Same as Build Alternatives 2a and 2b, respectively.	**Consistent.** Build Alternatives 6a and 6b would add a transit lane in each direction, which would improve transit service reliability.	**Partially consistent.** Same as Build Alternatives 2a and 2b, respectively.
Policy M-4.14: Park and Ride. The City shall cooperate with Caltrans and Yolobus in the development of Park-and-Ride facilities near major transportation corridors.	**Inconsistent.** The No Build Alternative does not involve development of a transportation improvement project.	**Consistent.** Build Alternatives 2a and 2b would include construction of a Park-and-Ride Facility in West Sacramento.	**Consistent.** Same as Build Alternatives 2a and 2b, respectively.	**Consistent.** Same as Build Alternatives 2a and 2b, respectively.	**Consistent.** Same as Build Alternatives 2a and 2b, respectively.	**Consistent.** Same as Build Alternatives 2a and 2b, respectively.	**Consistent.** Same as Build Alternatives 2a and 2b, respectively.
City of Sacramento 2035 General Plan Policies							
M.1.2.1. The City shall develop an integrated, multimodal transportation system that improves the attractiveness of walking, bicycling, and riding transit over time to increase travel choices and aid in achieving a more balanced transportation system and reducing air pollution and GHG emissions.	**Inconsistent.** The No Build Alternative does not involve development of a transportation improvement project.	**Partially consistent.** Build Alternatives 2a and 2b would incentivize increased vehicle occupancy and/or transit use. They would also extend the westernmost limit of the existing Class I bicycle pathway along I-80 at the Yolo Causeway to connect to CR-32A. The “b” alternative would further improve operations by providing a direct connection of the managed lanes via a managed lane connector ramp over US-50 at the I-80/US-50 interchange.	**Partially consistent.** Same as Build Alternatives 2a and 2b, respectively.	**Partially consistent.** Same as Build Alternatives 2a and 2b, respectively.	**Partially consistent.** Same as Build Alternatives 2a and 2b, respectively.	**Consistent.** Build Alternatives 6a and 6b would add a transit lane in each direction, which could improve the attractiveness of riding transit. It would also extend the westernmost limit of the existing Class I bicycle pathway along I-80 at the Yolo Causeway to connect to CR-32A.	**Partially consistent.** Build Alternatives 7a and 7b would repurpose lanes for HOVs, which may incentivize carpool and transit use. However, this alternative would not improve circulation on the project corridor compared to the No-Build Alternative 1.
M.1.3.6. The City shall work with adjacent jurisdictions and SACOG to identify existing and future transportation corridors that should be linked across jurisdictional boundaries to provide desired upstream and downstream traffic operations and to preserve sufficient right-of-way.	**Inconsistent.** The No Build Alternative does not involve development of a transportation improvement project.	**Consistent.** Build Alternatives 2a and 2b would improve traffic operations on I-80/US-50 in the project area. The “b” alternative would further improve operations by providing a direct connection of the managed lanes by flying over US-50 at the I-80/US-50 interchange.	**Consistent.** Same as Build Alternatives 2a and 2b, respectively.	**Consistent.** Same as Build Alternatives 2a and 2b, respectively.	**Consistent.** Same as Build Alternatives 2a and 2b, respectively.	**Inconsistent.** Due to the projected underutilization of the managed lanes under Build Alternatives 6 and 7, these alternatives would result in degraded I-80/US 50 corridor performance compared to the No-Build Alternative and would not meet the Project objectives.	**Inconsistent.** Due to lanes being repurposed for HOVs, these alternatives would not improve peak-hour circulation in the project corridor compared to the No-Build Alternative 1.

Policy	No Build Alternative 1	Build Alternatives 2a and 2b	Build Alternatives 3a and 3b	Build Alternatives 4a and 4b	Build Alternatives 5a and 5b	Build Alternatives 6a and 6b	Build Alternatives 7a and 7b
M.1.4.1. The City shall work with a broad range of agencies (e.g., SACOG, SMAQMD, SacRT, Caltrans) to encourage and support programs that increase regional average vehicle occupancy, including the provision of traveler information, shuttles, preferential parking for carpools/vanpools, transit pass subsidies, road and parking pricing, and other methods.	**Inconsistent.** The No Build Alternative does not involve development of a transportation improvement project.	**Consistent.** The types of managed lanes under Build Alternatives 2a and 2b would incentivize increased vehicle occupancy and/or transit use.	**Consistent.** Same as Build Alternatives 2a and 2b, respectively.	**Consistent.** Same as Build Alternatives 2a and 2b, respectively.	**Inconsistent.** Build Alternatives 5a and 5b would create an express lane in each direction where all users pay a fee regardless of vehicle occupancy. Therefore, it would not encourage increased vehicle occupancy unless there were discounted fees for carpools.	**Consistent.** Same as Build Alternatives 2a and 2b, respectively.	**Consistent.** Same as Build Alternatives 2a and 2b, respectively.
M.1.5.6. The City shall support State highway improvement projects and management plans consistent with the MTP/SCS.	**Inconsistent.** The No Build Alternative does not involve development of a transportation improvement project.	**Consistent.** Build Alternatives 2a and 2b would improve traffic operations on I-80/US-50 in the project area consistent with the MTP/SCS. The "b" alternative would further improve operations by providing a direct connection of the managed lanes by flying over US-50 at the I-80/US-50 interchange.	**Consistent.** Same as Build Alternatives 2a and 2b, respectively.	**Consistent.** Same as Build Alternatives 2a and 2b, respectively.	**Consistent.** Same as Build Alternatives 2a and 2b, respectively.	**Inconsistent.** Due to underuse of the proposed transit lane, these alternatives would not improve peak-hour circulation in the project corridor compared to the No-Build Alternative 1. It would be inconsistent with the MTP/SCS.	**Inconsistent.** Due to lanes being repurposed for HOVs, these alternatives would not improve peak-hour circulation in the project corridor compared to the No-Build Alternative 1. They would not be consistent with the MTP/SCS.
Sacramento County General Plan of 2005–2030							
Policy CI-2. Promote continued mobility for individuals whose access to automobile transportation is limited by age, illness, income, desire, or disability.	**Inconsistent.** The No Build Alternative does not involve development of a transportation improvement project.	**Partially consistent.** Although Build Alternatives 2a and 2b do not explicitly include improvements that benefit individuals whose access to automobile transportation is limited by age, illness, income, desire, or disability, Build Alternatives 2a and 2b include ITS, a park and ride facility, and auxiliary lane improvements that would help facilitate circulation between I-80 and the surrounding surface streets, benefiting environmental justice community members using bus and transit service.	**Partially consistent.** Same as Build Alternatives 2a and 2b, respectively.	**Partially consistent.** Same as Build Alternatives 2a and 2b, respectively.	**Partially consistent.** Same as Build Alternatives 2a and 2b, respectively.	**Partially consistent.** Same as Build Alternatives 2a and 2b, respectively.; however, Build Alternatives 6a and 6b add a transit-only lane, which may improve mobility for individuals who can access the existing transit system.	**Partially consistent.** Same as Build Alternatives 2a and 2b, respectively.
Policy CI-3. Travel modes shall be interconnected to form an integrated, coordinated, and balanced multi-modal transportation system, planned and developed consistent with the land uses to be served.	**Inconsistent.** The No Build Alternative does not involve development of a transportation improvement project.	**Partially consistent.** Build Alternatives 2a and 2b would improve operations and safety on I-80/US-50 in the project area, incentivize increased vehicle occupancy and/or transit use, and are consistent with the land uses to be served. These Build Alternatives include bicycle and pedestrian infrastructure improvements that would promote non-motorized travel modes throughout the project area.	**Partially consistent.** Same as Build Alternatives 2a and 2b, respectively.	**Partially consistent.** Same as Build Alternatives 2a and 2b, respectively.	**Partially consistent.** Same as Build Alternatives 2a and 2b, respectively.	**Partially consistent.** Same as Build Alternatives 2a and 2b, respectively.	**Partially consistent.** Same as Build Alternatives 2a and 2b, respectively.

Policy	No Build Alternative 1	Build Alternatives 2a and 2b	Build Alternatives 3a and 3b	Build Alternatives 4a and 4b	Build Alternatives 5a and 5b	Build Alternatives 6a and 6b	Build Alternatives 7a and 7b
Policy CI-4. Provide multiple transportation choices to link housing, recreational, employment, commercial, educational, and social services.	**Inconsistent.** The No Build Alternative does not involve development of a transportation improvement project.	**Partially consistent.** Build Alternatives 2a and 2b would not provide multiple transportation choices and would incentivize increased vehicle occupancy.	**Partially consistent.** Same as Build Alternatives 2a and 2b, respectively. They would incentivize increased vehicle occupancy.	**Partially consistent.** Same as Build Alternatives 2a and 2b, respectively. They would incentivize increased vehicle occupancy.	**Partially consistent.** Same as Build Alternatives 2a and 2b, respectively.	**Partially consistent.** Same as Build Alternatives 2a and 2b, respectively; however, Build Alternatives 6a and 6b would incentivize transit use.	**Partially consistent.** Same as Build Alternatives 2a and 2b, respectively and would incentivize increased vehicle occupancy.
Policy CI-11. To preserve public mobility, freeways and thoroughfares should have limited access and maintain functional characteristics that predominantly accommodate through-traffic.	**Inconsistent.** The No Build Alternative does not involve development of a transportation improvement project.	**Consistent.** Build Alternatives 2a and 2b would improve traffic operations on I-80/US-50 in the project area. The "b" alternative would further improve operations by providing a direct connection of the managed lanes via a managed lane connector ramp over US-50 at the I-80/US-50 interchange.	**Consistent.** Same as Build Alternatives 2a and 2b, respectively.	**Consistent.** Same as Build Alternatives 2a and 2b, respectively.	**Consistent.** Same as Build Alternatives 2a and 2b, respectively.	**Inconsistent.** Due to underuse of the proposed transit lane, these alternatives would not improve peak-hour circulation in the project corridor compared to the No-Build Alternative 1.	**Inconsistent.** Due to lanes being repurposed for HOVs, these alternatives would not improve peak-hour circulation in the project corridor compared to the No-Build Alternative 1.
Policy CI-13: Collaborate with regional transportation planning agencies and neighboring jurisdictions to provide cross-jurisdictional mobility.	**Inconsistent.** The No Build Alternative does not involve development of a transportation improvement project.	**Consistent.** Build Alternatives 2a and 2b would improve traffic operations on I-80/US-50 in the project area, improving cross-jurisdictional mobility. The "b" alternative would further improve operations by providing a direct connection of the managed lanes via a managed lane connector ramp over US-50 at the I-80/US-50 interchange.	**Consistent.** Same as Build Alternatives 2a and 2b, respectively.	**Consistent.** Same as Build Alternatives 2a and 2b, respectively.	**Consistent.** Same as Build Alternatives 2a and 2b, respectively.	**Inconsistent.** Due to underuse of the proposed transit lane, these alternatives would not improve peak-hour circulation in the project corridor compared to the No-Build Alternative 1.	**Inconsistent.** Due to lanes being repurposed for HOVs, these alternatives would not improve peak-hour circulation in the project corridor compared to the No-Build Alternative 1.
Policy CI-19. Collaborate with transit service providers to provide transit services within the County that are responsive to existing and future transit demand.	**Inconsistent.** The No Build Alternative does not involve development of a transportation improvement project.	**Partially consistent.** Although there would not be an exclusive transit lane under Build Alternatives 2a and 2b, transit use of managed lanes may result in reduced travel times for transit users.	**Partially consistent.** Same as Build Alternatives 2a and 2b, respectively.	**Partially consistent.** Same as Build Alternatives 2a and 2b, respectively.	**Partially consistent.** Same as Build Alternatives 2a and 2b, respectively.	**Consistent.** Build Alternatives 6a and 6b would add a transit lane in each direction, which would promote transit services that are responsive to existing and future transit demand.	**Partially consistent.** Same as Build Alternatives 2a and 2b, respectively.
Policy CI-20. Promote transit services in appropriate commercial corridors and where population and employment densities are sufficient or could be increased to support those transit services.	**Inconsistent.** The No Build Alternative does not involve development of a transportation improvement project.	**Partially consistent.** Although there would not be an exclusive transit lane under Build Alternatives 2a and 2b, transit use of managed lanes may result in reduced travel times for transit users.	**Partially consistent.** Same as Build Alternatives 2a and 2b, respectively.	**Partially consistent.** Same as Build Alternatives 2a and 2b, respectively.	**Partially consistent.** Same as Build Alternatives 2a and 2b, respectively.	**Consistent.** Build Alternatives 6a and 6b would add a transit lane in each direction, which would promote transit services that are responsive to existing and future transit demand.	**Partially consistent.** Same as Build Alternatives 2a and 2b, respectively.
Policy CI-23. Consider the transit needs of senior, disabled, low-income, and transit-dependent persons in making recommendations regarding transit services.	**Inconsistent.** The No Build Alternative does not involve development of a transportation improvement project.	**Partially consistent.** Although there would not be an exclusive transit lane under Build Alternatives 2a and 2b, transit use of managed lanes may result in reduced travel times for transit users.	**Partially consistent.** Same as Build Alternatives 2a and 2b, respectively.	**Partially consistent.** Same as Build Alternatives 2a and 2b, respectively.	**Partially consistent.** Same as Build Alternatives 2a and 2b, respectively.	**Consistent.** Build Alternatives 6a and 6b would add a transit lane in each direction, which would reduce travel times for transit users and thereby may benefit senior, disabled, low-income, and transit-dependent persons.	**Partially consistent.** Same as Build Alternatives 2a and 2b, respectively.

Policy	No Build Alternative 1	Build Alternatives 2a and 2b	Build Alternatives 3a and 3b	Build Alternatives 4a and 4b	Build Alternatives 5a and 5b	Build Alternatives 6a and 6b	Build Alternatives 7a and 7b
Policy CI-41. Consider Transportation System Management programs that increase the average occupancy of vehicles and divert automobile commute trips to transit, walking, and bicycling.	**Inconsistent.** The No Build Alternative does not involve development of a transportation improvement project.	**Consistent.** The types of managed lanes under Build Alternatives 2a and 2b would incentivize increased vehicle occupancy and/or transit use.	**Consistent.** Same as Build Alternatives 2a and 2b, respectively.	**Consistent.** Same as Build Alternatives 2a and 2b, respectively.	**Inconsistent.** Build Alternatives 5a and 5b would create an express lane in each direction where all users pay a fee regardless of vehicle occupancy. Therefore, it would not directly encourage increased vehicle occupancy.	**Consistent.** Same as Build Alternatives 2a and 2b, respectively.	**Consistent.** Same as Build Alternatives 2a and 2b, respectively.
Policy CI-42. Collaborate with other agencies to develop measures to provide for more efficient traffic flow, reduce vehicular travel demand and meet air quality goals.	**Inconsistent.** The No Build Alternative does not involve development of a transportation improvement project.	**Consistent.** To varying degrees, Build Alternatives 2a and 2b would improve traffic operations on I-80/US-50 in the project area, improving traffic flow. The "b" alternative would further improve operations by providing a direct connection of the managed lanes via a managed lane connector ramp over US-50 at the I-80/US-50 interchange.	**Consistent.** Same as Build Alternatives 2a and 2b, respectively.	**Consistent.** Same as Build Alternatives 2a and 2b, respectively.	**Consistent.** Same as Build Alternatives 2a and 2b, respectively.	**Inconsistent.** Due to underuse of the proposed transit lane, these alternatives would not improve peak-hour circulation in the project corridor compared to the No-Build Alternative 1.	**Inconsistent.** Due to lanes being repurposed for HOVs, these alternatives would not improve peak-hour circulation in the project corridor compared to the No-Build Alternative 1.

Key:
CR=County Road; **HOV**=high-occupancy vehicle; **I**=Interstate; **LOS**=level of service; **MTP/SCS**= Metropolitan Transportation Plan (MTP)/Sustainable Communities Strategy (SCS); **SOV**=single-occupancy vehicle; **SR**=State Route; **TMP**=Transportation Management Plan; **VMT**=vehicle miles traveled

2.1.2.2 Environmental Consequences

No Build Alternative 1

Construction and Operation

Under No Build Alternative 1, managed lanes and transportation improvements would not be constructed or operated. As such, the No Build Alternative, as shown in Table 2.1-1, would be inconsistent with regional and local policies.

Build Alternatives 2a and 2b

Construction and Operation

Build Alternatives 2a and 2b would involve adding an HOV 2+ lane in each direction. Build Alternatives 2a and 2b would reduce congestion and improve safety along I-80/US-50 in the project area by incentivizing increased vehicle occupancy and thus reducing vehicular traffic demand. Build Alternatives 2a and 2b would be consistent or partially consistent with local and regional plans and policies related to improved transportation infrastructure. The “b” alternative would further improve operations by providing a direct connection of the managed lanes via a managed lane connector ramp over US-50 at the I-80/US-50 interchange (Table 2.1-1).

There will be impacts to Vehicle Miles Traveled (VMT), where the build alternatives will induce VMT through the project scope. As part of mitigation and to align with all local, regional, and state plans (including climate adaptation plans), the project will reduce VMT through VMT mitigation efforts.

As mentioned in the Fehr and Peers VMT Mitigation Estimates Technical Memo (Caltrans 2024a), the methodology utilized for calculating VMT reduction for each mitigation measure is based on modeling techniques using two different modeling strategies. The modeling strategies (SACSIM and TDM+) put forth each mitigation measure for analysis on VMT effects. As each mitigation measure was analyzed with a modeling tool, each output was then put towards equations from the California Air Pollution Control Officers Association (CAPCOA) 2021 to calculate VMT reduction. Each mitigation measure’s VMT reduction is calculated and listed in the Technical Memo (Caltrans 2024b, as well as the VMT Mitigation Plan (Caltrans 2024a). Further, each mitigation measure was either part of SACOG’s MTP/SCS or its own environmental review analysis. SACOG’s MTP/SCS has a completed Environmental Impact Report, which incapsulates each project in the mitigation plan that is associated with the MTP/SCS.

The addition of three roundtrip train services on the Capitol Corridor route from Oakland to Sacramento would also reduce VMT, as mentioned in the VMT Mitigation Plan (Caltrans 2024a). The calculations and basis for the VMT reduction is based on a Traffic Congestion Relief Program (TCRP) equation, that utilizes a direct effect and indirect effect of train services. In this case, the three additional roundtrips save 6.3 million passenger miles, which is then multiplied by 2 to obtain the VMT reduction. Hence, the VMT reduction number of 12.6 million is shown in the VMT Mitigation Plan (Caltrans 2024a).

Build Alternatives 3a and 3b

Construction and Operation

Build Alternatives 3a and 3b would involve adding an HOT 2+ lane in each direction. As described under Build Alternatives 2a and 2b, Build Alternatives 3a and 3b would reduce congestion and improve safety along I-80/US-50 in the project area by incentivizing increased vehicle occupancy, thus reducing vehicular traffic demand. Tolling strategies would be consistent with SACOG, City, and County goals to provide a funding mechanism for capital costs; however, the fees may make these alternatives less beneficial to environmental justice communities or lower-income households who may be less able to pay fees for use of HOT lanes as further described in Section 2.1.7, Environmental Justice. Although there would not be an exclusive transit lane under Build Alternatives 3a and 3b, transit's use of managed lanes may result in reduced travel times for transit users. As described in the MTP/SCS, to resolve these inconsistencies, alternatives would explore innovative options for setting fees, such as including offsetting incentives for non-vehicular travel, offsets to fees for disadvantaged households, and keying fee rates to maintenance and fix-it-first goals. Accordingly, Build Alternatives 3a and 3b would be consistent or partially consistent with local and regional plans and policies (Table 2.1-1).

Build Alternatives 4a and 4b

Construction and Operation

Build Alternatives 4a and 4b would involve adding an HOT 3+ lane in each direction. Accordingly, Build Alternatives 4a and 4b propose a priced lane and would have similar effects related to consistency with local and regional plans and policies as Build Alternatives 3a and 3b, respectively.

Build Alternatives 5a and 5b

Construction and Operation

Build Alternatives 5a and 5b would be similar to Build Alternatives 3a and 3b, respectively; however, Build Alternative 5a and 5b would create an express lane in each direction where all users pay a fee regardless of vehicle occupancy. It would not encourage increased vehicle occupancy unless there were discounted fees for carpools, and as discussed in Table 2.1-1, Build Alternatives 5a and 5b would be inconsistent with Policy M.1.4.1 and Policy CI-41 from the City of Sacramento 2035 General Plan to encourage increased vehicle occupancy. Inconsistency with land use policies will potentially require Caltrans to work with local agencies to update existing land use plans to achieve consistency. Additionally, Caltrans will implement AMM EJ-1, EJ-2, and EJ-3, and VMT reducing measures (described in Table 2.1-27). Overall, Build Alternatives 5a and 5b are partially consistent with local policies related to improved transportation infrastructure.

Build Alternatives 6a and 6b

Construction and Operation

Build Alternatives 6a and 6b would involve adding a transit-only lane in each direction, which would promote and provide reduced travel times and would be consistent with policies supporting bus rapid transit service to Sacramento International Airport. Build Alternatives 6a and 6b would reduce congestion and improve safety in the project area by incentivizing increased transit and reducing vehicular traffic demand. Although it would not include tolling or pricing strategies, it could potentially provide benefits to lower-income households using transit by reducing travel times for transit users who are generally senior, disabled, low-income, and transit-dependent persons. Build Alternatives 6a and 6b would add a transit lane in each direction which could improve the attractiveness of riding transit. Build Alternatives 6a and 6b would be consistent or partially consistent with a majority of local and regional plans and policies; however, they remain inconsistent with several policies because they would result in degraded functionality in the project corridor compared to the No-Build Alternative 1. (Table 2.1-1). Inconsistency with land use policies will potentially require Caltrans to work with local agencies to update existing land use plans to achieve consistency. Additionally, Caltrans will implement AMM EJ-1, EJ-2, and EJ-3, and VMT reducing measures (described in Table 2.1-27).

Build Alternatives 7a and 7b

Construction and Operation

Build Alternatives 7a and 7b would involve repurposing the current number one general purpose lane to HOV 2+. No new lanes would be constructed. Consistency with local and regional plans would be mostly the same as described under Build Alternatives 2a and 2b, respectively, because Build Alternatives 7a and 7b do not propose a priced lane. However, they are inconsistent with several policies because they would result in degraded functionality in the project corridor compared to the No-Build Alternative 1. Inconsistency with land use policies will potentially require Caltrans to work with local agencies to update existing land use plans to achieve consistency. Additionally, Caltrans will implement AMM EJ-1, EJ-2, and EJ-3, and VMT reducing measures (described in Table 2.1-27).

2.1.2.3 Avoidance, Minimization, and/or Mitigation Measures

No AMMs or MMs are required.

2.1.3 Parks and Recreational Facilities

2.1.3.1 Regulatory Setting

The Park Preservation Act (California Public Resources Code [PRC] Sections 5400-5409) prohibits local and state agencies from acquiring any property which is in use as a public park at the time of acquisition unless the acquiring agency pays sufficient compensation or land, or

both, to enable the operator of the park to replace the park land and any park facilities on that land.

2.1.3.2 Affected Environment

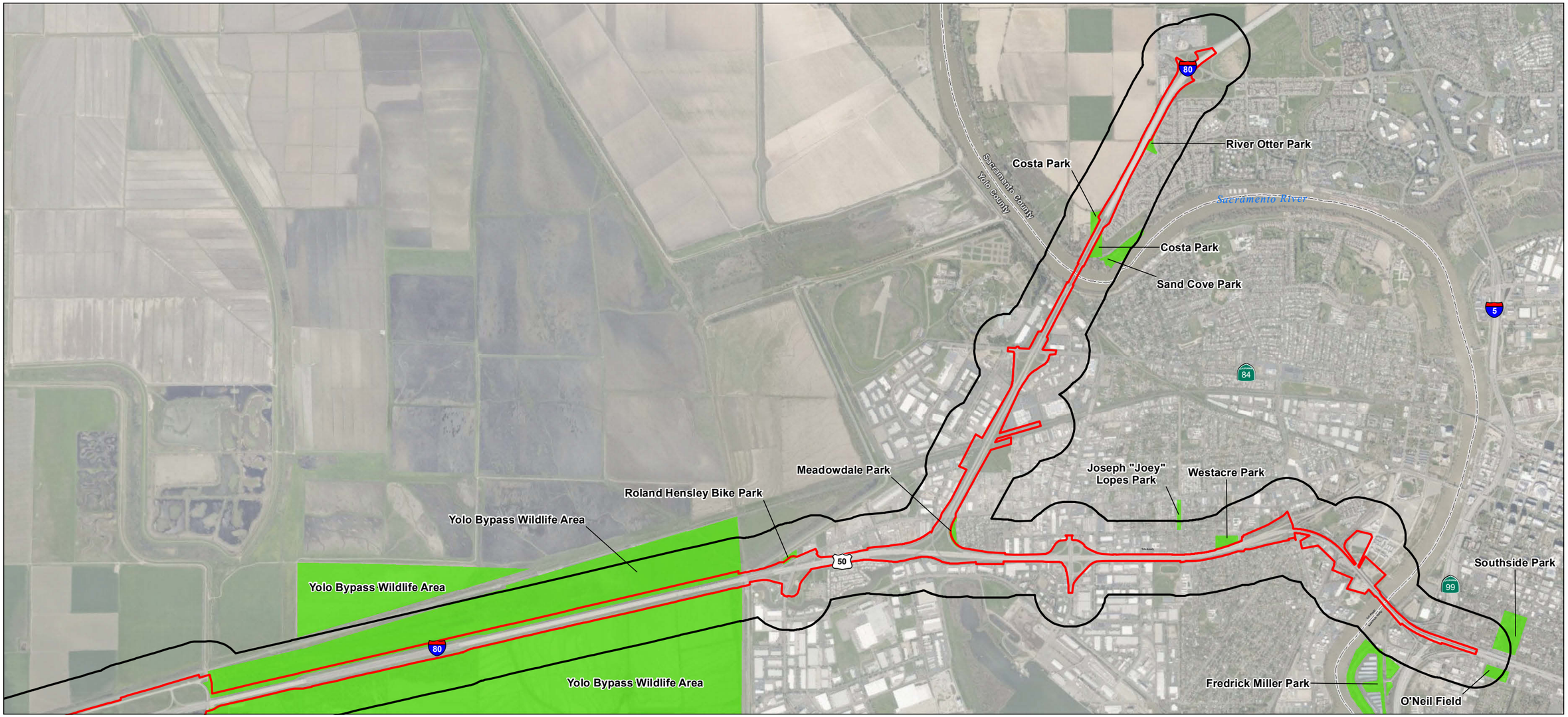
Information in this section is based on the CIA prepared for the project (Caltrans 2023a). Table 2.1-2 and Figure 2.1-2 summarize parks and recreational facilities located within 1,000 feet of the project area and Section 4(f) resources located within 500 feet of the project area.

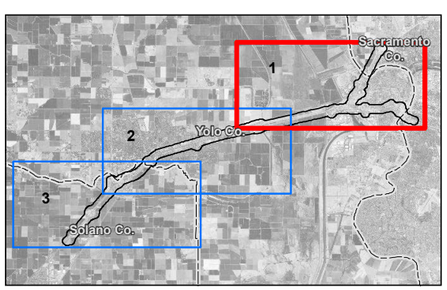
Table 2.1-2. Parks and Recreation Facilities within 1,000 Feet of the Project Area

Park and Recreational Facility Name	Description	Location	Park Operator
University of California, Davis (UC Davis) Arboretum and Public Garden	The UC Davis Arboretum and Public Garden spans the campus' 5,300-plus acres and includes the historic arboretum. It connects with the Putah Creek Riparian Reserve and is open to the public. Access is at various locations, but the visitor center is located on Le Rue Road. Section 4(f) resource – trails/nature area.	1046 Garrod Drive, Davis, CA 95616	UC Davis
Putah Creek Riparian Reserve	The Reserve is a 640-acre natural riparian and grassland ecosystem maintained and operated by the UC Davis Arboretum and Public Garden. Most of the reserve is open to the public. Section 4(f) resource – trails/nature area.	South of the intersection of Levee Road and Brooks Road, west of Highway 113, Davis, CA 95616	UC Davis Arboretum and Public Garden
Toad Hollow Dog Park	Toad Hollow Dog Park is a 2.5-acre, off-leash dog park. Section 4(f) resource – public park.	1919 2nd Street, Davis, CA 95616	City of Davis
Playfields Park	Playfields Park is a City of Davis park, approximately 16 acres, with three baseball/softball fields, a soccer field, batting cages, basketball hoops, and playground equipment. Section 4(f) resource – public park.	2500 Research Drive, Davis, CA 95618	City of Davis
Willow Creek Park	Willow Creek Park is a City of Davis park at 3800 Cowell Boulevard, approximately 5 acres, with play structures, a basketball area, and grassy areas.	3800 Cowell Boulevard, Davis, CA	City of Davis
Pioneer Park	Adjacent to Pioneer Elementary School in Davis, Pioneer Park includes a dog area, tennis courts, play structures, and restrooms.	5035 Swingle Drive, Davis, CA	City of Davis
Yolo Bypass Wildlife Area	The Wildlife Area comprises 17 separate management units covering approximately 16,600 acres. It is protected habitat for fish, waterfowl, migratory birds, raptors, invertebrates, snakes, and turtles. It is open daily to the public for wildlife viewing and fishing and includes self-driving tours along levees. Land also includes Tule Ranch, a working cattle ranch with extensive vernal pool areas and a Class 1 bicycle pathway on Levee Road managed by Yolo County. Section 4(f)/6(f) resource – wildlife area/recreational facility.	45211 CR-32B, Davis, CA 95618	California Department of Fish and Wildlife, Bay Delta Region; Yolo County
Roland Hensley Bike Park	Roland Hensley Bike Park is a 0.5-acre park in West Sacramento that provides a Class I bicycle lane that connects to the east end of the Yolo Causeway Bicycle Path. It includes a picnic area and water fountain. Section 4(f) resource – public park.	4940 West Capitol Avenue, West Sacramento, CA	City of West Sacramento

Park and Recreational Facility Name	Description	Location	Park Operator
Meadowdale Park	Meadowdale Park is a 4-acre park managed by West Sacramento and includes picnic tables, barbeques, a playground, and parking. Section 4(f) resource – public park.	3625 West Capitol Avenue, West Sacramento, CA	City of West Sacramento
Joseph "Joey" Lopes Park	The Joey Lopes Park includes play structures, picnic tables, drinking fountains, and a half-court basketball.	840-878 Sycamore Avenue, West Sacramento, CA	City of West Sacramento
Westacre Park	Westacre Park is a 5-acre park with an enclosed skateboard park, picnic tables, and shade areas. Section 4(f) resource – public park.	1755 Evergreen Avenue, West Sacramento, CA	City of West Sacramento
Jerome D. Barry Park	Jerome D. Barry Park is adjacent to the City's 3-million-gallon water facility and includes small seating areas, multi-use lawns, picnic areas, and play structures.	809 Ballpark Drive, West Sacramento, CA	City of West Sacramento
Garden Park	Garden Park is a 0.5-acre park with raised garden beds, grassy areas, public art, and picnic tables.	564 Garden Street, West Sacramento, CA	City of West Sacramento
Fredrick Miller Regional Park	Fredrick Miller Regional Park is a 40.25-acre park and includes picnic tables, restrooms, river access, a boat ramp, a marina, and a concession bar.	2710 Ramp Way, City of Sacramento, CA	City of Sacramento
O'Neil Park	O'Neil Park consists of a lighted soccer field and a baseball/softball field with restroom facilities and parking. Section 4(f) resource – public park.	715 Broadway, Sacramento, CA	City of Sacramento
Southside Park	Southside Park is a 20-acre park with tennis courts, basketball courts, a wading pool, jogging path, picnic tables, playgrounds, and a community garden. Section 4(f) resource – public park.	2115 6th Street, Sacramento, CA	City of Sacramento
Sand Cove Park	Sand Cove Park is a beach and river access park that spans 9.88 acres with a small parking lot. Section 4(f) resource – public park.	2005 Garden Highway, Sacramento, CA	City of Sacramento
River Otter Park	River Otter Park is a small (1.88-acre) park features a playground, volleyball court, and picnic tables. Section 4(f) resource – public park.	2303 Barandas Drive, Sacramento, CA	City of Sacramento
Two Rivers Park	Two Rivers Park is a 3.03-acre joint-use school and neighborhood park that features a multi-purpose sports field, picnic area, tot lot, and walkways.	3166 Two Rivers Drive, Sacramento, CA	City of Sacramento

Source: Community Impact Assessment Memorandum (Caltrans 2023).





Land Use Study Area
ESL
County Line

Parks and Recreation Facilities

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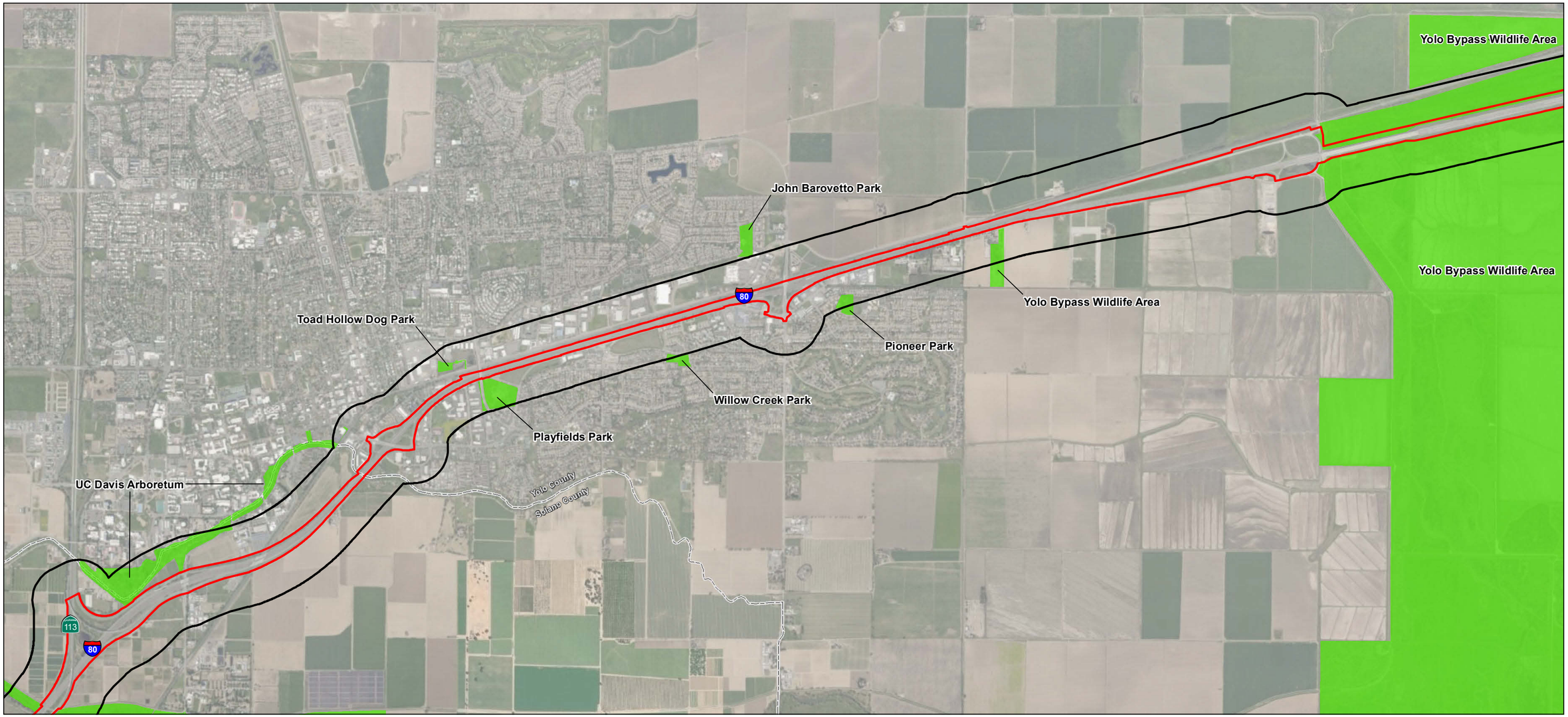
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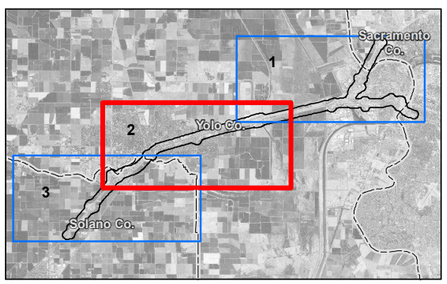
Notes
1. Coordinate System: NAD 1983 StatePlane California II FIPS 0402 Feet
2. Data Sources: CalTrans, Stantec, 2021
3. Background: Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Figure 2.1-2
Parks and Recreation Facilities in the Land Use Study Area
Yolo 80 Corridor Improvement Project
EA 03-3H900
Solano, Yolo, and Sacramento Counties, California

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Land Use Study Area
ESL
County Line

Parks and Recreation Facilities

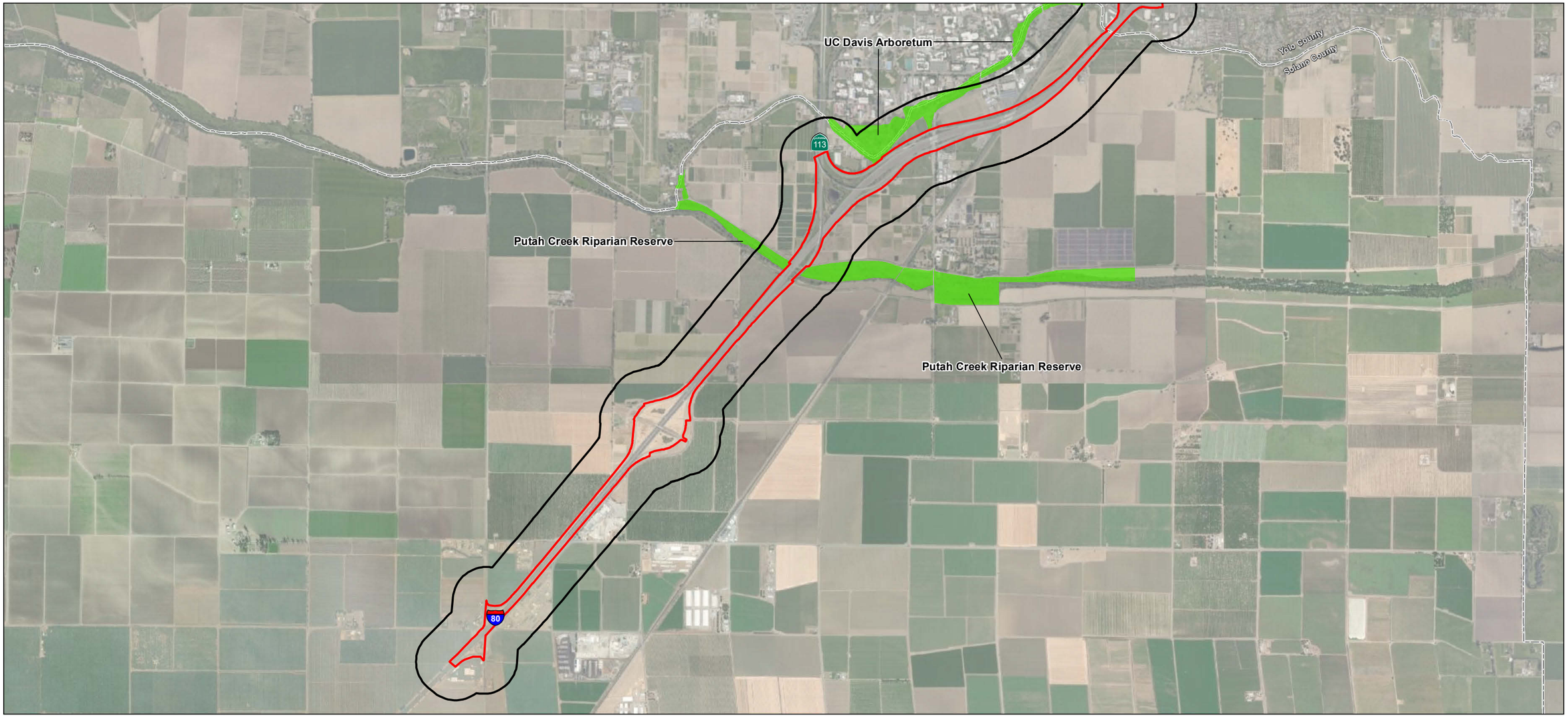
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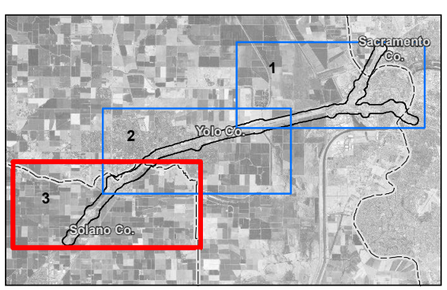
Notes
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2. Data Sources: CalTrans, Stantec, 2021
3. Background: Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Figure 2.1-2
Parks and Recreation Facilities in the Land Use Study Area
Yolo 80 Corridor Improvement Project
EA 03-3H900
Solano, Yolo, and Sacramento Counties, California

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Land Use Study Area
ESL
County Line
Parks and Recreation Facilities

N
0
1
Miles

Caltrans

Notes
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2. Data Sources: CalTrans, Stantec, 2021
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2.1.3.3 Environmental Consequences

No Build Alternative 1

Construction and Operation

Under No Build Alternative 1, managed lanes and transportation improvements would not be constructed or operated. As such, the No Build Alternative would have no effect on parks and recreational facilities.

Build Alternatives 2a and 2b

Construction

Build Alternatives 2a and 2b would involve adding an HOV 2+ lane in each direction. Construction of Build Alternatives 2a and 2b would occur almost entirely within the existing Caltrans right-of-way with the exception of a TCE and a staging area that would be located outside the Caltrans right-of-way. Several parks and recreational facilities are located within proximity of the project area and thus, users could be subject to potential air quality and noise impacts during construction. In particular, Build Alternative 2b would have a longer duration of construction than Build Alternative 2a and thus result in longer duration of exposure to potential impacts.

There are parks, recreational facilities, and wildlife areas within the project vicinity that are protected by Section 4(f) of the Department of Transportation Act of 1966. The Section 4(f) technical memorandum prepared for the project concludes that the project would not require the permanent use or constructive use of a Section 4(f) park or recreational facility (Appendix A). There would be a temporary occupancy resulting from construction activities at Roland Hensley Bike Park managed by the City of West Sacramento and the Class 1 bicycle pathway along Levee Road managed by Yolo County located in the Yolo Bypass Wildlife Area, but in both cases exception criteria are met. Concurrence from jurisdictional agencies was received from Yolo County and the City of West Sacramento on April 10 and 15, 2024, respectively, and is provided in Appendix A.

Build Alternatives 2a and 2b would require construction-related activities within Roland Hensley Bike Park and Yolo Bypass Wildlife Area that would result in temporary occupancy of these recreation resources. However, the duration of the occupancy would be temporary, the scope of work would be minor, no adverse impacts on protected activities or access would occur, the property would be restored to same or better condition than existing prior to the project, and the local jurisdictions would be involved (Caltrans 2023b).

Seven of the facilities identified in Table 2.1-2 (i.e., River Otter Park, Meadowdale Park, Westacre Park, Roland Hensley Bike Park, Yolo Bypass Wildlife Area, Putah Creek Riparian Reserve, and UC Davis Arboretum and Public Garden) are located adjacent to the Caltrans I-80 right-of-way and are currently subject to indirect air quality and noise impacts. Build Alternatives 2a and 2b would widen to the outside on the north side of I-80 from post mile 0.1 to post mile 1.0 in Yolo County, bringing traffic slightly closer to the Toad Hollow Dog Park. Noise analysis

determined that changes in long-term noise levels would be 0 - 2 dBA greater than existing conditions, which would be barely perceptible, and the Toad Hollow Dog Park is more than 250 feet from the I-80 travel lanes, with an active railroad line and Second Street between the park and highway. Therefore, no perceptible long-term changes in noise and air quality would occur at this park.

Build Alternatives 2a and 2b would have indirect air quality and noise impacts at these facilities due to proximity to construction activities and changes in long-term traffic volumes. As discussed in Section 2.2.6, Air Quality, Standard Measures would be implemented for air quality. As discussed in Section 2.2.7, Noise, AMM NOI-1 would require noise-generating construction activities to be restricted to 7:00 a.m. to 7:00 p.m. on weekdays, with no construction occurring on weekends or holidays. If work is necessary outside of these hours, a construction noise monitoring program and provide additional noise controls would be implemented. Caltrans Standard Specifications Section 14-8.02 would require that noise levels not to exceed 86 dBA within 50 feet of the job site from the hours of 9:00 p.m. to 6:00 a.m. (Standard Measure NOI-1). Build Alternatives 2a and 2b would also implement Standard Measures NOI-2 through NOI-5 further reducing temporary construction noise levels. Indirect air quality and noise impacts as a result of the proposed project would not be expected to result in substantial impairment to any of the facilities' activities, features, or attributes (Caltrans 2023b).

Build Alternatives 2a and 2b would replace the existing bicycle pathway pavement behind the gas station located north of West Capitol Avenue from PM 9.15 to PM 9.35. The existing bicycle pathway would be rerouted during repaving activities for up to two months, and repaving activities may occur at nighttime to minimize access disruption. To maintain access during daytime hours, bicycles traveling westbound would be redirected along West Capitol Avenue; and bicycles traveling eastbound would be redirected along a short segment of sidewalk on West Capitol Avenue and would use the crosswalk at the West Capitol Avenue/westbound I-80 off-ramp intersection. Bicyclists would then continue eastbound along West Capitol Avenue using the existing bicycle lane. Caltrans would add crosswalk pavement marking across the westbound I-80 off-ramp to West Capitol Avenue and near the existing West Capitol Avenue crosswalk. In addition, Caltrans would add advanced warning signs to alert the motorists traveling on the westbound I-80 off-ramp to West Capitol Avenue before reaching the proposed crosswalk. Caltrans would place signage as part of the TMP to note the access updates and identify the bicycle/pedestrian detours.

Build Alternatives 2a and 2b would also replace the existing bicycle pathway pavement from PM 9.1 to the Yolo Causeway bridge deck approach at approximately PM 8.9. While the existing Class I bicycle pathway is closed, a temporary bicycle pathway with K-rail barriers would be placed along the I-80 westbound on-ramp from West Capitol Avenue. Up to 100 linear feet of existing barrier near PM 8.9 would be removed and realigned to allow bicycles to rejoin the existing Class I Bicycle Pathway along Yolo Causeway. The existing Class I bicycle pathway along the Yolo Causeway would not require closure during construction activities.

Build Alternatives 2a and 2b would extend the westernmost limit of the existing Class I bicycle pathway from I-80 along Yolo Causeway to connect to CR-32A. Once construction of the pathway extension along the westbound I-80 off-ramp is complete, pavement from CR-32A to

Levee Road would be rehabilitated. During pavement rehabilitation activities, Levee Road would be closed. Bicycles would be redirected along the newly constructed pathway extension on the westbound I-80 off-ramp to access the existing Class I bicycle pathway along Yolo Causeway, which would be built prior to rehabilitation activities on Levee Road. Temporarily rerouting the bicycle paths would inconvenience bicycle pathway users.

Construction activities may result in temporary traffic delays and ramp closures on I-80/US-50 that could cause temporary delays in accessing recreation facilities in and near the project area. However, Standard Measure TT-3 would require that a traffic management plan is in place to maintain access. The TMP would plan construction in sections, with no more than one lane closed at a time and no successive ramp closures. The contractor would implement a planned public outreach program to keep area residents, businesses, emergency service providers, and transit operators informed of the project construction schedule as part of Standard Measure COM-1. With these standard practices, no AMMs are required.

None of the temporary construction-related impacts would adversely affect the activities, features, or attributes of the parks and recreation facilities in or near the project area.

Operation

Operation of Build Alternatives 2a and 2b would not require the acquisition of parks or recreational facilities. As a result, operation of Build Alternatives 2a and 2b would have no effect on parks or recreational facilities in or near the project area.

Build Alternatives 3a and 3b

Construction and Operation

Build Alternatives 3a and 3b would involve adding an HOT 2+ lane in each direction. Build Alternatives 3a and 3b propose similar project components within the same project area as Build Alternatives 2a and 2b, respectively. Therefore, the effects would be the same as effects described under Build Alternatives 2a and 2b.

Build Alternatives 4a and 4b

Construction and Operation

Build Alternatives 4a and 4b would involve adding an HOT 3+ lane in each direction. Build Alternatives 4a and 4b propose similar project components within the same project area as Build Alternatives 2a and 2b, respectively. Therefore, the effects would be the same as effects described under Build Alternatives 2a and 2b.

Build Alternatives 5a and 5b

Construction and Operation

Build Alternatives 5a and 5b would involve adding an Express Lane in each direction. Build Alternatives 5a and 5b propose similar project components within the same project area as

Build Alternatives 2a and 2b, respectively. Therefore, the effects would be the same as effects described under Build Alternatives 2a and 2b.

Build Alternatives 6a and 6b

Construction and Operation

Build Alternatives 6a and 6b would involve adding a transit-only lane in each direction. Build Alternatives 6a and 6b propose similar project components within the same project area as Build Alternatives 2a and 2b, respectively. Therefore, the effects would be the same as effects described under Build Alternatives 2a and 2b.

Build Alternatives 7a and 7b

Construction and Operation

Build Alternatives 7a and 7b would involve repurposing the current number 1 general purpose lane to HOV 2+. No new lanes would be constructed. The effect would be similar to effects described under Build Alternatives 2a and 2b, respectively. Additionally, Build Alternatives 7a and 7b would have a shorter construction period than Build Alternatives 2a and 2b, respectively, and may result in fewer delays to park and recreation facilities in and near the project area.

2.1.3.4 Avoidance, Minimization, and/or Mitigation Measures

No AMMs or MMs are required.

2.1.4 Farmlands

2.1.4.1 Regulatory Setting

The National Environmental Policy Act (NEPA) and the Farmland Protection Policy Act (FPPA, 7 United States Code [USC] 4201-4209; and its regulations, 7 Code of Federal Regulations [CFR] Part 658) require federal agencies, such as the Federal Highway Administration (FHWA), to coordinate with the Natural Resources Conservation Service (NRCS) if their activities may irreversibly convert farmland (directly or indirectly) to nonagricultural use. For purposes of the FPPA, farmland includes prime farmland, unique farmland, and land of statewide or local importance.

The California Environmental Quality Act (CEQA) requires the review of projects that would convert Williamson Act contract land to non-agricultural uses. The main purposes of the Williamson Act are to preserve agricultural land and to encourage open space preservation and efficient urban growth. The Williamson Act provides incentives to landowners through reduced property taxes to discourage the early conversion of agricultural and open space lands to other uses.

2.1.4.2 Affected Environment

Information in this section is based on the CIA prepared for the project (Caltrans 2023a).

The Department of Conservation Farmland Mapping and Monitoring Program (FMMP) produces maps and statistical data used for analyzing impacts on California agricultural resources. The important farmland category types are classified as:

- **Prime Farmland** – Prime Farmland is land that has the best combination of physical and chemical characteristics for the production of crops. It has the soil quality, growing season, and moisture supply needed to produce sustained high yields of crops when treated and managed, including water management, according to current farming methods. Prime Farmland must have been used for irrigated agricultural production at some time during the 4 years prior to the mapping date. It does not include publicly owned lands for which there is an adopted policy preventing agricultural use.

- **Farmland of Local Importance** – Farmland of Local Importance is either currently producing crops, has the capability of agricultural production, or is used for the production of confined livestock. Farmland of Local Importance is land other than Prime Farmland, Farmland of Statewide Importance, or Unique Farmland. This land may be important to the local economy due to its productivity or value. It does not include publicly owned lands for which there is an adopted policy preventing agricultural use.

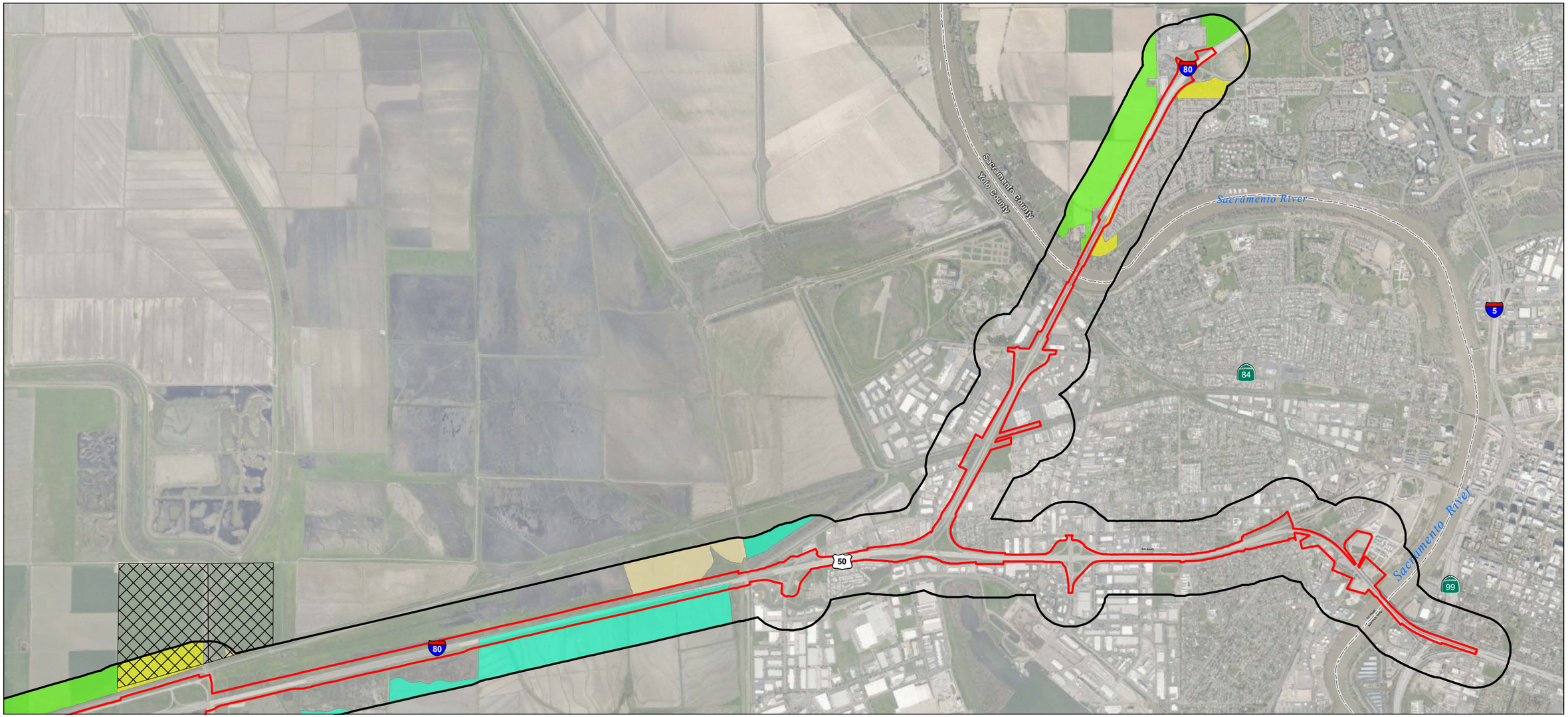
- **Unique Farmland** – Unique Farmland is land that does not meet the criteria for Prime Farmland or Farmland of Statewide Importance that has been used for the production of specific high economic value crops at some time during the 4 years prior to the mapping date. It has the special combination of soil quality, location, growing season, and moisture supply needed to produce sustained high quality or high yields of a specific crop when treated and managed according to current farming methods. Examples of such crops may include oranges, olives, avocados, rice, grapes, and cut flowers. It does not include publicly owned lands for which there is an adopted policy preventing agriculture use.

- **Urban and Built-Up Land** – Urban and Built-Up Land is used for residential, industrial, commercial, construction, institutional, public administrative process, railroad yards, cemeteries, airports, golf courses, sanitary landfills, sewage treatment plants, water control structures, and other development purposes. Highways, railroads, and other transportation facilities are mapped as a part of Urban and Built-Up Land if they are a part of the surrounding urban areas.

The Land Use Study Area includes several farmland areas, mostly located within unincorporated portions of Sacramento, Yolo, and Solano counties (Figure 2.1-3). The western segment of the Land Use Study Area in Solano County consists of agricultural lands with areas classified by the FMMP as Prime Farmland and Grazing Land. These areas are also mapped as an “Agricultural Reserve” by Solano County, indicating an area that experiences high development pressure, but where the County encourages voluntary conservation easements to promote the viability of agricultural operations.

East of the city of Davis, in unincorporated Yolo County, agricultural, open space, and wildlife refuge areas border I-80 across the Yolo Causeway, with several areas classified as Prime Farmland, Farmland of Local Importance, Unique Farmland, and Grazing Land, and Farmland

of Local Potential (i.e., areas with soils characterized as being Prime or of Statewide Importance that are not presently irrigated or cultivated). At the northeastern end of the project, the portion of the Land Use Study Area north of I-80 is within unincorporated Sacramento County and contains areas designated as Prime Farmland. In this area, the portion of the Land Use Study Area south of I-80 is within the city of Sacramento and contains several small areas of Farmland of Local Importance.



Land Use Study Area
ESL
County Line

FMMP Farmland Type
Prime Farmland
Farmland of Local Imortance
Unique Farmland
Local Potential Farmland
Grazing Land

Williamson Act Parcel

N

0 1
Miles

Caltrans

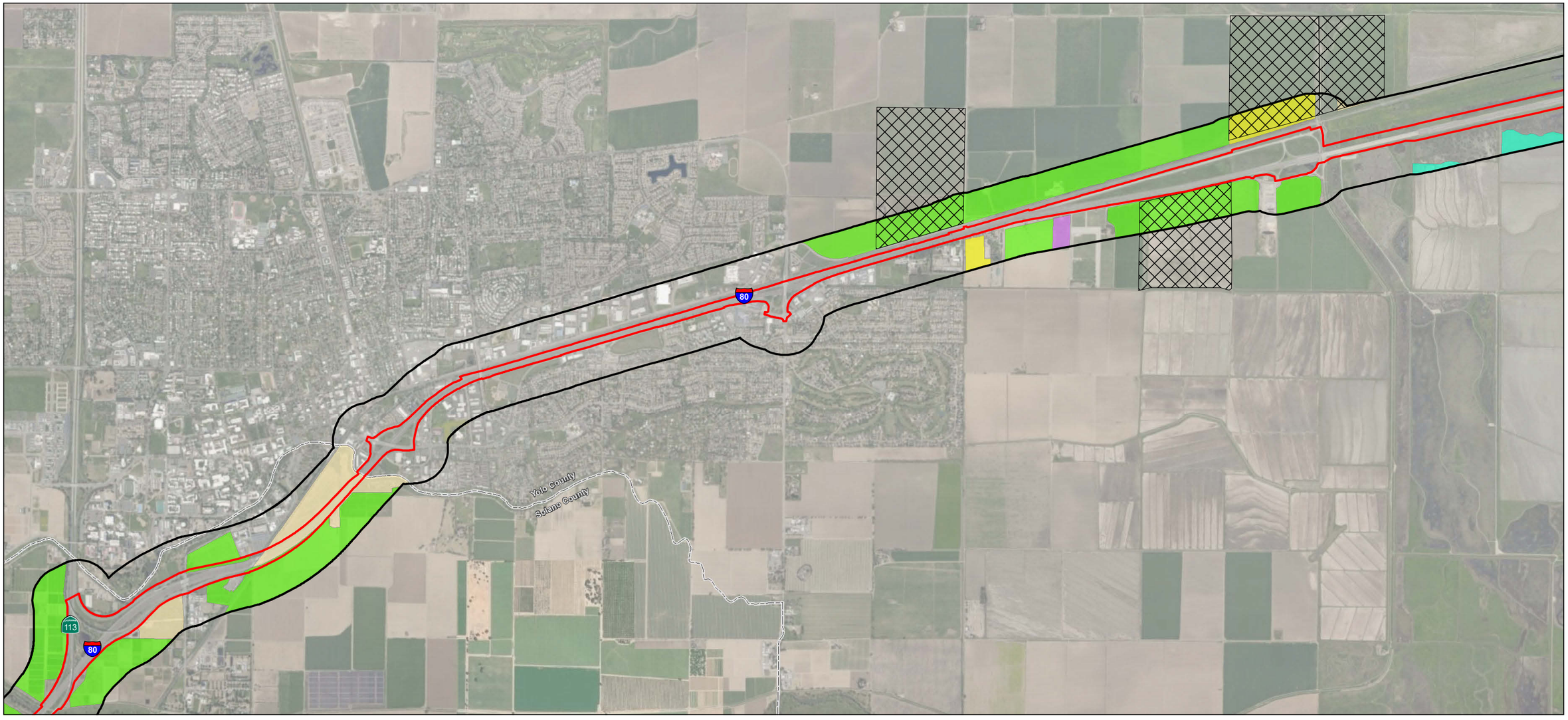
Notes
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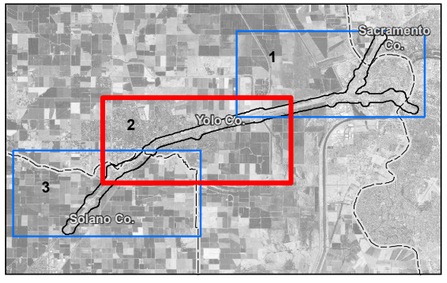
Figure 2.1-3
Farmland Mapped by the Farmland Mapping and Monitoring Program and Williamson Act Contracts

Yolo 80 Corridor Improvement Project
EA 03-3H900
Solano, Yolo, and Sacramento Counties, California

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Land Use Study Area
ESL
County Line

FMMP Farmland Type
- Prime Farmland
- Farmland of Local Imortance
- Unique Farmland
- Local Potential Farmland
- Grazing Land

Williamson Act Parcel

N

0 1
Miles

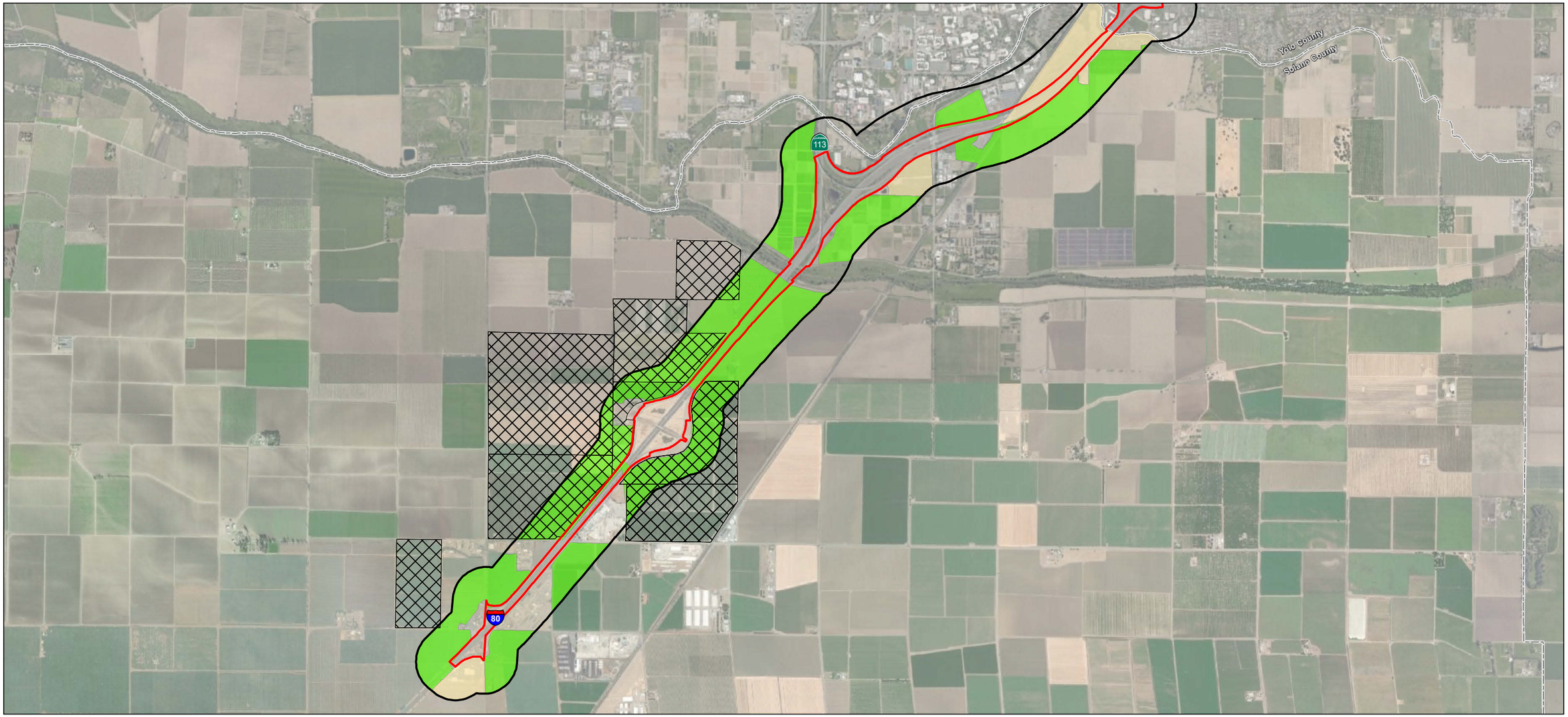
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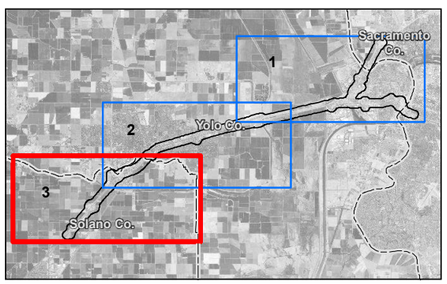
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Land Use Study Area
ESL
County Line

FMMP Farmland Type
Prime Farmland
Farmland of Local Imortance
Unique Farmland
Local Potential Farmland
Grazing Land

Williamson Act Parcel

N

0 1
Miles

Notes
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Figure 2.1-3
Farmland Mapped by the Farmland Mapping and Monitoring Program and Williamson Act Contracts
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Solano, Yolo, and Sacramento Counties, California

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In Solano County, several of the parcels designated as Prime Farmland are also under Williamson Act Contracts (Figure 2.1-3). There is also a Williamson Act parcel within Yolo County on a parcel along the Yolo Causeway that is classified as Local Potential Farmland.

The other portions of the Land Use Study Area, including the city of Davis, city of West Sacramento, and city of Sacramento are not agricultural and are classified by the FMMP as Urban and Built-up Land, Other Land, or Water.

2.1.4.3 Environmental Consequences

No Build Alternative 1

Construction and Operation

Under No Build Alternative 1, managed lanes and transportation improvements would not be constructed or operated. As such, the No Build Alternative1 would have no effect on farmlands.

Build Alternatives 2a and 2b

Construction

Build Alternatives 2a and 2b would involve adding an HOV 2+ lane in each direction, with Build Alternative 2b providing a direct connection of the managed lanes by flying over US-50 at the I-80/US-50 Interchange. Build Alternatives 2a and 2b would occur almost entirely within the existing Caltrans right-of-way and would not require the acquisition of Important Farmland or Williamson Act land for staging areas, TCEs, or to accommodate construction activities.

Operation

Build Alternatives 2a and 2b would occur almost entirely within the existing Caltrans right-of-way. Build Alternatives 2a and 2b would include a permanent easement for the proposed Park-and-Ride Facility. However, because this area is not designated as agricultural, Build Alternatives 2a and 2b would not result in the conversion of any Important Farmland or Williamson Act land to non-agricultural uses. As a result, Build Alternatives 2a and 2b would have no effect on Important Farmland or Williamson Act land in or near the project area.

Build Alternatives 3a and 3b

Construction and Operation

Build Alternatives 3a and 3b would involve adding an HOT 2+ lane in each direction. Build Alternatives 3a and 3a propose similar project components within the same project area as Build Alternatives 2a and 2b, respectively. Therefore, the effects would be the same as effects described under Build Alternatives 2a and 2b.

Build Alternatives 4a and 4b

Construction and Operation

Build Alternatives 4a and 4b would involve adding an HOT 3+ lane in each direction. Build Alternatives 4a and 4b propose similar project components within the same project area as Build Alternatives 2a and 2b, respectively. Therefore, the effects would be the same as effects described under Build Alternatives 2a and 2b.

Build Alternatives 5a and 5b

Construction and Operation

Build Alternatives 5a and 5b would involve adding an Express Lane in each direction. Build Alternatives 5a and 5b propose similar project components within the same project area as Build Alternatives 2a and 2b, respectively. Therefore, the effects would be the same as effects described under Build Alternatives 2a and 2b.

Build Alternatives 6a and 6b

Construction and Operation

Build Alternatives 6a and 6b would involve adding a transit-only lane in each direction. Build Alternatives 6a and 6b propose similar project components within the same project area as Build Alternatives 2a and 2b. Therefore, the effects would be the same as effects described under Build Alternatives 2a and 2b.

Build Alternatives 7a and 7b

Construction and Operation

Build Alternatives 7a and 7b would involve repurposing the current number 1 general purpose lane to HOV 2+. No new lanes would be constructed. Build Alternatives 7a and 7b would not change the overall number of lanes in the project area and would have no effect on Important Farmland or Williamson Act land in or near the project area.

2.1.4.4 Avoidance, Minimization, and/or Mitigation Measures

No AMMs or MMs are required.

2.1.5 Growth

2.1.5.1 Regulatory Setting

The Council on Environmental Quality (CEQ) regulations, which established the steps necessary to comply with the National Environmental Policy Act (NEPA) of 1969, require evaluation of the potential environmental effects of all proposed federal activities and programs. This provision includes a requirement to examine indirect effects, which may occur in areas beyond the immediate influence of a proposed action and at some time in the future. The CEQ

regulations (40 Code of Federal Regulations [CFR] 1508.8) refer to these consequences as indirect impacts. Indirect impacts may include changes in land use, economic vitality, and population density, which are all elements of growth.

The California Environmental Quality Act (CEQA) also requires the analysis of a project's potential to induce growth. The CEQA Guidelines (Section 15126.2[d]) require that environmental documents "…discuss the ways in which the proposed project could foster economic or population growth, or the construction of additional housing, either directly or indirectly, in the surrounding environment…"

2.1.5.2 Affected Environment

Information in this section is based on the CIA prepared for the project (Caltrans 2023a).

Growth inducement is defined as the relationship between the proposed transportation project and growth within the project area. It is often defined as the measurable increase in population, housing, and/or employment that can be reasonably attributable to implementation of a given project. The growth inducement assessment examines the relationship of the proposed project to economic and population growth or to the construction of additional housing in the project area. It focuses on the potential for a project to facilitate or accelerate growth beyond planned developments, or influence the location, type, and rate of future growth and development.

This section considers growth trends in the regional study area that include the greater Sacramento area and the surrounding counties of El Dorado, Placer, Sutter, Yolo, and Yuba counties as defined by the MTP/SCS. The MTP/SCS estimates that by 2040, the regional study area will have added 620,000 people, as well as the jobs and housing to support them (Table 2.1-3) (SACOG 2019a). SACOG's estimated growth pattern for the region is built by examining market forces and policy/regulatory influences, and is based on adopted local government general plans, community plans, specific plans, and other local policies and regulations. Based on this analysis, the six-county region's projected housing and employment is expected to grow at a faster rate than the state and national average over the next 30 years (SACOG 2019a). In 2019, the population of the regional study area totaled 2,324,773, representing approximately 6.22 percent of the state's total population. SACOG estimates that between 2016 and 2040, the regional study area will grow by 26 percent for a total population of 2,996,832 by 2040 (SACOG 2019b).

Table 2.1-3. Forecast Growth in the Regional Study Area

Year	Population	Employees	Households	Housing Units
2016	2,376,311	1,060,751	881,799	921,123
2040	2,996,832	1,300,813	1,136,599	1,181,251
Change 2016 to 2040	26%	23%	29%	28%

Source: Sacramento Area Council of Governments Draft Environmental Impact Report for the 2020 Metropolitan Transportation Plan/ Sustainable Communities Strategy (State Clearinghouse #2019049139)

Land use changes in the regional study area over the last 35 years have influenced regional travel patterns. These growth trends have contributed to changes in local traffic on I-80/US-50 in

the project corridor. Additionally, since I-80/US-50 serves a broader area for freight, regional, and statewide traffic, growth in the Bay Area, Sacramento/San Joaquin Valley, and Sierra/Tahoe Region have also modified traffic patterns and volumes on I-80/US-50 in the project area.

Yolo County is the western edge of the Sacramento region, and an important part of the I-80/US-50 corridor linking Sacramento to the Bay Area. Over the last two decades, Yolo County has experienced most of its growth within the incorporated cities; Yolo County had an estimated 2019 population of 220,500, with much of the population residing in the incorporated cities of Davis (69,413), Woodland (60,548), West Sacramento (53,519), and Winters (7,315) (U.S. Census Bureau 2019). Yolo County continues to advocate for the protection of economically important agricultural resources and to direct growth into existing cities and unincorporated towns.

In Sacramento County, development patterns between 1980 and 2005 were typified by low-density, generally suburban development on the edges of established communities. A consequence of these development patterns has been a reliance on automobile travel to serve long-distance trips between residential areas, employment opportunities, and other activity centers. In 2004, the SACOG Board of Directors adopted the Sacramento Region Blueprint, a smart growth vision for the region. The goal of this Blueprint was to integrate land use and transportation planning to curb sprawl and cut down on vehicle emissions and congestion to improve the quality of life for residents of the region. Using smart growth principles, the Blueprint encourages a variety of housing options closer to employment, shopping, and entertainment hubs, which gives options for people to walk, bicycle, or take public transportation to work and play.

The following sections describe growth-related policies and plans from jurisdictions along the I-80/US-50 corridor.

Yolo County

The Yolo County Revised Draft 2030 Countywide General Plan (Yolo County 2009) includes goals and policies that guide land use and development, including the location of uses, population, housing, and job growth. Yolo County maintains a strong focus on protecting agricultural and open space resources and directing growth into existing incorporated cities and towns, as 93 percent of Yolo County remains in farmland and open space despite development pressures from the Sacramento and Bay Area metropolitan areas (Yolo County 2009), with most growth occurring in its incorporated cities and unincorporated towns. Most of the new urban growth allowed under the Yolo County 2030 General Plan would occur within the existing unincorporated communities of Dunnigan, Knights Landing, Madison, Esparto, and Elkhorn. The town of Esparto has most of the new housing potential.

Yolo County has adopted “smart growth” principles in its neighborhood and community design guidelines. The MTP/SCS forecast for unincorporated Yolo County is 3,300 new jobs and 2,800 new housing units, of which 2,500 new jobs and 2,700 new housing units are at the UC Davis campus (SACOG 2019a). Along the I-80 corridor, unincorporated Yolo County land is limited to agricultural, open space, and wildlife refuge designations between the cities of Davis and West

Sacramento. This area would not be subject to future development. Nevertheless, projected growth in Yolo County could contribute to changes in traffic patterns in the regional study area.

City of Davis

The city of Davis is the largest city in Yolo County with a 2019 population of approximately 68,500 persons and 25,800 housing units. The City of Davis has limited new growth areas and has implemented "slow growth" policies since the mid-1980s. The City of Davis General Plan reflects policies intended to manage growth; maintain existing community character as a small, University-oriented town surrounded by farmland, greenbelt, and natural habitat areas; and improve residential, office, and industrial areas (City of Davis 2007, 2017).

The City of Davis adopted a housing/growth resolution in 2008 that establishes an annual 1 percent growth cap (approximately 260 units), not counting affordable housing, accessory dwelling units, and units in mixed-use buildings. The resolution allows the Davis City Council to grant exemptions for projects providing extraordinary community benefits. Consistency with the growth cap is evaluated each year by the Davis City Council. By 2040, the MTP/SCS forecast for Davis includes 1,630 new employees and 3,800 new housing units; most of this growth—61 percent of the employment and 60 percent of the housing—is planned in established communities (SACOG 2019a).

University of California, Davis

Student enrollment at UC Davis increased from 25,315 students in 2000 to 39,629 students in 2019 (City of Davis 2017; UC Davis 2021). The UC Davis LRDP (2018) provides the growth policies for the main Davis campus and Russell Ranch research lands, totaling about 5,300 acres in Yolo and Solano Counties. The LRDP estimates increases in student enrollment, employment (faculty and staff), and campus student housing, and academic building space. The MTP/SCS forecasts 2,500 new jobs and 2,700 new housing units at the UC Davis campus (SACOG 2019a). Planned growth in student enrollment and employment at UC Davis contribute to traffic on I-80/US-50 in the project area.

City of West Sacramento

The City of West Sacramento has been a heavy employment base for the region, centered on the Port of (West) Sacramento and associated industrial and manufacturing uses, since the 1950s (City of West Sacramento 2016). In more recent years, the City of West Sacramento has shifted toward a mix of employment and housing, resulting in considerable residential growth over the last 20 years. The city's population has grown from 31,615 in 2000 to 53,151 in 2019 (U.S. Census Bureau 2019). In the past decade, the pace of residential development in West Sacramento has intensified.

Apart from the riverfront area, much of the northern half of the city is developed, though significant infill opportunity exists. West Sacramento's recent development focus has been mixed-use, high-density projects along the riverfront, including the Bridge District Specific Plan area, the proposed Pioneer Bluff area, and revitalization of the Washington Specific Plan area (SACOG 2019a). Residential growth over the last 20 years has focused on the Southport area.

The MTP/SCS forecast for West Sacramento includes 16,590 new employees and 16,400 new housing units by 2040 (SACOG 2019a). Much of this development would occur in infill and redevelopment opportunities. Due to its location directly across the Sacramento River from Downtown Sacramento, and the type of development planned, West Sacramento is projected to become part of the urban core of the Sacramento region.

City of Sacramento

The city of Sacramento is centrally located within Sacramento County and is the largest city in the SACOG region, with 29 percent of the region's jobs and 21 percent of the region's housing units (SACOG 2019a). The city of Sacramento is projected to increase in population from approximately 513,624 in 2019 (U.S. Census Bureau 2019) to approximately 640,400 in 2035 and will require an additional 68,000 housing units by 2035 (City of Sacramento 2011). To meet forecasted housing needs, the City of Sacramento is trending toward more multifamily infill development instead of the historical trend of single-family residential growth in outlying areas. The MTP/SCS forecast includes 73,510 new housing units and 56,210 new employees by 2040 in the city of Sacramento, with approximately 48,510 new housing units and 32,210 new employees in the central city area through primarily infill and redevelopment projects (SACOG 2019a). Adding significant numbers of new housing developments to the central city area would provide a better jobs-to-housing ratio and help reduce regional VMT (SACOG 2019a). The small portion of the project limits located in the city of Sacramento (US-50 from Sacramento River to the US-50/I-5 interchange) is a developed, urban corridor with limited new growth potential.

2.1.5.3 Environmental Consequences

No Build Alternative 1

Construction and Operation

Under No Build Alternative 1, managed lanes and transportation improvements would not be constructed or operated. As such, the No Build Alternative 1 would have no effect on growth.

Build Alternatives 2a and 2b

Construction

It is anticipated for Build Alternatives 2a and 2b that construction workers would be drawn from either existing Caltrans staff or contractors in the local area who would commute from the neighboring cities. Therefore, the construction workforce would not be required to relocate to the area and thus would not require an increased demand for housing. As a result, construction activities would have no effect on growth.

Operation

Build Alternatives 2a and 2b would add capacity to I-80/US-50 within the project area. The purpose of the project is to improve traffic flow, help reduce congestion, and increase multi-modal opportunities for travel on the highway network. By improving access and highway capacity, Build Alternatives 2a and 2b would accommodate planned growth on a regional level

and could indirectly change development patterns surrounding the project area by changing the rate at which planned development would occur along the corridor. The rate and location of regional growth and land use change may be influenced by travel time and travel cost for residents and workers. Improvements in access, traffic conditions, and lower travel costs can influence the attractiveness of some areas over others for future development. Induced travel assessments need to consider future land use sensitivity to these changing conditions.

However, Build Alternatives 2a and 2b would not remove an impediment to growth, provide an entirely new public facility, or provide new access to previously unserved areas. Build Alternatives 2a and 2b are analyzed to include expected demand and existing conditions that have arisen from past development trends.

The highway capacity enhancements are planned along an existing freeway corridor adjacent to agricultural lands, open space preserve, and within urbanized areas of the cities of Davis, West Sacramento, and Sacramento. By increasing freeway capacity and reducing travel costs, Build Alternatives 2a and 2b could change the rate of development expected compared to the No-Build condition. Since I-80 is a key link between the Sacramento and Bay Area, and homes in the Sacramento area are typically more affordable than homes in the Bay Area, the improved travel times on I-80 in the Project corridor could influence more Bay Area residents to move east to the Sacramento area and commute to job centers. However, other bottlenecks on I-80 and other highways into the Bay Area west of the Project (e.g., I-680, I-580, I-880, SR-37, SR-4) may deter commuters from Sacramento and outlying areas to the Bay Area. Within the Community Study Area, Areas of new residential development adjacent to the I-80 corridor are limited by floodplain conditions, long-term wildlife refuge and agricultural preserves, and built-out conditions in city limits. Improving travel times and capacity along I-80 is not expected to stimulate growth into nearby areas where development is not planned, as other impediments to growth (e.g., floodplain conditions, long-term wildlife refuge and agricultural preserves, and built-out conditions in city limits), market conditions, and local land use policies are a greater influence on land use change than roadway capacity.

However, smart growth policies in these existing communities prioritize infill and redevelopment projects. Additionally, development or redevelopment in these areas would be driven more by market conditions, economics, and local land use policies than the proposed transportation improvements. Accordingly, Build Alternatives 2a and 2b would not directly increase development of residential land uses, encourage growth outside of existing growth boundaries, or alter existing access to residential and employment areas. Therefore, no adverse effects associated with growth would be anticipated.

Build Alternatives 3a and 3b

Construction and Operation

Build Alternatives 3a and 3b would involve adding an HOT 2+ lane in each direction. Build Alternatives 3a and 3b propose similar project components within the same project area as Build Alternatives 2a and 2b, respectively. Therefore, the effects would be the same as effects described under Build Alternatives 2a and 2b.

Build Alternatives 4a and 4b

Construction and Operation

Build Alternatives 4a and 4b would involve adding an HOT 3+ lane in each direction. Build Alternatives 4a and 4b propose similar project components within the same project area as Build Alternatives 2a and 2b, respectively. Therefore, the effects would be the same as effects described under Build Alternatives 2a and 2b.

Build Alternatives 5a and 5b

Construction and Operation

Build Alternatives 5a and 5b would involve adding an Express Lane in each direction. Build Alternatives 5a and 5b propose similar project components within the same project area as Build Alternatives 2a and 2b, respectively. Therefore, the effects would be the same as effects described under Build Alternatives 2a and 2b.

Build Alternatives 6a and 6b

Construction and Operation

Build Alternatives 6a and 6b would involve adding a transit-only lane in each direction and would not increase the afternoon peak hour volume crossing the Yolo Causeway compared to the No Build Alternative. Under Build Alternatives 6a and 6b, considerable congestion would still occur on the Yolo Causeway. However, effects would be similar to Build Alternatives 2a and 2b, respectively; and no adverse effects associated with growth would be anticipated with implementation of Build Alternatives 6a and 6b.

Build Alternatives 7a and 7b

Construction and Operation

Build Alternatives 7a and 7b would involve repurposing the current number 1 general purpose lane to HOV 2+ and would not increase the afternoon peak hour volume crossing the Yolo Causeway compared to the No Build Alternative. Under Build Alternatives 7a and 7b, considerable congestion would still occur on the Yolo Causeway. However, effects would be similar to Build Alternatives 2a and 2b, respectively; and no adverse effects associated with growth would be anticipated with implementation of Build Alternatives 7a and 7b.

2.1.5.4 Avoidance, Minimization, and/or Mitigation Measures

No AMMs or MMs are required.

2.1.6 Community Character and Cohesion

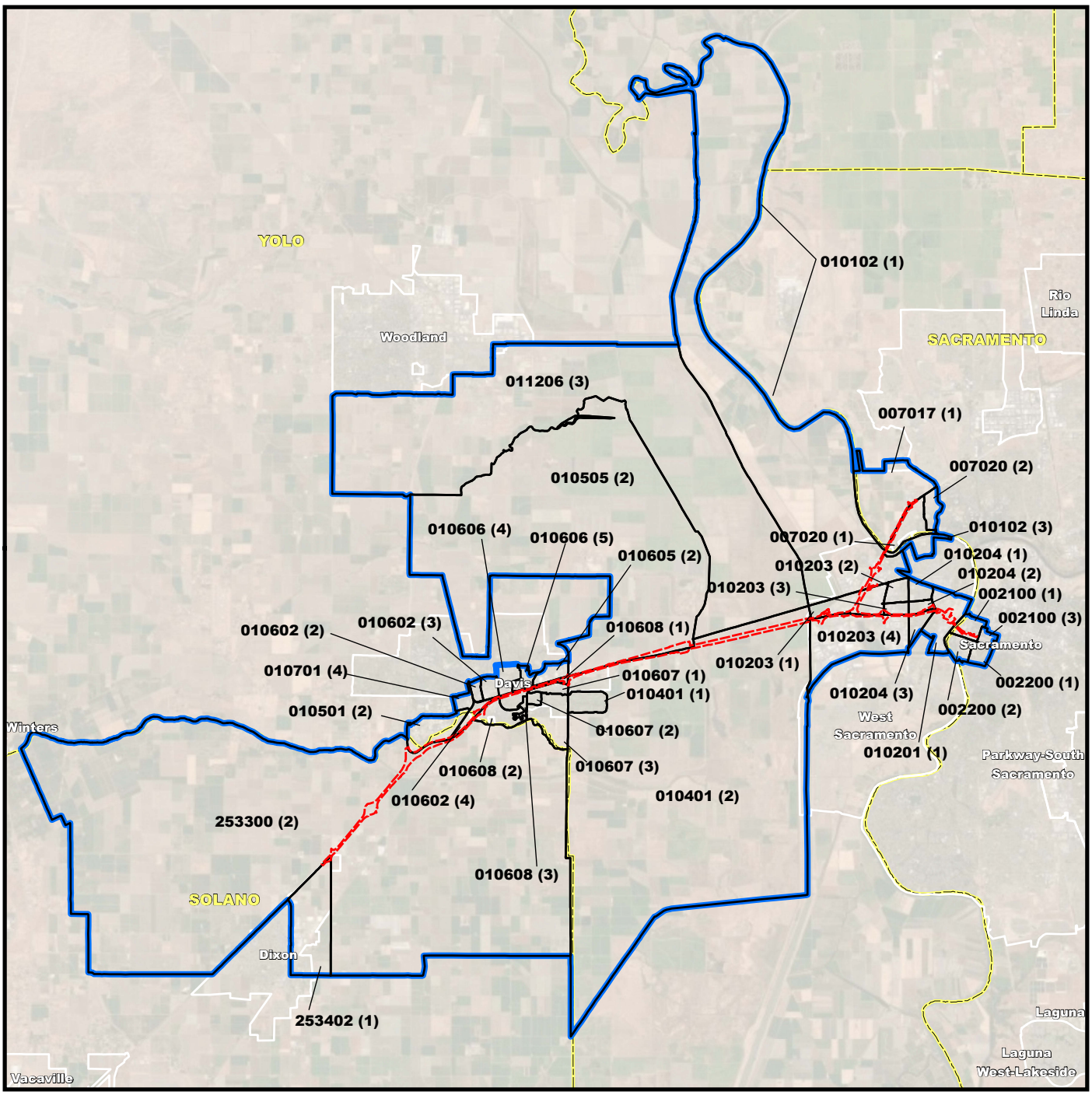
2.1.6.1 Regulatory Setting

The National Environmental Policy Act (NEPA) of 1969, as amended, established that the federal government use all practicable means to ensure for all Americans safe, healthful, productive, and aesthetically and culturally pleasing surroundings (42 United States Code [USC] 4331[b][2]). The Federal Highway Administration (FHWA) in its implementation of NEPA (23 USC 109[h]) directs that final decisions on projects are to be made in the best overall public interest. This requires taking into account adverse environmental impacts, such as destruction or disruption of human-made resources, community cohesion, and the availability of public facilities and services.

Under the California Environmental Quality Act (CEQA), an economic or social change by itself is not to be considered a significant effect on the environment. However, if a social or economic change is related to a physical change, then social or economic change may be considered in determining whether the physical change is significant. Since this project would result in physical change to the environment, it is appropriate to consider changes to community character and cohesion in assessing the significance of the project's effects.

2.1.6.2 Affected Environment

Information in this section is based on the CIA prepared for the project (Caltrans 2023a). The community study area includes all census tracts and block groups immediately adjacent to the project footprint (Figure 2.1-4). Demographic characteristics for the community study area, including population demographics and economic data, were obtained from the US Census for the applicable census tracts and census block groups. The community study area was used to evaluate effects on community character in comparison to the regional study area, as defined under Section 2.1.5, Growth.





Legend

- Project Limits
- Census Block Groups
- Community Study Area

N

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Miles

Caltrans

Service Layer Credits:
ESRI, National Geographic, DigitalGlobe, GeoEye
Data Sources: CalTrans, Stantec, AWE, 2021-2022
Date: 8/30/2022

Figure 2.1-4
Community Study Area

Yolo 80 Corridor Improvement Project
EA 03-3H900
Solano, Yolo, and Sacramento Counties, California

D:\AWE\20-018-003 Yolo CIA (YOL_80)\MXD\Yolo 80 Figure 1-4 Community Study Area_2022.mxd Revised: 2022-08-30 By: GIS 9-16

Regional Population Characteristics

Table 2.1-4 provides 2019 population for the state, regional study area, and community study area. Information for Yolo County and the cities of Davis, West Sacramento, and Sacramento are also provided for context. In 2019, the population of the regional study area totaled 2,324,773, representing approximately 6.22 percent of the state's total population. The regional study area is estimated to grow by 33 percent for a total population of 3,092,065 by 2045 (SACOG 2019a). The community study area population represents less than 3 percent of the regional study area population.

Table 2.1-4. Current Population (2019)

Area	2019 Population
California	39,283,497
Regional Study Area	2,488,449
Community Study Area	61,065
Yolo County	217,352
City of Davis	68,543
City of West Sacramento	53,151
City of Sacramento	500,930

Source: Source: U.S. Census Bureau 2019, Table B03002

Race and Ethnicity

The racial characteristics of the regional study area and community study area are presented in Table 2.1-5. The regional study area reflects a population that is a majority of white (52.1 percent). The white population accounts for 44.5 percent of the community study area's population, with the Hispanic or Latino population making the next highest majority at 28.4 percent, which is higher than the regional study area (22 percent). The population of Asian descent account for 16 percent of the community study area, which is higher than either the regional study area (13 percent) or state as a whole (14.3 percent). The population with black ethnicity makes up 4.7 percent of the community study area, which is lower than the regional study area (6.5 percent) and the state (5.5 percent). Persons identifying as Native American, Hawaiian or Pacific Islander, and Other Race ethnicities make up a small percentage of the community study area's population, at 0.2, 1.0, and 0.2 percent, respectively.

Table 2.1-5. Racial Distribution of Area Population

Area	Non-Hispanic							Hispanic or Latino
	White	Black or African American	American Indian or Alaska Native	Asian	Native Hawaiian and Other Pacific Islander	Other races	Two or more races	
California	37.2%	5.5%	0.4%	14.3%	0.4%	0.3%	3.0%	39.0%
Regional Study Area	52.1%	6.5%	0.4%	13.0%	0.8%	0.3%	4.8%	22.2%
Community Study Area	44.5%	4.7%	0.2%	16.0%	1.0%	0.2%	5.0%	28.4%
Yolo County	46.7%	2.4%	0.3%	13.9%	0.4%	0.2%	4.5%	31.6%
City of Davis	55.5%	2.1%	0.4%	22.7%	0.3%	0.4%	5.01	13.6%
City of West Sacramento	45.9%	4.6%	0.3%	10.5%	1.0%	0.1%	7.4%	30.1%
City of Sacramento	32.4%	12.7%	0.4%	18.6%	1.7%	0.4%	4.9%	28.9%

Source: U.S. Census Bureau 2019, Table B03002
Note: Percentages are based on the total number of persons in the area. The percentages do not total 100 due to margin of error and rounding.

Homogeneity of the population may contribute to higher levels of cohesion. Communities that are ethnically homogeneous often speak the same language, hold similar beliefs, and share a common culture, and are more likely to engage in social interaction on a routine basis. The community study area is ethnically diverse with 44.5 percent white, 28.4 percent Hispanic or Latino, 16.0 percent Asian, and 4.7 percent black or African American populations.

Age

As shown in Table 2.1-6, the age demographics of the community study area are similar to the regional study area. The community study area reflects a notably lower percentage of people over the age of 65 (10.4 percent) than the regional study area (15.0 percent). Additionally, the percentage of persons under the age of 18 in the community study area (21.7 percent) is slightly lower than the regional study area (23.3 percent). People over 65 and under 18 are considered more susceptible to the negative environmental effects resulting from construction projects (e.g., health impacts, air quality, noise). When compared to the regional study area as a whole, the community study area does not have a disproportionate percentage of people that are over 65 or under 18.

Communities with a higher percentage of residents aged 65 years or older tend to demonstrate a greater social commitment to their communities because they tend to be more active in the community as a result of having more time available for volunteering and participating in social organizations. The community study area has a lower population of people over age 65 (10.4 percent) than the Regional Study Area (15.0 percent).

Table 2.1-6. Age Statistics of Population

Area	Total (Under 18)	Percent of Population (Under 18)	Total (18 to 64)	Percent of Population (18 to 64)	Total (Over 65)	Percent of Population (Over 65)	Percent Under 18 and Over 65	Median Age
California	9,022,146	23.0	24,775,310	63.1	5,486,041	13.96	36.9	36.5
Regional Study Area	579,592	23.3	1,536,730	61.8	372,127	15.0	38.2	37.3
Community Study Area[1]	13,240	21.7	41,478	67.9	6,347	10.4	32.1	34.6
Yolo County	46,026	21.2	144,930	66.7	26,396	12.1	33.3	31.0
City of Davis	10,234	14.9	50,564	73.8	7,745	11.3	26.2	25.5
City of West Sacramento	13,875	26.1	33,183	62.4	6,093	11.5	37.6	34.3
City of Sacramento	115,731	23.1	319,570	63.8	65,629	13.1	36.2	34.5

Source: U.S. Census Bureau 2019., Tables B01001 and B01002
Note: 1 Age data is presented for all census tracts in the community study area.

Neighborhoods/Communities/Community Character

The community study area comprises multiple communities in Yolo and Sacramento counties. Communities are often delineated by physical barriers such as transportation infrastructure, large open spaces, and natural features such as rivers. The community study area is divided from north to south by I-80 and SR-51/I-80 Business/US-50, and from east to west by the Yolo Bypass Floodway, SR-113 in Davis, and the Sacramento River in West Sacramento and Sacramento. Pedestrian and bicycle crossing is limited over the river and over/under freeways and the floodway. The community study area includes portions of the following neighborhoods, described west to east.

Solano County

The western segment of the community study area begins in Solano County (Segment 1a) and consists of agricultural lands with few residents. Approximately 80 percent of the land in Solano County is agricultural or open space. Pockets of industrial properties are located along the I-80 corridor, such as between the Pedrick Road and Kidwell Road exits with facilities such as the CEMEX Dixon Tremont Concrete Plant. Based on the population density being low, community cohesion in unincorporated Solano County within the Project corridor is low.

City of Dixon

Dixon is located in northeastern Solano County and along I-80 within the Community Study Area. Dixon is characterized by its agricultural small-town character and is a community ringed by agricultural and open space lands. Dixon is a hub for grain, alfalfa, and dairy farming and has a long history in the sheep industry. The City hosts an annual sheep festival known as Lamb Town and the annual Dixon May Fair, the oldest state fair in California. The City of Dixon consists of pedestrian-oriented homes and businesses that are no more than three stories tall. I-

80 serves as a prominent gateway to the City of Dixon with a retail and service center geared towards highway travelers consisting of restaurants, gas stations, and motels. Based on the walkability and public space and housing design, social cohesion in the City of Dixon is moderate to high.

UC Davis Campus

I-80 crosses Putah Creek South Fork into the South Campus of UC Davis. Once I-80 crosses into Yolo County (Segment 1b), it is surrounded by the UC Davis 5,300-acre campus and associated agricultural research lands and open space, including the UC Davis Arboretum. The campus infrastructure encourages bicycling and walking with its many bike circles, wide bike lanes, and traffic signals specifically for bikes. Based on the large percentage of rental housing, small average household size, and transient student population, social cohesion at the UC Davis campus is low.

City of Davis

Between the Richards Boulevard and Mace Boulevard interchanges, Davis' south and east neighborhoods include a mix of residential and commercial land uses. Areas immediately adjacent to I-80 in Davis are characterized by multifamily residential, business, office, and commercial uses. Davis has a small-town atmosphere with an emphasis on parks and open spaces. It is a university town, with nearly one-third of all housing units occupied by students (City of Davis 2017). The Davis Farmers Market is held year-round on Wednesdays and Saturdays in Central Park. Davis has a reputation for excellent public schools, is a walkable and bikeable town, and has vibrant arts community influenced by the university offerings. Davis has also been a "slow-growth" city, resulting in housing shortages and high real estate prices. Based on the walkability, public space and housing design, racial diversity, and commute patterns indicating people work where they live, social cohesion in the City of Davis is moderate to high.

Yolo County

The community study area east of Davis (Segment 1c) is located within unincorporated Yolo County. Yolo County is typified by its small communities and rural character with over 93 percent of the county in farmland and open space. This portion of the community study area comprises agricultural and open space, as well as a wildlife refuge that borders the highway across the Yolo Causeway. The Yolo Causeway is a 3.2-mile-long elevated section of I-80 across the Yolo Bypass floodplain linking the cities of Davis and West Sacramento. The Yolo Bypass Wildlife Area is located within the Yolo Bypass, a flood control structure within the historic Yolo Basin floodplain. Based on the population density being low, social cohesion in unincorporated Yolo County within the Project corridor is low.

City of West Sacramento

In West Sacramento, the highway passes through the dominantly commercial and industrial areas along West Capitol Avenue and Industrial Boulevard. North of the I-80/US-50 interchange (Segment 2), I-80 is fronted by industrial, commercial, and business park areas. East of Harbor Boulevard (Segment 3a), US-50 passes adjacent to residential neighborhoods in the West

Sacramento, including Old West Sacramento, which is a hub for deep sea shipping and farming productions with a traditional neighborhood where homes date to the 1900s and show great pride of ownership; Pioneer Bluff which is a proposed mixed-use development area along the Sacramento River; and the Triangle or Bridge District which is a modern mixed-use redevelopment area near Raley Field with townhomes, condominiums, and single family residences. Based on the higher percentage of owner-occupied housing units and higher average household size, social cohesion in the City of West Sacramento within the Project corridor is moderate.

City of Sacramento

After crossing the Pioneer Bridge over the Sacramento River (Segment 3b), US-50 enters Sacramento. At the US-50/I-5 interchange, adjacent neighborhoods include Old Sacramento and the Southside Park neighborhood to the north and the Upper Land Park neighborhood to the south. Old Sacramento consists of historic buildings, wood-plank sidewalks, museums, the Sacramento River, and an ambience from the Gold Rush era. The historic buildings house numerous shops, restaurants, bars, and entertainment venues. This area was separated from downtown Sacramento with the construction of I-5 in the early 1970s. Old Sacramento attracts more than 3 million visitors annually. Southside Park is home to several corner markets and churches, including Our Lady of Guadalupe, which is a large Spanish-speaking church. Many annual celebrations and a Sunday Farmers Market are held throughout the year near Southside Park, a 20-acre park in this neighborhood. Upper Land Park is characterized by traditional neighborhoods, tree-lined streets, distinguished parks, and local shops. Based on the walkability, public space and housing design, and commute patterns indicating people work where they live, social cohesion in the City of Sacramento is moderate.

Housing

Table 2.1-7 and Table 2.1-8 provide data on the housing characteristics in the community study area and regional study area. As shown, in 2019, the community study area had 22,017 housing units, representing approximately 28 percent of Yolo County's total housing stock (77,947 units). Housing characteristics within the community study area vary from the housing characteristics in the regional study area. Fewer vacant housing units are available within the community study area (4.6 percent) compared to the regional study area as a whole (7.9 percent).

In the community study area, about 60 percent of the housing stock consists of single-family homes and 40 percent is multifamily, whereas the regional study area's housing stock in 2019 comprised 74 percent single-family units and 23 percent multifamily. Although subject to debate and dependent on the geographic location and other social factors, areas with a high proportion of single-family homes may be an indicator that a community has a higher degree of cohesion compared to areas with more multifamily housing.

The community study area has a significantly lower percentage of owner-occupied units at 47 percent as compared to the regional study area, and Yolo County has 60 percent and 52 percent, respectively. This difference may be due, in part, to the high percentage of rental units in Davis occupied by students. Communities with a higher percentage of owner-occupied residences are typically more cohesive because their population tends to be less mobile.

Homeowners often take a greater interest in what is happening in their communities than renters do because they have a financial stake in their communities. This often translates to a stronger sense of belonging to their communities.

The median value of homes in the community study area was also more than $134,000 higher than the overall regional study area median home value, and $83,000 more than that in Yolo County (Table 2.1-7).

The Census Bureau reports number of persons per household. This analysis assumes that higher persons per household translates to more families with children and that communities with a high percentage of families with children are more cohesive than communities consisting largely of single people. There are slightly fewer persons per household in the community study area (2.69 persons) than in either Yolo County (2.81 persons) or the regional study area (2.77 persons).

Table 2.1-7. Selected Housing Characteristics

Area	Total Housing Units	Percent Vacant (%)	Percent Single Family Units(%)	Percent multiple Family Units (%)	Percent Owner Occupied (%)	Median Value ($)	Median Rent ($ per month)
California	14,175,976	8.0	64.8	2.95	54.8	505,000	1,503
Regional Study Area	966,189	7.9	74.0	2.77	60.2	374,283	1,236
Community Study Area[1]	22,017	4.6	58.5	2.69	47.3	508,375	1,395
Yolo County	77,947	4.7	66.0	2.81	51.6	424,900	1,324
City of Davis	25,844	4.7	55.8	2.70	43.2	652,300	1,567
City of West Sacramento	19,478	4.6	69.9	2.84	56.9	349,800	1,026
City of Sacramento	196,652	5.8	66.9	2.66	48.5	336,900	1,263

Source: U.S. Census Bureau 2019, Tables B25002, B25003, B25010, B25024, B25064 and B25077
Note: 1. Housing data is presented for all census tracts in the community study area.

The community study area has higher percentages of householders who have lived in their units for shorter periods of time when compared to the regional study area and Yolo County (Table 2.1-8). The community study area comprises 13.5 percent householders who moved into their current housing unit since 2017, compared to 10.8 percent householders in the regional study area, and has only 7.4 percent householders who have lived in their current housing unit since prior to 1989, compared to the 10.2 percent householders in the regional study area. This may indicate that residents of the community study area have lived in the area for fewer years, or maybe a function of newer housing developments in the West Sacramento and Davis area. Communities with a high percentage of long-term residents are typically more cohesive because a greater proportion of the population has had time to establish social networks and develop an identity with the community.

Given the large percentage of rental units, high percentage of multi-family residential, and short average length of occupancy per housing unit, it is reasonable to assume a lower degree of social cohesion exists within the community study area as a whole compared to the regional study area. The City of Davis has the largest percentage of multi-family housing units and the largest percentage of rental units within the Community Study Area, indicating a lower level of cohesion. The City of West Sacramento has the largest percentage of owner-occupied housing and highest average householder size within the Community Study Area, indicating a moderate level of cohesion.

Table 2.1-8. Householder Tenure

Area	Year Householder Moved into Unit by Percentage					
	2017 or Later	2015 to 2016	2010 to 2014	2000 to 2009	1990 to 1999	1989 or Earlier
California	9.7	14.8	27.3	23.8	12.4	12.0
Regional Study Area[1]	10.8	16.6	27.8	23.7	10.9	10.2
Community Study Area[1]	13.5	22.4	27.4	20.9	8.5	7.4
Yolo County	11.9	18.3	26.3	22.4	11.0	10.0
City of Davis	18.3	23.4	21.1	15.6	12.3	9.2
City of West Sacramento	8.9	17.0	31.2	28.4	7.1	7.4
City of Sacramento	12.5	17.4	30.5	20.5	8.7	10.3

Source: U.S. Census Bureau 2019, Table B25038
Note: 1. Housing data is presented for all census tracts in the community study area.

Estimations from the MTP/SCS anticipate approximately 46,400 acres of land will be developed in the regional study area through 2040 to accommodate the projected increase of approximately 620,500 new residents, 260,000 new housing units, and 270,000 new employees (SACOG 2019a). To keep up with the housing demand, SACOG estimates that the region will need to produce 11,000 new homes annually on average (SACOG 2019a). Housing permit data from local building departments show increased demand for more closely situated, denser housing development in 2017 and 2018 (SACOG 2019a). SACOG's planning for future housing aligns with the Sacramento Region Blueprint, which aims to integrate land use and transportation planning to curb sprawl and reduce vehicle emissions and congestion.

Household Income

The average household size in the community study area (2.69 persons per household) was smaller than the regional study area (2.77) and the state as a whole (2.95) (Table 2.1-9). Median household incomes within the community study area ($70,759) were similar to the regional study area ($71,259) and lower than the state ($75,235). Census block groups within the community study area have some of the lowest and highest incomes in the region, with census tract 22, block group 2 (West Broadway in Sacramento) falling within the lowest range ($16,667 median household income) and census tract 106.07, block group 3 (El Macero in

Davis) falling within the highest range ($182,125 median household income). The percentage of families and individuals living below the poverty level within the community study area is higher than the regional study area or state percentage (Table 2.1-9).

Table 2.1-9. Selected Income Characteristics

Area	Population	Average Number of Persons per Household	2Median Household Income[1] ($)	Population Below Poverty Level	Percent of Individuals Below Poverty Level (%)	Percent of Families Below poverty Level[2] (%)
California	38,535,926	2.95	75,235	5,149,742	13.4	9.6
Regional Study Area	2,452,053	2.77	71,259	332,122	13.5	9.4
Community Study Area	101,654	2.69	70,759	21,906	21.5	10.9
Yolo County	209,222	2.81	70,228	39,919	19.1	9.0
City of Davis	66,738	2.70	69,379	19,900	29.8	6.4
City of West Sacramento	52,875	2.84	70,699	8,053	15.2	11.8
City of Sacramento	492,815	2.66	62,335	81,673	16.6	12.1

Source: U.S. Census Bureau 2019, Tables B19001, B17012, B19013, and S1701

Community Facilities

Community facilities may contribute to community cohesion by providing health and welfare resources to the local population or a means to interact with other members of the community. Community facilities include schools, libraries, museums, recreation facilities, health providers, emergency services, community centers, and other similar institutions. Facilities that are frequently accessed by the elderly, disabled, low-income, and minority populations are especially important because these groups often have limited mobility and may depend on transit for access.

This section provides a description of community facilities such as community centers, museums, and schools within the Land Use Study Area, which includes the project area plus a 1,000-foot buffer. These physical areas directly surrounding I-80/US-50 in the project area are considered the areas with the potential to experience direct effects on community facilities. Parks and other recreational facilities within the Land Use Study Area are described in Section 2.1.3, Parks and Recreational Facilities.

There are various community facilities in the Land Use Study Area within the city of Davis, including the Mondavi Center for the Arts, Davis Musical Theater Company, the Davis Amtrak Station, numerous bus stops, a US Post office, a Community Housing Facility, a California Department of Forestry and Fire equipment facility, the Yolo Hospice, and Yolo Community Care Continuum (a nonprofit organization serving people with mental illness).

Schools within the Land Use Study Area in Davis include the UC Davis Campus, UC Davis Extension sites, the Mondavi Institute for Wine and Food Studies, Peregrine Elementary School, and Pioneer Elementary School. The Land Use Study Area in Davis also includes an equestrian center, gymnastics center, multiple fitness centers, and numerous other commercial community facilities, such as stores and restaurants.

Within unincorporated areas of Solano County and Yolo County, there are occasional farm stands and other commercial facilities along I-80, as well as the Yolo Basin Foundation headquarters.

Community facilities in the Land Use Study Area in West Sacramento include the West Sacramento Health Education Council, West Sacramento KOA Campground and RV Park, numerous bus stops, DaVita Dialysis Center, California School Boards Association headquarters, a US Post Office, the West Sacramento Chamber of Commerce, River City Dance Academy, Collings West Sacramento Teen Center, Margaret McDowell Manor senior apartment complex, and Veterans of Foreign Wars post 8762.

Churches within the Land Use Study Area in West Sacramento include Community Lutheran Church, Our Lady of Grace Church, Center for Spiritual Awareness (a nondenominational community church), and River City Apostolic Church. Schools within the Land Use Study Area in West Sacramento include Westmore Oak Elementary School, West Sacramento School for Independent Study, Washington Unified School District offices, and James Marshall Nursery School.

In Sacramento, community facilities in the Land Use Study Area include Tenrikyo High Sacramento Church, Muslim Mosque Association, Saint John's Missionary Baptist Church, and the California Automobile Museum.

Regional Economy

The community study area and regional study area have had economic growth and a low unemployment rate that has been supported by substantial growth in the real estate, construction, manufacturing, health care, and retail sectors. Over 2010–2019, Yolo County posted a 36.84 percent net gain in real gross domestic product (GDP), which outpaced the statewide average (36.15 percent). In comparison, Sacramento County and Solano County's GDP grew by approximately 26.45 percent and 23.86 percent, respectively, between 2010 and 2019 (California Regional Economic Analysis Project 2021).

The I-80/US-50 corridor is an important facility for moving freight throughout California. I-80 is a major west-east connector through California, linking the Bay Area with the Sacramento Region and locations across the country. The 203-mile length of I-80 in California between US 101 and the California-Nevada line is designated as a primary link in the National Highway Freight Network by the FHWA (FHWA 2018).

Yolo County's leading economic activity is agriculture and is supported by other industries such as warehousing and distribution, food processing, technology and biotechnology research and development, and higher education at UC Davis. The soils, growing climate, and water supplies

in unincorporated Yolo County support agriculture. Almonds are Yolo County's leading commodity, followed by tomatoes, wine grapes, rice, and organic production. Yolo County is working to become a leader in economic sustainability, focusing on agricultural advancement, emerging green technology expertise, and eco- and agri-tourism opportunities. UC Davis is a leading generator of innovative graduates with expertise in all these industries.

Employment in Yolo County includes government, transportation, warehousing, retail. and agriculture. However, agriculture is on the decline due to increasing mechanization of farming, which reduces labor needs. Job growth is seen in education, healthcare, professional and business services, and leisure and hospitality, largely due to activities at the Cache Creek Casino. UC Davis is the largest employer, followed by Cache Creek Casino, the State of California, and the U.S. Postal Service.

Table 2.1-10 provides information on major employment sectors in the regional study area and community study area. According to the U.S. Census Bureau 2019 American Community Survey, the state had an available labor force of 18,591,241. Comparatively, the regional study area had an available labor force of 1,135,810. At the time of the census, approximately 2.6 to 4.8 percent of the available labor force in the regional study area was unemployed, as compared to 3.8 percent of the state (U.S. Census Bureau 2019). According to the State of California Employment Development Department (CEDD 2022), major employers in Yolo County include:

- Government offices such as the California Procurement Office, Yolo County District Attorney, Yolo County Sheriff's Office, and the City of Davis City Manager's Office
- Hospitals and health care businesses such as Beckman Coulter, Sutter Davis Hospital, Dignity Health Woodland, and the Woodland Healthcare Foundation
- Higher education at UC Davis
- Manufacturing and distribution centers such as Clark Pacific, Nor-Cal Beverage, Pacific Coast Producers, Target, and Rite Aid
- Other private corporations such as Cache Creek Casino Resort, United Parcel Service Customer Center, Tony's Fine Foods, Promega, Mariani Nut, IKEA, Clark Pacific, Capital Express Lines, Walmart, Mcguire & Hester, and Dennis Blazona Construction

Table 2.1-10. Employment Characteristics (2019)

Employment Area	Percentage of Workforce		
	California	Regional Study Area	Community Study Area
Management, business, science, and arts occupations	39.3	40.2	48.5
Service occupations	18.5	18.8	17.0
Sales and office occupations	21.2	22.3	16.8
Natural resources, construction, and maintenance occupations	9.0	8.4	7.9
Production, transportation, and material moving occupations	12.0	10.4	9.9

Source: U.S. Census Bureau 2019

Table 2.1-11 gives employment statistics and labor force composition. The unemployment rate in the community study area at 6.60 percent is slightly higher than the regional study area (6.14 percent) and Yolo County (6.19 percent). The composition of the labor force in the community study area has approximately the same percentage of women workers in the labor force as the regional study area and Yolo County. The labor force of employed persons who are college educated in the community study area (72 percent) is slightly higher than the regional study area (69 percent) and Yolo County (70 percent).

Table 2.1-11. Employment and Labor Force Composition

Area	Number Persons in Labor Force[1]	Number of Persons Employed	Number of Persons Unemployed	Percent Unemployed	Percent Women in Labor Force	Percent Employed and College Educated[2]
California	19,790,474	18,591,241	1,199,233	6.06	46.0	64.5
Regional Study Area	1,210,148	1,135,810	74,338	6.14	47.8	69.2
Community Study Area[3]	51,943	48,514	3,429	6.60	48.8	72.1
Yolo County	105,929	99,367	6,562	6.19	48.4	69.8

Notes:
1 Labor Force: Aged 16 years and older
2 College Educated Population: Aged 25 years and older with more than a high school education.
3 Data is provided on census tract level, not census block group
Source: U.S. Census Bureau 2019, Tables B23001, B24010, and B23006

There are several business centers along the I-80/US-50 corridor in the community study area. The major economic centers include commercial businesses, industrial and manufacturing centers, and office/business parks in Davis and West Sacramento. Major employment centers along the project corridor include UC Davis and the Port of (West) Sacramento.

The California Department of Tax and Fee Administration 2019–2020 Annual Report (CDTFA 2021) reported local sales and use tax revenue distributed for fiscal year 2019-2020 was $4.37 million to Yolo County, $7.33 million to Davis, $19.7 million to West Sacramento, and $85.4 million to the City of Sacramento. Total taxable transactions for the same period in Yolo County

were $4.69 billion, Davis reported $0.55 billion, West Sacramento reported $1.59 billion, and the City of Sacramento reported $6.84 billion (CDTFA 2021).

The COVID-19 pandemic created economic uncertainty in the community study area. The region's economy, like many others throughout the state, was impacted due to the recession induced by the COVID-19 pandemic. This impact was mitigated to a degree by stimulus packages approved by the federal and state governments. In the transition to post-pandemic life, housing demand is higher than supply in the region as Bay Area residents continue to move inland in search of less expensive housing alternatives. Economic recovery from the pandemic is ongoing.

Commute Patterns

The Yolo basin floodway and the Sacramento River present natural physical barriers to traveling within the study area. Limited connectivity across rivers and floodways creates longer trip lengths, greater dependence on automobiles, concentrated vehicle traffic flows on the existing causeway and bridges and their connecting approach roadways, and a barrier to economic activity, social exchanges, recreational opportunities, and access to jobs within the urban core of Sacramento, West Sacramento, and Davis. According to a West Sacramento draft project report for the Broadway Bridge Project, peak morning and afternoon congestion is caused by local intercity commuters using the state highway system as a result of having few local river crossing options (City of West Sacramento 2022).

Table 2.1-12 shows the percentage of workers aged 16 years and older who commute to work using different modes of transportation. Transportation modes to work for workers in the community study area are somewhat consistent with Yolo County, with a slightly higher percentage of workers walking or biking and a slightly lower percentage of workers driving alone. The same differences are more pronounced when comparing the community study area to the regional study area, with a difference of 8.3 percent more workers walking or biking and 10.4 percent fewer workers driving alone. This difference is largely attributable to Davis, where more than 21 percent of the workers walk or bike to work, with two census block groups having 54 and 69 percent of its workers walking or biking to work. These statistics are also provided by census tracts in the table below. One census tract in Davis (census tract 106.08) has a high percentage of workers using public transportation at 18.3 percent, with the next highest at less than 8 percent. One census tract in Davis has a high percentage of workers working from home at 18.4 percent.

Table 2.1-12. Transportation to Work

Area	Total Number Workers[1]	Percent Drove Alone	Percent Carpool	Percent Public Transpor--tation	Percent Other	Percent Walk/Bike	Percent Work from Home
California	18,191,555	73.7	10.1	5.1	1.6	3.6	5.9
Regional Study Area[1]	1,115,602	76.9	9.6	2.2	1.2	3.1	7.0
Community Study Area	26,063	66.5	9.8	4.0	1.2	11.4	7.1
Yolo County	97,220	69.1	9.8	4.2	1.0	9.9	6.0
Census Tract and Census Block Groups in the Community Study Area[2]							
Segment 1a Kidwell Road to Solano/Yolo County Line							
2533 (2)	380	77.1	1.3	3.9	0.0	11.1	6.6
2534.02 (1)	903	74.0	18.3	0.0	0.0	1.9	5.9
105.01 (2)	643	16.6	3.3	4.4	4.8	68.9	2.0
Segment 1b Solano/Yolo County Line to Yolo Causeway							
106.02 (2-4)	1,970	49.5	7.5	1.9	0.5	25.3	15.3
106.06 (4-5)	1,264	65.2	2.5	7.7	0.0	14.6	10.0
106.08 (1-3)	2,470	49.3	2.1	18.3	0.5	20.7	9.1
107.01 (4)	261	27.6	0.0	0.0	0.0	54.0	18.4
106.05 (2)	554	73.5	4.2	1.6	0.9	11.2	8.7
105.05 (2)	222	69.8	0.0	0.0	0.0	24.3	5.9
106.07 (1-3)	1,725	63.7	10.8	0.5	0.9	11.5	12.6
104.01 (1-2)	1,739	76.5	8.9	3.7	0.0	4.3	6.6
Segment 1c Yolo Causeway to Enterprise Boulevard							
112.06 (3)	2,079	70.6	17.8	2.1	1.0	0.8	7.7
Segment 2 Enterprise Boulevard to West El Camino Avenue							
101.02 (1, 3)	1,672	60.3	17.6	0.0	1.1	8.3	12.7
70.20 (1, 2)	2,307	84.3	7.2	1.2	1.1	1.5	4.8
70.17(1)	665	86.3	7.7	0.0	2.7	0.0	3.3
Segment 3a I-80/US-50 to Jefferson Boulevard							
102.03 (1-4)	1,725	74.1	12.1	5.9	1.4	5.9	0.6
102.04 (1-3)	1,971	79.4	11.7	0.8	0.0	3.6	4.6
Segment 3b Jefferson Boulevard to I-5							
102.01 (1)	1,408	58.9	19.9	3.2	7.5	8.2	2.3
22 (1-2)	1,145	67.4	7.6	5.9	2.7	13.9	2.4
21 (1, 3)	960	78.0	8.9	1.9	0.0	10.4	0.8

Source: U.S. Census Bureau 2019, Table B08301
Notes: 1. Workers aged 16 years and older.
2. Census Block Groups are shown in parenthesis after the Census Tract numbers.

Table 2.1-13 shows commuting patterns and the location of employment relative to area of residence for workers over the age of 16. The community study area has a lower percentage of people who work within their county of residence (64 percent) than the regional study area (73 percent) and a higher percentage of people who work within their city or census-designated place of residence (38 percent) compared to the regional study area (31 percent). In general, communities with a high percentage of the population that reside and work in the same county or place of residence tend to demonstrate higher levels of involvement and interaction within their communities. The community study area also has a higher percentage of workers with a short commute time of less than 30 minutes (72 percent) compared to the regional study area (61 percent) and the state (56 percent). Communities with a high percentage of the population with shorter travel times to work are generally more cohesive than communities with longer commute times. When people spend less time commuting, they have more time to engage in their local communities and greater cohesion is demonstrated.

Table 2.1-13. Commuting Patterns

Area	Work Inside County of Residence	Work Outside County of Residence	Work Inside Place of Residence[1]	Work Outside Place of Residence	Travel Time to Work[2] <30 Minutes	Travel Time to Work 30 to 60 Minutes	Travel Time to Work >60 Minutes
California	82.4%	17.6%	35.1%	60.2%	56.0%	31.3%	12.7%
Regional Study Area[3]	72.6%	27.4%	30.5%	62.5%	60.5%	31.0%	8.6%
Community Study Area	64.2%	35.8%	38.3%	55.7%	72.1%	22.2%	5.7%
Yolo County	63.1%	36.9%	33.4%	61.3%	69.1%	23.5%	7.4%

Source: U.S. Census Bureau 2019, Tables B08007, B08008, and B08303
Notes:
1. Place of residence is defined as a city or census designated place.
2. Travel Time to Work percentages calculated using total number of workers, excluding those working from home.
3. Population for the regional study area based on the total population within the SACOG area, including El Dorado, Placer, Sacramento, Sutter, Yolo, and Yuba Counties.

The jobs-housing balance is the ratio of jobs to housing in a given area. If the jobs-housing ratio is too high, adequate housing may be unavailable or unaffordable for workers in that area, contributing to traffic congestion. If the jobs-housing balance is too low, this may indicate inadequate job availability for area residents. Table 2.1-14 shows a predicted improvement in the jobs-to-housing ratio for Yolo County and the regional study area through 2040. Providing housing near employment centers reduces commute distances and leads to improvements in traffic and air quality conditions. In regional land use and transportation planning, an improved jobs-to-housing ratio is defined as a ratio that moves toward the regional average. The majority of regional housing and employment growth in the regional study area, approximately 80 percent, is projected to occur in Sacramento County (61 of the total employment growth and 63 percent of the total housing growth) and Placer County (17 percent of the total for both employment and housing growth). Yolo County is projected to have the next highest amount of growth (10 percent of the total employment growth and 9 percent of the total housing growth),

followed by El Dorado, Sutter, and Yuba counties (SACOG 2019). Table 2.1-14 illustrates how jobs-to-housing ratios are projected to change over the next 20 years.

Table 2.1-14. Summary of Jobs to Housing Ratios

Area	2016			2016–2040			2040		
	Dwelling Units	Employ-ees	Jobs to Housing Ratio	New Dwelling Units	New Employ-ees	Jobs to Housing Growth	Dwelling Units	Employ-ees	Jobs to Housing Growth
Yolo County	77,705	104,771	1.3	28,662	30,604	1.0	106,367	135,376	1.2
Regional Study Area[1]	921,123	1,060,751	1.2	260,128	270,060	1.1	1,181,251	1,330,813	1.2

Source: SACOG 2019
Note: 1 Population for the regional study area based on the total population within the SACOG area, including El Dorado, Placer, Sacramento, Sutter, Yolo, and Yuba Counties.

Toll Projects

Travelers do not currently pay tolls on roads or bridges in the community or regional study areas. The 2020 MTP/SCS prepared by SACOG has identified managed lane projects as an option for transportation revenue and pricing. Managed lanes are one tool for modernizing funding methods for transportation infrastructure. Pricing mechanisms can raise revenue to build and maintain the region's transportation system, provide mobility benefits to residents, manage traffic and congestion, and help to achieve the state-mandated greenhouse gas reduction targets (SACOG 2019).

Build Alternatives 3, 4, and 5 all feature managed lanes with tolling options. Each Build Alternative has a distinct tolling structure that defines the Build Alternative as described in Section 1.5 Proposed Project. All tolling option alternatives feature at least one type of tolling exemption for certain occupancy classes of vehicles except Build Alternative 5, which requires that all motorists using the managed lane are subject to the toll regardless of the occupancy classification of the vehicle. The economic impacts of priced lanes must consider the equity of imposing tolls on roadway users, particularly low-income users.

2.1.6.3 Environmental Consequences

No Build Alternative 1

Construction and Operation

Under No Build Alternative 1, managed lanes and transportation improvements would not be constructed or operated. As such, the No Build Alternative 1 would have no effect on neighborhoods, communities, and community character.

Build Alternatives 2a and 2b

Construction

Under Build Alternatives 2a and 2b, construction activities would result in delays for roadway users and potentially affect access to surrounding businesses and community facilities. Build Alternative 2b would result in a longer construction timeline in order to build the I-80 connector structure, thus the effects of construction would be longer than Build Alternative 2a.

For both Build Alternatives 2a and 2b, ramp closures are anticipated at all ramp locations adjacent to proposed widening or proposed mainline paving and would occur for up to 15 days. Traffic would be detoured to the next interchange.

Build Alternative 2b may require a temporary, full closure on westbound US-50 for construction of the I-80 connector structure. Closures would be during night or during a continuous operation (24 or 48 hours). The primary detour for westbound US-50 traffic would be to use northbound I-5 to westbound I-80. Local traffic would use other interchanges in the area. Any full closures would be scheduled to take place during the hours of the lowest volume of traffic to minimize effects on businesses, commuters, and the local community.

A Traffic Management Plan (TMP) (Standard Measure TT-3) would be developed by Caltrans during the design phase. The TMP would include elements such as haul routes, one-way traffic controls to minimize speeds and congestion, flag workers, and phasing, to reduce impacts on local residents as feasible and maintain access for police, fire, and medical services in the local area. Additionally, the contractor would implement a planned public outreach program to keep area residents, businesses, emergency service providers, and transit operators informed of the project construction schedule as part of Standard Measure COM-1.

Furthermore, Build Alternatives 2a and 2b would also implement visual, noise, and air quality standard measures. Therefore, Build Alternatives 2a and 2b would not have substantial effects on the community during construction.

Operation

Build Alternatives 2a and 2b would involve adding an HOV 2+ lane in each direction. As described in Section 2.1.5, Growth, by improving access and highway capacity, Build Alternatives 2a and 2b would help accommodate planned growth on a regional level and could indirectly change development patterns surrounding the project area. A sound wall, mature trees, and vegetation are located between I-80 and residential properties, thus creating a buffer for noise impacts. Noise experienced by nearby residential development would be barely perceptible, which is consistent with existing conditions. Similarly, visual resource effects associated with Build Alternatives 2a and 2b would be compatible with the existing visual character of the corridor since the corridor is already developed as a roadway.

The operational air quality analysis concludes that mobile source air toxic (MSAT) and DPM emissions would decrease in future years compared to existing conditions, reducing pollutant burdens for households neighboring the highway. For Build Alternatives 2a and 2b, significant

operational air quality impacts on nearby sensitive receptors are not expected as air quality is expected to improve in future years. However, fugitive sources of particulate matter, like tire wear, brake wear, and road dust are the largest fraction of particulate matter emissions from traffic, and they increase as VMT increases. Therefore, $PM_{2.5}$ and PM_{10} emissions would continue to increase as VMT in the corridor increases, adding to the pollution burden associated with fugitive particulate matter on communities next to the highway.

Build Alternatives 2a and 2b would occur primarily within the existing Caltrans right-of-way and would not provide new access to previously unserved areas. Build Alternatives 2a and 2b would require acquisition of a vacant parcel to construct a Park-and-Ride lot south of I-80 at Enterprise Boulevard in West Sacramento. However, this acquisition would not result in changes to community character or displacement of any residence, business, or employees.

Build Alternatives 2a and 2b would ultimately improve circulation along I-80/US-50 in the project corridor, which could result in improved access to nearby community facilities. Build Alternatives 2a and 2b would not adversely change the regional economy or locations of employment centers and would be expected to have a beneficial effect on the regional economy when completed, by improving access, travel time, and highway capacity. No businesses would be acquired or relocated and no changes to sales tax revenue or property values are anticipated within the regional study area. Build Alternatives 2a and 2b would not divide an existing neighborhood or result in additional barriers within the community study area, and there would be no adverse effects on community character and cohesion.

Build Alternatives 3a and 3b

Construction and Operation

Build Alternatives 3a and 3b would involve adding an HOT 2+ lane in each direction. While implementation of a tolling structure would result in congestion relief and enhanced accessibility, low-income travelers within the community may not realize the full benefit unless they take advantage of carpooling or high vehicle occupancy, as further described in Section 2.1.7, Environmental Justice. Build Alternatives 3a and 3b offer reduced or no payment options for riders in managed lanes who take advantage of carpooling or high vehicle occupancy. Build Alternatives 3a and 3b propose similar project components within the same project area as Build Alternatives 2a and 2b, respectively. Therefore, the effects would be the same as effects described under Build Alternatives 2a and 2b.

Build Alternatives 4a and 4b

Construction and Operation

Build Alternatives 4a and 4b would involve adding an HOT 3+ lane in each direction. While implementation of a tolling structure would result in congestion relief and enhanced accessibility, low-income travelers within the community may not realize the full benefit unless they take advantage of carpooling or high vehicle occupancy, as further described in Section 2.1.7, Environmental Justice. Build Alternatives 4a and 4b offer reduced or no payment options for riders in managed lanes who take advantage of carpooling or high vehicle occupancy. Build

Alternatives 4a and 4b propose similar project components within the same project area as Build Alternatives 2a and 2b, respectively. Therefore, the effects would be the same as effects described under Build Alternatives 2a and 2b.

Build Alternatives 5a and 5b

Construction and Operation

Build Alternatives 5a and 5b would involve adding an Express Lane in each direction. While implementation of a tolling structure would result in congestion relief and enhanced accessibility, low-income travelers within the community may not realize the full benefit and there would be no reduced payment option from carpooling or high vehicle occupancy, as further described in Section 2.1.7, Environmental Justice. Build Alternatives 5a and 5b offer no reduction in toll for ridesharing, carpooling, or other high vehicle occupancy and would affect lower-income individuals who cannot afford to pay a toll but would otherwise use the managed lanes for ridesharing and carpooling. Use of tolled lanes constitutes a higher financial burden on low-income travelers who choose to use the managed lanes than on higher-income individuals using the tolled lanes.

Build Alternatives 5a and 5b propose similar project components within the same project area as Build Alternatives 2a and 2b, respectively. Therefore, the effects would be the same as effects described under Build Alternatives 2a and 2b.

Build Alternatives 6a and 6b

Construction and Operation

Build Alternatives 6a and 6b would involve adding a transit-only lane in each direction. Build Alternatives 6a and 6b propose similar project components within the same project area as Build Alternatives 2a and 2b, respectively. Therefore, the effects would be the same as effects described under Build Alternatives 2a and 2b.

Build Alternatives 7a and 7b

Construction and Operation

Build Alternatives 7a and 7b would involve repurposing the current number one general purpose lane to HOV 2+. No new lanes would be constructed. Because Build Alternatives 7a and 7b would not add new lanes, but would repurpose existing lanes as managed lanes, the Build Alternatives 7a and 7b construction period may have shorter duration resulting in fewer delays than those under Build Alternatives 2a, 2b, 3a, 3b, 4a, 4b, 5a, 5b, 6a, and 6b. Otherwise, Build Alternatives 7a and 7b propose similar project components within the same project area as Build Alternatives 2a and 2b, respectively. Therefore, the effect would be similar to the effects described under Build Alternatives 2a and 2b.

2.1.6.4 Avoidance, Minimization, and/or Mitigation Measures

No AMMs or MMs are required.

2.1.7 Environmental Justice

2.1.7.1 Regulatory Setting

All projects involving a federal action (e.g., funding, permit, or land) must comply with Executive Order (EO) 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, signed February 11, 1994. This EO directs federal agencies to take the appropriate and necessary steps to identify and address disproportionately high and adverse effects of federal projects on the health or environment of minority and low-income populations to the greatest extent practicable and permitted by law. Low income is defined based on the Department of Health and Human Services poverty guidelines. For 2023, the amount was $30,000 for a family of four (ASPE 2023).

All considerations under Title VI of the Civil Rights Act of 1964, and related statutes, have also been included in this project. Caltrans' commitment to upholding the mandates of Title VI is demonstrated by its Title VI Policy Statement, signed by the Director, which can be found in Appendix B of this document.

2.1.7.2 Affected Environment

Information in this section is based on the CIA prepared for the project (Caltrans 2023a) and Caltrans' Title VI Policy Statement (Appendix B).

The community study area, which includes all census tracts and block groups immediately adjacent to the project footprint, consists of a variety of socioeconomic neighborhoods. The ethnic composition of the community study area, as described in Section 2.1.6 and summarized in Table 2.1-5, is similar in diversity to the regional study area. As described in Section 2.1.6, Community Character and Cohesion, and summarized in Table 2.1-9, median household income in the community study area is $71,216, similar to the regional study area of $71,717. According to the U.S. Census Bureau, which defines poverty thresholds by household income, size of family, and number of children, approximately 10.9 percent of families in the community study area are below the U.S. Census 2019 federal poverty level, which is a higher percentage than the regional study area (9.4 percent).

Environmental Justice Communities

For this analysis, environmental justice communities are defined consistently with the FHWA environmental justice strategy as areas that have concentrated populations of low-income and/or communities of color. The CEQ's Environmental Justice Guidance under NEPA (CEQ 1997) defines low-income populations using the annual poverty thresholds from the Census Bureau and minority populations as areas where the minority population exceeds 50 percent or the minority population percentage is meaningfully greater than the minority population percentage in the general population or other appropriate unit of geographic analysis (CEQ 1997). These guidelines were adopted for use at the national level and do not take into consideration income and population characteristics specific to California. California has a high cost of living, so the federal poverty level does not adequately capture households that experience poverty in California. The minority population has grown to half or more of the

population in Sacramento and Yolo counties, and 45 percent of the region's population (SACOG 2019).

SACOG has defined environmental justice communities for the regional planning area, taking into consideration the differences in income and diversity unique to this region. SACOG has integrated those definitions into the RTP/SCS and the SACSIM traffic model, allowing for a robust analysis of changes in traffic patterns for environmental justice communities.

FHWA definitions for low-income and minority individuals are intended to be consistent with the definitions for EO 12898 that have been issued by CEQ and the EPA, with the following exceptions: FHWA defines low-income individuals using the poverty guidelines from the Department of Health and Human Services (DHHS) rather than U.S. Census Bureau, and the minority category of Native Hawaiian and Other Pacific Islander was added. The primary difference between the U.S. Census Bureau poverty thresholds and the DHHS poverty guidelines is the DHHS have geographic variation to account for the much higher costs of living in Alaska and Hawaii (Institute for Research on Poverty 2023).

To allow for a more dynamic analysis of project effects on environmental justice travelers and to provide consistency with the RTP/SCS and other regional planning documents, Caltrans has used the environmental justice community definitions from SACOG for this analysis.

Environmental justice communities within the regional study area are defined as follows:

- **Low-Income Communities:** Census tracts or block groups where 40 percent or more of the population earns 200 percent or less of the federal poverty level.

- **Minority Communities:** Census tracts or block groups where 70 percent or more of the population are Hispanic or Latino, Native Hawaiian or Other Asian Pacific Islander, Black or African American, American Indian and Alaska Native, or other non-white ethnic groups.

Approximately 39 percent of residents in the community study area (15 of 37 census block groups) live in defined environmental justice communities (SACOG 2019a).

The I-80 corridor is heavily used in Yolo County because it is the only west-east connector that crosses the Yolo Basin, which separates the cities of Davis and West Sacramento. In the larger regional picture, it is also the only west-east connector between the Bay Area and the city of Sacramento. Within the community study area, the percentage of individuals living below the poverty line (approximately 21.5 percent) is higher than the percentage of both the regional study area and California (13.5 and 13.4 percent, respectively).

Within the community study area, low-income, minority, and low-income/minority communities are in portions of downtown and south Davis, along I-80 and US-50 through most of West Sacramento, and near the US-50/I-5 interchange in Sacramento. The percentage of individuals living below the poverty line (approximately 21.5 percent) is higher than the percentage of both the Regional Study Area and California as a whole (13.5 and 13.4 percent, respectively). Table 2.1-9, included in Section 2.1.6, Community Character and Cohesion, identifies census block

groups in the community study area that meet the SACOG income and minority criteria as environmental justice communities.

When evaluating transportation improvement effects on environmental justice communities, it is important to recognize that, on average, residents living in these communities walk, bicycle, and take transit at a higher rate than non-environmental justice households. Within the regional study area, transit use in environmental justice communities is more than twice the rate for non-environmental justice communities, and environmental justice communities have a 65 percent greater rate for walking and bicycling region-wide than non-environmental justice communities (SACOG 2019a). Vehicle availability contributes to this trend. Eleven percent of regional households in environmental justice communities do not have a vehicle compared to 4 percent in non-environmental justice communities. Although vehicle availability in environmental justice communities is less than in non-environmental justice communities, most environmental justice area residents still use personal vehicles for transportation. The existing and future infrastructure support of the transportation needs of these communities is a significant factor in their ability to access jobs, schools, services, and the effects on their overall health and quality of life (SACOG 2019a).

Table 2.1-15 and Table 2.1-16 provide existing daily I-80/US-50 traveler data by income and race/ethnicity for two freeway segments: I-80 at Yolo Causeway and US-50 at Sacramento River. These data are limited to those individuals who reside in the regional study area. As shown in the data, 22.6 to 23.3 percent of daily travelers had yearly incomes of less than $40,000, and minority community members represent between 46.7 and 50.2 percent of travelers using the freeway.

Residents living below the poverty level within the community study area walk, bicycle, and take transit at a higher rate than residents living above the poverty level. Within the regional study area, transit use in low-income communities is more than twice the rate than higher-income communities, and low-income communities have a 65 percent greater rate for walking and bicycling region-wide (SACOG 2019). In the Community Study Area, more workers in the Davis neighborhoods use public transportation or walk or bike to work than workers in other census tracts (Table 2.1-12), so these residents may have more options for public transit and alternative transportation modes than other areas.

Table 2.1-15. Travelers by Household Income in the Regional Study Area

Location	Household Income	Eastbound Travelers	Eastbound Percent of Travelers	Westbound Travelers	Westbound Percent of Travelers
I-80 at Yolo Causeway	$0 to $20,000	3,387	10.5%	3,456	10.3%
	$20,001 to $40,000	3,931	12.2%	4,149	12.3%
	$40,001 to $80,000	8,137	25.3%	8,735	25.9%
	$80,001 to $100,000	3,160	9.8%	3,277	9.7%
	>$100,000	13,583	42.2%	14,103	41.8%
	Total	32,198	100%	33,720	100%
US-50 at Sacramento River	$0 to $20,000	5,897	10.2%	5,611	10.1%
	$20,001 to $40,000	7,469	13.0%	7,334	13.2%
	$40,001 to $80,000	14,948	26.0%	14,587	26.2%
	$80,001 to $100,000	6,110	10.6%	5,807	10.4%
	>$100,000	23,190	40.3%	22,342	40.1%
	Total	57,614	100%	55,681	100%

Source: SACOG Replica model output provided by Caltrans (November 2020). Reported in I-80/ US-50 Travel Pattern Data Memorandum. February 10, 2021 (Fehr & Peers 2021a).
Notes: Number and percent of travelers has been filtered to those who had trips with their origin and destination within the SACOG region. Income values are assumed to be in 2019 dollars to match the model period.

Table 2.1-16. Travelers by Race and Ethnicity in Regional Study Area

Location	Race and Ethnicity	Eastbound Travelers	Eastbound Percent of Travelers	Westbound Travelers	Westbound Percent of Travelers
I-80 at Yolo Causeway	White, Not Hispanic or Latino Origin	17,169	53.3%	17,915	53.1%
	Hispanic or Latino Origin	7,124	22.1%	7,742	23.0%
	Asian, Not Hispanic or Latino Origin	4,569	14.2%	4,722	14.0%
	Black, Not Hispanic or Latino Origin	1,726	5.4%	1,704	5.1%
	Two or More Races, Not Hispanic or Latino Origin	1,179	3.7%	1,201	3.6%
	Native Hawaiian or Pacific Islander, Not Hispanic or Latino Origin	235	0.7%	233	0.7%
	American Indian or Alaskan Native, Not Hispanic or Latino Origin	104	0.3%	114	0.3%
	Some Other Race, Not Hispanic or Latino Origin	92	0.3%	89	0.3%
	Total	**32,198**	**100%**	**33,720**	**100%**
US-50 at Sacramento River	White, Not Hispanic or Latino Origin	28,707	49.8%	27,798	49.9%
	Hispanic or Latino Origin	13,489	23.4%	13,153	23.6%
	Asian, Not Hispanic or Latino Origin	8,390	14.6%	8,043	14.4%
	Black, Not Hispanic or Latino Origin	3,656	6.4%	3,450	6.2%
	Two or More Races, Not Hispanic or Latino Origin	2,318	4.0%	2,236	4.0%
	Native Hawaiian or Pacific Islander, Not Hispanic or Latino Origin	707	1.2%	675	1.2%
	American Indian or Alaskan Native, Not Hispanic or Latino Origin	183	0.3%	175	0.3%
	Some Other Race, Not Hispanic or Latino Origin	164	0.3%	151	0.3%
	Total	**57,614**	**100%**	**55,681**	**100%**

Source: SACOG Replica model output provided by Caltrans (November 2020). Reported in I-80/ US-50 Travel Pattern Data Memorandum. February 10, 2021 (Fehr & Peers 2021a).
Notes: Number and percent of travelers has been filtered to those who had trips with their origin and destination within the SACOG region.

2.1.7.3 Environmental Consequences

The environmental justice analysis in this section examines whether minority and/or low-income populations in the project area would experience disproportionately high and adverse effects and whether the improvements would benefit low-income and minority communities equitably. FHWA Order 6640.23A defines an adverse effect as one that:

- is predominately borne by a minority population and/or a low-income population
- will be suffered by the minority population and/or low-income population and is appreciably more severe or greater in magnitude than the adverse effect that will be suffered by the nonminority population and/or non-low-income population

In determining whether an environmental justice community would experience disproportionately adverse effects or whether impacts are predominantly borne by an environmental justice community, the analysis considers the change in the roadway capacity, traffic, congestion, travel times, travel cost, and facility footprint, and the resulting direct and indirect effects on the human and natural environment, both short-term construction impacts and on-going effects associated with management and operations of the project. This project was analyzed for potential for property acquisitions and relocations in environmental justice communities; effects on environmental justice neighborhood cohesion; and changes in noise, air quality, and visual conditions in environmental justice communities attributable to the construction and operation of that project.

No Build Alternative 1

Construction and Operation

Under No Build Alternative 1, managed lanes and transportation improvements would not be constructed or operated. As such, the No Build Alternative 1 would have no effect on environmental justice communities.

Build Alternatives 2a and 2b

Construction

Build Alternatives 2a and 2b would involve adding an HOV 2+ lane in each direction. Build Alternatives 2a and 2b would occur primarily within the existing Caltrans right-of-way, but it would require one permanent right-of-way easement outside the existing Caltrans right-of-way within census tract 102.03, an environmental justice community. Under all Build Alternatives, Caltrans would acquire right-of-way to construct a Park-and-Ride Facility with approximately 300 parking spaces on the east side of Enterprise Boulevard. The subject parcel is currently vacant, and the new facility would be located partially within and partially outside of the existing Caltrans right-of-way. Surrounding land uses include highway service commercial uses such as restaurants and gas stations. The development of the Park-and-Ride Facility would be consistent with existing land uses and would not displace minority or low-income residents, businesses, or employees. There would be no disruption or adverse effect on existing land uses or community members in the surrounding areas. The Park-and-Ride facility area have been

largely undeveloped. Historical aerial photographs on google earth and historical USGS topographic maps available online show that a road was located on the site from at least 1967 through 2002. The access to I-80 continued across Enterprise Boulevard, across the south-central portion of the site, and connected with Lake Road. The current google maps aerial photo shows the southern portion of the site is being used as a staging area for construction across Lake Road. No other development is identified on the site dating back to 1948 (Google Earth Pro 2023) The Park-and-Ride Facility would not result in changes to land uses, acquisition of residential or commercial property, or displacement of any minority residence, business, or employees.

Since households in environmental justice communities generally have fewer vehicles than households in non-environmental justice communities, the benefits of the Build Alternatives may not be realized by environmental justice community members who do not own a vehicle. However, ITS and auxiliary lane improvements with all Build Alternatives would help facilitate circulation between I-80 and the surrounding surface streets, benefiting environmental justice community members using bus and transit service entering and exiting the highway.

As described in Section 2.1.6, Community Character and Cohesion, project impacts on air quality, noise, and visual resources can affect community character for environmental justice communities and non-environmental justice communities. The severity of these community impacts is a function of proximity to the highway facility. Communities adjacent to highways in the regional study area and community study area are a mix of environmental justice and non-environmental justice neighborhoods.

As discussed in Section 2.2.7, Noise, the noise study completed for the project (Illingworth and Rodkin 2022) concluded that future noise levels along I-80 under the Build Alternatives would increase from 0 to +2 A-weighted decibels (dBA) at all receptors when compared to existing conditions. This modest increase in noise would not substantially affect adjacent communities and would not disproportionately affect community character or quality of life in environmental justice communities compared to non-environmental justice communities, nor would it be predominantly borne by environmental justice communities in the community study area.

Travel lanes would move closer to neighboring properties along some segments and could increase traffic noise. This widening to the outside occurs within an environmental justice community (census tract 106.02 block group 4). Adjacent land uses include a small area of multi-family residential development including a mobile home park, Olive Court (an affordable housing community), and the Arbors (apartment complex). The noise study indicates that future noise levels would increase from 0 to +2 dBA at the sensitive receptors located in this environmental justice community because of this Project by the 2049 horizon year, when compared to existing conditions and also when compared to the No-Build alternative. A sound wall, mature trees, and vegetation are located between I-80 and these residential properties, creating a buffer for noise impacts. This modest increase in noise would not substantially affect community character or quality of life in environmental justice communities compared to non-environmental justice communities.

As noted in Section 2.2.6, Air Quality, the air quality analysis completed for the project (Caltrans 2024c) determined that the Build Alternatives would not substantially change the traffic mix and

future emissions for all pollutants except fugitive particulate matter are expected to be lower than present levels. Fugitive particulate matter emitted is proportional to changes in VMT, so each alternative differs in its relative change in emission levels. Therefore, the Build Alternatives would not increase the pollution burden on neighboring environmental justice communities in the long term.

As noted in Section 2.2.11, Visual and Aesthetics, the visual impact analysis completed for the project (Stantec 2022) concluded that the Build Alternatives would affect the visual environmental of the corridor by removing center median functional plantings, increasing paved surfaces, and adding barriers and fencing, new roadway structures, new overhead and roadside signs, lighting, a Park-and-Ride Facility, and ITS elements, all of which collectively would result in an increasingly urbanized aesthetic. Both environmental justice and non-environmental justice communities that front the highway would be affected by these visual impacts. The resulting effect of these visual changes on community character would be modest. This impact is not appreciably more severe in environmental justice communities than the non-environmental justice communities nor predominantly borne by environmental justice communities in the community study area.

Construction activities would result in delays for roadway users and potentially affect access to surrounding businesses and community facilities. In particular, Build Alternative 2b would result in a longer construction timeline in order to build the I-80 connector structure, thus the effects of construction would be longer than Build Alternative 2a. Construction activities and ground-disturbing activities would result in temporary visual effects; increased noise levels; and increased air pollutants such as dust and particulate matter due to the excavation, grading, hauling, and other construction-related activities. This impact is not appreciably more severe in environmental justice communities than the non-environmental justice communities nor predominantly borne by environmental justice communities in the community study area.

A TMP (Standard Measure TT-3) would be developed by Caltrans during the design phase. Additionally, the contractor would implement a planned public outreach program to keep area residents, businesses, emergency service providers, and transit operators informed of the project construction schedule as part of Standard Measure COM-1. Build Alternatives 2a and 2b would also implement visual, noise, and air quality standard measures. Therefore, Build Alternatives 2a and 2b would not cause disproportionately high and adverse direct effects on environmental justice communities during construction nor create impacts that are predominantly borne by environmental justice communities in the community study area.

Operation

Build Alternatives 2a and 2b would occur primarily within the existing Caltrans right-of-way, but would require one permanent right-of-way easement outside the existing Caltrans right-of-way within census tract 102.03, an environmental justice community. Under Build Alternatives 2a and 2b, Caltrans would acquire 2.8 acres of right-of-way to construct a Park-and-Ride Facility with approximately 300 parking spaces on the east side of Enterprise Boulevard. The subject parcel is currently vacant, and the new facility would be partially outside the existing Caltrans right-of-way. Surrounding land uses include highway service commercial uses such as restaurants and gas stations.

Improved traffic flow and movement of persons on I-80/US-50 within the project limits would benefit a wide range of communities including those defined as environmental justice communities. With the lane addition on I-80 and US-50 under Build Alternative 2a, the volume of vehicles and persons moved through the corridor during peak commute hours would increase compared to Alternative 1 (No Build). Despite the added capacity, congested conditions would still be expected in both directions during peak hours. Under Build Alternatives 2a and 2b, which would add a managed HOV 2+ lane in each direction would not impose tolls on travelers, so the benefits of these alternatives would be equally shared by travelers of all income levels. Additionally, the inclusion of VMT mitigation that includes transit and rail improvements would provide alternative modes of transportation and route flexibility, and transit pass subsidies and reduced fares that would benefit EJ communities.

Build Alternatives 3a and 3b

Construction

Build Alternatives 3a and 3b are within the same project area as Build Alternatives 2a and 2b, respectively and would have the same construction-related effects.

Operation

Build Alternatives 3a and 3b would involve adding an HOT 2+ lane in each direction, which would introduce a toll structure. Since the congestion relief and enhanced accessibility associated with the project would benefit all I-80/US-50 travelers, there is no disproportionate adverse effect on environmental justice travelers for all Build Alternatives. Environmental justice communities may not realize the full benefit from alternatives that include tolling due to cost. Use of toll lanes (Alternatives 3 through 5) by environmental justice (low-income) travelers would cause a higher financial burden that is predominantly borne by environmental justice communities and may be considered a disproportionate impact. Caltrans has adopted AMMs to reduce potential adverse effects on low-income drivers. Caltrans' future-appointed tolling authority would be required to implement a tolling program in alignment with Caltrans Deputy Directive 43-R1. This represents a reduction in the receipt of benefits by low-income groups under tolling alternatives and an inequitable distribution of project benefit. With implementation of AMMs EJ-1, EJ-2, and EJ-3, and VMT mitigation that includes transit and rail improvements, Build Alternatives 3a and 3b would not cause disproportionately high and adverse direct effects on environmental justice communities.

Build Alternatives 4a and 4b

Construction

Build Alternatives 4a and 4b propose similar project components within the same project area as Build Alternatives 2a and 2b, respectively. Therefore, the effect on existing environmental justice communities in the surrounding areas would have the same as effects described under Build Alternatives 2a and 2b.

Operation

Build Alternatives 4a and 4b would involve adding an HOT 3+ lane in each direction. As Build Alternatives 4a and 4b are toll-based alternatives; effects on environmental justice travelers would be similar to Build Alternatives 3a and 3b. With implementation of AMMs EJ-1, EJ-2, and EJ-3, Build Alternatives 4a and 4b would not cause disproportionately high and adverse direct effects on environmental justice communities.

Build Alternatives 5a and 5b

Construction

Build Alternatives 5a and 5b propose similar project components within the same project area as Build Alternatives 2a and 2b, respectively. Therefore, the effect on environmental justice communities in the surrounding areas would have the same as construction-related effects described under Build Alternatives 2a and 2b.

Operation

Build Alternatives 5a and 5b would involve adding an Express Lane in each direction. As Build Alternatives 5a and 5b are also toll-based alternatives, effects on Environmental Justice Travelers would be similar to Build Alternatives 3a and 3b, respectively. However, there would be no reduced payment option from carpooling or high vehicle occupancy. With implementation of AMMs EJ-1, EJ-2, and EJ-3 Build Alternatives 5a and 5b would not cause disproportionately high and adverse direct effects on environmental justice communities.

Build Alternatives 6a and 6b

Construction

Build Alternatives 6a and 6b propose similar project components within the same project area as Build Alternatives 2a and 2b, respectively. Therefore, the effect on environmental justice communities in the surrounding areas would be the same as construction-related effects described under Build Alternatives 2a and 2b.

Operation

Build Alternatives 6a and 6b would add a transit-only lane in each direction. This transit-only alternative would improve traffic flow and movement of persons on I-80/US-50 within the project limits which would benefit a wide range of communities, including those defined as environmental justice communities. Build Alternatives 6a and 6b would not impose tolls on travelers, so the benefits of these alternatives would be equally shared by travelers of all income levels.

Build Alternatives 7a and 7b

Construction

Build Alternatives 7a and 7b would involve repurposing the current number one general purpose lane to HOV 2+. No new lanes would be constructed and proposed work would mostly be limited to restriping. Build Alternative 7b would construct the I-80 managed lane connector structure, providing a direct connection of the managed lanes via a managed lanes connector ramp over US-50 at the I-80/US-50 Interchange. A TMP (Standard Measure TT-3) would be developed by Caltrans during the design phase. Additionally, the contractor would implement a planned public outreach program to keep area residents, businesses, emergency service providers, and transit operators informed of the Project construction schedule as part of Standard Measure COM-1. Further, Build Alternatives 7a and 7b would also implement visual, noise, and air quality standard measures. Therefore, Build Alternatives 7a and 7b would not cause disproportionately high and adverse direct effects on environmental justice communities during construction.

Operation

Build Alternatives 7a and 7b would involve repurposing the current number one general purpose lane to HOV 2+. As a described under Build Alternatives 2a and 2b, with the addition of a managed HOV 2+ lane in each direction that would not impose tolls on travelers, the benefits of these alternatives would be equally shared by travelers of all income levels.

2.1.7.4 Avoidance, Minimization, and/or Mitigation Measures

Based on the above discussion and analysis, the Build Alternatives will not cause disproportionately high and adverse effects on any minority or low-income populations in accordance with the provisions of EO 12898. No further environmental justice analysis is required.

With the inclusion of the following AMMs, the project will not result in adverse impacts: Build Alternatives 3a, 3b, 4a, 4b, 5a, and 5b. If Build Alternative 3a, 3b, 4a, 4b, 5a, or 5b is selected as the preferred alternative, the California Transportation Commission would authorize a tolling authority to operate the toll lanes. In part, the tolling authority's role would be to realize travel benefits from lane pricing to all travelers on I-80/US 50, including environmental justice communities who may not realize the cost-benefit of time savings associated with a tolled lane. The future tolling authority, at the direction of Caltrans, will include a tolling program that offers, but is not limited to, the following strategies to offset the effects of toll lane alternatives on environmental justice travelers.

- **AMM EJ-1 (Build Alternatives 3a, 3b, 4a, 4b, 5a, and 5b)**: Caltrans would establish a variable pricing for express lanes or provide discounted per-mile tolls, credits, rebates and/or exemptions based on income levels and cost of living.

- **AMM EJ-2 (Build Alternatives 3a, 3b, 4a, 4b, 5a, and 5b)**: Caltrans would offset the financial burden of enrolling in electronic tolling program. The toll authority would

improve methods for environmental justice communities and other users to obtain toll tags/transponders. For example, the toll authority would provide that drivers without a credit card or bank account can receive toll tags, waive or redefine the monthly minimum balance requirements for low-income users. and provide translation services to community travelers with Limited English Proficiency (LEP).

- **AMM EJ-3 (Build Alternatives 3a, 3b, 4a, 4b, 5a, and 5b)**: Caltrans would use no less than 50 percent of excess toll revenue to improve multi-modal transit, expand transportation choice, and other transportation improvements that would distribute benefits to environmental justice communities identified in this report.

2.1.8 Equity

2.1.8.1 Regulatory Setting

Equity in transportation seeks fairness in mobility and accessibility to meet the needs of all community members. A central goal of transportation equity is to facilitate social and economic opportunities by providing equitable levels of access to affordable and reliable transportation options based on the needs of the populations being served, particularly populations that are traditionally underserved. It is important to note that transportation equity does not mean equal. An equitable transportation plan considers the circumstances impacting a community's mobility and connectivity needs, and this information is used to determine the measures needed to develop an equitable transportation network (U.S. Department of Transportation 2022a, 2022b).

Equity is related to environmental justice, discussed in the previous section, but is more broadly defined. Recent laws and policies have been adopted regarding equity and the consideration of how past policies and plans have resulted in disparities for underserved and disadvantaged populations.

Executive Order 13985. EO 13985, *Advancing Racial Equity and Support for Underserved Communities Through the Federal Government* (2021), affirms that "the Federal Government should pursue a comprehensive approach to advancing equity for all, including people of color and others who have been historically underserved, marginalized, and adversely affected by persistent poverty and inequality. Affirmatively advancing equity, civil rights, racial justice, and equal opportunity is the responsibility of the whole of our Government." Under EO 13985, the term "equity" means the consistent and systematic fair, just, and impartial treatment of all individuals, including individuals who belong to underserved communities that have been denied such treatment, such as Black, Latino, and Indigenous and Native American persons, Asian Americans and Pacific Islanders and other persons of color; members of religious minorities; lesbian, gay, bisexual, transgender, and queer persons; persons with disabilities; persons who live in rural areas; and persons otherwise adversely affected by persistent poverty or inequality. The term "underserved communities" refers to populations sharing a particular characteristic, as well as geographic communities, that have been systematically denied a full opportunity to participate in aspects of economic, social, and civic life. The EO seeks to advance equity through various efforts, including coordinating across the federal government, identifying methods to assess equity, conducting an equity assessment in federal agencies, allocating

federal resources to advance fairness and opportunity, promoting equitable delivery of government benefits and equitable opportunities, engaging with members of underserved communities, and establishing an Equitable Data Working Group.

USDOT Equity and Access Policy. The U.S. Department of Transportation's March 2021 Equity and Access Policy Statement (USDOT 2021) states that "the Department is committed to promoting equitable delivery of government benefits and opportunities, including advancing meaningful engagement with all communities and ensuring that government contracting and procurement opportunities are available on an equal basis to all eligible providers of goods and services." The policy statement reiterates USDOT's commitment to incorporate environmental justice and equity principles into transportation planning and decision-making processes, including ensuring full and equitable access to programs, activities, and services for persons with limited English proficiency in accordance with Executive Order 13166 *Improving Access to Services for Persons with Limited English Proficiency*.

Caltrans Equity Statement. The Caltrans Equity Statement (December 10, 2020) acknowledges that communities of color and underserved communities have experienced fewer benefits and a greater share of negative impacts associated with our state's transportation system. Some of these disparities reflect a history of transportation decision-making, policy, processes, planning, design, and construction that "quite literally put up barriers, divided communities, and amplified racial inequities, particularly in our Black and Brown neighborhoods."

Local Agency Equity Policies and Programs. Local governments are also addressing equity in their policies and programs. Yolo County established their Inclusion and Diversity Work Group in 2019 with a goal of creating and sustaining an equitable work environment and prioritizing services to underserved communities (Yolo County 2022).The City of West Sacramento recently created a sidewalks and transportation equity program, which will review and prioritize projects with a "lens of equity" by focusing on benefits for disadvantaged communities, seniors, and providing safe routes to schools and parks (City of West Sacramento 2022). The City of Sacramento established their Office of Diversity and Equity in July 2018 with the mission of creating "a more equitable and inclusive City of Sacramento by facilitating the integration of greater representation, fairness, belonging and care into our policies, protocols, practices and work-places" (City of Sacramento 2022). In February 2021, Sacramento County approved a Resolution on Racial Equity and Social Justice, declaring racism a public health crisis (Sacramento County 2021). Solano County's Equity and Diversity Committee is working to improve health services for underserved populations (Solano County 2022).

2.1.8.2 Affected Environment

Information in this section is based on the CIA prepared for the project (Caltrans 2023a).

To help identify communities that are disproportionately burdened by multiple sources of pollution and with population characteristics that make them more sensitive to pollution, the California Office of Environmental Health Hazards Assessment developed the CalEnviroScreen mapping tool. CalEnviroScreen identifies communities facing socioeconomic disadvantages or health disadvantages.

The California Environmental Protection Agency has defined disadvantaged communities as those census tracts that fall in or above the 75th percentile in CalEnviroScreen. Census tracts with the highest CalEnviroScreen score along the I-80/US-50 corridor are concentrated in West Sacramento and near the US-50/I-5 interchange in Sacramento, where the pollution burden percentiles and population characteristic percentiles combine for an overall score of 75 percent or greater. The *I-80/US-50 Travel Pattern Data Memorandum* prepared for the project (Fehr & Peers 2021a) summarizes available data on existing travel patterns for the I-80/US-50 corridor, including use by environmental justice community members.

When identifying underserved and disadvantaged communities in the study area, the CIA for the project considers historic impacts from transportation infrastructure development, existing environmental conditions and pollution burdens, health disparities that make communities more sensitive to pollution, and other socioeconomic factors that correlate with sensitivity to environmental impacts and traditionally underserved communities.

To help identify communities that are disproportionately burdened by multiple sources of pollution and with population characteristics that make them more sensitive to pollution, the California Office of Environmental Health Hazards Assessment developed the CalEnviroScreen mapping tool (OEHHA 2021). The CalEnviroScreen mapping tool identifies communities facing socioeconomic disadvantages or health disadvantages. It uses environmental, health, and socioeconomic data from state and federal government sources to score every census track in California. The scores are generated using statewide indicators in four categories: pollution exposures, environmental effects, sensitive populations, and socioeconomic factors. CalEnviroScreen ranks census tracts (low to high sensitivity) based on their combined pollution burden and population characteristics; a percentile is then calculated from the ordered values.

The California Environmental Protection Agency has defined disadvantaged communities as those census tracts that fall in or above the 75th percentile in CalEnviroScreen, meaning the combined score is higher than 75% of the census tracts in California. Census tracts with the highest CalEnviroScreen score along the I-80/US-50 corridor are concentrated in West Sacramento, where the pollution burden percentiles and population characteristic percentiles combine for an overall score in the 75th percentile when compared to census tracts in the state. This ranking indicates that these tracts are confronted with many burdens and vulnerabilities from environmental pollutants and are defined as disadvantaged communities. Within segment 3 (I-80/US-50 to Jefferson Boulevard and Jefferson Boulevard to I-5), CalEnviroScreen scores fall within the 66th to 96th percentile, indicating that these communities have a high pollution burden and/or high sensitivity.

2.1.8.3 Environmental Consequences

The environmental consequences of the proposed alternatives are evaluated for their potential to adversely affect underserved and disadvantaged communities through changes in the human and natural environment. Project effects on communities can include changes in pollution burdens, modifications to community character, and exacerbation of historical impacts from transportation infrastructure (e.g., divided communities). Section 2.1.7, Environmental Justice, describes localized changes in air quality, noise, and visual resources in underserved

communities; evaluates whether minority and/or low-income populations experience disproportionately adverse effects; and provides conclusions.

No Build Alternative 1

Construction and Operation

The No-Build Alternative 1 would not adversely affect underserved and disadvantaged communities through community disturbance, or tolls. The No-Build Alternative 1 would not provide the travel benefits of the Build Alternatives. As such, the No-Build Alternative 1 would have no effect on equity.

Build Alternatives 2a and 2b

Construction

Construction activities under Build Alternative 2a and 2b would result in short-term changes in access, circulation, light/glare noise, and air quality. Intermittent and temporary ramp and lane closures would inconvenience all roadway users and could require alternative traffic routing. Neighboring residents and businesses may experience short-term noise, fugitive dust, and light/glare from construction activities.

As discussed in Section 2.1.11, temporary sources of light and glare would be added to the project area during the construction phase; however, they would be minimized through use of standard construction equipment, protocols, and appropriate light and glare screening measures, including Standard Measure AR-4 and AMM AES-1, which would limit construction lighting and avoid or minimize glare through selection of materials and finishes, respectively.

However, these construction activities would be short-term and implementation of Standard Measures AR-2, AR-4, GHG-1 through GHG-6, TT-1 through TT-3 (see Appendix E), and AMMs NOI-1 through NOI-6, would help to minimize and reduce potential effects resulting from construction activities. Therefore, Build Alternatives 2a and 2b would not cause disproportionately high and adverse direct effects on underserved and disadvantaged communities through changes in the human and natural environment during construction.

Operation

Build Alternatives 2a and 2b would occur primarily within the existing Caltrans right-of-way. Build Alternatives 2a and 2b would construct a new Park-and-Ride Facility on a vacant parcel south of I-80 at Enterprise Boulevard in West Sacramento, in a traditionally underserved community. The Park-and-Ride Facility would not result in changes to land uses, acquisition of residential or commercial property, or displacement of any minority residence, business, or employees. No residential or business acquisitions in underserved communities would occur. Build Alternatives 2a and 2b would not divide communities. Build Alternatives 2a and 2b would not contribute to the historical division of the West Sacramento area that occurred with the construction of I-80 in the 1970s, but the added lanes within the existing I-80 corridor would not further divide the community nor remedy those historical divisions.

Noise from highway operations can influence community character and burden sensitive populations. Although Build Alternatives 2a and 2b would increase capacity and operational traffic, they would not change the traffic mix nor move major roadways closer to sensitive receptors. As discussed in Sections 2.1.6 and 2.1.7, the noise study for the project concluded that future noise levels along I-80 would increase from 0 to +2 dBA under Build Alternatives 2a and 2b. This modest increase in noise would be barely perceptible and would not substantially affect adjacent communities nor disproportionately affect community character or quality of life in underserved communities in the study area.

Vehicular air pollution and health disparities associated with those air pollutants (including asthma, cardiovascular disease, and low birth weight) are disproportionately borne by residents who live near major highways in California (Union of Concerned Scientists 2019). Traffic is a significant source of air pollution, particularly in urban areas, where more than 50 percent of particulate emissions come from traffic (OEHHA 2021). Exhaust from vehicles also contains toxic chemicals, including nitrogen oxides, carbon monoxide, and benzene. When determining whether the project would affect communities already burdened by air pollution and associated health risks, the analysis of projected air quality conditions was used. Air pollution emissions for eight out of nine toxic chemicals, are predicted to be lower in future years under the Build Alternatives than present levels (Caltrans 2024c). This is primarily a function of improved emission standards and the shift to more electric vehicles in future years rather than changes in traffic operations under the Build Alternatives. Although future emissions would be lower under all alternatives, the amount of fugitive particulate matter emitted with the No-Build and Build Alternatives is proportional to changes in VMT, so each alternative differs in its relative reduction in future emission levels. Build Alternatives 2a and 2b would increase future VMT, but would not significantly exacerbate air pollutant conditions compared to existing conditions and would not significantly exacerbate conditions compared to the future No-Build Alternative for nearby underserved communities and communities with associated health disparities. How changes in air pollutants affect health outcomes for communities that already have high pollutant burdens is difficult to predict. As noted by FHWA (2023), "While much work has been done to assess the overall health risk of air toxics, many questions remain unanswered. In particular, the tools and techniques for assessing project-specific health outcomes as a result of lifetime MSAT exposure remain limited.” Because of the limitations in the methodologies for forecasting health impacts, predicted differences in health impacts between alternatives is likely to be much smaller than the uncertainties associated with predicting the impacts (FHWA 2023).

Additionally, as part of the transportation conformity process for particulate matter, an interagency committee that includes the FHWA, Federal Transit Administration, and USEPA found the Project not to be a project of air quality concern. The Air Quality Report (Caltrans 2024c, Appendix J) concludes that Build Alternative 2a and 2b would not substantially increase the pollution burden on neighboring communities in the long term when compared to the No-Build condition.

Overall, Build Alternatives 2a and 2b would not significantly exacerbate air pollutant conditions for nearby underserved communities and communities with associated health disparities.

Visual changes would also influence community character in adjacent underserved communities. The project proposes to increase the amount of paving within the existing width of the freeway, introduce new overhead signage elements, and remove median plantings and roadside trees that provide visual buffering. These changes would have a notable visual impact that is apparent to both highway users and highway neighbors, including the surrounding community. While visual changes for neighboring communities would be more modest than changes experienced by highway users, Build Alternatives 2a and 2b may increase the dominance of the transportation facility in neighboring viewsheds, further degrading the existing visual condition for disadvantaged communities adjacent to the highway.

Build Alternatives 2a and 2b would improve traffic conditions for highway users, including members of underserved and disadvantaged communities. See Section 2.1.7, Environmental Justice, for an analysis of tolling and low-income populations. Build Alternatives 2a and 2b would not cause disproportionately high and adverse direct effects on underserved and disadvantaged communities through changes in the human and natural environments.

Build Alternatives 3a and 3b

Construction

Build Alternatives 3a and 3b are within the same project area as Build Alternatives 2a and 2b, respectively, and would have the same construction-related effects.

Operation

Build Alternatives 3a and 3b would involve adding an HOT 2+ lane in each direction, which would introduce a toll structure. Tolled lane options would introduce new signage that may present challenges for linguistically isolated households. Only one census block in the community study area in West Sacramento has a high proportion of households where no one over the age of 14 speaks English. Residents in these neighborhoods may be initially challenged by the toll-related signage and the process for obtaining toll transponders. Standard Measure EQ-1 would require If a tolled lane option (Alternatives 3a, 3b, 4a, 4b, 5a, or 5b) is selected as the preferred alternative, Caltrans' future-appointed tolling authority would be required to implement a tolling program in alignment with Caltrans Language Access Plan (2020) and Deputy Directive 91-R2, which would accommodate use of toll lane options by limited English proficiency community members. Caltrans 2020 Language Access Plan lays out reasonable steps to provide limited English proficiency individuals with meaningful access to all Caltrans activities, including the provision of translation and interpretation services to the public. The tolling authority would adhere to these policies. Providing instructions in multiple languages would help offset this burden, and linguistically isolated households are likely to adapt to the new signage and lane operations over time. Build Alternatives 3a and 3b would not cause disproportionately high and adverse direct effects on underserved and disadvantaged communities through changes in the human and natural environments.

Build Alternatives 4a and 4b

Construction

Build Alternatives 4a and 4b propose similar project components within the same project area as Build Alternatives 2a and 2b, respectively. Therefore, the effect on existing environmental justice communities in the surrounding areas would be the same as effects described under Build Alternatives 2a and 2b.

Operation

Build Alternatives 4a and 4b would involve adding an HOT 3+ lane in each direction. As discussed in Section 2.1.7, as Build Alternatives 4a and 4b are toll-based alternatives, effects on environmental justice travelers would be similar to Build Alternatives 3a and 3b. Standard Measure EQ-1 would be implemented Build Alternatives 4a and 4b. Build Alternatives 4a and 4b would not cause disproportionately high and adverse direct effects on underserved and disadvantaged communities through changes in the human and natural environments.

Build Alternatives 5a and 5b

Construction

Build Alternatives 5a and 5b propose similar project components within the same project area as Build Alternatives 2a and 2b, respectively. Therefore, the effect on environmental justice communities in the surrounding areas would be the same as construction-related effects described under Build Alternatives 2a and 2b.

Operation

Build Alternatives 5a and 5b would involve adding an Express Lane in each direction. As discussed in Section 2.1.7, as Build Alternatives 5a and 5b are also toll-based alternatives, effects on environmental justice travelers would be similar to Build Alternatives 3a and 3b, respectively. Standard Measure EQ-1 would be implemented Build Alternatives 5a and 5b. Build Alternatives 5a and 5b would not cause disproportionately high and adverse direct effects on underserved and disadvantaged communities through changes in the human and natural environments.

Build Alternatives 6a and 6b

Construction

Build Alternatives 6a and 6b propose similar project components within the same project area as Build Alternatives 2a and 2b, respectively. Therefore, the effect on environmental justice communities in the surrounding areas would be the same as construction-related effects described under Build Alternatives 2a and 2b.

Operation

Build Alternatives 6a and 6b would add a transit-only lane in each direction, which could benefit underserved communities that use transit at a higher rate than other communities. However, Build Alternative 6a and 6b do not substantially improve overall traffic conditions for all highway users. Refer to Section 2.1.10, Traffic and Transportation, for more information. Standard Measure EQ-1 would be used under Build Alternatives 6a and 6b. Build Alternatives 6a and 6b would not cause disproportionately high and adverse direct effects on underserved and disadvantaged communities through changes in the human and natural environments.

Build Alternatives 7a and 7b

Construction

Build Alternatives 7a and 7b would involve repurposing the current number one general purpose lane to HOV 2+. No new lanes would be constructed, and proposed work would mostly be limited to restriping. Build Alternative 7b would construct the I-80 managed lane connector structure, providing a direct connection of the managed lanes by flying over US-50 at the I-80/US-50 Interchange. A TMP (Standard Measure TT-3) would be developed by Caltrans during the design phase. Additionally, the contractor would implement a planned public outreach program to keep area residents, businesses, emergency service providers, and transit operators informed of the project construction schedule as part of Standard Measure COM-1. Further, Build Alternatives 7a and 7b would also implement visual, noise, and air quality standard measures. Therefore, Build Alternatives 7a and 7b would not cause disproportionately high and adverse direct effects on underserved and disadvantaged communities through changes in the human and natural environments.

Operation

Build Alternatives 7a and 7b would involve repurposing the current number one general purpose lane to HOV 2+. As described under Build Alternatives 2a and 2b, with the addition of a managed HOV 2+ lane in each direction without tolls, impacts would be similar to Build Alternatives 2a and 2b. Standard Measure EQ-1 would be used under Build Alternatives 7a and 7b.

2.1.8.4 Avoidance, Minimization, and/or Mitigation Measures

Based on the above discussion and analysis, the Build Alternatives would not substantially change existing conditions for neighboring underserved and disadvantaged populations. The project would not increase pollution burdens or divide or disrupt existing neighborhoods.

2.1.9 Utilities and Emergency Services

2.1.9.1 Affected Environment

Information in this section is based on the CIA prepared for the project (Caltrans 2023a).

Utilities

There are utility companies with facilities in the project area, including AT&T (fiber-optics/telecommunications provider) and PG&E (electrical and natural gas provider). Additionally, there may be aboveground or underground utilities related to telecommunications, public works, sewer services, water services, and other utility services.

Emergency Services

I-80 and US-50 in the project corridor pass through numerous jurisdictions; therefore, emergency response services are provided by various agencies. In Solano County, emergency services are provided by the County Sheriff's office and Office of Emergency Services (OES). In the city of Davis, the Davis Fire Department provides pre-hospital emergency medical services and responds to fires, hazardous materials incidents, natural disasters, and other emergencies. The Davis Police Department and UC Davis Police Department provide law enforcement. The Yolo County OES is the emergency management agency for Yolo County and coordinates the county government's response to disaster or other large-scale emergencies. The Yolo Emergency Medical Services Agency provides emergency medical care.

The West Sacramento Fire Department serves as emergency management coordinator for the city of West Sacramento and works with other city departments, the Yolo County OES, and surrounding jurisdictions. The West Sacramento Police Department provides law enforcement and emergency services. The Sacramento Fire Department is responsible for the management of fire operations within the city of Sacramento during emergency responses. The Fire Department coordinates all responses through the Sacramento Regional Fire Emergency Communication Center. Fire services also include the provision of emergency medical service and life-saving medical care. The Sacramento Police Department is responsible for law enforcement operations and terrorism prevention within the city.

In addition to its use by emergency responders, US-50 and I-80 are dedicated evacuation routes in Yolo and Sacramento counties. Yolo County's OES and the City of West Sacramento's Emergency Management division have identified evacuation zones and routes for given neighborhoods. The City of Sacramento also has prepared detailed maps showing hypothetical levee breaks at various locations for a 200-year event and recommended flood evacuation routes (City of Sacramento Department of Utilities 2021). I-80 and US-50 are identified evacuation routes on the Yolo County evacuation zone maps and under many levee break scenarios for the city of Sacramento. I-80 is a critical route for the West Sacramento area.

2.1.9.2 Environmental Consequences

No Build Alternative 1

Construction and Operation

Under No Build Alternative 1, managed lanes and transportation improvements would not be constructed or operated. As such, the No Build Alternative would have no effect on emergency services or utilities.

Build Alternatives 2a and 2b

Construction

Utilities

Build Alternatives 2a and 2b would not result in potential conflicts with existing utilities that are present along the I-80/US-50 corridor. Utility companies would require verification of facilities and involvement in construction plans. Accordingly, prior to construction, an estimated 15 test hole sites would be drilled at eight different locations for natural gas lines running transversely underneath I-80, the Yolo Causeway, and West Capitol Avenue in Sacramento, where the new managed lane would be constructed with retaining walls and columns. Positive findings would verify whether the gas line would require relocation or how to redesign to avoid conflicts with existing utilities.

Caltrans would provide verification and notify utilities of proposed construction work in accordance with Standard Measure UE-2. Under Build Alternative 2b, up to four 115-kilovolt overhead utility towers may need to be relocated or the tower height increased near the new I-80 connector structure at the I-80/US-50 separation in West Sacramento. As such, AMM AES-5 would be implemented to minimize the prominence, scale, and mass and avoid the need to raise/relocate adjacent powerline towers.

Build Alternatives 2a and 2b also would include installation of a fiber-optic cable line and associated fiber-optic splice boxes within the roadbed at the eastbound outside shoulder of I-80 from Pedrick Road in Solano County at about Post Mile (PM) 40.7 to PM 4.35 in Yolo County. Fiber-optic cable may also be placed via directional borings and to avoid conflicts with existing utilities.

As described, Standard Measure UE-2 would require coordination of utility conflicts, relocation, and cable protection so disruption of utility service would be minimized. Therefore, Build Alternatives 2a and 2b would not result in an adverse effect on utilities.

Operation

Utilities

Once constructed, there would be no project-related changes to utilities in the project area. Therefore, Build Alternatives 2a and 2b would not result in an adverse effect on utilities.

Construction

Emergency Services

Temporary traffic delays and ramp closures on I-80/US-50 during construction of Build Alternatives 2a and 2b could result in temporary delays in emergency services.

As described in Section 2.1.6, Community Character and Cohesion, to help ensure emergency services are maintained during construction, Standard Measure TT-3, Traffic Management Plan, would be developed by Caltrans consistent with Caltrans' standard procedures to maintain

access for emergency services throughout all phases of construction. The TMP would include elements such as traffic controls to minimize speeds/congestion and other measures to maintain access for police, fire, and medical services along I-80/US-50 in the project area during construction. Additionally, Standard Measure UE-1 would require that all emergency response agencies in the project area would be notified of the project construction schedule and would have access to I-80 and US 50 throughout the construction period.

Operation

Emergency Services

Once constructed, Build Alternatives 2a and 2b would improve circulation and reduce congestion along I-80/US-50 in the project corridor, which would result in improved emergency service access and response times. Therefore, Build Alternatives 2a and 2b would not result in an adverse effect on emergency services.

Build Alternatives 3a and 3b

Construction and Operation

Build Alternatives 3a and 3b would involve adding an HOT 2+ lane in each direction. Build Alternatives 3a and 3b propose similar project components within the same project area as Build Alternatives 2a and 2b, respectively. Therefore, the effect would be the same as effects on utilities and emergency services as described under Build Alternatives 2a and 2b.

Build Alternatives 4a and 4b

Construction and Operation

Build Alternatives 4a and 4b would involve adding an HOT 3+ lane in each direction. Build Alternatives 4a and 4b propose similar project components within the same project area as Build Alternatives 2a and 2b, respectively. Therefore, the effect would be the same as effects on utilities and emergency services as described under Build Alternatives 2a and 2b.

Build Alternatives 5a and 5b

Construction and Operation

Build Alternatives 5a and 5b would involve adding an Express Lane in each direction. Build Alternatives 5a and 5b propose similar project components within the same project area as Build Alternatives 2a and 2b, respectively. Therefore, the effect would be the same as effects on utilities and emergency services as described under Build Alternatives 2a and 2b.

Build Alternatives 6a and 6b

Construction and Operation

Build Alternatives 6a and 6b would involve adding a transit-only lane in each direction. Build Alternatives 6a and 6b propose similar project components within the same project area as

Build Alternatives 2a and 2b, respectively. Therefore, the effect would be the same as effects on utilities and emergency services as described under Build Alternatives 2a and 2b.

Build Alternatives 7a and 7b

Construction and Operation

Utilities

Build Alternatives 7a and 7b would involve repurposing the current number 1 general purpose lane to HOV 2+. No new lanes would be constructed. The effect on utilities would be similar to effects described under Build Alternatives 2a and 2b, respectively.

Emergency Services

Temporary traffic delays and ramp closures on I-80/US-50 during construction of Build Alternatives 7a and 7b could result in temporary delays in emergency services. Because Build Alternatives 7a and 7b would not add new lanes, but would repurpose existing lanes as managed lanes, the Build Alternatives 7a and 7b construction period may have shorter duration and result in fewer delays than those under Build Alternatives 2a and 2b, respectively. As described in Build Alternatives 2a and 2b, to provide that emergency services are maintained during construction, Standard Measure TT-3, Traffic Management Plan, as described in the Traffic and Transportation/Pedestrian and Bicycle Facilities section, would be developed by Caltrans consistent with Caltrans' standard procedures to maintain access for emergency services throughout all phases of construction. The TMP would include elements such as traffic controls to minimize speeds/congestion and other measures to maintain access for police, fire, and medical services along I-80/US-50 in the project area during construction.

Build Alternatives 7a and 7b would ultimately improve circulation and reduce congestion along I-80/US-50 in the project corridor, which would result in improved emergency service access and response times. Therefore, Build Alternatives 7a and 7b would not result in an adverse effect on emergency services.

2.1.9.3 Avoidance, Minimization, and/or Mitigation Measures

No AMMs or MMs are required.

2.1.10 Traffic and Transportation/Pedestrian and Bicycle Facilities

2.1.10.1 Regulatory Setting

Caltrans, as assigned by the Federal Highway Administration (FHWA), directs that full consideration should be given to the safe accommodation of pedestrians and bicyclists during the development of Federal-aid highway projects (see 23 Code of Federal Regulations [CFR] 652). It further directs that the special needs of the elderly and the disabled must be considered in all Federal-aid projects that include pedestrian facilities. When current or anticipated pedestrian and/or bicycle traffic presents a potential conflict with motor vehicle traffic, every

effort must be made to minimize the detrimental effects on all highway users who share the facility.

In July 1999, the U.S. Department of Transportation (USDOT) issued an Accessibility Policy Statement pledging a fully accessible multimodal transportation system. Accessibility in federally assisted programs is governed by the USDOT regulations (49 CFR 27) implementing Section 504 of the Rehabilitation Act (29 United States Code [USC] 794). The FHWA has enacted regulations for the implementation of the 1990 Americans with Disabilities Act (ADA), including a commitment to build transportation facilities that provide equal access for all persons. These regulations require application of the ADA requirements to Federal-aid projects, including Transportation Enhancement Activities.

California Environmental Quality Act - Senate Bill 743 and Vehicle Miles Traveled

SB 743 requires the Governor's Office of Planning and Research (OPR) to identify new metrics for the identification of transportation related impacts within CEQA. On December 28, 2018, regulatory changes to the CEQA Guidelines that implement SB 743 were approved, establishing Vehicle Miles of Travel (VMT) as the new metric for transportation analysis. Thresholds for determining a project's significant transportation impact shall be pursuant to section 15064.3 of the State CEQA Guidelines. Within CEQA, a project's effect on vehicle delay shall not constitute a significant transportation impact (Section 15064.3(a)). OPR released a Technical Advisory that contains recommendations for assessing VMT, thresholds of significance, and mitigation measures. On July 1, 2020, statewide implementation occurred.

In response to the change, Caltrans has prepared guidance in the form of the Transportation Analysis Framework (TAF) and the Transportation Analysis under CEQA: Evaluating Transportation Impacts of State Highway System Projects (TAC), each published in September 2020.

2.1.10.2 Affected Environment

This section describes the existing and planned transportation system within the project area. A Transportation Analysis Report (TAR) (Caltrans 2023d) addresses the project area shown in Figure 2.1-5. Additional documents referenced in this section are listed below. The project study limits consist of I-80 at Pedrick Road in Solano County to the west and I-80 at Northgate Boulevard and US 50 at SR 51/SR 99 in Sacramento to the east.

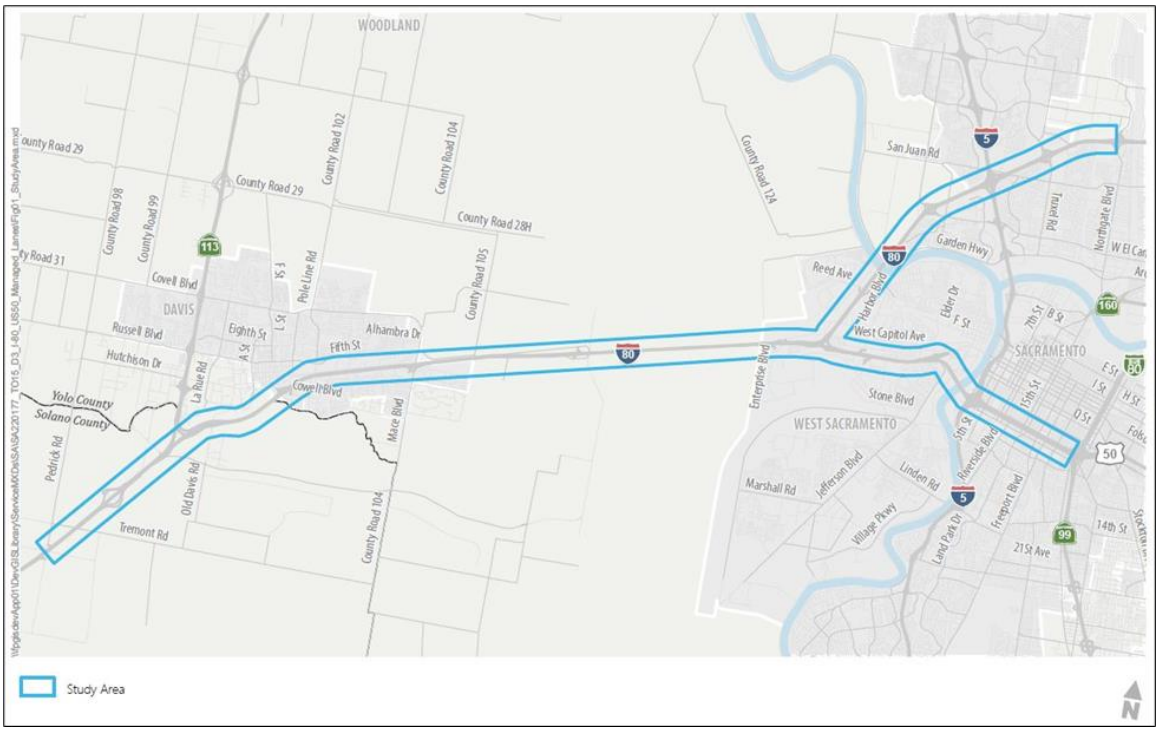


Figure 2.1-5. Transportation Analysis Report Study Area
Source: TAR (Caltrans 2023d)

Documents referenced for this analysis include the following:

- Interstate 80/US Highway 50 Managed Lanes Transportation Analysis Report (Caltrans 2023d)
- Interstate 80/US Highway 50 Managed Lanes Traffic Operations Report (Caltrans 2023e)
- Yolo 80 Managed Lanes Project, Final VMT Mitigation Plan (Caltrans 2024)
- I-80/US 50 Managed Lanes Project, Final VMT Mitigation Estimates (Caltrans 2024)
- I-80/US 50 Managed Lanes: Induced Travel & Truck VMT – Draft (Caltrans 2023h)
- Yolo 80 Corridor Improvements Project Draft Pedestrian and Bicyclist Travel Impact Assessment, (Caltrans 2023i)

2.1.10.3 Collision Data

Table 2.1-17 and Table 2.1-18 summarize the number of collisions and collision rates for the freeway segments of the project area on I-80 and US-50. The existing collisions and collision rates per million vehicle miles are presented for the most recent 5-year period from January 1, 2015, to December 31, 2019, from the Traffic Accident Surveillance and Analysis System (TASAS). The table provides a comparison of the actual collision rates to the average rates for similar facilities throughout California. Total collision rates include all reported fatal collisions, injury, and property damage collisions.

Analysis of the TASAS collision records shows that there was a total of 1,504 collisions (857 eastbound and 647 westbound) that includes 10 fatal collisions (4 eastbound and 6 westbound) for the I-80 segment from the Solano County line to US 50 during the 5-year period mentioned above. The total rate of fatal plus injury-related collisions is higher than the statewide average for the eastbound direction, but the fatal collision rate is lower than average. In the westbound direction, the actual collision rates for fatal, fatal plus injury, and total collisions are all lower than the statewide average.

Table 2.1-17. Freeway Segments— Traffic Accident Surveillance and Analysis System Collisions Summary (January 1, 2015, through December 31, 2019)

Segment		Total No. of Collisions*	Fatal Collisions	Fatal & Injury Collisions
I-80 from Solano Co. Line to US 50 (YOL 0.0 to R9.6)	EB	857	4	325
	WB	647	6	219
I-80 from US 50 to HOV Lane (YOL R9.6 to R11.7, SAC M0.0 to M1.4)	EB	137	1	47
	WB	402	2	138
US 50 from I-80 to I-5 (YOL 0.0 to 3.2, SAC L0.0 to L0.6)	EB	410	4	152
	WB	458	8	195

Source: Caltrans 2023d
Notes:
*Total reported collisions include Property Damage Only collisions
Key: EB = eastbound; WB = westbound

Table 2.1-18. Freeway Segments—Traffic Accident Surveillance and Analysis System Collision Rates (January 1, 2015, through December 31, 2019) per Million Vehicle Miles

Segment		Actual (per Million Vehicle Miles)			Average (per Million Vehicle Miles)		
		Fatal Collisions	Fatal + Injury Collisions	Total*	Fatal Collisions	Fatal + Injury Collisions	Total*
I-80 from Solano Co. Line to US 50 (YOL 0.0 to R9.6)	EB	0.003	**0.27****	**0.70****	0.006	0.22	0.67
	WB	0.005	0.18	0.53	0.006	0.22	0.67
I-80 from US 50 to HOV Lane (YOL R9.6 to R11.7, SAC M0.0 to M1.4)	EB	0.003	0.15	0.44	0.005	0.27	0.81
	WB	**0.006****	**0.44****	**1.29****	0.005	0.27	0.81
US 50 from I-80 to I-5 (YOL 0.0 to 3.2, SAC L0.0 to L0.6)	EB	**0.009****	**0.35****	**0.94****	0.003	0.27	0.84
	WB	**0.018****	**0.45****	**1.05****	0.003	0.27	0.84

Notes:
TASAS = Traffic Accident Surveillance and Analysis System; EB = eastbound; WB = westbound
*Total reported collisions includes Property Damage Only collisions
**(Bold) = actual collision rate greater than statewide average
Source: Caltrans 2023d

There was a total of 539 collisions (137 eastbound and 402 westbound) that included 3 fatal collisions (1 eastbound and 2 westbound) for the I-80 segment from US 50 to the start of the existing HOV lanes. The actual collision rate for all three categories is lower than the statewide average in the eastbound direction but higher for all three categories in the westbound direction.

There was a total of 868 collisions (410 eastbound and 458 westbound) that included 12 fatalities (4 eastbound and 8 westbound) for the segment of US 50 from I-80 to I-5. There was almost the same number of total collisions in each direction. The actual collision rate for all three categories is higher than the statewide average in both the eastbound direction and westbound direction.

Table 2.1-19 summarizes the number of collisions and collision rates at ramps where ramp meters would be installed under the build alternatives, as well as for the connector ramps at I-80/US-50 interchange.

As shown in Table 2.1-19, no collisions were recorded at four of the ramps during the 5-year period. The actual collision rates are higher than the statewide average at the remaining five ramp locations—SR 113 on-ramp to westbound I-80 had a higher than average fatal plus injury collision rate, SR 113 on-ramp to eastbound I-80 had a higher than average fatal collision rate, Richards Boulevard on-ramp to eastbound I-80 had a higher than average fatality plus injury collision rate, westbound I-80 to eastbound US 50 connector ramp had higher than average fatal plus injury collision rates as well as total collision rates, and the westbound US 50 to eastbound I-80 connector ramp has a higher than average total collision rate.

Table 2.1-19. Ramps—Traffic Accident Surveillance and Analysis System Collisions Summary (January 1, 2015 through December 31, 2019)

Ramp	Total No. of Collisions	Fatal Collisions	Fatal and Injury Collisions	Actual (per Million Vehicle Miles)			Average (per Million Vehicle Miles)		
				Fatal Collisions	Fatal + Injury Collisions	Total*	Fatal Collisions	Fatal + Injury Collisions	Total*
SR 113 On-ramp to WB I-80 (SR 113 PM SOL R21.9 to R22.0)	1	0	1	0.000	**0.22****	0.22	0.009	0.16	0.47
Old Davis Rd On-ramp to WB I-80 (PM SOL R43.2)	0	0	0	0.000	0.00	0.00	0.017	0.24	0.64
SR 113 On-ramp to EB I-80 (PM SOL R43.4)	4	1	1	**0.105****	0.11	0.42	0.020	0.24	0.53
Old Davis Rd On-ramp to EB I-80 (PM SOL R43.8)	0	0	0	0.000	0.00	0.00	0.017	0.24	0.64
Richards Blvd On-ramp to EB I-80 (PM YOL 0.5)	6	0	3	0.000	**0.28****	0.56	0.002	0.23	0.63
Mace Blvd On-ramp to WB I-80 (PM YOL 2.5)	2	0	2	0.000	0.19	0.19	0.002	0.23	0.63
County Rd 32A On-ramp to WB I-80 (PM YOL 2.5)	0	0	0	0.000	0.00	0.00	0.005	0.27	0.88
WB I-80 to EB US 50 Connector ramp (US 50 PM YOL 0.7)	7	0	5	0.000	**0.47****	**0.65****	0.005	0.15	0.48
WB US 50 to EB I-80 Connector ramp (US 50 PM YOL 0.6)	12	0	2	0.000	0.10	**0.57****	0.003	0.14	0.43

Source: Caltrans 2023d
Notes: *Total reported collisions includes Property Damage Only collisions
**Bold = actual collision rate greater than statewide average
Key: EB = eastbound; WB = westbound

2.1.10.4 Roadways

I-80 is a transcontinental highway that extends from San Francisco, CA to New York, NY. In the project area, I-80 serves commuter, freight, and recreational traffic between the San Francisco Bay Area and the Sacramento metropolitan area and provides one of two all-weather connections across the Yolo Bypass. I-80 is a six-lane freeway in most of the project area with an eight-lane portion from Kidwell Road to Old Davis Road in Solano County. System interchanges exist at SR 113, US 50, and I-5. Auxiliary lanes exist in both directions between Kidwell Road and SR 113, between Enterprise Boulevard/West Capitol Avenue and US 50, between West El Camino Avenue and I-5, between I-5 and Truxel Road, and between Truxel Road and Northgate Boulevard.

US-50 is a transcontinental highway that extends from I-80 in West Sacramento to Ocean City, MD. In the project area, US 50 serves commuter, freight, and recreational traffic between Yolo and Sacramento counties. US 50 is a six-lane to eight-lane freeway in the project area. Auxiliary lanes exist in both directions between I-80 and Harbor Boulevard, between Jefferson Boulevard and I-5, between I-5 and 15th Street/16th Street, and between 15th Street/16th Street and SR 51/SR 99. An eastbound auxiliary lane is provided from Harbor Boulevard to Jefferson Boulevard/Tower Bridge Gateway.

I-5 is a north-south freeway that extends from Mexico to Canada along the west coast of the United States. In the project area, I-5 serves regional traffic through the Central Valley and commuter traffic within the Sacramento metropolitan area. I-5 intersects both US 50 and I-80 in the project area. The I-5/US 50 interchange is near downtown Sacramento, and the freeway-to-freeway ramps also provide connections to P Street and Q Street. The I-5/I-80 interchange has a full cloverleaf configuration except that the westbound to southbound movement uses a direct connector ramp.

SR-113 is a north-south highway that runs from SR 12 west of Rio Vista to SR 99 south of Yuba City. In the project area, SR 113 is a four-lane freeway that connects I-80 to I-5 in Woodland. The system interchange ramps at I-80/SR 113 are braided with the adjacent I-80/Old Davis Road interchange.

SR-99 is a north-south highway that runs from I-5 south of Bakersfield to I-5 in Red Bluff. In the project area, SR 99 is an eight-lane freeway that connects US 50 at SR 51 with Elk Grove, Stockton, and the southern Central Valley. SR 99 serves commuters to and from downtown Sacramento.

SR 51 is a north-south eight-lane freeway that connects US 50 at SR 99 in downtown Sacramento to I-80 in northern Sacramento County. SR 51, which is signed as Business Loop 80, serves commuters in the Sacramento area.

Ramp meters operate on many of the ramp entrances to I-80 and US-50 during the morning and afternoon peak periods. Most metering locations operate with a variable metering rate based upon the freeway's mainline flows and on-ramp queue lengths.

Existing condition freeway traffic volumes for the project area was provided in the TAR (Caltrans 2023d). The TAR summarizes data from the PeMS online database to obtain mainline and ramp volumes from October 2019, where available. For locations where PeMS data was not available, the TAR obtained traffic volumes from StreetLight Data. StreetLight Data uses location-based services data and GPS data (anonymized location records from smartphones and navigation devices). The PeMS and StreetLight Data were combined, and the resulting volumes were balanced along the corridor. The October 2019 balanced demand volumes for the morning and afternoon peak -hour within the project area range from approximately 10,000 vehicles per hour in both the EB and WB directions during the morning peak hour to approximately 8,000 and 9,000 vehicles per hour, respectively, in the EB and WB directions during the afternoon peak hour.

The numbers of HOVs, defined as vehicles with two or more occupants, currently using the corridor are summarized in Table 2.1-20 as a percentage of the total flow during the morning and afternoon peak periods for the eastbound and westbound directions. Since the counts were conducted during COVID-19 pandemic, when people were encouraged to work from home and schools were closed, the observed HOV percentages were compared with similar average percentages measured in 2019 on other Sacramento area freeways with HOV lanes (US 50, SR 99, and I-80 east of the project area) to confirm reasonableness for use in this analysis. The vehicle classification counts were collected on one day only.

Table 2.1-20. Average Percentage of HOVs by Time Period – Existing Conditions

Location	Morning Peak Period		Afternoon Peak Period	
	6-8 a.m.	8-10 a.m.	3-5 p.m.	5-7 p.m.
Eastbound	14%	14%	20%	22%
Westbound	20%	20%	20%	22%

Source: Caltrans 2023d
HOV = high-occupancy vehicle

Freeway speed and travel time data were obtained for both directions of travel along I-80 and US 50 within the project area from the INRIX Roadways web-based application for midweek days (Tuesday, Wednesday, and Thursday) in October 2019. Data was collected in 15-minute intervals. The average midweek peak period speeds were calculated to prepare a corridor speed contour plot. Individual day speed contour plots were reviewed to exclude days or areas where non-recurrent congestion occurred. The model speed contour plots for the freeway segments by direction and peak period are presented below in Figure 2.1-6 through Figure 2.1-9

Figure 2.1-6 shows the speed contour plots for the morning and afternoon peak periods for the eastbound corridor from I-80 at Pedrick Road to US 50 at SR 51/SR 99. During the morning peak period, two bottlenecks occur in the eastbound direction: one on I-80 at Mace Boulevard and the other on US 50 in downtown Sacramento. The congestion at Mace Boulevard lasts from about 7:30 to 8:00 a.m. and is limited to the interchange itself. The downtown bottleneck is in the weaving section between I-5 and 15th Street. Congested conditions last from approximately 7:30 to 9:00 a.m. and extend back through the Harbor Boulevard interchange.

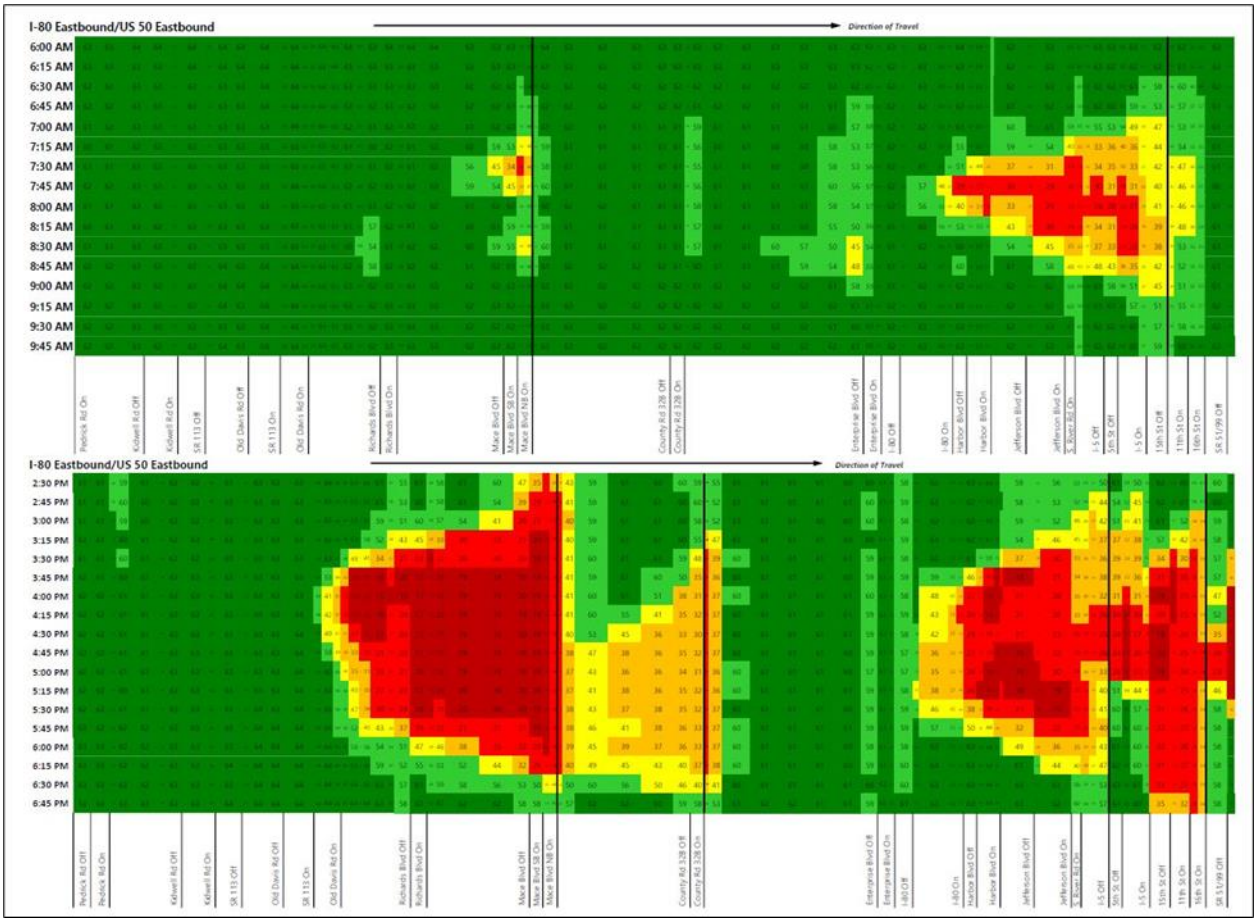


Figure 2.1-6. I-80 and US 50 Eastbound Average 2019 Weekday Speeds
Source: Caltrans 2023e

During the afternoon peak period, the eastbound I-80/US 50 corridor direction has several bottlenecks. The upstream bottleneck at Mace Boulevard lasts the entire peak period and results in congested speeds that extend back to Old Davis Road. The horizontal curve and the Mace Boulevard on-ramps traffic together create the bottleneck, which has a maximum throughput of about 4,800 vehicles per hour (vph) and lasts from approximately 2:30 to 6:30 p.m. Like Mace Boulevard, the secondary bottleneck at County Road 32B forms due to the on-ramp volume although a ramp meter on the on-ramp works to reduce this congestion. The bottleneck is also affected by the vertical curve at the beginning of the Yolo Causeway. The maximum throughput is about 5,320 vph, and congestion lasts from approximately 3:30 to 6:30 p.m. On US 50, the I-5 off-ramp and the weaving section between 16th Street and SR 51/SR 99 are bottlenecks. The first lasts from approximately 3:15 to 6:00 p.m. and the second from approximately 3:00 to 7:00 p.m. Both the SR 51 and SR 99 freeways also have downstream bottlenecks that can affect operations on US 50.

Figure 2.1-6 shows the speed contour plots for the morning and afternoon peak periods for eastbound I-80 from US 50 to Northgate Boulevard. During the morning peak period, eastbound I-80 from US 50 to Northgate Boulevard is not congested. However, two bottlenecks exist during the afternoon peak period. The Reed Avenue on-ramp serves as a bottleneck due to the on-

ramp volume combined with the grade and reduced clear zone at the Bryte Bend bridge. Congested conditions last from approximately 4:15 to 6:15 p.m. and extend back to US 50. Freeway capacity downstream of the Reed Avenue on-ramp is about 5,100 vph. The I-5 to Truxel Road weaving section is also a bottleneck due to the heavy I-5 on-ramp volume entering the freeway. Congestion lasts from approximately 3:45 to 5:45 p.m.. Downstream of the project area, a bottleneck exists at the Steelhead Creek bridge just east of the Northgate Boulevard interchange that causes congestion to extend upstream of the Northgate Boulevard off-ramp.

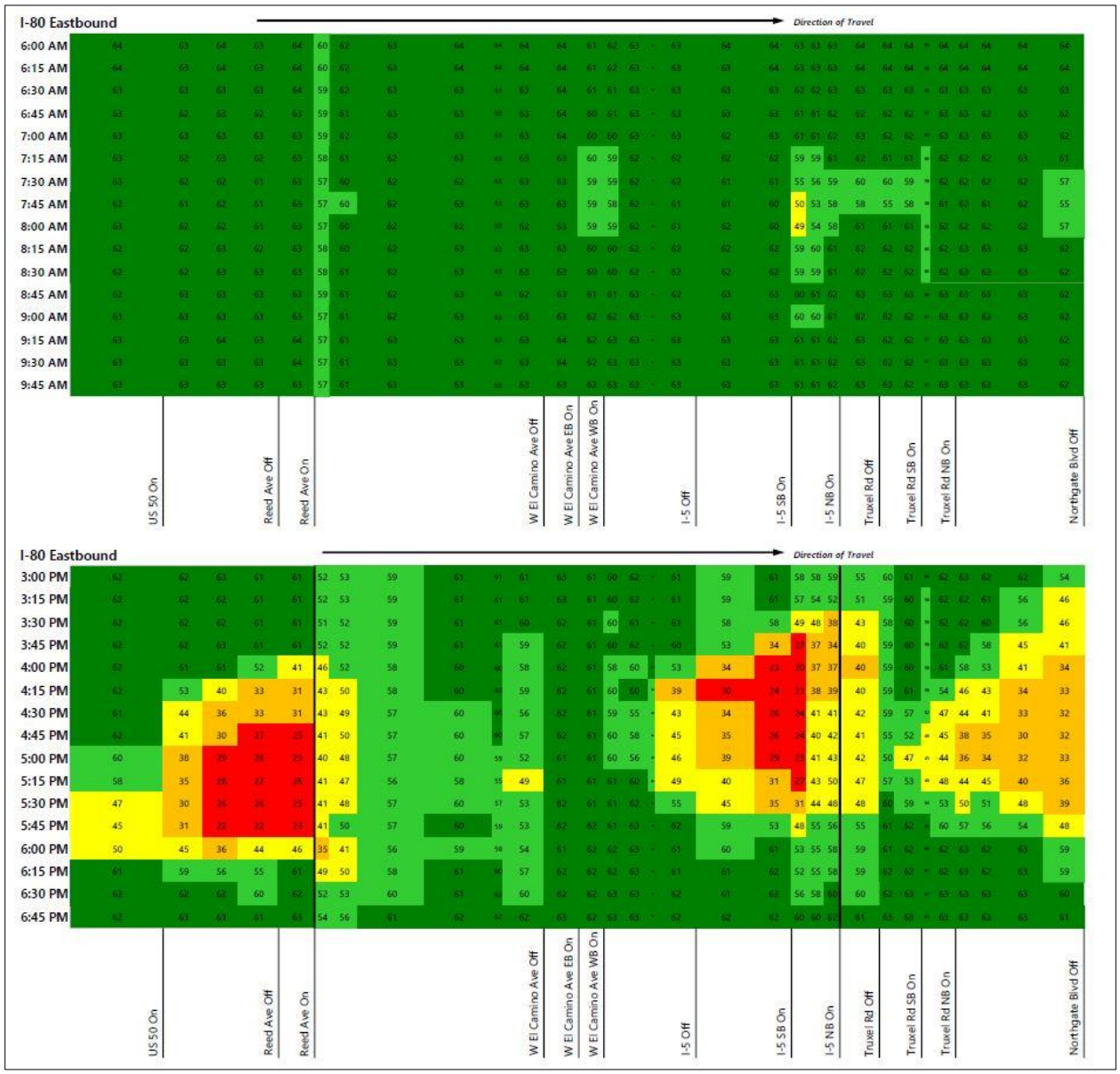


Figure 2.1-7. I-80 Eastbound Average 2019 Weekday Speeds
Source: Caltrans 2023e

Figure 2.1-7 shows the speed contour plots for the morning and afternoon peak periods for the westbound corridor from US 50 at SR 51/SR 99 to I-80 at Pedrick Road. During the morning peak period, the weaving section between the SR 51 on-ramp and the 16th Street off-ramp is a bottleneck from approximately 7:00 a.m. to after 9:00 a.m.. Congestion also occurs at the downstream weaving segment between 15th Street and I-5. At the downstream bottleneck at the Yolo Causeway, congestion begins at approximately 6:30 a.m. and lasts beyond the end of the analysis period at 10:00 a.m. Congestion extends from West Capitol Avenue upstream through the I-80 interchange. The maximum throughput on the Yolo Causeway is about 5,600 vph. During the afternoon peak period, the downtown section of US 50 has overlapping bottlenecks at SR 51 to 16th Street and the I-5 off-ramp. The downstream Jefferson Boulevard off-ramp is also a bottleneck, with a shorter duration of about an hour compared to the three hours of congestion downtown. The lane drop at Jefferson Boulevard requires the I-5 on-ramp traffic to merge over. Additionally, the off-ramp demand volume is greater than 1,500 vph, which suggests that two off-ramp lanes are needed. Like the morning peak period, the Yolo Causeway is also a bottleneck, but the congestion is less severe, only about two and a half hours in duration. The bottleneck throughput is about 4,700 vph.

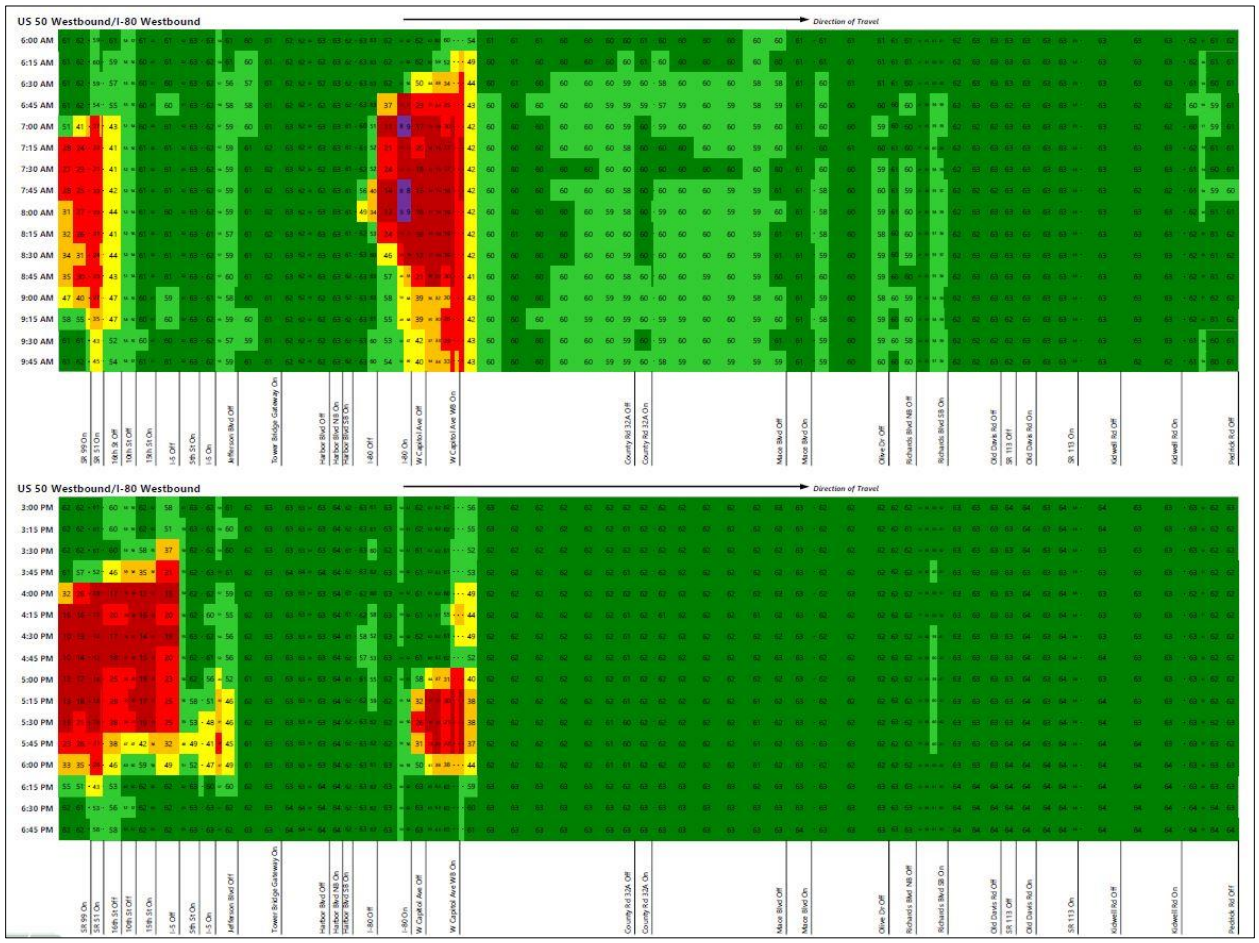


Figure 2.1-8. I-80 and US 50 Westbound Average 2019 Weekday Speeds
Source: Caltrans 2023e

Figure 2.1-8 shows the speed contour plots for the morning and afternoon peak periods for westbound I-80 from Northgate Boulevard to US 50. During the morning peak period, a bottleneck exists on southbound I-5 that extends onto the connector ramp from westbound I-80, which then causes congested conditions on westbound I-80 for about an hour. Congestion also extends from the Yolo Causeway bottleneck onto eastbound I-80 back to Reed Avenue. During the afternoon peak period, this freeway section is mostly uncongested. The only slow speeds occur near US 50 when congestion from the Yolo Causeway bottleneck extends back through this area.

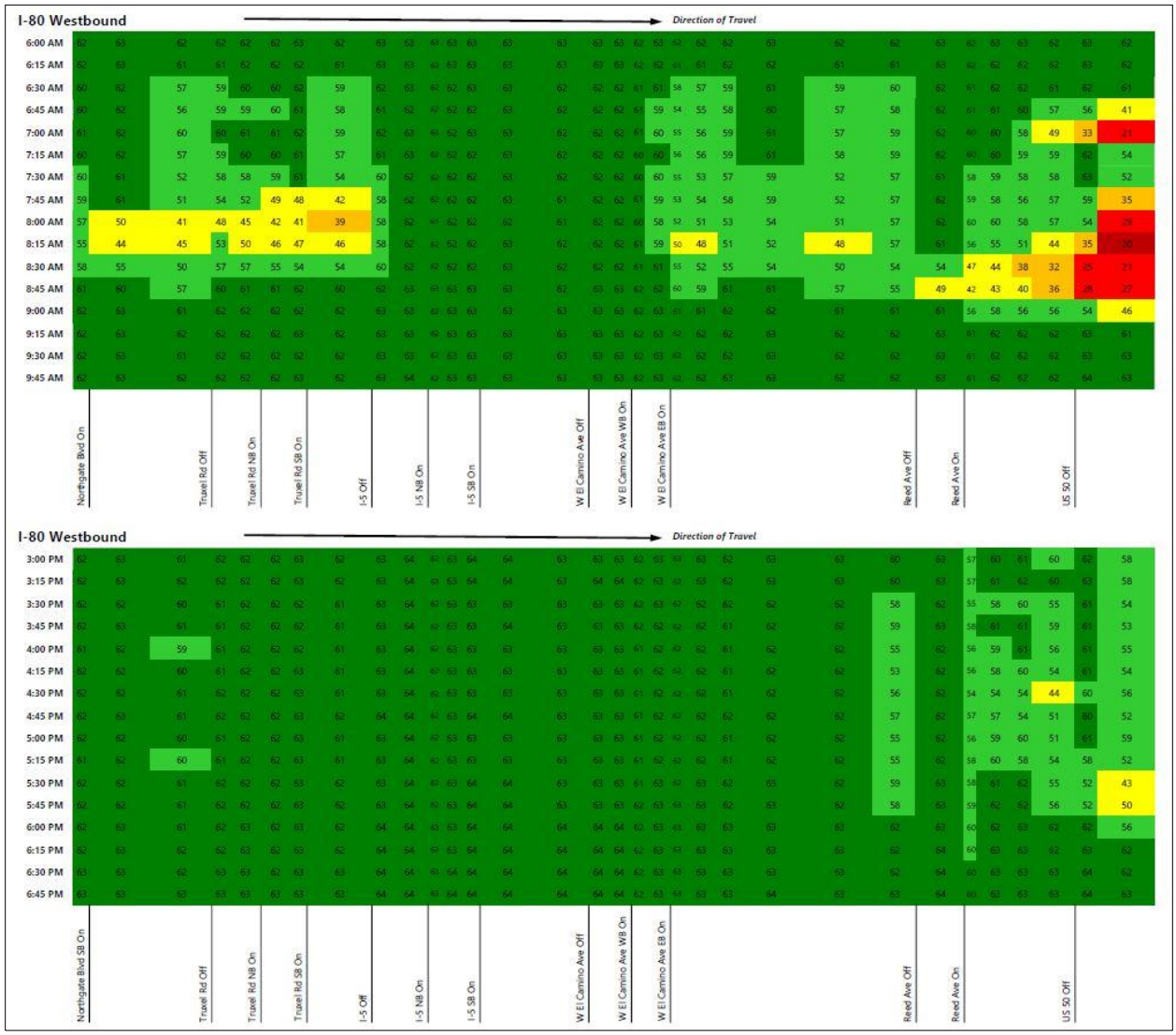


Figure 2.1-9. I-80 Westbound Average 2019 Weekday Speeds
Source: Caltrans 2023e

Peak hour travel times from the freeway traffic operations model is summarized in Table 2.1-21. For comparison purposes, the table also includes the free-flow travel time at the posted speed limit of 65 mph. During the morning peak hour, congested conditions affect eastbound travel times most prominently for eastbound US 50 from I-80 to SR 51/SR 99, which has an average

travel time 46 percent greater, an additional 2.3 minutes (7.3 minutes vs. 5.0 minutes), than the uncongested travel time. For westbound travel times, US 50/I-80 from the I-80 eastbound off-ramp to Kidwell Road has an average travel time 39 percent greater, an additional 4.8 minutes (17.0 minutes vs. 12.2 minutes), than the uncongested travel time.

During the afternoon peak hour, average eastbound travel time is 88 percent greater than free-flow conditions for I-80 from Kidwell Road to US 50 and 142 percent greater than free-flow conditions for US 50 from I-80 to SR 51/SR 99. Westbound travel time experiences the most delay for US 50 from SR 51 to I-80 where the congested travel time is 85 percent greater than free-flow conditions, which equates to approximately 3.5 additional minutes (7.6 minutes vs. 4.1 minutes).

Table 2.1-21. Corridor Travel Times (Minutes) – Existing Conditions (2019)

Path	Free-Flow Conditions	Morning Peak Hour	Afternoon Peak Hour
I-80 Eastbound: Kidwell Rd Off-ramp to US 50 Off-ramp	12.2	13.1 (+7%)	22.9 (+88%)
US 50 Eastbound: I-80 to SR 51/SR 99 Off-ramp	5.0	7.3 (+46%)	12.1 (+142%)
I-80 Eastbound: US 50 Off-ramp to Truxel Rd Off-ramp	5.2	5.5 (+6%)	7.5 (+44%)
US 50/I-80 Westbound: I-80 EB Off-ramp to Kidwell Rd Off-ramp	12.2	17.0 (39%)	12.9 (+6%)
US 50 Westbound: SR 51 On-ramp to I-80 Off-ramp	4.1	4.5 (+10%)	7.6 (+85%)
I-80 Westbound: Truxel Rd SB On-ramp to US 50	5.3	5.8 (+9%)	5.3 (+0%)

Source: Caltrans 2023e
Notes: Travel time is reported in minutes. Free-flow is the travel time at the posted speed of 65 mph. The peak hours are 7:00 to 8:00 a.m. and 4:00 to 5:00 p.m.

Traffic LOS is a measure of traffic operating conditions that is designated A through F with LOS A representing free flow conditions and LOS F representing severe traffic congestion. Table 2.1-22 summarizes the LOS thresholds from HCM Seventh Edition for freeway sections.

Table 2.1-22. Freeway Level of Service Thresholds

LOS	Description	Density (vehicles/mile-lane)	
		Basic	Merge, Diverge and Weave
A	Free-flow speeds prevail. Vehicles are almost completely unimpeded in their ability to maneuver.	≤11	≤10
B	Free-flow speeds are maintained. The ability to maneuver with the traffic stream is only slightly restricted.	>11 to 18	>10 to 20
C	Flow with speeds at or near free-flow speeds. Freedom to maneuver within the traffic stream is noticeably restricted, and lane changes require more care and vigilance on the part of the driver.	>18 to 26	>20 to 28
D	Speeds decline slightly with increasing flows. Freedom to maneuver with the traffic stream is more noticeably limited, and the driver experiences reduced physical and psychological comfort.	>26 to 35	>28 to 35

LOS	Description	Density (vehicles/mile-lane)	
		Basic	Merge, Diverge and Weave
E	Operation at capacity. There are virtually no usable gaps within the traffic stream, leaving little room to maneuver. Any disruption can be expected to produce a breakdown with queuing.	>35 to 45	>35 to 43
F	Represents a breakdown in flow.	>45 or v/c > 1[1]	>43 or v/c > 1[1]

Source: *Highway Capacity Manual, 7th Edition* (Transportation Research Board, 2022)
Note: [1]Volume-to-capacity ratio (v/c) is greater than 1 (exceeds capacity)
Key: LOS = level of service; ≤ means less than or equal to, > means greater than.

Table 2.1-23 and Table 2.1-24 show the peak hour (7:00 to 8:00 a.m. and 4:00 to 5:00 p.m.) level of service (LOS) and average density at select ramp junctions and mainline sections under existing conditions for the eastbound and westbound directions, respectively.

Table 2.1-23. Select Eastbound Freeway Operational Summaries – Existing Conditions

Freeway Segment	Facility Type	LOS/Density[1]	
		Morning Peak Hour	Afternoon Peak Hour
I-80 EB: Old Davis Rd to Richards Blvd	Basic	C / 26	**F / 66***
I-80 EB: Richards Blvd to Mace Blvd	Basic	C / 26	**F / 66***
I-80 EB: Mace Blvd SB On-ramp	Merge	**F / 49***	**F / 73***
I-80 EB: Mace Blvd to County Rd 32B	Basic	D / 28	E / 40
I-80 EB: County Rd 32B On-ramp	Merge	D / 30	**F / 52***
I-80 EB: County Rd 32B to Enterprise Blvd	Basic	D / 31	D / 29
I-80 EB: Enterprise Blvd to US 50	Weave	B / 16	B / 17
US 50 EB: I-80 to Harbor Blvd	Weave	**F / 49***	**F / 66***
US 50 EB: Harbor Blvd to Jefferson Blvd	Weave	**F / 44***	**F / 58***
US 50 EB: Jefferson Blvd On-ramp	Basic	**F / 60***	**F / 51***
US 50 EB: I-5 to 15th St	Weave	E / 38	**F / 56***
I-80 EB: US 50 to Reed Ave	Basic	C / 18	**F / 62***
I-80 EB: W El Camino Ave to I-5	Basic	B / 16	D / 28
I-80 EB: I-5 SB On-ramp	Merge	D / 32	**F / 73***
I-80 EB: I-5 to Truxel Rd	Weave	D / 31	E / 41
I-80 EB: Truxel Rd to Northgate Blvd	Basic	D / 28	**F / 57***

Source: Caltrans 2023e
Notes: *(Bold face) indicates LOS F conditions. The peak hours are 7:00 to 8:00 a.m. and 4:00 to 5:00 p.m.
[1]Density is reported in vehicles per lane per mile.

For the eastbound direction, morning peak hour LOS F congested conditions occur on US 50 from the I-80 on-ramp in West Sacramento to the I-5 on-ramp in Sacramento. LOS F also occurs on I-80 at Mace Boulevard, but the segments on either side of the interchange operate at

LOS D or better. During the afternoon peak hour, LOS F conditions exist on I-80 from Old Davis Road to County Road 32B in Davis, on US 50 from Harbor Boulevard to the I-5 off-ramp, and on US 50 from the I-5 on-ramp past the SR 51/SR 99 off-ramp. LOS F also occurs on I-80 between US 50 and Reed Avenue, at I-5, and from Truxel Road to east of Northgate Boulevard.

For the westbound direction, morning peak hour LOS F congested conditions occur on from the I-80/US 50 interchange through the West Capitol Avenue interchange. During the afternoon peak hour, LOS F conditions exist on US 50 from east of SR 51/SR 99 to the 15th Street on-ramp. The Yolo Causeway bottleneck forms after the peak hour, so LOS F conditions occur after 5 p.m. at this location.

Table 2.1-24. Select Westbound Freeway Operational Summaries – Existing Conditions

Freeway Segment	Facility Type	LOS/Density[1]	
		Morning Peak Hour	Afternoon Peak Hour
US 50 WB: SR 51 to 16th St	Weave	E / 39	**F / 87***
US 50 WB: 15th St to I-5	Weave	B / 20	**F / 45***
US 50 WB: I-5 On-ramp	Merge	C / 24	C / 27
US 50 WB: Jefferson Blvd to Harbor Blvd	Basic	C / 20	B / 18
US 50 WB: I-80 Off-ramp	Diverge	C / 23	B / 15
I-80 WB: US 50 to W Capitol Ave	Weave	**F / 73***	B / 15
I-80 WB: W Capitol Ave WB On-ramp	Merge	**F / 51***	D / 33
I-80 WB: County Rd 32A to Mace Blvd	Basic	D / 31	C / 24
I-80 WB: Mace Blvd to Olive Dr	Basic	D / 29	C / 20
I-80 WB: Richards Blvd to Old Davis Rd	Basic	C / 21	B / 16
I-80 WB: Old Davis Rd On-ramp to SR 113 On-ramp	Basic	B / 18	B / 13
I-80 WB: Truxel Rd to I-5	Weave	D / 35	B / 20
I-80 WB: I-5 to W El Camino Ave	Weave	C / 21	B / 17
I-80 WB: W El Camino Ave to Reed Ave	Basic	E / 35	C / 25
I-80 WB: Reed Ave to US 50	Basic	C / 27	D / 28
US 50 WB: SR 51 to 16th St	Weave	E / 39	**F / 87***

Source: Caltrans 2023e
Notes: *(Bold face) indicates LOS F conditions. The peak hours are 7:00 to 8:00 a.m. and 4:00 to 5:00 p.m.
1Density is reported in vehicles per lane per mile.

2.1.10.5 Bicycle and Pedestrian Facilities

A comprehensive Pedestrian and Bicycle Travel Impact Assessment was completed by Caltrans in April 2023 (Caltrans 2023). The assessment evaluated the locations within and adjacent to the project area that consist of facilities and travel origins and destinations commonly used by pedestrians and bicyclists. Changes in traffic patterns resulting from the project that could affect pedestrians and bicyclists, changes to access and configuration of pedestrian and bicyclist

facilities, and the effect of project construction on such facilities was addressed. The Highway Design Manual classifies Bikeway facilities as follows:

- Shared Roadways (No Bikeway Designation) are streets and highways without bikeway designations.
- Class I Bikeways (Bike Path) serve corridors not served by streets and highways. Class I facilities close gaps to bicycle travel caused by construction of freeways or because of the existence of natural barriers (rivers, mountains, etc.).
- Class II Bikeways (Bike Lane) are intended to delineate the right of way assigned to bicyclists and motorists and to provide for more predictable movements by each. To better accommodate bicyclists through corridors where insufficient room exists for side-by-side sharing of existing streets by motorists and bicyclists.
- Class III Bikeways (Bike Route) are shared facilities which serve either to provide continuity to other bicycle facilities (usually Class II bikeways); or designate preferred routes through high demand corridors.
- Class IV Bikeways (Separated Bikeways) is for the exclusive use of bicycles and includes a separation required between the separated bikeway and the through vehicular traffic.

The following describes the existing pedestrian and bicycle infrastructure within the project area.

Near the western limits of the project area, Old Davis Road is configured with Class II bike lanes that use green pavement markings at select locations. Parallel to Old Davis Road is a shared-use path that passes through the I-80 interchange with grade-separated crossings under the freeway ramps, allowing pedestrians and bicyclists to traverse through the interchange fully separated from vehicular traffic.

City of Davis roadways in the vicinity of the Richards Boulevard interchange include on- and off-street bicycle facilities and well-defined pedestrian infrastructure. Class II bike lanes are present on the Richards Boulevard overcrossing with a non-standard configuration in the westbound mixing zone where the path of travel for bicycles crosses the path of travel for vehicles approaching the westbound I-80 loop on-ramp. A sidewalk is present on the south side of the Richards Boulevard overcrossing only, and there are no marked crosswalks for pedestrians at the on- and off-ramps. The Yolo 80 Corridor Improvements Project Draft Pedestrian and Bicyclist Travel Impact Assessment (Caltrans 2023) notes how the Draft Downtown Davis Specific Plan identifies Richards Boulevard as part of its priority network for pedestrians, bicyclists, transit, and vehicular traffic. An off-street shared-use path is located approximately 1,200 feet southwest of the interchange, which allows pedestrians and bicyclists to cross under I-80, connecting the Davis Downtown area with residential areas on the opposite side of I-80.

The Dave Pelz Bike Overcrossing connects neighborhoods and employment centers in areas north and south of I-80. The overcrossing is part of the Davis Bike Loop, an approximately 12-mile-long bikeway used by bicyclists, walkers, and runners. The loop connects various portions

of Davis and UC Davis and is primarily made up of shared-use paths with a few sections on residential streets. Roadways in the vicinity of each overcrossing consist of off-street shared-use paths, Class II bike lanes, and pedestrian facilities. A shared-use path runs along the west side of Pole Line Road connecting the Fifth Street shared-use path with residential areas south of I-80. Class II bike lanes are also present on Pole Line Road, Fifth Street east of Pole Line Road, Cowell Boulevard, and other roadways in the vicinity of Pole Line Road. Multiple shared-use paths are also present throughout the neighborhoods south of I-80, which provide a connection to the Pole Line Road shared-use path. A Class I bicycle path runs parallel to the north side of I-80 and begins at Olive Drive just west of the Pole Line Road overcrossing.

Roadways in the vicinity of the Mace Boulevard interchange include on- and off-street bicycle facilities and pedestrian infrastructure. Class II bike lanes are present on the Mace Boulevard overcrossing, and they connect to Class II bike lanes on Second Street just north of the interchange and to a shared-use path on the east side of Mace Boulevard at Second Street. A sidewalk is present on the east side of the Mace Boulevard overcrossing only. South of I-80, a Class IV cycle track is present on Mace Boulevard from Redbud Drive to Cowell Boulevard, which is configured as a protected intersection. A gap exists where no bike lanes are present on Mace Boulevard between Cowell Boulevard and the I-80 interchange. Connections from Mace Boulevard to the I-80 shared-use path are provided along the northerly edge of the westbound on- and off-ramps.

The roadways in the vicinity of the County Road 32 interchange include limited bicycle infrastructure and generally lack pedestrian infrastructure. A Class I bicycle trail is present along the north side of the Yolo Causeway. The Yolo Causeway Class I bicycle trail terminates at the west end of the causeway, and a connection to local roads is provided by a path between the causeway and CR-32A and CR-32B. CR-32A runs parallel to I-80 on the north side of the freeway and is configured with narrow paved shoulders that are used by bicyclists. No sidewalks are present in the vicinity of the interchange.

The Yolo Causeway bicycle path is located along the northerly edge of the I-80 Yolo Causeway. The west end of the causeway bicycle path connects with CR-32 east of Davis. The east end of the causeway bicycle path connects with West Capitol Avenue in West Sacramento. The Yolo Causeway bicycle path runs parallel to the westbound I-80 vehicle lanes and is separated from vehicular traffic by a concrete barrier with a chain link fence attached to the top of the barrier.

Sidewalks are located on the west side of Enterprise Boulevard and West Capitol Avenue through the I-80 interchange area. Roadways in the vicinity of the interchange include Class II bike lanes on West Capitol Avenue, which begin at the westbound I-80 ramp interchange. There are no marked bicycle facilities within the interchange area or south of the interchange on Enterprise Boulevard. Class II bike lanes are present on Industrial Boulevard south of the interchange. A Class I bicycle path begins on the west side of West Capitol Avenue and connects to the Yolo Causeway bicycle path. The bicycle path can be accessed approximately 350 feet east of the westbound I-80 off-ramp at a location that includes a marked crosswalk with overhead warning beacons. The bicycle path can also be accessed at a location immediately adjacent to the westbound I-80 on-ramp.

Sidewalks are provided on each side of the Harbor Boulevard overcrossing. Class II bike lanes are generally present on Harbor Boulevard through the interchange; however, gaps exist at some locations where bike lane striping is not provided. Marked crosswalks are provided at some locations but are missing at each of the free-flowing ramps. Bike lanes are not provided on Harbor Boulevard immediately north or south of the interchange area. Roadways in the vicinity of the interchange include Class II bike lanes on West Capitol Avenue and on Harbor Boulevard north of West Capitol Avenue. Class II bike lanes are present on Industrial Boulevard south of the interchange except for a gap between Harbor Boulevard and Terminal Street.

Sidewalks are provided on each side of the Jefferson Boulevard undercrossing. Immediately north of the interchange, a small gap in the sidewalk exists on the east side of Jefferson Boulevard. Crosswalks are not provided at the State Route 275 ramp intersections. No bike lanes are present on Jefferson Boulevard through the interchange. Class II bike lanes are provided on Jefferson Boulevard north of West Capitol Avenue and south of Webster Street. Class II bike lanes are also provided on Park Boulevard south of Webster Street and on West Capitol Avenue east of Jefferson Boulevard. Immediately west of Jefferson Boulevard, a Class III bike route is designated on West Capitol Avenue until Poplar Avenue where Class II bike lanes begin.

No sidewalks are provided on either side of South River Road in the area where the road passes underneath I-80. North of Tower Street, a sidewalk is provided on the east side of South River Road only. Class II bicycle lanes are provided on South River Road, north of Tower Street and south of the Caltrans maintenance yard driveway. A sidewalk is provided on the west side of South River Road south of the Caltrans maintenance yard driveway.

Sidewalks are provided on each side of the Reed Avenue undercrossing, and Class II bike lanes are provided through the interchange area and to the west. Class II bike lanes are also provided on Reed Avenue east of the interchange except for a gap between the eastbound ramps and Ikea Court/Riverpoint Drive.

A sidewalk is provided along the north side of West El Camino Avenue through the interchange; however, marked crosswalks are not provided at the ramps. Marked crosswalks are also not provided at the intersection of West El Camino Avenue and El Centro Road near the hotels and truck stop. Class II bike lanes are provided on West El Camino Avenue and on Orchard Lane.

2.1.10.6 Transit

Existing transit service on the corridor is provided by the Amtrak Capitol Corridor regional commuter rail, by Fairfield and Suisun Transit (FAST) express bus service, by Yolo County Transportation District's Yolobus service, and by the Causeway Connection, which is operated by Yolobus and Sacramento Regional Transit. Except where noted, the service descriptions below reflect October 2019 conditions: that is, before service changes associated with the COVID-19 pandemic.

FAST operates the Blue Line express bus that provides weekday service between downtown Sacramento and Walnut Creek with a UC Davis stop in the project area. Effective August 2021, service is provided four times during each of the morning and afternoon peak periods.

The Capitol Corridor operates daily train service between San Jose and Auburn. On weekdays, 11 trains travel between Davis and Sacramento in each direction. Some of the trains terminate in Sacramento or Roseville rather than Auburn. Train service is approximately hourly during the morning and afternoon peak periods with longer headways during the middle of the day. The Sacramento and Davis stations are in the project area. The nearest station to the west is Fairfield-Vacaville and the nearest station to the east is Roseville.

Yolobus operates eight routes on I-80 in the project area. On weekdays, two routes provide intercity service throughout the day, and the other six are commuter routes between Davis and Sacramento. The intercity routes have stops adjacent to the park and ride lots at West Capitol Avenue and Mace Boulevard. The Yolobus routes are as follows:

- Routes 42A and 42B provide intercity service between Davis, Sacramento, and Woodland throughout the day. Route 42A travels in a clockwise direction and Route 42B travels in a counterclockwise direction. In the project area, Route 42A travels westbound along I-80 from West Capitol Avenue to Mace Boulevard and Route 42B travels eastbound from Mace Boulevard to Enterprise Boulevard. Service is provided hourly between 6:00 a.m. and 11:00 p.m.

- Route 43 provides commuter service between UC Davis and downtown Sacramento. Route 43 has five peak direction trips during each peak period (towards Sacramento in the morning and towards Davis in the afternoon). Route 43 travels between I-80 at Mace Boulevard and US 50 at Tower Bridge Gateway.

- Route 43R provides commuter service between UC Davis and downtown Sacramento. Route 43R has one off-peak direction trip during each peak period (towards Davis in the morning and towards Sacramento in the afternoon). Route 43R travels between I-80 at Richards Boulevard and US 50 at 5th Street in Sacramento.

- Routes 230, 231, and 232 provide commuter service between Davis and downtown Sacramento similar to Route 43. Route 230 has three peak direction trips during each peak period (towards Sacramento in the morning and towards Davis in the afternoon) and travels between I-80 at SR 113 and US 50 at Tower Bridge Gateway. Route 232 has one peak direction trip during each peak period (towards Sacramento in the morning and towards Davis in the afternoon) and travels between I-80 at Mace Boulevard and US 50 at Tower Bridge Gateway. Route 231 is an additional route that is scheduled late in the afternoon peak period that picks up passengers that may have missed an earlier Route 230 or 232 bus.

The Causeway Connection (Route 138) provides daily service between UC Davis and the UC Davis Medical Center in Sacramento. On weekdays, 15 buses travel in each direction and hourly service is provided between 6:00 a.m. and 8:00 p.m. In the project area, the route travels between I-80 at Old Davis Road and US 50 at Stockton Boulevard, which is just east of the SR 51/SR 99 interchange.

In addition to these transit services, other organizations provide bus service along I-80. Commercial bus carriers include Greyhound, Megabus, and FlixBus. Recreational tour

companies provide bus service to casinos and other recreational destinations in the Reno and Tahoe region.

2.1.10.7 Environmental Consequences

Caltrans has adopted guidelines in the form of the TAF and the TAC to guide the process of evaluating transportation impacts of State Highway System projects. Through the process of developing the TAF and TAC, Caltrans determined that induced travel demand, which is synonymous with induced VMT, represents the metric most appropriate for determining a transportation project's impact. Induced travel demand generally occurs when the cost for travel is lower after travel constraints, such as congestion, are reduced. In this context, cost can be in the form of travel time, actual financial cost (e.g., fuel and tolling), or a combination of both. Additional driving resulting from a capacity-enhancing highway project may occur due to factors such as a change in travel mode from transit to a single-occupant vehicle or choosing to make a trip that otherwise would not occur.

No-Build Alternative 1

Under the No-Build Alternative, managed lanes and transportation improvements would not be constructed or operated. As such, the No-Build Alternative would have no effect on current or future traffic or transportation conditions.

Build Alternatives 2a through 7b

Construction

Construction activities and ground-disturbing activities associated with the build alternatives would result in temporary traffic delays and ramp closures on I-80 and US 50 that could result in temporary effects on vehicular (including public transportation and emergency vehicles), bicycle, and/or pedestrian access in and near the project area. To maintain access through the project corridor, a transportation management plan (TMP) would be developed by Caltrans consistent with Caltrans standard procedures (Standard Measure TT-3 in Appendix E). The contractor would be required to schedule and conduct work to avoid unnecessary inconvenience to the public and to maintain access to community facilities, including bicycle and pedestrian facilities, within the work zone (Standard Measures TT-1 and TT-2). A TMP would plan construction in sections, with no more than one lane closed at a time and no successive ramp closures. The contractor would implement a planned public outreach program to keep area residents, businesses, community facilities, emergency service providers, and transit operators informed of the project construction schedule as part of the TMP. The TMP would include elements such as traffic controls to minimize speeds/congestion and other measures to maintain access during the construction period.

Operations

Vehicle volume forecasts were prepared for the project's opening year (2029) and a 20-year horizon (2049) for Alternatives 1, 2a, 3a, 4a, 5a, 6a, 7a, and 2b. Peak period conditions for Alternatives 2a and 2b, which are the HOV lane alternatives with and without the managed lane

median ramps at the I-80/US 50 interchange, were modeled using a calibrated traffic simulation model. The changes in traffic conditions between these two alternatives are expected to apply and be similar to Alternatives 3a versus 3b, Alternatives 4a versus 4b, etc., as the only difference between these respective alternatives would be the addition of the managed lane median ramps. Therefore, though individual operational analyses were not conducted for Alternatives 3b through 7b, they were extrapolated from analysis for Alternative 2b. Further detail from the travel demand modeling analysis is provided in the I-80/US 50 Travel Demand Modeling Report (Caltrans 2023h).

Traffic Forecasts

For Alternative 1 (No Build), afternoon peak hour demand volume is expected to increase by 22 percent at the Yolo Causeway by horizon year 2049. For alternatives with an added lane for HOVs and/or toll vehicles (Alternatives 2a through 5a, and 2b), the volume growth from existing conditions would range from 27 to 37 percent. At the Sacramento River bridges on I-80 and US 50, the growth rates would be higher for Alternative 1 (35 and 29 percent), but the added lane alternatives would have similar or higher growth rates.

In addition to preparing traffic volume forecasts, the travel demand model was used to estimate regional and corridor performance measures including VMT, personal miles traveled (PMT), peak hour travel times, vehicle hours of delay, average speeds, and network volumes served. For opening year 2029, the model predicted higher VMT with each of the build alternatives compared to Alternative 1 (No Build), as expected.

By horizon year 2049, I-80 and US 50 in the project area would become so congested that travelers would seek longer paths to have a lower travel time. I-5 between Woodland and Sacramento County would have a higher demand volume under Alternative 1. With the additional capacity provided under the other alternatives, travelers would shift back to I-80.

Since the SACSIM travel demand model does not pass the TAF (Caltrans 2020b) checklist for travel demand models to adequately estimate induced demand, the National Center for Sustainable Transportation (NCST) Induced Travel Calculator was applied as outlined by the TAF procedures. Alternatives 2a through 7b would include some additional capacity and all would increase VMT. VMT cannot be estimated for Alternatives 6a and 6b using the NCST Induced Travel Calculator since Alternatives 6a and 6b restrict the new lane to buses only, which is not a configuration addressed by the methodology. Alternative 7a (Convert HOV) would have the lowest increase in VMT over Alternative 1 (No Build). The increase in VMT under Alternatives 2a through 5a would be the same and would be more than 40 times the VMT increase for Alternative 7a. Alternative 2b would have a slightly higher VMT increase in comparison to Alternative 2a since it would add more lane-miles.

Opening Year 2029 Conditions

For the morning peak period, eastbound I-80 and US 50 would have the same bottleneck locations as existing conditions, and congestion in the project area under Alternative 1 (No Build) would be about the same. Alternatives 2a through 6a, and 2b would eliminate the 45 minutes of congestion otherwise occurring at Mace Boulevard under Alternative 1. Alternative

7a (Convert HOV) would have about two-and-a-half hours of congestion in the general-purpose lanes at Mace Boulevard. Westbound I-80 congestion at the Yolo Causeway would grow under Alternative 1 to extend outside the morning peak period and extend upstream to I-5 on both US 50 and I-80. Alternative 6a (Add Transit) would have conditions similar to Alternative 1, and Alternative 7a would have worse congestion extending into downtown Sacramento on US 50. Congestion under Alternatives 2a through 5a, and 2b would also extend outside the peak period, but the queue would extend upstream only to Harbor Boulevard on US 50. Alternative 2b (Add HOV with Median Ramps) would have less upstream congestion on I-80 in comparison to Alternative 2a.

For the afternoon peak period, congestion at the eastbound I-80 bottlenecks at Mace Boulevard and County Road 32B would expand to outside the afternoon peak period under Alternatives 1 and 6a. Alternatives 2a through 5a, and 2b would have increased throughput at Mace Boulevard and would eliminate the County Road 32B bottleneck. However, the increased throughput would increase downstream congestion on US 50 and I-80 at I-5. Under these alternatives, the congestion at the I-5/I-80 interchange would extend back to Mace Boulevard. Alternative 7a would be congested for the entire peak period due to major bottlenecks at Mace Boulevard, Harbor Boulevard, and I-5. In the westbound direction, additional congestion upstream on US 50 in downtown Sacramento would result in less congestion at the Yolo Causeway under Alternative 1. Except for Alternative 7a, the other alternatives would have similar congestion for an hour or less at the West Capitol Avenue interchange. Alternative 7a would have about two-and-a-half hours of congestion at the Yolo Causeway that would extend back into the I-80/US 50 interchange.

Horizon Year 2049 Conditions

For the morning peak period, eastbound I-80 congestion under Alternative 1 (No Build) at Mace Boulevard would grow to two-and-one-half hours and congestion at the County Road 32B bottleneck would be about one hour. On eastbound US 50, congestion from the I-5 bottleneck would extend back to I-80. Alternative 6a (Add Transit) would have less congestion at Mace Boulevard and County Road 32B (less than an hour at each). Alternatives 2a through 5a, and 2b would have no congestion at Mace Boulevard and County Road 32B, and I-5 congestion would only extend to about Jefferson Boulevard. Alternative 7a would have bottlenecks at Mace Boulevard, County Road 32B, and South River Road that would start around 7:00 a.m. and extend beyond 10:00 a.m.

Westbound I-80 morning peak period congestion at the Yolo Causeway would grow under Alternatives 1 and 6a to extend outside the morning peak period and extend upstream to SR 51/SR 99 on US 50 and merge with a bottleneck at West El Camino Avenue on I-80 to extend upstream beyond Northgate Boulevard. Alternative 7a would have worse congestion upstream on both US 50 and I-80 with speeds lower than 20 mph for most of the morning peak period. Under alternatives 2a through 5a, and 2b, congestion at the Yolo Causeway bottleneck would be lower, but a new bottleneck would form at the lane drop after the US 50 off-ramp. The combined congested area would extend outside the peak period and extend upstream to Harbor Boulevard on US 50. Alternative 2b (Add HOV with Median Ramps) would have the least upstream congestion on both US 50 and I-80 with the additional capacity provided by the

median ramp from I-80 and the reduced volume in the weaving section on I-80 between US 50 and West Capitol Avenue.

For the afternoon peak period, congestion at the eastbound I-80 bottlenecks at Mace Boulevard, County Road 32B, and South River Road would expand to outside the afternoon peak period under Alternatives 1 and 6a. Congestion at Mace Boulevard would extend upstream of Pedrick Road in Solano County by 4:00 p.m. Alternatives 2a through 5a, and 2b would have increased throughput at Mace Boulevard and would delay the congestion at Pedrick Road until 5:00 p.m. Congestion at the County Road 32B and South River Road bottlenecks would be reduced, but the congestion at the I-80/US 50 interchange due to queuing from the I-5/I-80 and/or I-80/Reed Avenue interchanges would be similar to Alternative 1. Alternative 7a would be congested for the entire peak period due to major bottlenecks at Mace Boulevard, Harbor Boulevard, and I-5.

In the westbound direction during the afternoon peak period, a new bottleneck at the Jefferson Boulevard and I-80 off-ramps on US 50 would have one-and-a-half hours of congestion under Alternative 1. Congestion on I-80 at the Yolo Causeway would last more than three hours and extend upstream to US 50. Alternatives 2a, 3a, 6a, 7a, and 2b would also have a bottleneck at the Jefferson Boulevard off-ramp. Alternatives 2a through 4a and 6a, 7a and 2b would also have a bottleneck at the I-80 off-ramp. The Reed Avenue off-ramp would also have high demand volumes leading to congested conditions for the ramp diverge under all project alternatives.

Safety Impacts

Under Alternative 1 (No Build), collision rates would be the same as existing conditions. With the forecasted increase in traffic volumes, congestion and congestion-related collisions would increase. The freeway segments with higher-than-average collision rates would continue to experience the same collision rates. Alternatives 2a through 5a, and 2b would reduce congestion compared to Alternative 1. Alternatives 2a through 6a, and 2b would be expected to lower the collision rate since these alternatives add a lane in most of the project area.

Transit Impacts

Although transit service was not assumed to change among the analysis years, transit ridership will differ based on the travel time performance under the project alternatives. Alternative 6a (Add Transit) would have the highest ridership since only buses would have the travel time savings provided by the managed lanes. Alternatives 2a through 5a, and 2b would have similar transit ridership and an increase over Alternative 1 (No Build). Alternative 7a would have the lowest ridership and a decrease compared to Alternative 1 due to network congestion.

Bicycle and Pedestrian Impacts

Each of the build alternatives would replace the existing bicycle pathway pavement behind the gas station located north of West Capitol Avenue from PM 9.15 to PM 9.35. The existing bicycle pathway would be rerouted during repaving activities for up to two months, but repaving activities may occur at nighttime to minimize access disruption. To maintain access, bicycles traveling westbound would be redirected along West Capitol Avenue. Bicycles traveling

eastbound would be redirected along a short segment of sidewalk on West Capitol Avenue and use the crosswalk at the West Capitol Avenue/westbound I-80 off-ramp intersection[1]. Bicyclists would then continue eastbound along West Capitol Avenue using the existing bicycle lane. Caltrans would add crosswalk pavement marking across the westbound I-80 off-ramp to West Capitol Avenue and near the existing West Capitol Avenue crosswalk. In addition, Caltrans would add advanced warning signs to alert the motorists traveling on the westbound I-80 off-ramp to West Capitol Avenue before reaching the proposed crosswalk. Caltrans would place signage as part of the traffic management plan to note the access updates and identify the bicycle/pedestrian detours.

The build alternatives would also replace the existing bicycle pathway pavement from PM 9.1 to the Yolo Causeway bridge deck approach at approximately PM 8.9. While the existing Class I bicycle pathway is closed, a temporary bicycle pathway with K-rail barrier would be placed along the I-80 westbound on-ramp from West Capitol Avenue. Up to 100 linear feet of existing barrier near PM 8.9 would be removed and realigned to allow bicycles to rejoin the existing Class I Bicycle Pathway along Yolo Causeway. The existing Class I bicycle pathway along the Yolo Causeway would not require closure during construction activities.

Each of the build alternatives would extend the westernmost limit of the existing Class I bicycle pathway from I-80 along Yolo Causeway to connect to County Road (CR) 32A. The pathway extension would be located adjacent to the westbound I-80 off-ramp to CR-32A and would be approximately 12-feet wide. The area surrounding the pathway extension would be graded to comply with the Americans with Disabilities Act of 1990 (ADA) regulations. A concrete barrier would separate the pathway extension from westbound off-ramp vehicular traffic. Once construction of the pathway extension along westbound I-80 off-ramp is complete, the build alternatives would conduct pavement rehabilitation on the western Yolo Causeway levee, from the Yolo Causeway bridge to from CR-32A to Levee Road. During pavement rehabilitation activities, Levee Road would be closed. Bicycles would be redirected along the newly constructed pathway extension on westbound I-80 off-ramp to access the existing Class I bicycle pathway along Yolo Causeway, which would be built prior to rehabilitation activities on Levee Road.

Alternatives Comparison

Table 2.1-25 provides a qualitative assessment of selected performance measures for the horizon year 2049. The alternatives are scored from 1 to 5, with 1 being very good performance and 5 being very poor performance. Peak period conditions for Alternatives 2a and 2b, which are the HOV lane alternatives with and without the managed lane median ramps at the I-80/US 50 interchange, were modeled using a calibrated traffic simulation model. The changes in traffic conditions between these two alternatives are expected to apply and be similar to Alternatives 3a versus 3b, Alternatives 4a versus 4b, etc., as the only difference between these respective alternatives would be the addition of the managed lane median ramps. Therefore, operational

[1] City of West Sacramento Municipal Code 10.32.020 states that bicycles are permitted on the public sidewalk but shall yield to any pedestrian.

analyses were not conducted for Alternatives 3b through 7b, but a qualitative discussion of the expected operations is provided in Section 8.1 of the TAR.

Table 2.1-25. Alternatives Comparison – Horizon Year 2049

Performance Measure	Alt 1	Alt 2a	Alt 3a	Alt 4a	Alt 5a	Alt 6a	Alt 7a	Alt 2b
Regional VMT	5	2	3	2	1	4	2	3
Corridor PMT	5	2	1	3	4	5	5	2
Persons served at bottlenecks	3.5	1	2	2.5	2.5	3.5	5	1
General purpose lane peak hour travel time	3.5	1.5	1.5	2	2	3	5	2
General purpose lane peak hour planning time index	4	2	2	2.5	1.5	3	5	2.5
Managed lane peak hour travel time	4.5	2	1.5	1.5	1.5	3	5	1.5
Vehicle hours of delay	4	2	2.5	2	1.5	2.5	5	1.5
Average speed	4	1.5	2.5	2	2	2.5	5	1
Total vehicles served	3.5	1.5	2	3	3	3	5	1
Total persons served	3	1	2	4	3	2.5	5	1
Deficient segments	5	2.5	2.5	2	1.5	3	4	1.5
Average score	4.1	1.7	2.0	2.4	2.1	3.2	4.6	1.6

Source: Caltrans 2023d
Notes: Comparison is based on a scale of 1 to 5, where 1 represents very good performance and 5 represents very poor performance.
Key: VMT = Vehicle miles traveled; PMT = Personal miles traveled

Alternatives 2a and 2b have the best overall performance, including very good performance in two categories for Alternative 2a and four categories for Alternative 2b. Alternative 2a would have at least good performance for all categories, and Alternative 2b would have neutral performance for only regional VMT. These alternatives would increase freeway capacity in the form of a HOV lane so that faster travel time would be available to vehicles eligible for the HOV lane. These alternatives would increase both vehicle and person throughput at the key bottlenecks: eastbound I-80 at Mace Boulevard and westbound I-80 at the Yolo Bypass. Alternative 2b would perform better than all other alternatives during the morning peak period since the median ramps at I-80/US 50 would provide a travel time advantage to HOVs, but afternoon peak hour travel time would be worse since fewer general purpose lanes would be provided on eastbound I-80 between Enterprise Boulevard and US 50. The morning peak period performance leads Alternative 2b to have the best overall average score.

Alternatives 3a, 4a, and 5a would perform well, although not as high as Alternatives 2a and 2b. For Alternative 3a, performance would be worse because more vehicles would be eligible for the managed lane than in the other alternatives, so congestion would be higher where vehicles are entering and leaving the managed lane. In particular, the transition section from the HOT lane to the existing HOV lane on eastbound I-80 near West El Camino Avenue would have

more turbulence than the other alternatives in a location where the general purpose lanes are congested from a downstream bottleneck at I-5. The additional turbulence would result in longer travel times and lower network average speed. Alternative 4a would also have turbulence at the transition sections. Additionally, Alternative 4a would serve fewer people overall since HOV2s would have to pay to use the managed lane. For Alternative 5a, restricting the managed lane to tolled vehicles would restrict vehicles served and persons served since ridesharing would not provide a travel time savings. However, these alternatives perform better than Alternatives 1 and 7a and offer better travel time reliability in the managed lane than the HOV lane alternatives.

Alternative 6a would not perform well compared to the other alternatives. While person throughput could be improved if additional bus service were provided, the forecasted passenger vehicle volume would be constrained by the network capacity resulting in performance like Alternative 1 for many performance measures. Alternative 7a would also perform poorly. While the HOV lane would provide lower travel time than in the general purpose lanes, congestion in the general purpose lanes would be such that HOVs would be severely delayed entering and exiting the HOV lane.

The TAF provides two approaches to assess the induced VMT attributable to the project; the first being an empirical approach using the NCST Induced Travel Calculator and the second by applying a regional or local area travel demand model. Both the calculator and the travel demand models have strengths and limitations when estimating induced VMT depending on the specific corridor under analysis. Therefore, both the corridor context and analysis limitations are considered when using VMT forecasts from either method. The advantages and disadvantages of these methods are described in the TAR (Caltrans 2023d).

Table 2.1-26 presents the estimated long-term induced travel based on the NCST calculator. The calculator does not estimate the induced VMT for transit-only lane alternatives (Alternatives 6a and 6b). Caltrans has determined that the NCST calculator be used to report VMT for the project alternatives, since the travel demand model does not satisfy all five checks of the TAF's checklist for evaluating adequacy of the travel demand model. These alternatives have the potential to induce VMT, which may constitute a potentially significant impact under the California Environmental Quality Act (CEQA). The induced VMT for Alternatives 6a and 6b, the transit lane alternatives, cannot be calculated by the NCST calculator; however, added transit service generally does not induce auto VMT.

As shown in Table 2.1-26, the NCST calculators induced daily and annual VMT estimates indicate that all the project alternatives would result in substantial increases in VMT, which would represent an adverse effect with respect to induced travel except for No Build Alternative 1 and the transit-only lane Alternatives 6a and 6b[2]. The NCST calculator cannot

[2] The induced VMT of 133 million reported in the Draft EIR was the result of a calculation error. Early in the analysis, the annual VMT estimate from the NCST Induced Travel Calculator was converted to daily VMT using a factor of 300 based on older Performance Measurement System (PeMS) volume data that showed that the average mid-week daily volume was higher than the average volume for all days of the year. PeMS data from 2023 for I-80 in the project area was found to have a conversion factor close to 365. So, the daily VMT was later converted back to annual VMT using this higher value. The corrected value of 110 million removes the artificial increase based on the difference in the daily to annual conversion factors (300 vs. 365).

calculate induced VMT for transit-only lane alternatives (Alternatives 6a and 6b); however, added transit service generally does not induce auto VMT.

Table 2.1-26. Daily and Annual Induced VMT

Project Alternatives	Induced Total Daily VMT	Induced Truck Daily VMT	Induced Total Annual VMT	Induced Auto Annual VMT
Alternative 1 (No Build)	—	—	—	—
Alternative 2a (Add HOV)	+495,300	143,600	148,600,000	105,506,000
Alternative 3a (Add HOT2+)[1]	+495,300	143,600	148,600,000	105,506,000
Alternative 4a (Add HOT3+)[1]	+495,300	143,600	148,600,000	105,506,000
Alternative 5a (Add Toll)[1]	+495,300	143,600	148,600,000	105,506,000
Alternative 6a (Add Transit)	—	—	—	—
Alternative 7a (Convert HOV)	+12,300	3,600	3,700,000	2,627,000
Alternative 2b (Add HOV with Median Ramps)	+516,000	149,600	154,800,000	109,908,000
Alternative 3b (Add HOT2+ with Median Ramps)	n/a	n/a	154,800,000	109,908,000
Alternative 4b (Add HOT3+ with Median Ramps)	n/a	n/a	154,800,000	109,908,000
Alternative 5b (Add Toll with Median Ramps)	n/a	n/a	154,800,000	109,908,000
Alternative 6b (Add Transit with Median Ramps)	—	—	—	—
Alternative 7b (Convert HOV with Median Ramps)	n/a	n/a	9,900,000	7,029,000

Source: Caltrans 2023d, Caltrans 2023g
Key: n/a = daily induced VMT was not calculated for all alternatives, VMT = vehicle miles traveled

2.1.10.8 Avoidance, Minimization, and/or Mitigation Measures

As mentioned in Section 2.2.1.7, Alternative 1 is the no-build Alternative and would not have a negative impact on transportation since it would not induce additional vehicular travel. Similarly, Alternatives 6a and 6b, which add transit-only lanes, are not expected to induce additional automobile VMT.

AMMs have been specified to reduce, avoid, and offset VMT impacts from the project build Alternatives 2a/b through 5a/b, and 7a/b. The following measures to avoid or minimize VMT impacts would be implemented by the project:

- AMM TRANS-1: Reduce the induced VMT effects of the project Alternatives 2a/b through 5a/b, and 7a/b by contributing funding to regional VMT reducing measures. Caltrans will contribute $55 million, roughly 15 percent of the total capital construction cost, to the following eight measures: 1) Voluntary trip reduction program in Yolo County ($20.7 million); 2) Expand Capitol Corridor Frequency between Martinez and Sacramento ($15 million) ; 3) Microtransit in Yolo County ($4.5 million); 4) Expand

YoloBus Route 42 ($6.9 million); 5) Expand causeway connection Route 138 ($2.4 million); 6) Expand Unitrans ($3.5 million); 7) Expand Putah Creek Trail to connect to future Nishi Student Housing Development site ($2 million). Mitigation funding may be supplemented beyond the $55 million with excess net tolling revenue. In addition, Caltrans will initiate a Project Initiation Document (PID) for a new project in July 2025 which will include, but not be limited to, alternatives such as the addition of toll lanes and the conversion of general-purpose lanes.

The annual induced auto VMT from the build alternatives (roughly 106-110 million annual auto VMT for the added-lane alternatives and roughly 2.6-7 million annual auto VMT for the general-purpose lane conversions to HOV) would need to be reduced through the action of VMT reducing measures. Table 2.1-27 summarizes potential measures and the associated VMT reduction to be expected by implementation of the measure as described in the Yolo 80 Managed Lanes Project Final VMT Mitigation Plan (Caltrans 2024). However, as shown the potential total VMT reduction from these measures (approximately 57.1 million annual auto VMT) is not sufficient to offset the induced VMT forecasts of approximately 106-110 million annual VMT for most of the project alternatives. It would be sufficient to fully offset only the alternatives that would convert an existing lane to an HOV-only lane (Alternatives 7a and 7b).

However, full implementation of these VMT-reducing measures is subject to feasibility (see Table 2.1-27) and are not sufficient to fully offset the induced VMT impact of Alternatives 2a/b through 5a/b.

The non-housing mitigation measures are based on 2040 conditions according to the SACSIM model. Some portion of the VMT reduction may not apply if the monthly transit pass subsidies and reduced transit fares are offered. The strategies offer different methods for reducing transit costs but may end up targeting similar people that could dampen the reported effectiveness.

Table 2.1-27. Vehicle Miles Traveled Reducing Measures

Mitigation Measure	Description	Annual VMT Reduced	Cost to Construct or Implement	Yolo 80 Managed Lane Contribution	$/VMT
Voluntary Trip Reduction Program in Yolo County	Part of an approved program provided by Yolo Commute, that include features such as community-based travel planning, ridesharing, transit pass subsidies, and pay-per-mile auto insurance; no physical improvements; payments directly to Yolo Commute.	24.7 million	$1.3 million (annual cost to implement program)	$20.7 million over 15 years (to be supplemented with future toll revenue)	$0.05
Expand Capitol Corridor Frequency between Martinez and Sacramento	Increase Capitol Corridor rail service by three round trip trains between Martinez and Sacramento, on an annual basis, and/or implement buy-down program to reduce fares.	12.6 million	$5 million (annual cost to operate three (3) additional roundtrip train services and/or implement buy-down program)	$15 million over 3 years (to be supplemented with future toll revenue)	$0.40

Mitigation Measure	Description	Annual VMT Reduced	Cost to Construct or Implement	Yolo 80 Managed Lane Contribution	$/VMT
Micro transit in Yolo County	Expand transit service by 25% to add flexible route buses with more frequent service and/or longer service hours.	6.2 million	$1.5 million (annual cost to expand service)	$4.5 million over 3 years (to be supplemented with future toll revenue)	$0.24
Expand YoloBus Route 42	Increase Route 42 A & B services during 30-minute services all day, with the addition of 12 new trips in each direction for both the A and B routes.	3.7 million	$2.3 million (annual cost to expand service)	$6.9 million over 3 years (to be supplemented with future toll revenue)	$0.48
Expand Causeway Connection Route 138	Reduce service headways from 60 minutes all day to 15 minutes for morning and afternoon peak periods and 30 minutes for midday/off-peak periods for Route 138.	5.9 million	$800k (annual cost to expand service)	$2.4 million over 3 years (to be supplemented with future toll revenue)	$0.26
Expand Unitrans	Increase service frequency from 30 to 15 minutes during the morning and afternoon peak periods.	1.2 million	$875k (annual cost to expand service)	$3.5 million over 4 years (to be supplemented with future toll revenue)	$0.75
Expand Putah Creek Trail to Connect to Future Nishi Student Housing Development Site	Expanding the Putah Creek Trail will improve the existing Putah Creek Trail between the Union Pacific Railroad tunnel and Old Davis Road at Hutchison Drive in Davis, and provide direct improvements and access to future Nishi Student Housing Development.	1.4 million	$3.8 million	$2 million	$1.45
Total	—	55.6 million (50% of induced VMT)	--	$55 million	

Source: Caltrans 2024a
Key: VMT = vehicle miles traveled

The Yolo 80 Managed Lanes Project Final VMT Mitigation Plan (Caltrans 2024a) lists additional VMT reducing measures that were analyzed and rejected as not reasonable or feasible, as shown in Table 2.1-28 below.

Table 2.1-28. Potential VMT Reducing Measures Analyzed and Rejected (Not Reasonable or Feasible)

Mitigation Measure	Description	Annual VMT Reduced	Cost to Construct or Implement /Reason Rejected	Yolo 80 ML Contribution	$/VMT
Increase Parking Costs	Double parking costs at UC Davis and Downtown Sacramento.	64.1 million	N/A Neither agency has a plan to proceed with this program, hence there is no cost and it is deemed unfeasible	N/A	N/A
Build 1,000 Housing Units in Downtown Davis	The Downtown Davis Specific Plan area is bounded by Union Pacific Railroad, 1st, A, and 5th Streets, and includes the G Street corridor. The proposed development would include up to 1000 housing units.	18.3 million	$25 million ($250k per unit to construct) The low financial contribution of $5M for a minimum $25M cost to construct is not feasible to claim full VMT reduction credit.	$5 million	$0.27
Build 700 Housing Units at Nishi Development in City of Davis	Nishi property in Davis is bounded by I-80, Union Pacific Railroad, and Putah Creek. The proposed development would include up to 700 housing units for students at the adjacent UC Davis campus.	14.6 million	$175 million ($250k per unit to construct) The low financial contribution of $5M for a minimum $175M cost to construct is not feasible to claim full VMT reduction credit.	$5 million	$0.34
Expand Sidewalks in Yolo County	Increase sidewalk coverage by 10% throughout Yolo County.	13,6 million	N/A Agency has no plan to proceed with this program, hence there is no cost available and it is deemed infeasible	N/A	N/A
Build 4,442 Housing Units at Bridge District in West Sacramento	The Bridge District Specific Plan area is bounded by the Sacramento River, Tower Bridge Gateway, US 50, South River Road, and 15th Street. The proposed development would include up to 4,442 housing units.	8.4 million	$1.1 billion ($250k per unit to construct) The low financial contribution of $5M for a minimum $1.1B cost to construct is not feasible to claim full VMT reduction credit.	$5 million	$0.59
Green Line LRT Extension: Township 9 to Sac Airport	Extend the Green Line Light Rail Transit from Township 9 Boulevard to the Sacramento International Airport.	7.2 million	$1.2 billion Not feasible or reasonable for cost-to-VMT reduction benefit. Also, in MTP and project funding would only get partial VMT credit.	N/A	$166

Mitigation Measure	Description	Annual VMT Reduced	Cost to Construct or Implement /Reason Rejected	Yolo 80 ML Contribution	$/VMT
Subsidize Monthly Transit Passes in Yolo County	Incentivize transit ridership through subsidizing monthly transit passes for frequent users of Yolobus and Capitol Corridor. This would reduce the cost of monthly passes by 50% on Capitol Corridor and Yolobus transit services for Yolo County residents.	5.6 million	$225K (annual cost to subsidize) Not reasonable or feasible because already subsidizing monthly passes under Mitigation measures Voluntary Trip Reduction Program in Yolo County and Expand Capitol Corridor	$4.5 million over 20 years (to be supplemented with future toll revenue)	$0.04
Downtown Riverfront Streetcar	Construct and operate the proposed Downtown Riverfront Streetcar system.	4.3 million	$259 million Not feasible or reasonable for cost-to-VMT reduction benefit. Also, in MTP and project funding would only get partial VMT credit	N/A	$60
Reduce Transit Fares	Reduce the bus fare for Yolobus and Capitol Corridor users in Yolo County by 50%	3.7 million	$225k (annual cost to reduce fares) Not feasible or reasonable because already subsidizing monthly passes under Mitigation measures Voluntary Trip Reduction Program in Yolo County and Expand Capitol Corridor	$5 million over 20 years (to be supplemented with future revenue)	$0.07
Truxel Road Bridge	Construct a two-lane multimodal bridge at the American River from Garden Highway to Sequoia Pacific Boulevard.	3.7 million	$217 million Not feasible or reasonable for cost-to-VMT reduction benefit. Also, in MTP and project funding would only get partial VMT credit	N/A	$58
Build 400 Housing Units in Downtown Sacramento	The proposed development would include up to 400 housing units in the Downtown Sacramento area bounded by J Street, 16th Steet, N Street, and 7th Street.	3.3 million	$100 million ($250k per unit to construct) The low financial contribution of $5M for a minimum $100M cost to construct is not feasible to claim full VMT reduction credit.	$5 million	$1.51

Source: Caltrans 2024a

2.1.11 Visual and Aesthetics

2.1.11.1 Regulatory Setting

The National Environmental Policy Act (NEPA) of 1969, as amended, establishes that the federal government use all practicable means to ensure all Americans safe, healthful, productive, and aesthetically (emphasis added) and culturally pleasing surroundings (42 United States Code [USC] 4331[b][2]). To further emphasize this point, the Federal Highway administration (FHWA), in its implementation of NEPA (23 USC 109[h]), directs that final decisions on projects are to be made in the best overall public interest taking into account adverse environmental impacts, including among others, the destruction or disruption of aesthetic values.

The California Environmental Quality Act (CEQA) establishes that it is the policy of the state to take all action necessary to provide the people of the state "with…enjoyment of aesthetic, natural, scenic and historic environmental qualities" (CA Public Resources Code [PRC] Section 21001[b]).

California Streets and Highways Code Section 92.3 directs Caltrans to use drought resistant landscaping and recycled water when feasible and incorporate native wildflowers and native and climate-appropriate vegetation into the planting design when appropriate.

2.1.11.2 Affected Environment

Information in this section is based on the Visual Impact Assessment (VIA) prepared for the project in October 2021 and revised in March 2023 (Stantec 2023). The purpose of the VIA is to document potential visual impacts caused by the project and to propose measures to lessen impacts that are identified. Visual impacts are demonstrated by identifying visual resources in the project area, measuring the amount of change that would occur as a result of the project, and predicting how the affected public would respond to or perceive those changes.

Visual Resources

The Sacramento River, Sacramento River Corridor, and Yolo Bypass Wildlife Area (YBWA) were identified as areas of scenic value within the project area. The project crosses the Sacramento River on I-80 and US-50, and the river corridor creates one of the primary natural scenic resources in Sacramento. The project crosses the YBWA on the Yolo Causeway which is elevated and provides open views of managed wildlife habitat and seasonal views of flooded riparian waterways.

Visual Character

Visual character includes attributes such as form, line, color, and texture; and they are used to describe, not evaluate. These attributes are neither considered good nor bad. However, a change in visual character can be evaluated when it is compared with the viewer response to that change. Changes in visual character can be quantified by identifying how visually

compatible a project would be with the existing condition by using visual character attributes as an indicator. The following attributes were considered:

- Form: visual mass and shape
- Line: edges or linear definition
- Color: reflective brightness (light, dark) and hue (red, green)
- Texture: surface coarseness
- Dominance: position, size, or contrast
- Scale: apparent size as it relates to the surroundings
- Diversity: a variety of visual patterns
- Continuity: uninterrupted flow of form, line, color, or textural pattern

Visual Quality

Visual quality is evaluated by identifying the vividness, intactness, and unity present in the project corridor. Public attitudes validate the assessed level of quality and predict how changes to the project corridor can affect these attitudes. This process helps identify specific methods for addressing each visual impact that may occur as a result of the project. The three criteria for evaluating visual quality are defined below:

- Vividness: the extent to which the landscape is memorable and is associated with distinctive, contrasting, and diverse visual elements.

- Intactness: the integrity of visual features in the landscape and the extent to which the existing landscape is free from non-typical visual intrusions.

- Unity: the extent to which all visual elements combine to form a coherent, harmonious visual pattern.

Visual Assessment Units

The project corridor was divided into a series of “outdoor rooms” or visual assessment units (VAU). Each VAU has its own visual character and visual quality. It is typically defined by the limits of a particular viewshed which collectively exhibit a similar overall character. For this project, the following four (4) VAUs and their associated key views (KVs) have been identified: Solano County, Davis, Yolo County, and West Sacramento (Figure 2.1-10). KVs represent the viewer groups that have the highest potential to be affected by the project considering exposure and sensitivity based on each Build Alternative. Each VAU is described below. Figure 2.1-10 illustrates the VAUs and respective KVs evaluated for the project.

Solano County Visual Assessment Unit

This VAU is located within the limits of Solano County, west of Davis limits. It extends from the project’s western terminus (PM SOL 40.7) northeast along I-80 to south of the Yolo County/Davis limits (PM YOL 0.0) (see Figure 2.1-10).

This VAU was established based on common attributes which include land use (mostly agricultural), development density (comparatively lower than the adjacent VAUs), regulatory

setting (Solano County), roadway cross section (no center median vegetation), and viewshed (higher frequency of distant views). These attributes combine to create a notably different visual setting than the adjacent VAU.

Davis Visual Assessment Unit

This VAU is located along I-80 from the UC Davis just south and east of the City of Davis boundary (PM YOL 0.0) and extends through the City of Davis to the eastern limits of the city (PM YOL 3.71) (See Figure 2.1-10).

This VAU was established based on common attributes which include land use (mostly suburban), development density (comparatively higher than the adjacent VAUs), regulatory setting (City of Davis), roadway cross section (presence of consistent median vegetation and roadside tree canopy), and viewshed (mostly enclosed roadway corridor with distant views uncommon).

Yolo County Visual Assessment Unit

This VAU is located along I-80 from the eastern limits of the Davis (PM YOL 3.71) spanning the Yolo Bypass to the western limits of West Sacramento (PM YOL 8.80) (See Figure 2.1-10).

This VAU was established based on common attributes which include land use (mostly wildlife preserve), development density (comparatively lower than the adjacent VAUs), regulatory setting (Yolo County), roadway cross section (no median vegetation or roadside tree canopy with an elevated roadway), and viewshed (frequent distant views available). These attributes combine to create a notably different visual setting than the adjacent VAU.

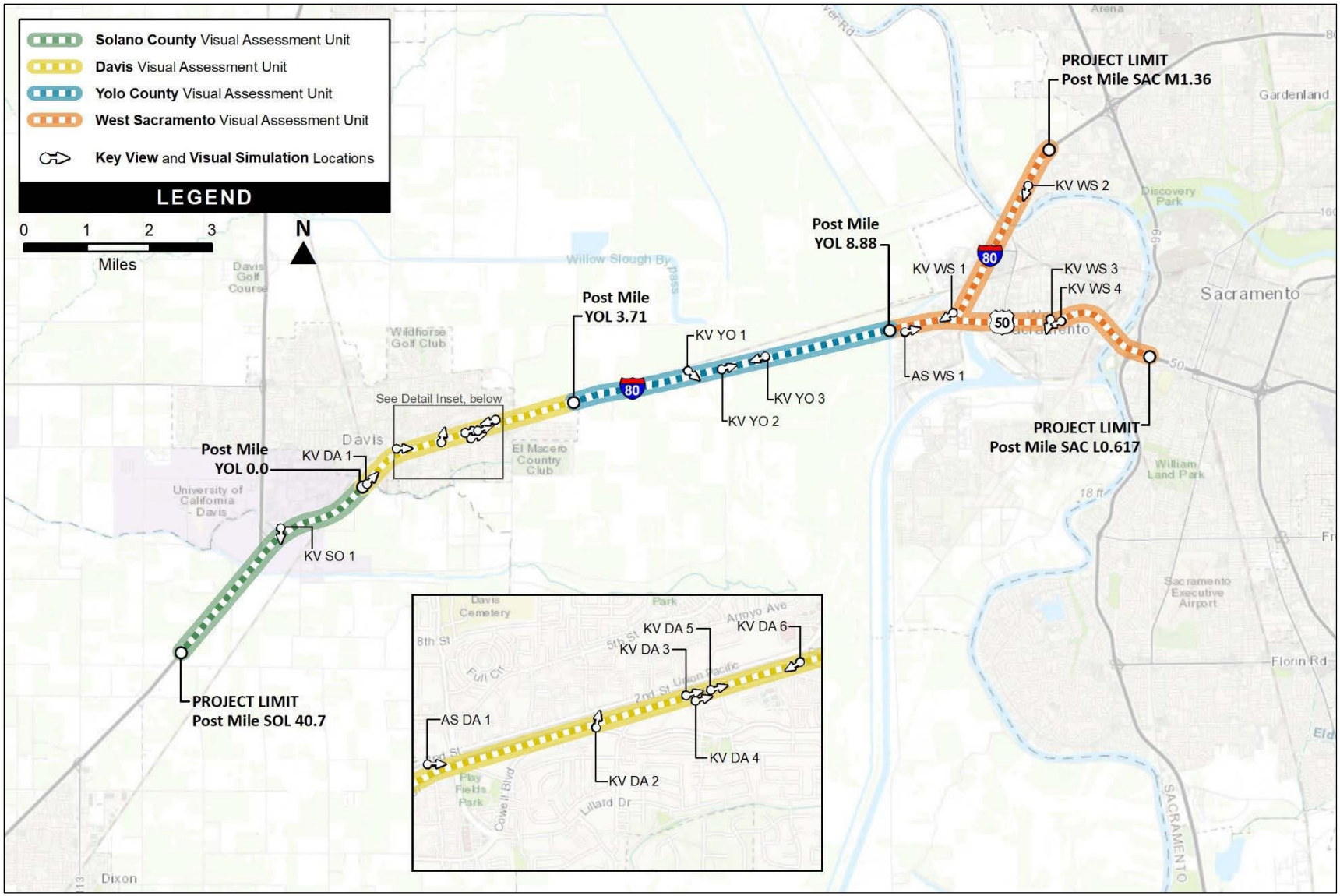


Figure 2.1-10 Visual Assessment Units and Key View Locations

West Sacramento Visual Assessment Unit

This VAU is located along the I-80/US-50 corridor within the city limits of West Sacramento and Sacramento, extending from the west boundary of West Sacramento (PM YOL 8.80) to the project's two eastern termini (PM SAC L0.78 and PM SAC M0.55) (See Figure 2.1-10).

This VAU was established based on common attributes which include land use (mostly suburban), development density (comparatively higher than the adjacent VAU), regulatory setting (West Sacramento and Sacramento), roadway cross section (road is at grade with sound walls more common), and viewshed (comparatively more enclosed roadway corridor with distant views less common). These attributes combine to create a notably different visual setting than the adjacent VAU.

Viewers

Viewer groups identified within the project area include highway neighbors and highway users. In general, highway neighbors have views to the road, and highway users have views from the road. Viewer sensitivity and exposure to proposed resource changes varies for each viewer group based on their level of awareness. As a result, potential visual concerns can be assumed for each viewer group in response to resource change.

Highway Neighbors

Highway neighbors are viewer groups with views to the road. They can be subdivided into different viewer groups by land use. The following highway neighbors were considered:

- Residential/Commercial property viewers
- Pedestrians and bicyclists
- Agricultural viewers
- Amtrak Capitol Corridor Commuters
- Yolo Bypass Wildlife Area viewers
- Industrial/Commercial property viewers

Highway Users

Highway users are viewer groups with views from the road. They can be subdivided into different viewer groups in two different ways—by mode of travel or by reason for travel. The following highway users were considered:

- Commuters
- Truck Drivers
- Recreational travelers (travel is primarily leisure and not related to work or other typical daily tasks)
- Pedestrians and bicyclists (on Yolo Causeway)

Visual Setting

Solano County Visual Assessment Unit

The majority of land directly abutting the highway (i.e., the east and west sides of the highway) is agricultural land, but it also includes views to and from the UC Davis Campus and Arboretum. Generally, views in this VAU include a large open space component with agricultural parcels and undeveloped landscape, with intermittent trees and other vegetation along the roadway partially screening views. Vegetation is most prominent at the UC Davis Arboretum, SR-113 Interchange, and riparian vegetation along Putah Creek. Some existing industrial and agricultural industrial development is present in the westernmost section of the VAU. The UC Davis Campus includes notable built forms that are visible for eastbound and westbound drivers, such as the Mondavi Center for Performing Arts, Mondavi Institute for Wine and Food Science, and the Manetti Shrem Museum of Art. These buildings are separated from the roadway by open space and appear in the middle-ground of the view from highway users. Multiple highway-facing advertising billboards are located along the roadway.

Visual character can be considered moderate, though it varies in this VAU from moderate-low to moderate-high. These ratings are tied to the relationship and comparative density of visual obstructions and vegetation, especially mature trees, which varies within the corridor. Where dense landscaping and/or mature vegetation is present, it softens the appearance, mass, scale, and dominance of visual intrusions, such as highway infrastructure and large built forms. These areas are considered to have moderate to moderate-high visual character. By contrast, visual character declines where dense landscaping and/or mature vegetation is absent, where billboards are present, and/or where the density of highway infrastructure is high within a particular view.

Visual quality in this VAU can be considered moderate, though it varies from moderate-low to moderate-high. Vividness is higher where dense landscaping and/or mature vegetation is present. Intactness and unity are correspondingly higher along these segments, since visibility of visual intrusions such as highway infrastructure and large built forms is limited, resulting in scenes composed of a strong linear element (the freeway) and consistent vegetative screening. This occurs most notably in this VAU at the Pedrick Interchange, at the SR-113/I-80 interchange, and at the UC Davis Arboretum. These areas are considered to have moderate to moderate-high visual quality. By contrast, visual quality declines where dense landscaping and/or mature vegetation is absent (lower vividness), where billboards are present (greater encroachment by features into the roadway corridor and interruption of visibility beyond the roadway corridor), where more industrial agricultural facilities are visible (resulting in a less unified composition) and/or where the density of highway infrastructure is high within a particular view (affecting both the memorability and intactness of views). Portions of the southern segment of this VAU that have one or more of these characteristics, and visual quality is generally lower as a result.

Davis Visual Assessment Unit

Foreground views of highway users are dominated by the paved roadway surface and related infrastructure such as overhead signage and lighting, which are softened by center median

vegetation and a consistent planting of mature trees along both edges of the right-of-way in the corridor, which has a framing effect for highway users. Shoulder vegetation consists of deciduous and evergreen trees lining the highway, shrubs and grasses, and groupings of trees at interchanges. Views under the tree canopies to and from adjacent developments are consistently available since sound walls are uncommon. In the eastbound direction, partially screened views of residential development, commercial buildings and urban development occur where the plantings break. A railroad corridor runs east-to-west, parallel to I-80 from the VAU's eastern terminus to the Pole Line Road overpass. The rail corridor is partially screened by tree and shrub vegetation. Near Richards Boulevard in the westbound direction, there are trees planted in front of a sound wall; and partial views of the tops of residential and commercial buildings can be seen above the wall and trees.

Visual character can be considered moderate, though it varies from moderate-low to moderate-high. These ratings are tied to the relationship and relative density of visual obstructions and vegetation (especially mature trees) to each other, which varies in the corridor. Where dense landscaping and/or mature vegetation is present, it softens the appearance, mass, scale, and dominance of visual intrusions such as highway infrastructure and large built forms. These areas are considered to have moderate to moderate-high visual character. By contrast, visual character declines where dense landscaping and/or mature vegetation is absent, where the center median vegetation is absent or in poor health, and/or where the density of highway infrastructure is high within a particular view.

Visual quality in this VAU can be considered moderate to moderate-high, though it varies from moderate-low to moderate-high. These ratings are tied to the relationship and comparative density of visual obstructions and vegetation (especially center median vegetation and mature trees), which varies within the corridor. Where dense landscaping and/or mature trees and other vegetation are present, views have a higher degree of vividness, along with an intactness and unity that reflect the reduced visibility of other features (infrastructure and other built forms) alongside or just outside of the roadway corridor. When in bloom, the dense median oleander increases the vividness of the corridor as well. These areas are considered to have moderate to moderate-high visual quality depending on the position of the viewer. By contrast, visual quality declines where dense landscaping and/or mature vegetation is absent (allowing for visual intrusion by other elements, reducing intactness and overall unity of views), where the center median vegetation is absent or in poor health (reduced vividness), and/or where the density of highway infrastructure is high within a particular view, reducing the intactness compared with other segments where linear components appear uninterrupted. The westernmost section of this VAU near the Richards Boulevard interchange and a few select gaps where fire has damaged the median planting have lower visual quality because the absence of median planting increases the visibility of highway infrastructure.

Yolo County Visual Assessment Unit

Foreground views of highway users in this VAU are dominated by the paved roadway surface and related infrastructure such as fencing along the bicycle path on the westbound side of the highway. Middle ground views of highway users are dominated by distant views of fields, rural agricultural, and open spaces with some groupings of mature trees. There are views of

overhead utility and transmission lines parallel and crossing above the highway. From CR-32A to West Sacramento, middle ground views of highway users in this VAU are dominated by distant views of the natural landscape, including wet-lands, uplands, floodplains, fields, levees, and riparian habitats, with distant views of urban development and views of the city skyline.

Visual character can be considered moderate, though it varies in this VAU from moderate-low to moderate-high. These ratings are tied to the relationship and relative density of visual obstructions to each other, e.g., signage, fencing, overhead utilities, vegetation (especially mature trees), and open water, which varies within the corridor. Where mature vegetation is present, it softens the appearance, mass, scale, and dominance of visual intrusions such as highway infrastructure and large built forms. These areas are considered to have moderate to moderate-high visual character. This VAU has unique varying and seasonal views of open water when the YBWA is being managed for habitat and/or as a floodway during the rainy season. Visual character declines where the utility and highway infrastructure are present within a particular view.

Visual quality can be considered moderate, though it varies in this VAU from moderate-low to moderate-high. Similar to assessments of visual character, these ratings are tied to the relationship and relative density of visual obstructions to each other, e.g., signage, fencing, overhead utilities, vegetation (especially mature trees), open water, and views of the City skyline, which varies within the corridor. Where dense landscaping, open water views, and/or mature vegetation are present, it adds elements of vividness to the view. Intactness is comparatively higher in such locations as well, where the linear roadway passes through and over generally rectilinear farmland and more natural appearing waterways with little overlap or encroachment observable. This VAU generally lacks mature vegetation, though a large eucalyptus stand and some oak plantings are present. Views of open water to the south are seasonal, and more common in the winter and spring. Views to the City skyline are limited to eastbound traffic and are best in the afternoon and evenings when the sun is behind the viewer. Where one or more of these are present, visual character can be moderate to moderate-high. Visual quality declines where the utility and highway infrastructure are present within a particular view. Overhead utilities and highway signage are relatively infrequent within this VAU; but where they are present, visual quality declines.

West Sacramento Visual Assessment Unit

The segment of I-80 from the interchange to the eastern terminus of the project is elevated or above-grade with three lanes in each direction and paved shoulders in each direction. This segment of I-80 has a continuous paved and unpaved median; there is also a median barrier along the edges of pavement for a majority of the segment. At the elevated crossing over the Sacramento River, the highway splits into separate bridges for each direction of traffic and joins again east of the Sacramento River crossing. From east of the Sacramento River crossing to the project terminus, the center median contains a vertical concrete barrier separating directions of traffic. Roadway lighting is minimal for most of the segment. This segment of I-80 is elevated over West Capitol Avenue, a railroad, Garden Highway, and the Sacramento River. Overhead utility lines cross I-80highway in a few locations and run adjacent to I-80.

The segment of US-50 from the I-80/US-50 to the eastern terminus of the project is generally four lanes in each direction in Yolo County, and it reduces to three lanes in each direction at approximately the Sacramento County line. The road is elevated over Westacre Road, at grade under Harbor Boulevard overpass, elevated and under the SR-275 on-ramp, and elevated over SR-84, Soule Street, and the Sacramento River. The travel directions are separated by a paved center median with a vertical concrete median barrier. Roadway lighting is spaced evenly at approximately 140-foot intervals where present. Sound walls are located on both sides of the highway throughout portions of this segment.

Foreground views of highway users in this VAU are dominated by the paved roadway surface and related infrastructure such as overhead signage, roadway lighting, concrete medians, sound walls, and overhead utility lines. Views in this VAU vary where the highway is elevated or above-grade, such as over train tracks or the Sacramento River. At the I-80/US-50 interchange, views include Prospect Slough, distant views of field and agricultural, and industrial commercial development partially screened by trees and other vegetation. Other views in this VAU include drainages, canals, levees, and the Sacramento River.

Middleground views of highway users in the I-80 section of the VAU consist primarily of the tops of the adjacent commercial and industrial development and large parking lots where the highway is elevated. Sound walls are common adjacent to residential areas which screen views to/from the freeway. Vegetation in this VAU are largely trees, shrubs, and grasses on either side of the corridor. Views in this VAU also contain lighting associated with nearby businesses and residences (including interior and exterior building lighting, overhead lighting within parking lots, and roadway lighting) is minimal to non-existent on the I-80 section of the VAU.

Middleground views of highway users in the US-50 section of this VAU consist primarily of the paved roadway surface and related infrastructure, such as overhead signage, roadway lighting, concrete medians, sound walls, and overhead utility lines. Views are of predominantly low-rise industrial and commercial uses, large parking lots, buildings and signage associated with the adjacent industrial and commercial land uses, and billboards. Sound walls screen development through much of the segment; there the tops of trees and commercial signage visible above the sound walls. Vegetation consists of grasses, trees at grade, or tops of trees above sound walls.

Visual character can be considered moderate, though it varies in this VAU from moderate-low to moderate-high. These ratings are tied to the relationship and relative density of visual obstructions and vegetation (especially mature trees) to each other, which varies in the corridor. Where dense landscaping and/or mature vegetation is present, it softens the appearance, mass, scale and dominance of visual intrusions, such as highway infrastructure, overhead utilities, sound walls, industrial areas, and large built forms. These areas are considered to have moderate to moderate-high visual character. By contrast, visual character declines where dense landscaping and/or mature vegetation is absent, sound walls are present without vines and/or landscaping, and/or where the density of highway or utility infrastructure is high within a particular view.

Visual quality can be considered moderate, though it varies in this VAU from moderate-low to moderate-high. These ratings are tied to the relationship and relative density of visual obstructions and vegetation (especially mature trees) to each other, which varies in the corridor.

Where dense landscaping, river views, Sacramento skyline views and/or mature vegetation are present, they add elements of vividness to the view while also reducing visibility of or drawing attention away from visual intrusions such as highway infrastructure, overhead utilities, sound walls, and industrial areas. The US-50/I-80 interchange has ornamental planting which helps increase the visual quality of the interchange. Where US-50 crosses the Sacramento River, it offers vivid views of the downtown Sacramento skyline and the Sacramento River. Where I-80 crosses the Sacramento River, visual quality is increased by the presence of dense riparian vegetation and river views. View unity is drawn from the experience of traveling a landscaped roadway within an urbanized setting. These areas are considered to have moderate to moderate-high visual quality. By contrast, visual quality declines where dense landscaping and/or mature vegetation is absent, sound walls are present without vines and/or landscaping, large overhead powerlines are present, sound walls have graffiti or patches of graffiti cover-up paint, and/or where the density of highway or utility infrastructure is high within a particular view. Intactness is reduced by the increased visibility of multiple forms within or alongside the roadway corridor, and the unity described above is less present in these segments. Further, many of the sound walls in the US-50 corridor appear to have experienced issues with vandalism. The area between the Yolo Causeway and the US-50/I-80 interchange generally experiences lower visual quality due to dominant freeway infrastructure, presence of overhead utilities, industrial land uses, large sound walls, and the lack of vegetation.

2.1.11.3 Environmental Consequences

No Build Alternative 1

Construction and Operation

Under the No Build Alternative 1, managed lanes and transportation improvements would not be constructed or operated. As such, no change to visual and aesthetics resources would occur.

Build Alternatives 2a and 2b

Construction

For Build Alternatives 2a and 2b, highway users would experience short-term visual impacts as a result of construction. Construction equipment would add visual intrusion and disturbances to the corridor and would reduce the intactness and unity of the visual resources in the study area during the period of construction. Equipment and machinery would be stationed at staging areas within the project limits, and traffic control signage would be used as needed. Temporary sources of light and glare would be added to the project area during the construction phase; however, they would be minimized through use of standard construction equipment, protocols, and appropriate light and glare screening measures, including Standard Measure AR-4 and AMM AES-1, which would limit construction lighting and avoid or minimize glare through selection of materials and finishes, respectively.

Duration of construction is expected to vary by alternative and range from 22 to 36 months. Temporary visual effects from construction would be typical of any major corridor improvement

project and are not considered to be substantial nor significantly contribute to a permanent effect. Measures are proposed to reduce the impacts from temporary construction.

Operation

Resource Changes for Build Alternative 2a include adding managed lanes on I-80 and US-50. New lighting is proposed at the auxiliary lane in the Solano County and Davis VAUs, the Bryte Bend Bridge in the West Sacramento VAU, and the new bike path at the CR-32A exit in the Yolo County VAU. Existing ITS elements and infrastructure would be expanded and modified and would include ramp meters, fiber-optic conduit and cables, and overhead signs. Overall visual impacts for Build Alternative 2a would be moderate-low but would range from very low to moderate-high.

Build Alternatives 2a and 2b would require tree removal or other vegetative clearing to accommodate road widening, work areas, staging, and installation of fiber optic cable. The increase in roadway infrastructure components coupled with the loss of vegetation would alter the character of the corridor toward a more urbanized aesthetic in areas that are currently more naturalized and suburban in overall character.

Visual impacts for Build Alternative 2b would include additional impacts related to the I-80 connector structure in the West Sacramento VAU. Resource changes would occur over the course of approximately 1 mile and include the addition of new walls in the center median of the freeway, a new I-80 connector structure, removal of additional trees, and creation of a new earthen berm at the I-80/US-50 interchange. Visual impacts related to this feature would be moderate-high. The increased impacts associated with this segment would elevate the impacts of each Build Alternative 2a counterpart. Build Alternative 2b impacts would be moderate-high. Implementation of AMM AES-3 would replace highway plantings and vegetation, including oleander. Landscaping and revegetation plans would be prepared to maintain, repair, and expand corridor landscaping and vegetation where proper setbacks exist and where feasible.

The project would implement measures to reduce the potential visual effects of the project by design. Such measures include aesthetic treatment of new structures (Standard Measure AR-1), restoring vegetation and natural contour for temporary access roads, construction easements, and staging areas that were previously vegetated (Standard Measure AR-2), burying guardrail terminals (Standard Measure AR-3), limiting construction lighting (Standard Measure AR-4), and minimizing removal of established trees and vegetation where feasible (Standard Measure AR-5). AMM AES-4 would reduce views of any new overhead signage that may be proposed on the I-80 connector structure. AMM AES-5 would refine the design of the I-80 connector structure to prioritize solutions which reduce visual impacts and limit potential to require powerline relocation.

The rock slope protection strategies proposed primarily in the area of the new bike lane extension of CR-32A have the potential to degrade the existing visual character and quality of public views of the site and its surroundings. However, AMM AES-2 would minimize high-contrast rock slope protection by specifying rock colors and/or stains which match or complement the predominant immediately adjacent landscape color. Alternatively, planted options at this location would be considered.

With implementation of AMM AES-1 through AMM AES-5, Build Alternatives 2a and 2b would not cause disproportionately high and adverse direct effects on visual resources.

Build Alternatives 3a and 3b

Construction and Operation

Build Alternatives 3a and 3b would involve adding an HOT2+ lane in each direction. Build Alternatives 3a and 3b propose similar project components within the same project area as Build Alternatives 2a and 2b; however, they would include additional impacts related to 35 additional overhead pricing signs. The presence of these additional signs would reduce visual quality and character in the vicinity to which they are introduced and would increase the visual impacts of the project. Implementation of AES AMM-4 would reduce the magnitude of these effects by requiring that the location of all new overhead signage and read points be reviewed and that sensitive locations are avoided or screened to the extent possible. Furthermore, read points would be integrated into existing and proposed overhead structures where feasible. Overall visual impacts would be moderate but would range from low to moderate-high. Alternative 3b impacts would be moderate-high to high. With implementation of AMM AES-1 through AMM AES-5, Build Alternatives 3a and 3b would not cause disproportionately high and adverse direct effects on visual resources.

Build Alternatives 4a and 4b

Construction and Operation

Build Alternatives 4a and 4b would involve adding an HOT2+ lane in each direction. Build Alternatives 4a and 4b propose similar project components within the same project area as Build Alternatives 2a and 2b; however, they would include additional impacts related to 35 additional overhead pricing signs. The presence of these additional signs would reduce visual quality and character in the vicinity to which they are introduced and would increase the visual impacts of the project. Overall visual impacts would be moderate but would range from low to moderate-high. Alternative 4b impacts would be moderate-high to high. With implementation of AMM AES-1 through AMM AES-5, Build Alternatives 4a and 4b would not cause disproportionately high and adverse direct effects on visual resources.

Build Alternatives 5a and 5b

Construction and Operation

Build Alternatives 5a and 5b would involve adding an HOT2+ lane in each direction. Build Alternatives 5a and 5b propose similar project components within the same project area as Build Alternatives 2a and 2b; however, they would include additional impacts related to 35 additional overhead pricing signs. The presence of these additional signs would reduce visual quality and character in the vicinity to which they are introduced and would increase the visual impacts of the project. Overall visual impacts would be moderate but would range from low to moderate-high. Alternative 5b impacts would be moderate-high to high. With implementation of AMM AES-1 through AMM AES-5, Build Alternatives 5a and 5b would not cause disproportionately high and adverse direct effects on visual resources.

Build Alternatives 6a and 6b

Construction and Operation

Build Alternatives 6a and 6b propose similar project components within the same project area as Build Alternatives 2a and 2b. Overall visual impacts would be moderate-low but would range from very low to moderate-high. Build Alternative 6b impacts would be moderate-high. With implementation of AMM AES-1 through AMM AES-5, Build Alternatives 6a and 6b would not cause disproportionately high and adverse direct effects on visual resources.

Build Alternatives 7a and 7b

Construction

Construction-related impacts are lowest in Alternative 7a, where reduced impacts occur in the Davis VAU since the center median work would not be performed and the construction schedule would be shortened. However, construction-related impacts are highest in Build Alternative 7b where the I-80 connector structure would be built in the West Sacramento VAU, increasing the schedule to 42 months and including the use of a crane.

Operation

Resource changes for Build Alternative 7a are the same as Build Alternative 2a but would include converting an existing lane into a managed lane on I-80 and US-50 with no shoulder widening or median reconstruction with a concrete barrier. The reduction in impacts would primarily be from highway users in the Davis VAU, where the median plantings would be retained and the vegetation contributions to visual character and quality would be retained. Overall visual impacts of Build Alternative 7a would be low but would range from very low to moderate-high. Build Alternative 7b impacts would be moderate to moderate-high. With implementation of AMM AES-1 through AMM AES-5, Build Alternatives 7a and 7b would not cause disproportionately high and adverse direct effects on visual resources.

2.1.11.4 Avoidance, Minimization, and/or Mitigation Measures

AMMs have been specified to reduce, avoid, and offset visual impacts from the project.

The following would be designed and implemented into the project, with concurrence of the District Landscape Architect, as applicable. The following measures to avoid or minimize visual impacts would be incorporated into the project:

- **AMM AES-1: Avoid or minimize glare through the selection of materials and finishes**. Implement paint finishes that are only matte, satin, or non-glare producing. Concrete colors/finishes would be selected to reduce their potential to become a source of glare.

- **AMM AES-2: Minimize high contrast rock slope protection:** Colors and/or stains that match or complement the predominant immediately adjacent landscape color would be used where stormwater energy dissipation and/or slope stabilization devices are used.

- **AMM AES-3: Account for the loss of plantings and vegetation by providing replacement highway plantings and vegetation.** Plans would be prepared which maintain and repair corridor landscaping and vegetation where proper setbacks exist and where feasible. Plans would help ensure work within any existing classified landscape freeway maintains the status of the landscaped freeway. Appropriate replacement planting would be provided when existing planting (including oleander) is removed to a level considered roughly proportionate, with a target of 100%/1:1 and not less than 60%. Plantings would occur as close to the original impacts as possible. When native, naturally occurring or specimen trees are removed, replacement plantings would reflect the visual importance of the plantings lost.

- **AMM AES-4: Reduce views of new overhead signage and read points from visually sensitive locations.** Where new overhead signage and/or read points are proposed, consider refinements to their final location to avoid or screen direct views from sensitive viewsheds such as those of homeowners and recreationalists. Integrate read points into existing and proposed overhead structures where feasible.

- **AMM AES-5: Minimize I-80 connector structure design profile.** The I-80 connector structure design refinements would be prioritized to minimize its prominence, scale, and mass and avoid the need to raise/relocate adjacent powerline towers.

2.1.12 Cultural Resources

2.1.12.1 Regulatory Setting

The term “cultural resources,” as used in this document, refers to elements that constitute the “built environment” (which comprises buildings; objects, structures such as bridges; and linear features such as railroads, water conveyance systems, etc.), places of traditional or cultural importance, and archaeological sites (both prehistoric and historic), regardless of their significance. Under federal and state laws, cultural resources that meet certain criteria of significance are referred to by various terms including “historic properties,” “historic sites,” “historical resources,” and “tribal cultural resources.” Laws and regulations dealing with cultural resources include:

The National Historic Preservation Act (NHPA) of 1966, as amended, sets forth national policy and procedures for dealing with historic properties, which are defined as districts, sites, buildings, structures, and objects included in or eligible for listing in the National Register of Historic Places (NRHP). Section 106 of the NHPA requires federal agencies to take into account the effects of their undertakings on historic properties and to allow the Advisory Council on Historic Preservation (ACHP) the opportunity to comment on those undertakings, following regulations issued by the ACHP (36 Code of Federal Regulations [CFR] 800). On January 1, 2014, the First Amended Section 106 Programmatic Agreement (PA) among the Federal Highway Administration (FHWA), the ACHP, the California State Historic Preservation Officer (SHPO), and Caltrans went into effect for Caltrans projects, both state and local, with FHWA involvement. The PA implements the ACHP’s regulations, 36 CFR 800, streamlining the Section 106 process and delegating certain responsibilities to Caltrans. The FHWA’s responsibilities

under the PA have been assigned to Caltrans as part of the Surface Transportation Project Delivery Program (23 United States Code [USC] 327).

Historic properties may also be covered under Section 4(f) of the U.S. Department of Transportation Act, which regulates the "use" of land from historic properties (in Section 4(f) terminology—historic sites). See Appendix A for specific information about the applicability of Section 4(f) to historic properties.

CEQA requires the consideration of cultural resources that are historical resources and tribal cultural resources, as well as "unique" archaeological resources. California Public Resources Code (PRC) Section 5024.1 established the California Register of Historical Resources (CRHR) and outlined the necessary criteria for a cultural resource to be eligible for listing in the CRHR and, therefore, to be considered a historical resource. Historical resources are defined in PRC Section 5020.1(j). In 2014, Assembly Bill 52 (AB 52) added the term "tribal cultural resources" to CEQA, and AB 52 is commonly referenced instead of CEQA when discussing the process to identify tribal cultural resources (as well as identifying measures to avoid, preserve, or mitigate adverse effects to them). Defined in PRC Section 21074(a), a tribal cultural resource is a CRHR or local register eligible site, feature, place, cultural landscape, or object which has a cultural value to a California Native American tribe. Tribal cultural resources must also meet the definition of a historical resource. Unique archaeological resources are referenced in PRC Section 21083.2.

PRC Section 5024 requires state agencies to identify and protect state-owned historical resources that meet the NRHP listing criteria. It further requires Caltrans to inventory state-owned historical resources Sections 5024(f) and 5024.5 require state agencies to provide notice to and consult with the SHPO before altering, transferring, relocating, or demolishing state-owned historical resources that are listed on or are eligible for inclusion in the NRHP or are registered or eligible for registration as California Historical Landmarks. Procedures for compliance with PRC Section 5024 are outlined in a Memorandum of Understanding (MOU) between Caltrans and SHPO, effective January 1, 2015. For most Federal-aid projects on the State Highway System, compliance with the PA will satisfy the requirements of PRC Section 5024.

2.1.12.2 Affected Environment

Analysis of the cultural resources for the project was carried out by Caltrans Professionally Qualified Staff (PQS) in a manner consistent with Caltrans regulatory responsibilities under the PA. Methods used to support the studies for the analysis include records searches, field surveys including Phase I pedestrian surveys and Extended Phase I testing, field testing and Native American consultation with tribal entities (Table 2.1-29).

The Native American Heritage Commission (NAHC) was contacted May 14, 2020, to request a search of the Sacred Land Files and request a list of Native American tribes or individuals with potential interests, concerns, and/or knowledge regarding cultural resources or Traditional Cultural Properties that may be affected by the project. Of the 11 tribes originally identified by the NAHC, all responded and requested to continue consultation except for the Ione Band of

Miwok Indians, the Nashville Enterprise Miwok-Maidu-Nishinam Tribe, the Ts'i Akim Maidu, and the Cortina Rancheria-Kletsel Dehe Band of Wintun Indians.

Table 2.1-29. Section 106 Technical Reports

Report Title	Date
Historic Property Survey Report	August 2021
Archaeological Survey Report	March 2021
Historic Resources Evaluation Report	August 2021
Extended Phase I Report	November 2020 and May 2021
Finding of No Adverse Effect	October 2021

Formal consultation began on June 4th, 2020 and was followed up by phone calls and/or emails to the Native American contacts who were identified as having an interest in projects within this area by the NAHC:

- Rhonda Morningstar Pope, Chairperson, Buena Vista Rancheria of Me-Wuk Indians
- Clyde Prout, Chairman, Colfax-Todds Valley Consolidated Tribe
- Sara Dutschke Setchwaelo, Chairperson, Ione Band of Miwok Indians
- Cosme Valdez, Chairperson, Nashville Enterprise Miwok-Maidu-Nishinam Tribe
- Regina Cuellar, Chairperson, Shingle Springs Band of Miwok Indians
- Grayson Coney, Cultural Director, Ts'i Akim Maidu
- Gene Whitehouse, Chairperson, United Auburn Indian Community of the Auburn Rancheria
- Raymond Hitchcock, Chairperson, Wilton Rancheria
- Anthony Roberts, Chairperson, Yocha Dehe Wintun Nation
- Charlie Wright, chairperson, Cortina Rancheria-Kletsel Dehe Band of Wintun Indians
- Marlene Sanchez, Chairperson, Guidiville Indian Rancheria

The Colfax-Todds Valley Consolidated Tribe noted that they would like to defer to a tribe more familiar with the project area. Buena Vista Rancheria of Me-Wuk Indians reviewed the project and did not request additional consultation but requested to be notified if any cultural resources are documented. Guidiville Indian Rancheria had no concerns and requested copies of the reports to add to their records.

Shingle Springs noted areas of concern and asked for continued consultation. United Auburn Indian Community notes areas of concern and requested to monitor testing. The Yocha Dehe Wintun Nation noted areas of concern requested to monitor testing. Wilton Ranchera also noted areas of concern and a desire to continue consultation. A joint meeting was held with concern tribes were project details and areas of concern were discussed. Consultation continued in the form of emails, phone calls, and online meetings with all concerns parties as the project developed.

The Yocha Dehe Wintun Nation provided a monitor for the XPI trenching, and UAIC monitored Geotech work at Bryte Bend bridge. Following the negative results from surveys and

subsurface testing, no additional concerns were raised about the potential to affect historic properties within the project limits.

Responses were not received from the other identified parties.

Area of Potential Effects

The Area of Potential Effects (APE) is the area studied for cultural resources present in the general project area and which may extend beyond the boundary of the project study area. The APE is defined to avoid impacts to cultural resources when feasible, and where avoidance did not conflict with the purpose and need of the proposed project. The APE aligns with the cultural resources study area and project study area and is the same among all project alternatives. It consists of a broad corridor that encompasses existing and proposed new right-of-way as well as lands that may be used during construction but are not included in the final right-of-way. As defined by Caltrans for the project, the project study area comprises the entire APE, totaling 1,475 acres.

Cultural Resources

The Caltrans Office of Cultural Resources Studies conducted research, architectural history surveys, extended phase I studies, and evaluations of cultural resources within the APE in various dates in 2021. Identification and evaluation efforts by Caltrans have resulted in the documentation of one historic property within the APE: Reclamation District 900 (RD 900). Caltrans assumed RD 900 to be eligible for listing in the National Register under Criterion A, for the purposes of this project only, pursuant to Stipulation VIII.C.4 of the PA. On August 9, 2021 Caltrans Cultural Studies Office granted permission to assume the resource's eligibility.

Seven built-environment resources were also identified within the APE (MR1, MR2, MR3, MR4, MR5, MR6, and MR7); however, Caltrans determined all are ineligible for inclusion in the NRHP/CRHR. On September 30, 2021, Caltrans received concurrence from SHPO that the seven built environment resources were ineligible.

In addition, several cultural resources were identified within the APE but were considered to be exempt from evaluation pursuant to Attachment 4 of the Section 106 Programmatic Agreement (Properties Exempt from Evaluation) and as applicable PRC 5024 MOU Stipulation VIII.C.1 and Attachment 4.

Reclamation District 900 (RD 900) will be avoided by the project, and the character defining features for which it is assumed eligible—as a large linear resource associated with historic themes of agriculture/irrigation and land reclamation in the Sacramento Valley—will not be affected. As such, Caltrans, pursuant to PA Stipulation X.B.2, found that there will be no adverse effect. The undertaking will not destroy or alter any contributing feature of RD 900 and will not affect the resource's integrity or ability to convey its historical significance, and the project would have No Adverse Effect without standard conditions.

SHPO concurred with the findings on January 12, 2022. As such, the undertaking would not result in any Section 4(f) use or *de minimis* finding to any historic properties or historical resources, regardless of alternative. The undertaking would have No Adverse Effect overall.

2.1.12.3 Environmental Consequences

No Build Alternative 1

Construction and Operation

Under the No Build Alternative, managed lanes would not be added to the I-80 or US-50 corridors and existing capacity would not increase. No ground disturbing activities would occur. Therefore, there would be no effects related to cultural resources.

Build Alternatives 2a and 2b

Construction

Build Alternatives 2a and 2b would involve adding an HOV 2+ lane in each direction. As described previously, of the cultural resources identified within the APE, and seven cultural resources were evaluated and determined to be ineligible for inclusion to the NRHP/CRHR and one cultural resource, the RD 900 canal, was assumed to be eligible for the purpose of the undertaking.

Project construction would create subsurface disturbances that could result in damage to or destruction of previously undiscovered subsurface archaeological deposits or unmarked burials. Although all the areas of construction and access roads have been subject to the cultural resources survey, the potential remains for previously unidentified archaeological remains to be discovered below the visible ground surface.

If cultural materials are discovered during construction, all earth-moving activity within and around the immediate discovery area would be diverted until a qualified archaeologist can assess the nature and significance of the find as outlined in Standard Measure CR-3 . Standard Measure CR-4 outlines requirements in the event human remains are discovered.

If human remains are discovered, all work within 60 feet of the discovery would halt and Caltrans’ Cultural Resource Studies office would be called. Caltrans' Cultural Resources Studies Office Staff would assess the remains and, if determined human, would contact the County Coroner as per Public Resources Code (PRC) Sections 5097.98, 5097.99, and 7050.5 of the California Health and Safety Code. If the Coroner determines the remains to be Native American, the Coroner will contact the Native American Heritage Commission who would then assign and notify a Most Likely Descendant. Caltrans would consult with the Most Likely Descendant on respectful treatment and reburial of the remains. Further provisions of PRC 5097.98 are to be followed as applicable.

Caltrans, pursuant to Section 106 PA Stipulation X.B.2, found that there would be no adverse effect without standard conditions. The undertaking would not destroy or alter any contributing

feature of RD 900 and would not affect the resource's integrity or ability to convey its historical significance.

Operation

Operation of Build Alternatives 2a and 2b would not require earth-moving activity or ground disturbance. While capacity of the bridge would increase, which could result in increased noise effects, and changes to existing visual character and quality would occur, there would be no adverse effect to cultural resources within the APE.

Build Alternatives 3a and 3b

Construction and Operation

Build Alternatives 3a and 2b would involve adding an HOT 2+ lane in each direction. Because Build Alternatives 3a and 3b would be located in the same project area as Build Alternatives 2a and 2b, respectively, the effect would be the same as the effects described under Build Alternatives 2a and 2b.

Build Alternatives 4a and 4b

Construction and Operation

Build Alternatives 4a and 4b would involve adding an HOT 3+ lane in each direction. Because Build Alternatives 4a and 4b would be located in the same project area as Build Alternatives 2a and 2b, respectively, the effect would be the same as the effects described under Build Alternatives 2a and 2b.

Build Alternatives 5a and 5b

Construction and Operation

Build Alternatives 5a and 5b would involve adding an Express Lane in each direction. Because Build Alternatives 5a and 5b would be located in the same project area as Build Alternatives 2a and 2b, respectively, the effect would be the same as the effects described under Build Alternatives 2a and 2b.

Build Alternatives 6a and 6b

Construction and Operation

Build Alternatives 6a and 6b would involve adding a transit-only lane in each direction. Because Build Alternatives 6a and 6b would be in the same project area as Build Alternative 2a and 2b, respectively, the effect would be the same as the effects described under Build Alternatives 2a and 2b.

Build Alternatives 7a and 7b

Construction and Operation

Build Alternatives 7a and 7b involves repurposing the current number 1 general purpose lane to HOV 2+. No new lanes would be constructed. Because Build Alternatives 7a and 7b involves ground disturbing activities, the effect would be the same as the effects described under Build Alternatives 2a and 2b.

2.1.12.4 Avoidance, Minimization, and/or Mitigation Measures

No AMMs or MMs are required.

2.2 Physical Environment

2.2.1 Hydrology and Floodplain

2.2.1.1 Regulatory Setting

Executive Order (EO) 11988

Executive Order (EO) 11988 (Floodplain Management) directs all federal agencies to refrain from conducting, supporting, or allowing actions in floodplains unless it is the only practicable alternative. The Federal Highway Administration (FHWA) requirements for compliance are outlined in 23 Code of Federal Regulations (CFR) 650 Subpart A.

To comply, the following must be analyzed:

- The practicability of alternatives to any longitudinal encroachments
- Risks of the action
- Impacts on natural and beneficial floodplain values
- Support of incompatible floodplain development
- Measures to minimize floodplain impacts and to preserve/restore any beneficial floodplain values affected by the project

The base floodplain is defined as “the area subject to flooding by the flood or tide having a 1 percent chance of being exceeded in any given year.” An encroachment is defined as “an action within the limits of the base floodplain.”

Section 408

The purpose of a Section 408 Permission is to demonstrate that any proposed work “will not be injurious to the public interest and will not impair the usefulness of the civil works project.” If that can be shown, the project would receive a Section 408 permission from the United States Army Corps of Engineers (USACE) and a Central Valley Flood Protection Board (CVFPB) permit before construction begins.

2.2.1.2 Affected Environment

This section was prepared using the Floodplain Hydraulics Study prepared for this project (Caltrans 2021b).

FEMA Flood Zones

The project is located in areas designated by the Federal Emergency Management Agency (FEMA) as Special Flood Hazard Area (SFHA) Zone A, SFHA Zone AE, and SFHA Zone 99A (Figure 2.2-1). Additionally, the project is also located within areas designated by FEMA as Other Areas of Flood Hazard Zone X (both shaded and unshaded). FEMA uses Zone A to characterize areas subject to inundation by the 1 percent annual chance flood (100-year flood) where no Base Flood Elevations (BFEs) have been determined. FEMA uses Zone AE to characterize areas subject to inundation by the 1 percent annual chance flood (100-year flood) where BFEs have been determined. FEMA uses Zone A99 to characterize areas to be protected from the 1 percent annual chance flood by a Federal flood protection system under construction where no BFEs have been determined. FEMA uses shaded Zone X to characterize areas of 0.2 percent annual chance flood (500-year flood); areas of 1 percent annual chance flood (100-year flood) with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from the 1 percent annual chance flood (100-year flood). FEMA uses unshaded Zone X to characterize areas determined to be outside of the 0.2 percent annual chance flood (500-year flood).

Section 408

Between PM 5.8 and 8.9, I-80 crosses the Yolo Bypass. The west and east levees of the Yolo Bypass, located at PM 5.8 and 8.9 respectively, are State Plan of Flood Control Levees and are part of the Sacramento River Flood Control Project. Consequently, the levees are under the jurisdiction of both the CVFPB and the USACE.

2.2.1.3 Environmental Consequences

No Build Alternative 1

Under No Build Alternative 1, managed lanes would not be added to the I-80 or US-50 corridors, and existing capacity would not increase. No ground-disturbing activities would occur. Therefore, No Build Alternative 1 would not have any new effects related to floodplains.

Build Alternatives 2a and 2b

Construction

The proposed bike path extensions for Build Alternatives 2a and 2b, involving rehabilitation of the existing bike path on the crown of the west levee of the Yolo Bypass, classifies the project as falling under the jurisdiction of Section 408. Therefore, Caltrans would need to receive an encroachment permit from the CVFPB and a Section 408 permission from the USACE prior to construction of Build Alternatives 2a and 2b.

New drainage inlets and culverts are proposed to be replaced or repaired to accommodate areas where existing shoulders are being narrowed, to accommodate additional runoff due to the increased pavement area, or to perpetuate existing drainage patterns. Build Alternatives 2a and 2b would construct five new culverts and replace or improve 21 existing culverts. As described, many of the proposed drainage features would be located within the construction footprint of the median for the new HOV 2+ managed lane. In addition, proposed culverts would traverse beneath the freeway to convey drainage to a new outlet. Proposed drainage features for the I-80 managed lane direct connector, under Build Alternative 2b, would occur within the construction footprint of the I-80 managed lane direct connector.

Operations

Build Alternatives 2a and 2b would involve adding an HOV lane in each direction for use by HOV 2+. Most of the project work would occur entirely within the existing Caltrans right-of-way and would not result in any changes to hydrology adjacent to the project area.

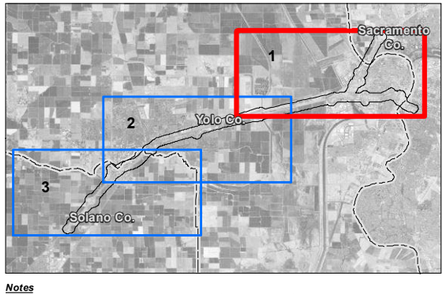
The Hydrology Study (Wood Rodgers 2022) determined the magnitude of increased peak flow rates arriving at existing drainage infrastructure caused by the proposed project improvements. Under Build Alternatives 2a and 2b, AMM HF-1 would be used to reduce the potential for adverse impacts resulting from increased peak flow. AMM HF-1 would require installation of a detention basin riser to tie into existing storm drains on the upstream side at two locations in Davis—one detention basin rise inlet is proposed at the storm drain crossing on Mace Boulevard south of I-80 and the other would be at the westbound I-80 off-ramp to Chiles Road.

The bike path extension design option for Build Alternatives 2a and 2b would occur within an SFHA, specifically within Zone A floodplains. This would be a transverse encroachment into the floodplain and would be identical at each bridge location. Accordingly, Build Alternatives 2a and 2b encroach transversely into the floodplains and would not raise or change the profile of any of the highway. It is anticipated that there would be no adverse effects on the FEMA-mapped floodplain in this area.

Build Alternative 2b proposes to construct a concrete median barrier on I-80 in Yolo County from PM 0.21 to PM 4.3 (a median barrier is not proposed under Build Alternative 2a.). At this location, I-80 is located within a Zone A floodplain. Due to the nature of Zone A, no BFEs have been established and the extents of flooding are approximate. A review was made of the FEMA Flood Insurance Study (FIS) for Yolo County to determine how the Zone A floodplain was developed in this area (Wood Rodgers 2022). The FIS states that:

> “Approximate analyses of ‘behind levee’ flooding were conducted for all the levees to indicate the extent of the behind levee floodplains. Along the Sacramento River, Sacramento River Toe Drain, and Yolo Bypass, the area shown on the most recent flood insurance rate map (FIRM) (prior to this current revision) as protected by the levees was assumed to be the area that would be inundated by the 1% annual chance flood if the levees were to fail.”





ESL
County Line

FEMA Flood Hazard
1% Annual Chance Flood Hazard
Area with Reduced Risk Due to Levee
Regulatory Floodway

N
0
1
Miles

Caltrans

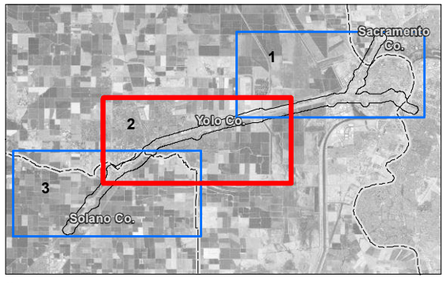
Notes
1. Coordinate System: NAD 1983 StatePlane California II FIPS 0402 Feet
2. Data Sources: CalTrans, Stantec, 2021
3. Background: Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Figure 2.2-1
FEMA Flood Hazard
Yolo 80 Corridor Improvement Project
EA 03-3H900
Solano, Yolo, and Sacramento Counties, California

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ESL
County Line

FEMA Flood Hazard
1% Annual Chance Flood Hazard
0.2% Annual Chance Flood Hazard

N
0
1
Miles

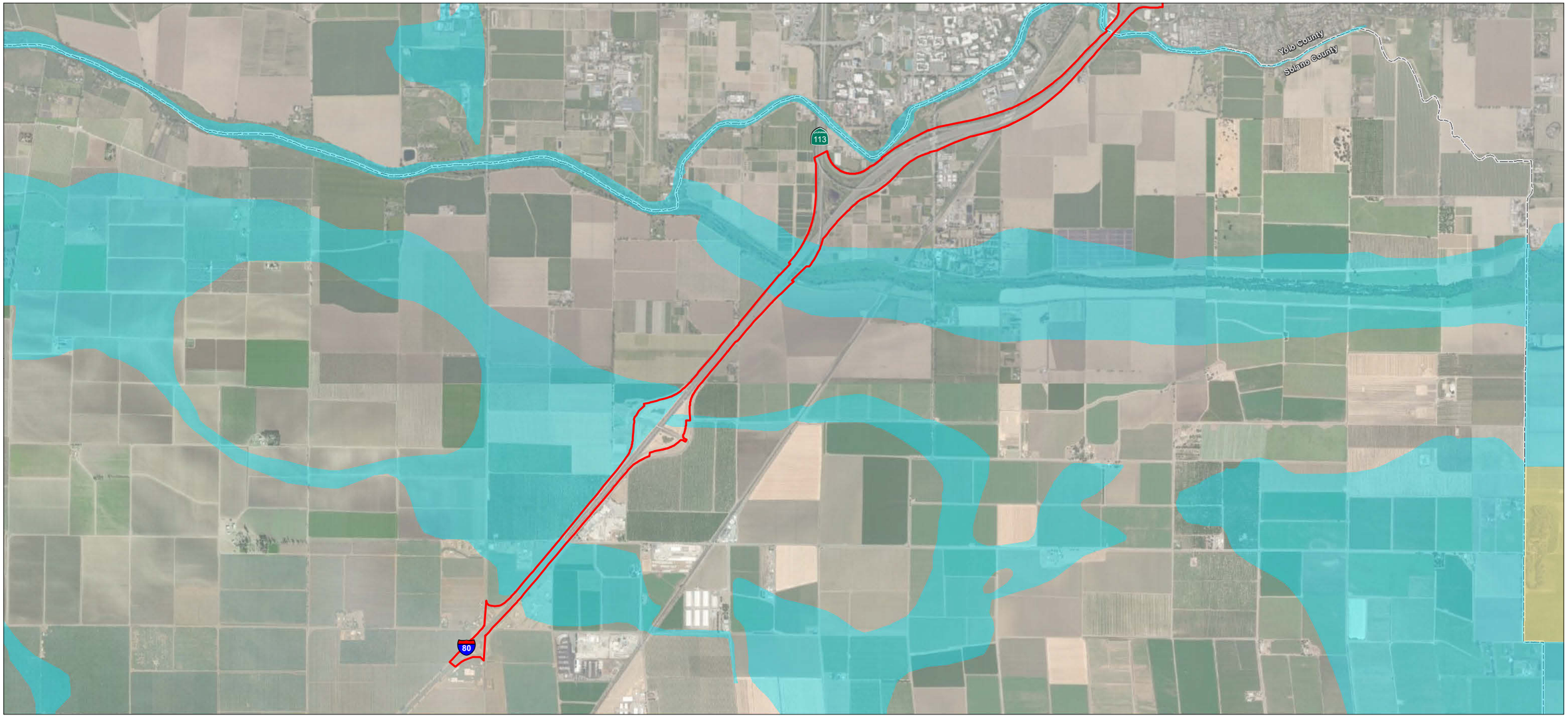
Caltrans

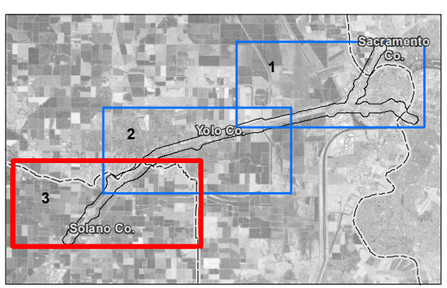
Notes
1. Coordinate System: NAD 1983 StatePlane California II FIPS 0402 Feet
2. Data Sources: CalTrans, Stantec, 2021
3. Background: Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Figure 2.2-1
FEMA Flood Hazard
Yolo 80 Corridor Improvement Project
EA 03-3H900
Solano, Yolo, and Sacramento Counties, California

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ESL
County Line

FEMA Flood Hazard
1% Annual Chance Flood Hazard
Area of Undetermined Flood Hazard

N
0 1
Miles

Notes
1. Coordinate System: NAD 1983 StatePlane California II FIPS 0402 Feet
2. Data Sources: CalTrans, Stantec, 2021
3. Background: Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Figure 2.2-1
FEMA Flood Hazard
Yolo 80 Corridor Improvement Project
EA 03-3H900
Solano, Yolo, and Sacramento Counties, California

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This location is behind the west levee of the Yolo Bypass, and the floodplain was determined using the above methodology. Flooding at this location is likely due to a failure of the Yolo Bypass, upstream and/or downstream of I-80. Therefore, to determine the depth of flooding on I-80 from PM 0.21 to PM 4.3, the published BFE in the Yolo Bypass adjacent to the project was used. An elevation of 29.5 feet (NAVD 88) was used to determine that this area of I-80 is completely submerged during the 100-year flood event and would continue to be so after the construction of the proposed concrete median under Build Alternative 2b. Thus, Build Alternative 2a or 2b would have no effect on the FEMA-mapped floodplain in this area. The project is located within a 100-year base floodplain but will not result in a significant floodplain encroachment as defined in 23 CFR, Section 650.105.

Per the effective FEMA FIRM for Yolo County (effective date May 16, 2012), the 100-year BFE for the Yolo Bypass at I-80 is approximately at 29.5 feet elevation (NAVD 88). This was determined by interpolating BFEs located upstream and downstream of where I-80 crosses the Yolo Bypass. Although there is a potential for short-term adverse effects on riparian habitat during construction activities, no long-term effects on natural and beneficial floodplain values are anticipated as a result of Build Alternatives 2a and 2b. Build Alternatives 2a and 2b would not promote incompatible development within the floodplain; and with the implementation of AMM HF-1, these alternatives would not contribute to adverse effects on floodplains.

Build Alternatives 3a and 3b

Construction and Operation

Build Alternatives 3a and 3b would involve adding an HOT 2+ lane in each direction, and they propose similar project components within the same project area as Build Alternatives 2a and 2b, respectively. Therefore, the effects would be the same as effects described under Build Alternatives 2a and 2b.

Build Alternatives 4a and 4b

Construction and Operation

Build Alternatives 4a and 4b would involve adding an HOT 3+ lane in each direction, and they propose similar project components within the same project area as Build Alternatives 2a and 2b, respectively. Therefore, the effects would be the same as effects described under Build Alternatives 2a and 2b.

Build Alternatives 5a and 5b

Construction and Operation

Build Alternatives 5a and 5b would create an express lane in each direction where all users pay a fee regardless of vehicle occupancy, and they propose similar project components within the same project area as Build Alternatives 2a and 2b, respectively. Therefore, the effects would be the same as effects described under Build Alternatives 2a and 2b.

Build Alternatives 6a and 6b

Construction and Operation

Build Alternatives 6a and 6b would involve adding a transit-only lane in each direction, and they propose similar project components within the same project area as Build Alternatives 2a and 2b, respectively. Therefore, the effects would be the same as effects described under Build Alternatives 2a and 2b.

Build Alternatives 7a and 7b

Construction and Operation

Build Alternatives 7a and 7b would involve repurposing the current number 1 general purpose lane to HOV 2+. No new lanes would be constructed. Build Alternatives 7a and 7b propose similar project components within the same project area as Build Alternatives 2a and 2b, respectively. Therefore, the effects would be the same as effects described under Build Alternatives 2a and 2b.

2.2.1.4 Avoidance, Minimization, and/or Mitigation Measures

Caltrans will use the following avoidance and minimization measure to reduce impacts on the floodplain.

- **AMM HF-1 Detention Basin Risers (Build Alternatives 2a and 2b):** Increased peak flows will be moderated by the use of detention basin risers in existing infrastructure. Caltrans will install detention basin risers to tie into existing storm drains on the upstream side at two locations in the city of Davis—one detention basin rise inlet is proposed at the storm drain crossing on Mace Boulevard south of I-80 and the other will be at the WB I-80 off-ramp to Chiles Road.

2.2.2 Water Quality and Stormwater Runoff

2.2.2.1 Regulatory Setting

Federal Requirements: Clean Water Act

In 1972, Congress amended the Federal Water Pollution Control Act, making the addition of pollutants to the waters of the United States (U.S.) from any point source[3] unlawful unless the discharge is in compliance with a National Pollutant Discharge Elimination System (NPDES) permit. This act and its amendments are known today as the Clean Water Act (CWA). Congress has amended the act several times. In the 1987 amendments, Congress directed dischargers of storm water from municipal and industrial/construction point sources to comply with the NPDES permit scheme. The following are important CWA sections:

[3] A point source is any discrete conveyance such as a pipe or a man-made ditch.

1. Sections 303 and 304 require states to issue water quality standards, criteria, and guidelines.

2. Section 401 requires an applicant for a federal license or permit to conduct any activity that may result in a discharge to waters of the U.S. to obtain certification from the state that the discharge will comply with other provisions of the act. This is most frequently required in tandem with a Section 404 permit request (see below).

3. Section 402 establishes the NPDES, a permitting system for the discharges (except for dredge or fill material) of any pollutant into waters of the U.S. Regional Water Quality Control Boards (RWQCBs) administer this permitting program in California. Section 402(p) requires permits for discharges of storm water from industrial/construction and municipal separate storm sewer systems (MS4s).

4. Section 404 establishes a permit program for the discharge of dredge or fill material into waters of the U.S. This permit program is administered by the U.S. Army Corps of Engineers (USACE).

The goal of the CWA is "to restore and maintain the chemical, physical, and biological integrity of the Nation's waters."

The USACE issues two types of 404 permits: General and Individual. There are two types of General permits: Regional and Nationwide. Regional permits are issued for a general category of activities when they are similar in nature and cause minimal environmental effect. Nationwide permits are issued to allow a variety of minor project activities with no more than minimal effects.

Ordinarily, projects that do not meet the criteria for a Regional or Nationwide Permit may be permitted under one of the USACE's Individual permits. There are two types of Individual permits: Standard permits and Letters of Permission. For Individual permits, the USACE decision to approve is based on compliance with U.S. Environmental Protection Agency's (U.S. EPA) Section 404 (b)(1) Guidelines (40 Code of Federal Regulations [CFR] Part 230), and whether the permit approval is in the public interest. The Section 404(b)(1) Guidelines (Guidelines) were developed by the U.S. EPA in conjunction with the USACE, and allow the discharge of dredged or fill material into the aquatic system (waters of the U.S.) only if there is no practicable alternative which would have less adverse effects. The Guidelines state that the USACE may not issue a permit if there is a least environmentally damaging practicable alternative (LEDPA) to the proposed discharge that would have lesser effects on waters of the U.S. and not have any other significant adverse environmental consequences. According to the Guidelines, documentation is needed that a sequence of avoidance, minimization, and compensation measures has been followed, in that order. The Guidelines also restrict permitting activities that violate water quality or toxic effluent[4] standards, jeopardize the continued existence of listed species, violate marine sanctuary protections, or cause "significant degradation" to waters of the U.S. In addition, every permit from the USACE, even if not subject

[4] The U.S. EPA defines "effluent" as "wastewater, treated or untreated, that flows out of a treatment plant, sewer, or industrial outfall."

to the Section 404(b)(1) Guidelines, must meet general requirements. See 33 CFR 320.4. A discussion of the LEDPA determination, if any, for the document is included in the Wetlands and Other Waters section.

State Requirements: Porter-Cologne Water Quality Control Act

California's Porter-Cologne Act, enacted in 1969, provides the legal basis for water quality regulation within California. This act requires a "Report of Waste Discharge" for any discharge of waste (liquid, solid, or gaseous) to land or surface waters that may impair beneficial uses for surface and/or groundwater of the state. It predates the CWA and regulates discharges to waters of the state. Waters of the State include more than just waters of the U.S., like groundwater and surface waters not considered waters of the U.S. Additionally, it prohibits discharges of "waste" as defined, and this definition is broader than the CWA definition of "pollutant." Discharges under the Porter-Cologne Act are permitted by Waste Discharge Requirements (WDRs) and may be required even when the discharge is already permitted or exempt under the CWA.

The State Water Resources Control Board (SWRCB) and RWQCBs are responsible for establishing the water quality standards (objectives and beneficial uses) required by the CWA and regulating discharges to ensure compliance with the water quality standards. Details about water quality standards in a project area are included in the applicable RWQCB Basin Plan. In California, RWQCBs designate beneficial uses for all water body segments in their jurisdictions and then set criteria necessary to protect those uses. As a result, the water quality standards developed for particular water segments are based on the designated use and vary depending on that use. In addition, the SWRCB identifies waters failing to meet standards for specific pollutants. These waters are then state-listed in accordance with CWA Section 303(d). If a state determines that waters are impaired for one or more constituents and the standards cannot be met through point source or non-point source controls (NPDES permits or WDRs), the CWA requires the establishment of Total Maximum Daily Loads (TMDLs). TMDLs specify allowable pollutant loads from all sources (point, non-point, and natural) for a given watershed.

State Water Resources Control Board and Regional Water Quality Control Boards

The SWRCB administers water rights, sets water pollution control policy, and issues water board orders on matters of statewide application, and oversees water quality functions throughout the state by approving Basin Plans, TMDLs, and NPDES permits. RWCQBs are responsible for protecting beneficial uses of water resources within their regional jurisdiction using planning, permitting, and enforcement authorities to meet this responsibility.

National Pollutant Discharge Elimination System (NPDES) Program

Municipal Separate Storm Sewer Systems (MS4)

Section 402(p) of the CWA requires the issuance of NPDES permits for five categories of storm water discharges, including Municipal Separate Storm Sewer Systems (MS4s). An MS4 is defined as "any conveyance or system of conveyances (roads with drainage systems, municipal streets, catch basins, curbs, gutters, ditches, human-made channels, and storm drains) owned

or operated by a state, city, town, county, or other public body having jurisdiction over storm water, that is designed or used for collecting or conveying storm water." The SWRCB has identified Caltrans as an owner/operator of an MS4 under federal regulations. The Caltrans MS4 permit covers all Caltrans rights-of-way, properties, facilities, and activities in the state. The SWRCB or the RWQCB issues NPDES permits for five years, and permit requirements remain active until a new permit has been adopted.

The Caltrans MS4 Permit, Order No. 2012-0011-DWQ (adopted on September 19, 2012 and effective on July 1, 2013), as amended by Order No. 2014-0006-EXEC (effective January 17, 2014), Order No. 2014-0077-DWQ (effective May 20, 2014) and Order No. 2015-0036-EXEC (conformed and effective April 7, 2015) has three basic requirements:

1. Caltrans must comply with the requirements of the Construction General Permit (see below);

2. Caltrans must implement a year-round program in all parts of the State to effectively control storm water and non-storm water discharges; and

3. The Caltrans storm water discharges must meet water quality standards through implementation of permanent and temporary (construction) Best Management Practices (BMPs), to the maximum extent practicable, and other measures as the SWRCB determines to be necessary to meet the water quality standards.

To comply with the permit, Caltrans developed the Statewide Storm Water Management Plan (SWMP) to address storm water pollution controls related to highway planning, design, construction, and maintenance activities throughout California. The SWMP assigns responsibilities within Caltrans for implementing storm water management procedures and practices as well as training, public education and participation, monitoring and research, program evaluation, and reporting activities. The SWMP describes the minimum procedures and practices Caltrans uses to reduce pollutants in storm water and non-storm water discharges. It outlines procedures and responsibilities for protecting water quality, including the selection and implementation of BMPs. The proposed project will be programmed to follow the guidelines and procedures outlined in the latest SWMP to address storm water runoff.

Construction General Permit

Construction General Permit, Order No. 2009-0009-DWQ (adopted on September 2, 2009 and effective on July 1, 2010), as amended by Order No. 2010-0014-DWQ (effective February 14, 2011) and Order No. 2012-0006-DWQ (effective on July 17, 2012). The permit regulates storm water discharges from construction sites that result in a Disturbed Soil Area (DSA) of one acre or greater, and/or are smaller sites that are part of a larger common plan of development. By law, all storm water discharges associated with construction activity where clearing, grading, and excavation result in soil disturbance of at least one acre must comply with the provisions of the General Construction Permit. Construction activity that results in soil disturbances of less than one acre is subject to this Construction General Permit if there is potential for significant water quality impairment resulting from the activity as determined by the RWQCB. Operators of regulated construction sites are required to develop Storm Water Pollution Prevention Plans

(SWPPPs); to implement sediment, erosion, and pollution prevention control measures; and to obtain coverage under the Construction General Permit.

The Construction General Permit separates projects into Risk Levels 1, 2, or 3. Risk levels are determined during the planning and design phases, and are based on potential erosion and transport to receiving waters. Requirements apply according to the Risk Level determined. For example, a Risk Level 3 (highest risk) project would require compulsory storm water runoff pH and turbidity monitoring, and before construction and after construction aquatic biological assessments during specified seasonal windows. For all projects subject to the permit, applicants are required to develop and implement an effective SWPPP. In accordance with the Caltrans SWMP and Standard Specifications, a Water Pollution Control Program (WPCP) is necessary for projects with DSA less than one acre.

Section 401 Permitting

Under Section 401 of the CWA, any project requiring a federal license or permit that may result in a discharge to a water of the U.S. must obtain a 401 Certification, which certifies that the project will be in compliance with state water quality standards. The most common federal permits triggering 401 Certification are CWA Section 404 permits issued by the USACE. The 401 permit certifications are obtained from the appropriate RWQCB, dependent on the project location, and are required before the USACE issues a 404 permit.

In some cases, the RWQCB may have specific concerns with discharges associated with a project. As a result, the RWQCB may issue a set of requirements known as WDRs under the State Water Code (Porter-Cologne Act) that define activities, such as the inclusion of specific features, effluent limitations, monitoring, and plan submittals that are to be implemented for protecting or benefiting water quality. WDRs can be issued to address both permanent and temporary discharges of a project.

2.2.2.2 Affected Environment

Caltrans completed a Water Quality Assessment for the project (Caltrans 2022a). This section summarizes the findings of that review.

Regional and Local Hydrology

The project area is located within the Cache Slough Watershed in Solano County, and in the Knights Landing Ridge Cut-Tule Canal Watershed in Yolo and Sacramento counties. Table 2.2-1 summarizes hydrologic units within the project area.

Table 2.2-1. Hydrologic Units

Project Location (PM)	County	Hydrologic Unit	Hydrologic Sub-Area/Number	Latitude/Longitude	Hydrologic Area
40.7-42.392	Solano	Valley Putah-Cache Slough	Undefined/511.10	38.511, -121.7732	Elmira
42.932-5.813	Solano and Yolo	Valley Putah-Cache Slough	Undefined/511.20	38.5572, -121.6667	Lower Putah Creek
5.813-3.12	Yolo	Sacramento Delta	Undefined/510.00	38.5746, -121.5604	undefined
M0.0-M1.36	Sacramento	Valley-American	Pleasant Grove/519.22	38.6099, -121.5401	Coon-American
L0.0-L0.617	Sacramento	Valley-American	Franklin/519.11	38.569, -121.5111	Morrison Creek

Source: Caltrans 2021b

Erosion Potential

The project is not in an area where slopes are prone to erosion (Caltrans 2022a).

Receiving Waters and TMDL Compliance

The only portion of the project that lies within a high-risk receiving watershed boundary is located in Sacramento County where the project crosses over the Sacramento River. High-risk receiving watersheds are watersheds that drain to water bodies that are either listed on the CWA 303(d) List for sedimentation/siltation or turbidity, have a USEPA-approved Total Maximum Daily Load Implementation Plan (TDML) for sediment; or have beneficial uses of Cold, Spawn, and Migratory.

The nearest major receiving waters that could potentially be impacted by project activities are Putah Creek, Willow Slough Bypass, Sacramento River, and Delta Waterways as summarized in Table 2.2-2. Under CWA Section 303(d), states, territories, and authorized tribes are required to develop a list of water quality limited segments that do not meet water quality standards. As discussed previously, the CWA requires the establishment of TMDLs, which specify allowable pollutant loads for a given watershed. Putah Creek, Willow Slough Bypass, and the Delta Waterways are listed on the CWA TMDLs and the USEPA's 303(d) List of Water Quality Limited Segments.

Caltrans is a named stakeholder for the methymercury TMDL associated with the Delta Waterways further south of the project area and within specific designated priority reaches.

Table 2.2-2. Major Receiving Waterways

Waterway	County	Total Maximum Daily Loads
Putah Creek	Solano	Mercury
Northern Willow Slough	Yolo	Boron, bacteria, malathion, selenium, conductivity, toxicity, chlorpyrifos, and diuron
Sacramento River (Knights Landing to Delta)	Sacramento	Chlordane, chlorpyrifos, DDT, diazinon, dieldrin, conductivity, Group A Pesticides, invasive species, mercury, PCBs, and toxicity
Delta Waterways, northern portion	Sacramento	Chlordane, chlorpyrifos, DDT, diazinon, dieldrin, conductivity, Group A Pesticides, invasive species, mercury, PCBs, and toxicity

Source: Caltrans 2021b
PCBs = polychlorinated biphenyl; DDT = dichlorodiphenyltrichloroethane

Beneficial Uses

Beneficial uses define resources for aquatic systems and are the basis for water quality objectives. Designated uses are established by the State for each waterbody or water segment. Beneficial uses are critical to water quality management and the protection and enhancement of these beneficial uses are the primary goals of water quality planning. Using the Central Valley Regional Basin Plan and Caltrans' Water Quality Planning Tool, Table 2.2-3 identifies the following beneficial uses:

Table 2.2-3. Beneficial Uses

Hydrologic Sub-Area	Waterbody Name	Beneficial Uses
511.0	Yolo Bypass	AGR, COLD, MIGR, REC1, REC2, SPWN, WARM, WILD
511.20	Sacramento River (Colusa Basin Drain to I Street Bridge	AGR, COLD, MIGR, MUN, REC1, REC2, SPWN, WRM, WILD
510.0	Cosumnes River – Source to Delta	AGR, COLD, MIGR, MUN, REC1, REC2, SPWN, WARM, WILD
510.0	Sacramento San Joaquin Delta (8,9)	AGR, COLD, IND, MIGR, MUN, NAV, REC1, REC2, SPWN, WARM, WILD
510.0	Yolo Bypass	AGR, COLD, MIGR, REC1, REC2, SPWN, WARM, WILD

Source: Caltrans 2021b, California Water Board 2017
Key:
AGR = agricultural supply; COLD = cold freshwater habitat; IND = industrial service supply; MIGR = fish migration; MUN = municipal and domestic supply; NAV = navigation; PROC = industrial process supply; REC1 = water contact recreation; REC2 = noncontact water recreation; SPWN = fish spawning; WARM = warm freshwater habitat; WILD = wildlife habitat

Water Quality Objectives

All inland surface waters within the Sacramento River Basin have water quality objectives that are standard for the following constituents: bacteria, biostimulatory substances, chemical constituents, color, dissolved oxygen, floating material, mercury, methylmercury, oil and grease, pH, pesticides, radioactivity, salinity, sediment, settleable material, suspended material, tastes

and odors, temperature, toxicity, and turbidity. The thresholds and limits for these can be found in the latest Central Valley Regional Basin Plan.

2.2.2.3 Environmental Consequences

No Build Alternative 1

Construction and Operation

Under No Build Alternative 1, managed lanes would not be added to the I-80 nor US-50 corridors and existing capacity would not increase and no ground-disturbing activities would occur. Vehicles traveling on I-80 and US-50 corridors would continue to generate pollutants from tire and brake wear, oil and grease leaks, and exhaust emissions. The release of these pollutants would be similar to existing conditions. Therefore, No Build Alternative 1would not have any new effects related to water quality and stormwater runoff.

Build Alternatives 2a and 2b

Construction

Build Alternatives 2a and 2b would involve adding an HOV2+ lane in each direction. Construction of Build Alternatives 2a and 2b would involve land-disturbing activities, use of construction equipment, clearing and grading, excavation, temporary staging of materials, etc. Ground disturbance would include proposed temporary and permanent impact areas such as staging areas, access roads, sign structures, and roadway widening. Discharge of storm water runoff from construction activities would potentially impact Putah Creek (Solano and Yolo counties), Willow Slough Bypass, Sacramento River, and Delta Waterways.

The discharge of storm water runoff from construction sites has the potential to affect water quality standards, water quality objectives, and beneficial uses. Potential pollutants and sources would include sediment; non-storm water (groundwater, waters from cofferdams, dewatering, water diversions) discharges from vehicle and equipment cleaning agents, fueling, and maintenance; and waste materials from storage activities.

A primary pollutant of concern is sediment and siltation from the disturbed construction areas. As such, Caltrans will implement a SWPPP, in accordance with Standard Measure WQ-1, which would include construction site BMPs during construction activities to avoid and reduce potential water quality effects. The SWPPP would include BMPs to protect sensitive areas and to prevent and minimize stormwater and non-stormwater discharges. Standard Measure WQ-1 requires Caltrans to follow all applicable guidelines and requirements in the 2018 Caltrans Standard Specifications, Section 13, regarding water pollution control and general specifications for preventing, controlling, and abating water pollution to Caltrans-owned storm sewers, streams, waterways, and other bodies of water.

In addition, Caltrans will comply with the NPDES Construction General Permit as part of Standard Measure WQ-2. Standard Measure WQ-3 requires coordination with the Caltrans District NPDES coordination during design to prepare a dewatering and discharge work plan.

If fueling or maintenance of construction vehicles occurs within the project area during construction, there is a risk of accidental spills or releases of fuels, oils, or other potentially toxic materials. An accidental release of materials may adversely affect water quality if contaminants enter storm drains, grassy swales, drainage ditches, or receiving water bodies. The magnitude of the effect from an accidental release depends on the amount and type of material spilled. Caltrans would implement Standard Measure WQ-1, which requires that any spills or leaks from construction equipment (i.e., fuel, oil, hydraulic fluid, and grease) would be cleaned up in accordance with applicable local, state, and/or federal regulations.

With implementation of Standard Measures, construction would not adversely affect water quality.

Operation

Once construction is completed, Build Alternatives 2a and 2b would include 22 acres and 25 acres, respectively, of new impervious surface. Build Alternative 2a would create approximately 16 acres of new impervious surface plus 3 acres of replaced impervious surface, totaling 19 acres of new impervious surface. Build Alternative 2b would create approximately 21 acres of new impervious surface plus 3 acres of replaced impervious surface, totaling 24 acres of new impervious surface. In accordance with the Caltrans MS4 permit, the Build Alternatives 2a and 2b would implement Standard Measure WQ-1 and incorporate post-construction water quality treatment BMPs and low-impact development controls to reduce non-point source pollutants as needed. Additionally, Standard Measure WQ-4 requires preparation of a Stormwater Data Report during the design phase, which would describe whether permanent treatment BMPs should be incorporated.

Operation of Build Alternatives 2a and 2b would have minimal effects on water quality.

Build Alternatives 3a and 3b

Construction and Operation

Build Alternatives 3a and 3b would involve adding an HOT 2+ lane in each direction. Because Build Alternatives 3a and 3b would be located in the same project area as Build Alternatives 2a and 2b and would involve similar ground-disturbing activities and the potential to release similar pollutants, the effects from construction and operation of Build Alternatives 3a and 3b would be the same as those described under Build Alternatives 2a and 2b, respectively.

Build Alternatives 4a and 4b

Construction and Operation

Build Alternatives 4a and 4b would involve adding an HOT 3+ lane in each direction. Because Build Alternatives 4a and 4b would be located in the same project area as Build Alternatives 2a and 2b and would involve similar ground-disturbing activities and the potential to release similar pollutants, the effects from construction and operation of Build Alternatives 4a and 4b would be the same as those described under Build Alternatives 2a and 2b, respectively.

Build Alternatives 5a and 5b

Construction and Operation

Build Alternatives 5a and 5b would create an express lane in each direction where all users pay a fee regardless of vehicle occupancy. Because Build Alternatives 5a and 5b would be located in the same project area as Build Alternatives 2a and 2b and would involve similar ground-disturbing activities and the potential to release similar pollutants, the effects from construction and operation of Build Alternatives 5a and 5b would be the same as those described under Build Alternatives 2a and 2b, respectively.

Build Alternatives 6a and 6b

Construction and Operation

Build Alternatives 6a and 6b would involve adding a transit-only lane in each direction. Because Build Alternatives 6a and 6b would be located in the same project area as Build Alternatives 2a and 2b and would involve similar ground-disturbing activities and the potential to release similar pollutants, the effects from construction and operation of Build Alternatives 6a and 6b would be the same as those described under Build Alternatives 2a and 2b, respectively.

Build Alternatives 7a and 7b

Construction and Operation

Build Alternatives 7a and 7b would involve repurposing the current number 1 general purpose lane to HOV 2+. Because Build Alternatives 7a and 7b would be located in the same project area as Build Alternatives 2a and 2b and would involve similar ground-disturbing activities and the potential to release similar pollutants, the effects from construction and operation of Build Alternatives 7a and 7b would be the same as those described under Build Alternatives 2a and 2b, respectively, with the exception of impervious surface. Build Alternative 7a would create approximately 6 acres of new impervious surface and 10 acres of net new impervious surface. Build Alternative 7b would create approximately 12 acres of new impervious surface and 16 acres of net new impervious surface.

2.2.2.4 Avoidance, Minimization, and/or Mitigation Measures

No AMMs or MMs would be required.

2.2.3 Geology/Soils/Seismic/Topography

2.2.3.1 Regulatory Setting

For geologic and topographic features, the key federal law is the Historic Sites Act of 1935, which establishes a national registry of natural landmarks and protects “outstanding examples of major geological features.” Topographic and geologic features are also protected under CEQA. This section discusses geology, soils, and seismic concerns as they relate to public safety and project design. Earthquakes are prime considerations in the design and retrofit of

structures. Structures are designed using the Caltrans' Seismic Design Criteria (SDC). The SDC provides the minimum seismic requirements for highway bridges designed in California. A bridge's category and classification will determine its seismic performance level and which methods are used for estimating the seismic demands and structural capabilities. For more information, please see Caltrans' Division of Engineering Services, Office of Earthquake Engineering, Seismic Design Criteria.

2.2.3.2 Affected Environment

This section was prepared using the District Preliminary Geotechnical Reports that were prepared for the project (Caltrans 2021d, Caltrans 2021e, Caltrans 2021f). A subsurface investigation was performed in August 2020 of five rotary borings of varying depths from 90 feet to 210 feet. Another subsurface investigation was performed in April 2021 that consisted of 10 rotary borings of varying depths from 31.5 feet to 36.5 feet.

Geology

The project is located within the Sacramento Valley region of the Great Valley Geomorphic Providence. The Great Valley province is an asymmetrical synclinal trough that extends roughly 400 miles north to south and varies up to 50 miles in width separating the Sierra Nevada Mountains on the east from the Coast Range on the west. The surface of the Great Valley consists of up to several thousand feet of Quaternary aged, unconsolidated, marine and non-marine alluvial deposited sediments.

The materials that underlie the project area are mapped as Quaternary aged Alluvium deposits. From west to east, the project area is mapped as: Quaternary Alluvium (Q) between Kidwell road and the western side of the South Fork of Putah Creek; from the South Fork of Putah Creek to approximately Mace Blvd., the project area is mapped as Quaternary aged Levee and Channel Deposits (Qa); and from Mace Blvd. to the Sacramento River as Quaternary aged Basin Deposits (Qb); isolated alluvial deposits associated with the Modesto Riverbank Formation (Qmr) directly north and east of the Kidwell Rd and I-80 intersection; and alluvial deposits associated with the Modesto Formation (Qm), directly north and east of the Mace Blvd and I-80 intersection. Typically, materials associated with basin deposit consists of fine-grained sediments with horizontal stratification deposited by standing or slow-moving water in topography lows. (Caltrans 2021d).

Surface Conditions

The roadway elevation gradually decreases from west to the east, from an approximate maximum of 50 feet above sea level on the west end of the project to approximate low of 10 feet above sea level in the vicinity of the Sacramento River. Within the project area, local drainage generally trends northwest-southeast towards the Yolo Bypass and Sacramento River, which drains north-southwest.

Subsurface Conditions

The subsurface material below the existing roadway is composed of fill material that ranges in thickness from several feet to approximately 25 feet. The fill within the project limits is generally thicker in the areas of the bridge approaches. Below this fill material, the site is predominately composed of alluvial soils typically consisting of mixed layers of clay, silt, sand, and gravels in varying thickness.

Groundwater

The depth of groundwater varies throughout the project area due to variations in ground surface elevations and groundwater conditions. Based on groundwater depths and elevations, depth of groundwater decreases from west to east along the project route. Measured groundwater during the April 2021 and August 2020 subsurface investigation and review of the existing log of test borings (LOTBs) show that the groundwater depth is shallow in the majority of the project area, except the west section where groundwater was measured to be deeper than 25 feet.

Seismic Hazards

There are two main faults located in Yolo County: the Hunting Creek Fault and the Dunnigan Hills Fault (Yolo County 2009). There are three fault zones located in Sacramento County: Cleveland Hills, Sierra Nevada, and San Joaquin Fault.

The only fault in Yolo County that has been identified to be active, or potentially active, and subject to surface rupture is the Hunting Creek Fault (sometimes referred to as the Hunting Creek-Berryessa Fault). The fault is located about 40 miles northwest of the project area. Other major regional faults outside Yolo County in the Coast Ranges and in the Sierra Nevada foothills are capable of producing ground shaking in the county (Yolo County 2009). Additionally, the Coast Range-Sierran Block Boundary, located at the edge of the western side of the lower Sacramento Valley, is recognized as a potential seismic source capable of generating moderate earthquakes that could affect Yolo County (Yolo County 2009).

Fault Rupture

The potential for surface fault rupture within the project area is low since there are no known faults of Holocene or younger age that fall within 1,000 feet of the project limits, or trend towards the project limits, nor do the project limits fall within an Alquist-Priolo Fault Zone.

Liquefaction

Loose, saturated soils pose the greatest threat during episodes of strong ground shaking. Possible hazards that could result from strong ground shaking include unstable soils, liquefaction, and landslides. Liquefaction is a phenomenon in which soils lose all shear strength and essentially turn into liquids. Within the project area, the subsurface soil profile consists of clayey or fill material at the overlaying native interbedded layers of medium dense to dense silts and sands. There are also isolated thin layers of saturated loose granular soils present in the project area. These conditions may lead to the potential for liquefaction.

Mineral Resources

The project area does not contain any known mineral resource zones but does traverse several gas fields near Davis and West Sacramento (Yolo County 2009, Sacramento County 2011).

2.2.3.3 Environmental Consequences

No Build Alternative 1

Construction and Operation

Under No Build Alternative 1, managed lanes would not be added to the I-80 or US-50 corridors and existing capacity would not increase. No ground-disturbing activities would occur and there would be no roadway improvements. Because on-site soils would not be disturbed, no impact related to significant disruptions, displacements, compaction or overcrowding of on-site soils, and/or substantial change in topography or ground surface relief features would occur. Therefore, No Build Alternative 1 would not have any effects related to geology and soils.

Build Alternatives 2a and 2b

Construction

Build Alternatives 2a and 2b would involve adding an HOV2+ lane in each direction. Construction of Build Alternatives 2a and 2b would involve land-disturbing activities such as clearing and grading, excavation, and temporary staging or stockpiling of materials. Build Alternatives 2a and 2b could result in disruptions, displacements, compaction, or overcrowding of on-site soils, and changes in topography or ground surface features that could result in wind or water erosion of onsite or offsite soils.

During construction, Caltrans would implement Standard Measure GS-1 which would include BMPs designed to minimize slope failure, settlement, and erosion. In addition, Caltrans would implement a SWPPP, in accordance with Standard Measure WQ-1, which would include implementation of construction site BMPs to avoid and reduce potential effects related to erosion, siltation, runoff, and discharge of pollutants. The SWPPP would include BMPs to protect sensitive areas. With implementation of Standard Measures GS-1 and WQ-1, potential construction and operation effects on erosion, siltation, and runoff would be minimal.

New embankment fill would be required for the bike pathway extension from I-80 along the Yolo Causeway to connect to CR-32A for Build Alternatives 2a and 2b. The Build Alternative 2b connector structure would include a retaining wall on either side and would travel underneath the existing eastbound connector from US-50 to I-80. Accordingly, the connector structure would require new embankment fill. The underlining clay layer which extends up to 16 to 20 feet below the original ground ranges in consistency from medium stiff to very stiff and is less susceptible to consolidation settlements. However, the proposed large embankment fill consolidation settlement could be considerable. All earthwork on the connector structure would be done in conformance with Section 19 of the 2018 Standard Specifications and would follow the recommendations associated with construction settlement in the geotechnical analyses

(AMM GEO-3). Therefore, the construction of Build Alternative 2b would not have an adverse effect on the slope stability of the proposed embankment.

Build Alternatives 2a and 2b would construct five new culverts and replace or improve 21 existing culverts located beneath the roadway, fill, and embankments at depths unlikely to encounter groundwater. Overhead sign structures would have a concrete foundation of up to 6.5 feet diameter and would either be supported on a cast-in-drilled-hole pile foundation or supported by a structure that could be approximately 30 feet in depth. Build Alternatives 2a and 2b would install a fiber-optic cable and associated fiber-optic splice boxes within the roadbed at the eastbound outside shoulder of I-80 from west of Kidwell Road at PM 40.7 in Solano County to PM 4.35 in Yolo County. Cut and cover or trenching would be the primary construction method and would require excavation of up to 42 inches to install within a 12-foot buffer surrounding the running line. In addition, Build Alternative 2b proposes pile driving during construction for installation of footings of the connector structure to a depth of approximately 40 feet. Groundwater is anticipated to be encountered in excavations as shallow as 1 to 2 feet below ground surface within the Yolo Bypass, and 5 feet below ground surface east of the Yolo Bypass. Groundwater is anticipated to be deeper than 25 feet in the western section of the project. However, groundwater conditions can be expected to fluctuate in response to seasons, storm events, and other factors. Dewatering may be required if encountered during construction of the connector structure. AMM GEO-1 states that during construction, all trenching and earthwork will be performed in accordance with Section 19 of the 2018 Standard Specifications.

According to the Yolo County General Plan EIR, liquefaction is expected to be relatively higher in the Great Valley portion of the county, particularly along the floodplains of streams, where the sediments are generally sandier than other areas (Yolo County 2009). In addition, project-specific geotechnical investigations and review of the LOTBs show that the subsurface profile throughout the project limits consists of clayey or fill material at the overlaying native interbedded layers of medium dense to dense silts and sands with isolated thin layers of saturated loose granular soils.

There is low potential for seismic activity to occur during construction due to the distance from active faults. Seismic shaking creates opportunities for liquefaction. Construction workers could be exposed to seismic hazards during installation of the proposed improvements due to the potential for seismic activity, causing a potentially adverse impact on construction workers' safety. AMM GEO-2 would be implemented to reduce the potential for adverse impacts resulting from seismic activity during construction.

Operation

During project operation, the project area could be affected by ground motion, liquefaction, and possible ground rupture from seismic activity. Without proper engineering, improvements could pose safety issues to people and structures as a result of soil erosion, subsidence, expansive soils, corrosive soils, surface fault rupture, seismic shaking, liquefaction, and landslides. AMM GEO-3 requires that, prior to final design, additional subsurface testing will be conducted so that any new or modified structure will be designed and constructed to current building and seismic standards and includes consideration of liquefaction potential in the design of foundation and retaining systems. Build Alternatives 2a and 2b would be designed and constructed in

accordance with the latest Caltrans design guidelines based on the site-specific field investigations required for the preliminary foundation report during the development of the Final Design (Plans, Specifications, and Estimates). Therefore, operation of the project is not expected to result in substantial effects on resources related to seismicity within the project area.

Build Alternatives 3a and 3b

Construction and Operation

Build Alternatives 3a and 3b would involve adding an HOT 2+ lane in each direction. Build Alternatives 3a and 3b would be located in the same project area and involve similar ground-disturbing activities as Build Alternatives 2a and 2b, respectively. Therefore, the effects would be the same as effects described under Build Alternatives 2a and 2b.

Build Alternatives 4a and 4b

Construction and Operation

Build Alternatives 4a and 4b would involve adding an HOT 3+ lane in each direction. Build Alternatives 4a and 4b would be located in the same project area and involve similar ground-disturbing activities as Build Alternatives 2a and 2b, respectively. Therefore, the effects would be the same as effects described under Build Alternatives 2a and 2b.

Build Alternatives 5a and 5b

Construction and Operation

Build Alternatives 5a and 5b would create an express lane in each direction where all users pay a fee regardless of vehicle occupancy. Build Alternatives 5a and 5b would be located in the same project area and involve similar ground-disturbing activities as Build Alternatives 2a and 2b, respectively. Therefore, the effects would be the same as effects described under Build Alternatives 2a and 2b.

Build Alternatives 6a and 6b

Construction and Operation

Build Alternatives 6a and 6b would involve adding a transit-only lane in each direction. Build Alternatives 6a and 6b would be located in the same project area and involve similar ground-disturbing activities as Build Alternatives 2a and 2b, respectively. Therefore, the effects would be the same as effects described under Build Alternatives 2a and 2b.

Build Alternatives 7a and 7b

Construction and Operation

Build Alternatives 7a and 7b would involve repurposing the current number 1 general purpose lane to HOV 2+. No new lanes would be constructed. Build Alternatives 7a and 7b would be

located in the same project area and involve similar ground-disturbing activities as Build Alternatives 2a and 2b, respectively. Therefore, the effects would be the same as effects described under Build Alternatives 2a and 2b.

2.2.3.4 Avoidance, Minimization, and/or Mitigation Measures

Caltrans would implement the following AMMs to prevent and reduce permanent effects on geology and soils.

- **AMM GEO-1 Earthwork.** During construction, all trenching and earthwork shall be performed in accordance with Section 19 of the 2018 Standard Specifications.

- **AMM GEO-2:** With respect to worker safety during construction, Caltrans' Standard Specifications and California Division of Occupational Safety and Health Administration (Cal OSHA) requires employers to comply with hazard-specific safety and health standards. Pursuant to Section 5(a) (1) of Cal OSHA, employers must provide their employees with a workplace free from recognized hazards likely to cause death or serious physical harm.

- **AMM GEO-3:** As part of the final design phase, Caltrans requires preparation of the geotechnical design reports that incorporate the results of additional subsurface fieldwork and laboratory testing. Site-specific subsurface soil conditions, slope stabilities, and groundwater conditions within the Build Alternative area would be verified during the preparation of these geotechnical design reports. The identification of the site-specific soil conditions within the project limits would be used to determine the appropriate final design for the foundations and footings that would support the proposed Build Alternative improvements. Caltrans' standard design and construction guidelines incorporate engineering standards that address seismic risks. Proposed structures constructed within the project area would consider seismically induced liquefaction and settlement during the final design phase.

2.2.4 Paleontology

2.2.4.1 Regulatory Setting

Paleontology is a natural science focused on the study of ancient animal and plant life as it is preserved in the geologic record as fossils. A number of federal statutes specifically address paleontological resources, their treatment, and funding for mitigation as a part of federally authorized projects.

- 16 United States Code (USC) 431-433 (the "Antiquities Act") prohibits appropriating, excavating, injuring, or destroying any object of antiquity situated on federal land without the permission of the Secretary of the Department of Government having jurisdiction over the land. Fossils are considered "objects of antiquity" by the Bureau of Land Management, the National Park Service, the Forest Service, and other federal agencies.

- 23 United States Code (USC) 1.9(a) requires that the use of Federal-aid funds must be in conformity with all federal and state laws.

- 23 United States Code (USC) 305 authorizes the appropriation and use of federal highway funds for paleontological salvage as necessary by the highway department of any state, in compliance with 16 USC 431-433 above and state law.

Under California law, paleontological resources are protected by the California Environmental Quality Act (CEQA).

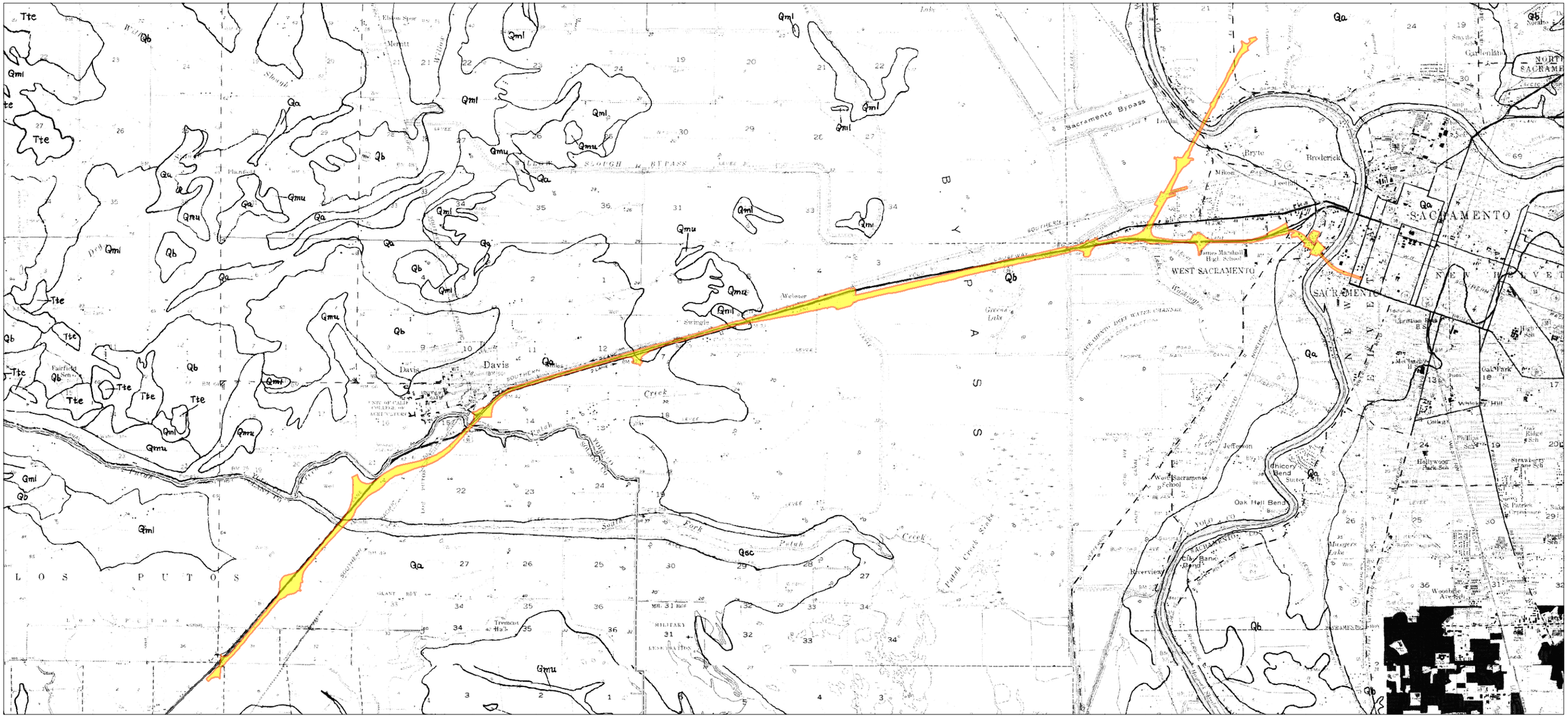
2.2.4.2 Affected Environment

A Paleontological Identification Report (PIR) was prepared for this report in March 2021 (Caltrans 2021g) and was updated and adapted to the new paleontological template in August 2023. This section is based on the findings of the PIR. The project site is located within the Sacramento Valley region of the Great Valley geomorphic province in California. The Great Valley province is an asymmetrical synclinal trough that extends roughly 400 miles north to south and up to 50 miles in width separating the Sierra Nevada Mountains on the east from the Coast Range on the west. The surface of the Great Valley consists of up to several thousand feet of unconsolidated marine and non-marine sediments.

The project site is generally on flat agricultural and delta terrain. It crosses Putah Creek near its western end and the Sacramento River in two places near its eastern end. The American River meets the Sacramento River between the project forks. Underlying the project are gravel-filled channels laid down during the Pleistocene time by ancestors of the Sacramento River, the American River, and smaller tributaries such as Putah Creek (Figure 2.2-2).

The paleontological potential of the geologic units underlying and near the Project corridor was evaluated. These units include artificial fill (Af), stream channel deposits (Qsc), Holocene alluvial deposits (Qa), Holocene basin deposits (Qb), Modesto Formation (Qmu/Qml), and Riverbank Formation (Qrl) (Figure 2.2-2). The Modesto Formation (Qmu/Qml) and Riverbank Formation (Qrl) date to the late Pleistocene and have the potential to contain scientifically significant vertebrate fossils. Most of the project crosses sediment that is Holocene alluvial deposits (Qa) or Holocene basin deposits (Qb) however the Modesto and Riverbank Formations could be encountered at depth.

Searches of the UC Berkeley Museum of Paleontology and the PaleoBiology databases were performed in January and February 2021 and updated in 2023 as was a literature review. Records of seven vertebrate fossil localities were found within four miles of the project in sediment similar to that of the project site.



Notes

1. Coordinate System: NAD 1983 StatePlane California II FIPS 0402 Feet
2. Data Sources: CalTrans, Stantec, 2021
3. Background: 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 User Community

Figure 2.2-2
Geologic Units
Yolo 80 Corridor Improvement Project
EA 03-3H900
Solano, Yolo, and Sacramento Counties, California

V:\1857\Active\185793022_CT80Yolo103_data\gis_cad\gis\mxd\Figures\Fig_2-2-2_GeologicUnits.mxd Revised: 2021-10-21 By: pdierdening

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2.2.4.3 Environmental Consequences

Caltrans uses a tripartite system to rank the risk of encountering significant fossil resources: no, low, and high risk. If significant fossil resources have been previously discovered within a geologic unit (formation), then that formation in its entirety is considered High risk.

No Build Alternative 1

Construction and Operation

Under No Build Alternative 1, managed lanes would not be added to the I-80 or US-50 corridors and existing capacity would not increase. No ground-disturbing activities would occur. Therefore, No Build Alternative 1 would not have any effects related to paleontological resources.

Build Alternatives 2a and 2b

Construction

Build Alternatives 2a and 2b would involve adding an HOV2+ lane in each direction. Build Alternatives 2a and 2b would require soil disturbance, including installation of signage, road cutting or filling, extending or replacing culverts, utility relocation, and fiber optic line installation. In addition, Build Alternatives 2a and 2b would include excavation for roadbed, and retaining and sound wall installation. Build Alternatives 2a and 2b would install poles for lighting, signs, and Intelligent Transportation Systems (ITS). Foundations for these structures would generally be installed using an auger to drill a hole up to 6.5 feet in diameter and up to 30 feet deep, and a cast-in-drilled-hole concrete foundation would be constructed.

Build Alternative 2b proposes pile driving during construction for installation of footings of the connector structure to a depth of approximately 40 feet. Such activities would be deep enough to reach potentially unknown sensitive paleontological resources. In addition, foundation work for signs, structures, underground utilities, and culvert/drainage installations could also encounter sensitive paleontological resources.

Due to the low sensitivity of the surficial geology directly underneath the project limits, construction activities with shallow disturbances (up to 4 feet) are unlikely to encounter significant fossil resources. In addition, many proposed construction activities would occur within existing disturbed areas of the roadway corridors. Due to the proximity of the project to known high-sensitivity geologic units, excavations greater than 4 feet below the ground surface have an increased potential to encounter sensitive formations and significant fossil resources. Build Alternatives 2a and 2b would require excavations greater than 4 feet for installation of signs, CMS structures, and retaining walls.

Standard Measure GS-2 outlines actions to be taken in the event of a paleontological discovery during construction. If unanticipated paleontological resources are discovered during construction, they would not be disturbed. Work within a 60-foot radius of the discovery would stop; the area would be secured; and the work would not resume until appropriate measures are taken. In addition, AMM PALEO-1 would require preparation of a Paleontological Evaluation

Report (PER) during the design phase to verify if project activities have the potential to impact paleontological resources. Depending on the findings of the PER, AMM PALEO-2 will be implemented, which requires the preparation and execution of a Paleontological Mitigation Plan (PMP) during project construction in areas of high sensitivity. In addition, AMM PALEO-3 would require paleontological construction monitoring in areas with high paleontological sensitivity. With implementation of Standard Measure GS-2 and AMMs PALEO-1 through PALEO-3, Alternatives 2a and 2b would not have substantial adverse effects on paleontological resources.

Operation

No ground disturbance would occur during operation of Build Alternatives 2a and 2b. Therefore, there would be no effects on paleontological resources during operation.

Build Alternatives 3a and 3b

Construction and Operation

Build Alternatives 3a and 3b would involve adding an HOT 2+ lane in each direction. Because Build Alternatives 3a and 3b would be located in the same project area as Build Alternatives 2a and 2b, respectively, and would involve similar ground-disturbing activities, the effects from construction and operation of Build Alternatives 3a and 3b would be the same as those described under Build Alternatives 2a and 2b, respectively.

Build Alternatives 4a and 4b

Construction and Operation

Build Alternatives 4a and 4b would involve adding an HOT 3+ lane in each direction. Build Alternatives 4a and 4b would be located in the same project area and involve similar ground-disturbing activities as Build Alternatives 2a and 2b, respectively. Therefore, the effects would be the same as effects described under Build Alternatives 2a and 2b.

Build Alternatives 5a and 5b

Construction and Operation

Build Alternatives 5a and 5b would create an express lane in each direction where all users pay a fee regardless of vehicle occupancy. Build Alternatives 5a and 5b would be located in the same project area and involve similar ground-disturbing activities as Build Alternatives 2a and 2b, respectively. Therefore, the effects would be the same as effects described under Build Alternatives 2a and 2b.

Build Alternatives 6a and 6b

Construction and Operation

Build Alternatives 6a and 6b would involve adding a transit-only lane in each direction. Build Alternatives 6a and 6b would be located in the same project area and involve similar ground-

disturbing activities as Build Alternatives 2a and 2b, respectively. Therefore, the effects would be the same as effects described under Build Alternatives 2a and 2b.

Build Alternatives 7a and 7b

Construction and Operation

Build Alternatives 7a and 7b would involve repurposing the current number 1 general purpose lane to HOV 2+. No new lanes would be constructed. Build Alternatives 7a and 7b would be located in the same project area and involve similar ground-disturbing activities as Build Alternatives 2a and 2b, respectively. Therefore, the effects would be the same as effects described under Build Alternatives 2a and 2b.

2.2.4.4 Avoidance, Minimization, and/or Mitigation Measures

Caltrans would implement the following AMMs to reduce potential effects on paleontological resources.

- **AMM PALEO-1: Paleontological Evaluation Report**. During the design phase, a qualified paleontologist will prepare a PER. If the PER results in an evaluation that the project does not risk encountering paleontological resources, no further measures are required.

- **AMM PALEO-2: Paleontological Resources Management Plan.** During the design phase, a qualified paleontologist will prepare a PMP. If the PER results in an evaluation that the project does not risk encountering paleontological resources, a PMP would not be required. The PMP would incorporate the results of the PER along with design details to develop a plan for where and when construction activities are at risk of encountering fossils and construction monitoring will occur. The PMP will also include procedures for worker training and actions for construction staff to follow if fossils are encountered. It will also include a curation agreement for the housing and identification of any fossils found.

- **AMM PALEO-3: Paleontological Resources Monitoring.** During construction, areas of high paleontological sensitivity would be monitored by a qualified paleontological monitor. The monitor would spot-check locations where foundation, utility, and/or culvert work extends deeper than 4 feet below ground surface into native soils (not fill material).

2.2.5 Hazardous Waste and Materials

2.2.5.1 Regulatory Setting

Hazardous materials, including hazardous substances and wastes, are regulated by many state and federal laws. Statutes govern the generation, treatment, storage, and disposal of hazardous materials, substances, and waste, and also the investigation and mitigation of waste releases, air and water quality, human health, and land use.

The primary federal laws regulating hazardous wastes/materials are the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) of 1980, and the Resource Conservation and Recovery Act (RCRA) of 1976 (RCRA). The purpose of CERCLA, often referred to as "Superfund," is to identify and cleanup abandoned contaminated sites so that public health and welfare are not compromised. The RCRA provides for "cradle to grave" regulation of hazardous waste generated by operating entities. Other federal laws include:

- Community Environmental Response Facilitation Act (CERFA) of 1992
- Clean Water Act
- Clean Air Act
- Safe Drinking Water Act
- Occupational Safety and Health Act (OSHA)
- Atomic Energy Act
- Toxic Substances Control Act (TSCA)
- Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA)

In addition to the acts listed above, Executive Order (EO) 12088, *Federal Compliance with Pollution Control Standards*, mandates that necessary actions be taken to prevent and control environmental pollution when federal activities or federal facilities are involved.

California regulates hazardous materials, waste, and substances under the authority of the CA Health and Safety Code and is also authorized by the federal government to implement RCRA in the state. California law also addresses specific handling, storage, transportation, disposal, treatment, reduction, cleanup, and emergency planning of hazardous waste. The Porter-Cologne Water Quality Control Act also restricts disposal of wastes and requires cleanup of wastes that are below hazardous waste concentrations but could impact ground and surface water quality. California regulations that address waste management and prevention and cleanup of contamination include Title 22 Division 4.5 Environmental Health Standards for the Management of Hazardous Waste, Title 23 Waters, and Title 27 Environmental Protection.

Worker and public health and safety are key issues when addressing hazardous materials that may affect human health and the environment. Proper management and disposal of hazardous material is vital if it is found, disturbed, or generated during project construction.

2.2.5.2 Affected Environment

An Initial Site Assessment (ISA) was completed for this project in February 2021 (Caltrans 2021h). The ISA included investigations pertaining to naturally occurring asbestos (NOA), hazardous waste sites (Cortese List), aerially deposited lead (ADL), lead-containing paint (LCP) and thermoplastic striping, and treated wood waste (TWW).

A geologic evaluation regarding NOA was conducted within the project limits. This evaluation included a review of geologic maps and reports including data prepared by the California Geological Survey (CGS) and the United States Geological Survey (USGS), and previous studies conducted by Caltrans and their consultants. The evaluation did not indicate the presence of altered ultramafic bedrock, alluvium derived from ultramafic rock, or rock commonly associated with NOA.

ADL also exists along roadways throughout California from the historical use of leaded gasoline. ADL from motor-vehicle exhaust may be present in the soils adjacent to project area roads based on the age of the roadway and the date of the ban (1996) of leaded motor vehicle fuel.

LCP and asbestos containing materials (ACM) have the potential to be present within the project area. Bridges and overpass structures may be coated with LCP and/or ACM in paints, gaskets, caulking, insulation, and tarred surfaces. The likelihood of asbestos being present increases with the age of the bridge, since the use of asbestos-containing building materials began to diminish in the 1980s. Similarly, lead-based paint was commonly used to coat bridge components such as railings and other metal and wood surfaces prior to its being banned in California in 1978. Lead and asbestos are state-recognized carcinogens, and lead is a reproductive toxin.

TWW has the potential to be encountered in the form of posts along metal beam guard railing three-beam barrier, piles, or roadside signs. These wood products are typically treated with preserving chemicals that may be hazardous (e.g., carcinogenic) and could include arsenic, chromium, copper, creosote, or pentachlorophenol. Based upon visual survey of the proposed disposal area by Google Earth Street-View Imagery, TWW may be present within the area (Caltrans 2021h).

The Cortese List is a compilation of contaminated sites identified by the SWRCB; active, closed, and inactive landfills identified by the Integrated Waste Management Board; and potential hazardous waste sites identified by the Department of Toxic Substance Control. This list was reviewed as part of the initial screening for this project. Both the Envirostor and the Geotracker database did not show that the project area contains any hazardous waste/sources.

2.2.5.3 Environmental Consequences

No Build Alternative 1

Construction and Operation

Under No Build Alternative 1, managed lanes would not be added to the I-80 or US-50 corridors and existing capacity would not increase. No ground-disturbing activities would occur. Therefore, No Build Alternative 1 would not have any effects related to hazardous waste and materials.

Construction

Build Alternatives 2a and 2b

Build Alternatives 2a and 2b would involve adding an HOV2+ lane in each direction. Results of the ISA did not indicate the presence of NOA within the footprint of Build Alternatives 2a or 2b; therefore, Build Alternatives 2a or 2b would not have the potential to expose workers or nearby residents to NOA. In addition, Build Alternatives 2a and 2b are not within a Cortese List site boundary and would not impact any site on the Cortese List. Therefore, Build Alternatives 2a and 2b would not affect known hazardous sites.

ACM and LCP have the potential to be encountered during project construction and ground-disturbing activities including grinding/cold planing.

An ACM and LCP survey by a qualified and licensed inspector prior to construction is required for any structure proposed to be demolished or disturbed, including but not limited to, the following structures (AMM HAZ-1):

- Bridge #22-0077 - Richards Blvd OC
- Bridge #22-0043 - Webster UC
- Bridge #22-0044 - Yolo Causeway West
- Bridge #22-0045 - Yolo Causeway East
- Bridge #22-0100 - Enterprise Blvd UC

Standard Measure HW-1 would require Caltrans to prepare a Lead Compliance Plan that would include protocols for environmental and personnel monitoring, requirements for personal protective equipment, and other procedures for handling of lead-impacted soil. In addition, AMM HAZ-2 would require Caltrans to prepare an Asbestos Compliance Plan to outline the procedures to report, handle, store, and dispose of ACM. All ACM or LCP, if found, would be removed by a certified contractor in accordance with local, state, and federal requirements (Standard Measure HW-2 and AMM HAZ-2).

In addition, prior to construction, a demolition notification form and attachments would be prepared by the contractor and submitted to the air district, as required by the National Emission Standards for Hazardous Air Pollutants (AMM HAZ-2).

ADL exists along roadways throughout California due to the historical use of leaded gasoline. There is the likely presence of soils with elevated concentrations of lead as a result of ADL on the state highway system right-of-way within the limits of the project area. Soil determined to contain lead concentrations exceeding stipulated thresholds must be managed under the July 1, 2016, ADL Agreement between Caltrans and the California Department of Toxic Substances Control. This ADL Agreement allows such soils to be safely reused within the project area as long as all requirements of the ADL Agreement are met.

Prior to construction, Caltrans would conduct a PSI for ADL. Based on results of the PSI, special materials handling, worker health and safety training, or regulated soil disposal may be required for construction (AMM HAZ-3).

Construction would involve the use and storage of fuels, lubricants, solvents, and other possible contaminants. In the event hazardous materials are encountered or spilled during construction, Caltrans would implement actions outlined in AMM HAZ-4, Hazardous Materials Incident Contingency Plan, to report, contain, and mitigate roadway spills. The plan will designate a chain of command for notification, evacuation, response, and cleanup of roadway spills.

Based on visual survey of the project area, TWW has the potential to be encountered during construction in the form of posts along metal beam guard railing three-beam barrier, piles, or roadside signs. The Department of Toxic Substance Control requires that TWW either be disposed as a hazardous waste or tested. If not tested, the generator may presume that TWW is

a hazardous waste and must be disposed in an approved TWW facility. If TWW is present, Caltrans will implement Standard Measure HW-3, which outlines specifications for worker training and TWW handling, storage, and disposal requirements.

Standard Measures HW-1, HW-2, HW-3 and AMMs HAZ-1, HAZ-2, HAZ-3, and HAZ-4 would minimize potential effects related to hazards during construction; and no adverse effect would occur.

Operation

Operation of Build Alternatives 2a and 2b would not release hazardous materials; however, vehicles traveling on I-80 or US-50 roadway corridors would continue to generate pollutants from tire and brake wear, oil and grease leaks, and exhaust emissions. The release of these pollutants would be similar to existing conditions; therefore, Build Alternatives 2a and 2b would not result in new adverse effects.

Build Alternatives 3a and 3b

Construction and Operation

Build Alternatives 3a and 3b would involve adding an HOT 2+ lane in each direction. Because Build Alternatives 3a and 3b would be located in the same project area as Build Alternatives 2a and 2b, would involve the use of the same hazardous materials, and/or would encounter the same hazardous waste during construction, the effects from construction and operation of Build Alternatives 3a and 3b would be the same as those described under Build Alternatives 2a and 2b.

Build Alternatives 4a and 4b

Construction and Operation

Build Alternatives 4a and 4b would involve adding an HOT 3+ lane in each direction. Because Build Alternatives 4a and 4b would be located in the same project area as Build Alternatives 2a and 2b, would involve the use of the same hazardous materials, and/or would encounter the same hazardous waste during construction, the effects from construction and operation of Build Alternatives 4a and 4b would be the same as those described under Build Alternatives 2a and 2b.

Build Alternatives 5a and 5b

Construction and Operation

Build Alternatives 5a and 5b would create an express lane in each direction where all users pay a fee regardless of vehicle occupancy. Because Build Alternatives 5a and 5b would be located in the same project area as Build Alternatives 2a and 2b, would involve the use of the same hazardous materials, and/or would encounter the same hazardous waste during construction, the effects from construction and operation of Build Alternatives 5a and 5b would be the same as those described under Build Alternatives 2a and 2b.

Build Alternatives 6a and 6b

Construction and Operation

Build Alternatives 6a and 6b would involve adding a transit-only lane in each direction. Because Build Alternatives 6a and 6b would be located in the same project area as Build Alternatives 2a and 2b, would involve the use of the same hazardous materials, and/or would encounter the same hazardous waste during construction, the effects from construction and operation of Build Alternatives 6a and 6b would be the same as those described under Build Alternatives 2a and 2b.

Build Alternatives 7a and 7b

Construction and Operation

Build Alternatives 7a and 7b would involve repurposing the current number 1 general purpose lane to HOV 2+. Because Build Alternatives 7a and 7b would be located in the same project area as Build Alternatives 2a and 2b, would involve the use of the same hazardous materials, and/or would encounter the same hazardous waste during construction, the effects from construction and operation of Build Alternatives 7a and 7b would be the same as those described under Build Alternatives 2a and 2b.

2.2.5.4 Avoidance, Minimization, and/or Mitigation Measures

Caltrans would implement the following AMMs to reduce potential effects caused by hazardous waste and materials.

- **AMM HAZ-1 Asbestos and Lead-Based Paint Survey.** During the design phase, existing bridge or structures that would be disturbed by the project would be tested for asbestos and lead-based paint by a qualified and licensed inspector prior to construction. All asbestos-containing material or lead-based paint, if found, would be removed by a certified contractor in accordance with local, state, and federal requirements.

- **AMM HAZ-2 National Emission Standards for Hazardous Air Pollutants Notification.** Prior to construction, the contractor will prepare a demolition/renovation/rehabilitation notification/permit form and attachments to be submitted to the Air Pollution Control District (APCD) or Air Quality Management District (AQMD) as required by the National Emission Standards for Hazardous Air Pollutants (NESHAP) at 40 CFR Part 61, Subpart M, and California Health and Safety Code section 39658(b)(1).

- **AMM HAZ-3 Aerially Deposited Lead Preliminary Site Investigation.** Prior to construction, Caltrans would conduct a preliminary site investigation for aerially deposited lead. Soil samples collected to evaluate aerially deposited lead would be analyzed for total lead and soluble lead in accordance with Department of Toxic Substances Control’s requirements to determine appropriate actions that would ensure the protection of construction workers, future site users, and the environment.

- **AMM HAZ-4 Hazardous Materials Incident Contingency Plan**. Prior to construction, the contractor will prepare a hazardous materials incident contingency plan to report, contain, and mitigate roadway spills. The plan would designate a chain of command for notification, evacuation, response, and cleanup of roadway spills. This plan is to be prepared by the contractor.

2.2.6 Air Quality

2.2.6.1 Regulatory Setting

The Federal Clean Air Act (FCAA), as amended, is the primary federal law that governs air quality while the California Clean Air Act is its companion state law. These laws, and related regulations by the United States Environmental Protection Agency (USEPA) and the California Air Resources Board (CARB), set standards for the concentration of pollutants in the air. At the federal level, these standards are called National Ambient Air Quality Standards (NAAQS). NAAQS and state ambient air quality standards have been established for six criteria pollutants that have been linked to potential health concerns: CO, nitrogen dioxide (NO_2), O_3, particulate matter —which is broken down for regulatory purposes into particles of 10 micrometers or smaller (PM_{10}) and particles of 2.5 micrometers and smaller ($PM_{2.5}$), Lead (Pb), and sulfur dioxide (SO_2). In addition, state standards exist for visibility reducing particles, sulfates, hydrogen sulfide (H2S), and vinyl chloride. The NAAQS and state standards are set at levels that protect public health with a margin of safety and are subject to periodic review and revision. Both state and federal regulatory schemes also cover toxic air contaminants (air toxics); some criteria pollutants are also air toxics or may include certain air toxics in their general definition.

Federal air quality standards and regulations provide the basic scheme for project-level air quality analysis under the NEPA. In addition to this environmental analysis, a parallel "Conformity" requirement under the FCAA also applies.

Conformity

The conformity requirement is based on FCAA Section 176(c), which prohibits the USDOT and other federal agencies from funding, authorizing, or approving plans, programs, or projects that do not conform to State Implementation Plan (SIP) for attaining the NAAQS. "Transportation Conformity" applies to highway and transit projects and takes place on two levels: the regional (or planning and programming) level and the project level. The proposed project must conform at both levels to be approved.

Conformity requirements apply only in nonattainment and "maintenance" (former nonattainment) areas for the NAAQS, and only for the specific NAAQS that are or were violated. USEPA regulations at 40 CFR 93 govern the conformity process. Conformity requirements do not apply in unclassifiable/attainment areas for NAAQS and do not apply at all for state standards regardless of the status of the area.

Regional conformity is concerned with how well the regional transportation system supports plans for attaining the NAAQS for CO, NO_2, O, particulate matter (PM_{10} and $PM_{2.5}$), and in some areas (although not in California), SO_2. California has nonattainment or maintenance areas for

all of these transportation-related “criteria pollutants” except SO_2, and also has a nonattainment area for lead (Pb); however, lead is not currently required by the FCAA to be covered in transportation conformity analysis. Regional conformity is based on emission analysis of RTPs and federal transportation improvement programs (FTIPs) that include all transportation projects planned for a region over a period of at least 20 years (for the RTP) and 4 years (for the FTIP). RTP and FTIP conformity uses travel demand and emission models to determine whether or not the implementation of those projects would conform to emission budgets or other tests at various analysis years showing that requirements of the FCAA and the SIP are met. If the conformity analysis is successful, the Metropolitan Planning Organization (MPO), FHWA, and Federal Transit Administration (FTA) make the determinations that the RTP and FTIP are in conformity with the SIP for achieving the goals of the FCAA. Otherwise, the projects in the RTP and/or FTIP must be modified until conformity is attained. If the design concept and scope and the “open-to-traffic” schedule of a proposed transportation project are the same as described in the RTP and FTIP, then the proposed project meets regional conformity requirements for purposes of project-level analysis.

Project-level conformity is achieved by demonstrating that the project comes from a conforming RTP and TIP; the project has a design concept and scope that has not changed significantly from those in the RTP and TIP; project analyses have used the latest planning assumptions and USEPA-approved emissions models; and in particulate matter areas, the project complies with any control measures in the SIP. Furthermore, additional analyses (known as hot-spot analyses) may be required for projects located in CO and particulate matter nonattainment or maintenance areas to examine localized air quality effects.

Local

The US Environmental Protection Agency (USEPA) has delegated responsibility to air districts to establish local rules to protect air quality. Caltrans Standard Specification 14-9.02requires compliance with all applicable air quality laws and regulations including local and air district ordinances and rules.

2020 MTP/SCS

AB 375 requires SACOG to include SCSs in its RTP updates to describe how the GHG emissions reductions set by CARB would be met through land use and transportation planning. In 2015, the SACOG Board adopted the Sacramento Region Transportation Climate Adaptation Plan as part of an update to the 2016 MTP/SCS. The plan provides high-level action and identifies key vulnerabilities to climate change in the region’s transportation infrastructure and provides recommendations for best practices and strategies to meet the state targets for reducing GHG emissions from light-duty vehicles. In 2019, SACOG approved and adopted the 2020 MTP/SCS and accompanying documents. 2020 MTP/SCS is the most recent update to its RTP, which includes implementation of transportation projects and Climate Initiatives Program that, together, would result in emissions from light-duty vehicles that meet the region’s GHG reduction targets, per AB 375. It provides for both priority and timely completion/implementation of the transportation control measures (TCMs) in the applicable SMAQMD air quality plans identified below.

SMAQMD and Yolo-Solano Air Quality Management District SIPs and Redesignation Requests

The SMAQMD and YSAQMD are the designated local authorities responsible for monitoring air pollution within the applicable portion of the Sacramento Valley Air Basin (SVAB) where the project would occur. The SMAQMD and YSAQMD develop and administer plans and programs, including SIPs and redesignation requests, to reduce air pollution levels below the health-based standards established by the state and federal governments.

On January 22, 2009, the SMAQMD adopted the 2009 Sacramento Regional 8-Hour Ozone Attainment and Reasonable Further Progress Plan. This plan set out a strategy for attaining the 1997 O_3 NAAQS and was submitted by CARB to the USEPA on April 17, 2009, as a revision to the California SIP and included revisions to the area's motor vehicle emissions budgets as well as 43 TCMs. The 2016 MTP/SCS included these TCMs and all of them were completed on or before 2018.

In 2010, SMAQMD prepared the particulate matter less than 10 microns in diameter, respirable particulate matter (PM_{10}) Implementation/Maintenance Plan and Redesignation Request for Sacramento County to fulfill the requirements for USEPA to redesignate Sacramento County from nonattainment to attainment/maintenance for the PM_{10} NAAQS. The USEPA approved SMAQMD's request through FR Vol. 78, No. 187 in 2013.

Then, in 2013, SMAQMD prepared the particulate matter less than 2.5 microns in diameter, respirable particulate matter ($PM_{2.5}$) Implementation/Maintenance Plan and Redesignation Request. It was approved by CARB and submitted to the USEPA to fulfill the requirements to redesignate Sacramento County from nonattainment to attainment/maintenance for the $PM_{2.5}$ NAAQS. In January 2017, USEPA recognized Sacramento County as attaining the 2006 $PM_{2.5}$ NAAQS; however, the nonattainment designation is still in effect.

On September 28, 2017, SMAQMD submitted the Sacramento Federal Ozone Nonattainment Area Redesignation Substitution Request for the 1979 1-hour O_3 Standard. This request demonstrated that the Sacramento Federal Ozone Nonattainment Area (SFNA) met the USEPA's requirements, based on ambient air quality monitoring to be redesignated as an attainment area for the revoked 1979 1-hour O_3 NAAQS. The SFNA was designated as a "severe" nonattainment area for the 1-hour standard, that was replaced by the more stringent 1997 8-hour O_3 NAAQS. The USEPA found that the SFNA attained the revoked 1-hour O_3 standard on October 18, 2012 (77 FR 64036). However, the District is still subject to anti-backsliding requirements for the 1-hour standard unless a Redesignation Substitution Request is approved by USEPA. Once approved, the request will redesignate the SFNA to attainment for the revoked 1-hour O_3 standard and remove the obligations associated with it.

The SMAQMD, along with the other air districts within the SFNA, developed and submitted a plan to demonstrate attainment of the 2008 8-hour NAAQS of 75 parts per billion (ppb) by an attainment year of 2024. The Sacramento Regional 2008 NAAQS 8-Hour Ozone Attainment Plan and Reasonable Further Progress Plan were approved by the SMAQMD Board on August 24, 2017, and by CARB on November 16, 2017. This plan sets motor vehicle emissions budgets and demonstrates how it complies with VMT emissions offset requirements. It was then

submitted to the USEPA, along with CARB's 2018 Updates to the California SIP, on December 18, 2017 as a revision to the California SIP. On October 29, 2020, the USEPA published in the Federal Register (85 FR 68533) a proposal to approve all or portions of the submitted plans for the Sacramento Metro nonattainment area. Comments on the proposal were collected through November 30, 2020. Once approved by the USEPA, the plan would meet all the applicable ozone nonattainment area requirements, and the plan's contingency measure requirements would be conditionally approved. The 2023 and 2024 motor vehicle emissions budgets would also be approved.

The Sacramento Regional 2008 NAAQS 8-Hour Ozone Attainment Plan and Reasonable Further Progress Plan includes one TCM that will be in place through 2024. SMAQMD's "Spare the Air" program is a year-round public education program with an episodic ozone reduction element during the summer ozone season and a general awareness during the rest of the year. It is designed to inform people when air quality is unhealthy and achieve voluntary emission reductions by encouraging them to reduce vehicle trips (i.e., VMT).

SMAQMD Rules and Regulations

SMAQMD has adopted rules and regulations applicable to construction projects in the region. These include rules/regulations applicable to visible emissions (Rule 401), fugitive dust emissions (Rule 403) application of architectural coatings (Rule 442), and cutback and emulsified asphalt paving materials (Rule 453).

In addition, SMAQMD has developed a construction mitigation protocol and standard levels. When the levels are exceeded, all feasible mitigation will be applied as required by CEQA. SMAQMD-recommended feasible MMs include enhanced exhaust controls for on-site equipment.

2.2.6.2 Affected Environment

The analysis summarized in this section is based on the Air Quality Report prepared for the project (Caltrans 2024c). The project area is within the city of Sacramento in Sacramento County, Yolo County, and Solano County and is within the SVAB which, in addition to Sacramento County includes Yolo, Yuba, Sutter, Colusa, Glenn, Butte, Tehama, and Shasta counties and parts of Solano and Placer counties. Air quality regulation in the SVAB is administered by nine different air quality management districts: Sacramento Metro, Feather River, Placer, Butte, Shasta, Tehama, Glenn, Colusa, and Yolo-Solano. The Sacramento Metropolitan Air District and the Yolo-Solano Air Quality Management District are responsible for air quality within the project area.

Meteorology (weather) and terrain can influence air quality. Certain weather parameters are highly correlated to air quality, including temperature, the amount of sunlight, and the type of winds at the surface and above the surface. Winds can transport ozone and ozone precursors from one region to another, contributing to air quality problems downwind of source regions. Furthermore, mountains can act as a barrier that prevents ozone from dispersing.

The climate of the SVAB is Mediterranean in character, with mild, rainy winter weather from November through March and warm to hot, dry weather from May through September. Sacramento Valley temperatures range from 20 to 115°F and the average annual rainfall is 20 inches. The topographic features giving shape to the SVAB are the Coast Range to the west, the Sierra Nevada to the east, and the Cascade Range to the north. These mountain ranges channel winds through the SVAB, but also inhibit the dispersion of pollutant emissions.

The predominant annual and summer wind pattern in the Sacramento Valley is the full sea breeze, commonly referred to as Delta breezes. These cool winds originate from the Pacific Ocean and flow through a sea-level gap in the Coast Range called the Carquinez Straits. In the winter (December to February), northerly winds predominate. Wind directions in the Sacramento Valley are influenced by the predominant wind flow pattern associated with each season. During about half the days from July through September, however, a phenomenon called the “Schultz Eddy,” which is a large isotropic vertical-axis eddy on the north side of the Carquinez Straits, prevents the Delta breezes from transporting pollutants north and out of the Sacramento Valley and causes the wind pattern to circle back south, which tends to keep air pollutants in the Sacramento Valley.

Existing Air Quality

The USEPA and CARB designate air basins where ambient air quality standards are exceeded as “nonattainment” areas. If standards are met, the area is designated as an “attainment” area. If there is inadequate or inconclusive data to make a definitive attainment designation, they are considered “unclassified.” National nonattainment areas are further designated as marginal, moderate, serious, severe, or extreme as a function of deviation from standards. Attainment status is based on the NAAQS and the California Ambient Air Quality Standards (CAAQS).

The Clean Air Act (CAA) identifies two types of NAAQS. Primary standards provide public health protection, including protecting the health of sensitive populations such as asthmatics, children, and the elderly. Secondary standards provide public welfare protection, including protection against decreased visibility and damage to animals, crops, vegetation, and buildings (USEPA 2022c). The CAAQS are equal to or more stringent than the NAAQS and include pollutants for which national standards do not exist. Table 2.2-4 presents the applicable NAAQS and CAAQS for the project area.

Table 2.2-4. California and National Ambient Air Quality Standards

Pollutant	Averaging Time	California Standards	National Standards	
		Concentration	Primary	Secondary
Ozone (O_3)	1 hour	0.09 ppm (180 µg/m^3)	—	Same as primary standard
	8 hours	0.070 ppm (137 µg/m^3)	0.070 ppm (137 µg/m^3)	
Respirable Particulate Matter (PM_{10})	24 hours	50 µg/m^3	150 µg/m^3	Same as primary standard
	Annual arithmetic mean	20 µg/m^3	—	
Fine Particulate Matter ($PM_{2.5}$)	24 hours	—	35 µg/m^3	Same as primary standard
	Annual arithmetic mean	12 µg/m^3	9.0 µg/m^3	
Carbon monoxide (CO)	1 hour	20 ppm (23 mg/m^3)	35 ppm (40 mg/m^3)	—
	8 hours	9.0 ppm (10 mg/m^3)	9 ppm (10 mg/m^3)	—
	8 hours (Lake Tahoe)	6 ppm (7 mg/m^3)	—	—
Nitrogen dioxide (NO_2)	1 hour	0.18 ppm (339 µg/m^3)	100 ppb (188 µg/m^3)	—
	Annual arithmetic mean	0.030 ppm (57 µg/m^3)	0.053 ppm (100 µg/m^3)	Same as primary standard
Sulfur dioxide (SO_2)	1 hour	0.25 ppm (655 µg/m^3)	75 ppb (196 µg/m^3)	—
	3 hours	—	—	0.5 ppm (1,300 µg/m^3)
	24 hours	0.04 ppm (105 µg/m^3)	0.14 ppm (for certain areas)	—
	Annual arithmetic mean	—	0.030 ppm (for certain areas)	—
Lead (Pb)	30-day average	1.5 µg/m^3	—	—
	Calendar quarter	—	1.5 µg/m^3	Same as Primary Standard
	Rolling 3-month average	—	0.15 µg/m^3	
Visibility-reducing particles	8 hours	See Footnote [1]	No National Standards	
Sulfates	24 hours	25 µg/m^3		
Hydrogen sulfide	1 hours	0.03 ppm (42 µg/m^3)		
Vinyl chloride	24 hours	0.01 ppm (26 µg/m^3)		

Source: USEPA 2022c

Note: 1. In 1989, CARB converted both the general statewide 10-mile visibility standard and the Lake Tahoe 30-mile visibility standard to instrumental equivalents, which are "extinction of 0.23 per kilometer" and "extinction of 0.07 per kilometer" for the statewide and Lake Tahoe Air Basin standards, respectively.

Key: ppb = parts per billion, µg/m3 =micrograms per liter, PM_{10} = particulate matter less than 10 microns in diameter, $PM_{2.5}$ = particulate matter less than 2.5 microns in diameter, mg/m3 = milligrams per cubic meter

As shown in Table 2.2-5, Yolo and Sacramento Counties are designated Nonattainment (Serious) for the 2015 8-hour O3 NAAQS and Nonattainment (Severe-15) for the 2008 8-hour O3 NAAQS. The Sacramento County and the eastern portion of Yolo County is designated Nonattainment (Moderate) for the 2006 24-hour $PM_{2.5}$ NAAQS. Sacramento County is also designated Maintenance (Moderate) for the 1987 24-hour PM_{10} NAAQS. The counties are Attainment/Unclassified for all other NAAQS. For the more stringent CAAQS, both Sacramento County and Yolo County are designated Nonattainment for O_3 and PM_{10} and are in attainment of all other State standards.

Table 2.2-5. Attainment Status for Sacramento/Yolo Counties

Pollutant	State Status		Federal Status	
	Yolo	Sacramento	Yolo	Sacramento
Ozone (O_3)	Nonattainment – Transitional	Nonattainment	(2015 8-hour) Nonattainment – Serious (2008 8-hour) Nonattainment – Severe 15	(2015 8-hour) Nonattainment – Serious (2008 8-hour) Nonattainment – Severe 15
Particulate Matter (PM10)	Nonattainment	Nonattainment	(1987 24-hour) Attainment – Unclassified	(1987 24-hour) Maintenance – Moderate
Fine Particulate Matter ($PM_{2.5}$)	Unclassified	Attainment	(2012 annual) Attainment – Unclassified (2006 24-hour) Nonattainment – Moderate (2024 24-hour) N/A (designation pending)	(2012 annual) Attainment – Unclassified (2006 24-hour) Nonattainment – Moderate (2024 24-hour) N/A (designation pending)
Carbon Monoxide (CO)	Attainment	Attainment	(1971 1-hour, 8-hour) Unclassifiedble/Attainment	(1971 1-hour, 8-hour) Unclassifed/Attainment
Nitrogen Dioxide (NO_2)	Attainment	Attainment	(1971 1-hour, annual) Unclassified/Attainment	(1971 1-hour, annual) Unclassified/Attainment
Sulfur Dioxide (SO_2)	Attainment	Attainment	(1971, 2010 1-hour, 3-hour, 24-hours, annual) Unclassified/Attainment	(1971, 2010 1-hour, 3-hour, 24-hours, annual) Unclassified/Attainment
Lead	Attainment	Attainment	(1978 30-day, quarter, 3-month) Unclassified/Attainment	(1978 30-day, quarter, 3-month) Unclassified/Attainment
Sulfates	Attainment	Attainment	N/A	N/A
Visibility Reducing Particles	Unclassified	Unclassified	N/A	N/A
Sulfates	Attainment	Attainment	N/A	N/A
Hydrogen Sulfide	Unclassified	Unclassified	N/A	N/A
Vinyl Chloride	N/A	N/A	N/A	N/A

The California Air Resources Board maintains the only monitoring station that collects ambient air quality data in Sacramento County. The nearest monitoring location is found in Sacramento County approximately 0.75-mile northeast of the project location. Data from the monitoring station are shown in Table 2.2-6 and Figure 2.2-3 shows the monitoring station location.

Sensitive receptors are places where people susceptible to air pollution may stay for long periods of time. These locations include land uses such as residential, schools, playgrounds, parks, childcare centers and hospitals. There are several land uses and many residences that are within close vicinity of the project. The project limits are depicted with a map in Appendix I.

Table 2.2-6. Criteria Air Pollutants Data (Sacramento T Street Monitoring Station)

Pollutant	Averaging Time	Applicable Standard	2018	2019	2020	2021	2022
Ozone (O_3)	1-Hour	Maximum Concentration (ppm)	0.097	0.100	0.112	0.091	0.106
		Number of Days State Standard Exceeded	0	0	0	0	1
	8-Hour	Maximum Concentration (ppm)	0.084	0.074	0.076	0.080	0.079
		Number of Days National Standard Exceeded (>0.075ppm)	1	1	3	1	3
		Number of Days State Standard Exceeded (>0.07ppm)	1	1	3	1	3
Particulate Matter 10 Microns or Less (PM_{10})	24-Hour	Maximum Concentration ($\mu g/m^3$)	309.5	179.1	298	132	60.2
		Number of Days National Standard Exceeded	6	1	4	0	0
		Number of Days State Standard Exceeded	22	24	25	59	6
	Annual	State Annual Average (20 $\mu g/m^3$)	29.7	20.7	20.2	31.2	21.0
Particulate Matter 2.5 Microns or Less ($PM_{2.5}$)	24-Hour	Maximum Concentration ($\mu g/m^3$)	263.3	37.1	30.7	26.2	33.1
		Number of Days State Standard Exceeded	0	0	0	0	0
	Annual	National Annual (12.0 $\mu g/m^3$)	11.4	7.7	14.8	8.8	8.5
Carbon Monoxide (CO)*	1-Hour	Maximum Concentration (ppm)	3.2	1.4	4.3	2.2	2.0
		Number of Days National Standard Exceeded	0	0	0	0	0
		Number of Days State Standard Exceeded	0	0	0	0	0
	8-Hour	Maximum Concentration (ppm)	3.0	1.3	1.6	1.3	1.6
		Number of Days State Standard Exceeded	0	0	0	0	0

Source: http://www.epa.gov/airdata/; https://www.arb.ca.gov/adam/topfour/topfour1.php
Note: *Carbon monoxide concentrations have not been measured at the T Street station since 2006; the nearest monitoring station is located approximately 1 mile north to the project location at 100 Bercut Drive, Sacramento
Key: µg/m3 =micrograms per cubic meter, ppm = parts per million

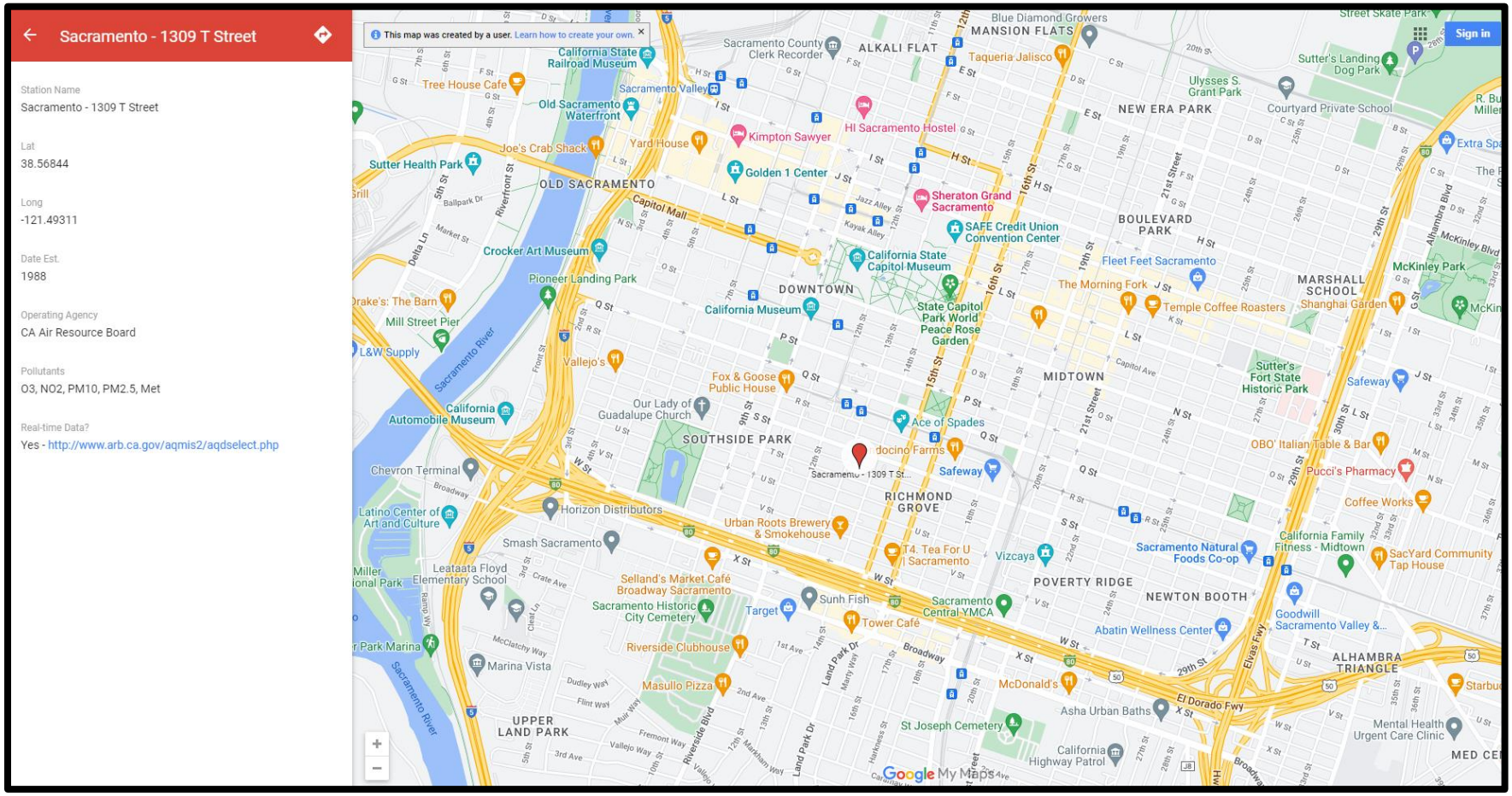


Figure 2.2-3. Air Quality Monitoring Station Located in Downtown Sacramento

Sensitive receptors are places where people susceptible to air pollution may stay for long periods of time. These locations include land uses such as residential, schools, playgrounds, parks, childcare centers and hospitals. There are several land uses and many residences that are within close vicinity of the project. The project limits are depicted with a map in Appendix I. Sensitive receptors within 500 feet of the Project are shown in Table 2.2-7.

Table 2.2-7. Sensitive Receptors Located Within 500 ft of the Project Site.

Receptor	Description	Distance Between Receptor and Project (ft)
UC Davis	University	500
Toad Hollow Dog Park	Park	300
Play Fields Park	Park	350
Playground at New Harmony Mutual Housing Community	Playground	350
Merryhill Preschool	Preschool	500
Yolo High School	School	450
Westacre Park	Playground	150
River Otter Park	Park	100
Davis Urgent Care	Medical Facility	400
Concentra Urgent Care	Medical Facility	250
Davita West	Medical Facility	250
Sacramento Valley Charter School	School	200
River Bend Nursing Center	Medical Facility	300
Southside Park	Park/Playground	150

Mobile Source Air Toxics

In addition to the criteria air pollutants, the US EPA also regulates a list of air toxics (64 FR 38706). Toxic air pollutants or hazardous air pollutants (HAPs) are known to cause or suspected of causing cancer or other serious health ailments. Controlling air toxic emissions became a national priority with the passage of the Clean Air Act Amendments (CAAA) of 1990, whereby Congress mandated that US EPA regulate 188 air toxics, also known as hazardous air pollutants. In 2001, US EPA issued its first Mobile Source Air Toxics Rule, which identified 21 MSAT compounds as being hazardous air pollutants that required regulation. A subset of these MSAT compounds was identified as having the greatest influence on health. EPA issued the second MSAT Rule in 2007, which generally supported the findings of the first rule and provided additional recommendations of compounds having the greatest impact on health. The rule also identified several engine emission certification standards that must be implemented. US EPA has assessed this expansive list in their latest rule on the Control of Hazardous Air Pollutants from Mobile Sources (Federal Register, Vol. 72, No. 37, page 8430, February 26, 2007) and identified a group of 93 compounds emitted from mobile sources that are listed in their Integrated Risk Information System (IRIS).

The 21 HAPs identified by US EPA as MSATs are emitted from highway vehicles and non-road equipment. Some toxic compounds are present in fuel and are emitted to the air when the fuel evaporates or passes through the engine unburned. Other toxics are emitted from the incomplete combustion of fuels or as by-products. Metal air toxics result from engine wear or from impurities in oil or gasoline. US EPA has identified seven compounds with significant contributions from mobile sources that are among the national and regional-scale cancer risk drivers from their 1999 National Air Toxics Assessment (NATA). These are acrolein, benzene, 1,3-butadiene, diesel particulate matter (DPM) that includes diesel exhaust organic gases, formaldehyde, naphthalene, and polycyclic organic matter. While FHWA considers these the priority mobile source air toxics, the list is subject to change and may be adjusted in consideration of future EPA rules.

The US EPA is the lead federal agency responsible for administering the Clean Air Act and has certain responsibilities regarding the health effects of MSATs. In its 2001 rule (66 FR 17229), US EPA examined the impacts of existing and newly promulgated mobile source control programs, including its reformulated gasoline program, national low emission vehicle standards, Tier 2 motor vehicle emissions standards and gasoline sulfur control requirements, and proposed heavy duty engine and vehicle standards and on-highway diesel fuel sulfur control requirements. The agency is preparing another rule under authority of Clean Air Act Section 202(l) that will address these issues and could adjust the full 21 and primary seven MSATs.

FHWA's ongoing work in air toxics includes a research program to better understand and quantify the contribution of mobile sources to air emissions, the establishment of policies for addressing mobile source emissions in environmental reports, and the assessment of scientific literature on health impacts associated with motor vehicle emissions. California's vehicle emission control and fuel standards are more stringent than federal standards and are effective earlier. CARB found that DPM contributes over 70 percent of the known risk from air toxics and poses the greatest cancer risks among all identified air toxics. Diesel trucks contribute more than half of the total diesel combustion sources. In response, CARB adopted a Diesel Risk Reduction Plan with control measures to reduce the overall DPM emissions by about 85 percent from 2000 to 2020. Part of the plan included recently adopted regulation that requires operators of truck and bus fleets in California to retrofit or replace vehicles to meet US EPA NOX and $PM_{2.5}$ emission standards for 2010 model trucks (13 C.C.R. section 2025). Implementation of this regulation begins in 2014. By 2023, nearly all trucks and buses operating in California will need to meet 2010 model year engine emission standards.

Emissions of MSATs are anticipated to decrease substantially in future years. According to an FHWA analysis using EPA's MOVES2010b model combined reduction of 83 percent in the total emissions for the priority MSATs from 2010 to 2050 is projected. This would occur while vehicle-miles travelled (VMT) is assumed to increase by 102 percent. The combined State and federal regulations are expected to result in greater emission reductions, more quickly, than the FHWA analysis indicates.

2.2.6.3 Environmental Consequences

Regional Conformity

Regional conformity requires planned and programmed transportation projects be included in a regional emissions analysis; however, certain types of projects are exempt from conformity requirements. These project types are found by the USEPA to be neutral from an air quality or emissions standpoint and are listed in the Conformity Regulations at 40 CFR 93.126, 40 CFR 92.127, and 40 CFR 92.128. If a project is exempt, it may need little or no conformity analysis and does not need to be individually listed and considered in the regional emissions analysis (i.e., regional conformity modeling).

Each of the Build Alternatives would improve operations, reduce congestion, and increase vehicle occupancy within the travel corridor. Because the proposed alternatives would add lanes, they would add roadway capacity, and would not be considered exempt from either regional or project-level conformity requirements. Therefore, the project requires an individual listing in the RTP (i.e., 2020 MTP/SCS) and their associated regional emissions analyses to demonstrate regional conformity.

The proposed project is listed in the SACOG 2020 MTP/SCS financially constrained Regional Transportation Plan, amendment number 16, which was found to conform by FHWA on November 20, 2019, and FHWA and FTA made a regional conformity determination finding on December 16, 2022. The project is also included in SACOG financially constrained 2023-2026 Metropolitain Transportation Improvement Program. The 2023-2026 Metropolitain Transportation Improvement Program was determined to conform by FHWA and FTA on April 16, 2021. The design concept and scope of the proposed project is consistent with the project description in the 2020 RTP, 2023-2026 MTIP, and the “open to traffic” assumptions of the SACOG regional emissions analysis.

Project-Level Conformity

Project-level conformity requires project sponsors to demonstrate that their transportation project would not cause or contribute to any new localized CO, PM_{10}, and/or $PM_{2.5}$ violations, increase the frequency or severity of any existing CO, PM_{10}, and/or $PM_{2.5}$ violations, or delay timely attainment of any NAAQS or any required interim emission reductions or other SIP milestones. This conformity is demonstrated through a hot-spot analysis where Build and No-Build emissions are modeled, both with and without any MMs committed to in the RTP.

The project area is in an attainment/unclassified area for CO, an attainment/maintenance area for PM_{10}, and a nonattainment area for $PM_{2.5}$. Thus, a project-level conformity analysis applies to the project for both PM_{10} and $PM_{2.5}$ under 40 CFR 93.109. Hot-spot analysis for PM_{10} and $PM_{2.5}$ is only required for projects found to meet the definition of a Project of Air Quality Concern (POAQC) through interagency consultation with the MPO’s the Project Level Conformity Group (PLCG).

The proposed project has undergone Interagency Consultation (IAC) regarding POAQC determination. Interagency Consultation participants concurred that the project is not a POAQC

on October 15, 2021, by EPA, and October 18, 2021, by FHWA. These findings were reaffirmed by IAC on April 26, 2024, after an advertised SACOG meeting. The proposed project is not considered a POAQC because it does not meet the definition as defined in U.S. EPA's Transportation Conformity Guidance for Quantitative Hot-spot Analysis and $PM_{2.5}$ and PM_{10} Nonattainment and Maintenance Areas October 2021 (see Appendix J). Therefore, PM hot-spot analysis is not required. FHWA issued a project-level conformity determination on April 27, 2024 (see Appendix J).

40 CFR 93.123(c)(5) states that: "CO, PM_{10}, and $PM_{2.5}$ hot-spot analyses are not required to consider construction-related activities which cause temporary increases in emissions. Each site which is affected by construction-related activities shall be considered separately, using established 'Guideline' methods. Temporary increases are defined as those which occur only during the construction Phase and last 5 years or less at any individual site." Because construction of the project is expected to last less than 5 years, an evaluation of CO, PM_{10}, and $PM_{2.5}$ emissions during project construction is not required for project-level conformity determination.

No Build Alternative 1

Construction

Under No Build Alternative 1, managed lanes and transportation improvements would not be constructed. There would be no construction emissions.

Operation

Under No Build Alternative 1, the managed lanes and transportation improvements would not be constructed. However, vehicles would continue to travel within the project area contributing to long-term emissions. As shown in Table 2.2-10 and Table 2.2-8, PM_{10} and $PM_{2.5}$ emissions are calculated to increase by up to 22.2 percent by year 2049 under No Build Alternative 1 conditions. The increase is not considered substantial.

Build Alternatives 2a and 2b

Short-Term Construction Impacts

Construction-related emissions are generally short-term in duration but may still cause adverse air quality impacts.

Construction Dust

Dust would be generated during grading and construction operations. The amount of dust generated would be highly variable and is dependent on the size of the area disturbed, amount of activity, soil conditions and meteorological conditions.

Although grading and construction activities would be temporary, they would have the potential to cause both nuisance and health air quality impacts. PM_{10} is the pollutant of greatest concern associated with dust. If uncontrolled, elevated PM_{10} levels could occur downwind of actively

disturbed areas. In addition, dust fall on adjacent properties could be a nuisance. If uncontrolled, dust generated by grading and construction activities would have an adverse effect on air quality. The project would comply with rules and regulations pertaining to the control of fugitive dust and prevention of public nuisance published by the SMAQMD and YSAQMD. In addition, Standard Measures (Appendix E) would include AQ-1 and GHG-1. Therefore, there would be no adverse effect from fugitive dust emissions during the construction of the project.

Construction Equipment Exhaust

Daily Maximum construction emissions were estimated using the latest version of Caltrans' CAL-CET2021 emissions model which uses emission factors from EMFAC2021 developed by CARB. Detailed construction plans were not available at the time of this analysis. Therefore, equipment quantities and construction phases provided by CAL-CET2021 were used along with maximum project durations provided by the Caltrans' design engineering team. Appendix J lists all the construction inputs provided and entered into CAL-CET2021. Inputs to the model included the construction start date, total construction cost, estimated working days, and project length. Table 2.2-8 shows the maximum construction emissions per project phase.

Table 2.2-8. Maximum Construction Emissions

Project Phase	Reactive Organic Gases	Nitrogen Oxides	Particulate Matter 10 Microns or Less	Particulate Matter 2.5 Microns or Less
Grubbing/Land Clearing	10.0 lbs/day	67.4 lbs/day	214.1 lbs/day	25.2 lbs/day
Roadway Excavation/Removal	13.8 lbs/day	107.7 lbs/day	96.0 lbs/day	15.0 lbs/day
Structure Excavation/Removal	10.6 lbs/day	59.2 lbs/day	135.7 lbs/day	16.4 lbs/day
Base/Subbase/Imported Borrow	15.2 lbs/day	129.7 lbs/day	139.6 lbs/day	20.2 lbs/day
Structure Concrete	11.7 lbs/day	67.8 lbs/day	4.3 lbs/day	4.2 lbs/day
Paving	13.7 lbs/day	105.9 lbs/day	5.7 lbs/day	5.5 lbs/day
Drainage/Utilities/Sub-Grade	11.0 lbs/day	48.5 lbs/day	67.8 lbs/day	4.4 lbs/day
Traffic Signalization	17.4 lbs/day	137.3 lbs/day	6.6 lbs/day	6.4 lbs/day
Total (Tons/Construction project)	2.0	13.5	6.1	1.3
SMAQMD Standard Levels	65 lbs/day	85 lbs/day	80 lbs/day	82 lbs/day
YSAQMD Standard Levels	55 lbs/day	55 lbs/day	80 lbs/day	82 lbs/day

Caltrans has statewide jurisdiction on projects within its right-of-way. Since the setting for projects varies extensity across the state, Caltrans has not and will not develop standard levels. Further, because most air district thresholds have not been established by regulation or by delegation from a federal or state agency with regulatory authority over Caltrans, Caltrans is not required to adopt those standard levels in Caltrans' documents. The SMAQMD and YSAQMD standard levels are provided for reference.

Construction equipment and associated heavy-duty truck traffic generate diesel exhaust. Diesel exhaust poses both a health and nuisance impact to nearby receptors. These construction

activities are expected to occur during a relatively short time and therefore would not have an adverse effect.

Long-Term Operational Impacts

The operational emissions analysis compares emissions for existing/baseline conditions to the forecasted conditions for the No-Build and Build alternatives given the project's opening year (2029), RTP horizon year (2040), and design year (2049) with and without an HOV-HOV connector based on the traffic data provided from the Traffic Forecasting from Caltrans (Tables 2.2-9 through 2.2-12). Air pollutant emissions associated with the roadways in the project area were estimated using specific traffic data and conditions provided by the Caltrans District 3 traffic forecasting and the CT-EMFAC2021 emission model.

Table 2.2-9. Project Total Average Annual Daily Traffic, Truck Average Annual Daily Traffic, and Vehicle Miles Traveled for Opening, Metropolitan Transportation Improvement Program, and Design Years

Opening Year 2029	Alt 1 (No Build)	Alt 2 (HOV)	Alt 3 (HOT)	Alt 4 (HOT 3+)	Alt 5 (Express Lane)	Alt 6 (Transit)	Alt 7 (Repurpose #1 Lane)
AADT	157,663	173,786	173,806	171,958	169,971	160,847	156,565
Truck % Change from No Build (Alt Option a)	0	10.2	10.2	9.0	7.8	2.0	-0.7
Truck % Change from No Build (Alt Option b)	0	10.2	10.2	9.1	7.8	2.0	-0.7
Truck AADT (Alt Option a)	112,114	13,352*	13,354*	13,212*	13,059*	12,359*	12,029*
Truck AADT (Alt Option b)	11,667	12,865	12,866	12,730	12,583	11,907	11,590
VMT	3,880,995	4,237,651	4,239,821	4,196,181	4,176,124	3,953,571	3,867,187

MTIP Year 2040	Alt 1 (No Build)	Alt 2 (HOV)	Alt 3 (HOT)	Alt 4 (HOT 3+)	Alt 5 (Express Lane)	Alt 6 (Transit)	Alt 7 (Repurpose #1 Lane)
AADT	162,995	175,741	175,832	173,350	172,582	163,081	159,511
Truck % Change from No Build (Alt Option a)	0	7.8	7.8	6.3	5.9	0	-2.1
Truck % Change from No	0	7.8	7.9	6.4	5.9	0.1	-2.1

Build (Alt Option b)							
Truck AADT (Alt Option a)	12,524	13,504*	13,511*	13,320*	13,261*	12,531*	12,257*
Truck AADT (Alt Option b)	12,066	13,010	13,016	12,833	12,776	12,072	11,808
VMT	4,026,381	4,324,520	4,329,187	4,272,099	4,252,533	4,025,319	3,931,677

Design Year 2049	Alt 1 (No Build)	Alt 2 (HOV)	Alt 3 (HOT)	Alt 4 (HOT 3+)	Alt 5 (Express Lane)	Alt 6 (Transit)	Alt 7 (Repurpose #1 Lane)
AADT	180,290	190,362	188292	1863744	186,374	176,866	174,064
Truck % Change from No Build (Alt Option a)	0	5.4	5.6	4.4	3.4	-1.9	-3.5
Truck % Change from No Build (Alt Option b)	0	5.4	5.6	4.4	3.4	-1.9	-3.5
Truck AADT (Alt Option a)	13,852	14,599*	14,624*	14,465*	14,318*	13,587*	13,372*
Truck AADT (Alt Option b)	13,346	14,067	14,125	13,890	13,187	13,093	12,885
VMT	4,495,673	4,683,131	4,691,980	4,642,888	4,599,005	4,381,640	4,276,831

Note: *The truck percentage numbers were varied: they reflect no connector between I-80 and SR-50
Key: AADT=average annual daily traffic; HOT=high-occupancy toll; HOV=high-occupancy vehicle; HOT= MTIP=Metropolitan Transportation Improvement Program; VMT=vehicle miles traveled,

Table 2.2-10 Estimate of Air Pollutants by the Project Operations for Opening Year 2029

Opening Year 2029		Baseline (Existing Year 2019)	Alt 1 (No Build)	Alt 2 (HOV)	Alt 3 (HOT)	Alt 4 (HOT 3+)	Alt 5 (Express Lane)	Alt 6 (Transit)	Alt 7 (Repurpose #1 Lane)
PM2.5 (lbs/day)		139.25	127.52	138.48	137.60	135.54	134.48	131.37	128.03
PM10 (lbs/day)		610.76	632.23	689.94	687.86	679.21	672.88	648.59	628.45
NOx (lbs/day)		1996.39	722.43	799.26	779.45	759.98	752.33	747.42	813.10
ROG (lbs/day)		402.65	256.07	265.81	258.21	253.89	253.03	267.80	293.99
Diesel PM (lbs/day)		24.57	7.32	8.64	8.59	8.39	8.23	7.40	8.07
Comparison between Existing and Build (%)	$PM_{2.5}$		-8.4	-0.6	-1.2	-2.7	-3.4	-5.7	-8.1
	PM_{10}		3.5	13.0	12.6	11.2	10.2	6.2	2.9
	NOx		-63.8	-60.0	-61.0	-61.9	-62.3	-62.6	-59.3
	ROG		-36.4	-34.0	-35.9	-36.9	-37.2	-33.5	-27.0
	Diesel PM		-70.2	-64.8	-65.0	-65.8	-66.5	-69.0	-67.2
Comparison Between Build and No Build (%)	$PM_{2.5}$			8.6	7.9	6.3	5.5	3.0	0.4
	PM_{10}			9.1	8.8	7.4	6.4	2.6	-0.6
	NOx			10.6	7.9	5.2	4.1	3.5	12.6
	ROG			3.8	0.8	-0.8	-1.2	4.6	14.8
	Diesel PM			18.0	17.4	14.7	12.5	1.1	10.2

Table 2.2-11 Estimate of Air Pollutants by the Project Operations for MTIP Year 2040

MTIP Year 2040	Baseline (Existing Year 2019)	Alt 1 (No Build)	Alt 2 (HOV)	Alt 3 (HOT)	Alt 4 (HOT 3+)	Alt 5 (Express Lane)	Alt 6 (Transit)	Alt 7 (Repurpose #1 Lane)
PM2.5 (lbs/day)	139.25	128.18	135.35	135.03	132.52	131.39	128.21	124.76
PM10 (lbs/day)	610.76	660.65	702.97	702.42	690.88	686.30	660.85	642.31

MTIP Year 2040		Baseline (Existing Year 2019)	Alt 1 (No Build)	Alt 2 (HOV)	Alt 3 (HOT)	Alt 4 (HOT 3+)	Alt 5 (Express Lane)	Alt 6 (Transit)	Alt 7 (Repurpose #1 Lane)
NOx (lbs/day)		1996.39	430.98	455.54	440.23	426.05	419.07	430.29	490.45
ROG (lbs/day)		402.65	194.51	191.55	187.51	182.80	180.49	194.10	212.38
Diesel PM (lbs/day)		24.57	5.21	6.37	6.32	6.21	6.19	5.21	5.83
Comparison between Existing and Build (%)	$PM_{2.5}$		-7.9	-2.8	-3.0	-4.8	-5.6	-7.9	-10.4
	PM_{10}		8.2	15.1	15.0	13.1	12.4	8.2	5.2
	NOx		-78.4	-77.2	-77.9	-78.7	-79.0	-78.4	-75.4
	ROG		-51.7	-52.4	-53.4	-54.6	-55.2	-51.8	-47.3
	Diesel PM		-78.8	-74.1	-74.3	-74.7	-74.8	-78.8	-76.3
Comparison Between Build and No Build (%)	$PM_{2.5}$			5.6	5.3	3.4	2.5	0.0	-2.7
	PM_{10}			6.4	6.3	4.6	3.9	0.0	-2.8
	NOx			5.7	2.1	-1.1	-2.8	-0.2	13.8
	ROG			-1.5	-3.6	-6.0	-7.2	-0.2	9.2
	Diesel PM			22.3	21.4	19.4	18.9	0.1	12.0

Table 2.2-12 Estimate of Air Pollutants by the Project Operations in Design Year 2049

Design Year 2049	Baseline (Existing Year 2019)	Alt 1 (No Build)	Alt 2 (HOV)	Alt 3 (HOT)	Alt 4 (HOT 3+)	Alt 5 (Express Lane)	Alt 6 (Transit)	Alt 7 (Repurpose #1 Lane)
PM2.5 (lbs/day)	139.25	145.40	148.09	148.51	146.75	146.73	141.52	136.59
PM10 (lbs/day)	610.76	746.33	771.97	774.99	764.38	762.81	729.06	708.99
NOx (lbs/day)	1996.39	533.36	436.59	418.64	412.55	409.46	496.49	470.30
ROG (lbs/day)	402.65	249.29	191.80	187.09	186.14	187.00	230.44	213.14
Diesel PM (lbs/day)	24.57	4.58	5.70	5.61	5.38	5.18	4.63	5.16

Design Year 2049		Baseline (Existing Year 2019)	Alt 1 (No Build)	Alt 2 (HOV)	Alt 3 (HOT)	Alt 4 (HOT 3+)	Alt 5 (Express Lane)	Alt 6 (Transit)	Alt 7 (Repurpose #1 Lane)
Comparison between Existing and Build (%)	$PM_{2.5}$		4.4	6.3	6.7	5.4	5.4	1.6	-1.9
	PM_{10}		22.2	26.4	26.9	25.2	24.9	19.4	16.1
	NOx		-73.3	-78.1	-79.0	-79.3	-79.5	-75.1	-76.4
	ROG		-38.1	-52.4	-53.5	-53.8	-53.6	-42.8	-47.1
	Diesel PM		-81.3	-76.8	-77.2	-78.1	-78.9	-81.1	-79.0
Comparison Between Build and No Build (%)	$PM_{2.5}$			1.8	2.1	0.9	0.9	-2.7	-6.1
	PM_{10}			3.4	3.8	2.4	2.2	-2.3	-5.0
	NOx			-18.1	-21.5	-22.7	-23.2	-6.9	-11.8
	ROG			-23.1	-25.0	-25.3	-25.0	-7.6	-14.5
	Diesel PM			24.4	22.5	17.4	13.1	1.1	12.6

Carbon Monoxide Analysis

U.S. EPA declared that transportation conformity requirements related to CO in Sacramento ended on June 1, 2018. That date marked 20 years from the redesignation of the areas to attainment and implementation of a maintenance plan. The approved maintenance plan for Sacramento did not extend the maintenance plan period beyond 20 years from redesignation. Consequently, Transportation Conformity requirements for CO ceased to apply after June 1, 2018 (i.e., 20 years after the effective date of the U.S. EPA's approval of the first ten-year maintenance plan and redesignation of the areas to attainment for the CO NAAQS.

$PM_{2.5}$/PM_{10} Analysis

The proposed project has undergone Interagency Consultation (IAC) regarding POAQC determination. Interagency Consultation participants concurred that the project is not a POAQC on October 15, 2021 by EPA and on October 18, 2021 by FHWA. These findings were reaffirmed by IAC on April 26, 2024, after an advertised SACOG meeting. The proposed project is not considered a POAQC because it does not meet the definition as defined in U.S. EPA's Transportation Conformity Guidance. Therefore, PM hot-spot analysis is not required.

The project is located in a particulate matter $PM_{2.5}$ maintenance area and it has been determined that the project is not a project of air quality concern. Project-level hot-spot analysis for particulate matter is therefore not required for a conformity determination.

Table 2.2-13 and Table 2.2-14 show that the total daily PM_{10} and $PM_{2.5}$ emissions for the Build and No Build alternatives in the opening year and the horizon year would be higher than existing conditions. However, the increase of total daily PM_{10} emissions is estimated to be 9. percent, 6.4 percent, and 3.1 percent of PM_{10} for Alternative 2b with opening year 2029, MTP year 2040, and Design year 2049, respectively. This increase is not considered substantial.

$PM_{2.5}$ emissions for Build Alternative 2b are estimated to increase 8.6 percent, 5.6 percent, 1.9 percent with opening year 2029, MTP year 2040, and Design year 2049, respectively. It is anticipated that the decreases of PM_{10} and $PM_{2.5}$ emissions for Build Alternative 2a would be associated with less traffic generated without an HOV-HOV connector. Therefore, the difference between the Build Alternatives and the No Build Alternative 1 would not be significant in terms of PM_{10} and $PM_{2.5}$ in regard to the increase of total AADT between the Build Alternatives and the No Build Alternative 1 with an HOV-HOV connector.

Table 2.2-13. Total Daily Particulate Matter (10 Microns or Less) Emissions with and *without an HOV-HOV Connector

Opening Year 2029	HOV Connector	Baseline (Existing Year 2019)	Alt 1 (No Build)	Alt 2 (HOV)	Alt 3 (HOT)	Alt 4 (HOT 3+)	Alt 5 (Express Lane)	Alt 6 (Transit)	Alt 7 (Repurpose #1 Lane)
PM_{10} Emission (lb)	Alt Option a	610.8	632.2	597.4	597.2	593.4	589.7	561.5	544.0
	Alt Option b			689.9	687.9	672.9	648.6	628.6	628.4
% Change between Build/No-Build	Alt Option a	N/A	N/A	-5.5	-5.5	-6.1	-6.7	-11.2	-14.0
	Alt Option b			9.1	8.8	6.4	2.6	-0.6	-0.6
% Change between Existing/Build	Alt Option a	N/A	3.5	-2.2	-2.2	-2.9	-3.5	-8.1	-10.9
	Alt Option b			13.0	12.6	10.2	6.2	2.9	2.9

MTIP Year 2040	HOV Connector	Baseline (Existing Year 2019)	Alt 1 (No Build)	Alt 2 (HOV)	Alt 3 (HOT)	Alt 4 (HOT 3+)	Alt 5 (Express Lane)	Alt 6 (Transit)	Alt 7 (Repurpose #1 Lane)
PM_{10} Emission (lb)	Alt Option a	N/A	660.6	609.3	607.6	597.6	594.4	571.6	555.8
	Alt Option b			703.0	702.4	690.9	686.3	660.8	642.3
% Change between Build/No-Build	Alt Option a	N/A	N/A	-7.8	-8.0	-9.5	-10.0	-13.5	-15.9
	Alt Option b			6.4	6.3	4.6	3.9	0.1	-2.8
% Change between Existing/Build	Alt Option a	N/A	8.2	-0.2	-0.5	-2.2	-2.7	-6.4	-9.0
	Alt Option b			15.1	15.0	13.1	12.4	8.2	5.2

Design Year 2049	HOV Connector	Baseline (Existing Year 2019)	Alt 1 (No Build)	Alt 2 (HOV)	Alt 3 (HOT)	Alt 4 (HOT 3+)	Alt 5 (Express Lane)	Alt 6 (Transit)	Alt 7 (Repurpose #1 Lane)
PM_{10} Emission (lb)	Alt Option a	N/A	746.3	668.6	671.5	665.5	659.4	630.8	613.8
	Alt Option b			772.0	775.0	764.4	762.8	729.1	709.0
% Change between Build/No-Build	Alt Option a	N/A	N/A	-10.4	-10.0	-10.8	-11.6	-15.5	-17.8
	Alt Option b			3.5	3.9	3.0	2.2	-2.3	-5.0
% Change between Existing/Build	Alt Option a	N/A	22.2	9.5	9.9	9.0	8.0	3.3	0.5
	Alt Option b			26.4	26.9	25.1	24.9	19.4	6.1

Table 2.2-14. Total Daily Particulate Matter (2.5 Microns or Less) Emissions with and *without an HOV-HOV Connector

Opening Year 2029	HOV Connector	Baseline (Existing Year 2019)	Alt 1 (No Build)	Alt 2 (HOV)	Alt 3 (HOT)	Alt 4 (HOT 3+)	Alt 5 (Express Lane)	Alt 6 (Transit)	Alt 7 (Repurpose #1 Lane)
$PM_{2.5}$ Emission (lb)	Alt Option a	139.2	127.5	120.0	119.8	119.3	118.9	113.8	110.9
	Alt Option b			138.5	137.6	135.5	134.5	131.4	128.0
%Change between Build/No-Build	Alt Option a	N/A	N/A	-6.3	-6.0	-6.4	-6.7	-10.7	-13.0
	Alt Option b			8.6	7.9	6.3	5.5	3.1	0.4
%Change between Existing/Build	Alt Option a	N/A	-8.4	-13.7	-13.9	-14.3	-14.6	-18.2	-20.3
	Alt Option b			-0.5	-1.1	-2.7	-3.4	-5.6	-8.0

MTIP Year 2040	HOV Connector	Baseline (Existing Year 2019)	Alt 1 (No Build)	Alt 2 (HOV)	Alt 3 (HOT)	Alt 4 (HOT 3+)	Alt 5 (Express Lane)	Alt 6 (Transit)	Alt 7 (Repurpose #1 Lane)
$PM_{2.5}$ Emission (lb)	Alt Option a	N/A	128.2	117.5	116.8	114.6	113.9	110.9	108.0
	Alt Option b			135.4	135.0	132.5	131.4	128.2	124.8
%Change between Build/No-Build	Alt Option a	N/A	N/A	-8.3	-8.9	-10.6	-11.2	-13.5	-15.8
	Alt Option b			5.6	5.3	3.4	0.8	0.1	-2.7
%Change between Existing/Build	Alt Option a	N/A	-7.9	-15.6	-16.0	-17.7	-18.2	-20.3	-22.4
	Alt Option b			-2.7	-3.0	-4.8	-5.6	-7.9	-10.3

Design Year 2049	HOV Connector	Baseline (Existing Year 2019)	Alt 1 (No Build)	Alt 2 (HOV)	Alt 3 (HOT)	Alt 4 (HOT 3+)	Alt 5 (Express Lane)	Alt 6 (Transit)	Alt 7 (Repurpose #1 Lane)
$PM_{2.5}$ Emission (lb)	Alt Option a	N/A	145.4	128.4	129.1	128.1	127.0	122.5	118.4
	Alt Option b			148.1	148.5	146.8	146.7	141.5	136.6
%Change between Build/No-Build	Alt Option a	N/A	N/A	-11.7	-11.2	-11.9	-12.7	-15.7	-18.6
	Alt Option b			1.9	2.1	1.0	0.9	-2.7	-6.1
%Change between Existing/Build	Alt Option a	N/A	4.5	-7.8	-7.3	-8.0	-8.8	-12.0	-14.9
	Alt Option b			6.4	6.7	5.5	5.4	1.7	-1.9

Mobile Source Air Toxics

FHWA released updated guidance in Jan. 18, 2023 for determining when and how to address MSAT impacts in the NEPA process for transportation projects. FHWA identified three levels of analysis:

- No analysis for exempt projects or projects with no potential for meaningful MSAT effects;
- Qualitative analysis for projects with low potential MSAT effects; and
- Quantitative analysis to differentiate alternatives for projects with higher potential MSAT effects.

Projects with no impacts generally include those that a) qualify as a categorical exclusion under 23 CFR 771.117, b) qualify as exempt under the FCAA conformity rule under 40 CFR 93.126, and c) are not exempt, but have no meaningful impacts on traffic volumes or vehicle mix.

Projects that have low potential MSAT effects are those that serve to improve highway, transit, or freight operations or movement without adding substantial new capacity or creating a facility that is likely to substantially increase emissions. The large majority of projects fall into this category.

Projects with high potential MSAT effects include those that:

- Create or significantly alter a major intermodal freight facility that has the potential to concentrate high levels of Diesel Particulate Matter in a single location; or
- Create new or add significant capacity to urban highways such as interstates, urban arterials, or urban collector-distributor routes with traffic volumes where the AADT is projected to be in the range of 140,000 to 150,000, or greater, by the design year; and
- Are proposed to be located in proximity to populated areas or, in rural areas, in proximity to concentrations of vulnerable populations (i.e., schools, nursing homes, hospitals).

The latest version of CT-EMFAC, CT-EMFAC2021, was used to estimate emissions of benzene, 1,3-butadiene, acetaldehyde, formaldehyde, acrolein, ethylbenzene, naphthalene, DPM, and polycyclic organic matter. Please note that Appendix D illustrates the extent of the area considered in the MSAT analysis. Traffic activity data were estimated for each of different periods of a representative day in the baseline, opening 2029, and horizon 2049 years. Emissions were estimated for all MSATs using CT-EMFAC2021, based on EMFAC2021 and speciation factors provided by CARB and U.S. EPA.

As shown in Table 2.2-15, MSAT emission rates are anticipated to decrease substantially, especially for diesel PM, by the opening year of 2029 and even further by the horizon year of 2049. The area surrounding the project is not heavily industrialized and comprises only approximately six percent heavy trucks. The project would not substantially increase the percentage of trucks traveling along I-80 of the project limits, and local truck emissions may in

fact decrease in future analysis years 2029 and 2049 due to penetration of electric heavy duty trucks. In sum, under all Build Alternatives in the opening year and design year it is expected there would be negligible increases in MSAT emissions relative to the No Build Alternative due to the dispersion across the SACOG region and to EPA's MSAT reduction programs.

Moreover, U.S. EPA regulations for vehicle engines and fuels will cause overall MSATs to decline significantly over the next several decades. Based on regulations now in effect, an analysis of national trends with EPA's MOVES3 model forecasts a combined reduction of over 76 percent in the total annual emission rate for the priority MSAT from 2020 to 2060 while vehicle-miles of travel are projected to increase by over 31 percent. This will both reduce the background level of MSAT as well as the possibility of even minor MSAT emissions from this project.

Table 2.2-15. Mobile Source Air Toxic Emission Rates (pounds per day)

Analysis Year/ Scenario		1,3-butadiene	Acetaldehyde	Acrolein	Benzene	Diesel PM	Ethylbenzene	Formaldehyde	Naphthalene	Polycyclic organic matter
2019	Baseline (Existing Conditions)	0.84	3.89	0.08	11.84	24.57	4.59	8.87	0.77	0.22
2029	No-Build Alt1	0.36	1.82	0.04	6.23	7.32	2.77	4.09	0.34	0.10
	Build Alt 2a	*0.34	*1.68	*0.03	*5.64	*7.67	*2.48	*3.78	*0.31	*0.09
	Build Alt 2b	0.39	1.94	0.04	6.61	8.64	2.90	4.37	0.37	0.11
	Build Alt 3a	*0.33	*1.64	*0.03	*5.52	*7.56	*2.42	*3.69	*0.31	*0.09
	Build Alt 3b	0.38	1.88	0.04	6.42	8.59	2.82	4.24	0.36	0.10
	Build Alt 4a	*0.33	*1.64	*0.03	*5.52	*7.56	*2.42	*3.69	*0.31	*0.09
	Build Alt 4b	0.37	1.84	0.04	6.30	8.39	2.77	4.14	0.35	0.10
	Build Alt 5a	*0.32	*1.64	*0.03	*5.53	*7.04	*2.45	*3.69	*0.30	*0.09
	Build Alt 5b	0.37	1.83	0.04	6.26	8.23	2.76	4.12	0.35	0.10
	Build Alt 6a	0.32	1.65	0.03	5.55	6.57	2.47	3.69	0.30	0.30
	Build Alt 6b	0.37	1.90	0.04	6.50	7.40	2.90	4.26	0.35	0.10
	Build Alt 7a	0.36	1.80	0.04	6.17	7.16	2.72	4.06	0.33	0.10
	Build Alt 7b	0.42	2.08	0.04	7.23	8.07	3.20	4.70	0.39	0.12
	*% Diff. between Alt 2 and No Build	-6.7	-7.6	-6.7	-9.5	4.7	-10.7	-7.5	-6.4	-7.3
	% Diff. between Alt 2 and No Build	9.2	6.5	14.5	6.0	18.0	4.7	6.9	9.5	8.4

Analysis Year/ Scenario		1,3-butadiene	Acetaldehyde	Acrolein	Benzene	Diesel PM	Ethylbenzene	Formaldehyde	Naphthalene	Polycyclic organic matter
	*% Diff. between Alt 3 and No Build	-8.8	-9.7	-8.5	-11.5	3.3	-12.6	-9.6	-8.6	-9.7
	% Diff. between Alt 3 and No Build	6.2	3.4	12.1	3.0	17.4	1.7	3.7	6.8	5.3
	*% Diff. between Alt 4 and No Build	-9.9	-9.8	-11.5	-11.5	-0.6	-12.2	-9.8	-9.7	-10.0
	% Diff. between Alt 4 and No Build	3.8	1.1	7.9	1.0	14.7	0.0	1.4	4.5	2.9
	*% Diff. between Alt 5 and No Build	-10.5	-9.5	-11.5	-11.3	-3.9	-11.6	-9.6	-10.3	-10.4
	% Diff. between Alt 5 and No Build	2.8	0.5	6.7	0.4	12.5	-0.5	0.8	3.4	2.2
	*% Diff. between Alt 6 and No Build	-11.5	-9.4	-13.3	-10.9	-10.3	-10.9	-9.7	-11.3	-10.8
	% Diff. between Alt 6 and No Build	3.6	4.3	4.8	4.2	1.1	4.4	4.2	3.7	3.5
	*% Diff. between Alt 7 and No Build	-0.1	-0.7	0.6	-1.1	-2.2	-1.7	-0.6	-0.7	0.0
	% Diff. between Alt 7 and No Build	17.1	14.7	20.6	16.0	10.2	15.3	15.0	16.4	16.4
2049	No-Build Alt1	0.26	0.95	0.03	5.45	4.58	2.64	2.24	0.22	0.06
	Build Alt 2a	*0.18	*0.68	*0.02	*3.72	*4.99	*1.78	*1.60	*0.16	*0.04
	Build Alt 2b	0.21	0.78	0.02	4.28	5.70	2.05	1.82	0.18	0.05
	Build Alt 3a	*0.17	*0.66	*0.02	*3.63	*4.84	*1.74	*1.56	*0.15	*0.04
	Build Alt 3b	0.20	0.75	0.02	4.16	5.61	1.99	1.77	0.17	0.05
	Build Alt 4a	0.17	0.65	0.02	3.60	4.69	1.73	1.54	0.15	0.04
	Build Alt 4b	0.20	0.75	0.02	4.13	5.38	1.98	1.75	0.17	0.05
	Build Alt 5a	0.17	0.65	0.02	3.59	4.55	1.73	1.53	0.15	0.04
	Build Alt 5b	0.20	0.75	0.02	4.13	5.18	1.99	1.75	0.17	0.05
	Build Alt 6a	0.20	0.77	0.02	4.32	4.10	2.09	1.80	0.18	0.05

Analysis Year/ Scenario		1,3-butadiene	Acetaldehyde	Acrolein	Benzene	Diesel PM	Ethylbenzene	Formaldehyde	Naphthalene	Polycyclic organic matter
	Build Alt 6b	0.24	0.89	0.02	5.05	4.63	2.44	2.09	0.20	0.05
	Build Alt 7a	0.19	0.72	0.02	4.04	4.55	1.94	1.70	0.17	0.04
	Build Alt 7b	0.23	0.84	0.02	4.72	5.16	2.27	1.97	0.20	0.05
	*% Diff. between Alt 2 and No Build	-29.7	-28.8	-30.5	-31.8	8.9	-32.6	-28.8	-29.5	-28.7
	% Diff. between Alt 2 and No Build	-18.3	-18.7	-18.6	-21.5	24.4	-22.5	-18.7	-18.6	-18.0
	*% Diff. between Alt 3 and No Build	-32.0	-30.5	-32.2	-33.4	5.7	-34.0	-30.6	-31.6	-30.7
	% Diff. between Alt 3 and No Build	-21.0	-21.0	-21.2	-23.6	22.5	-24.5	-21.0	-21.0	-21.1
	*% Diff. between Alt 4 and No Build	-33.0	-31.2	-33.1	-34.0	2.2	-34.5	-31.3	-32.5	-31.4
	% Diff. between Alt 4 and No Build	-22.2	-21.8	-22.0	-24.3	17.4	-25.0	-21.9	-22.3	-21.1
	*% Diff. between Alt 5 and No Build	-33.4	-31.6	-34.7	-34.2	-0.7	-34.6	-31.7	-33.1	-32.2
	% Diff. between Alt 5 and No Build	-22.8	-21.9	-23.7	-24.2	13.1	-24.7	-22.1	-22.8	-21.5
	*% Diff. between Alt 6 and No Build	-21.1	-19.5	-21.2	-20.8	-10.6	-20.9	-19.6	-20.4	-19.9
	% Diff. between Alt 6 and No Build	-6.9	-6.9	-8.5	-7.4	1.1	-7.5	-7.0	-7.0	-6.1
	*% Diff. between Alt 7 and No Build	-24.4	-24.2	-25.4	-25.9	-0.8	-26.5	-24.1	-24.0	-24.1
	% Diff. between Alt 7 and No Build	-10.9	-12.4	-12.7	-13.4	12.6	-14.1	-12.2	-11.0	-11.1

In FHWA's view, information is incomplete or unavailable to credibly predict the project-specific health impacts due to changes in mobile source air toxic (MSAT) emissions associated with a

proposed set of highway alternatives. The outcome of such an assessment, adverse or not, would be influenced more by the uncertainty introduced into the process through assumption and speculation rather than any genuine insight into the actual health impacts directly attributable to MSAT exposure associated with a proposed action.

The Environmental Protection Agency (EPA) is responsible for protecting the public health and welfare from any known or anticipated effect of an air pollutant. They are the lead authority for administering the Clean Air Act and its amendments and have specific statutory obligations with respect to hazardous air pollutants and MSAT. The EPA is in the continual process of assessing human health effects, exposures, and risks posed by air pollutants. They maintain the Integrated Risk Information System (IRIS), which is "a compilation of electronic reports on specific substances found in the environment and their potential to cause human health effects" (EPA, https://www.epa.gov/iris/). Each report contains assessments of non-cancerous and cancerous effects for individual compounds and quantitative estimates of risk levels from lifetime oral and inhalation exposures with uncertainty spanning perhaps an order of magnitude.

Other organizations are also active in the research and analyses of the human health effects of MSAT, including the Health Effects Institute (HEI). A number of HEI studies are summarized in Appendix D of FHWA's Updated Interim Guidance on Mobile Source Air Toxic Analysis in NEPA Documents. Among the adverse health effects linked to MSAT compounds at high exposures are: cancer in humans in occupational settings; cancer in animals; and irritation to the respiratory tract, including the exacerbation of asthma. Less obvious is the adverse human health effects of MSAT compounds at current environmental concentrations (HEI Special Report 16, https://www.healtheffects.org/publication/mobile-source-air-toxics-critical-reviewliterature-exposure-and-health-effects) or in the future as vehicle emissions substantially decrease.

The methodologies for forecasting health impacts include emissions modeling; dispersion modeling; exposure modeling; and then final determination of health impacts – each step in the process building on the model predictions obtained in the previous step. All are encumbered by technical shortcomings or uncertain science that prevents a more complete differentiation of the MSAT health impacts among a set of project alternatives. These difficulties are magnified for lifetime (i.e., 70 year) assessments, particularly because unsupportable assumptions would have to be made regarding changes in travel patterns and vehicle technology (which affects emissions rates) over that time frame, since such information is unavailable. It is particularly difficult to reliably forecast 70-year lifetime MSAT concentrations and exposure near roadways; to determine the portion of time that people are actually exposed at a specific location; and to establish the extent attributable to a proposed action, especially given that some of the information needed is unavailable.

There are considerable uncertainties associated with the existing estimates of toxicity of the various MSAT, because of factors such as low-dose extrapolation and translation of occupational exposure data to the general population, a concern expressed by HEI (Special Report 16, https://www.healtheffects.org/publication/mobile-source-air-toxicscritical-review-literature-exposure-and-health-effects). As a result, there is no national consensus on air dose-response values assumed to protect the public health and welfare for MSAT compounds, and in particular for diesel PM. The EPA states that with respect to diesel engine exhaust, "[t]he

absence of adequate data to develop a sufficiently confident dose-response relationship from the epidemiologic studies has prevented the estimation of inhalation carcinogenic risk." (EPA IRIS database, Diesel Engine Exhaust, Section II.C https://iris.epa.gov/static/pdfs/0642_summary.pdf).

There is also the lack of a national consensus on an acceptable level of risk. The current context is the process used by the EPA as provided by the Clean Air Act to determine whether more stringent controls are required in order to provide an ample margin of safety to protect public health or to prevent an adverse environmental effect for industrial sources subject to the maximum achievable control technology standards, such as benzene emissions from refineries. The decision framework is a two-step process. The first step requires EPA to determine an "acceptable" level of risk due to emissions from a source, which is generally no greater than approximately 100 in a million. Additional factors are considered in the second step, the goal of which is to maximize the number of people with risks less than 1 in a million due to emissions from a source. The results of this statutory two-step process do not guarantee that cancer risks from exposure to air toxics are less than 1 in a million; in some cases, the residual risk determination could result in maximum individual cancer risks that are as high as approximately 100 in a million. In a June 2008 decision, the U.S. Court of Appeals for the District of Columbia Circuit upheld EPA's approach to addressing risk in its two-step decision framework. Information is incomplete or unavailable to establish that even the largest of highway projects would result in levels of risk greater than deemed acceptable (https://www.cadc.uscourts.gov/internet/opinions.nsf/284E23FFE079CD5985257800005 0C9DA/$file/07-1053-1120274.pdf).

Because of the limitations in the methodologies for forecasting health impacts described, any predicted difference in health impacts between alternatives is likely to be much smaller than the uncertainties associated with predicting the impacts. Consequently, the results of such assessments would not be useful to decision makers, who would need to weigh this information against project benefits, such as reducing traffic congestion, accident rates, and fatalities plus improved access for emergency response, that are better suited for quantitative analysis.

Build Alternatives 3a and 3b

Construction

Build Alternatives 3a and 3b propose similar project components within the same project area as Build Alternatives 2a and 2b, respectively; and construction effects would be similar.

Operation

Build Alternatives 3a and 3b would involve adding an HOT2+ lane in each direction. Permanent effects would be similar to Build Alternatives 2a and 2b; however, PM_{10} and $PM_{2.5}$ emissions would increase slightly under Alterative 3b and would decrease under Alterative 3a compared to the No Build Alternative 1 (Table 2.2-10 and Table 2.2-11). Therefore, the effects would be similar to effects described under Build Alternatives 2a and 2b.

Build Alternatives 4a and 4b

Construction

Build Alternatives 4a and 4b propose similar project components within the same project area as Build Alternatives 2a and 2b, respectively; and construction effects would be similar.

Operation

Build Alternatives 4a and 4b would involve adding an HOT3+ lane in each direction. Permanent effects would be similar to Build Alternatives 2a and 2b, respectively; however, PM_{10} and $PM_{2.5}$ emissions would increase slightly under Alterative 4b and would decrease under Alterative 4a compared to the No Build Alternative 1 (Table 2.2-13 and Table 2.2-14). Therefore, the effects would be similar to effects described under Build Alternatives 2a and 2b.

Build Alternatives 5a and 5b

Construction

Build Alternatives 5a and 5b propose similar project components within the same project area as Build Alternatives 2a and 2b, respectively; and construction effects would be similar.

Operation

Build Alternatives 5a and 5b would involve adding an Express Lane in each direction. Permanent effects would be similar to Build Alternatives 2a and 2b, respectively; however, PM_{10} and $PM_{2.5}$ emissions would decrease slightly compared to the No Build Alternative 1 in Design Year 2029 (Table 2.2-13 and Table 2.2-14). Therefore, the effects would be slightly less than described under Build Alternatives 2a and 2b, respectively.

Build Alternatives 6a and 6b

Construction

Build Alternatives 6a and 6b propose similar project components within the same project area as Build Alternatives 2a and 2b, respectively; and construction effects would be similar.

Operation

Build Alternatives 6a and 6b would involve adding a transit-only lane in each direction. Permanent effects would be similar to Build Alternatives 2a and 2b, respectively; however, however, PM_{10} and $PM_{2.5}$ emissions would decrease slightly compared to the No Build Alternative in Design Year 2029 (Table 2.2-13 and Table 2.2-14). Therefore, the effects would be slightly less than described under Build Alternatives 2a and 2b, respectively.

Build Alternatives 7a and 7b

Construction

Build Alternatives 7a and 7b would involve repurposing an existing general purpose lane to HOV 2+. No new lanes would be constructed. Because Build Alternatives 7a and 7b would not add new lanes but would repurpose existing lanes as managed lanes, the Build Alternatives 7a and 7b construction period may have shorter duration resulting in fewer delays than those under Build Alternatives 2a, 2b, 3a, 3b, 4a, 4b, 5a, 5b, 6a, and 6b and would result in less emissions.

Operation

As no new lanes would be constructed, Build Alternatives 7a and 7b do not increase capacity due to replacing an existing traffic lane with an HOV 2+ lane; therefore, PM_{10} and $PM_{2.5}$ emissions would decrease slightly compared to the No Build Alternative 1 in Design Year 2029 (Table 2.2-13 and Table 2.2-14). Therefore, the effects would be slightly less than described under Build Alternatives 2a and 2b, respectively.

2.2.6.4 Avoidance, Minimization, and/or Mitigation Measures

No AMMs or MMs would be required.

2.2.7 Climate Change

Neither the United States Environmental Protection Agency (U.S. EPA) nor the Federal Highway Administration (FHWA) has issued explicit guidance or methods to conduct project-level greenhouse gas analysis. FHWA emphasizes concepts of resilience and sustainability in highway planning, project development, design, operations, and maintenance. Because there have been requirements set forth in California legislation and executive orders on climate change, the issue is addressed in the California Environmental Quality Act (CEQA) chapter of this document. The CEQA analysis may be used to inform the National Environmental Policy Act (NEPA) determination for the project.

2.2.8 Noise

2.2.8.1 Regulatory Setting

The National Environmental Policy Act (NEPA) of 1969 and the California Environmental Quality Act (CEQA) provide the broad basis for analyzing and abating highway traffic noise effects. The intent of these laws is to promote the general welfare and to foster a healthy environment. The requirements for noise analysis and consideration of noise abatement and/or mitigation, however, differ between NEPA and CEQA.

California Environmental Quality Act

CEQA requires a strictly baseline versus build analysis to assess whether a proposed project will have a noise impact. If a proposed project is determined to have a significant noise impact under CEQA, then CEQA dictates that mitigation measures must be incorporated into the

project unless those measures are not feasible. The rest of this section will focus on the NEPA/Title 23 Part 772 of the Code of Federal Regulations (23 CFR 772) noise analysis; please see Chapter 3 of this document for further information on noise analysis under CEQA.

National Environmental Policy Act and 23 CFR 772

For highway transportation projects with Federal Highway Administration (FHWA) involvement (and Caltrans, as assigned), the Federal-Aid Highway Act of 1970 and its implementing regulations (23 CFR 772) govern the analysis and abatement of traffic noise impacts. The regulations require that potential noise impacts in areas of frequent human use be identified during the planning and design of a highway project. The regulations include noise abatement criteria (NAC) that are used to determine when a noise impact would occur. The NAC differ depending on the type of land use under analysis. For example, the NAC for residences (67 dBA) is lower than the NAC for commercial areas (72 dBA). Table 2.2-13 lists the noise abatement criteria for use in the NEPA/23 CFR 772 analysis.

Table 2.2-16. Noise Abatement Criteria

Activity Category	NAC, Hourly A-Weighted Noise Level, Leq(h)	Description of activity category
A	57 (Exterior)	Lands on which serenity and quiet are of extraordinary significance and serve an important public need and where the preservation of those qualities is essential if the area is to continue to serve its intended purpose.
B[1]	67 (Exterior)	Residential.
C[1]	67 (Exterior)	Active sport areas, amphitheaters, auditoriums, campgrounds, cemeteries, day care centers, hospitals, libraries, medical facilities, parks, picnic areas, places of worship, playgrounds, public meeting rooms, public or nonprofit institutional structures, radio studios, recording studios, recreation areas, Section 4(f) sites, schools, television studios, trails, and trail crossings.
D	52 (Interior)	Auditoriums, day care centers, hospitals, libraries, medical facilities, places of worship, public meeting rooms, public or nonprofit institutional structures, radio studios, recording studios, schools, and television studios.
E	72 (Exterior)	Hotels, motels, offices, restaurants/bars, and other developed lands, properties, or activities not included in A–D or F.
F	No NAC—reporting only	Agriculture, airports, bus yards, emergency services, industrial, logging, maintenance facilities, manufacturing, mining, rail yards, retail facilities, shipyards, utilities (water resources, water treatment, electrical, etc.), and warehousing.
G	No NAC—reporting only	Undeveloped lands that are not permitted.

Notes:
1. Includes undeveloped lands permitted for this activity category.

Figure 2.2-4 lists the noise levels of common activities to enable readers to compare the actual and predicted highway noise levels discussed in this section with common activities.

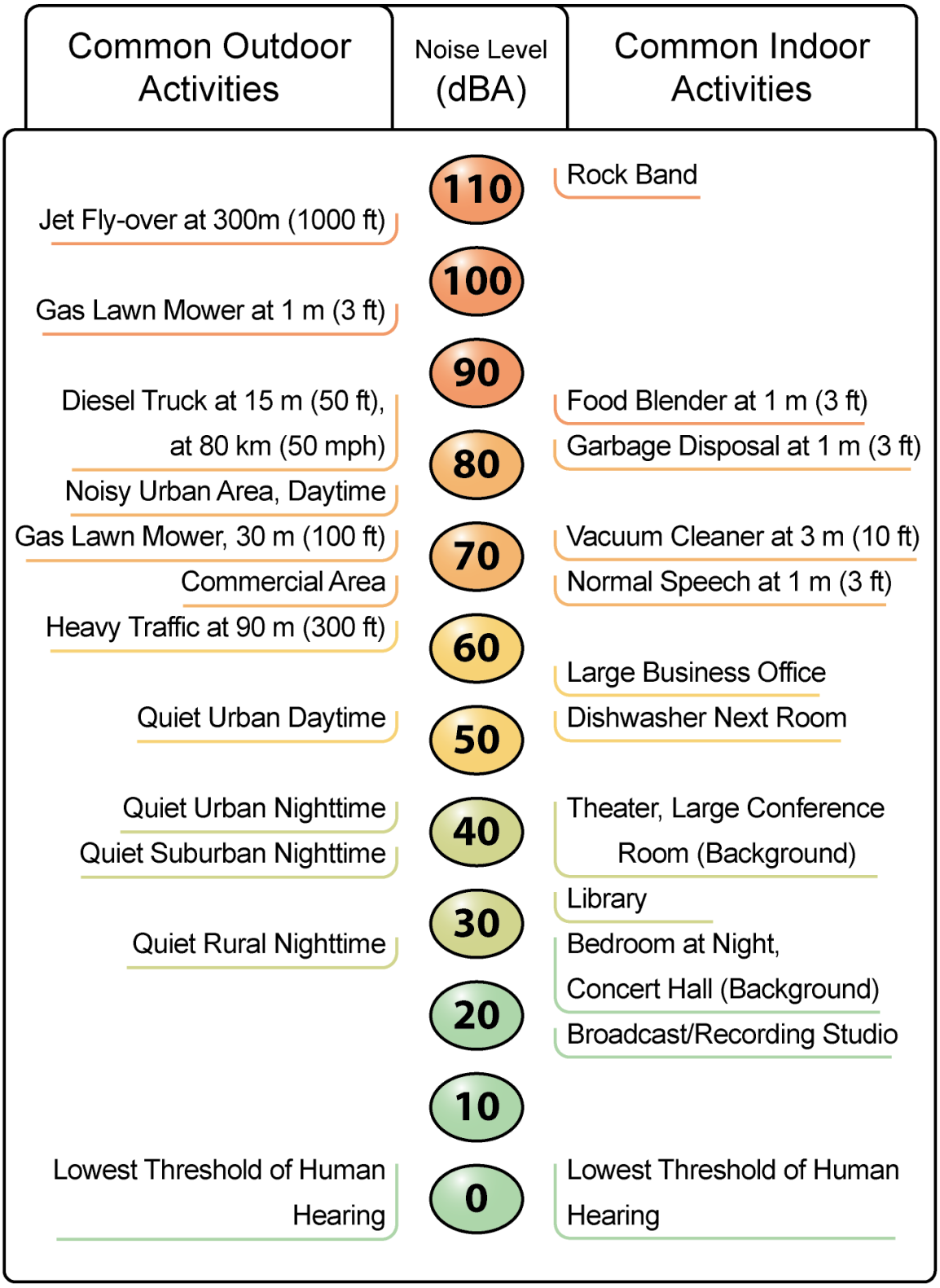


Figure 2.2-4. Noise Levels of Common Activities

According to the Caltrans *Traffic Noise Analysis Protocol for New Highway Construction and Reconstruction Projects, April 2020*, a noise impact occurs when the predicted future noise level with the project substantially exceeds the existing noise level (defined as a 12 dBA or more) or when the future noise level with the project approaches or exceeds the NAC. A noise level is considered to approach the NAC if it is within 1 dBA of the NAC.

If it is determined that the project will have noise impacts, then potential abatement measures must be considered. Noise abatement measures that are determined to be reasonable and feasible at the time of final design are incorporated into the project plans and specifications. This document discusses noise abatement measures that would likely be incorporated in the project.

The Caltrans *Traffic Noise Analysis Protocol* sets forth the criteria for determining when an abatement measure is reasonable and feasible. Feasibility of noise abatement is basically an engineering concern. Noise abatement must be predicted to reduce noise by at least 5 dB at an impacted receptor to be considered feasible from an acoustical perspective. It must also be possible to design and construct the noise abatement measure for it to be considered feasible. Factors that affect the design and constructability of noise abatement include, but are not limited to, safety, barrier height, topography, drainage, access requirements for driveways, presence of local cross streets, underground utilities, other noise sources in the area, and maintenance of the abatement measure. The overall reasonableness of noise abatement is determined by the following three factors: 1) the noise reduction design goal of 7 dB at one or more impacted receptors; 2) the cost of noise abatement; and 3) the viewpoints of benefited receptors (including property owners and residents of the benefited receptors).

2.2.8.2 Affected Environment

The information for the noise analysis was obtained from the Noise Study Report prepared for the project (Caltrans 2022b). The noise study encompasses all developed land uses surrounding the project limits, with a focus on noise-sensitive land uses. Noise-sensitive land uses include areas where serenity and quiet are of extraordinary significance, residential land uses, and other community uses such as hospitals, schools, cemeteries, and parks. Commercial land uses including hotels, motels, and offices are also sensitive to noise.

Receptor Categories

Noise-sensitive land uses in the vicinity of the project limits include Category B (residential), Category C (parks, trails, schools, medical facilities, and active sports areas), Category D (schools, medical facilities, and places of worship), and Category E (hotels and offices). Category F land uses (agriculture, retail facilities, utilities, and warehousing) are also present in the project vicinity.

Segment 1: Kidwell Road to east of Enterprise Boulevard

Segment 1a of the project area is surrounded by agriculture (Activity Category F), University of California Davis (Activity Category C), and single-family residential uses (Activity Category B) and does not have existing sound walls.

Segment 1b of the project area is surrounded by eight multi-family properties (Activity Category B) and three residential subdivisions (Activity Category B) with an existing 6-foot sound barrier located along the I-80 westbound off-ramp at Richards Boulevard. This sound wall is currently shielding a multi-family residential development west of a storage facility. East of the storage facility is another 6-foot sound wall shielding additional multi-family residences. Two medical facilities (Activity Category D), a hotel (Activity Category E), offices (Activity Category E), a sports facility (Activity Category C), and a school (Activity Category D) are also located within the project vicinity. There are no outdoor areas associated with the offices and medical facilities that are considered to be areas of frequent human use.

Segment 1c of the project area is surrounded by agriculture (Activity Category F), undeveloped lands that are not permitted (Activity Category F), and a wildlife trail crossing (Activity Category C).

Segment 2: East of Enterprise Boulevard to West El Camino Avenue

Segment 2 of the project area is surrounded by single-family residential (Activity Category B), a RV Park (Activity Category C), a mobile home park (Activity Category B), and a medical facility (Activity Category D). This area is generally flat. An existing 12-foot sound wall runs parallel to I-80 between the eastbound lanes and Thor Drive, shielding a mobile home park. An existing 12-foot sound wall is located adjacent to I-80 eastbound, just south of West El Camino Avenue and shields the single-family residential housing development. No outdoor areas considered to be areas of frequent human use are associated with the medical facility.

Segment 3: I-80/US-50 Separation to I-5

Segment 3a of the project area is surrounded by three residential subdivisions (Activity Category B), two multi-family properties (Activity Category B), two medical facilities (Activity Category C and D), two hotels (Activity Category E), a school (Activity Category C and D), a park (Activity Category C), and a place of worship (Activity Category D). An existing sound wall, located north of US-50 just east of the I-80/US-50 interchange, is approximately 13.5 feet tall and shields multi-family and single-family developments. Another 12-foot-tall sound wall is located south of the US-50 eastbound lanes at the off-ramp at Harbor Boulevard. This wall is shielding a Motel 6 and Radisson hotel. The Sacramento Valley Charter School, single-family housing area, Westacre Park, and Yolo High School, which are located north of the US-50 westbound lanes west of the Jefferson Boulevard interchange, are shielded by 6- to 12-foot tall sound walls. The single-family houses south of the US-50 eastbound lanes, which are also west of the Jefferson Boulevard interchange, are also currently shielded by 6- to 12-foot tall sound walls.

Segment 3b of the project area is surrounded by Parks (Category C) and residential (Activity Category B) land uses.

Noise Modeling

Short-term and long-term measurements were taken to document the existing noise environment within the project area. Accordingly, 69 short-term noise measurements were

made at land uses in the project vicinity. Ten long-term noise measurements were made to quantify the trend in noise levels and establish the peak traffic noise hour. The existing loudest hour noise levels (L_{eq}[5][h]) ranged from 46 to 85 decibels (dBA) L_{eq} [h] at short-term measurement locations. The existing loudest hour noise levels ranged from 64 to 82 dBA Leq[h] at long-term locations.

In addition to the short-term and long-term measurement locations, there are 152 modeled receptor locations. Receptors are shown in Figure 2.2-5 through Figure 2.2-19.

[5] Leq represents an average of the sound energy occurring over a specified period. In effect, Leq is the steady-state sound level containing the same acoustical energy as the time-varying sound that actually occurs during the same period. The 1-hour A-weighted equivalent sound level (Leq[h]) is the energy average of A-weighted sound levels occurring during a one-hour period and is the basis for NAC used by Caltrans and FHWA.

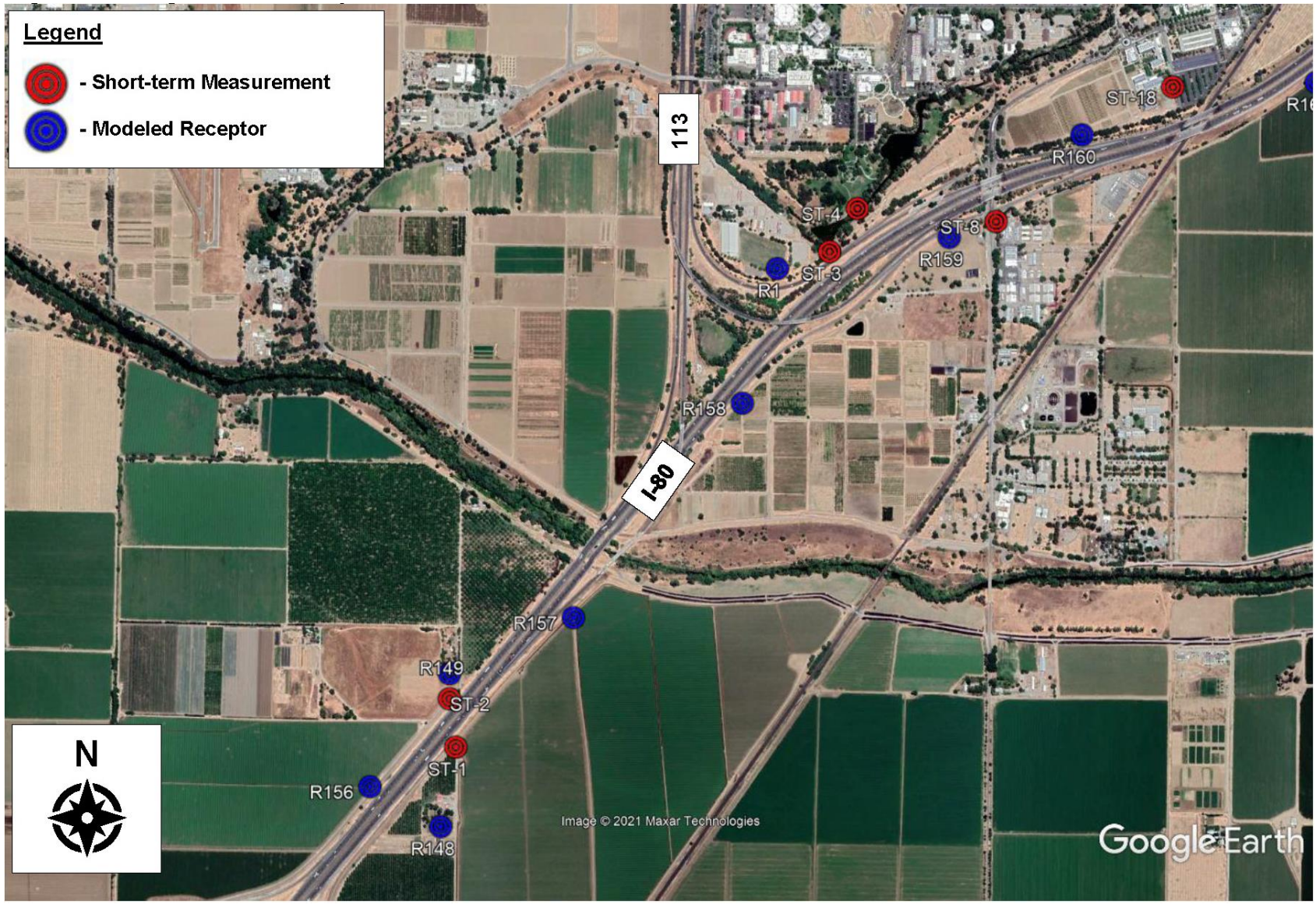


Figure 2.2-5. Segment 1A Receptor Locations and Noise Barriers West of the Railroad Tracks

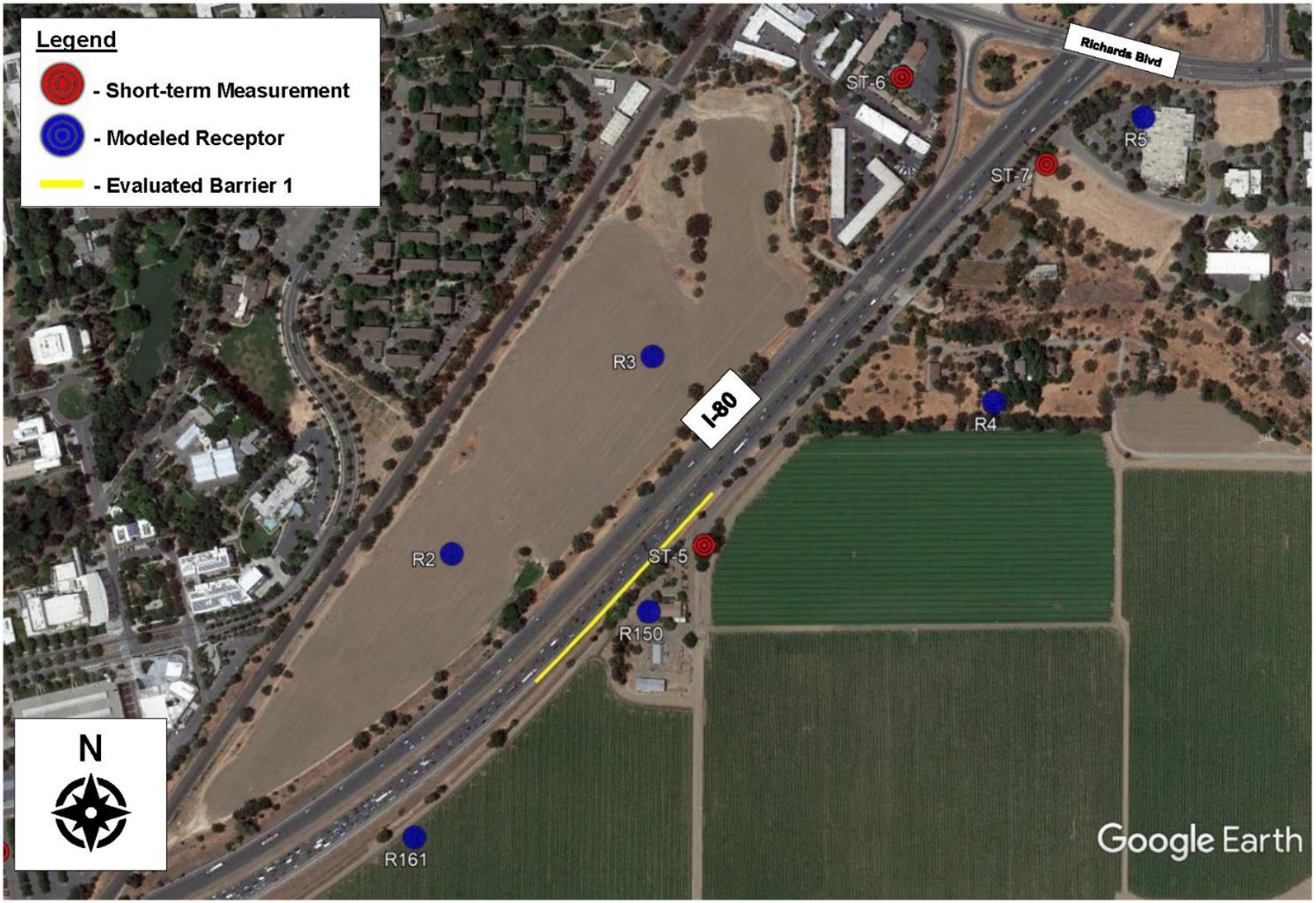


Figure 2.2-6. End of Segment 1A and Beginning of Segment 1B Receptor Locations and Noise Barriers West of Richards Boulevard

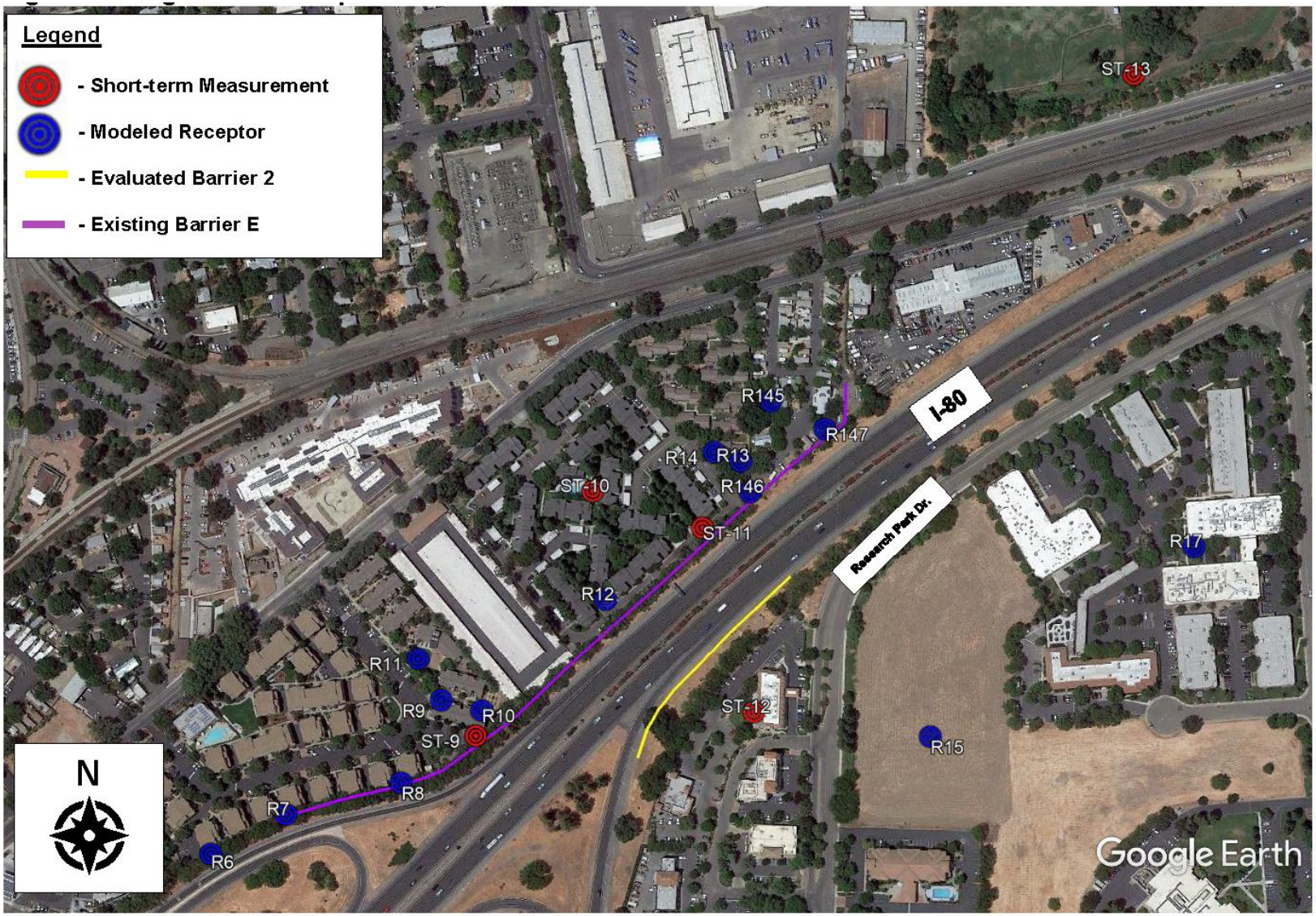


Figure 2.2-7. Segment 1B Receptor Locations and Noise Barriers West of Pole Line Road

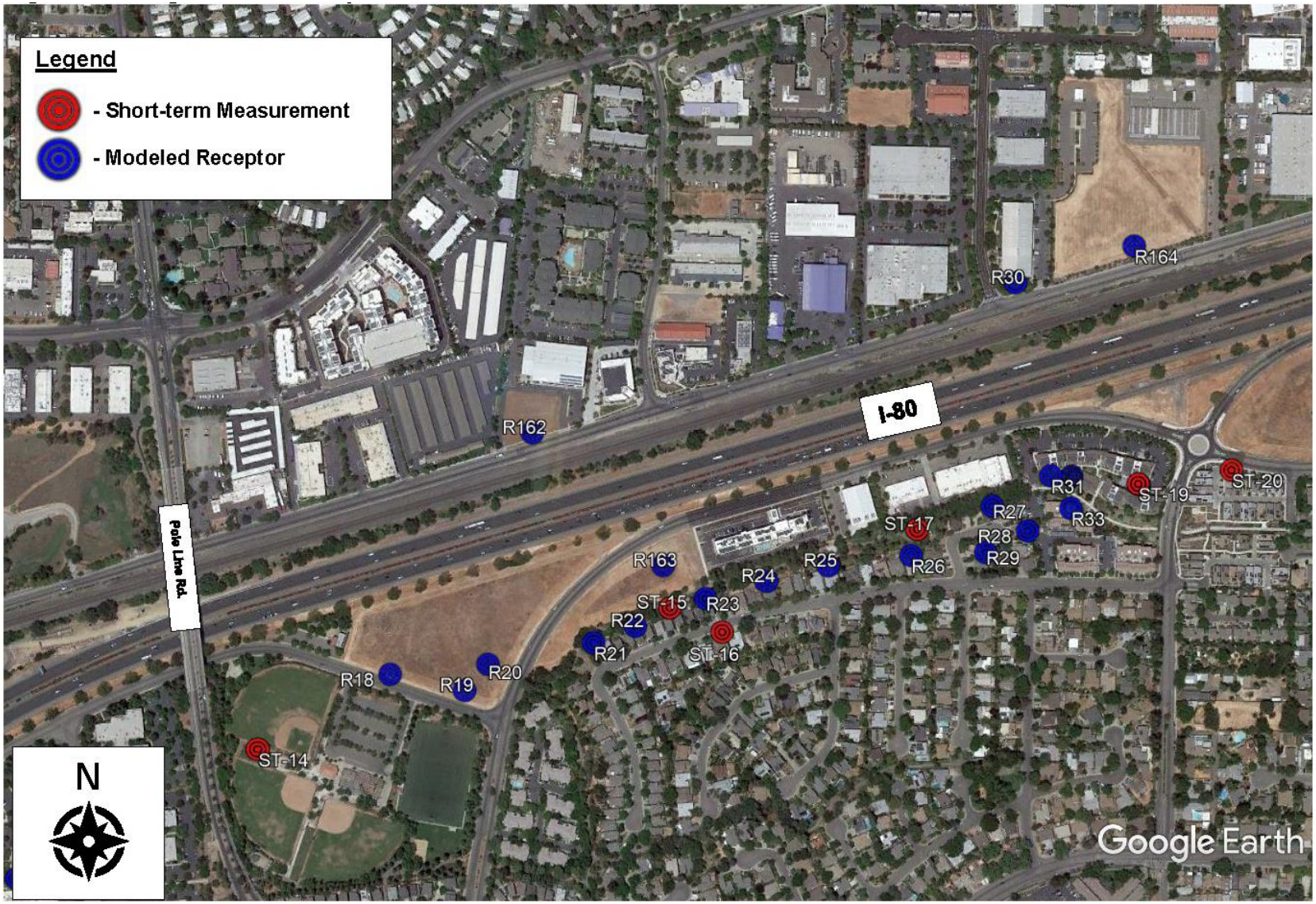


Figure 2.2-8. Segment 1B Receptor Locations and Noise Barriers East of Pole Line Road

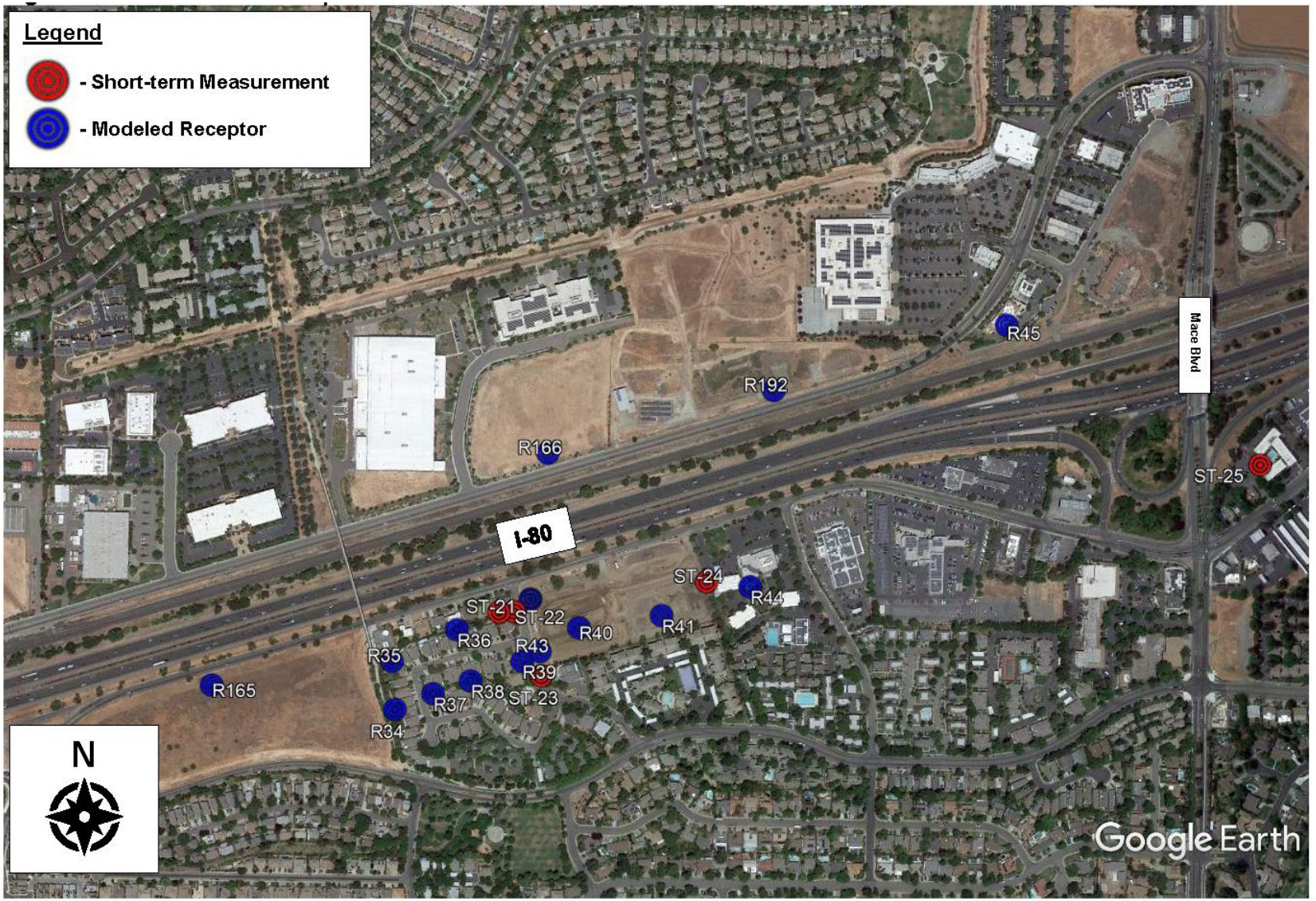


Figure 2.2-9. Section 1B Receptor Locations and Noise Barriers to Just East of Mace Boulevard



Figure 2.2-10. Section 1B Receptor Locations and Noise Barriers East of Mace Boulevard



Figure 2.2-11. End of Section 1B and Beginning of Section 1C Receptor Locations and Noise Barriers Just East of Levee Road



Figure 2.2-12. Beginning of Section 1C Receptor Locations West of Levee Road

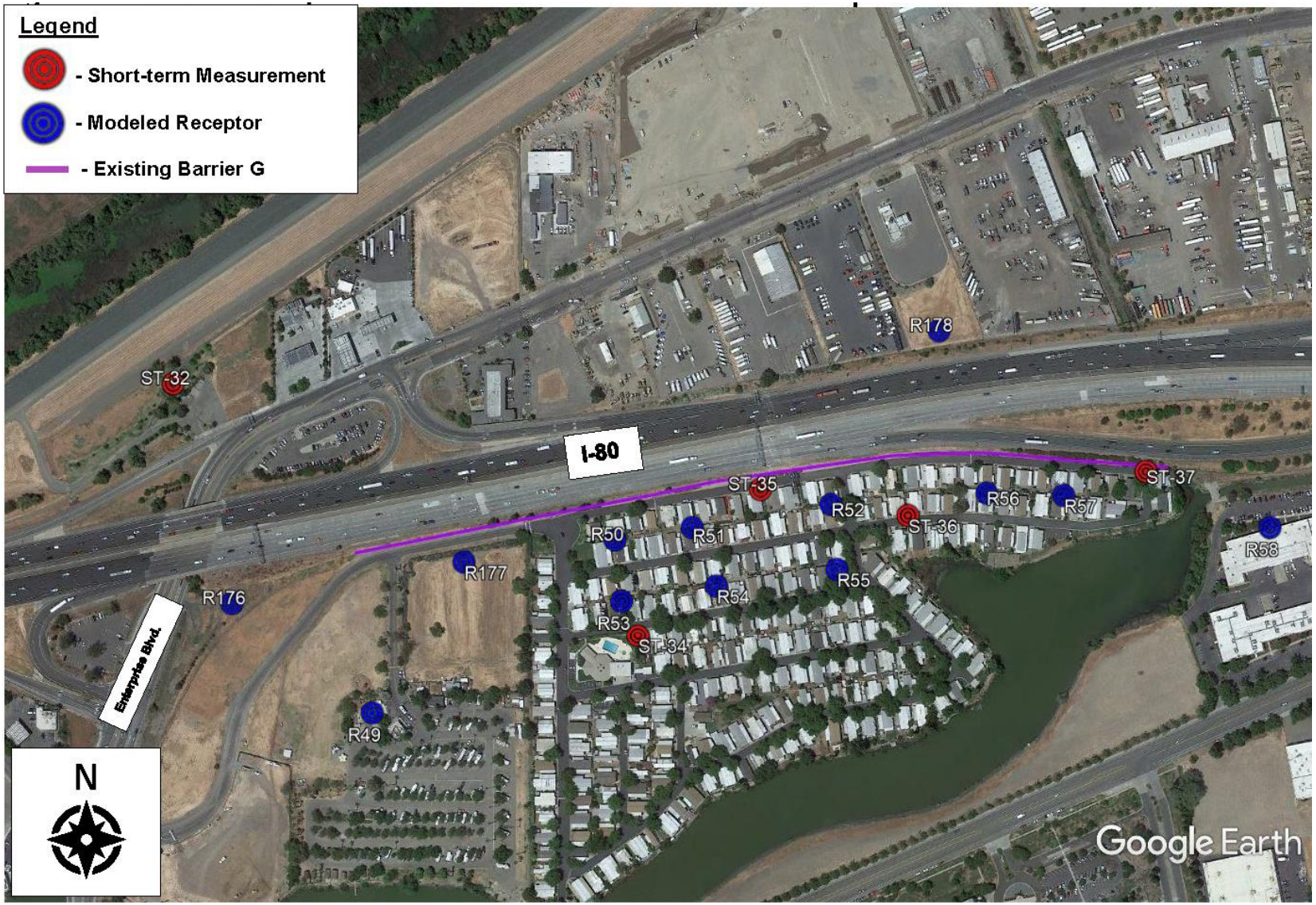


Figure 2.2-13. Section 2 Receptor Locations and Noise Barriers East of Enterprise Boulevard

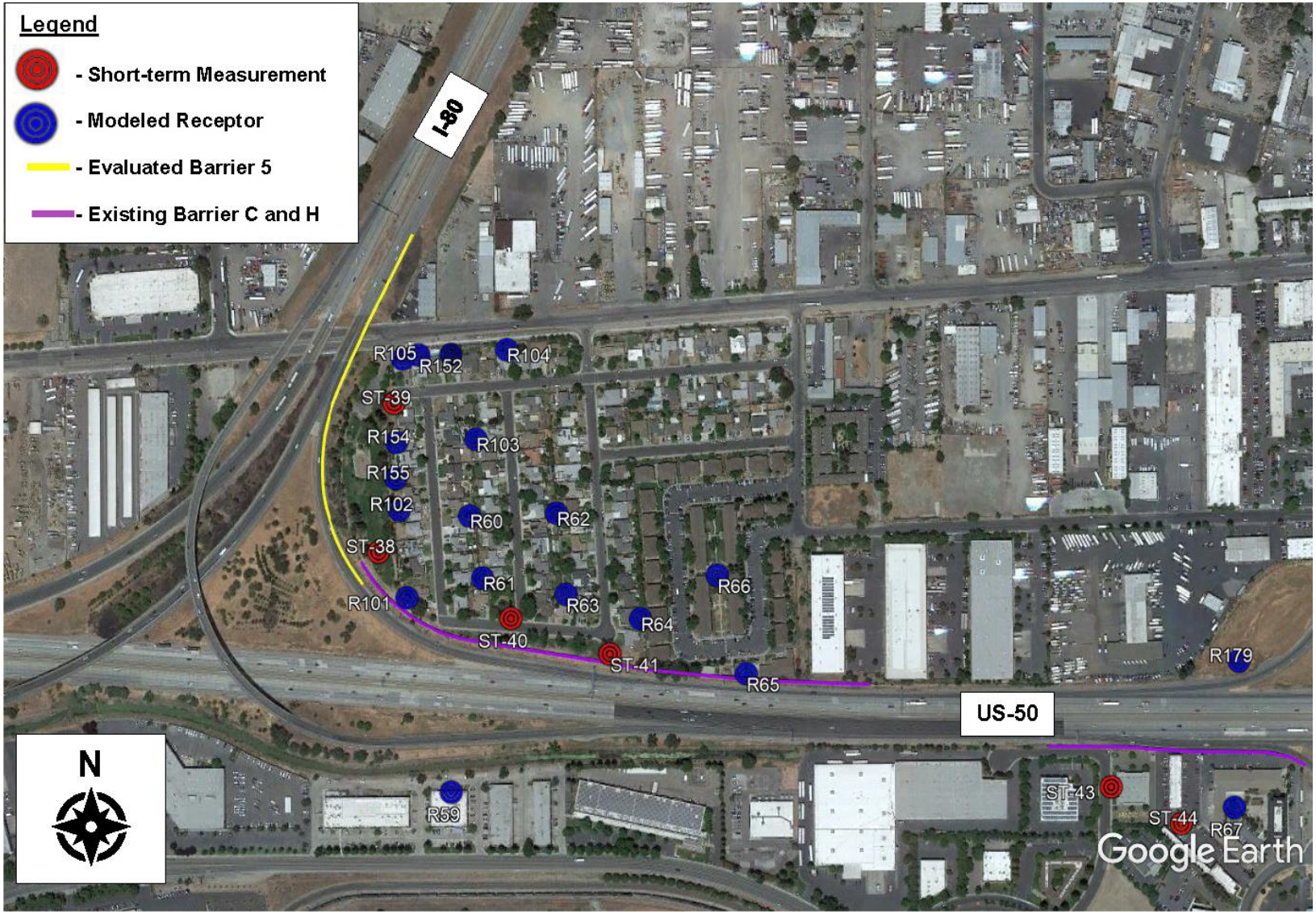


Figure 2.2-14. Section 3A Receptor Locations and Noise Barriers at the US-50 I-80 Interchange

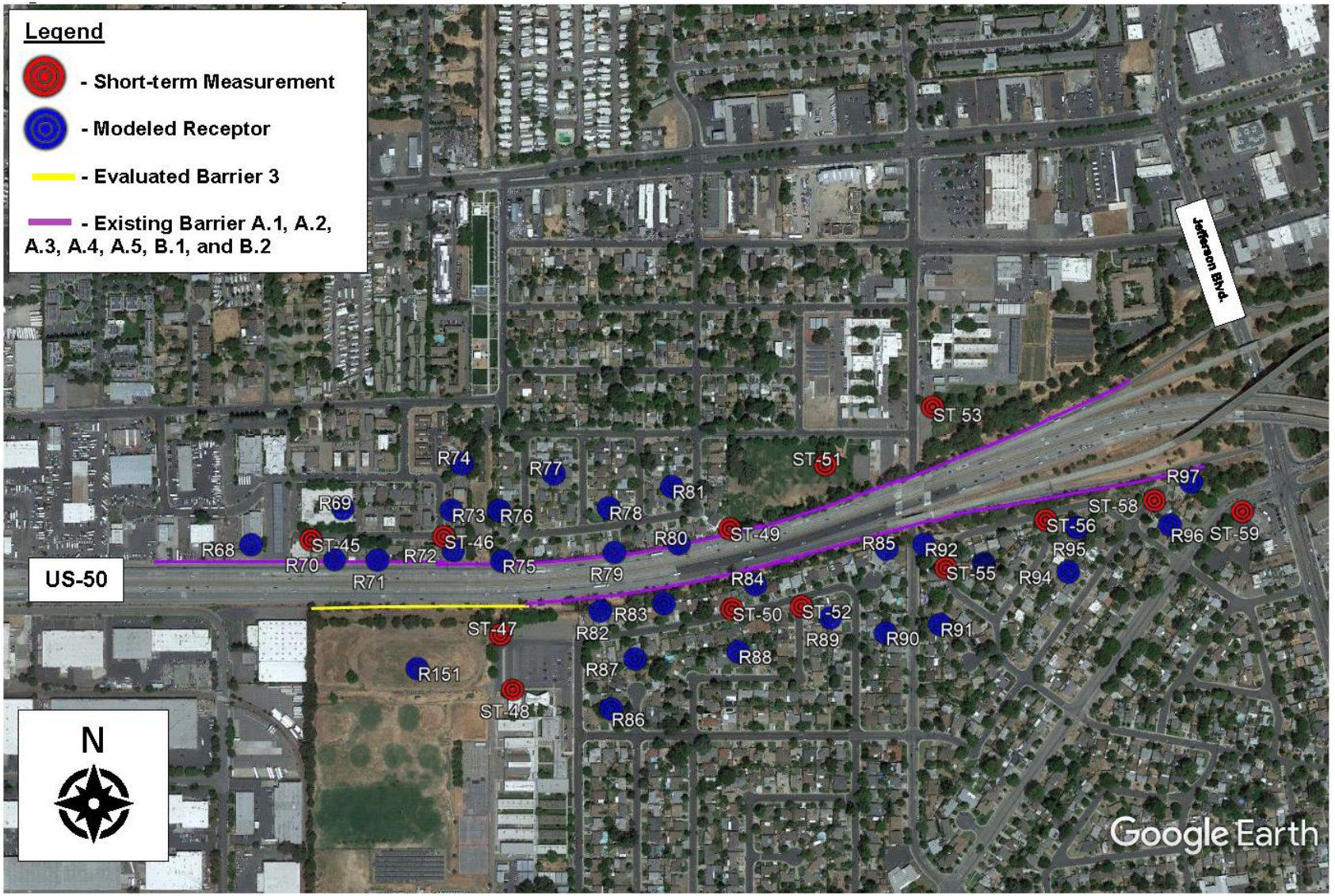


Figure 2.2-15. Section 3A Receptor Locations and Noise Barriers West of Jefferson Boulevard

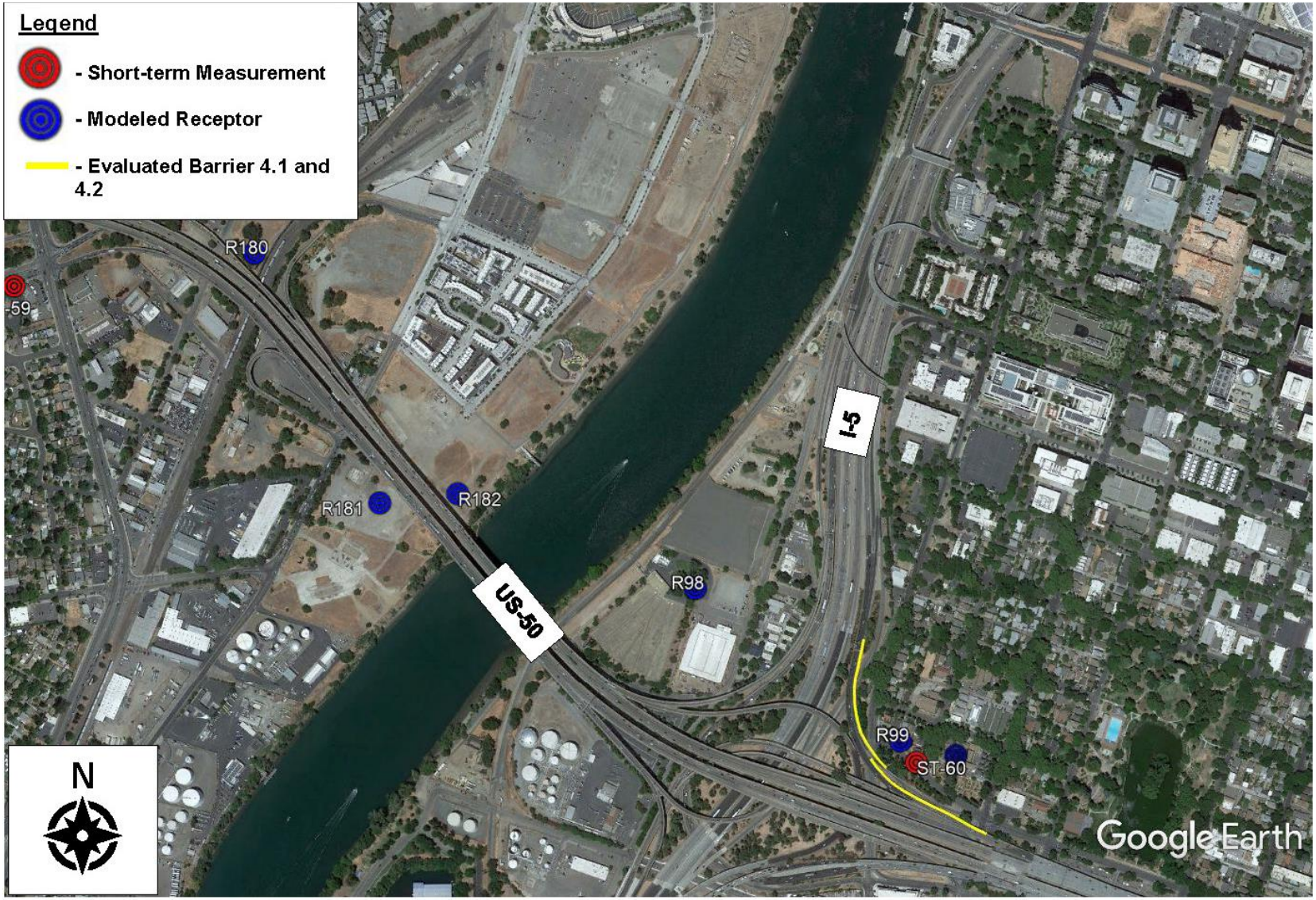


Figure 2.2-16. Section 3B Receptor Locations and Noise Barriers at the US-50 and I-5 Interchange



Figure 2.2-17. Section 2 Receptor Locations at Reed Avenue

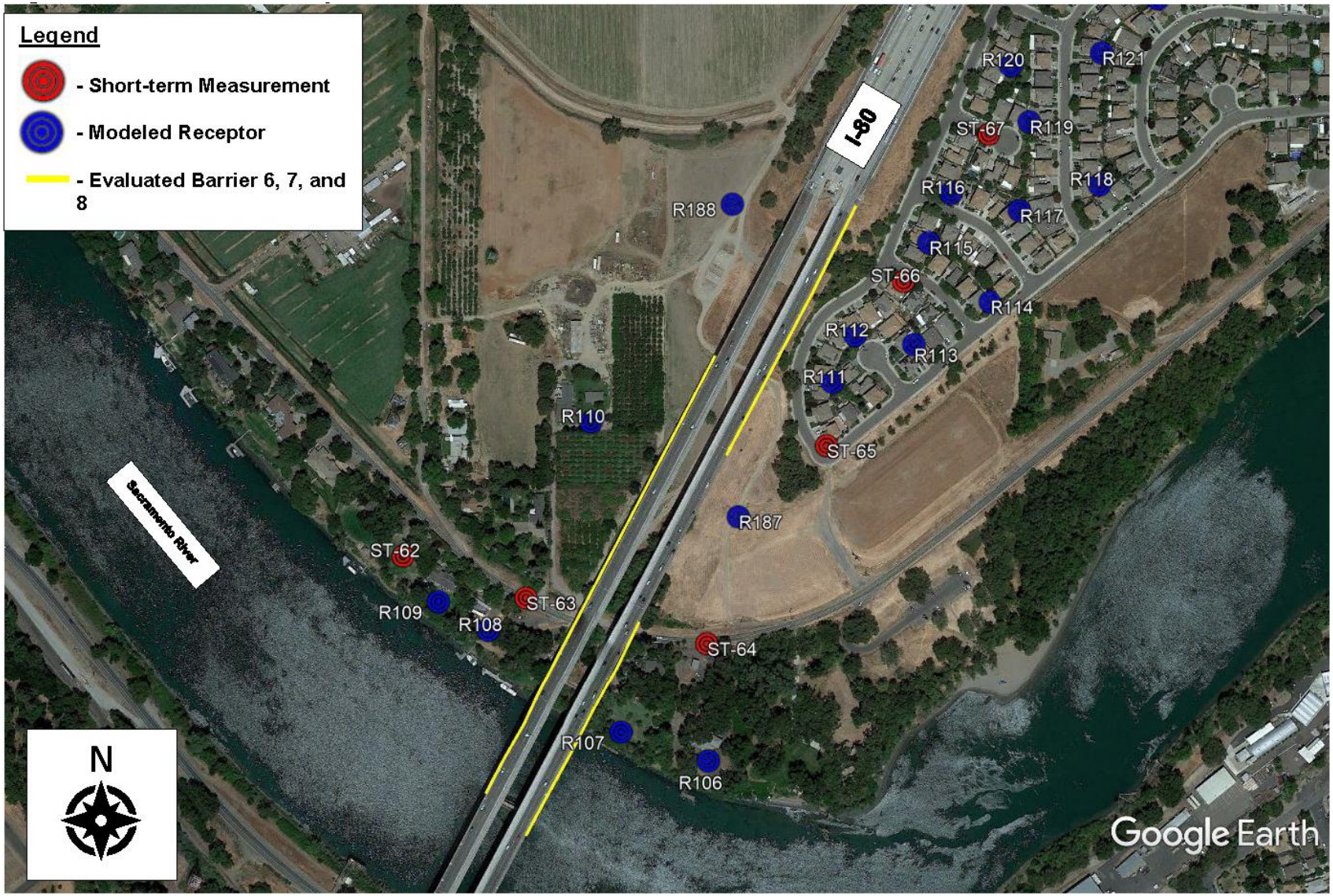


Figure 2.2-18. Section 2 Receptor Locations and Noise Barriers North of Sacramento River



Figure 2.2-19. Section 2 Receptor Locations and Noise Barriers South of West El Camino Avenue

2.2.8.3 Environmental Consequences

The Code of Federal Regulations (23 CFR 772) "Procedures for Abatement of Highway Traffic Noise" provides procedures for preparing operational and construction noise studies and evaluating noise abatement options. Under 23 CFR 772, projects are categorized as Type I or Type II projects. Type I projects are defined as proposed federal or federal-aid highway improvements for the construction of a highway on new location; or the physical alteration of an existing highway which significantly changes either the horizontal or vertical alignment or increases the number of through-traffic lanes.

The project is a Type I project because it would involve the addition of lanes and would be eligible to receive federal funding from the Federal Highway Administration (FHWA) administered through Caltrans. Therefore, the project requires noise abatement to be considered for impacted receptors.

No Build Alternative 1

Construction

Under No Build Alternative 1, managed lanes and transportation improvements would not be constructed. As such, there would be no construction noise or vibration.

Operation

Under No Build Alternative 1, the managed lanes and transportation improvements would not be constructed; however, vehicles would continue to travel within the project area contributing to long-term noise. Noise levels are calculated to increase by up to 2 dBA by year 2049 under No Build Alternative 1 conditions. The increase is not considered substantial.

Build Alternatives 2a and 2b

Construction

Noise

Construction activities under Build Alternatives 2a and 2b would result in temporary increases to noise and vibration levels at adjacent sensitive receptors. Project construction would occur over a period of approximately 3 years and would include road cut/fill, grinding, grubbing/land cleaning, grading/excavation, drainage/utilities, and paving. Pile driving would be used for the construction of the I-80 connector structure under Build Alternative 2b. Construction noise would primarily result from the operation of heavy construction equipment and the arrival and departure of heavy-duty trucks.

Construction Table 2.2-17 summarizes the typical noise levels by construction phase and indicates that construction noise under Build Alternatives 2a and 2b would not exceed quantitative noise limits established by Caltrans except for nighttime work, which could result in an exceedance.

The construction noise levels in Table 2.2-17 are calculated for each major phase of the project at a distance of 100 feet, based on calculations conducted in FHWA's Roadway Construction Noise Model (RCNM) using project-specific construction information. This construction noise model includes representative sound levels for the most common types of construction equipment. In some instances, maximum instantaneous noise levels are calculated to be slightly lower than hourly average noise levels. This occurs because the model reports the maximum instantaneous noise level generated by the loudest single piece of construction equipment, while reporting the hourly average noise levels resulting from the additive effect of multiple pieces of construction equipment operating simultaneously. Noise generated by construction equipment drops off at a rate of 6 dB per doubling of distance.

Table 2.2-17. Noise Levels by Construction Phase at 100 Feet

Construction Type	Construction Phase	Maximum Noise Level (Lmax, dBA)	Hourly Average Noise Level (Leq[h], dBA)
Roadway Construction	Grubbing/Land Clearing	78	77
	Grading/Excavation	79	83
	Drainage/Utilities	79	82
	Paving	78	78
Bridge/Structures Construction	Grubbing/Land Clearing	78	77
	Grading/Excavation	79	84
	Drainage/Utilities	79	83
	Paving	75	77
Impact Pile Driving	—	95	88

Source: Caltrans 2022b

Although the overall construction schedule would occur over a period of 3 years, roadway construction activities would occur for relatively short periods of time in any specific location as construction proceeds along the project's alignment. Construction noise would mostly be of concern in areas where heavy construction would be concentrated for extended periods of time in areas adjacent to noise-sensitive receptors, where noise levels from individual pieces of equipment are substantially higher than ambient conditions, or when construction activities would occur during noise-sensitive early morning, evening, or nighttime hours.

As indicated through comparison of Table 2.2-17, most construction phases would generate average noise levels that would exceed ambient daytime noise levels at adjacent land uses by 15 to 20 dBA Leq[h]. Receptors shielded by noise barriers would be exposed to a similar increase in noise, albeit at lower overall noise levels because the shielding provided by the existing noise barriers would attenuate construction noise at a similar rate to traffic noise.

Except for possible nighttime construction involving heavy equipment, construction noise levels would not be expected to exceed the quantitative noise limits established by Caltrans. AMM NOI-1 would require noise-generating construction activities to be restricted to 7:00 a.m. to 7:00 p.m. on weekdays, with no construction occurring on weekends or holidays. If work is necessary

outside of these hours, a construction noise monitoring program and provide additional noise controls would be implemented.

Caltrans Standard Specifications Section 14-8.02 would require that noise levels not to exceed 86 dBA within 50 feet of the job site from the hours of 9:00 p.m. to 6:00 a.m. (Standard Measure NOI-1). Build Alternatives 2a and 2b would also implement Standard Measures NOI-2 through NOI-5 further reducing temporary construction noise levels. Therefore, temporary construction noise would have no adverse effects on nearby receptors.

Construction Vibration

Due to the short-term nature of construction, the primary concern is the potential for vibration to damage a structure. Critical factors pertaining to the impact of construction vibration on sensitive receptors include the proximity of the existing structures to the project site, soil conditions, the soundness of the structures, and the methods of construction used.

Caltrans identifies a vibration limit of 0.5 inch/second (in/sec) Peak Particle Velocity (PPV) as the threshold at which there is a potential risk of damage to new residential and modern commercial/industrial structures, 0.3 in/sec PPV for older residential structures, and a conservative limit of 0.25 in/sec PPV for historic and some old buildings (see Table 2.2-18).

Table 2.2-18. Reaction of People and Damage to Buildings from Continuous or Frequent Intermittent Vibration Levels

Velocity Level, PPV (in/sec)	Human Reaction	Effect on Buildings
0.01	Barely perceptible	No effect
0.04	Distinctly perceptible	Vibration unlikely to cause damage of any type to any structure
0.08	Distinctly perceptible to strongly perceptible	Recommended upper level of the vibration to which ruins and ancient monuments should be subjected
0.1	Strongly perceptible	Threshold at which there is a risk of damage to fragile buildings with no risk of damage to most buildings
0.25	Strongly perceptible to severe	Threshold at which there is a risk of damage to historic and some old buildings.
0.3	Strongly perceptible to severe	Threshold at which there is a risk of damage to older residential structures
0.5	Severe (Vibrations considered unpleasant)	Threshold at which there is a risk of damage to new residential and modern commercial/industrial structures

Note: PPV (in/sec) = peak particle velocity (inches per second)

Construction activities with the greatest potential of generating perceptible vibration levels would include the removal of pavement and soil, the dropping of heavy objects, and the movement of heavy tracked equipment. Table 2.2-19 presents typical vibration levels that could be expected from representative construction equipment at a reference distance of 25 feet. Vibration levels are highest close to the source and then attenuate with increasing distance depending on soil conditions.

Table 2.2-19. Vibration Source Levels for Construction Equipment

Equipment	PPV at 25 feet (in/sec)	Nearest Structure Setback 10 feet[1]	Nearest Structure Setback 50 feet[1]	Nearest Structure Setback 100 feet[1]
Impact Pile Driver – Upper Range	1.158	3.173	0.540	0.252
Impact Pile Driver – Typical	0.644	1.764	0.300	0.140
Sonic Pile Driver – Upper Range	0.734	2.011	0.342	0.160
Sonic Pile Driver – Typical	0.17	0.466	0.079	0.037
Clam Shovel Drop	0.202	0.553	0.094	0.044
Hydromill (Slurry Wall) – In Soil	0.022	0.022	0.004	0.002
Hydromill (Slurry Wall) – In Rock	0.047	0.047	0.008	0.004
Vibratory Roller	0.210	0.575	0.098	0.046
Hoe Ram	0.089	0.244	0.042	0.019
Large bulldozer	0.089	0.244	0.042	0.019
Caisson drilling	0.089	0.244	0.042	0.019
Loaded trucks	0.076	0.208	0.035	0.017
Jackhammer	0.035	0.096	0.016	0.008
Small bulldozer	0.003	0.008	0.001	0.001

Source: Caltrans 2022b
Notes:
1. Representative of Setbacks of Nearest Structures (in/sec PPV). These levels are calculated assuming normal propagation conditions, using a standard equation of PPVeqmt-PPVref * (25/D) 1.1, from Caltrans, September 2013.
Key: PPV (in/sec) = peak particle velocity (inches per second)

As shown in Table 2.2-20, Caltrans recommends a vibration limit of 0.5 in/sec PPV for new residential and modern commercial/industrial structures, 0.3 in/sec PPV for older residential structures, and 0.25 in/sec PPV for historic and some old buildings. Construction vibration limits would not be exceeded during periods of construction. Therefore, temporary construction vibration would have no adverse effects on nearby receptors.

Table 2.2-20. Distance to Exceedance of Vibration Limit by Structure Type

Structure Type	Threshold	Impact Pile Driving Distance to Exceedance of Threshold (feet)[1]	Heavy Construction Distance to Exceedance of Threshold (feet) [1]
Historic Buildings	0.25 in/sec PPV	100 feet	22 feet
Older Residences	0.3 in/sec PPV	85 feet	18 feet
New Residential and Commercial/Industrial Buildings	0.5 in/sec PPV	55 feet	12 feet

Source: Caltrans 2022b
[1]These levels calculated assuming normal propagation conditions, using a standard equation of *PPVeqmt-PPVref * (25/D) $^{1.1}$*, from Caltrans, September 2013.
Key: PPV (in/sec) = peak particle velocity (inches per second)

Operation

Build Alternatives 2a and 2b would involve adding an HOV2+ lane in each direction while Build Alternative 2b would also include building an I-80 connector structure.

Modeled noise levels under Build Alternative 2a would be the same as Build Alternative 2b with the exception of areas adjacent to the proposed I-80 connector structure (Build Alternative 2b only). Build Alternative 2b, as presented in Table 2.2-21, would increase noise levels by up to 2 dBA over existing conditions and over No Build conditions under future year 2049 conditions, with one residential receptor experiencing up to a 3 dBA. These noise level increases are not considered substantial per the Caltrans Noise Analysis Protocol for New Highway Construction (Caltrans 2020a).

Under Build Alternatives 2a and 2b, traffic noise levels would approach or exceed the Noise Abatement Criteria (NAC) at Category B receptors located north of US-50 westbound travel lanes between Harbor Boulevard and Jefferson Boulevard, south of US-50 eastbound travel lanes between Harbor Boulevard and Jefferson Boulevard, east of the US-50 and I-5 interchange, east of the US-50 westbound ramp onto I-80 eastbound, to the east and west of I-80 at the Sacramento River, and to the east of I-80 eastbound between Sacramento River and West El Camino Avenue. Some of these receptors are located behind existing noise barriers.

Traffic noise levels are predicted to approach or exceed the NAC at Category C receptors located east of the US-50 westbound ramp onto I-80 eastbound and south of US-50 eastbound travel lanes between Harbor Boulevard and Jefferson Boulevard.

Accordingly, noise abatement was considered for impacted receptors as further described in Section 2.2.8.4, Avoidance, Minimization, and/or Mitigation Measures.

Table 2.2-21. Calculated Noise Levels

Receptor ID	Location	Activity Category (NAC)	Land Use	Existing Loudest $L_{eq[h]}$ (dBA)[2]	Year 2049 No Build Loudest $L_{eq[h]}$ (dBA)[2]	Alt 2A Loudest $L_{eq[h]}$ (dBA)[2]	Alt 2A Increase Over No Build (dBA)	Alt 2A Impact[1]	Alt 2b Loudest $L_{eq[h]}$ (dBA)[2]	Alt 2b Increase Over No Build (dBA)	Alt 2b Impact[1]	Alt 3a Loudest $L_{eq[h]}$ (dBA)[2]	Alt 3a Increase Over No Build (dBA)	Alt 3a Impact[1]	Alt 4a Loudest $L_{eq[h]}$ (dBA)[2]	Alt 4a Increase Over No Build (dBA)	Alt 4a Impact[1]	Alt 5a Loudest $L_{eq[h]}$ (dBA)[2]	Alt 5a Increase Over No Build (dBA)	Alt 5a Impact[1]	Alt 6a Loudest $L_{eq[h]}$ (dBA)[2]	Alt 6a Increase Over No Build (dBA)	Alt 6a Impact[1]	Alt 7a Loudest $L_{eq[h]}$ (dBA)[2]	*Alt 7a Increase Over No Build (dBA)*	Alt 7a Impact[1]
ST-1	9010 Sparling Ln	B	Residential	68	68	68	0	None[6]	68	0	None[6]	68	0	None[6]	68	0	None[6]	68	0	None[6]	68	0	None[6]	68	0	None[6]
ST-2	8991-8999 Olmo Ln	B	Residential	69	70	70	0	None[6]	70	0	None[6]	70	0	None[6]	70	0	None[6]	70	0	None[6]	70	0	None[6]	70	0	None[6]
ST-3	UC Davis SE Corner of Equestrian Center Property	C	School-Active Sports Area	66	67	67	0	None[6]	67	0	None[6]	67	0	None[6]	67	0	None[6]	67	0	None[6]	67	0	None[6]	67	0	None[6]
ST-4	UC Davis near Carolee Shields Gazebo	C	School-Arboretum	58	58	58	0	None	58	0	None	58	0	None	58	0	None	58	0	None	58	0	None	58	0	None
ST-5	9460 W Chiles Rd	B	Residential	71	72	72	0	None[6]	72	0	None[6]	72	0	None[6]	72	0	None[6]	72	0	None[6]	72	0	None[6]	72	0	None[6]
ST-6	University Inn Park and Suites Pool Area	E	Hotel	57	57	58	1	None	58	0	None	58	1	None	58	1	None	58	1	None	58	1	None	57	0	None
ST-7	1100 Chiles Nachtmann Analytical Laboratory	E	Office	71	71	72	1	None[5]	72	1	None[5]	72	1	None[5]	72	1	None[5]	72	1	None[5]	72	1	None[5]	71	0	None[5]
ST-8	UC Davis Center for Laboratory Animal Science	D	School	69	69	69	0	None[5]	69	0	None[7]	69	0	None[7]	69	0	None[5]	69	0	None[5]	69	0	None[5]	69	0	None[5]
ST-9	Cesar Chavez Plaza Apartments	B	Residential	63	63	65	2	None	64	1	None	65	2	None	65	2	None	65	2	None	65	2	None	63	0	None
ST-10	The Arbors Apartments Pool Area	B	Residential	49	49	50	1	None	50	1	None	50	1	None	50	1	None	50	1	None	50	1	None	49	0	None
ST-11	The Arbors Apartments	B	Residential	64	64	66	2	None[6]	66	2	None[6]	66	2	None[6]	66	2	None[6]	66	2	None[6]	66	2	None[6]	64	0	None[6]
ST-12	La Quinta Inn and Suites by Wyndham Davis Pool Area	E	Hotel	71	71	71	0	A/E	71	0	A/E	71	0	A/E	71	0	A/E	71	0	A/E	71	0	A/E	71	0	A/E
ST-13	Toad Hollow Dog Park	C	Park	54	54	55	1	None	55	1	None	55	1	None	55	1	None	55	1	None	55	1	None	54	0	None
ST-14	Play Fields Park	C	Active Sports Area	61	61	61	0	None	61	0	None	61	0	None	61	0	None	61	0	None	61	0	None	61	0	None

Receptor ID	Location	Activity Category (NAC)	Land Use	Existing Loudest $L_{eq[h]}$ (dBA)[2]	Year 2049 No Build Loudest $L_{eq[h]}$ (dBA)[2]	Alt 2A Loudest $L_{eq[h]}$ (dBA)[2]	Alt 2A Increase Over No Build (dBA)	Alt 2A Impact[1]	Alt 2b Loudest $L_{eq[h]}$ (dBA)[2]	Alt 2b Increase Over No Build (dBA)	Alt 2b Impact[1]	Alt 3a Loudest $L_{eq[h]}$ (dBA)[2]	Alt 3a Increase Over No Build (dBA)	Alt 3a Impact[1]	Alt 4a Loudest $L_{eq[h]}$ (dBA)[2]	Alt 4a Increase Over No Build (dBA)	Alt 4a Impact[1]	Alt 5a Loudest $L_{eq[h]}$ (dBA)[2]	Alt 5a Increase Over No Build (dBA)	Alt 5a Impact[1]	Alt 6a Loudest $L_{eq[h]}$ (dBA)[2]	Alt 6a Increase Over No Build (dBA)	Alt 6a Impact[1]	Alt 7a Loudest $L_{eq[h]}$ (dBA)[2]	*Alt 7a Increase Over No Build (dBA)*	Alt 7a Impact[1]
ST-15	2617 Albany Ave	B	Residential	65	65	65	0	None	65	0	None	65	0	None	65	0	None	65	0	None	65	0	None	65	0	None
ST-16	2646 Albany Ave	B	Residential	52	52	52	0	None	52	0	None	52	0	None	52	0	None	52	0	None	52	0	None	52	0	None
ST-17	2813 Albany Ave	C	Playground	60	61	61	0	None	61	0	None	61	0	None	61	0	None	61	0	None	61	0	None	61	0	None
ST-18	UC Davis August A Busch III Brewing and Food Science Laboratory 641 Hilgard Ln	D	School	60	61	61	0	None[5]	61	0	None7	61	0	None[7]	61	0	None[5]	61	0	None[5]	61	0	None[5]	61	0	None[5]
ST-19	Playground at New Harmony Mutual Housing Community	C	Playground	55	55	56	1	None	55	0	None	56	1	None	56	1	None	56	1	None	56	1	None	55	0	None
ST-20	3212 Koso Terrace	B	Residential	67	67	67	0	None[6]	67	0	None6	67	0	None[6]	67	0	None[6]	67	0	None[6]	67	0	None[6]	67	0	None[6]
ST-21	3720 Chiles Rd	B	Residential	60	60	60	0	None	60	0	None	60	0	None	60	0	None	60	0	None	60	0	None	60	0	None
ST-22	3707 El Segundo Ave	B	Residential	66	66	66	0	None[6]	66	0	None6	66	0	None[6]	66	0	None[6]	66	0	None[6]	66	0	None[6]	66	0	None[6]
ST-23	Merryhill Preschool 213 La Vida Way	C	Preschool	56	56	56	0	None	56	0	None	56	0	None	56	0	None	56	0	None	56	0	None	56	0	None
ST-24	Days Inn by Wyndham Davis Near UC Davis	E	Hotel	59	59	59	0	None	59	0	None	59	0	None	59	0	None	59	0	None	59	0	None	59	0	None
ST-25	Pool Area at Motel 6 Davis–Sacramento	E	Hotel	65	65	65	0	None	65	0	None	65	0	None	65	0	None	65	0	None	65	0	None	65	0	None
ST-26	5070 Veranda Terrace	B	Residential	46	46	47	1	None	47	1	None	47	1	None	47	1	None	47	1	None	47	1	None	46	0	None
ST-27	5093 Veranda Terrace	B	Residential	50	50	51	1	None	51	1	None	51	1	None	51	1	None	51	1	None	51	1	None	50	0	None
ST-28	Yolo Basin Foundation 45211 CR-32 B	B	Residential	60	60	60	0	None	60	0	None	60	0	None	60	0	None	60	0	None	60	0	None	60	0	None
ST-29	Davis Soccer Fields- 26375 CR-105 D	C	Active Sport Area	58	58	58	0	None	58	0	None	58	0	None	58	0	None	58	0	None	58	0	None	58	0	None
ST-30	Yolo Bypass Wildlife Area-Bike Trail	E	Trail	80	80	80	0	None[3]	80	0	None3	80	0	None[3]	80	0	None[3]	80	0	None[3]	80	0	None[3]	80	0	None[3]

Receptor ID	Location	Activity Category (NAC)	Land Use	Existing Loudest $L_{eq[h]}$ (dBA)[2]	Year 2049 No Build Loudest $L_{eq[h]}$ (dBA)[2]	Alt 2A Loudest $L_{eq[h]}$ (dBA)[2]	Alt 2A Increase Over No Build (dBA)	Alt 2A Impact[1]	Alt 2b Loudest $L_{eq[h]}$ (dBA)[2]	Alt 2b Increase Over No Build (dBA)	Alt 2b Impact[1]	Alt 3a Loudest $L_{eq[h]}$ (dBA)[2]	Alt 3a Increase Over No Build (dBA)	Alt 3a Impact[1]	Alt 4a Loudest $L_{eq[h]}$ (dBA)[2]	Alt 4a Increase Over No Build (dBA)	Alt 4a Impact[1]	Alt 5a Loudest $L_{eq[h]}$ (dBA)[2]	Alt 5a Increase Over No Build (dBA)	Alt 5a Impact[1]	Alt 6a Loudest $L_{eq[h]}$ (dBA)[2]	Alt 6a Increase Over No Build (dBA)	Alt 6a Impact[1]	Alt 7a Loudest $L_{eq[h]}$ (dBA)[2]	*Alt 7a Increase Over No Build (dBA)*	Alt 7a Impact[1]
ST-31	Yolo Bypass Wildlife Area	E	Trail	69	69	70	1	None[4]	70	1	None4	70	1	None[4]	70	1	None[4]	70	1	None[4]	70	1	None[4]	69	0	None[4]
ST-32	Roland Hensley Park- 4900 W Capitol Ave	E	Trail	65	65	65	0	None	65	0	None	65	0	None	65	0	None	65	0	None	65	0	None	65	0	None
ST-34	Valhalla Mobile Home Club Pool Area	B	Residential	52	53	53	0	None	53	0	None	53	0	None	53	0	None	53	0	None	53	0	None	53	0	None
ST-35	10 Thor Dr	B	Residential	67	68	68	0	None[6]	68	0	None6	68	0	None[6]	68	0	None[6]	68	0	None[6]	68	0	None[6]	68	0	None[6]
ST-36	43 Bragi Dr	B	Residential	57	57	58	1	None	57	0	None	57	0	None	58	1	None	58	1	None	58	1	None	57	0	None
ST-37	241 Bragi Dr	B	Residential	61	63	63	0	None/	63	0	None/	63	0	None/	63	0	None/	63	0	None/	63	0	None/	63	0	None
ST-38	Meadowdale Park	C	Park	65	67	67	0	A/E	68	1	A/E	67	0	A/E	67	0	A/E	67	0	A/E	67	0	A/E	67	0	A/E
ST-39	3624 Palomar Ave	B	Residential	66	68	68	0	None[6]	68	0	None6	68	0	None[6]	68	0	None[6]	68	0	None[6]	68	0	None[6]	68	0	None[6]
ST-40	3604 Doran Ave	B	Residential	64	65	65	0	None	65	0	None	65	0	None	65	0	None	65	0	None	65	0	None	65	0	None
ST-41	861 Garnet St	B	Residential	65	66	66	0	None[6]	66	0	None6	66	0	None[6]	66	0	None[6]	66	0	None[6]	66	0	None[6]	66	0	None[6]
ST-43	Center for Spiritual Awareness 1275 Starboard Dr	D	Place of Worship	65	67	67	0	None[5]	67	0	None7	67	0	None[7]	67	0	None[5]	67	0	None[5]	67	0	None[5]	67	0	None[5]
ST-44	Motel 6 West Sacramento Pool Area	E	Hotel	56	57	57	0	None	57	0	None	57	0	None	57	0	None	57	0	None	57	0	None	57	0	None
ST-45	2225 Hickory Way	B	Residential	63	65	65	0	None	65	0	None	65	0	None	65	0	None	65	0	None	65	0	None	65	0	None
ST-46	1089 Orchard Way	B	Residential	66	67	67	0	A/E	67	0	A/E	67	0	A/E	67	0	A/E	67	0	A/E	67	0	A/E	67	0	A/E
ST-47	Westmore Oaks Elementary School 1514 Fallbrook St	C	School	73	74	74	0	None[5]	74	0	None5	74	0	None5	74	0	None[5]	74	0	None[5]	74	0	None[5]	74	0	None[5]
ST-48	Westmore Oaks Elementary School 1514 Fallbrook St	D	School	64	64	65	1	None	65	1	None7	65	1	None[7]	65	1	None	65	1	None	65	1	None	64	0	None
ST-49	1905 Buckeye Dr	B	Residential	68	70	70	0	A/E	70	0	A/E	70	0	A/E	70	0	A/E	70	0	A/E	70	0	A/E	70	0	A/E
ST-50	1412 Norfolk Ave	B	Residential	58	59	59	0	None	59	0	None	59	0	None	59	0	None	59	0	None	59	0	None	59	0	None

Receptor ID	Location	Activity Category (NAC)	Land Use	Existing Loudest $L_{eq[h]}$ (dBA)[2]	Year 2049 No Build Loudest $L_{eq[h]}$ (dBA)[2]	Alt 2A Loudest $L_{eq[h]}$ (dBA)[2]	Alt 2A Increase Over No Build (dBA)	Alt 2A Impact[1]	Alt 2b Loudest $L_{eq[h]}$ (dBA)[2]	Alt 2b Increase Over No Build (dBA)	Alt 2b Impact[1]	Alt 3a Loudest $L_{eq[h]}$ (dBA)[2]	Alt 3a Increase Over No Build (dBA)	Alt 3a Impact[1]	Alt 4a Loudest $L_{eq[h]}$ (dBA)[2]	Alt 4a Increase Over No Build (dBA)	Alt 4a Impact[1]	Alt 5a Loudest $L_{eq[h]}$ (dBA)[2]	Alt 5a Increase Over No Build (dBA)	Alt 5a Impact[1]	Alt 6a Loudest $L_{eq[h]}$ (dBA)[2]	Alt 6a Increase Over No Build (dBA)	Alt 6a Impact[1]	Alt 7a Loudest $L_{eq[h]}$ (dBA)[2]	*Alt 7a Increase Over No Build (dBA)*	Alt 7a Impact[1]
ST-51	Westacre Park	C	Playground	64	65	65	0	None	65	0	None	65	0	None	65	0	None	65	0	None	65	0	None	65	0	None
ST-52	1309 Norfolk Ave	B	Residential	61	62	62	0	None	62	0	None	62	0	None	62	0	None	62	0	None	62	0	None	62	0	None
ST-53	Yolo High School 919 Westacre Rd	C	School	61	63	63	0	None	63	0	None	63	0	None	63	0	None	63	0	None	63	0	None	63	0	None
ST-55	719 11th St	B	Residential	61	63	63	0	None	63	0	None	63	0	None	63	0	None	63	0	None	63	0	None	63	0	None
ST-56	1011 Canna Way	B	Residential	63	65	65	0	None	65	0	None	65	0	None	65	0	None	65	0	None	65	0	None	65	0	None
ST-58	918 Meadow Rd	B	Residential	64	66	66	0	A/E	66	0	A/E	66	0	A/E	66	0	A/E	66	0	A/E	66	0	A/E	66	0	A/E
ST-59	Food Distribution Center for Our Lady of Grace Church	E	Office	68	70	70	0	None[5]	70	0	None5	70	0	None5	70	0	None[5]	70	0	None[5]	70	0	None[5]	70	0	None[5]
ST-60	2214 4th St	B	Residential	72	72	72	0	A/E	72	0	A/E	72	0	A/E	72	0	A/E	72	0	A/E	72	0	A/E	72	0	A/E
ST-62	NW of 2197 Garden Highway	B	Residential	64	64	66	2	A/E	66	2	A/E	66	2	A/E	66	2	A/E	66	2	A/E	66	2	A/E	64	0	None
ST-63	2184 Garden Highway	B	Residential	65	65	66	1	None[5]	66	1	None5	66	1	None5	66	1	None[5]	66	1	None[5]	66	1	None[5]	65	0	None[5]
ST-64	2125 Garden Highway	B	Residential	70	70	72	2	None[6]	72	2	None6	72	2	None6	72	2	None[6]	72	2	None[6]	72	2	None[6]	70	0	None[6]
ST-65	3814 W River Dr	B	Residential	69	69	70	1	None[6]	71	2	None6	71	2	None6	71	2	None[6]	71	2	None[6]	71	2	None[6]	69	0	None[6]
ST-66	3760 W River Dr	B	Residential	59	59	60	1	None	60	1	None	60	1	None	60	1	None	60	1	None	60	1	None	59	0	None
ST-67	6 Rivulet Ct	B	Residential	61	61	63	2	None	63	2	None	63	2	None	63	2	None	63	2	None	63	2	None	61	0	None
ST-68	3638 W River Dr	B	Residential	64	64	66	2	None	66	1	None5	66	2	None5	66	2	None	66	2	None	66	2	None	64	0	None
ST-70	5 Cool Fountain Ct	B	Residential	65	65	67	2	None	67	2	None5	67	2	None5	67	2	None	670	2	None	67	2	None	65	0	None
ST-71	River Otter Park	C	Park	64	64	64	1	None	65	1	None	65	2	None	64	1	None	646	1	None	64	1	None	63	0	None
ST-72	3451 Delphinium Way	B	Residential	57	57	58	1	None	58	1	None	58	1	None	58	1	None	58	1	None	58	1	None	57	0	None
ST-73	40 White Lilly Ct	B	Residential	59	59	60	1	None	60	1	None	60	1	None	60	1	None	60	1	None	60	1	None	59	0	None
ST-74	52 Blue Fern Ct	B	Residential	61	61	62	1	None	62	1	None	62	1	None	62	1	None	62	1	None	62	1	None	61	0	None
ST-75	11 Swinging Bridge Ct	B	Residential	54	54	55	1	None	55	1	None	55	1	None	55	1	None	55	1	None	55	1	None	54	0	None

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R1	1 Equestrian Ln	C	Active Sports Area	62	63	63	0	None	63	0	None	63	0	None	63	0	None	63	0	None	63	0	None	63	0	None
R4	7826 Hamel Ln	B	Residential	57	57	57	0	None	57	0	None	57	0	None	57	0	None	57	0	None	57	0	None	57	0	None
R5	UC Davis Center for Neuroscience 1544 Newton Ct	D	School	71	71	71	0	None[5]	71	0	None7	71	0	None[7]	71	0	None[5]	71	0	None[5]	71	0	None[5]	71	0	None[5]
R6	1100 Olive Dr	B	Residential	68	69	69	0	None[5]	69	0	None5	69	0	None5	69	0	None[5]	69	0	None[5]	69	0	None[5]	69	0	None[5]
R7	1100 Olive Dr	B	Residential	55	55	56	1	None	56	1	None	56	1	None	56	1	None	56	1	None	56	1	None	55	0	None
R8	1100 Olive Dr	B	Residential	59	59	60	1	None	60	1	None	60	1	None	60	1	None	60	1	None	60	1	None	59	0	None
R9	1200 Olive Dr	B	Residential	52	52	53	1	None	53	1	None	53	1	None	53	1	None	53	1	None	53	1	None	52	0	None
R10	1200 Olive Dr	B	Residential	59	59	61	2	None	61	2	None	61	2	None	61	2	None	61	2	None	61	2	None	59	0	None
R11	1200 Olive Dr	B	Residential	54	55	55	0	None	55	0	None	55	0	None	55	0	None	55	0	None	55	0	None	55	0	None
R12	1280 Olive Dr	B	Residential	62	63	64	1	None	64	1	None	63	0	None	64	1	None	64	1	None	64	1	None	63	0	None
R13	1414 Olive Dr	B	Residential	63	63	65	2	None	65	2	None	65	2	None	65	2	None	65	2	None	65	2	None	63	0	None
R14	1414 Olive Dr	B	Residential	63	63	65	2	None	65	2	None	65	2	None	65	2	None	65	2	None	65	2	None	63	0	None
R15	Research Park Dr	B	Residential	53	53	53	0	None	53	0	None	53	0	None	53	0	None	53	0	None	53	0	None	53	0	None
R17	1445 Drew Ave	E	Office	65	65	65	0	None	65	0	None	65	0	None	65	0	None	65	0	None	65	0	None	65	0	None
R18	Cowell Dr	B	Residential	57	57	57	0	None	57	0	None	57	0	None	57	0	None	57	0	None	57	0	None	57	0	None
R19	Cowell Dr	B	Residential	56	56	56	0	None	56	0	None	56	0	None	56	0	None	56	0	None	56	0	None	56	0	None
R20	Cowell Dr	B	Residential	52	53	53	0	None	53	0	None	53	0	None	53	0	None	53	0	None	53	0	None	53	0	None
R21	2601 Albany Ave	B	Residential	64	64	64	0	None	64	0	None	64	0	None	64	0	None	64	0	None	64	0	None	64	0	None
R22	2611 Albany Ave	B	Residential	65	65	65	0	None	65	0	None	65	0	None	65	0	None	65	0	None	65	0	None	65	0	None
R23	2643 Albany Ave	B	Residential	64	64	64	0	None	64	0	None	64	0	None	64	0	None	64	0	None	64	0	None	64	0	None
R24	2721 Albany Ave	B	Residential	59	59	59	0	None	59	0	None	59	0	None	59	0	None	59	0	None	59	0	None	59	0	None
R25	2745 Albany Ave	B	Residential	60	60	60	0	None	60	0	None	60	0	None	60	0	None	60	0	None	60	0	None	60	0	None
R26	2817 Albany Ave	B	Residential	61	61	61	0	None	61	0	None	61	0	None	61	0	None	61	0	None	61	0	None	61	0	None
R27	613 Benbow Ct	B	Residential	62	62	62	0	None	62	0	None	62	0	None	62	0	None	62	0	None	62	0	None	62	0	None

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R28	601 Benbow Ct	B	Residential	60	60	60	0	None	60	0	None	60	0	None	60	0	None	60	0	None	60	0	None	60	0	None
R29	612 Benbow Ct	B	Residential	59	59	59	0	None	59	0	None	59	0	None	59	0	None	59	0	None	59	0	None	59	0	None
R30	University of California Agriculture and Natural Resources 2801 2nd St	D	School	71	71	71	0	None[5]	71	0	None7	71	0	None7	71	0	None[5]	71	0	None[5]	71	0	None[5]	71	0	None[5]
R31	3030 Cowell Boulevard	B	Residential	58	58	59	1	None	59	1	None	59	1	None	59	1	None	59	1	None	59	1	None	58	0	None
R32	3030 Cowell Boulevard	B	Residential	58	58	59	1	None	59	1	None	59	1	None	59	1	None	59	1	None	59	1	None	58	0	None
R33	3030 Cowell Boulevard	B	Residential	54	54	54	0	None	54	0	None	54	0	None	54	0	None	54	0	None	54	0	None	54	0	None
R34	3641 El Segundo Ave	B	Residential	65	65	65	0	None	65	0	None	65	0	None	65	0	None	65	0	None	65	0	None	65	0	None
R35	3665 El Segundo Ave	B	Residential	64	64	64	0	None	64	0	None	64	0	None	64	0	None	64	0	None	64	0	None	64	0	None
R36	3714 Chiles Rd	B	Residential	59	59	59	0	None	59	0	None	59	0	None	59	0	None	59	0	None	59	0	None	59	0	None
R37	3650 El Segundo Ave	B	Residential	48	48	48	0	None	48	0	None	48	0	None	48	0	None	48	0	None	48	0	None	48	0	None
R38	3704 El Segundo Ave	B	Residential	48	48	49	1	None	48	0	None	49	1	None	49	1	None	49	1	None	49	1	None	48	0	None
R39	3730 El Segundo Ave	B	Residential	59	59	59	0	None	59	0	None	59	0	None	59	0	None	59	0	None	59	0	None	59	0	None
R40	3820 Chiles Rd	B	Residential	49	50	50	0	None	50	0	None	50	0	None	50	0	None	50	0	None	50	0	None	50	0	None
R41	3820 Chiles Rd	B	Residential	44	45	45	0	None	45	0	None	45	0	None	45	0	None	45	0	None	45	0	None	45	0	None
R42	3820 Chiles Rd	B	Residential	51	51	51	0	None	51	0	None	51	0	None	51	0	None	51	0	None	51	0	None	51	0	None
R43	3820 Chiles Rd	B	Residential	48	49	49	0	None	49	0	None	49	0	None	49	0	None	49	0	None	49	0	None	49	0	None
R44	Days Inn Wyndham Davis Nearby UC Davis	E	Hotel	47	47	47	0	None	47	0	None	47	0	None	47	0	None	47	0	None	47	0	None	47	0	None
R45	Davis Urgent Care 4515 Fermi Place	D	Medical Facility	70	70	70	0	None[5]	70	0	None7	70	0	None[7]	70	0	None[5]	70	0	None[5]	70	0	None[5]	70	0	None[5]
R46	5063 Veranda Terrace	B	Residential	52	52	52	0	None	52	0	None	52	0	None	52	0	None	52	0	None	52	0	None	52	0	None
R47	5069 Veranda Terrace	B	Residential	54	54	54	0	None	54	0	None	54	0	None	54	0	None	54	0	None	54	0	None	54	0	None

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R48	5077 Veranda Terrace	B	Residential	54	54	55	1	None	55	1	None	55	1	None	54	0	None	55	1	None	55	1	None	54	0	None
R49	3951 Lake Rd	B	Residential	61	61	61	0	None	61	0	None	61	0	None	61	0	None	61	0	None	61	0	None	61	0	None
R50	3901 Lake Rd	B	Residential	62	62	62	0	None	62	0	None	62	0	None	62	0	None	62	0	None	62	0	None	62	0	None
R51	3901 Lake Rd	B	Residential	62	62	63	1	None	63	1	None	63	1	None	63	1	None	63	1	None	63	1	None	62	0	None
R52	3901 Lake Rd	B	Residential	58	58	58	0	None	58	0	None	58	0	None	58	0	None	58	0	None	58	0	None	58	0	None
R53	3901 Lake Rd	B	Residential	58	58	58	0	None	59	1	None	58	0	None	58	0	None	58	0	None	58	0	None	58	0	None
R54	3901 Lake Rd	B	Residential	61	61	62	1	None	62	1	None	62	1	None	62	1	None	62	1	None	62	1	None	61	0	None
R55	3901 Lake Rd	B	Residential	64	64	64	0	None	64	0	None	64	0	None	64	0	None	64	0	None	64	0	None	64	0	None
R56	3901 Lake Rd	B	Residential	59	59	60	1	None	60	1	None	60	1	None	60	1	None	60	1	None	60	1	None	59	0	None
R57	3901 Lake Rd	B	Residential	63	63	63	0	None	63	0	None	63	0	None	63	0	None	63	0	None	63	0	None	63	0	None
R58	Concentra Urgent Care 3680 Industrial Boulevard	D	Medical Facility	59	59	61	2	None[5]	61	2	None7	61	1	None[7]	61	2	None[5]	61	2	None[5]	61	2	None[5]	59	0	None[5]
R59	DaVita West 3450 Industrial Boulevard	D	Medical Facility	70	70	72	2	None[5]	72	2	None5	72	2	None[7]	72	2	None[5]	72	2	None[5]	72	2	None[5]	70	0	None[5]
R60	829 Marigold St	B	Residential	61	61	61	0	None	62	1	None	61	0	None	61	0	None	61	0	None	61	0	None	61	0	None
R61	844 Morning Glory St	B	Residential	62	62	63	1	None	64	2	None	63	1	None	63	1	None	63	1	None	63	1	None	62	0	None
R62	832 Garnet St	B	Residential	61	61	62	1	None	63	2	None	62	1	None	62	1	None	62	1	None	62	1	None	61	0	None
R63	3524 Doran Ave	B	Residential	60	60	61	1	None	62	2	None	61	1	None	61	1	None	61	1	None	61	1	None	60	0	None
R64	857 Garnet St	B	Residential	57	57	58	1	None	58	1	None	58	1	None	58	1	None	58	1	None	58	1	None	57	0	None
R65	3427 Evergreen Circle	B	Residential	64	64	66	2	None	66	2	A/E	66	2	A/E	66	2	None	66	2	None	66	2	None	64	0	None
R66	3427 Evergreen Circle	B	Residential	55	55	56	1	None	56	1	None	56	1	None	56	1	None	56	1	None	56	1	None	55	0	None
R67	Ramada by Wyndham West Sacramento Hotel & Suites	E	Hotel	55	55	57	2	None	57	2	None	57	2	None	57	2	None	57	2	None	57	2	None	55	0	None
R68	Sacramento Valley Charter School 2399 Sellers Way	D	School	66	66	68	2	None[5]	68	2	None7	68	2	None[7]	68	2	None[5]	68	2	None[5]	68	2	None[5]	66	0	None[5]

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R69	River Bend Nursing Center 2215 Oakmont Way	C	Medical Facility	61	61	62	1	None	62	1	None	62	1	None	62	1	None	62	1	None	62	1	None	61	0	None
R70	2205 Hickory Way	B	Residential	68	68	70	2	A/E	70	2	A/E	70	2	A/E	70	2	A/E	70	2	A/E	70	2	A/E	68	0	A/E
R71	2143 Hickory Way	B	Residential	69	69	70	1	A/E	70	1	A/E	70	1	A/E	70	1	A/E	70	1	A/E	70	1	A/E	69	0	A/E
R72	2105 Hickory Way	B	Residential	65	65	67	2	None	67	2	None5	67	2	None5	67	2	None	67	2	None	67	2	None	65	0	None
R73	1049 Orchard Way	B	Residential	64	64	66	2	None	66	2	None5	66	2	None5	66	2	None	66	2	None	66	2	None	64	0	None
R74	959 Orchard Way	B	Residential	62	62	63	1	None	63	1	None	63	1	None	63	1	None	63	1	None	63	1	None	62	0	None
R75	2019 Buckeye Dr	B	Residential	67	67	69	2	A/E	69	2	A/E	69	2	A/E	69	2	A/E	69	2	A/E	69	2	A/E	67	0	A/E
R76	1020 Sycamore Ave	B	Residential	58	58	59	1	None	59	1	None	59	1	None	59	1	None	59	1	None	59	1	None	58	0	None
R77	1009 Sycamore Ave	B	Residential	57	57	59	2	None	59	2	None	59	2	None	59	2	None	59	2	None	59	2	None	57	0	None
R78	1021 Hemlock St	B	Residential	59	59	60	1	None	60	1	None	60	1	None	60	1	None	60	1	None	60	1	None	59	0	None
R79	1933 Buckeye Dr	B	Residential	66	66	68	2	A/E	68	2	A/E	68	2	A/E	68	2	A/E	68	2	A/E	68	2	A/E	66	0	A/E
R80	1913 Buckeye Dr	B	Residential	66	66	68	2	A/E	68	2	A/E	68	2	A/E	68	2	A/E	68	2	A/E	68	2	A/E	66	0	A/E
R81	1012 Poplar Ave	B	Residential	58	58	60	2	None	60	2	None	60	2	None	60	2	None	60	2	None	60	2	None	58	0	None
R82	1608 Norfolk Ave	B	Residential	69	69	71	2	A/E	71	2	A/E	71	2	A/E	71	2	A/E	71	2	A/E	71	2	A/E	69	0	A/E
R83	1504 Norfolk Ave	B	Residential	68	68	70	2	A/E	70	2	A/E	70	2	A/E	70	2	A/E	70	2	A/E	70	2	A/E	68	0	A/E
R84	1404 Norfolk Ave	B	Residential	69	69	71	2	A/E	71	2	A/E	71	2	A/E	71	2	A/E	71	2	A/E	71	2	A/E	69	0	A/E
R85	1204 Norfolk Ave	B	Residential	70	70	72	2	A/E	72	2	A/E	72	2	A/E	72	2	A/E	72	2	A/E	72	2	A/E	70	0	A/E
R86	1604 Meadow Rd	B	Residential	58	58	60	2	None	60	2	None	60	2	None	60	2	None	60	2	None	60	2	None	58	0	None
R87	1601 Norfolk Ave	B	Residential	59	59	60	1	None	60	1	None	60	1	None	60	1	None	60	1	None	60	1	None	59	0	None

Receptor ID	Location	Activity Category (NAC)	Land Use	Existing Loudest $L_{eq[h]}$ (dBA)[2]	Year 2049 No Build Loudest $L_{eq[h]}$ (dBA)[2]	Alt 2A Loudest $L_{eq[h]}$ (dBA)[2]	Alt 2A Increase Over No Build (dBA)	Alt 2A Impact[1]	Alt 2b Loudest $L_{eq[h]}$ (dBA)[2]	Alt 2b Increase Over No Build (dBA)	Alt 2b Impact[1]	Alt 3a Loudest $L_{eq[h]}$ (dBA)[2]	Alt 3a Increase Over No Build (dBA)	Alt 3a Impact[1]	Alt 4a Loudest $L_{eq[h]}$ (dBA)[2]	Alt 4a Increase Over No Build (dBA)	Alt 4a Impact[1]	Alt 5a Loudest $L_{eq[h]}$ (dBA)[2]	Alt 5a Increase Over No Build (dBA)	Alt 5a Impact[1]	Alt 6a Loudest $L_{eq[h]}$ (dBA)[2]	Alt 6a Increase Over No Build (dBA)	Alt 6a Impact[1]	Alt 7a Loudest $L_{eq[h]}$ (dBA)[2]	*Alt 7a Increase Over No Build (dBA)*	Alt 7a Impact[1]
R88	1024 Haverhill St	B	Residential	60	60	62	2	None	62	2	None	62	2	None	62	2	None	62	2	None	62	2	None	60	0	None
R89	1305 Norfolk Ave	B	Residential	60	60	62	2	None	62	2	None	62	2	None	62	2	None	62	2	None	62	2	None	60	0	None
R90	1104 Westacre Rd	B	Residential	60	60	62	2	None	62	2	None	62	2	None	62	2	None	62	2	None	62	2	None	60	0	None
R91	1101 Westacre Rd	B	Residential	62	62	64	2	None	64	2	None	64	2	None	64	2	None	64	2	None	64	2	None	62	0	None
R92	727 11th St	B	Residential	69	69	71	2	A/E	71	2	A/E	71	2	A/E	71	2	A/E	71	2	A/E	71	2	A/E	69	0	A/E
R93	715 Webster St	B	Residential	64	64	66	2	None	66	2	A/E	66	2	A/E	66	2	None	66	2	None	66	2	None	64	0	None
R94	1020 Meadow Rd	B	Residential	62	62	64	2	None	64	2	None	64	2	None	64	2	None	64	2	None	64	2	None	62	0	None
R95	609 Webster St	B	Residential	62	62	64	2	None	64	2	None	64	2	None	64	2	None	65	3	None	65	3	None	62	0	None
R96	504 Webster St	B	Residential	64	64	66	2	A/E	66	2	A/E	66	2	A/E	66	2	A/E	66	2	A/E	66	2	A/E	64	0	None
R97	911 Meadow Rd	B	Residential	65	65	67	2	A/E	67	2	A/E	67	2	A/E	67	2	A/E	67	2	A/E	67	2	A/E	65	0	None
R98	Levia Park	C	Park	65	65	65	0	None	65	0	None	65	0	None	65	0	None	65	0	None	65	0	None	65	0	None
R99	316 V St	B	Residential	72	72	72	0	A/E	72	0	A/E	72	0	A/E	72	0	A/E	72	0	A/E	72	0	A/E	72	0	A/E
R100	2209 4th St	B	Residential	65	65	65	0	A/E	65	0	None	65	0	None	65	0	A/E	65	0	A/E	65	0	A/E	65	0	None
R101	846 Marigold St	B	Residential	63	63	65	2	None	66	3	A/E	65	2	None	65	2	None	65	2	None	65	2	None	63	0	None
R102	828 Marigold St	B	Residential	64	64	65	1	None	65	1	None	65	1	None	65	1	None	65	1	None	65	1	None	64	0	None
R103	812 Morning Glory St	B	Residential	60	60	61	1	None	62	2	None	61	1	None	61	1	None	61	1	None	61	1	None	60	0	None
R104	3600 Palomar Ave	B	Residential	64	64	64	0	None	65	1	None	64	0	None	64	0	None	64	0	None	64	0	None	64	0	None
R105	3624 Palomar Ave	B	Residential	67	67	69	2	A/E	69	2	A/E	69	2	A/E	68	1	A/E	68	1	A/E	69	2	A/E	67	0	A/E
R106	2125 Garden Highway	B	Residential	69	69	71	2	A/E	71	2	A/E	71	2	A/E	71	2	A/E	71	2	A/E	71	2	A/E	69	0	A/E
R107	2145 Garden Highway	B	Residential	68	68	70	2	A/E	70	2	A/E	70	2	A/E	70	2	A/E	70	2	A/E	70	2	A/E	68	0	A/E
R108	2181 Garden Highway	B	Residential	65	65	66	1	A/E	66	1	A/E	66	1	A/E	66	1	A/E	66	1	A/E	66	1	A/E	65	0	None
R109	2197 Garden Highway	B	Residential	65	65	67	2	A/E	66	1	A/E	67	2	A/E	67	2	A/E	67	2	A/E	67	2	A/E	65	0	None
R110	2184 Garden Highway	B	Residential	64	64	66	2	None	66	2	A/E	66	2	A/E	66	2	None	66	2	None	66	2	None	64	0	None
R111	3796 W River Dr	B	Residential	64	64	65	1	None	66	2	A/E	66	2	A/E	65	1	None	65	1	None	66	2	None	64	0	None

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R112	3778 W River Dr	B	Residential	60	60	62	2	None	62	2	None	62	2	None	62	2	None	62	2	None	62	2	None	60	0	None
R113	3575 Wheelhouse Ave	B	Residential	65	65	67	2	None	67	2	A/E	67	2	A/E	67	2	None	67	2	None	67	2	None	65	0	None
R114	2106 Sternwheeler Way	B	Residential	60	60	62	2	None	62	2	None	62	2	None	62	2	None	62	2	None	62	2	None	60	0	None
R115	3742 W River Dr	B	Residential	57	57	59	2	None	59	2	None	59	2	None	59	2	None	59	2	None	59	2	None	57	0	None
R116	3724 W River Dr	B	Residential	60	60	62	2	None	62	2	None	62	2	None	62	2	None	62	2	None	62	2	None	60	0	None
R117	21116 Smokestack Way	B	Residential	60	60	61	1	None	61	1	None	61	1	None	61	1	None	61	1	None	61	1	None	60	0	None
R118	3542 Delta Queen Ave	B	Residential	60	60	61	1	None	61	1	None	61	1	None	61	1	None	61	1	None	61	1	None	60	0	None
R119	3517 Delta Queen Ave	B	Residential	62	62	64	2	None	64	2	None	64	2	None	64	2	None	64	2	None	64	2	None	62	0	None
R120	3682 W River Dr	B	Residential	61	61	62	1	None	62	1	None	62	1	None	62	1	None	62	1	None	62	1	None	61	0	None
R121	3494 Delta Queen Ave	B	Residential	54	54	55	1	None	55	1	None	55	1	None	55	1	None	55	1	None	55	1	None	54	0	None
R122	3481 Delta Queen Ave	B	Residential	60	60	62	2	None	62	2	None	62	2	None	62	2	None	62	2	None	62	2	None	60	0	None
R123	3441 River Shoal Ave	B	Residential	55	55	57	2	None	57	2	None	57	2	None	57	2	None	57	2	None	57	2	None	55	0	None
R124	3451 Delta Queen Ave	B	Residential	58	58	60	2	None	60	2	None	60	2	None	60	2	None	60	2	None	60	2	None	58	0	None
R125	3633 W River Dr	B	Residential	65	65	67	2	None	67	2	A/E	67	2	A/E	67	2	None	67	2	None	67	2	None	65	0	None
R126	2215 Shady Arbor Dr	B	Residential	64	64	66	2	None	66	2	A/E	66	2	A/E	66	2	None	66	2	None	66	2	None	64	0	None
R127	2171 Shady Arbor Dr	B	Residential	58	58	59	1	None	59	1	None	59	1	None	59	1	None	59	1	None	59	1	None	58	0	None
R128	3569 W River Dr	B	Residential	58	58	60	2	None	60	2	None	60	2	None	60	2	None	60	2	None	60	2	None	58	0	None
R129	3527 W River Dr	B	Residential	54	54	56	2	None	56	2	None	56	2	None	56	2	None	56	2	None	56	2	None	54	0	None
R130	5 Cool Fountain Ct	B	Residential	63	63	64	1	None	64	1	None	64	1	None	64	1	None	64	1	None	64	1	None	63	0	None
R131	3447 Sweet Pea Way	B	Residential	57	57	58	1	None	58	1	None	58	1	None	58	1	None	58	1	None	58	1	None	57	0	None
R132	3439 W River Dr	B	Residential	52	52	54	2	None	54	2	None	54	2	None	54	2	None	54	2	None	54	2	None	52	0	None
R133	3407 W River Dr	B	Residential	51	51	52	1	None	52	1	None	52	1	None	52	1	None	52	1	None	52	1	None	51	0	None

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R134	40 Shady Arbor Ct	B	Residential	59	59	60	1	None	60	1	None	60	1	None	60	1	None	60	1	None	60	1	None	59	0	None
R135	22 Calla Lily Ct	B	Residential	53	53	54	1	None	54	1	None	54	1	None	54	1	None	54	1	None	54	1	None	53	0	None
R136	2318 Barandas Dr	B	Residential	55	55	56	1	None	56	1	None	56	1	None	56	1	None	56	1	None	56	1	None	55	0	None
R137	3428 Delphinium Way	B	Residential	53	53	54	1	None	54	1	None	54	1	None	54	1	None	54	1	None	54	1	None	53	0	None
R138	27 White Lily Ct	B	Residential	54	54	55	1	None	55	1	None	55	1	None	55	1	None	55	1	None	55	1	None	54	0	None
R139	40 White Lily Ct	B	Residential	59	59	61	2	None	61	2	None	61	2	None	61	2	None	61	2	None	61	2	None	59	0	None
R140	3235 Spinning Rod Way	B	Residential	53	53	54	1	None	54	1	None	54	1	None	54	1	None	54	1	None	54	1	None	53	0	None
R141	27 Blue Fern Ct	B	Residential	65	65	66	1	A/E	66	1	A/E	66	1	A/E	66	1	A/E	66	1	A/E	66	1	A/E	65	0	None
R142	3259 Spinning Rod Way	B	Residential	54	54	55	1	None	55	1	None	55	1	None	55	1	None	55	1	None	55	1	None	54	0	None
R143	3175 Boathouse Way	B	Residential	51	51	52	1	None	52	1	None	52	1	None	52	1	None	52	1	None	52	1	None	51	0	None
R144	18 Spinning Rod Ct	B	Residential	61	61	63	2	None	63	2	None	63	2	None	63	2	None	63	2	None	63	2	None	61	0	None
R145	Olive Dr	B	Residential	64	64	65	1	None	65	1	None	65	1	None	65	1	None	65	1	None	65	1	None	64	0	None
R146	Olive Dr	B	Residential	64	64	65	1	None	65	1	None	65	1	None	65	1	None	65	1	None	65	1	None	64	0	None
R147	Olive Dr	B	Residential	62	63	63	1	None	63	0	None	63	0	None	63	1	None	63	0	None	63	0	None	63	0	None
R148	9010 Sparling Ln	B	Residential	56	57	57	1	None	57	0	None	57	0	None	57	1	None	57	0	None	57	0	None	57	0	None
R149	8991-8999 Olmo Ln	B	Residential	63	63	64	1	None	63	0	None	63	0	None	64	1	None	64	1	None	63	0	None	63	0	None
R150	9460 W Chiles Rd	B	Residential	71	71	72	1	A/E	72	1	A/E	72	1	A/E	72	1	A/E	72	1	A/E	72	1	A/E	71	0	A/E
R151	Westmore Oaks Elementary School	C	School	70	70	70	0	A/E	70	0	A/E	70	0	A/E	70	0	A/E	70	0	A/E	70	0	A/E	70	0	A/E
R152	3620 Palomar Ave	B	Residential	66	66	66	0	A/E	67	1	A/E	66	0	A/E	66	0	A/E	66	0	A/E	66	0	A/E	66	0	A/E
R153	3612 Palomar Ave	B	Residential	65	65	65	0	None	66	1	A/E	65	0	None	65	0	None	65	0	None	65	0	None	65	0	None
R154	812 Marigold St	B	Residential	65	65	65	0	None	65	0	None	65	0	None	65	0	None	65	0	None	65	0	None	65	0	None
R155	820 Marigold St	B	Residential	65	65	66	1	A/E	67	2	A/E	66	1	A/E	66	1	A/E	66	1	A/E	66	1	A/E	65	0	None

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R156	Olmo Lane	G	Undeveloped	67	67	67	0	None	67	0	None	68	1	None	67	0	None	67	0	None	67	0	None	67	0	None
R157	Sparling Lane	G	Undeveloped	67	65	65	0	None	65	0	None	66	1	None	65	0	None	65	0	None	65	0	None	65	0	None
R158	EB I-80 Old Davis Road Exit	G	Undeveloped	69	68	68	0	None	68	0	None	68	0	None	68	0	None	68	0	None	68	0	None	68	0	None
R159	EB I-80 Old Davis Road Exit	G	Undeveloped	62	69	69	0	None	69	0	None	69	0	None	69	0	None	69	0	None	69	0	None	69	0	None
R160	WB I-80 Old Davis Road Exit	G	Undeveloped	64	62	62	0	None	62	0	None	63	1	None	62	0	None	62	0	None	62	0	None	62	0	None
R161	W Chiles Road	G	Undeveloped	67	66	66	0	None	66	0	None	66	0	None	66	0	None	66	0	None	66	0	None	66	0	None
R162	2nd Street	G	Undeveloped	67	67	67	0	None	67	0	None	67	0	None	67	0	None	67	0	None	67	0	None	67	0	None
R163	Cowell Boulevard	G	Undeveloped	73	73	73	0	None	73	0	None	73	0	None	73	0	None	73	0	None	73	0	None	73	0	None
R164	2nd Street	G	Undeveloped	71	71	71	0	None	71	0	None	71	0	None	71	0	None	71	0	None	71	0	None	71	0	None
R165	Chiles Road	G	Undeveloped	71	71	71	0	None	71	0	None	71	0	None	71	0	None	71	0	None	71	1	None	71	0	None
R166	3808 Faraday Avenue	G	Undeveloped	71	71	71	0	None	71	0	None	71	0	None	71	0	None	71	0	None	71	0	None	71	0	None
R167	32A	G	Undeveloped	71	71	71	0	None	72	1	None	71	0	None	71	0	None	71	0	None	72	1	None	71	0	None
R168	32A	G	Undeveloped	56	56	56	0	None	57	1	None	56	0	None	56	0	None	56	0	None	57	1	None	56	0	None
R169	Howat	G	Undeveloped	57	57	57	0	None	57	0	None	57	0	None	57	0	None	57	0	None	57	0	None	57	0	None
R170	32A	G	Undeveloped	75	75	75	0	None	76	1	None	75	0	None	75	0	None	75	0	None	76	1	None	75	0	None
R171	WB I-80 32A onramp	G	Undeveloped	74	74	75	1	None	75	1	None	75	1	None	75	1	None	75	1	None	75	1	None	74	0	None
R172	Chiles Road	G	Undeveloped	77	77	77	0	None	78	1	None	77	9	None	77	0	None	77	0	None	78	1	None	77	0	None
R173	East of 32A	G	Undeveloped	67	67	70	3	None	70	3	None	70	3	None	70	3	None	70	3	None	70	3	None	67	0	None
R174	WB I-80	G	Undeveloped	67	67	67	0	None	67	0	None	67	0	None	67	0	None	67	0	None	67	0	None	67	0	None
R175	WB I-80	G	Undeveloped	66	66	66	0	None	66	0	None	66	0	None	66	0	None	66	0	None	66	0	None	66	0	None
R176	3980 Lake Road	G	Undeveloped	71	71	71	0	None	71	0	None	71	0	None	71	0	None	71	0	None	71	0	None	71	0	None
R177	3951 Lake Road	G	Undeveloped	65	65	67	2	None	67	3	None	66	1	None	66	1	None	66	1	None	67	2	None	65	0	None
R178	West Capitol Avenue	G	Undeveloped	78	78	79	1	None	79	1	None	79	1	None	79	1	None	79	1	None	79	1	None	78	0	None
R179	Harbor Boulevard	G	Undeveloped	72	72	75	3	None	76	4	None	75	3	None	75	3	None	75	3	None	75	3	None	72	0	None
R180	531 Drever Street	G	Undeveloped	71	71	73	2	None	74	3	None	73	2	None	73	2	None	73	2	None	74	3	None	71	0	None

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R181	1301 South River Road	G	Undeveloped	69	69	71	2	None	73	4	None	71	2	None	71	2	None	71	2	None	72	3	None	69	0	None
R182	Mill Street	G	Undeveloped	69	69	71	2	None	73	4	None	71	2	None	71	2	None	71	2	None	72	3	None	69	0	None
R183	600 Sutter Street	G	Undeveloped	66	66	68	2	None	69	3	None	68	2	None	68	2	None	68	2	None	69	2	None	66	0	None
R184	Reed Avenue	G	Undeveloped	70	70	72	2	None	72	2	None	72	2	None	72	2	None	72	2	None	72	2	None	70	0	None
R185	Reed Avenue	G	Undeveloped	70	70	72	2	None	74	4	None	73	3	None	72	2	None	72	2	None	73	3	None	70	0	None
R186	North Harbor Boulevard	G	Undeveloped	69	69	71	2	None	73	4	None	72	3	None	71	2	None	71	2	None	72	3	None	69	0	None
R187	2126 Garden Highway	G	Undeveloped	70	70	72	2	None	73	3	None	72	2	None	72	2	None	73	3	None	73	3	None	70	0	None
R188	El Centro Road	G	Undeveloped	68	68	69	1	None	69	1	None	69	1	None	69	1	None	69	1	None	69	1	None	68	0	None
R189	El Centro Road	G	Undeveloped	74	74	75	1	None	75	1	None	75	1	None	75	1	None	75	1	None	75	1	None	74	0	None
R190	El Centro Road	G	Undeveloped	76	76	76	0	None	76	0	None	76	0	None	76	0	None	76	0	None	76	0	None	76	0	None
R191	Willow Creek	G	Undeveloped	76	76	78	2	None	78	2	None	78	2	None	78	2	None	78	2	None	78	2	None	76	0	None
R192	2nd Street	G	Undeveloped	71	71	71	0	None	71	0	None	71	0	None	71	0	None	71	0	None	71	0	None	71	0	None

Source: Caltrans 2022b

[1] Impact Type: S = Substantial Increase (12 dBA or more), A/E = Approach or Exceed NAC, None = Increase is less than 12 decibels and noise levels do not approach or exceed the NAC.
[2] As stated in the TeNS, modeling results are rounded to the nearest decibel before comparisons are made.
[3] As stated in the Traffic Noise Protocol (TNAP) April 2020, bike baths that serve primarily as a transportation facility are not evaluated as recreational trails.
[4] As stated in the Traffic Noise Protocol (TNAP) April 2020, recreational trails that primarily involve the use of motorized vehicles are not evaluated as recreational
[5] This location does not include any exterior noise sensitive land uses; exterior noise levels are provided for reference only.
[6]This location is not considered an area of frequent human use where people are exposed to traffic for an extended period of time on a regular basis. Where applicable, additional receivers have been placed in areas of frequent human use.
[7] This location does not include any exterior noise sensitive land uses, so would be considered a Category D land use only. Exterior noise levels are presented in the Table.
Notes: $L_{eq[h]}$ = The 1-hour A-weighted equivalent sound level; dBA = A-weighted decibels; u

Interior Noise

A noise impact would occur if, as a result of a proposed freeway project, noise levels approach or exceed 52 dBA Leq[h] in the interior of auditoriums, day care centers, hospitals, libraries, medical facilities, places of worship, public meeting rooms, public or nonprofit institutional structures, radio studios, recording studios, schools, and television studios. Based on FHWA Guidance, a typical Category D use structure would be anticipated to provide about 10 dBA of noise reduction from exterior noise sources with windows open, and 20 to 30 dBA of noise reduction with windows in the closed position, depending on the window and exterior wall construction. Category D use structures that do not have forced-air mechanical ventilation to allow occupants to keep windows closed to control noise could be anticipated to have interior noise levels approaching or exceeding 52 dBA Leq[h] with exterior exposures of 62 dBA Leq[h] or more. For structures with windows in the closed position, exterior noise levels of 72 to 82 dBA Leq[h] or less, depending on the acoustical construction of the structure, would result in acceptable interior noise levels.

Under Build Alternative 2a and 2b, noise levels at the worst-case exterior façades of Category D land uses that are identified along the alignment range from 56 to 72 dBA Leq[h] by year 2049. Table 2.2-22 lists the calculated loudest-hour interior noise levels within the three Category D land uses.

Four medical facilities were identified in the project area. Davis Urgent Care is located approximately 320 feet north of I-80 and is represented by Receptor R45 (Figure 2.2-8). The 4515 Fermi Place building, of which Davis Urgent Care is an occupant, is a large office building of modern construction and is anticipated to provide about 30 dB of exterior-to-interior noise reduction with windows closed. Concentra Urgent Care is located approximately 350 feet south of I-80 and is represented by Receptor R58 (Figure 2.2-11). The 3680 Industrial Boulevard building, of which Concentra Urgent Care is an occupant, is a large office building of modern construction and is anticipated to provide about 30 dB of exterior-to-interior noise reduction with windows closed. DaVita West Sacramento Dialysis Center is located approximately 280 feet south of US-50 and is represented by Receptor R59 (Figure 2.2-12). The 3450 Industrial Boulevard building, of which DaVita West Sacramento Dialysis Center is an occupant, is a large office building of modern construction and is anticipated to provide about 30 dB of exterior-to-interior noise reduction with windows closed. Noise levels within the 3450 Industrial Boulevard building are not anticipated to approach or exceed 52 dBA Leq[h]. River Bend Nursing Center is located approximately 180 feet north of US-50 and is represented by Receptor R69 (Figure 2.2-13). The 2215 Oakmont Way building, of which River Bend Nursing Center is an occupant, is a large office building of modern construction and is anticipated to provide about 30 dB of exterior-to-interior noise reduction with windows closed. All four office buildings include mechanical ventilation, allowing occupants the option of closing windows to control noise. Therefore, noise levels at all four buildings are not anticipated to approach or exceed 52 dBA Leq.

Table 2.2-22. Calculated Interior Noise Levels for No Build Alternative 1 and Build Alternatives 2a and 2b

Receptor ID	Loudest-Hour Exterior Noise Levels, $Leq_{[h]}$ dBA[2]			Calculated Interior Noise Level	Land Use	Impact
	Existing	2049 No Build (Alt 1)	2049 Build (Alts 2a/2b)	2049 Build (Alts 2a/2b)		
ST-8	69	69	69	39	School	None
ST-18	60	61	61	31	School	None
ST-23	56	56	56	26	Preschool	None
ST-43	65	67	67	37	Place of Worship	None
ST-48	64	64	65	35	School	None
ST-53	61	63	63	33	School	None
R5	71	71	71	41	School	None
R30	71	71	71	41	School	None
R45	70	70	70	40	Medical Facility	None
R58	59	59	61	31	Medical Facility	None
R59	70	70	72	42	Medical Facility	None
R68	66	66	68	38	School	None
R69	61	61	62	32	Medical Facility	None

Two colleges were identified in the project area. University of California Davis (UC Davis) has multiple building locations throughout the project area. The UC Davis Center of Laboratory Animal Science is located approximately 290 feet south of I-80 and is represented by Receptor ST-8 (). The laboratory building is a large office building of modern construction and is anticipated to provide about 30 dB of exterior-to-interior noise reduction with windows closed. Based on a desktop review, the laboratory building includes mechanical ventilation, allowing occupants the option of closing windows to control noise. Noise levels within the UC Davis Center for Laboratory Animal Science building are not anticipated to approach or exceed 52 dBA Leq[h]. The UC Davis August A. Busch III Brewing and Food Science Laboratory is located approximately 450 feet north of I-80 and is represented by Receptor ST-18 (). The 641 Hilgard Lane building, of which The UC Davis August A. Busch III Brewing and Food Science Laboratory is an occupant, is a large office building of modern construction and is anticipated to provide about 30 dB of exterior-to-interior noise reduction with windows closed. Based on a desktop review, the 641 Hilgard Lane building includes mechanical ventilation, allowing occupants the option of closing windows to control noise. Noise levels within the 641 Hilgard Lane building are not anticipated to approach or exceed 52 dBA Leq[h]. The UC Davis Center for Neuroscience is located approximately 250 feet east of I-80 and is represented by Receptor R5 (Figure 2.2-5). The 1544 Newton Court building, of which the UC Davis Center for

Neuroscience is an occupant, is a large office building of modern construction and is anticipated to provide about 30 dB of exterior-to-interior noise reduction with windows closed. Based on a desktop review, the 1544 Newton Court building includes mechanical ventilation, allowing occupants the option of closing windows to control noise. Noise levels within the 1544 Newton Court building are not anticipated to approach or exceed 52 dBA Leq[h]. The University of California Agriculture and Natural Resources is located approximately 300 feet north of I-80 and is represented by Receptor R30 (Figure 2.2-7). The 2801 2nd Street building, of which the University of California Agriculture and Natural Resources is an occupant, is a large office building of modern construction and is anticipated to provide about 30 dB of exterior-to-interior noise reduction with windows closed. Based on a desktop review, the 2801 2nd Street building includes mechanical ventilation, allowing occupants the option of closing windows to control noise. Noise levels within the 2801 2nd Street building are not anticipated to approach or exceed 52 dBA Leq[h].

Four schools were identified in the project area. Merryhill Preschool is located approximately 320 feet south of I-80 and is represented by Receptor ST-23 (Figure 2.2-8). The 222 La Vida Way building, of which Merryhill Preschool is an occupant, is a medium building of modern construction and is anticipated to provide about 30 dB of exterior-to-interior noise reduction with windows closed. Based on a desktop review, the 222 La Vida Way building includes mechanical ventilation, allowing occupants the option of closing windows to control noise. Noise levels within the 222 La Vida Way building are not anticipated to approach or exceed 52 dBA Leq[h]. Westmore Oaks Elementary School is located approximately 400 feet south of US-50 and is represented by Receptor ST-48 (Figure 2.2-13). The 1514 Fallbrook Street building, of which Westmore Oaks Elementary School is an occupant, is a large building of modern construction and is anticipated to provide about 30 dB of exterior-to-interior noise reduction with windows closed. Based on a desktop review, the 1514 Fallbrook Street building includes mechanical ventilation, allowing occupants the option of closing windows to control noise. Noise levels within the 1514 Fallbrook Street building are not anticipated to approach or exceed 52 dBA Leq[h]. Yolo High School is located approximately 340 feet north of US-50 and is represented by Receptor ST-53 (Figure 2.2-13). The 919 Westacre Road building, of which Yolo High School is an occupant, is a large building of modern construction and is anticipated to provide about 30 dB of exterior-to-interior noise reduction with windows closed. Based on a desktop review, the 919 Westacre Road building includes mechanical ventilation, allowing occupants the option of closing windows to control noise. Noise levels within the 919 Westacre Road building are not anticipated to approach or exceed 52 dBA Leq[h]. Sacramento Valley Charter School is located approximately 125 feet north of US-50 and is represented by Receptor R68 (Figure 2.2-13). The 2399 Sellers Way building, of which Sacramento Valley Charter School is an occupant, is a large building of modern construction and is anticipated to provide about 30 dB of exterior-to-interior noise reduction with windows closed. Based on a desktop review, the 2399 Sellers Way building includes mechanical ventilation, allowing occupants the option of closing windows to control noise. Noise levels within the 2399 Sellers Way building are not anticipated to approach or exceed 52 dBA Leq[h].

One place of worship was identified in the project area. The Center for Spiritual Awareness is located approximately 128 feet south of US-50 and is represented by Receptor ST-43 (Figure 2.2-12). The 1275 Starboard Drive building, of which the Center for Spiritual Awareness is an

occupant, is a large building of modern construction and is anticipated to provide about 30 dB of exterior-to-interior noise reduction with windows closed. Based on a desktop review, the 1275 Starboard Drive building includes mechanical ventilation, allowing occupants the option of closing windows to control noise. Noise levels within the 1275 Starboard Drive building are not anticipated to approach or exceed 52 dBA Leq[h].

Therefore, no adverse effect would occur related to interior noise levels.

Build Alternatives 3a and 3b

Construction

Build Alternatives 3a and 3b propose similar project components within the same project area as Build Alternatives 2a and 2b, respectively. Therefore, the effect would be the same as effects described under Build Alternatives 2a and 2b, respectively.

Operation

Build Alternatives 3a and 3b would involve adding an HOT 2+ lane in each direction. Build Alternative 3b would also include building an I-80 connector structure. The 2049 Build Alternative 3a conditions would increase noise levels by up to 2 dBA over existing conditions and over No Build conditions. These noise level increases are not considered substantial per the Protocol. Traffic noise modeling results and predicted traffic noise impacts for existing and design year conditions are shown in Table 2.2-21 for Build Alternative 3a.

Build Alternative 3b was not modeled as part of the analysis but would have similar effects as Build Alternative 2b shown in Table 2.2-21. As discussed under Alternatives 2a and 2b, Build Alternatives 3a and 3b, respectively, are predicted to approach or exceed NAC at Category B and Category C receptors. Some of those receptors are already behind existing barriers. Noise abatement was considered for impacted receptors as further described in Section 2.2.8.4, Avoidance, Minimization, and/or Mitigation Measures.

Build Alternatives 4a and 4b

Construction

Build Alternatives 4a and 4b propose similar project components within the same project area as Build Alternatives 2a and 2b, respectively. Therefore, the effects would be the same as effects described under Build Alternatives 2a and 2b.

Operation

Build Alternatives 4a and 4b would involve adding an HOT 3+ lane in each direction. Build Alternative 4b would also include building an I-80 connector structure. Noise increases under Alternatives 4a and 4b would be similar or less than that experienced under Build Alternatives 2b and 3a as shown in Table 2.2-18. Build Alternative 4b was not modeled as part of the analysis but would have similar effects as Build Alternative 2b shown in Table 2.2-21 because it would include the I-80 connector structure. As discussed under Alternatives 2a and 2b, Build

Alternatives 4a and 4b, respectively, are predicted to approach or exceed NAC at Category B and Category C receptors. Some of those receptors are already behind existing barriers. Noise abatement was considered for impacted receptors.

Build Alternatives 5a and 5b

Construction

Build Alternatives 5a and 5b propose similar project components within the same project area as Build Alternatives 2a and 2b, respectively. Therefore, the effects would be the same as effects described under Build Alternatives 2a and 2b, respectively.

Operation

Build Alternatives 5a and 5b would create an express lane in each direction where all users pay a fee regardless of vehicle occupancy. Noise increases under Build Alternatives 5a and 5b would be similar or less than that experienced under Alternatives 2b and 3a as shown in Table 2.2-21. Build Alternative 5b was not modeled as part of the analysis but would have similar effects as Build Alternative 2b shown in Table 2.2-21 because it would include the I-80 connector structure. As discussed under Alternatives 2a and 2b, all build conditions are predicted to approach or exceed NAC at Category B and Category C receptors. Some of those receptors are already behind existing barriers. Noise abatement was considered for impacted receptors.

Build Alternatives 6a and 6b

Construction

Build Alternatives 6a and 6b propose similar project components within the same project area as Build Alternatives 2a and 2b, respectively. Therefore, the effects would be the same as effects described under Build Alternatives 2a and 2b, respectively.

Operation

Build Alternatives 6a and 6b would involve adding a transit-only lane in each direction. Build Alternative 6b would also include building an I-80 connector structure. Noise increases under Build Alternatives 6a and 6b would be similar or less than that experienced under Alternatives 2b and 3a as shown in Table 2.2-21. Build Alternative 6b was not modeled as part of the analysis, but would have similar effects as Build Alternative 2b shown in Table 2.2-21 because it would include the I-80 connector structure. As discussed under Alternatives 2a and 2b, all build conditions are predicted to approach or exceed NAC at Category B and Category C receptors. Some of those receptors are already behind existing barriers. Noise abatement was considered for impacted receptors.

Build Alternatives 7a and 7b

Construction

Construction phase noise and vibration effects described under Build Alternatives 7a and 7b would be shorter than the effects described under Build Alternatives 2a and 2b, respectively. Build Alternatives 7a and 7b would involve repurposing the current number 1 general purpose lane to HOV 2+ and therefore would have a shorter construction duration than Build Alternatives 2a and 2b through 6a and 6b. AMM NOI-1 would require noise-generating construction activities to be restricted to between 7:00 a.m. and 7:00 p.m. on weekdays, with no construction occurring on weekends or holidays. If work is necessary outside of these hours, a construction noise monitoring program and provide additional noise controls would be implemented.

Caltrans Standard Specifications Section 14-8.02 would require that noise levels not to exceed 86 dBA within 50 feet of the job site from the hours of 9:00 PM to 6:00 AM (Standard Measure NOI-1). Build Alternatives 3a and 3b would also implement Standard Measures NOI-2 through NOI-5 to further reduce temporary construction noise levels. Therefore, temporary construction noise would have no adverse effects on nearby receptors.

The vibration analysis also found that no alternatives would exceed construction vibration limits during construction. Accordingly, under Build Alternatives 7a and 7b, neither construction noise nor vibration would result in an adverse impact.

Operation

Build Alternatives 7a and 7b would involve repurposing the current number 1 general purpose lane to HOV 2+. Build Alternative 7b would also include building an I-80 connector structure. Alternatives 7a and 7b would be similar or less than that experienced under Alternatives 2b and 3a as shown in Table 2.2-21. Build Alternative 7b was not modeled as part of the analysis but would have similar effects as Build Alternative 2b shown in Table 2.2-21 because it would include the I-80 connector structure. As discussed under Alternatives 2a and 2b, all build conditions are predicted to approach or exceed NAC at Category B and Category C receptors. Some of those receptors are already behind existing barriers. Noise abatement was considered for impacted receptors.

2.2.8.4 Avoidance, Minimization, and/or Mitigation Measures

Construction

- **AMM NOI-1:** Noise-generating construction activities will be restricted to between 7:00 a.m. and 7:00 p.m. on weekdays, with no construction occurring on weekends or holidays. If work is necessary outside of these hours, Caltrans will require the contractor to implement a construction noise monitoring program and provide additional noise controls where practical and feasible. Pile driving activities will be limited to daytime hours only.

Operation

Noise abatement was considered where noise impacts were predicted in areas of frequent human use that would benefit from a lowered noise level. Noise abatement must be predicted to provide a minimum of a 5 dB reduction at an impacted receptor to be considered feasible by Caltrans (i.e., the barrier would provide a noticeable noise reduction). Additionally, the Caltrans acoustical design goal states the barrier must achieve a 7 dB noise reduction at one or more benefited receptors.

Noise barriers were the only form of noise abatement considered for exterior land uses in the project area. Each noise barrier was evaluated for feasibility based on achievable noise reduction. As described in the Protocol, Caltrans typically limits noise barrier heights to 16 feet for seismic considerations. For each noise barrier found to be acoustically feasible, reasonable cost allowances were calculated by multiplying the number of benefited receptors by $107,000.

Preliminary noise barriers were evaluated at the most acoustically effective locations within the right-of-way. Where the roadway is at grade, or elevated above receptors, the most acoustically effective location for a barrier is near the edge of the shoulder, either on the structure or at the top of the slope. Where the roadway is located in a cut-section, the most acoustically effective location for a barrier is typically at the right-of-way. Barrier analysis was performed in accordance with the Protocol for instances where noise levels at receptors located behind existing noise barriers approached or exceeded the NAC. If, through a comparison of project noise levels with and without the existing barrier, the existing barrier meets the feasibility and acoustical reasonableness requirements for noise reduction, no modifications to the existing barrier or additional abatement were considered.

Eight new noise barriers were studied as potential noise abatement. In addition, 2049 Build noise levels were calculated to approach or exceed the NAC at locations behind four existing barriers. These existing barriers were assessed for feasibility and reasonableness. If the existing barriers did not meet feasibility and acoustical reasonableness requirements, additional barrier heights were considered.

Barrier 1

The outdoor use area at the residential property located at 9460 W Chiles Road (represented by Receptor R150), has been identified for noise abatement because modeled 2049 Build Alternative 3a noise levels would approach or exceed the NAC.

Evaluated Barrier 1 was modeled along the I-80 eastbound travel lanes, extending approximately 970 feet. Table 2.2-23 shows the 2049 Build noise levels and insertion loss for Evaluated Barrier 1 at various design heights.

Table 2.2-23. Evaluated Barrier 1: 2049 Build Noise Levels and Insertion Loss

Receptor ID	Units Represented	2049 Noise Level w/o Wall	$L_{eq[h]}$ Wall H=6 ft	I.L. Wall H=6 ft	$L_{eq[h]}$ Wall H=8 ft	I.L. Wall H=8 ft	$L_{eq[h]}$ Wall H=10 ft	I.L. Wall H=10 ft	$L_{eq[h]}$ Wall H=12[1] ft	I.L. Wall H=12[1] ft	$L_{eq[h]}$ Wall H=14[1] ft	I.L. Wall H=14[1] ft	$L_{eq[h]}$ Wall H=16[1] ft	I.L. Wall H=16[1] ft
R150	1	72	67	5	66	6	65	7	64	8	64	8	64	8

Note: 1 Barrier breaks line of sight between 11.5-foot-high truck stack and 5-foot-high receptor.
Key: H = Height; Leq[h] = The 1-hour A-weighted equivalent sound level; I.L. = Insertion Loss

As shown in Table 2.2-23, Evaluated Barrier 1 would feasibly abate traffic noise at a minimum height of 6 feet, but would not meet the 7 dB design goal. Evaluated Barrier 1 would feasibly abate traffic noise and meet the 7 dB noise reduction goal at a minimum height of 10 feet.

Barrier 2

The pool area at La Quinta Inn & Suites by Wyndham Davis (represented by Receptor ST-12) has been identified for noise abatement because modeled 2049 Build noise levels would exceed the NAC.

Evaluated Barrier 2 was modeled along the I-80 eastbound travel lanes, extending approximately 560 feet. Table 2.2-24 shows the modeled 2049 Build noise levels and insertion loss for Evaluated Barrier 2 at various design heights.

Table 2.2-24. Evaluated Barrier 2: 2049 Build Noise Levels and Insertion Loss

Receptor ID	Units Represented	2049 Noise Level w/o Wall	$L_{eq[h]}$ Wall H=6 ft	I.L. Wall H=6 ft	$L_{eq[h]}$ Wall H=8 ft	I.L. Wall H=8 ft	$L_{eq[h]}$ Wall H=10 ft	I.L. Wall H=10 ft	$L_{eq[h]}$ Wall H=12[1] ft	I.L. Wall H=12[1] ft	$L_{eq[h]}$ Wall H=14[1] ft	I.L. Wall H=14[1] ft	$L_{eq[h]}$ Wall H=16[1] ft	I.L. Wall H=16[1] ft
ST-12	1	71	70	1	70	1	69	2	69	2	69	2	68	3

Note: 1 Barrier breaks line of sight between 11.5-foot-high truck stack and 5-foot-high receptor.
Key: H = Height; Leq[h] = The 1-hour A-weighted equivalent sound level; I.L. = Insertion Loss

As indicated above in Table 2.2-24, Evaluated Barrier 2 would not feasibly abate traffic noise or meet the 7 dB noise reduction goal, at any impacted receptors, even at a height of 16 feet. Therefore, this barrier is not considered to be feasible and new abatement measures are not recommended. A reasonability analysis was not performed because feasibility was not achieved.

Existing Barriers A.1, A.2, A.3

The private outdoor areas of residences at the homes east of Harbor Boulevard, represented by Receptors R70 and R71, have been identified for noise abatement because 2049 Build noise levels would exceed the NAC. Receptors R70 and R71 are shielded from US-50 by an existing 15- to 16-foot-high noise barrier (Existing Barrier A.1) located along US-50 westbound travel lanes.

The private outdoor areas of residences at the homes east of Harbor Boulevard, represented by Receptors R75, R76, R77, R78, and R79, have been identified for noise abatement because 2049 Build noise levels would exceed the NAC. Receptors R75, R76, R77, R78, and R79 are shielded from US-50 by an existing 11- to 16-foot-high noise barrier (Existing Barrier A.2) located along US-50 westbound travel lanes.

The private outdoor areas of residences at the homes east of Harbor Boulevard, represented by Receptors R80, R81, and ST-49, have been identified for noise abatement because 2049 Build noise levels would exceed the NAC. Receptors R80, R81, and ST-49 are shielded from US-50 by an existing 16- to 11-foot-high noise barrier (Existing Barrier A.3) located along US-50 westbound travel lanes.

As summarized in Table 2.2-25, existing Barriers A.1, A.2 and A.3 were calculated to provide 5 dB of noise reduction at R78, 6 dB of noise reduction at R73, and 7 dB of noise reduction at R76, therefore meeting the noise reduction standard for feasibility. The barrier was calculated to provide noise reduction at other receptors in the area, including 9 dB of noise reduction at R68, 10 dB of noise reduction at R72, 11 dB of noise reduction at R70, 12 dB of noise reduction at R71, 13 dB of noise reduction at R75, 14 dB of noise reduction at R80, and 15 dB noise reduction at R79 and ST-49, therefore meeting the noise reduction design goal. Existing Barriers A.1, A.2, and A.3 meet the noise reduction standard for feasibility and the noise reduction design goal.

Table 2.2-25. Existing Barriers A.1, A.2, and A.3

Receptor ID	Units Represented	Noise Level without Wall	$L_{eq[h]}$ with Existing Wall H=11 to 16 feet	I.L. with Existing Wall H=11 to 16 feet
R68	1	77	68	9
R69	1	65	62	3
R70	6	81	70	11
R71	6	82	70	12
R72	6	77	67	10
R73	12	72	66	6
R74	1	66	63	3
R75	7	82	69	13
R76	8	67	59	7
R77	10	61	58	2
R78	5	65	60	5
R79	5	83	68	15
R80	3	82	68	14
R81	6	64	60	4
ST-49	1	85	70	15

Key: Key: H = Height;Leq[h] = The 1-hour A-weighted equivalent sound level; I.L. = Insertion Loss

As shown above, Existing Barriers A.1, A.2, and A.3 would feasibly abate traffic noise and meet the 7 dB design goal at its existing heights of 11 feet to 16 feet.

Barrier 3

Evaluated Barrier 3 was modeled along the US-50 eastbound travel lanes, extending approximately 970 feet. Table 2.2-26 shows the 2049 Build noise levels and insertion loss for Evaluated Barrier 3 at various design heights.

Table 2.2-26. Evaluated Barrier 3 2049 Build Noise Levels and Insertion Loss

Receptor ID	Units Represented	2049 Noise Level w/o Wall	$L_{eq[h]}$ Wall H=6 ft	I.L. Wall H=6 ft	$L_{eq[h]}$ Wall H=8 ft	I.L. Wall H=8 ft	$L_{eq[h]}$ Wall H=10 ft	I.L. Wall H=10 ft	$L_{eq[h]}$ Wall H=12[1] ft	I.L. Wall H=12[1] ft	$L_{eq[h]}$ Wall H=14[1] ft	I.L. Wall H=14[1] ft	$L_{eq[h]}$ Wall H=16[1] ft	I.L. Wall H=16[1] ft
R151	1	70	66	4	66	4	66	4	64	6	64	6	64	6

Note: 1 Barrier breaks line of sight between 11.5-foot-high truck stack and 5-foot-high receptor.
Key: H = Height; Leq[h] = The 1-hour A-weighted equivalent sound level; I.L. = Insertion Loss

As shown above, Evaluated Barrier 3 would feasibly abate traffic noise at a height of 12 feet but would not meet the 7 dB noise reduction goal, at any impacted receptors, even at a height of 16 feet. Therefore, this barrier is not considered to be feasible and new abatement measures are not recommended. A reasonability analysis was not performed because feasibility was not achieved.

Existing Barriers B.1 and B.2

The private outdoor areas of residences at the homes east of Harbor Boulevard, represented by Receptors R82, R83, R84, R85, R86, R87, R88, R89, R90, R91, and R92, have been identified for noise abatement because 2049 Build noise levels would exceed the NAC. Receptors R82, R83, R84, R85, R86, R87, R88, R89, R90, R91, and R92 are shielded from US-50 by an existing 8- to 13.5-foot-high noise barrier (Existing Barrier B.1) located along US-50 westbound travel lanes.

The private outdoor areas of residences at the homes east of Harbor Boulevard, represented by Receptors R93, R94, R95, R96, and R97, have been identified for noise abatement because 2049 Build noise levels would exceed the NAC. Receptors R93, R94, R95, R96, and R97 are shielded from US-50 by an existing 11.5- to 9-foot-high noise barrier (Existing Barrier B.2) located along US-50 westbound travel lanes.

As shown in Table 2.2-27, existing Barriers B.1 and B.2 were calculated to provide 6 dB of noise reduction at R85, and 7dB of noise reduction at R84, therefore meeting the noise reduction standard for feasibility. The barriers were calculated to provide noise reduction at other receptors in the area, including 8 dB of noise reduction at R83, 9 dB of noise reduction at R82, therefore meeting the noise reduction design goal. Existing Barriers B.1 and B.2 meet the noise reduction standard for feasibility and the noise reduction design goal.

Table 2.2-27. Existing Barriers B.1 and B.2

Receptor ID	Units Represented	Noise Level without Wall	$L_{eq[h]}$ with Existing Wall H=8 to 13.5 feet	I.L. with Existing Wall H=8 to 13.5 feet
R82	6	80	71	9
R83	7	79	71	8
R84	9	78	71	7
R85	2	78	71	6
R86	10	61	72	1
R87	10	62	60	2
R88	13	63	60	1
R89	9	63	62	1
R90	4	63	62	1
R91	8	65	62	1
R92	3	73	64	1
R93	11	66	70	3
R94	5	64	66	0
R95	7	64	64	0
R96	5	66	64	0
R97	4	67	66	0

Key: H = Height;:Leq[h] = The 1-hour A-weighted equivalent sound level; I.L. = Insertion Loss

As shown above, Existing Barriers B.1 and B.2 would feasibly abate traffic noise and meet the 7 dB design goal at its existing heights of 8 feet to 13.5 feet.

Existing Barrier 4.1 and 4.2

The private outdoor areas of residences at the US-50 and I-5 interchange, represented by Receptors ST-60, R99, and R100, have been identified for noise abatement because modeled 2049 Build noise levels would approach or exceed the NAC.

Evaluated Barriers 4.1 and 4.2 were modeled along the US-50 westbound ramp onto the I-5 northbound, extending approximately 700 feet and 760 feet, respectively. Table 2.2-28 shows the 2049 Build noise levels and insertion loss for Evaluated Barriers 4.1 and 4.2 at various design heights.

Table 2.2-28. Evaluated Barriers 4.1 and 4.2 in Segment 3b: 2049 Build Noise Levels and Insertion Loss

Receptor ID	Units Represented	2049 Noise Level w/o Wall	$L_{eq[h]}$ Wall H=6 ft	I.L. Wall H=6 ft	$L_{eq[h]}$ Wall H=8 ft	I.L. Wall H=8 ft	$L_{eq[h]}$ Wall H=10 ft	I.L. Wall H=10 ft	$L_{eq[h]}$ Wall H=12[1] ft	I.L. Wall H=12[1] ft	$L_{eq[h]}$ Wall H=14[1] ft	I.L. Wall H=14[1] ft	$L_{eq[h]}$ Wall H=16[1] ft	I.L. Wall H=16[1] ft
ST-60	1	72	69	3	69	3	68	4	68	4	68	4	67	5
R99	9	72	70	2	69	3	69	3	68	4	68	4	67	5
R100	7	65	64	1	64	1	63	2	63	2	63	2	63	2

Note: 1 Barrier breaks line of sight between 11.5-foot-high truck stack and 5-foot-high receptor.
Key: H = Height; Leq[h] = The 1-hour A-weighted equivalent sound level; I.L. = Insertion Loss

As shown above, Evaluated Barriers 4.1 and 4.2 would feasibly abate traffic noise at a height of 16 feet but would not meet the 7 dB noise reduction goal, at any impacted receptors, even at a height of 16 feet. Therefore, this barrier is not considered to be feasible and new abatement measures are not recommended. A reasonability analysis was not performed because feasibility was not achieved.

Existing Barrier C

The private outdoor areas of residences at the I-80 US-50 interchange, represented by Receptors R60, R61, R62, R63, R64, R65, R66, ST-40, and ST-41, have been identified for noise abatement because modeled 2049 Build noise levels would approach or exceed the NAC. Receptors R60, R61, R62, R63, R64, R65, R66, ST-40, and ST-41 are shielded from US-50 by an existing 8- to 13.5-foot-high noise barrier (Existing Barrier C) located along US-50 westbound travel lanes and along the US-50 westbound to I-80 eastbound ramp.

As summarized in Table 2.2-29, existing Barrier C was calculated to provide 5 dB of noise reduction at R64 and 6 dB of noise reduction at R61, therefore meeting the noise reduction standard for feasibility. The barrier was calculated to provide noise reduction at other receptors in the area, including 9 dB of noise reduction at ST-40, 11 dB of noise reduction at ST-41, 14 dB of noise reduction at R65, therefore meeting the noise reduction design goal. Existing Barrier C meets the noise reduction standard for feasibility and the noise reduction design goal.

Table 2.2-29. Existing Barrier C: 2049 Build Noise Levels and Insertion Loss

Receptor ID	Units Represented	Noise Level without Wall	$L_{eq[h]}$ with Existing Wall H=8 to 13.5 feet	I.L. with Existing Wall H=8 to 13.5 feet
R60	8	64	62	2
R61	10	70	64	6
R62	14	63	63	0
R63	11	66	62	4
R64	4	63	58	5
R65	1	80	66	14

Receptor ID	Units Represented	Noise Level without Wall	$L_{eq[h]}$ with Existing Wall H=8 to 13.5 feet	I.L. with Existing Wall H=8 to 13.5 feet
R66	1	58	56	2
ST-40	1	75	66	9
ST-41	1	77	66	11

Key: H = Height;Leq[h] = The 1-hour A-weighted equivalent sound level; I.L. = Insertion Loss

As shown above, Existing Barrier C would feasibly abate traffic noise and meet the 7 dB design goal at its existing heights of 8 feet to 13.5 feet.

Barrier 5

The private outdoor areas of residences at the I-80 US-50 interchange, represented by Receptors R102, R103, R104, R105, R152, R153, R154, and R155, have been identified for noise abatement because modeled 2049 Build noise levels would approach or exceed the NAC. Meadowdale Park, represented by ST-38, has also been identified for noise abatement because 2049 Build noise levels would approach or exceed the NAC.

Evaluated Barrier 5 was modeled along the US-50 westbound ramp onto the I-80 eastbound, extending approximately 1,200 feet. Table 2.2-30 shows the 2049 Build noise levels and insertion loss for Evaluated Barrier 5 at various design heights.

Table 2.2-30. Evaluated Barrier 5: 2049 Build Noise Levels and Insertion Loss

Receptor ID	Units Represented	2049 Noise Level w/o Wall	$L_{eq[h]}$ Wall H=6 ft	I.L. Wall H=6 ft	$L_{eq[h]}$ Wall H=8 ft	I.L. Wall H=8 ft	$L_{eq[h]}$ Wall H=10 ft	I.L. Wall H=10 ft	$L_{eq[h]}$ Wall H=12[1] ft	I.L. Wall H=12[1] ft	$L_{eq[h]}$ Wall H=14[1] ft	I.L. Wall H=14[1] ft	$L_{eq[h]}$ Wall H=16[1] ft	I.L. Wall H=16[1] ft
R102	3	65	63	2	62	3	62	3	61	4	61	4	60	5
R103	11	62	61	1	60	2	60	2	59	3	59	3	59	3
R104	4	65	63	2	63	2	62	3	61	4	61	4	61	4
R105	1	69	67	2	66	3	65	4	65	4	64	5	64	5
R152	2	67	65	2	65	2	64	3	63	4	63	4	63	4
R153	3	66	64	2	63	3	62	4	62	4	62	4	62	4
R154	3	65	63	2	62	3	62	3	61	4	61	4	61	4
R155	2	67	64	3	63	4	63	4	62	5	62	5	62	5
ST-38	1	67	66	1	65	2	65	2	65	2	65	2	64	3

Note: 1 Barrier breaks line of sight between 11.5-foot-high truck stack and 5-foot-high receptor.
Key: H = Height; Leq[h] = The 1-hour A-weighted equivalent sound level; I.L. = Insertion Loss

As indicated above, Evaluated Barrier 5 would feasibly abate traffic noise at a height of 12 feet but would not meet the 7 dB noise reduction goal, at any impacted receptors, even at a height of

16 feet. Therefore, this barrier is not considered to be feasible and new abatement measures are not recommended.

Barrier 6 and 7

The private outdoor areas of residences at the Sacramento River, represented by Receptors ST-62, R106, R107, R108, R109, and R110, have been identified for noise abatement because modeled 2049 Build noise levels would approach or exceed the NAC.

Evaluated Barriers 6 and 7 were modeled along the I-80 eastbound and westbound travel lanes, extending approximately 600 feet and 650 feet, respectively. Table 2.2-31 shows the modeled 2049 Build noise levels and insertion loss for Evaluated Barriers 6 and 7 at various design heights.

Table 2.2-31. Evaluated Barriers 6 and 7: 2049 Build Noise Levels and Insertion Loss

Receptor ID	Units Represented	2049 Noise Level w/o Wall	$L_{eq[h]}$ Wall H=6 ft	I.L. Wall H=6 ft	$L_{eq[h]}$ Wall H=8 ft	I.L. Wall H=8 ft	$L_{eq[h]}$ Wall H=10 ft	I.L. Wall H=10 ft	$L_{eq[h]}$ Wall H=12[1] ft	I.L. Wall H=12[1] ft	$L_{eq[h]}$ Wall H=14[1] ft	I.L. Wall H=14[1] ft	$L_{eq[h]}$ Wall H=16[1] ft	I.L. Wall H=16[1] ft
ST-62	1	66	63	3	62	4	62	4	61	5	61	5	61	5
R106	1	71	71	0	70	1	70	1	70	1	70	1	70	1
R107	1	70	69	1	69	1	69	1	69	1	69	1	69	1
R108	1	66	62	4	62	4	62	4	61	5	61	5	61	5
R109	1	67	65	2	63	4	63	4	63	4	63	4	63	4
R110	1	66	64	2	64	2	64	2	64	2	64	2	64	2

Note: 1 Barrier breaks line of sight between 11.5-foot-high truck stack and 5-foot-high receptor.
Key: H = Height; Leq[h] = The 1-hour A-weighted equivalent sound level; I.L. = Insertion Loss

As indicated above, Evaluated Barriers 6 and 7 would feasibly abate traffic noise at a height of 12 feet but would not meet the 7 dB noise reduction goal, at any impacted receptors, even at a height of 16 feet. Therefore, this barrier is not considered to be feasible and new abatement measures are not recommended. A reasonability analysis was not performed because feasibility was not achieved.

Barrier 8

The private outdoor areas of residences at the subdivision north of the Sacramento River, represented by Receptors ST-65, ST-66, R111, R112, and R113, have been identified for noise abatement because modeled 2049 Build noise levels would approach or exceed the NAC.

Evaluated Barrier 8 was modeled along the I-80 eastbound lanes, extending approximately 750 feet. Table 2.2-32 shows the modeled 2049 Build noise levels and insertion loss for Evaluated Barrier 8 at various design heights.

Table 2.2-32. Evaluated Barrier 8: 2049 Build Noise Levels and Insertion Loss

Receptor ID	Units Represented	2049 Noise Level w/o Wall	$L_{eq[h]}$ Wall H=6 ft	I.L. Wall H=6 ft	$L_{eq[h]}$ Wall H=8 ft	I.L. Wall H=8 ft	$L_{eq[h]}$ Wall H=10 ft	I.L. Wall H=10 ft	$L_{eq[h]}$ Wall H=12[1] ft	I.L. Wall H=12[1] ft	$L_{eq[h]}$ Wall H=14[1] ft	I.L. Wall H=14[1] ft	$L_{eq[h]}$ Wall H=16[1] ft	I.L. Wall H=16[1] ft
ST-65	1	71	69	2	68	3	67	4	66	5	66	5	66	5
ST-66	1	60	59	1	59	1	59	1	58	2	58	2	58	2
R111	8	66	62	4	61	5	60	6	60	6	60	6	60	6
R112	4	62	60	2	58	4	58	4	57	5	57	5	57	5
R113	8	67	64	3	63	4	62	5	61	6	61	6	61	6

Note: 1 Barrier breaks line of sight between 11.5-foot-high truck stack and 5-foot-high receptor.
Key: H = Height; Leq[h] = The 1-hour A-weighted equivalent sound level; I.L. = Insertion Loss

As indicated above in Table 2.2-29, Evaluated Barrier 8 would feasibly abate traffic noise at a height of 8 feet but would not meet the 7 dB noise reduction goal, at any impacted receptors, even at a height of 16 feet. Therefore, this barrier is not considered to be feasible and new abatement measures are not recommended. A reasonability analysis was not performed because feasibility was not achieved.

Existing Barrier D

The private outdoor areas of residences north of the Sacramento River to West El Camino Avenue, represented by Receptors ST-68, ST-70, ST-72, ST-73, ST-74, ST-75, R125, R126, R127, R128, R129, R130, R131, R132, R133, R134, R135, R136, R137, R138, R139, R140, R141, R142, R143, and R144, have been identified for noise abatement because modeled 2049 Build noise levels would exceed the NAC. River Otter Park, represented by Receptor ST-71, has been identified for noise abatement because modeled 2049 Build noise levels would exceed the NAC. Receptors ST-68, ST-69, ST-70, ST-71, ST-72, ST-73, ST-74, ST-75, R125, R126, R127, R128, R129, R130, R131, R132, R133, R134, R135, R136, R137, R138, R139, R140, R141, R142, R143, and R144 are shielded from I-80 by an existing 12.5- to 13-foot-high noise barrier (Existing Barrier D) located along I-80 eastbound travel lanes.

As summarized in Table 2.2-33, existing Barrier D was calculated to provide 5 dB of noise reduction at R128, therefore meeting the noise reduction standard for feasibility. The barrier was calculated to provide noise reduction at other receptors in the area, including 7 dB of noise reduction at R139, 8 dB of noise reduction at ST-72 and ST-73, 9 dB of noise reduction at R125 and R126, and 10 dB of noise reduction at ST-70, ST-71, R130, and R141, therefore meeting the noise reduction design goal. Existing Barrier D meets the noise reduction standard for feasibility and the noise reduction design goal.

Table 2.2-33. Existing Barrier D: 2049 Build Noise Levels and Insertion Loss

Receptor ID	Units Represented	Noise Level without Wall	Leq[h] with Existing Wall H=12.5 to 13 feet	I.L. with Existing Wall H=12.5 to 13 feet
ST-68	1	68	66	2
ST-70	1	77	67	10
ST-71	1	75	65	10
ST-72	1	66	58	8
ST-73	1	68	60	8
ST-74	1	73	62	11
ST-75	3	59	55	4
R125	5	76	67	9
R126	5	75	66	9
R127	6	59	59	0
R128	8	65	60	5
R129	5	58	56	2
R130	11	74	64	10
R131	8	62	58	4
R132	10	54	54	0
R133	8	55	53	2
R134	6	68	60	8
R135	3	57	54	3
R136	14	57	56	1
R137	6	55	54	1
R138	16	57	55	2
R139	10	68	61	7
R140	20	56	54	0
R141	7	76	66	10
R142	6	56	55	1
R143	40	53	52	1
R144	7	63	63	0

Key: H = Height;Leq[h] = The 1-hour A-weighted equivalent sound level; I.L. = Insertion Loss

As shown in Table 2.2-33, Existing Barrier D would feasibly abate traffic noise and meet the 7 dB design goal at its existing heights of 12.5 feet to 13 feet.

Noise Abatement Evaluation Summary

The overall reasonableness of noise abatement is determined by the following three factors:

- The noise reduction design goal (a barrier must be predicted to provide at least 7 dB of noise reduction at one or more benefited receptors).
- The cost of noise abatement (reasonable allowance of $107,000 per benefited receptor).
- The viewpoints of benefited receptors (including property owners and residents of the benefited receptors).

For any noise barrier to be considered reasonable from a cost perspective, the estimated cost of the barrier should be equal to or less than the total cost allowance calculated for the barrier. The cost calculations of the noise barrier must include all items appropriate and necessary for construction of the barrier, such as traffic control, drainage modification, retaining walls, landscaping for graffiti abatement, and right-of-way costs. Lastly, all existing sound barriers discussed in this EIR/EA are to be left in place.

Table 2.2-34 lists the reasonableness allowance calculated for all barriers that were calculated to be acoustically feasible and to meet the Caltrans noise reduction design goal. For each noise barrier found to be acoustically feasible, reasonable cost allowances were calculated by multiplying the number of benefited receptors by $107,000.

Table 2.2-34. Summary of Acoustically Feasible and Reasonable Noise Barriers and Replacement Barriers

Barrier ID	Approximate Stationing/ Location[1]	Noise Level without Barrier at Benefited Receptors ($L_{eq[h]}$)	Barrier Height (feet)	Insertion Loss (dBA)	Number of Benefited Receptors	Total Reasonable Monetary Allowance
Evaluated Barrier 1	Along I-80 eastbound from south of Richards Boulevard to north of railroad tracks (970 ft)	72	10	-7	1	$107,000
			12[2]	-8	1	$107,000
			14[2]	-8	1	$107,000
			16[2]	-8	1	$107,000

Notes:
1. Barrier lengths are based on linear approximations used for purposes of noise modeling in TNM 2.5. Actual lengths may differ slightly due to barrier curvature, etc.
2. Barrier breaks line of sight between 11.5-foot-high truck stack and 5-foot-high receptor.
Key: Leq[h] = The 1-hour A-weighted equivalent sound level; dBA = A-weighted decibels

According to the Noise Abatement Decision Report (Caltrans 2022b), the evaluated barriers would cost significantly more than the reasonable monetary allowance that it would be allocated. As such, the evaluated barriers are considered unreasonable and were not recommended and are therefore not considered further. Without noise barriers, interior noise levels are anticipated to increase by a maximum of 2 dBA at sensitive receptors (Table 2.2-21). This change is barely perceivable by the human ear, therefore there would not be an adverse impact.

No new barriers are proposed as part of the project.

2.2.9 Energy

2.2.9.1 Regulatory Setting

The National Environmental Policy Act (NEPA) (42 U.S. Code Part 4332) requires the identification of all potentially significant impacts on the environment, including impacts on energy resources. Guidance for evaluating energy impacts of transportation projects subject to NEPA is outlined in FHWA's Technical Advisory T 6640.8A (Technical Advisory). The Technical Advisory energy analysis requirement applies to projects for which an Environmental Impact Statement (EIS) is prepared. The Technical Advisory indicates that documentation should discuss energy requirements for construction and operation, and the overall conservation potential for each of the project alternatives. The relationship of the project alternatives to applicable state or regional energy plan should also be documented. Additional conservation measures, such as use of high-occupancy vehicle incentives and other measures to improve traffic flow should also be identified.

Other measures to improve energy efficiency in the transportation sector have been implemented at the federal level. In recent years, the United States Environmental Protection Agency (U.S. EPA) and the National Highway Traffic Safety Administration (NHTSA) issued Final Rules governing Corporate Average Fuel Economy (CAFE) standards and other improvements to fuel economy to new vehicles.

On December 28, 2018, the Governor's Office of Planning and Research and the California Natural Resources Agency updated the California Environmental Quality Act (CEQA) Guidelines to require that an environmental document include an analysis of a project's potential for significant environmental effects resulting from wasteful, inefficient, or unnecessary use of energy; or wasteful use of energy resources (Guidelines § 15126.2(b)). The Initial Study/Negative Declaration/Mitigated Negative Declaration (IS/ND/MND) or Environmental Impact Report shall describe feasible measures which could minimize inefficient and unnecessary consumption of energy (Guidelines § 15126.4) and examples of energy conservation measures are provided in the Guidelines Appendix F.

Assembly Bill (AB) 32 codified the 2020 greenhouse gas (GHG) emissions reduction goals outlined in Executive Order (EO) S-3-05. Senate Bill 32 codified the GHG reduction targets established in EO B-30-15 to achieve a mid-range goal of 40 percent below 1990 levels by 2030. The California Air Resources Board (ARB) is required to create a scoping plan and implement rules to achieve “real, quantifiable, cost-effective reductions of greenhouse gases.” The law requires ARB to adopt rules and regulations to achieve the maximum technologically feasible and cost-effective GHG reductions. Energy use and efficiency are important considerations for achieving state goals to reduce greenhouse gas emissions.

2.2.9.2 Affected Environment

The I-80/US-50 corridor experiences heavy congestion during commute periods due to high vehicular demand. The corridor has infrastructure deficiencies, such as short weaving and merging areas, lane drops that create bottlenecks, incomplete ramp metering and auxiliary lane

systems, and inadequate ITS elements. The corridor also experiences recreational traffic, leading to heavy congestion on weekends and holidays.

The Yolo Bypass Causeway is the only direct route connecting the Davis area to West Sacramento and beyond. Heavy congestion and stop-and-go traffic have contributed to increased vehicle emissions, travel costs, emergency response times, and reduced travel time reliability. The congestion has been created by multiple factors, including high traffic volumes, short weaving and merging areas, lane drops, limited sight distances, and incomplete bus and carpool lanes, ramp metering, and auxiliary lane networks.

Motorists traveling on I-80/US-50 experience delays throughout the day, with congestion at its maximum during the afternoon peak period. Data analysis shows that in the eastbound direction, the peak hour occurs during the 4:00 p.m. to 5:00 p.m. hour, with the peak period starting from 3:00 p.m. and lasting to 7:00 p.m. through Davis, and travel being impacted by bottlenecks at Richards Boulevard and Mace Boulevard. Significant morning delays on westbound I-80 occur between 8:00 a.m. to 10:00 a.m., with a severe bottleneck forming at the I-80/US-50 interchange when travel demand volumes are at their peak because of commute-related trips. Westbound US-50 frequently experiences congestion due to queue spillback of traffic at the I-80/US-50 interchange bottleneck. Peak congestion on eastbound US-50 within the project limits occurs during the afternoon peak period, from 4:00 p.m. to 6:00 p.m. The I-80/US-50 corridor primarily operates at Level of Service (LOS) F during the morning and afternoon peak hours within the project limits. The LOS F conditions are anticipated to worsen due to the projected traffic growth in the area.

The existing Yolo 80 bikeway on the north side of the existing Yolo Causeway is underutilized by bicycle riders due to lack of connectivity. Currently, there are three entrance and exit points to the Yolo 80 bikeway. The configuration of the eastern terminus requires that east/west bicycle and pedestrian traffic traverse around the back of two gas stations to avoid several driveways of ingress and egress for automobile and commercial truck traffic. Bicycle and pedestrian traffic must then cross four lanes of traffic to proceed eastbound on West Capitol Avenue.

Transportation energy is generally described in terms of direct and indirect energy. Direct energy is the energy consumed in the actual propulsion (e.g., automobiles, trains, airplanes). This energy consumption is a function of traffic characteristics such as VMT, speed, vehicle mix, and thermal value of the fuel being used. Some projects may also include features such as new or replacement roadway lighting or other features requiring electricity, which is an ongoing and permanent source of direct energy consumption.

Indirect energy is defined as all of the remaining energy consumed to run a transportation system, including maintenance energy, and any substantial impacts on energy consumption related to project-induced land use changes and mode shifts, as well as any substantial changes in energy associated with vehicle operation, manufacturing, or maintenance due to increased automobile use. The one-time energy expenditure involved in constructing a project is also considered indirect energy.

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This energy consumption is a function of traffic characteristics such as VMT, speed, vehicle mix, and thermal value of the fuel being used. Some projects may also include features such as new or replacement roadway lighting or other features requiring electricity, which is an ongoing and permanent source of direct energy consumption.

Indirect energy is defined as all of the remaining energy consumed to run a transportation system, including maintenance energy, and any substantial impacts on energy consumption related to project-induced land use changes and mode shifts, as well as any substantial changes in energy associated with vehicle operation, manufacturing, or maintenance due to increased automobile use. The one-time energy expenditure involved in constructing a project is also considered indirect energy.

2.2.9.3 Environmental Consequences

This section was prepared using the Energy Evaluation that was prepared for the project (Caltrans 2023j). The basic procedure for analyzing direct energy consumption from mobile sources is to calculate fuel consumption using CT-EMFAC2021. CT-EMFAC2021 is an emission model developed by Caltrans that calculates project-level emissions and fuel consumption using data from the California Air Resources Board's EMFAC model. The fuel consumption can be easily derived from the CT-EMFAC model run prepared for the criteria pollutant and GHG emissions analyses.

The basic procedure for analyzing indirect energy consumption from construction activities is to obtain fuel consumption projections in gallons from the Caltrans Construction Emission Tool (CAL-CET 2021, v1.0).

With regards to VMT, the Project level VMT distribution data and speed bins for the existing, no build, and build alternatives, along with the CT-EMFAC2021 emission rates, were used to calculate the fuel consumptions for the existing 2019, opening 2029, and design 2049 year conditions with (alternative option b) or without (alternative option a) an HOV-HOV connector. Direct Energy

The project fuel consumption during construction is summarized in Table 2.2-35. Fuel consumption projections were determined from the Caltrans Construction Emission Tool (CAL-CET 2020).

Table 2.2-35. Project Level Fuel Consumption During Construction

Construction	Diesel (gallon/project)	Gasoline (gallon/project)	Electricity
Roadway	230,359	140,913	23,883
Bridge/Structures	140,161	23,775	7,661

Source: Caltrans District 3 Yolo Corridor Improvement Project Energy Study (Caltrans 2023j)

VMT data for the existing, No Build, and Build Alternatives, along with the CT-EMFAC2017 emission rates, were used to calculate the fuel consumptions for the existing 2019 and Opening

Year 2029. They are summarized in Table 2.2-36. The fuel consumption for the existing 2029 compared to horizon year 2049 conditions is summarized in Table 2.2-37.

Indirect Energy

Construction indirect energy consumption would result from traffic delays due to construction. The Project's TMP would reduce construction related traffic impacts. The TMP would assist in managing traffic congestion and provide signage to affected residents and businesses in the event temporary closures or detours are warranted during construction activities. Compared with indirect energy use by construction vehicles and equipment, indirect energy use due to construction-related traffic delays would be minimal and would be reduced with implementation of the TMP.

For indirect energy of maintaining the project (permanent impacts) in the long term, it will incorporate the use of energy-efficient lighting, such as LED traffic signals and streetlights, to the extent feasible. LED lights consume 10 percent of the electricity of traditional lights. Furthermore, Intelligent Transportation System (ITS) elements within the project limits would give travelers information about special events such as traffic congestion, accidents, and incidents such as terrorist attacks, AMBER/Silver/Blue Alerts, roadwork zones, or speed limits on a specific highway segment. Such ITS would save energy by notifying vehicles to take alternative routes, limit travel speed, warn of duration and location of the incidents, inform of the traffic conditions, or display public safety messages.

Table 2.2-36. Comparison between Existing, Build Alternatives and No Build Alternative in Fuel Consumption in Opening Year 2029 with Alternative a and Alternative b.

Opening	2019 Existing	2029 No Build	2029 Alt2a	2029 Alt 2b	2029 Alt3a	2029 Alt 3b	2029 Alt4a	2029 Alt 4b	2029 Alt 5a	2029 Alt 5b	2029 Alt6a	2029 Alt 6b	2029 Alt7a	2029 Alt 7b
Gasoline (gal/day)	118,115.7	112,737.4	96,895.4	113,602.2	96,101.1	113,240.1	94,586.6	111,806.4	93,065.5	110,301.0	89,144.9	104,470.5	91,917.2	107,769.4
Diesel (gal/day)	19,464.3	21,706.0	19,657.7	22,082.0	19,502.8	21,903.1	19,248.7	21,555.6	19,024.3	21,308.1	18,201.1	20,439.8	18,518.8	20,808.4
Natural Gas (diesel-equivalent gal)	1,001.3	987.9	886.9	1,022.5	868.5	998.7	867.2	981.8	868.9	974.6	874.1	1,006.8	962.1	1,111.9
Electricity (kilowatt-hr)	10,036.0	82,312.6	71,573.3	83,386.3	71,391.8	82,639.7	70,605.0	81,615.7	69,909.8	80,714.0	66,246.6	77,211.0	65,888.5	76,811.2
*Combined Gas+Diesel+ Natural Gas+Electricity (million BTU/day)	17,053.5	16,959.3	14,721.7	17,123.4	14,601.8	17,049.4	14,381.9	16,823.4	14,166.0	16,604.3	13,569.5	15,776.1	13,957.5	16,236.7
VMT	3,128,486	3,279,744	3,614,707	3,614,707	3,615,206	3,615,206	3,576,768	3,576,768	3,535,334	3,535,334	3,345,638	3,345,638	3,256,781	3,256,781
VMT Change (%) with No build/Build	—	—	10.2%	10.2%	10.2%	10.2%	9.1%	9.1%	7.8%	7.8%	2.0%	2.0%	-0.7%	-0.7%
% Fuel Consumption with No Build/Build	—	—	-13.2%	1.0%	-13.9%	0.5%	-15.2%	-0.8%	-16.5%	-2.1%	-20.0%	-7.0%	-17.7%	-4.3%
% Fuel Consumption with Existing/Build	—	-0.6%	-13.7%	0.4%	-14.3%	0%	-15.7%	-1.3%	-16.9%	-2.6%	-20.4%	-7.5%	-18.2%	-4.8%

Source: Caltrans District 3 Yolo Corridor Improvement Project Energy Study (Caltrans 2023j)
*Conversion factors were applied (120,286 BTU/gal Gas, 137,381 BTU/gal Diesel, and 3,412 BTU/kWh)
Key: VMT=vehicle miles traveled

Table 2.2-37. Comparison between Existing, Build and No Build in fuel consumption in Horizon Year 2049 with Alternative a and Alternative b

Horizon	2019 Existing	2049 No Build	2049 Alt2a	2049 Alt 2b	2049 Alt3a	2049 Alt 3b	2049 Alt4a	2049 Alt 4b	2049 Alt 5a	2049 Alt 5b	2049 Alt 6a	2049 Alt 6b	2049 Alt 7a	2049 Alt 7b
Gasoline (gal/day)	118,115.7	107,479.6	90,802.3	106,125.9	89,735.1	105,275.4	88,442.4	103,266.1	87,459.6	102,154.2	88,493.8	103,786.8	87,275.0	102,428.0
Diesel (gal/day)	19,464.3	18,282.5	16,331.1	18,395.5	16,217.0	18,298.0	16.007.0	17,975.7	15,828.6	17,843.6	15,718.6	17,745.2	15,436.8	17,430.6
Natural Gas (diesel-equivalent gal)	1,001.3	300.1	238.5	270.1	236.8	267.1	235.0	264.2	233.8	264.6	250.4	285.1	237.0	270.0
Electricity (kilowatt-hr)	10,036.0	233,749.4	209,457.4	241,193.3	208,109.3	40,462.5	205,610.9	235,691.1	203,737.5	234,315.9	198,723.7	228,827.8	195,505.0	225,226.6
*Combined Gas+Diesel+ Natural Gas+ Electricity (million BTU/day)	17,053.5	16,278.7	13,924.1	16,152.7	13,764.4	16,034.1	13,571.3	15,731.5	13,422.0	15,574.9	13,516.4	15,741.9	13,318.3	15,520.9
VMT	3,128,486	3,749,990	3,952,666	3,952,666	3,968,640	3,968,640	3,902,746	3,902,746	3,882,278	3,882,278	3,678,605	3,678,605	3,620,698	3,620,698
VMT Change (%) with No build/Build	—	—	5.4%	5.4%	5.8%	5.8%	4.1%	4.1%	3.5%	3.5%	-1.9%	-1.9%	-3.4%	-3.4%
% Fuel Consumption with No Build/Build	—	—	-14.5%	-0.8%	-15.4%	-1.5%	-16.6%	-3.4%	-17.5%	-4.3%	-17.0%	-3.3%	-18.2%	-4.7%
% Fuel Consumption with Existing/ Build	—	-4.5%	-18.4%	-5.3%	-19.3%	-6.0%	-20.4%	-7.8%	-21.3%	-8.7%	-20.7%	-7.7%	-21.9%	-9.0%

Source: Caltrans District 3 Yolo Corridor Improvement Project Energy Study (Caltrans 2023j)
*Conversion factors were applied (120,286 BTU/gal Gas, 137,381 BTU/gal Diesel, and 3,412 BTU/kWh)
Key: VMT=vehicle miles traveled

No Build Alternative 1

Construction and Operation

Under No Build Alternative 1, managed lanes and transportation improvements would not be constructed or operated. As such, No Build Alternative 1 would not involve any construction energy effects. Vehicles would continue to consume fuel and energy within the project area.

Build Alternatives 2a and 2b

Construction

Build Alternatives 2a and 2b would result in short-term energy consumption related to the manufacture of construction materials, the use of construction equipment that requires petroleum fuels, and the use of construction workers' motor vehicles as they travel to and from the site. Due to high daytime traffic volumes, night work would be expected. Both day and night work should be anticipated throughout the project duration. Thus, construction-related energy consumption would be finite and limited and would have an incremental impact on area energy supplies.

As indicated above, energy use associated with project construction under Build Alternatives 2a and 2b is conservatively estimated to result in the short-term consumption of 370,520 gallons of combined diesel and gasoline from construction equipment. This represents a small demand on local and regional fuel supplies that would be easily accommodated, and this demand would cease once construction is complete. Moreover, construction-related energy consumption would be temporary and not a permanent new source of energy demand, and demand for fuel would have no noticeable effect on peak or baseline demands for energy.

Construction indirect energy consumption would result from traffic delays due to construction. The project's TMP, as required per Standard Measure TT-3, would reduce construction-related traffic effects. The TMP would assist in managing traffic congestion and provide signage to affected residents and businesses in the event temporary closures or detours are warranted during construction activities. Compared with direct energy use by construction vehicles and equipment, indirect energy use due to construction-related traffic delays would be minimal and would be reduced with implementation of the TMP. Additionally, AMM Energy-1 would be implemented to help conserve energy during the construction period. Therefore, construction of the project would not result in an inefficient, wasteful, and unnecessary consumption of energy.

Operation

Build Alternatives 2a and 2b would involve adding an HOV2+ lane in each direction. Build Alternatives 2a and 2b would increase highway capacity which would result in an increase of traffic using the managed lanes and associated I-5/US-50 interchange and I-80/US-50 connectors. For opening year and horizon year, as shown in Table 2.2-36 and Table 2.2-37, Build Alternatives 2a and 2b would generate new vehicular traffic trips causing increased VMT. Direct energy consumption (i.e., fuel for vehicles) is expected to decrease about 13.2 percent for Build Alternative 2a and increase 1 percent for Build Alternative 2b as compared to No Build Alternative 1.

Although there is a modeled increase in VMT during operation of the project over the long term, newer and more fuel-efficient vehicles and electric vehicles would enter the fleet, resulting in an overall lower potential for an increase in energy consumption. When compared to No Build Alternative 1, Build Alternatives 2a and 2b are expected to result in a 14.5 percent and 0.8 percent, respectively, decrease in energy use in the year 2049 (Table 2.2-37). The project's proposed improvements under Build Alternatives 2a and 2b would improve roadway operations and reduce traffic delay within the project limits. Excess fuel consumption associated with vehicle delay and congestion within the project limits would decrease compared to No Build Alternative 1.

For indirect energy, the project would incorporate the use of energy-efficient lighting, such as LED traffic signals and streetlights, to the extent practicable. LED lights consume 10 percent of the electricity of traditional lights. Furthermore, ITS within the project limits would give travelers information such as traffic congestion, accidents, and other incidents that may cause traffic delays. ITS would save energy by notifying vehicles to take alternate routes, limit travel speed, warn of duration and location of incidents, inform travelers of traffic conditions, or display public safety messages.

When balancing energy used during construction and operation against energy saved by relieving congestion and other transportation efficiencies, the project would not have substantial energy effects. No adverse permanent effects are anticipated.

Build Alternatives 3a and 3b

Construction

Build Alternatives 3a and 3b propose similar project components within the same project area as Build Alternatives 2a and 2b, respectively; and construction effects would be similar.

Operation

Build Alternatives 3a and 3b would involve adding an HOT2+ lane in each direction. Permanent effects would be similar to Build Alternatives 2a and 2b; however, fuel consumption would be decreased by 13.9 percent for Build Alternative 3a and increased by 0.5 percent for Build Alternative 3b compared to No Build Alternative 1 in Opening Year 2029 (Table 2.2-36). When compared to No Build Alternative 1 in horizon year 2049, Build Alterative 3a would result in a decrease of 15.4 percent and Build Alternative 3b would result in a decrease of 1.5 percent. The effects would be slightly less than effects described under Build Alternatives 2a and 2b.

Build Alternatives 4a and 4b

Construction

Build Alternatives 4a and 4b propose similar project components within the same project area as Build Alternatives 2a and 2b, respectively; and construction effects would be similar.

Operation

Build Alternatives 4a and 4b would involve adding an HOT3+ lane in each direction. Permanent effects would be similar to Build Alternatives 2a and 2b, respectively; however, the fuel consumption would decrease by 15.2 percent under Build Alternative 4a and decreased by 0.8 percent under Build Alternative 4b compared to No Build Alternative 1 in Opening Year 2029 (Table 2.2 36). Fuel consumption would decrease 16.6 percent under Build Alternative 4a and decreased 3.4 percent under Build Alternative 4b compared to No Build Alternative 1 in the horizon year 2049. The effects would be slightly less than effects described under Build Alternatives 2a and 2b, respectively.

Build Alternatives 5a and 5b

Construction

Build Alternatives 5a and 5b propose similar project components within the same project area as Build Alternatives 2a and 2b, respectively; and construction effects would be similar.

Operation

Build Alternatives 5a and 5b would involve adding an Express Lane in each direction. Permanent effects would be similar to Build Alternatives 2a and 2b, respectively. The fuel consumption would decrease 16.5 percent under Build Alternative 5a and decrease 2.1 percent under Build Alternative 5b compared to No Build Alternative 1 in Opening Year 2029 (Table 2.2-36). Fuel consumption would decrease 17.5 percent under Build Alternative 5a and decrease 4.3 percent under Build Alternative 5b compared to No Build Alternative 1 in horizon year 2049. The effects would be slightly less than described under Build Alternatives 2a and 2b, respectively.

Build Alternatives 6a and 6b

Construction

Build Alternatives 6a and 6b propose similar project components within the same project area as Build Alternatives 2a and 2b, respectively; and construction effects would be similar.

Operation

Build Alternatives 6a and 6b would involve adding a transit-only lane in each direction. Permanent effects would be similar to Build Alternatives 2a and 2b, respectively; however, the fuel consumption would decrease 20.0 percent under Build Alternative 6a and decrease 7.0 percent under Build Alternative 6b compared to No Build Alternative 1 in Opening Year 2029 (Table 2.2-36). Fuel consumption would decrease 17.0 percent under Build Alternative 6a and decrease 3.3 percent under Build Alternative 6b compared to No Build Alternative 1 in horizon year 2049. Therefore, the effects would be slightly less than described under Build Alternatives 2a and 2b, respectively.

Build Alternatives 7a and 7b

Construction

Build Alternatives 7a and 7b would involve repurposing an existing general-purpose lane to HOV 2+. No new lanes would be constructed. Because Build Alternatives 7a and 7b would not add new lanes but would repurpose existing lanes as managed lanes, the Build Alternatives 7a and 7b construction period may have shorter duration resulting in fewer delays than those under Build Alternatives 2a, 2b, 3a, 3b, 4a, 4b, 5a, 5b, 6a, and 6b and would use less gasoline and fuel.

Operation

As no new lanes would be constructed, Build Alternatives 7a and 7b do not increase capacity due to replacing an existing traffic lane with an HOV 2+ lane. The fuel consumption would decrease 17.7 percent under Build Alternative 7a and decrease 4.3 percent under Build Alternative 7b compared to No Build Alternative 1 in Opening Year 2029 (Table 2.2 36). Fuel consumption would decrease 18.2 percent under Build Alternative 7a and decreased 4.7 percent under Build Alternative 7b compared to No Build Alternative 1 in horizon year 2049. The effects would be slightly less than described under Build Alternatives 2a and 2b, respectively.

2.2.9.4 Avoidance, Minimization, and/or Mitigation Measures

Caltrans would implement the following AMMs to reduce construction effects on energy consumption.

- **AMM ENERGY-1: Construction Energy Efficiency Plan**. As part of the Plans, Specifications, and Estimates (PS&E), the Resident Engineer will prepare a Construction Energy Efficiency Plan, which may include the following:
    - Reuse of existing rail, steel, and lumber, wherever possible, such as for falsework, shoring, and other applications during the construction process
    - Recycling of asphalt taken up from roadways, if practicable and cost-effective
    - Use of newer, more energy-efficient equipment, where feasible, and maintenance of older construction equipment to keep in good working order
    - Promoting of scheduling of construction operations to efficiently use construction equipment (i.e., only haul waste when haul trucks are full and combine smaller dozer operations into a single comprehensive operation, where possible)
    - Promotion of construction employee carpooling

2.3 Biological Environment

Caltrans prepared a Natural Environment Study (NES) to provide technical information to determine the extent that the project would affect plants, wildlife, and natural communities,

including special-status species, potentially jurisdictional wetlands and waters, and protected plant communities (Caltrans 2023). These biological resources are further detailed in the following sections. As summarized in Appendix E, Standard Measures BIO-1 through BIO-4 are incorporated into the project to avoid potential impacts on biological resources.

The biological study area (BSA) encompasses all currently proposed project improvements and ancillary construction areas (e.g., staging areas, access roads), and totals approximately 1,147.22 acres. For this project, the BSA encompasses the same boundary as the ESL.

2.3.1 Natural Communities

This section of the document discusses natural communities of concern. The focus of this section is on biological communities, not individual plant or animal species. This section also includes information on wildlife corridors and habitat fragmentation. Wildlife corridors are areas of habitat used by wildlife for seasonal or daily migration. Habitat fragmentation involves the potential for dividing sensitive habitat and thereby lessening its biological value.

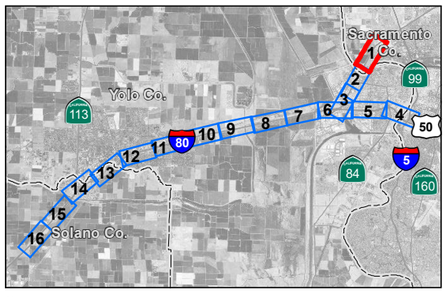
Habitat areas that have been designated as critical habitat under the Federal Endangered Species Act are discussed below in the Threatened and Endangered Species Section 2.3.8. Wetlands and other waters are also discussed below in Section 2.3.2.

2.3.1.1 Affected Environment

On May 10-14 and 18-20, 2021, and July 14, 2022, a vegetation characterization survey was conducted within the BSA. Habitat types in the BSA were classified based on the California Wildlife Habitat Relationships (CWHR) classification scheme that used vegetation descriptions as developed in *A Guide to Wildlife Habitats of California* (Mayer and Laudenslayer 1988), which were converted (via crosswalk) from the vegetation alliance classification system described in *A Manual of California Vegetation, Second Edition* (MCV) (Sawyer et al. 2009) and the web-based version *Manual of California Vegetation Online* (CNPS 2021). A total of 21 MCV alliances that correspond to 11 CWHR habitat types were identified in the BSA (Figure 2.3-1) (Table 2.3-1). Descriptions of the 11 CHWR habitat types are detailed below.

More than 50 percent (685.29 acres) of the BSA was classified as either developed, or ornamental, with developed accounting for the highest acreage (595.93 acres). There are five natural/semi-natural habitat types that occur in the BSA, of which California Annual and Perennial Grassland accounted for the highest acreage (346.88 acres) comprising predominantly non-native grass species such as rye grass (*Festuca perennis*) and wild oats (*Avena* spp.).





Notes
1. Coordinate System: NAD 1983 StatePlane California II FIPS 0402 Feet
2. Data Sources: CalTrans, Stantec, 2022
3. Background: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

ESL (1,147.22 acres)
Post Mile
County Line

Impacts to Vegetation Communities
Permanent Impact
Temporary Impact

Vegetation Communities
Developed
Ornamental
Valley oak woodland and forest
Wild oats and annual brome grasslands

Impacts to Sensitive Natural Communities

CWHR Community Type	CDFW Sensitive Natural Community	Temporary Impact (Acres)	Permanent Impact (Acres)
Valley Foothill Riparian	Oregon ash groves	1.87	0
	CA Sycamore Woodlands		
	Freemont Cottonwood Forest and Woodland		
Valley Oak Woodland	Valley Oak Woodland and Forest	0.51	0.14
Annual/Perennial Grassland	Gum Plant Patches	0.007	0
	Total	**2.387**	**0.14**

N

0 1,000
Feet

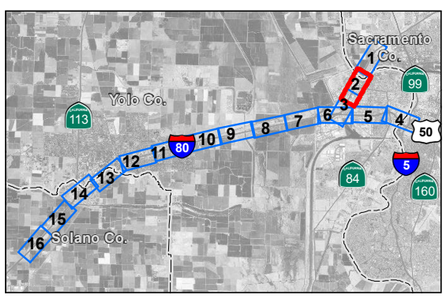
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Figure 2.3-1
Impacts to Vegetation Communities
Yolo 80 Corridor Improvement Project
EA 03-3H900
Solano, Yolo, and Sacramento Counties, California

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- ESL (1,147.22 acres)
- Post Mile
- County Line

Vegetation Communities
- California sycamore woodlands
- Developed
- Fremont cottonwood forest and woodland
- Open water
- Ornamental
- Valley oak woodland and forest
- Wild oats and annual brome grasslands

Impacts to Sensitive Natural Communities

CWHR Community Type	CDFW Sensitive Natural Community	Temporary Impact (Acres)	Permanent Impact (Acres)
Valley Foothill Riparian	Oregon ash groves	1.87	0
	CA Sycamore Woodlands		
	Freemont Cottonwood Forest and Woodland		
Valley Oak Woodland	Valley Oak Woodland and Forest	0.51	0.14
Annual/Perennial Grassland	Gum Plant Patches	0.007	0
	Total	**2.387**	**0.14**

N

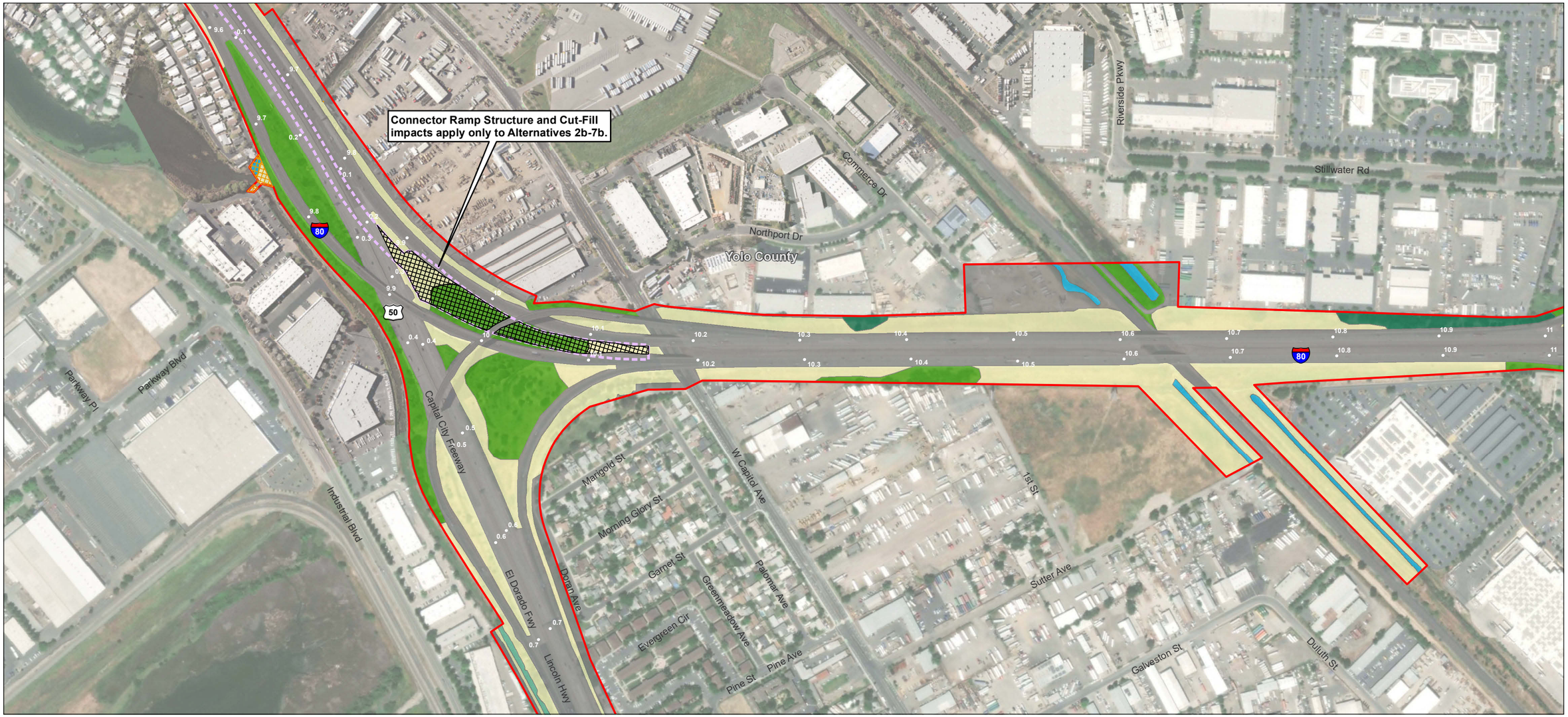
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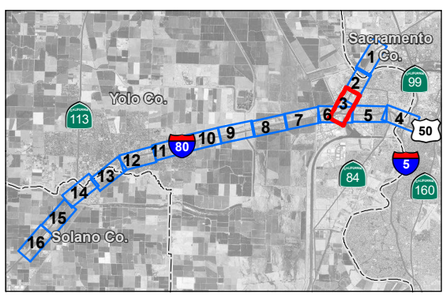
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Figure 2.3-1
Impacts to Vegetation Communities
Yolo 80 Corridor Improvement Project
EA 03-3H900
Solano, Yolo, and Sacramento Counties, California

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ESL (1,147.22 acres)
Connector Ramp and Associated Cut-Fill (Alternatives 2b-7b)
Post Mile

Impacts to Vegetation Communities
Permanent Impact
Temporary Impact

Vegetation Communities
Developed
Open water
Ornamental
Valley oak woodland and forest
Water primrose wetlands
Wild oats and annual brome grasslands

Impacts to Sensitive Natural Communities

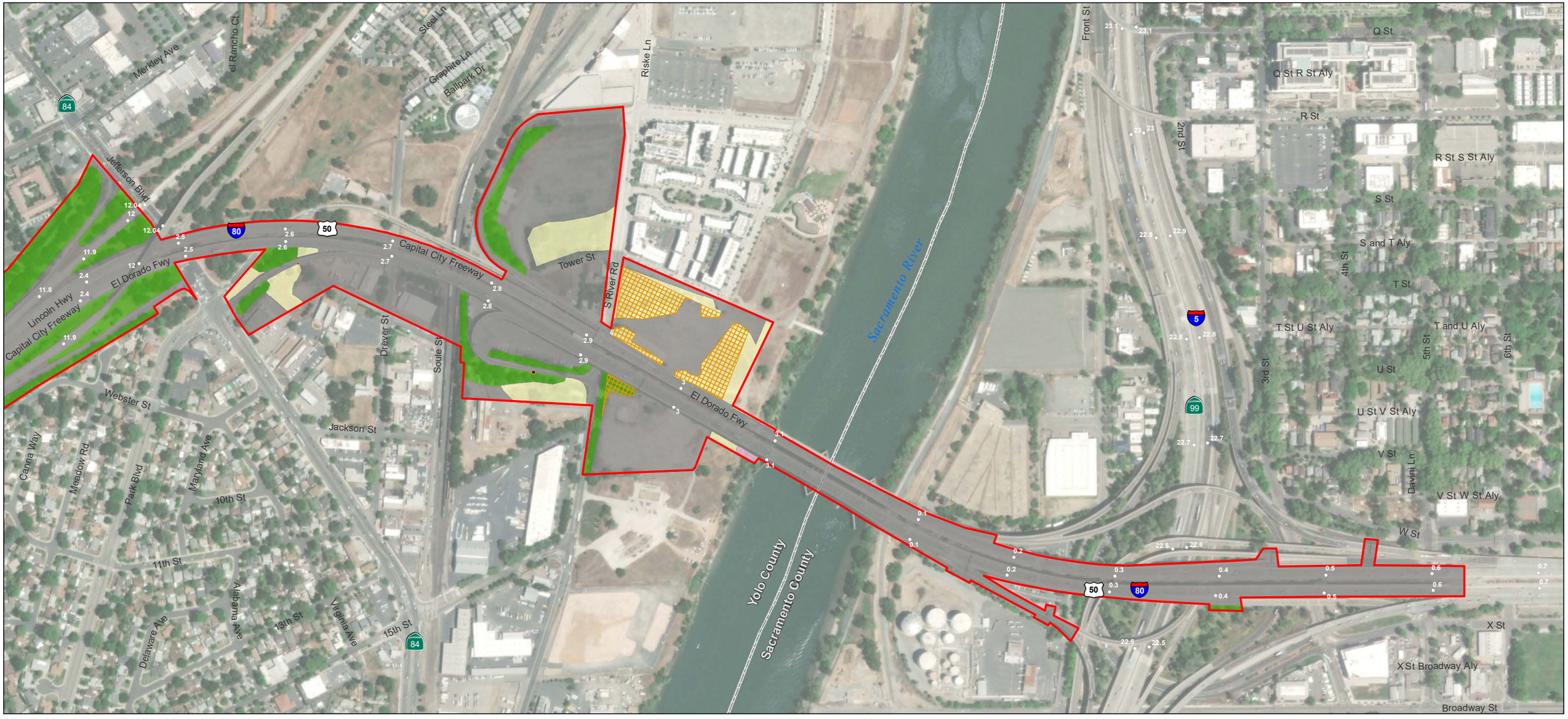
CWHR Community Type	CDFW Sensitive Natural Community	Temporary Impact (Acres)	Permanent Impact (Acres)
Valley Foothill Riparian	Oregon ash groves	1.87	0
	CA Sycamore Woodlands		
	Freemont Cottonwood Forest and Woodland		
Valley Oak Woodland	Valley Oak Woodland and Forest	0.51	0.14
Annual/Perennial Grassland	Gum Plant Patches	0.007	0
	Total	**2.387**	**0.14**

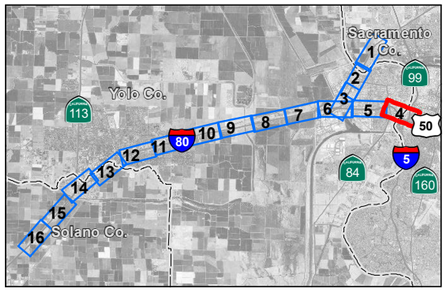
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Figure 2.3-1
Impacts to Vegetation Communities
Yolo 80 Corridor Improvement Project
EA 03-3H900
Solano, Yolo, and Sacramento Counties, California

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3. Background: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

ESL (1,147.22 acres)
Post Mile
County Line

Impacts to Vegetation Communities
Permanent Impact
Temporary Impact

Vegetation Communities
Developed
Fremont cottonwood forest and woodland
Open water
Ornamental
Wild oats and annual brome grasslands

Impacts to Sensitive Natural Communities

CWHR Community Type	CDFW Sensitive Natural Community	Temporary Impact (Acres)	Permanent Impact (Acres)
Valley Foothill Riparian	Oregon ash groves	1.87	0
	CA Sycamore Woodlands		
	Freemont Cottonwood Forest and Woodland		
Valley Oak Woodland	Valley Oak Woodland and Forest	0.51	0.14
Annual/Perennial Grassland	Gum Plant Patches	0.007	0
	Total	**2.387**	**0.14**

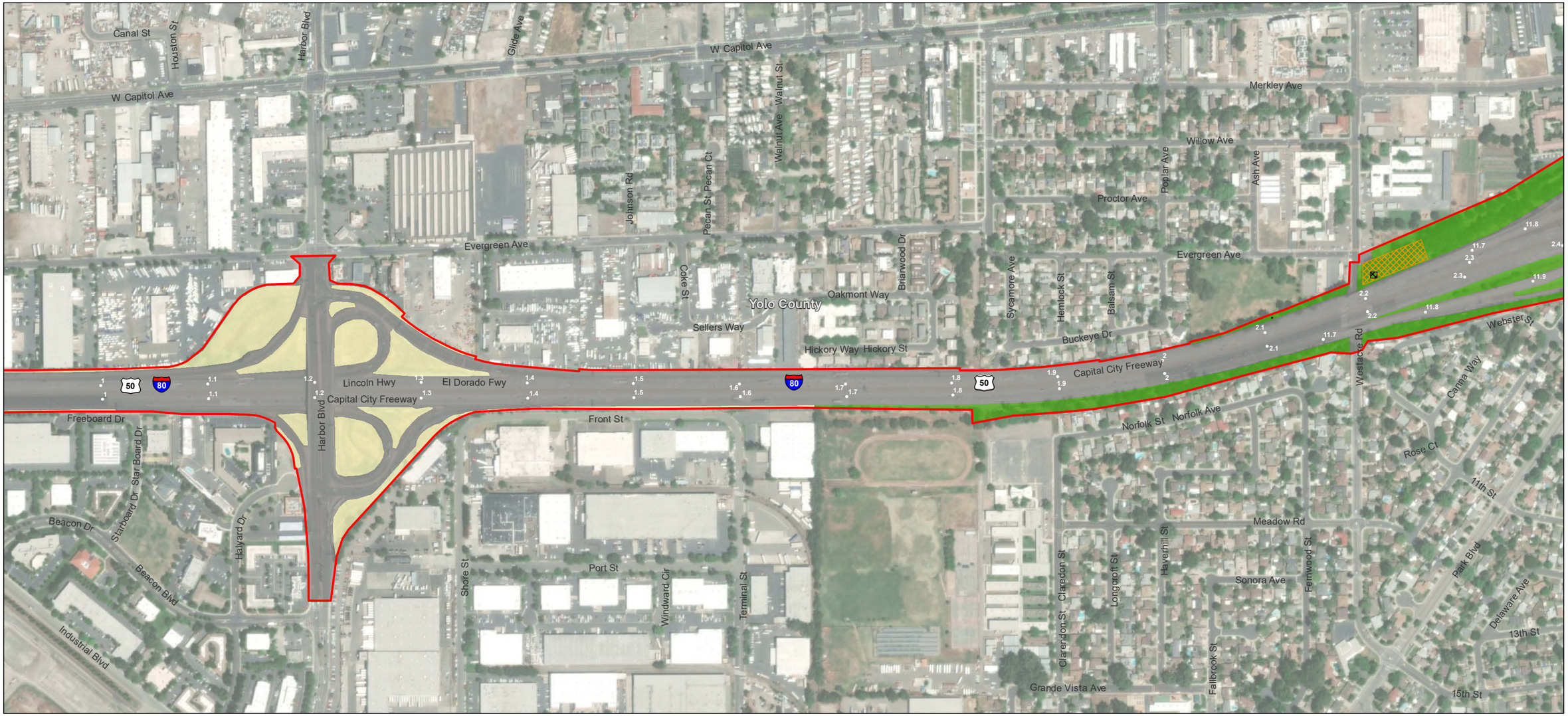
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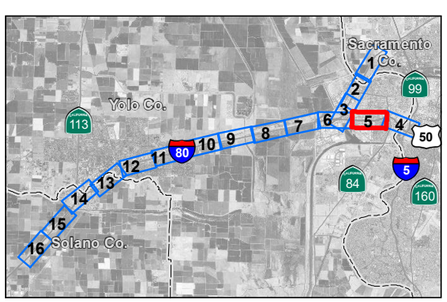
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Figure 2.3-1
Impacts to Vegetation Communities
Yolo 80 Corridor Improvement Project
EA 03-3H900
Solano, Yolo, and Sacramento Counties, California

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ESL (1,147.22 acres)

Post Mile

Impacts to Vegetation Communities

Permanent Impact

Temporary Impact

Vegetation Communities

Developed

Ornamental

Wild oats and annual brome grasslands

Notes

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2. Data Sources: CalTrans, Stantec, 2022

3. Background: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

Impacts to Sensitive Natural Communities

CWHR Community Type	CDFW Sensitive Natural Community	Temporary Impact (Acres)	Permanent Impact (Acres)
Valley Foothill Riparian	Oregon ash groves	1.87	0
	CA Sycamore Woodlands		
	Freemont Cottonwood Forest and Woodland		
Valley Oak Woodland	Valley Oak Woodland and Forest	0.51	0.14
Annual/Perennial Grassland	Gum Plant Patches	0.007	0
	Total	**2.387**	**0.14**

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Figure 2.3-1
Impacts to Vegetation Communities

Yolo 80 Corridor Improvement Project

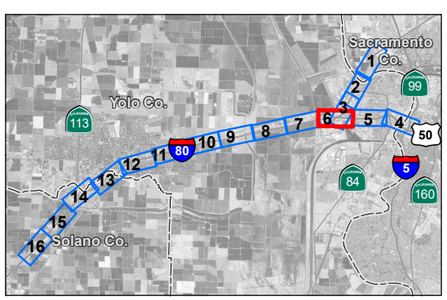
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Solano, Yolo, and Sacramento Counties, California

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ESL (1,147.22 acres)
Connector Ramp and Associated Cut-Fill (Alternatives 2b-7b)
Post Mile

Impacts to Vegetation Communities
Permanent Impact
Temporary Impact

Vegetation Communities
Developed
Open water
Ornamental
Perennial pepper weed patches
Water primrose wetlands
Wild oats and annual brome grasslands

Impacts to Sensitive Natural Communities

CWHR Community Type	CDFW Sensitive Natural Community	Temporary Impact (Acres)	Permanent Impact (Acres)
Valley Foothill Riparian	Oregon ash groves CA Sycamore Woodlands Freemont Cottonwood Forest and Woodland	1.87	0
Valley Oak Woodland	Valley Oak Woodland and Forest	0.51	0.14
Annual/Perennial Grassland	Gum Plant Patches	0.007	0
	Total	**2.387**	**0.14**

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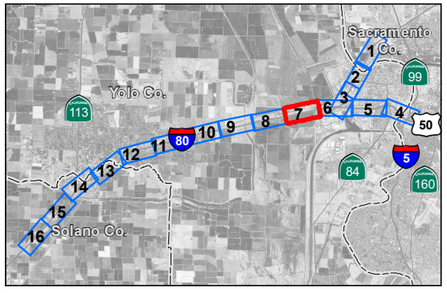
Caltrans

Figure 2.3-1
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Yolo 80 Corridor Improvement Project
EA 03-3H900
Solano, Yolo, and Sacramento Counties, California

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3. Background: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

ESL (1,147.22 acres)

Post Mile

Impacts to Vegetation Communities

Temporary Impact

Vegetation Communities

Cropland
Developed
Fremont cottonwood forest and woodland
Gum plant patches
Open water
Ornamental
Perennial pepper weed patches
Perennial rye grass fields
Water primrose wetlands
Wild oats and annual brome grasslands

Impacts to Sensitive Natural Communities

CWHR Community Type	CDFW Sensitive Natural Community	Temporary Impact (Acres)	Permanent Impact (Acres)
Valley Foothill Riparian	Oregon ash groves	1.87	0
	CA Sycamore Woodlands		
	Freemont Cottonwood Forest and Woodland		
Valley Oak Woodland	Valley Oak Woodland and Forest	0.51	0.14
Annual/Perennial Grassland	Gum Plant Patches	0.007	0
	Total	**2.387**	**0.14**

N

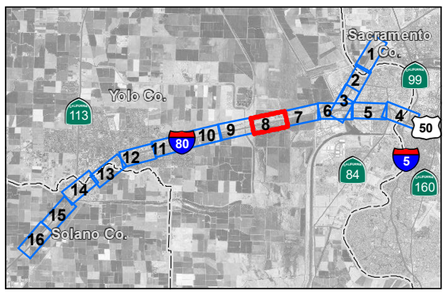
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Figure 2.3-1
Impacts to Vegetation Communities
Yolo 80 Corridor Improvement Project
EA 03-3H900
Solano, Yolo, and Sacramento Counties, California

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ESL (1,147.22 acres)

Post Mile

Vegetation Communities

- Cocklebur patches
- Cropland
- Developed
- Goodding's willow riparian woodland and forest
- Open water
- Perennial pepper weed patches
- Perennial rye grass fields
- Water primrose wetlands

Impacts to Sensitive Natural Communities

CWHR Community Type	CDFW Sensitive Natural Community	Temporary Impact (Acres)	Permanent Impact (Acres)
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Annual/Perennial Grassland	Gum Plant Patches	0.007	0
	Total	**2.387**	**0.14**

N

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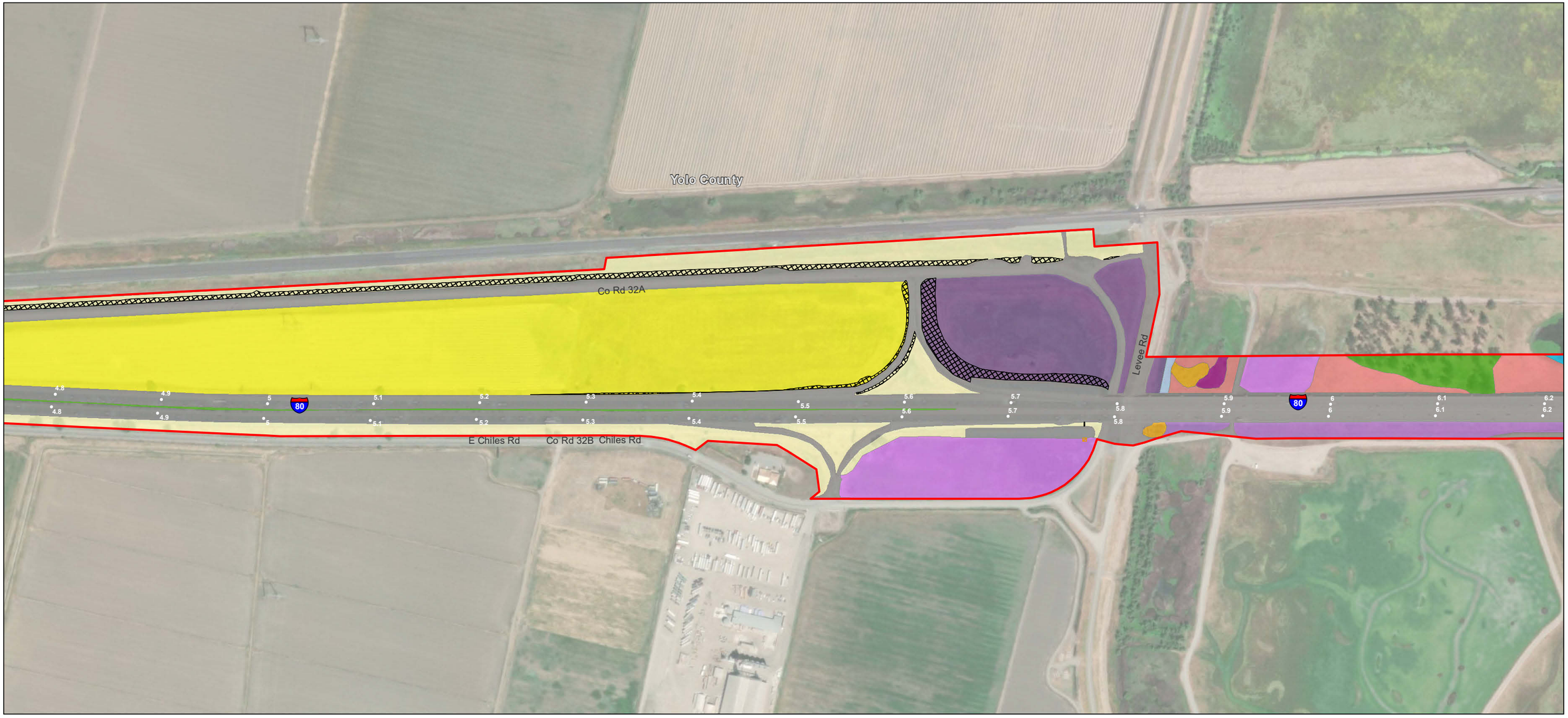
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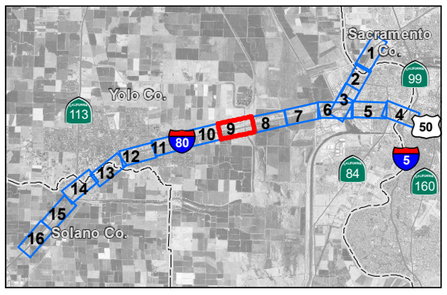
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Figure 2.3-1
Impacts to Vegetation Communities
Yolo 80 Corridor Improvement Project
EA 03-3H900
Solano, Yolo, and Sacramento Counties, California

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ESL (1,147.22 acres)

Post Mile

Impacts to Vegetation Communities

Permanent Impact

Temporary Impact

Vegetation Communities

Cocklebur patches

Cropland

Developed

Goodding's willow riparian woodland and forest

Gum plant patches

Hardstem bulrush marshes

Open water

Ornamental

Perennial pepper weed patches

Perennial rye grass fields

Upland mustards or star-thistle fields

Wild oats and annual brome grasslands

Impacts to Sensitive Natural Communities

CWHR Community Type	CDFW Sensitive Natural Community	Temporary Impact (Acres)	Permanent Impact (Acres)
Valley Foothill Riparian	Oregon ash groves	1.87	0
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	Freemont Cottonwood Forest and Woodland		
Valley Oak Woodland	Valley Oak Woodland and Forest	0.51	0.14
Annual/Perennial Grassland	Gum Plant Patches	0.007	0
	Total	**2.387**	**0.14**

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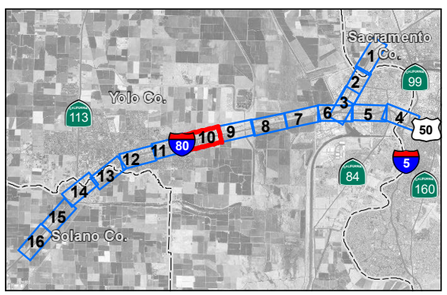
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Figure 2.3-1
Impacts to Vegetation Communities
Yolo 80 Corridor Improvement Project
EA 03-3H900
Solano, Yolo, and Sacramento Counties, California

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ESL (1,147.22 acres)

Post Mile

Impacts to Vegetation Communities

Permanent Impact

Temporary Impact

Temporary Impact (Alternatives 7a and 7b only)*

Vegetation Communities

Cropland

Developed

Ornamental

Wild oats and annual brome grasslands

Impacts to Sensitive Natural Communities

CWHR Community Type	CDFW Sensitive Natural Community	Temporary Impact (Acres)	Permanent Impact (Acres)
Valley Foothill Riparian	Oregon ash groves	1.87	0
	CA Sycamore Woodlands		
	Freemont Cottonwood Forest and Woodland		
Valley Oak Woodland	Valley Oak Woodland and Forest	0.51	0.14
Annual/Perennial Grassland	Gum Plant Patches	0.007	0
	Total	**2.387**	**0.14**

*** Note:** Alternatives 7a and 7b do not include median widening. Where temporary impact is noted in the median (pp 10-12) it is the result of proposed culvert work for Alternatives 7a and 7b. The same locations are permanently impacted by median widening proposed for Alternatives 2, 3, 4, 5, and 6.

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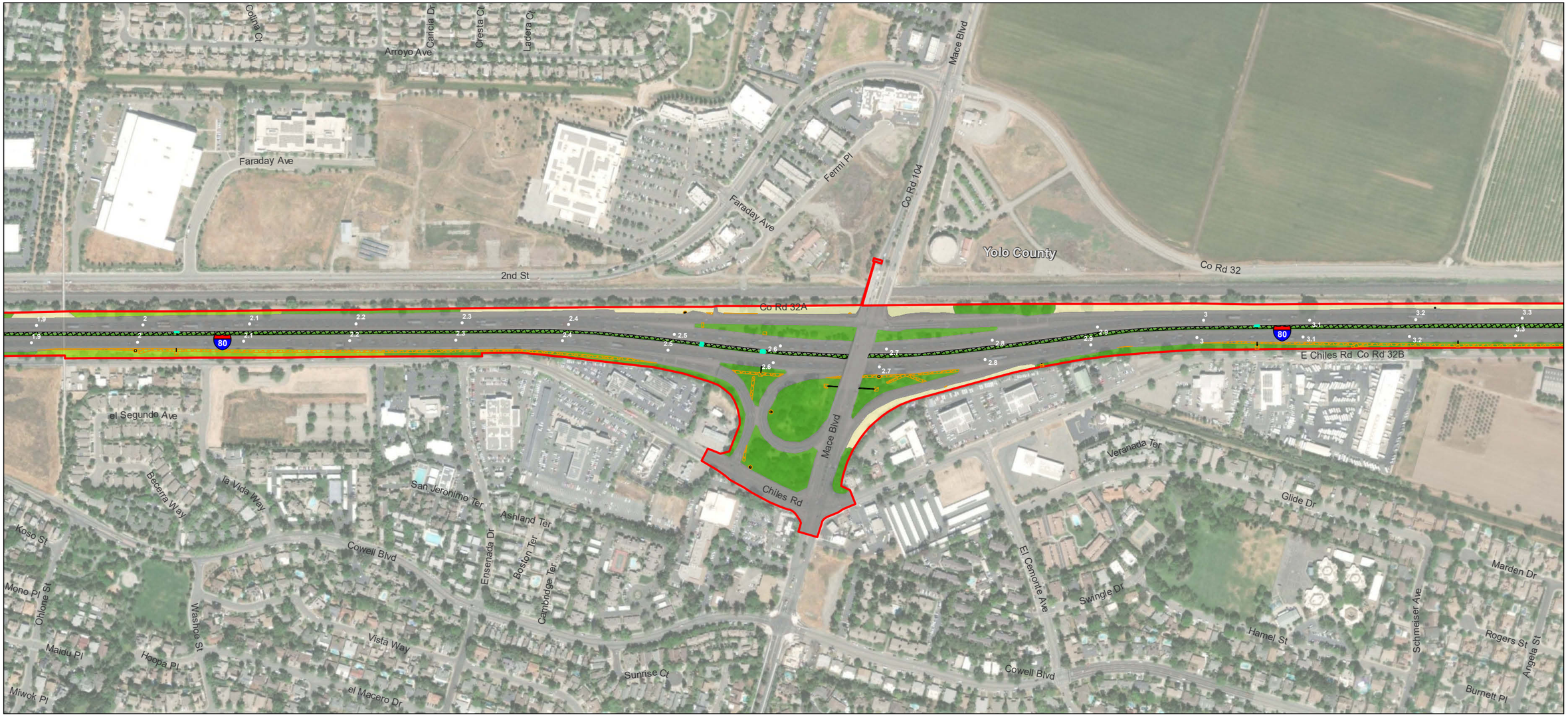
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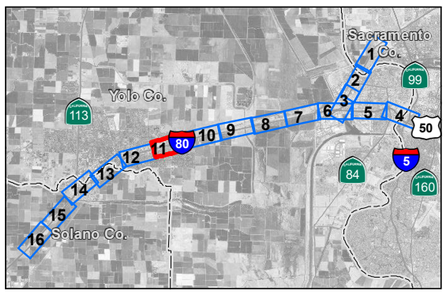
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Figure 2.3-1
Impacts to Vegetation Communities
Yolo 80 Corridor Improvement Project
EA 03-3H900
Solano, Yolo, and Sacramento Counties, California

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ESL (1,147.22 acres)

Post Mile

Impacts to Vegetation Communities

Permanent Impact

Temporary Impact

Temporary Impact (Alternatives 7a and 7b only)*

Vegetation Communities

Coast live oak woodland and forest

Developed

Ornamental

Wild oats and annual brome grasslands

Impacts to Sensitive Natural Communities

CWHR Community Type	CDFW Sensitive Natural Community	Temporary Impact (Acres)	Permanent Impact (Acres)
Valley Foothill Riparian	Oregon ash groves	1.87	0
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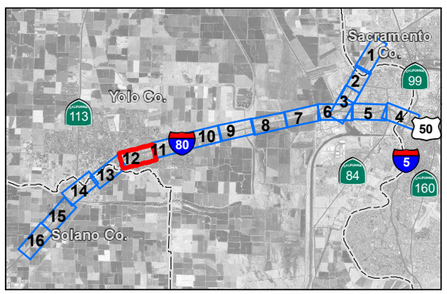
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Figure 2.3-1
Impacts to Vegetation Communities
Yolo 80 Corridor Improvement Project
EA 03-3H900
Solano, Yolo, and Sacramento Counties, California

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ESL (1,147.22 acres)
Post Mile

Impacts to Vegetation Communities
Permanent Impact
Temporary Impact
Temporary Impact (Alternatives 7a and 7b only)*

Vegetation Communities
Developed
Ornamental
Wild oats and annual brome grasslands

Impacts to Sensitive Natural Communities

CWHR Community Type	CDFW Sensitive Natural Community	Temporary Impact (Acres)	Permanent Impact (Acres)
Valley Foothill Riparian	Oregon ash groves	1.87	0
	CA Sycamore Woodlands		
	Freemont Cottonwood Forest and Woodland		
Valley Oak Woodland	Valley Oak Woodland and Forest	0.51	0.14
Annual/Perennial Grassland	Gum Plant Patches	0.007	0
	Total	**2.387**	**0.14**

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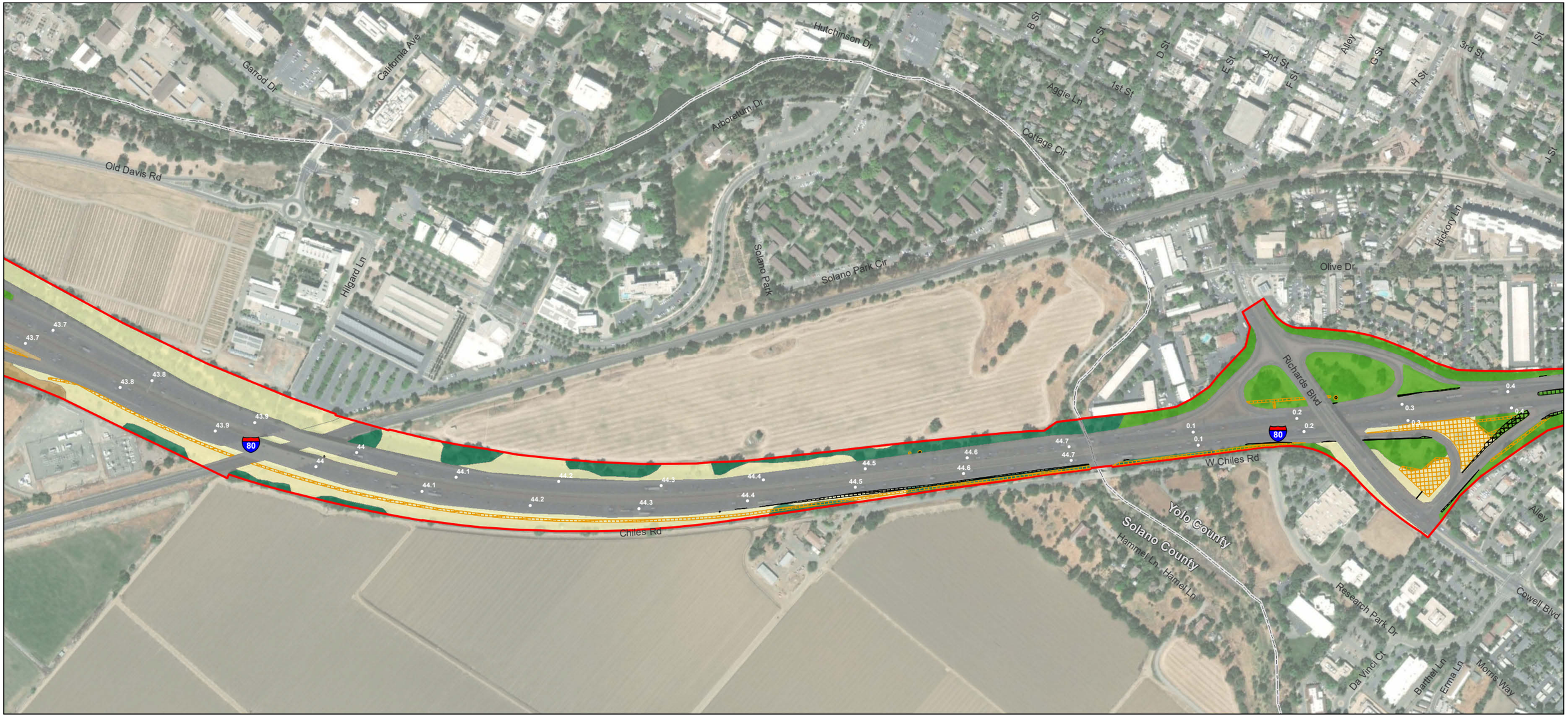
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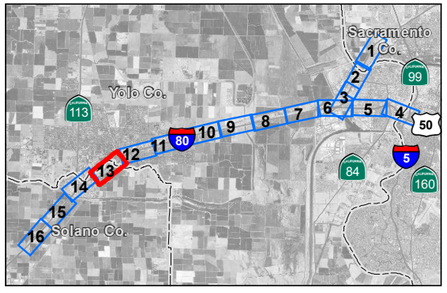
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Figure 2.3-1
Impacts to Vegetation Communities
Yolo 80 Corridor Improvement Project
EA 03-3H900
Solano, Yolo, and Sacramento Counties, California

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ESL (1,147.22 acres)
Post Mile
County Line

Impacts to Vegetation Communities
Permanent Impact
Temporary Impact

Vegetation Communities
California sycamore woodlands
Developed
Ornamental
Valley oak woodland and forest
Wild oats and annual brome grasslands

Impacts to Sensitive Natural Communities

CWHR Community Type	CDFW Sensitive Natural Community	Temporary Impact (Acres)	Permanent Impact (Acres)
Valley Foothill Riparian	Oregon ash groves	1.87	0
	CA Sycamore Woodlands		
	Freemont Cottonwood Forest and Woodland		
Valley Oak Woodland	Valley Oak Woodland and Forest	0.51	0.14
Annual/Perennial Grassland	Gum Plant Patches	0.007	0
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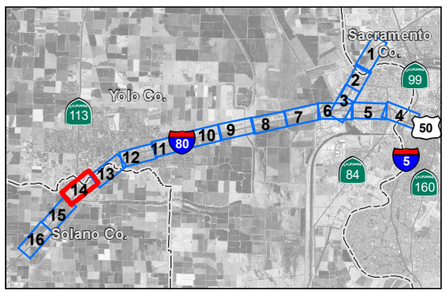
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Figure 2.3-1
Impacts to Vegetation Communities
Yolo 80 Corridor Improvement Project
EA 03-3H900
Solano, Yolo, and Sacramento Counties, California

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- ESL (1,147.22 acres)
- Post Mile
- County Line

Impacts to Vegetation Communities
- Permanent Impact
- Temporary Impact

Vegetation Communities
- California sycamore woodlands
- Coast live oak woodland and forest
- Cocklebur patches
- Developed
- Fremont cottonwood forest and woodland
- Interior live oak woodland and forest
- Open water
- Oregon ash groves
- Ornamental
- Valley oak woodland and forest
- Wild oats and annual brome grasslands

Impacts to Sensitive Natural Communities

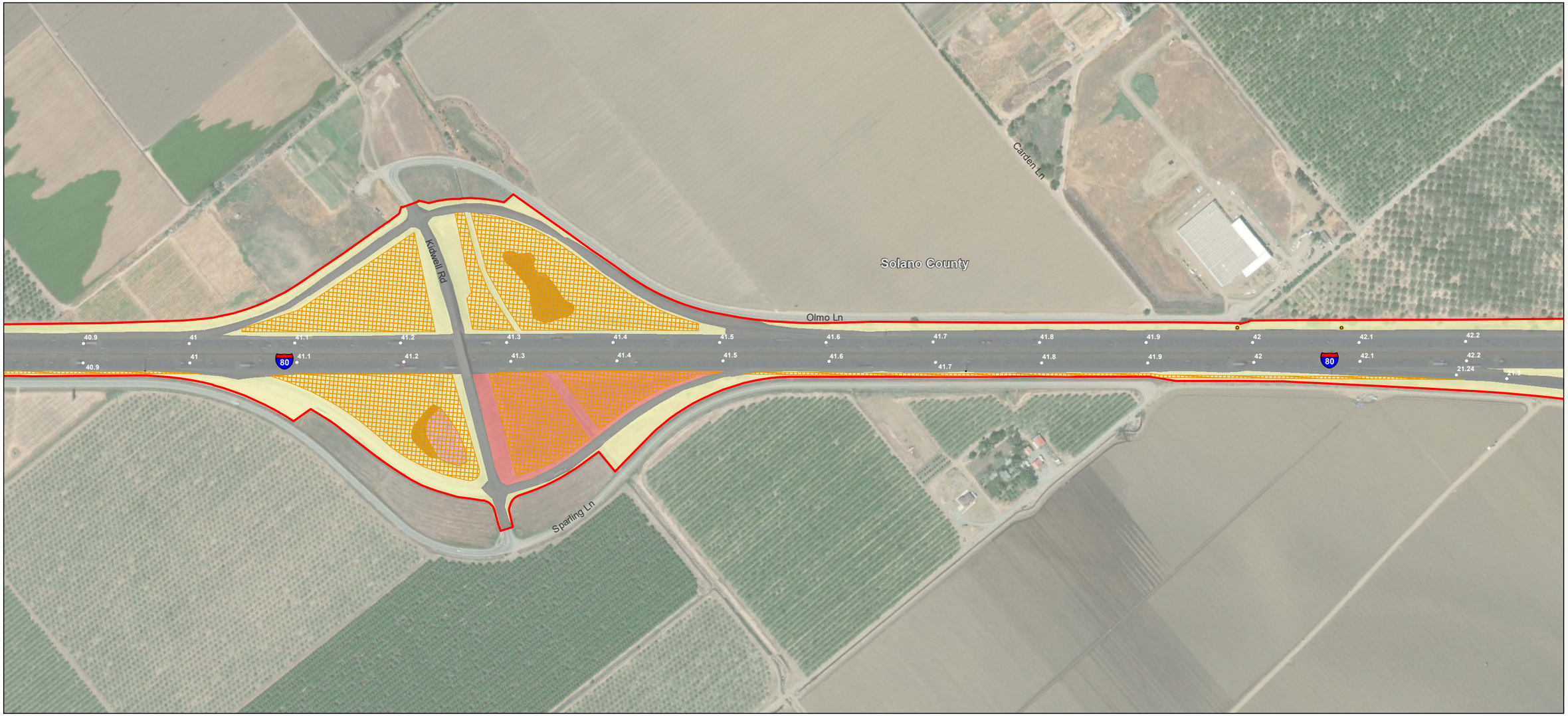
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	Freemont Cottonwood Forest and Woodland		
Valley Oak Woodland	Valley Oak Woodland and Forest	0.51	0.14
Annual/Perennial Grassland	Gum Plant Patches	0.007	0
	Total	**2.387**	**0.14**

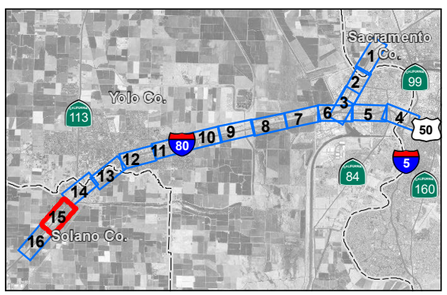
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Figure 2.3-1
Impacts to Vegetation Communities
Yolo 80 Corridor Improvement Project
EA 03-3H900
Solano, Yolo, and Sacramento Counties, California

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ESL (1,147.22 acres)

Post Mile

Impacts to Vegetation Communities

Permanent Impact

Temporary Impact

Vegetation Communities

Developed

Fremont cottonwood forest and woodland

Perennial pepper weed patches

Sandbar willow thickets

Wild oats and annual brome grasslands

Notes

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Impacts to Sensitive Natural Communities

CWHR Community Type	CDFW Sensitive Natural Community	Temporary Impact (Acres)	Permanent Impact (Acres)
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	Freemont Cottonwood Forest and Woodland		
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Annual/Perennial Grassland	Gum Plant Patches	0.007	0
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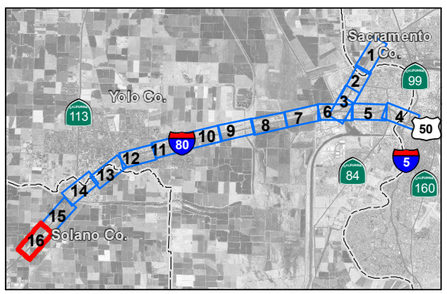
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Figure 2.3-1
Impacts to Vegetation Communities
Yolo 80 Corridor Improvement Project
EA 03-3H900
Solano, Yolo, and Sacramento Counties, California

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ESL (1,147.22 acres)

Post Mile

Impacts to Vegetation Communities

Temporary Impact

Vegetation Communities

- Developed
- Salt grass flats
- Valley oak woodland and forest
- Wild oats and annual brome grasslands

Notes

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Impacts to Sensitive Natural Communities

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Annual/Perennial Grassland	Gum Plant Patches	0.007	0
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N

0 1,000

Feet

Caltrans

Figure 2.3-1
Impacts to Vegetation Communities
Yolo 80 Corridor Improvement Project
EA 03-3H900
Solano, Yolo, and Sacramento Counties, California

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Table 2.3-1. Vegetation Communities in the Biological Study Area

CWHR Habitat	MCV Vegetation Alliance	Acres of BSA	Percent of BSA
Developed	N/A	595.93	51.9%
Ornamental	N/A	89.36	7.8%
Cropland	N/A	61.44	5.4%
Annual Grassland	Wild oats and annual brome grasslands	224.76	19.59%
	Upland mustards or star thistle fields	12.59	1.1%
	Cocklebur patches	6.69	<1%
	Gum plant patches	17.28	1.5%
Perennial Grassland	Perennial rye grass fields	11.50	1%
	Perennial pepper weed patches	74.06	6.5%
Coastal Oak Woodland	Coast live oak woodland and forest	2.36	<1%
Interior Live Oak	Interior live oak woodland and forest	1.16	<1%
Valley Oak Woodland	Valley oak woodland and forest	21.88	1.9%
Valley Foothill Riparian	Oregon ash groves	0.60	<1%
	California sycamore woodlands	8.59	<1%
	Fremont cottonwood forest and woodland	4.72	<1%
	Gooding's willow riparian woodland and forest	1.43	<1%
	Sandbar willow thickets	1.51	<1%
Saline Emergent Wetland	Salt grass flats	0.58	<1%
Fresh Emergent Wetland	Hardstem bulrush marshes	0.16	<1%
	Water primrose wetlands	4.82	<1%
Open Water	N/A	5.96	<1%

Source: Caltrans District 3 Yolo Corridor Improvement Project Natural Environment Study. (Caltrans. 2023)
Note: BSA – Biological Study Area, CWHR - California Wildlife Habitat Relationships, MCV – Manual of California Vegetation

Developed

Developed areas account for more than half (about 596 acres) of the BSA and include highways, on-ramps, off-ramps, frontage roads, commercial areas, and other urbanized areas. Vegetation is absent on the road surface, although sparse opportunistic grasses and forbs are present on the road shoulders.

Ornamental

Ornamental is the most represented vegetation type in the BSA. Within the BSA, non-native ornamental vegetation has been planted as windbreaks near croplands and as landscaping in urban areas. Stands observed include various eucalyptus (*Eucalyptus* spp.), Lombardy poplar (*Populus nigra*), English walnut (*Juglans regia*), Peruvian pepper tree (*Schinus molle*), and Chinese elm (*Ulmus parvifolia*). The MCV includes ornamental vegetation alliances that do not encompass all species encountered in the BSA. For the purposes of this survey, all ornamental stands have been lumped together in one ornamental category.

Cropland

Croplands are present in the Yolo Bypass, where there are rice fields that are regularly flooded. There is also a large hayfield just to the west of Yolo Bypass and adjacent to CR 32A.

Annual Grassland

Annual Grassland is the second largest habitat type in the BSA. It occurs throughout the BSA, along the highway, off-ramps, and shoulders, where it is regularly mowed and/or treated with herbicide. Within the BSA, this habitat type is dominated (greater than 30 percent relative cover) by one of several non-native grass species such as wild oat, soft chess (*Bromus hordeaceus*), or wall barley (*Hordeum murinum*). Other non-native grasses and forbs including ripgut brome (*Bromus diandrus*), perennial pepper weed (*Lepidium latifolium),* and prickly oxtongue (*Helminthotheca echioides*).

Perennial Grassland

Perennial Grassland occurs adjacent to the highway in the Yolo Bypass and is dominated (greater than 50 percent relative cover) by perennial rye grass. Other non-native grasses and forbs, including ripgut brome, soft chess, perennial pepperweed, and prickly oxtongue, are present as well.

Coast Oak Woodland

Coastal oak woodland occurs within the BSA in small, scattered stands to the north along the highway near Davis. These stands appear to have been planted along the highway as a landscaping tree. Coast live oak is dominant with greater than 50 percent relative cover in the tree stratum in association with other ornamental trees. The herbaceous stratum contains non-native grass species such as wild oats.

Valley Oak Woodland

Valley oak woodland occurs intermittently in the BSA, with most occurrences near Davis and also near the Sacramento River. Many stands associated with I-80 have been planted, while some stands in proximity to riparian corridors, such as Putah Creek, appear to be naturally occurring. Valley oak is dominant with greater than 35 percent relative cover and in association with other oak species (*Quercus* sp.) and English walnut at lower cover. The herbaceous

stratum is typically dominated by non-native grass species such as wild oats and perennial rye grass (*Festuca perennis*).

Interior Live Oak Woodland

Interior live oak woodland was mapped in one planted stand in the BSA, south of Davis, along the interchange to northbound State Route 113. Interior live oak (*Quercus wislizeni*) is dominant with greater than 50 percent relative cover. The herbaceous stratum is dominated by non-native grass species such as wild oats and perennial rye grass.

Valley Foothill Riparian

Valley foothill riparian occurs in small patches in the BSA, and is typically associated with drainages, particularly in the Yolo Bypass, Prospect Slough, and along the Sacramento River. One isolated stand occurs near Sparling Lane south of Davis, and one is associated with a pond. Fremont cottonwood (*Populus fremontii*) is dominant with greater than 50 percent relative cover and in association with various willows (*Salix* spp.) at low cover, and a sparse herbaceous stratum.

Saline Emergent Wetland

Saline emergent wetland occurs in and adjacent to a shallow roadside ditch that runs adjacent to I-80 in Dixon. This alliance is dominated by salt grass (*Distichlis spicata*) at greater than 70 percent relative cover with other non-native grasses and forbs such as harding grass (*Phalaris aquatica*) and bristly ox tongue. Patchy broadleaf cattail (*Typha latifolia*) and bulrush (*Schoenoplectus acutus*) also are present.

Fresh Emergent Wetland

Fresh Emergent Wetland occurs in a ditch that runs adjacent to I-80 near the east side of the Yolo Bypass and is dominated by hardstem bulrush at greater than 50 percent relative cover. Other emergent species in this feature, such as broadleaf cattail and water primrose, are present as well. Another occurrence of fresh emergent wetland occurs in ditches near Yolo Bypass and in a ditch west of Sacramento. It is dominated almost exclusively by invasive water primrose (*Ludwigia peploides*), which floats on top of the water and persists on the ground surface when water levels drop. Mosquito fern (*Azolla microphylla*), a native species, is also present at less than 10 percent relative cover.

Open Water

Open Water is not a vegetation alliance; but for the purposes of this survey, it is included as unvegetated waterbodies. Within the BSA, this includes the Sacramento River, which is crossed twice by the BSA, the South Fork of Putah Creek, Prospect Slough, agricultural ditches, and a pond in the Yolo Bypass.

Habitat Connectivity

Habitat corridors are segments of land that provide linkages between different habitats while also providing cover. On a broader level, corridors also function as avenues along which wide-ranging animals can travel, plants can propagate, genetic interchange can occur, populations can move in response to environmental changes and natural disasters, and threatened species can relocate from other areas. Habitat corridors often consist of riparian areas along streams, rivers, or other natural features. Additionally, the rivers and streams themselves may serve as migration corridors for anadromous fish. The Sacramento River, Putah Creek, the Yolo Bypass, and the adjacent upland forested communities (e.g., riparian corridors along the Sacramento River and Putah Creek) could provide habitat connectivity within the BSA.

Sensitive Natural Communities

California Department of Fish and Wildlife (CDFW) maintains a list of California Sensitive Natural Communities. Sensitive Natural Communities are classified following the technical approach described in the MCV (Sawyer et al. 2009) and the California Native Plants Society (CNPS) web-based version of the manual, *A Manual of California Vegetation Online* (CNPS 2021). The MCV describes common to rare vegetation types in California and is the authority on vegetation classification for large- to fine-scale vegetation mapping efforts in the state. The current list of California Sensitive Natural Communities (CDFW 2021a) was reviewed to determine whether any Sensitive Natural Communities occur in the BSA.

Seven MCV alliances mapped within the BSA are considered Sensitive Natural Communities by CDFW: Oregon ash groves, California sycamore woodlands, Fremont cottonwood forest and woodland, valley oak woodland and forest, Gooding's willow riparian woodland and forest, gum plant patches, and hardstem bulrush marshes. These alliances correspond to the valley foothill riparian, valley foothill woodland, fresh emergent wetland, and annual/perennial grassland CWHR communities described in the Vegetation Communities section above. Table 2.3-2 provides a crosswalk for how these alliances correspond to the CWHR communities.

Table 2.3-2. California Department of Fish and Wildlife Sensitive Natural Community to California Wildlife Habitat Relationships Community Crosswalk

CWHR Community Type	CDFW Sensitive Natural Community
Annual/perennial grassland	Gum plant patches
Fresh emergent wetlands	Hardstem bulrush marshes
Valley foothill riparian	Oregon ash groves California sycamore woodlands Fremont cottonwood forest and woodland Gooding's willow riparian woodland and forest
Valley oak woodland	Valley oak woodland and forest

Source: Caltrans District 3 Yolo Corridor Improvement Project Natural Environment Study. (Caltrans. 2023)
Note: CWHR - California Wildlife Habitat Relationships; CDFW – California Department of Fish and Wildlife

Riparian Habitat

Riparian habitat is considered a sensitive natural community by USACE, Regional Water Quality Control Board (RWQCB), and CDFW, and is present in the BSA. In addition to providing habitat for many wildlife species, riparian areas provide shade, sediment, nutrient or chemical regulation, stream bank stability, and input for large woody debris or organic matter to the channel, which are necessary habitat elements for fish and other aquatic species. Riparian habitat (approximately 15.4 acres) occurs in the vicinity of Putah Creek, Yolo Bypass, and along the Sacramento River at both the I-80 and US-50 crossings in the BSA.

2.3.1.2 Environmental Consequences

No Build Alternative 1

Construction and Operation

No Build Alternative 1 would not result in physical or operational improvements within the BSA. Therefore, No Build Alternative 1 would not affect natural communities of concern.

Build Alternatives 2a and 2b

Construction and Operation

Impacts on CDFW Sensitive Natural Communities would only occur on sensitive natural communities located within the valley foothill riparian and valley foothill woodland CWHR communities. Temporary and permanent impacts, as a result of Build Alternatives 2a and 2b, on CDFW Sensitive Natural Communities and the riparian communities considered sensitive by USACE and RWQCB are summarized in Table 2.3-3. Table 2.3-3 summarizes potential impacts within Sensitive Natural Communities. Standard Measures BIO-1, BIO-3, and BIO-4 (see Appendix E) would be implemented and require contractor briefings, invasive non-native species control, pre-construction surveys for sensitive plant species, etc. Temporary impacts would result from the staging areas, and installation of the fiber optic line. Permanent impacts would result from the permanent footprint of the roadway expansion. In addition, indirect impacts could result from the introduction and spread of non-native invasive plants, which would degrade the quality of habitat or change the vegetation composition and structure. Further, with incorporation of Standard Measures BIO-1, BIO-3, and BIO-4, this impact would not result in adverse impacts to Sensitive Natural Communities. The project is located within the boundaries of the Yolo Habitat Conservation Plan/Natural Community Conservation Plan (HCP/NCCP) and abuts the boundaries of the Natomas Basin Habitat Conservation Plan (NBHCP). With implementation of Standard Measures BIO-1 through BIO-4 and AMMs BIO-1 through BIO-32, construction and operation of the project would not conflict with either HCP/NCCP.

Table 2.3-3. Summary of Sensitive Natural Community Approximate Impacts within the Biological Study Area

CWHR Community Type	CDFW Sensitive Natural Community	Temporary Impact (Acres)	Permanent Impact (Acres)
Valley Foothill Riparian	Oregon ash groves California sycamore woodlands Fremont cottonwood forest and woodland	1.87	-
Valley Oak Woodland	Valley oak woodland and forest	0.51	0.14
Annual/Perennial Grassland	Gum plant patches	0.007	
Total		**2.39**	**0.14**

Source: Caltrans District 3 Yolo Corridor Improvement Project Natural Environment Study. (Caltrans. 2023)
Note: CWHR - California Wildlife Habitat Relationships; CDFW – California Department of Fish and Wildlife

Build Alternatives 3a and 3b

Construction and Operation

Build Alternatives 3a and 3b would involve adding an HOT2+ lane in each direction. Build Alternatives 3a and 3a propose similar project components within the same project area as Build Alternatives 2a and 2b, respectively; therefore, the temporary and permanent effects would be the same as the temporary and permanent effects described under Build Alternatives 2a and 2b.

Build Alternatives 4a and 4b

Construction and Operation

Build Alternatives 4a and 4b would involve adding an HOT3+ lane in each direction. Build Alternatives 4a and 4b propose similar project components within the same project area as Build Alternatives 2a and 2b, respectively; therefore, the temporary and permanent effects would be the same as the temporary and permanent effects described under Build Alternatives 2a and 2b.

Build Alternatives 5a and 5b

Construction and Operation

Build Alternatives 4a and 4b would involve adding an HOT3+ lane in each direction. Build Alternatives 4a and 4b propose similar project components within the same project area as Build Alternatives 2a and 2b, respectively; therefore, the temporary and permanent effects would be the same as the temporary and permanent effects described under Build Alternatives 2a and 2b.

Build Alternatives 6a and 6b

Construction and Operation

Build Alternatives 6a and 6b would involve adding a transit-only lane in each direction. Build Alternatives 6a and 6b propose similar project components within the same project area as Build Alternatives 2a and 2b, respectively; therefore, the effects temporary and permanent would be the same as the temporary and permanent effects described under Build Alternatives 2a and 2b.

Build Alternatives 7a and 7b

Construction and Operation

Build Alternatives 7a and 7b would involve repurposing the current number 1 general purpose lane to HOV 2+. No new lanes would be constructed. Build Alternatives 7a and 7b propose similar project components within the same project area as Build Alternatives 2a and 2b, respectively; therefore, the temporary and permanent effects would be the same as the temporary and permanent effects described under Build Alternatives 2a and 2b.

2.3.1.3 Avoidance, Minimization, and/or Mitigation Measures

Caltrans would implement Standard Measures BIO-1, BIO-3, and BIO-4 to reduce impacts on Sensitive Natural Communities. No other avoidance and minimization measures are required.

2.3.2 Wetlands and Other Waters

2.3.2.1 Regulatory Setting

Wetlands and other waters are protected under a number of laws and regulations. At the federal level, the Federal Water Pollution Control Act, more commonly referred to as the Clean Water Act (CWA) (33 United States Code [USC] 1344), is the primary law regulating wetlands and surface waters. One purpose of the CWA is to regulate the discharge of dredged or fill material into waters of the U.S., including wetlands. Waters of the U.S. include navigable waters, interstate waters, territorial seas, and other waters that may be used in interstate or foreign commerce. The lateral limits of jurisdiction over non-tidal water bodies extend to the ordinary high water mark (OHWM), in the absence of adjacent wetlands. When adjacent wetlands are present, CWA jurisdiction extends beyond the OHWM to the limits of the adjacent wetlands. To classify wetlands for the purposes of the CWA, a three-parameter approach is used that includes the presence of hydrophytic (water-loving) vegetation, wetland hydrology, and hydric soils (soils formed during saturation/inundation). All three parameters must be present, under normal circumstances, for an area to be designated as a jurisdictional wetland under the CWA.

Section 404 of the CWA establishes a regulatory program that provides that discharge of dredged or fill material cannot be permitted if a practicable alternative exists that is less damaging to the aquatic environment or if the nation’s waters would be significantly degraded.

The Section 404 permit program is run by the U.S. Army Corps of Engineers (USACE) with oversight by the U.S. Environmental Protection Agency (U.S. EPA).

The USACE issues two types of 404 permits: General and Individual. There are two types of General permits: Regional and Nationwide. Regional permits are issued for a general category of activities when they are similar in nature and cause minimal environmental effect. Nationwide permits are issued to allow a variety of minor project activities with no more than minimal effects.

Ordinarily, projects that do not meet the criteria for a Regional or Nationwide Permit may be permitted under one of USACE's Individual permits. There are two types of Individual permits: Standard permits and Letters of Permission. For Individual permits, the USACE decision to approve is based on compliance with U.S. EPA's Section 404(b)(1) Guidelines (40 Code of Federal Regulations [CFR] Part 230), and whether permit approval is in the public interest. The Section 404 (b)(1) Guidelines (Guidelines) were developed by the U.S. EPA in conjunction with the USACE, and allow the discharge of dredged or fill material into the aquatic system (waters of the U.S.) only if there is no practicable alternative which would have less adverse effects. The Guidelines state that the USACE may not issue a permit if there is a "least environmentally damaging practicable alternative" (LEDPA) to the proposed discharge that would have lesser effects on waters of the U.S., and not have any other significant adverse environmental consequences.

The Executive Order for the Protection of Wetlands (EO 11990) also regulates the activities of federal agencies with regard to wetlands. Essentially, EO 11990 states that a federal agency, such as Federal Highway Administration (FHWA) and/or the Department, as assigned, cannot undertake or provide assistance for new construction located in wetlands unless the head of the agency finds: (1) that there is no practicable alternative to the construction and (2) the proposed project includes all practicable measures to minimize harm. A Wetlands Only Practicable Alternative Finding must be made.

At the state level, wetlands and waters are regulated primarily by the State Water Resources Control Board (SWRCB), the Regional Water Quality Control Boards (RWQCBs) and the California Department of Fish and Wildlife (CDFW). In certain circumstances, the Coastal Commission (or Bay Conservation and Development Commission or the Tahoe Regional Planning Agency) may also be involved. Sections 1600-1607 of the California Fish and Game Code require any agency that proposes a project that will substantially divert or obstruct the natural flow of or substantially change the bed or bank of a river, stream, or lake to notify CDFW before beginning construction. If CDFW determines that the project may substantially and adversely affect fish or wildlife resources, a Lake or Streambed Alteration Agreement will be required. CDFW jurisdictional limits are usually defined by the tops of the stream or lake banks, or the outer edge of riparian vegetation, whichever is wider. Wetlands under jurisdiction of the USACE may or may not be included in the area covered by a Streambed Alteration Agreement obtained from the CDFW.

The RWQCBs were established under the Porter-Cologne Water Quality Control Act to oversee water quality. Discharges under the Porter-Cologne Act are permitted by Waste Discharge Requirements (WDRs) and may be required even when the discharge is already permitted or

exempt under the CWA. In compliance with Section 401 of the CWA, the RWQCBs also issue water quality certifications for activities which may result in a discharge to waters of the U.S. This is most frequently required in tandem with a Section 404 permit request. Please see the Water Quality section for more details.

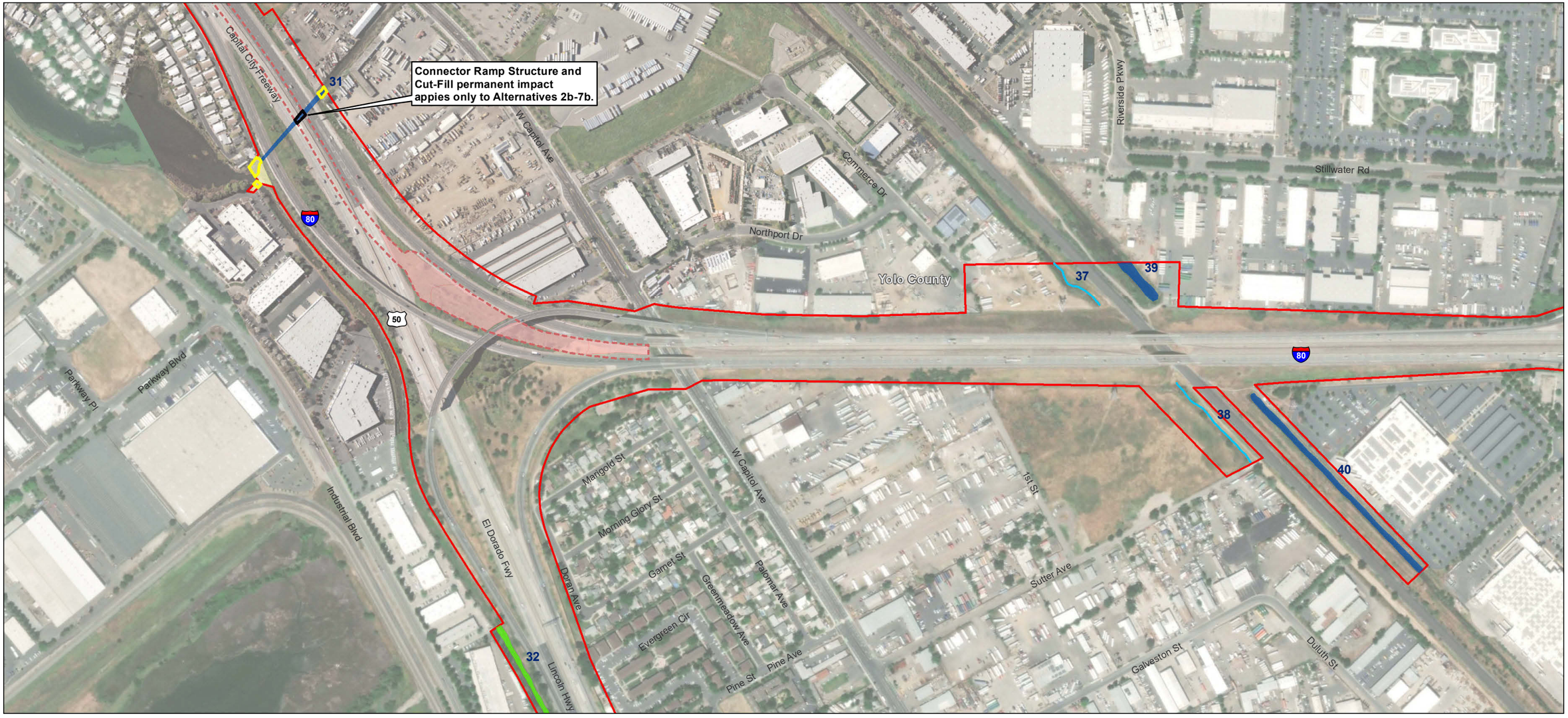
2.3.2.2 Affected Environment

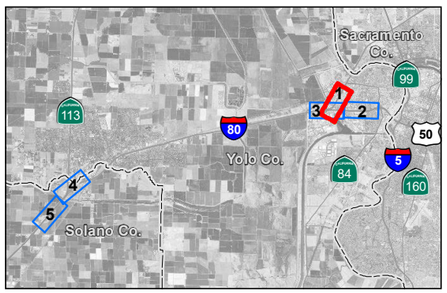
On December 18, 21, 22, 28, and 29, 2020, February 19 and 20–24, 2021, and July 21, 2022, a delineation of aquatic resources subject to agency jurisdiction (i.e., USACE, RWQCB, CDFW) was conducted. Waters of the United States were delineated according to methodology described in the Corps of Engineers Wetlands Delineation Manual (Environmental Laboratory 1987) and the Regional Supplement to the Corps Wetland Delineation Manual: Arid West Region (USACE 2008). Waters of the state were delineated in accord with the definitions and methods described in the Porter-Cologne Water Quality Control Act and the SWRCB's *Implementation Guidance for the State Wetland Definition and Procedures for Discharges of Dredged or Fill Material to Waters of the State* (SWRCB 2020).

A total of 29.013 acres (8,671.87 linear feet) of aquatic resources potentially subject to agency jurisdiction (i.e., waters of the United States or waters of the state) were identified in the BSA. These features include perennial drainage (5.692 acres; 1,148.01 linear feet), intermittent drainage (0.741 acre; 2,734.89 linear feet), ephemeral drainage (0.461 acre; 1,654.61 linear feet), fresh emergent wetland (0.399 acre), woody riparian wetland (5.058 acres), seasonal wetland (4.002 acres), vegetated ditch (7.553 acres), canal (1.523 acres; 3,134.36 linear feet), and pond (3.584 acres). These features are listed in Table 2.3-4 and shown in Figure 2.3-2.

Table 2.3-4. Summary of Aquatic Resources within the BSA

Feature Type	Acres	Linear Feet
Wetlands		
Fresh Emergent Marsh	0.399	N/A
Seasonal Wetlands	4.002	N/A
Vegetated Ditches	7.553	N/A
Woody Riparian Wetlands	5.058	N/A
Wetlands Total	**17.012**	N/A
Other Waters		
Ephemeral Drainages	0.461	1,654.61
Intermittent Drainages	0.741	2,734.89
Perennial Drainages	5.692	1,148.01
Canals	1.523	3,134.36
Ponds	3.584	N/A
Other Waters Total	**12.001**	**8,671.87**
Total	**29.013**	**8,671.87**





Environmental Study Limit (1,147.22 acres)

Connector Ramp and Associated Cut-Fill (Alternatives 2b-7b)

Aquatic Resources

- Canal
- Drainage
- Canal
- Vegetated Ditch

Project Impacts

- Permanent Impact
- Temporary Impact

Impacted Aquatic Resources

- Permanent
- Temporary

Impacted Linear Aquatic Resources

- Temporary

Feature ID	Feature Type	Impact (acres)		Impact (linear feet)	
		Permanent	Temporary	Permanent	Temporary
Wetlands					
07	Woody Riparian Wetland	--	0.002	--	--
Other Waters					
04	Canal	--	<0.001	--	3.03
06	Perennial Drainage	--	0.005	--	12.67
31	Canal	--	0.028	--	42.59
33	Ephemeral Drainage	0.022	--	315.57	--
46	Pond	--	0.084	--	--

N

0 1,000

Feet

Caltrans

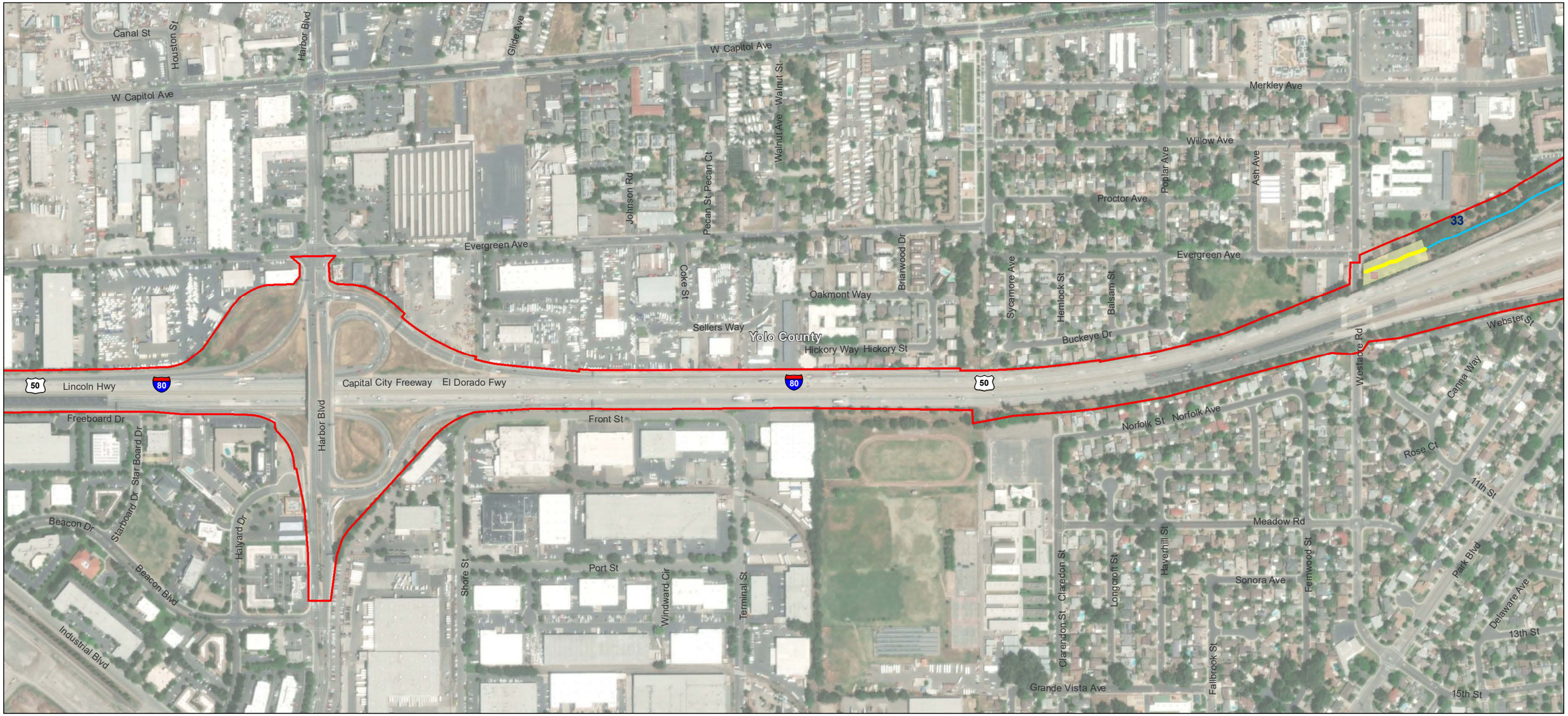
Notes

1. Coordinate System: NAD 1983 StatePlane California II FIPS 0402 Feet
2. Data Sources: CalTrans, Stantec, 2021
3. Background: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

Figure 2.3-2
Potential Impacts on Aquatic Resources
Yolo 80 Corridor Improvement Project
EA 03-3H900
Solano, Yolo, and Sacramento Counties, California

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Environmental Study Limit (1,147.22 acres)

Connector Ramp and Associated Cut-Fill (Alternatives 2b-7b)

Aquatic Resources

Canal

Drainage

Project Impacts

Permanent Impact

Temporary Impact

Impacted Aquatic Resources

Permanent

Temporary

Impacted Linear Aquatic Resources

Temporary

Feature ID	Feature Type	Impact (acres)		Impact (linear feet)	
		Permanent	Temporary	Permanent	Temporary
Wetlands					
07	Woody Riparian Wetland	--	0.002	--	--
Other Waters					
04	Canal	--	<0.001	--	3.03
06	Perennial Drainage	--	0.005	--	12.67
31	Canal	--	0.028	--	42.59
33	Ephemeral Drainage	0.022	--	315.57	--
46	Pond	--	0.084	--	--

N

0 1,000

Feet

Caltrans

Notes

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2. Data Sources: CalTrans, Stantec, 2021

3. Background: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

Figure 2.3-2
Potential Impacts on Aquatic Resources

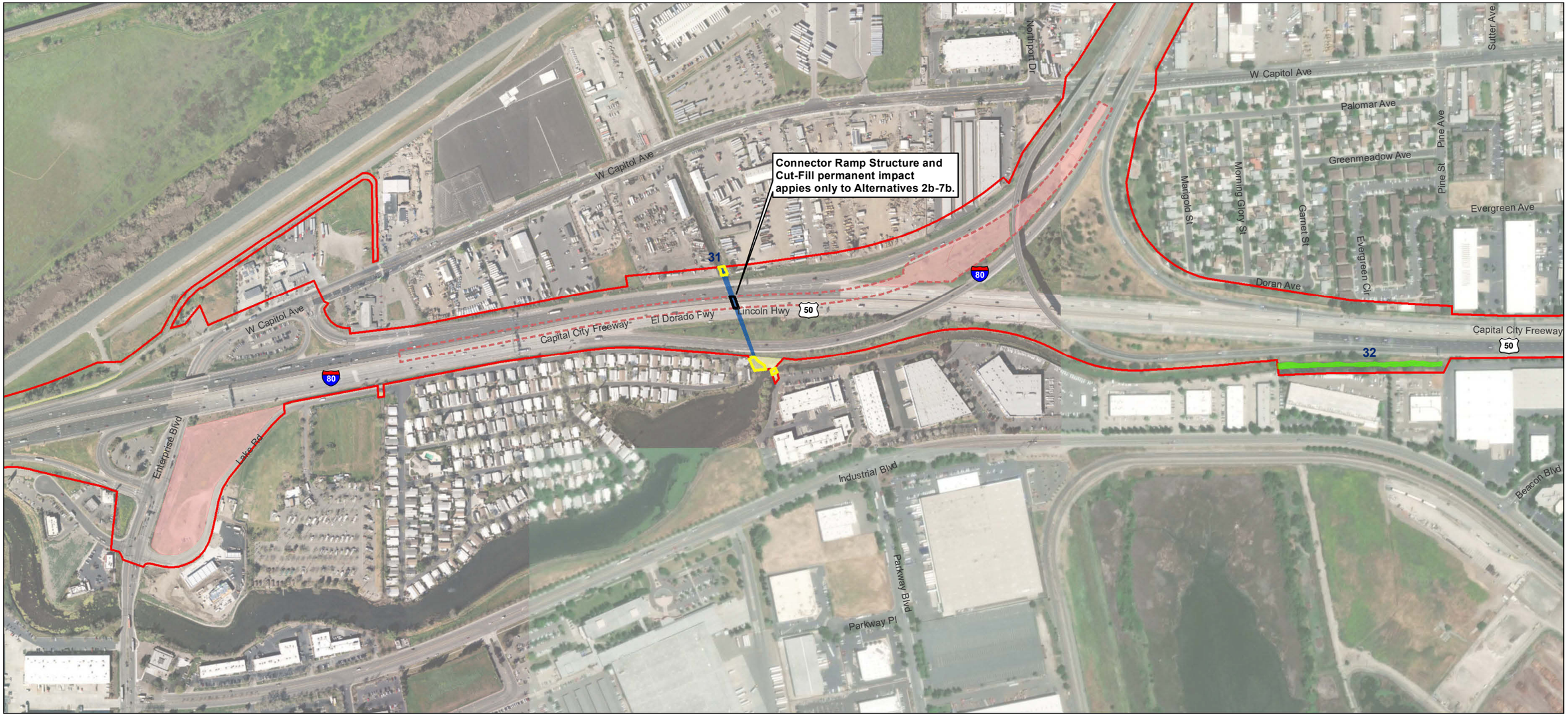
Yolo 80 Corridor Improvement Project

EA 03-3H900

Solano, Yolo, and Sacramento Counties, California

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Environmental Study Limit (1,147.22 acres)

Connector Ramp and Associated Cut-Fill (Alternatives 2b-7b)

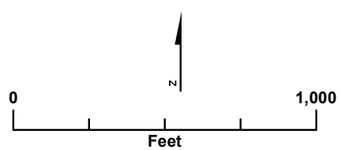
Aquatic Resources
- Canal
- Drainage
- Canal
- Vegetated Ditch

Project Impacts
- Permanent Impact
- Temporary Impact

Impacted Aquatic Resources
- Permanent
- Temporary

Impacted Linear Aquatic Resources
- Temporary

Feature ID	Feature Type	Impact (acres)		Impact (linear feet)	
		Permanent	Temporary	Permanent	Temporary
Wetlands					
07	Woody Riparian Wetland	--	0.002	--	--
Other Waters					
04	Canal	--	<0.001	--	3.03
06	Perennial Drainage	--	0.005	--	12.67
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33	Ephemeral Drainage	0.022	--	315.57	--
46	Pond	--	0.084	--	--



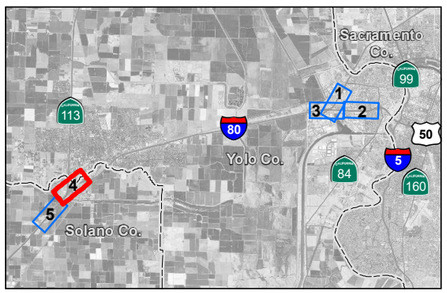
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Figure 2.3-2
Potential Impacts on Aquatic Resources
Yolo 80 Corridor Improvement Project
EA 03-3H900
Solano, Yolo, and Sacramento Counties, California

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Environmental Study Limit (1,147.22 acres)

Connector Ramp and Associated Cut-Fill (Alternatives 2b-7b)

Aquatic Resources

- Canal
- Drainage
- Perennial Drainage
- Woody Riparian Wetland
- Seasonal Wetland

Project Impacts

- Permanent Impact
- Temporary Impact

Impacted Aquatic Resources

- Permanent
- Temporary

Impacted Linear Aquatic Resources

- Temporary

Feature ID	Feature Type	Impact (acres)		Impact (linear feet)	
		Permanent	Temporary	Permanent	Temporary
Wetlands					
07	Woody Riparian Wetland	--	0.002	--	--
Other Waters					
04	Canal	--	<0.001	--	3.03
06	Perennial Drainage	--	0.005	--	12.67
31	Canal	--	0.028	--	42.59
33	Ephemeral Drainage	0.022	--	315.57	--
46	Pond	--	0.084	--	--

N

0 1,000

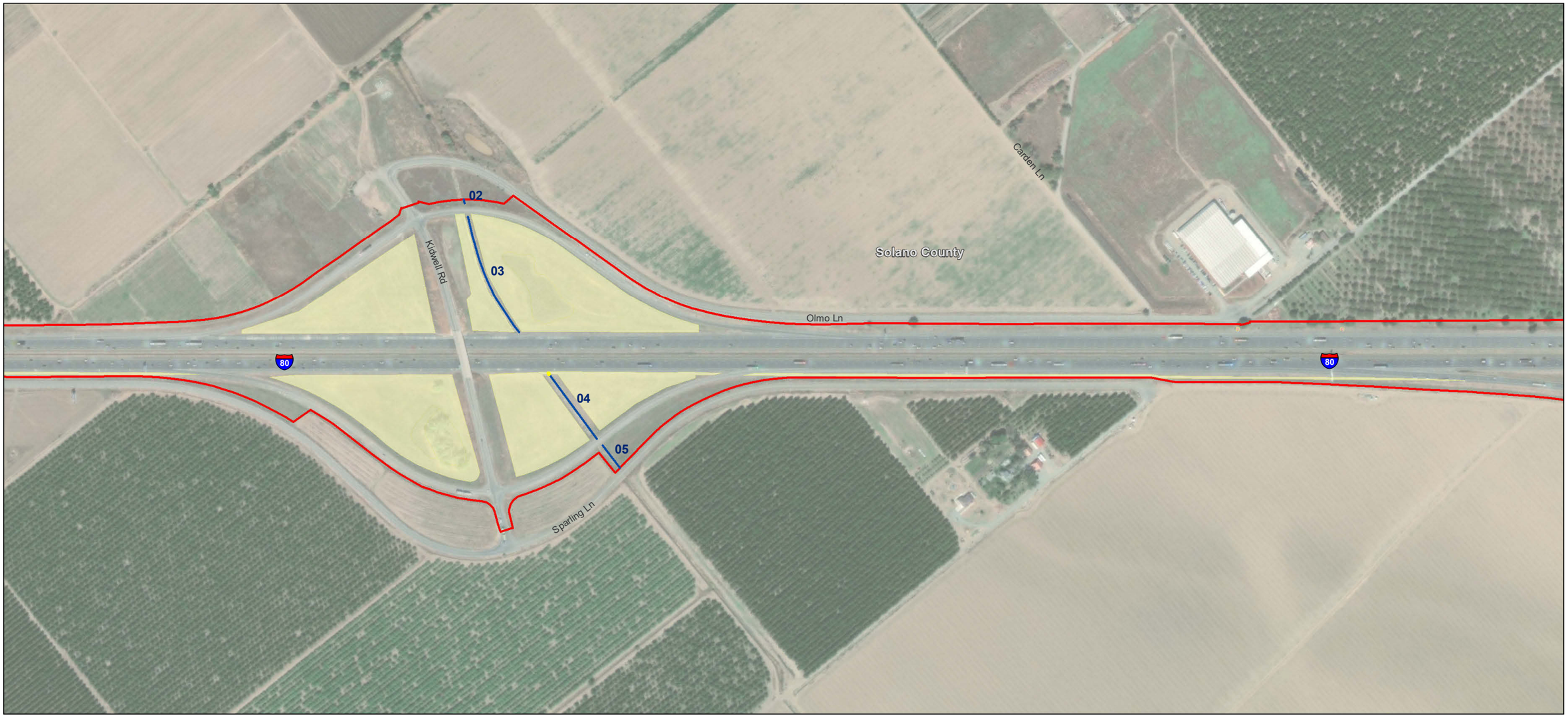
Feet

Caltrans

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Potential Impacts on Aquatic Resources
Yolo 80 Corridor Improvement Project
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Solano, Yolo, and Sacramento Counties, California

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Environmental Study Limit (1,147.22 acres)

Connector Ramp and Associated Cut-Fill (Alternatives 2b-7b)

Aquatic Resources

Canal

Drainage

Project Impacts

Permanent Impact

Temporary Impact

Impacted Aquatic Resources

Permanent

Temporary

Impacted Linear Aquatic Resources

Temporary

Feature ID	Feature Type	Impact (acres)		Impact (linear feet)	
		Permanent	Temporary	Permanent	Temporary
Wetlands					
07	Woody Riparian Wetland	--	0.002	--	--
Other Waters					
04	Canal	--	<0.001	--	3.03
06	Perennial Drainage	--	0.005	--	12.67
31	Canal	--	0.028	--	42.59
33	Ephemeral Drainage	0.022	--	315.57	--
46	Pond	--	0.084	--	--

N

0 1,000

Feet

Caltrans

Notes

1. Coordinate System: NAD 1983 StatePlane California II FIPS 0402 Feet

2. Data Sources: CalTrans, Stantec, 2021

3. Background: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

Figure 2.3-2
Potential Impacts on Aquatic Resources

Yolo 80 Corridor Improvement Project

EA 03-3H900

Solano, Yolo, and Sacramento Counties, California

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A total of three fresh emergent marsh wetlands were mapped within the Yolo Bypass portion of the BSA. Vegetation was dominated by obligate perennial species such as water primrose, broad-leaved cattail, and tule (*Schoenoplectus acutus* var. *occidentalis*).

Eleven woody riparian wetlands were mapped intermittently throughout the BSA, particularly in the Yolo Bypass and along the Sacramento River. Woody riparian wetlands exhibit signs of frequent ponding and/or flooding for long duration or very long duration during the growing season and were dominated by woody deciduous shrubs and trees, including dominant species such as Fremont cottonwood, black willow (*Salix goddingii*), and narrow-leaved willow (*Salix exigua*).

Six seasonal wetlands were mapped in the western portion of the BSA, starting in the Yolo Bypass area and intermittently occurring west toward Dixon. The seasonal wetland exhibited positive field indicators of long duration saturation during the growing season and hydrophytic vegetation characteristic of this wetland type. Dominant species observed in seasonal wetlands include umbrella sedge (*Cyperus eragrostis*), dallis grass (*Paspalum dilatatum*), and perennial ryegrass.

Six vegetated ditches were mapped throughout the BSA. Vegetated ditches generally consist of constructed drainage ditches that exhibit positive indicators for all three wetland parameters. Dominant species observed in the vegetated ditches include broad-leaved cattail, tule, and saltgrass.

Two ephemeral drainages and three intermittent drainages were mapped in the BSA. The two ephemeral drainages are both located in the urban sections adjacent to the Sacramento River. Both drainages are subject to flow from rainfall, are seasonally inundated, and are connected through storm drains to the Sacramento River. The three intermittent drainages and drainage segments were mapped in the BSA in the more urban sections of West Sacramento. All three of the drainage/drainage segments are hydrologically connected to the Yolo Bypass Toe Drain, either directly or indirectly, with a culverted connection.

Perennial drainages in the BSA occur as part of the Sacramento River, which intersects the BSA in two locations, at Prospect Slough as part of the Yolo Bypass and one segment of South Putah Creek. The Sacramento River originates outside the BSA and is fed by the intermittent and ephemeral drainages mapped within the BSA before draining into the Sacramento-San Joaquin Delta. South Putah Creek originates at Lake Berryessa outside the BSA, and it flows east until it drains into the Yolo Bypass and, subsequently, the Sacramento River.

Eight segments of canal were mapped within the BSA. Canal segments are man-made drainages that generally have steep sides and move water away from West Sacramento toward croplands for irrigation.

Three ponds with open water were mapped within the BSA. Two ponds are on the north side of the Yolo Bypass and connect via culvert to a vegetated ditch within the Yolo Bypass. The third is connected to a canal on the south side of I-80. These perennial ponds are open water features that are part of the tributary system connected to the Yolo Bypass.

2.3.2.3 Environmental Consequences

No Build Alternative 1

Construction and Operation

No Build Alternative 1 would make no physical or operational improvements within the BSA. Therefore, No Build Alternative 1 would not affect aquatic resources subject to agency jurisdiction (i.e., waters of the U.S. and waters of the state).

Build Alternatives 2a and 2b

Construction and Operation

Build Alternatives 2a and 2b include roadway improvements such as replacing culverts and installing a fiber optic line and vaults. Indirect impacts on aquatic resources could include the reduction in quality and/or function of the aquatic resources as a result of an incidental release of sediments or chemicals into surface waters, or the introduction or spread of non-native species into water features. Build Alternative 2b also includes construction of the connector structure which would result in permanent impacts on Canal 31. Permanent and temporary direct impacts associated with the proposed improvements on aquatic resources are summarized in Table 2.3-5.

Table 2.3-5. Approximate Impacts on Aquatic Resources – Build Alternatives 2a and 2b

Impacts/ Aquatic Resources	Feature ID	Water Feature	Acres		Linear Feet	
			Alt 2a-7a	Alt 2b-7b	Alt 2a-7a	Alt 2b-7b
Permanent Impacts on Other Waters	31	Canal		0.033		62.41
	33	Ephemeral Drainage	0.022	0.022	315.57	315.57
Total Permanent Impacts	**—**	**—**	**0.022**	**0.055**	**315.57**	**377.98**
Temporary Impacts on Wetlands	07	Woody Riparian Wetland	0.002	0.002	n/a	n/a
Temporary Impacts on Other Waters	06	Perennial Drainage	0.005	0.005	12.67	12.67
	04	Canal	<0.001	<0.001	3.03	3.03
	31	Canal	0.028	0.028	42.59	42.59
	46	Pond	0.084	0.084	n/a	n/a
Total Temporary Impacts	**—**	**—**	**0.12**	**0.12**	**58.296**	**58.29**

Standard Measures BIO-1, BIO-3 and BIO-4 (see Appendix E) would minimize the potential for indirect impacts on sensitive aquatic resources as a result of construction activities associated with the project. Further, with incorporation of AMMs BIO-1, BIO-2, and BIO-3, impacts on aquatic resources would be minimized; and the project would not result in substantial adverse effects to aquatic resources.

Build Alternatives 3a and 3b

Construction and Operation

Build Alternatives 3a and 3b would involve adding an HOT2+ lane in each direction. Build Alternatives 3a and 3a propose similar project components within the same project area as Build Alternatives 2a and 2b, respectively; therefore, the effects would be the same as effects described under Build Alternatives 2a and 2b.

Build Alternatives 4a and 4b

Construction and Operation

Build Alternatives 4a and 4b would involve adding an HOT3+ lane in each direction. Build Alternatives 4a and 4b propose similar project components within the same project area as Build Alternatives 2a and 2b, respectively; therefore, the effects would be the same as effects described under Build Alternatives 2a and 2b.

Build Alternatives 5a and 5b

Construction and Operation

Build Alternatives 4a and 4b would involve adding an HOT3+ lane in each direction. Build Alternatives 4a and 4b propose similar project components within the same project area as Build Alternatives 2a and 2b, respectively; therefore, the effects would be the same as effects described under Build Alternatives 2a and 2b.

Build Alternatives 6a and 6b

Construction and Operation

Build Alternatives 6a and 6b would involve adding a transit-only lane in each direction. Build Alternatives 6a and 6b propose similar project components within the same project area as Build Alternatives 2a and 2b; therefore, the effects would be the same as effects described under Build Alternatives 2a and 2b.

Build Alternatives 7a and 7b

Construction and Operation

Build Alternatives 7a and 7b would involve repurposing the current number 1 general purpose lane to HOV 2+. No new lanes would be constructed. Build Alternatives 7a and 7b propose similar project components within the same project area as Build Alternatives 2a and 2b; therefore, the effects would be the same as effects described under Build Alternatives 2a and 2b.

2.3.2.4 Avoidance, Minimization, and/or Mitigation Measures

Caltrans would implement the following AMMs to reduce impacts on wetlands and other waters.

- **AMM BIO-1: USACE and RWQCB Permitting.** Before any discharge of dredge or fill material into waters of the United States or waters of the state, the required permits/authorizations will be obtained from USACE and RWQCB. All terms and conditions of the required permits/authorizations will be implemented.

- **AMM BIO-2: CDFW Permitting.** Before beginning any activities that would obstruct the flow of, or alter the bed, channel, or bank of any feature subject to Fish and Game Code Section 1600, notification of streambed alteration will be submitted to CDFW. If required, a Streambed Alteration Agreement will be obtained from CDFW, and all conditions of the agreement will be implemented.

- **AMM BIO-3: Restoration of Aquatic Resources.** Aquatic resources subject to agency jurisdiction that are temporarily affected by project construction will be restored as close as practicable to their original contour and conditions within 10 days of the completion of construction activities.

2.3.2.5 Wetlands Only Practicable Alternative Finding

The proposed project would temporarily impact wetlands (see Table 2.3-5, above). No permanent effects on wetlands would occur. Executive Order 11990 requires federal agencies, and/or Caltrans, as assigned, to determine and make findings indicating that there is no practicable alternative to construction in wetlands and that the proposed project includes all practicable measures to minimize harm.

Meeting the need and purpose for the proposed project requires modification of infrastructure in close proximity to wetlands. The No-Build Alternative would not affect wetlands but does not meet the need and purpose of the proposed project because it does not address the need to correct operational inefficiencies and recurring congestion. It is, therefore, not a practicable alternative to avoid wetland impacts. Each of the proposed Build Alternatives would have a similar temporary effect on wetlands (0.002 acre temporarily affected).

Practicable measures to minimize harm to wetlands are built into the project design as well as identified above in Section 2.3.2.4. Through review and coordination with resource agencies, the design of the Build Alternatives uses the least footprint possible. The project includes AMM BIO-3, *Restoration of Aquatic Resources*, which requires that all aquatic resources subject to agency jurisdiction (such as wetlands) that are temporarily affected be restored as close as practicable to their original contour and conditions.

Based on the above considerations, it is determined that there is no practicable alternative to the proposed construction in wetlands and that the proposed action includes all practicable measures to minimize harm to wetlands that may result from such use.

2.3.3 Plant Species

2.3.3.1 Regulatory Setting

The U.S. Fish and Wildlife Service (USFWS) and California Department of Fish and Wildlife (CDFW) have regulatory responsibility for the protection of special-status plant species. "Special-status" species are selected for protection because they are rare and/or subject to population and habitat declines. Special-status is a general term for species that are provided varying levels of regulatory protection.

The highest level of protection is given to threatened and endangered species; these are species that are formally listed or proposed for listing as endangered or threatened under the Federal Endangered Species Act (FESA) and/or the California Endangered Species Act (CESA). Please see the Threatened and Endangered Species section 2.3.5 in this document for detailed information about these species.

This section of the document discusses all other special-status plant species, including CDFW species of special concern, USFWS candidate species, and California Native Plant Society (CNPS) rare and endangered plants.

The regulatory requirements for FESA can be found at 16 United States Code (USC) Section 1531, et seq. See also 50 Code of Federal Regulations (CFR) Part 402. The regulatory requirements for CESA can be found at California Fish and Game Code, Section 2050, et seq. Department projects are also subject to the Native Plant Protection Act, found at California Fish and Game Code, Section 1900-1913, and the California Environmental Quality Act (CEQA), found at California Public Resources Code, Sections 21000-21177.

2.3.3.2 Affected Environment

This section addresses the special-status plant species that are documented to have occurred or have the potential to occur in the BSA, based on literature and database searches, and botanical surveys.

A species was determined to have the potential to occur within the BSA if it met at least one of the following criteria:

- Historically occurred within or adjacent to the BSA, as documented in the CDFW Biogeographic Information and Observation System or CNDDB (CDFW 2021b)
- Has a known or expected geographic range within the vicinity of the project area
- Has known or expected habitat present within or near the BSA

Rare Plant Surveys

A protocol-level focused botanical survey and vegetation characterization (see Section 2.3.1 above) was conducted on May 10–14 and 18–20, 2021, and July 14, 2022. The focused

botanical survey was conducted to determine viability and potential presence during blooming period for special-status plants with a potential to occur within the BSA. Surveys were performed within the appropriate bloom periods, but no special-status plants were observed during the focused botanical surveys.

Suitable habitat is present within the BSA for 25 special-status plants. However, these species are presumed to be absent in the BSA because they were not observed during the focused botanical surveys (Table 2.3-6).

Table 2.3-6. Special-Status Plants Potentially Occurring or Known to Occur in the Biological Study Area

Common Name	*Scientific Name*	Status[1] (Fed/State/ CRPR)	General Habitat Description	Potential to Occur within the Biological Study Area[2]
depauperate milk-vetch	*Astragalus pauperculus*	—/—/4.3	Found in chaparral, cismontane woodland, and valley and foothill grassland with vernally mesic, volcanic soil. Blooms: March–June Elevation: 200 to 4,000 feet	None. The BSA is not within elevational range of the species. Vernally mesic, volcanic soils are not present within the BSA. No CNDDB occurrences within 5 miles of the BSA. This species was not observed during the May 2021 botanical surveys and is presumed to be absent from the BSA.
Ferris' milk-vetch	*Astragalus tener* var. *ferrisiae*	—/—/1B.1	Found in valley and foothill grassland (subalkaline flats) and meadows and seeps (vernally mesic). Blooms: April–May Elevation: 5 to 245 feet	None. No suitable subalkaline flats within valley and foothill grassland or meadows and seeps are present within the BSA. The most recent CNDDB occurrence is from 1954 at an unknown location along the Yolo Bypass. This species was not observed during the May 2021 botanical surveys and is presumed to be absent from the BSA.
alkali milk-vetch	*Astragalus tener* var. *tener*	—/—/1B.2	Found in playas, valley and foothill grassland (adobe clay), and vernal pools. Blooms: March–June Elevation: 5 to 200 feet	None. No suitable abode clay or vernal pools are present within the BSA to support the species. No CNDDB occurrences within 5 miles of the BSA. This species was not observed during the May 2021 botanical surveys and is presumed to be absent from the BSA.
heartscale	*Atriplex cordulata* var. *cordulata*	—/—/1B.2	Found in chenopod scrub, meadows and seeps, playas, and valley and foothill grasslands. Alkaline and clay soils. Blooms: April–October Elevation: 1–1,050 feet	Low. Marginal habitat is present within the grasslands, which have limited distribution in the BSA and are dominated by non-native and invasive species. The most recent CNDDB occurrence is from 1952 approximately 1.5 miles northwest of the BSA and is presumed extirpated. However, this species was not observed during the early or late season botanical surveys and is presumed to be absent from the BSA.
brittlescale	*Atriplex depressa*	—/—/1B.2	Found in chenopod scrub, meadows and seeps, playas, and valley and foothill grasslands. Alkaline and clay soils. Blooms: April–October Elevation: 1–1,050 feet	Low. Marginal habitat is present within the grasslands, which have limited distribution in the BSA and are dominated by non-native and invasive species. The most recent CNDDB occurrence is from 1996 approximately 2 miles northwest of the BSA in highly disturbed (plowed) alkali-sink habitat. However, this species was not observed during the early or late season botanical surveys and is presumed to be absent from the BSA.
vernal pool smallscale	*Atriplex persistens*	—/—/1B.2	Found in vernal pools (alkaline). Blooms: June, August–October Elevation: 30-375 feet	None. No suitable vernal pool habitat is present within the BSA. No CNDDB occurrences within 5 miles of the BSA. This species was not observed during the early or late season botanical surveys and is presumed to be absent from the BSA.

Common Name	*Scientific Name*	Status[1] (Fed/State/ CRPR)	General Habitat Description	Potential to Occur within the Biological Study Area[2]
valley brodiaea	*Brodiaea rosea* ssp. *vallicola*	—/—/4.2	Found in swales within valley and foothill grassland and vernal pools on old alluvial terraces with silty, sandy, and gravelly loam. Blooms: April–May (June) Elevation: 30-1,100 feet	None. No suitable alluvial terraces are present within the BSA to support the species. No CNDDB occurrences within 5 miles of the BSA. This species was not observed during May 2021 botanical surveys and is presumed to be absent from the BSA.
bristly sedge	*Carex comosa*	—/—/2B.1	Found in coastal prairie, marshes and swamps (lake margins), and vernal pools. Blooms: May–September Elevation: 0 to 2,050 feet	None. Marginal habitat is present in the fresh emergent marsh wetlands. However, the wetlands within the BSA have altered hydrological regimes. No CNDDB occurrences within 5 miles of the BSA. This species was not observed during the early or late season botanical surveys and is presumed to be absent from the BSA.
pappose tarplant	*Centromadia parryi* ssp. *parryi*	—/—/1B.2	Found in coastal prairie, marshes and swamps (coastal salt), meadows and seeps, chaparral, and valley and foothill grassland (vernally mesic). Blooms: May–November Elevation: 0 to 1,375 feet	Low. Marginal habitat is present in the fresh emergent marsh wetlands within the BSA in the Yolo Bypass area. However, the wetlands within the BSA have altered hydrological regimes. There is also suitable grassland habitat within the BSA. One CNDDB occurrence from 2015 along I-80 and the east side of the Yolo Bypass. However, this species was not observed during the early or late season botanical surveys and is presumed to be absent from the BSA.
Parry's rough tarplant	*Centromadia parryi* ssp. *rudis*	—/—/4.2	Found in valley and foothill grassland and vernal pools in areas that are alkaline, vernally mesic, in seeps, and sometimes roadsides. Blooms: May–October Elevation: 0 to 330 feet	Low. Suitable habitat is present within the BSA along roadsides and habitats. No CNDDB occurrences within 5 miles of the BSA. However, this species was not observed during the early or late season botanical surveys and is presumed to be absent from the BSA.
Bolander's water-hemlock	*Cicuta aculate* var. *bolanderi*	—/—/2B.1	Found in marshes and swamps with coastal, fresh, or brackish water. Blooms: July–September Elevation: 0 to 650 feet	None. Marginal habitat is present in the fresh emergent marsh wetlands. However, the wetlands within the BSA have altered hydrological regimes. No CNDDB occurrences within 5 miles of the BSA. However, this species was not observed during the early or late season botanical surveys and is presumed to be absent from the BSA.
recurved larkspur	*Delphinium recurvatum*	—/—/1B.2	Found in chenopod scrub, valley and foothill grassland, and cismontane woodland. Alkaline soils. Blooms: March–June Elevation:10–2,600 feet	None. No alkaline grasslands are present in the BSA. No CNDDB occurrences within 5 miles of the BSA. This species was not observed during the May 2021 botanical surveys and is presumed to be absent from the BSA.

Common Name	*Scientific Name*	Status[1] (Fed/State/ CRPR)	General Habitat Description	Potential to Occur within the Biological Study Area[2]
dwarf downingia	*Downingia pusilla*	—/—/2B.2	Found in valley and foothill grassland (mesic) and vernal pools. Blooms: March–May Elevation: 3 to 1,460 feet	Low. Marginal habitat is present within the grasslands, which have limited distribution in the BSA and are dominated by non-native and invasive species. No CNDDB occurrences within 5 miles of the BSA. This species was not observed during the early or late season botanical surveys and is presumed to be absent from the BSA.
Jepson's coyote-thistle	*Eryngium jepsonii*	—/—/1B.2	Found in valley and foothill grassland and vernal pools. Blooms: April–August Elevation: 10 to 985 feet	Low. Marginal habitat is present within the grasslands, which have limited distribution in the BSA and are dominated by non-native and invasive species; no vernal pools are present. No CNDDB occurrences within 5 miles of the BSA. This species was not observed during the early or late botanical surveys and is presumed to be absent from the BSA.
San Joaquin spearscale	*Extriplex joaquinana*	—/—/1B.2	Found in chenopod scrub, meadows and seeps, valley and foothill grassland, and playas. Alkaline soils. Blooms: April–October Elevation:2–2,740 feet	None. No grasslands with alkaline soils are present in the BSA. The most recent CNDDB occurrence is from 2001 approximately 4 miles southwest of the BSA. However, this species was not observed during the May 2021 botanical surveys and is presumed to be absent from the BSA.
stinkbells	*Fritillaria agrestis*	—/—/4.2	Found in chaparral, cismontane woodland, pinyon and juniper woodland, and valley and foothill grassland. Clay and sometimes serpentine soils. Blooms: March–June Elevation:30–5,100 feet	Low. Marginal habitat is present within the grasslands, which have limited distribution in the BSA and are dominated by non-native and invasive species. No CNDDB occurrences within 5 miles of the BSA. This species was not observed during the early or late season botanical surveys and is presumed to be absent from the BSA.
fragrant fritillary	*Fritillaria liliacea*	—/—/1B.2	Found in cismontane woodland, coastal prairie, coastal scrub, and valley and foothill grassland. Often serpentine soils. Blooms: February–April Elevation:10–1,350 feet	Low. Marginal habitat is present in the grasslands, which have limited distribution in the BSA and are dominated by non-native and invasive species. No CNDDB occurrences within 5 miles of the BSA. This species was not observed during the early or late season botanical surveys and is presumed to be absent from the BSA.
adobe-lily	*Fritillaria pluriflora*	—/—/1B.2	Found in cismontane woodland, chaparral, and valley and foothill grassland. Often adobe soils. Blooms: February–April Elevation:195–2,310 feet	Low. Marginal habitat is present within the grasslands, which have limited distribution in the BSA and are dominated by non-native and invasive species. However, this species was not observed during the early or late season botanical surveys and is presumed to be absent from the BSA.

Common Name	*Scientific Name*	Status[1] (Fed/State/ CRPR)	General Habitat Description	Potential to Occur within the Biological Study Area[2]
hogwallow starfish	*Hesperevax caulescens*	—/—/4.2	Found in valley and foothill grassland (mesic clay) and shallow vernal pools. Blooms: March–June Elevation: 0 to 1,650 feet	Low. Marginal habitat is present within the grasslands, which have limited distribution in the BSA and are dominated by non-native and invasive species. No CNDDB occurrences within 5 miles of the BSA. This species was not observed during the early or late season botanical surveys and is presumed to be absent from the BSA.
wooly rose-mallow	*Hibiscus lasiocarpos* var. *occidentalis*	—/—/1B.2	Found in marshes and swamps (freshwater). Often in riprap on sides of levees. Blooms: June–September Elevation:0–390 feet	Low. Marginal habitat is present in the fresh emergent marsh wetlands. However, the wetlands within the BSA have altered hydrological regimes. One CNDDB occurrence from 1994 was identified within the BSA in Natomas near the eastbound El Camino Avenue/I-80 on-ramp. However, this species was not observed during the early or late season botanical surveys and is presumed to be absent from the BSA.
Carquinez goldenbush	*Isocoma arguta*	—/—/1B.1	Found in valley and foothill grassland (alkaline). Blooms: August–December Elevation: 3 to 65 feet	None. No alkaline grasslands are present within the BSA. No CNDDB occurrences within 5 miles of the BSA. This species was not observed during the early or late season botanical surveys and is presumed to be absent from the BSA.
alkali-sink goldfields	*Lasthenia chrysantha*	—/—/1B.1	Found in vernal pools and wet saline flats. Blooms: February–April Elevation:0–325 feet	None. No suitable vernal pool habitat is present within the BSA. No CNDDB occurrences within 5 miles of the BSA. This species was not observed during the early or late season botanical surveys and is presumed to be absent from the BSA.
Coulter's goldfields	*Lasthenia glabrata* ssp. *coulteri*	—/—/1B.1	Found in marshes and swamps (coastal salt), playas, and vernal pools. Blooms: February–June Elevation:0–4,000 feet	None. No suitable coastal salt marsh or swamp, playas, or vernal pool habitat is present within the BSA to support the species. No CNDDB occurrences within 5 miles of the BSA. This species was not observed during the May 2021 botanical surveys and is presumed to be absent from the BSA.
Delta tule pea	*Lathyrus jepsonii* var. *jepsonii*	—/—/1B.2	Found in marshes and swamps (freshwater and brackish). Blooms: May–July (August-September) Elevation:0–16 feet	None. Marginal habitat is present in the fresh emergent marsh wetlands. However, the wetlands within the BSA have altered hydrological regimes. No CNDDB occurrences within 5 miles of the BSA. This species was not observed during the early or late season botanical surveys and is presumed to be absent from the BSA.
legenere	*Legenere limosa*	—/—/1B.1	Found in vernal pools. Blooms: April–June Elevation: 3-2,900 feet	None. No suitable vernal pool habitat is present within the BSA. No CNDDB occurrences within 5 miles of the BSA. This species was not observed during the May 2021 botanical surveys and is presumed to be absent from the BSA.

Common Name	*Scientific Name*	Status[1] (Fed/State/ CRPR)	General Habitat Description	Potential to Occur within the Biological Study Area[2]
Heckard's pepper-grass	*Lepidium latipes* var. *heckardii*	—/—/1B.2	Found in valley and foothill grassland (alkaline flats). Blooms: March–May Elevation: 5 to 670 feet	None. No alkaline flats are present within the BSA. The most recent CNDDB occurrence is from 1957 approximately 3 miles northeast of Davis. This species was not observed during the May 2021 botanical surveys and is presumed to be absent from the BSA.
woolly-headed lessingia	*Lessingia hololeuca*	—/—/3	Found in broad-leaved upland forest, coastal scrub, lower montane coniferous forest, and valley and foothill grassland. Clay, serpentine soil. Blooms: June–October Elevation: 50 to 1,000 feet	None. Habitat with suitable clay, serpentine soil is not present within the BSA to support the species. No CNDDB occurrences within 5 miles of the BSA. This species was not observed during the early or late season botanical surveys and is presumed to be absent from the BSA.
Mason's lilaeopsis	*Lilaeopsis masonii*	—/—/1B.1	Found in marshes and swamps (freshwater or brackish) and riparian scrub. Blooms: April–November Elevation:0–33 feet	None. Marginal habitat is present in the fresh emergent marsh wetlands and willow thickets within the BSA. However, the wetlands within the BSA have altered hydrological regimes. No CNDDB occurrences within 5 miles of the BSA. This species was not observed during the early or late season botanical surveys and is presumed to be absent from the BSA.
Delta mudwort	*Limosella australis*	—/—/2B.1	Found in marshes and swamps (freshwater or brackish) and riparian scrub. Usually mud banks Blooms: May–August Elevation:0–10 feet	None. Marginal habitat is present in the fresh emergent marsh wetlands and willow thickets within the BSA. However, the wetlands within the BSA have altered hydrological regimes No CNDDB occurrences within 5 miles of the BSA. This species was not observed during the early or late season botanical surveys and is presumed to be absent from the BSA.
Heller's bush-mallow	*Malacothamnus helleri*	—/—/3.3	Found in chaparral on sandstone and riparian woodland on gravel. Blooms: May–July Elevation:1,000–2,080 feet	None. The BSA is not within elevational range of this species. No CNDDB occurrences within 5 miles of the BSA.
little mousetail	*Myosurus minimus* ssp. *apus*	—/—/3.1	Found in valley and foothill grassland and vernal pools (alkaline). Blooms: March–June Elevation: 65 to 2,100 feet	Low. Marginal habitat is present within the grasslands, which have limited distribution in the BSA and are dominated by non-native and invasive species. No CNDDB occurrences within 5 miles of the BSA. This species was not observed during the early or late season botanical surveys and is presumed to be absent from the BSA.

Common Name	*Scientific Name*	Status[1] (Fed/State/ CRPR)	General Habitat Description	Potential to Occur within the Biological Study Area[2]
Baker's navarretia	*Navarretia leucocephala* ssp*. bakeri*	—/—/1B.1	Found in cismontane woodland, lower montane coniferous forest, meadows and seeps, valley and foothill grassland and vernal pools. Mesic. Blooms: April–July Elevation:15–5,700 feet	Low. Marginal habitat is present within the grasslands and woodlands, which have limited distribution in the BSA and are dominated by non-native and invasive species. No CNDDB occurrences within 5 miles of the BSA. This species was not observed during the early or late season botanical surveys and is presumed to be absent from the BSA.
bearded popcorn flower	*Plagiobothrys hystriculus*	—/—/1B.1	Found in valley and foothill grassland (mesic) and vernal pool margins. Blooms: April–May Elevation: 0 to 900 feet	Low. Marginal habitat is present within the grasslands, which have limited distribution in the BSA and are dominated by non-native and invasive species. No CNDDB occurrences within 5 miles of the BSA. This species was not observed during the May 2021 botanical surveys and is presumed to be absent from the BSA.
California alkali grass	*Puccinellia simplex*	—/—/1B.2	Found in chenopod scrub, meadows and seeps, valley and foothill grassland, and vernal pools. Alkaline, vernally mesic; sinks, flats, and lake margins. Blooms: March–May Elevation: 5–3,050 feet	Low. Marginal habitat is present within the grasslands, which have limited distribution in the BSA and are dominated by non-native and invasive species. The most recent CNDDB occurrence is from 1962 at an unknow location north of Davis and is presumed extirpated. This species was not observed during the May 2021 botanical surveys and is presumed to be absent from the BSA.
Sanford's arrowhead	*Sagittaria sanfordii*	—/—/1B.2	Found in marshes and swamps (assorted shallow freshwater). Blooms: May–October (November) Elevation:0–2,130 feet	Low. Marginal habitat is present in the fresh emergent marsh wetlands within the BSA. However, the wetlands within the BSA have altered hydrological regimes. The most recent CNDDB occurrence is from 1993 approximately 3 miles northeast of the BSA along the American River bike trail. However, this species was not observed during the early or late season botanical surveys and is presumed to be absent from the BSA.
Suisun Marsh aster	*Symphyotrichum lentum*	—/—/1B.2	Found in marshes and swamps (brackish and freshwater). Blooms: (April) May–November Elevation:0–10 feet	None. Marginal habitat is present in the fresh emergent marsh wetlands within the BSA in the Yolo Bypass area. However, the wetlands within the BSA have altered hydrological regimes. A single CNDDB occurrence from 2013 was identified within the Yolo Bypass less than 1 mile south of the BSA. However, this species was not observed during the early or late season botanical surveys.

Common Name	*Scientific Name*	Status[1] (Fed/State/ CRPR)	General Habitat Description	Potential to Occur within the Biological Study Area[2]
saline clover	*Trifolium hydrophilum*	—/—/1B.2	Found in marshes and swamps, valley and foothill grassland (mesic, alkaline), and vernal pools. Blooms: April–June Elevation: 0 to 985 feet	None. Suitable habitat with alkaline soil is not present within the BSA to support the species. No CNDDB occurrences within 5 miles of the BSA. This species was not observed during the May 2021 botanical surveys and is presumed to be absent from the BSA.

[1] CRPR Codes and Extensions:
1A Plants presumed extirpated in California and either rare or extinct elsewhere.
1B Plants rare, threatened, or endangered in California and elsewhere.
2A Plants presumed extirpated in California, but more common elsewhere.
2B Plants rare, threatened, or endangered in California, but more common elsewhere.
3 Review list: Plants about which more information is needed
4 Watch List: Plants of limited distribution
xx.3 Not very endangered in California
xx.2 Fairly endangered in California
xx.1 Seriously endangered in California

[2] Assessment Codes:
Present: The species is known to be present or has been recently observed in the BSA. **High**: The species has been observed and documented within 5 miles of the BSA within the last 5 years and habitat for the species is present in the BSA. **Moderate**: The BSA is located within the range of the species, there are documented occurrences within 5 miles of the BSA, and potential habitat for the species exists in the BSA. **Low**: The BSA is located within the range of the species, but no past documented occurrences have been recorded within 5 miles and only low quality (e.g., small fragmented patches or habitats under the influence of frequent anthropogenic disturbances) are present in the BSA. **None**: Focused surveys determined the species is absent from the BSA, the species is acknowledged to be extirpated locally or the BSA is located outside of the species range, or potential habitat to support the species is not present in the BSA.
Key: Fed – Federal, CRPR – California Rare Plant Rank, BSA – Biological Study Area, CNDDB – California Natural Diversity Database,

2.3.3.3 Environmental Consequences

No Build Alternative 1

Construction and Operation

No Build Alternative 1 would make no physical or operational improvements within the BSA. Therefore, No Build Alternative 1 would not affect special-status plant species.

Build Alternatives 2a and 2b

Construction and Operation

Protocol-level botanical surveys were performed during the blooming period of special-status plants that had potential habitat within the BSA. No special-status plants occur within the BSA; therefore, no adverse effects would occur. However, Standard Measure BIO-4 (see Appendix E) has been incorporated in the project to further reduce the potential for effects to special-status plants outside the BSA to occur as a result of the project, including the spread or introduction of non-native plants within the BSA.

Build Alternatives 3a and 3b

Construction and Operation

Build Alternatives 3a and 3b would involve adding an HOT2+ lane in each direction. Build Alternatives 3a and 3a propose similar project components within the same project area as Build Alternatives 2a and 2b, respectively; therefore, the effects would be the same as effects described under Build Alternatives 2a and 2b.

Build Alternatives 4a and 4b

Construction and Operation

Build Alternatives 4a and 4b would involve adding an HOT3+ lane in each direction. Build Alternatives 4a and 4b propose similar project components within the same project area as Build Alternatives 2a and 2b, respectively; therefore, the effects would be the same as effects described under Build Alternatives 2a and 2b.

Build Alternatives 5a and 5b

Construction and Operation

Build Alternatives 4a and 4b would involve adding an HOT3+ lane in each direction. Build Alternatives 4a and 4b propose similar project components within the same project area as Build Alternatives 2a and 2b, respectively; therefore, the effects would be the same as effects described under Build Alternatives 2a and 2b.

Build Alternatives 6a and 6b

Construction and Operation

Build Alternatives 6a and 6b would involve adding a transit-only lane in each direction. Build Alternatives 6a and 6b propose similar project components within the same project area as Build Alternatives 2a and 2b; therefore, the effects would be the same as effects described under Build Alternatives 2a and 2b.

Build Alternatives 7a and 7b

Construction and Operation

Build Alternatives 7a and 7b would involve repurposing the current number 1 general purpose lane to HOV 2+. No new lanes would be constructed. Build Alternatives 7a and 7b propose similar project components within the same project area as Build Alternatives 2a and 2b, respectively; therefore, the effects would be the same as effects described under Build Alternatives 2a and 2b.

2.3.3.4 Avoidance, Minimization, and/or Mitigation Measures

No AMMs or MMs are required to reduce effects related to special-status plant species.

2.3.4 Animal Species

2.3.4.1 Regulatory Setting

Many state and federal laws regulate impacts to wildlife. The U.S. Fish and Wildlife Service (USFWS), the National Oceanic and Atmospheric Administration's National Marine Fisheries Service (NOAA Fisheries), and the California Department of Fish and Wildlife (CDFW) are responsible for implementing these laws. This section discusses potential impacts and permit requirements associated with animals not listed or proposed for listing under the federal or state Endangered Species Act. Species listed or proposed for listing as threatened or endangered are discussed in the Threatened and Endangered Species Section 2.3.5 below. All other special-status animal species are discussed here, including CDFW fully protected species and species of special concern, and USFWS or NOAA Fisheries candidate species.

Federal laws and regulations relevant to wildlife include the following:

- National Environmental Policy Act
- Migratory Bird Treaty Act
- Fish and Wildlife Coordination Act

State laws and regulations relevant to wildlife include the following:

- California Environmental Quality Act
- Sections 1600 – 1603 of the California Fish and Game Code
- Sections 4150 and 4152 of the California Fish and Game Code

2.3.4.2 Affected Environment

The BSA provides sufficient habitat for various common and special-status wildlife species. This section addresses the regionally occurring special-status wildlife species. The potential for these species to occur within the BSA are presented in Table 2.3-7.

Western Pond Turtle

Western pond turtle (*Emys marmorata*) is proposed for Federal listing as Threatened and is designated as a species of special concern by CDFW. The federal listing status is under review under FESA as of April 10, 2015 (80 FR 192590 19263). This species is found throughout California in a wide range of permanent and intermittent aquatic habitats such as ponds, marshes, rivers, streams, and ephemeral pools with emergent structure for basking and feeding. Western pond turtles also use adjacent upland sites for nesting, often traveling great distances over land to reach suitable nesting sites.

A CNDDB database search and visual assessment to evaluate the potential for western pond turtle to occur within the BSA were conducted. The most recent CNDDB occurrence is from 2001 approximately 0.25 mile north of the BSA documenting 76 individuals, with one hatchling and eight juveniles captured between 1996 to 2001 in a disturbed portion of the UC Davis Arboretum waterway. Aquatic habitat for western pond turtle is present in Putah Creek, the vegetated ditches, and canals identified throughout the BSA. Suitable nesting, upland, and basking habitats (e.g., open banks, exposed logs, rocks) for the species were also identified in the BSA within or immediately adjacent to these features.

Special-Status and Nesting Migratory Raptors and Birds

The federal MBTA (15 USC 703-711), 50 CFR Part 21 and 50 CFR Part 10, and the California Department of Fish and Game Code Sections 3503, 3513, and 3800 protect migratory birds, their occupied nests, and their eggs from disturbance or destruction. “Migratory bird” includes all non-game, wild birds found in the U.S. except the house sparrow (*Passer domesticus*), European starling (*Sturnus vulgaris*), and rock dove (*Columbia livia*). The BSA and adjacent landscape provides foraging and nesting habitat for many species of birds, including those protected by the MBTA and those designated as CDFW species of special concern (SSC) and fully protected (FP) species.

Special-status and migratory raptors that could potentially forage or nest within the vicinity of the BSA during project activities such as burrowing owl (BUOW) (*Athene cunicularia*), white-tailed kite (*Elanus leucurus*), and northern harrier (*Circus hudsonius*). Potential nesting habitat includes larger trees, structures such as bridges, and open fields. Protocol surveys have been conducted within the BSA and surrounding areas for Swainson’s hawk (SWHA) (*Buteo swainsoni*) and BUOW. The results of the SWHA surveys are detailed in Section 2.3.8 and BUOW is discussed in detail below.

Table 2.3-7. Special-Status Wildlife Potentially Occurring or Known to Occur in the Biological Study Area

Common Name	*Scientific Name*	Status[1] (Fed/State)	General Habitat Description	Potential to Occur within the BSA[2]
Sacramento splittail	*Pogonichthys macrolepidotus*	—/SSC	Estuaries and deltas, endemic to California's Central Valley.	None. The BSA does not contain suitable habitat for the species.
Sacramento perch	*Archoplites interruptus*	—/SSC	Warm, turbid reservoirs and ponds.	None. The BSA does not contain suitable habitat for the species.
western spadefoot	*Spea hammondii*	FP/SSC	Breeds and lays eggs in shallow, temporary pools formed by heavy winter rains, often in grasslands. Requires underground refugia, such as mammal burrows, near breeding habitat.	None. The BSA does not contain suitable breeding habitat. The seasonal wetlands within the BSA are heavily vegetated and are not inundated for a sufficient amount of time during the breeding season to support the species. The BSA is within highly disturbed right-of-way and adjacent land use is mostly urban and agriculture with frequent anthropogenic disturbances. No CNDDB occurrences within 5 miles of the BSA.
western pond turtle	*Emys marmorata*	FP/SSC	Slow water aquatic habitat with available basking sites. Hatchlings require shallow water with dense submergent or short emergent vegetation. Requires an upland oviposition site near the aquatic site.	Moderate. The BSA contains suitable aquatic habitat for the species in Putah Creek, vegetated ditches, and canals throughout the BSA. The most recent CNDDB occurrence is from 2001 approximately 0.25 mile north of the BSA documenting 76 individuals (only one hatchling and eight juveniles) captured between 1996 to 2001 in a disturbed portion of the UC Davis Arboretum waterway.
northern harrier	*Circus hudsonius*	—/SSC	Nests on the ground in shrubby vegetation in emergent wetlands, along rivers or lakes, in grasslands, grain fields, or on sagebrush flats.	Present. Species was observed foraging in the Yolo Bypass during the January 12, 2021, survey of the BSA. The most recent CNDDB occurrence is from 2015 approximately 3 miles northwest of the BSA documenting an active nest in a wheat field.

Common Name	*Scientific Name*	Status[1] (Fed/State)	General Habitat Description	Potential to Occur within the BSA[2]
mountain plover	*Charadrius montanus*	—/SSC	Winter resident from September through March inhabiting grasslands and plowed fields in the Central Valley. Does not nest in California.	Moderate. The BSA contains suitable wintering habitat for the species within plowed fields and grassland habitat. No CNDDB occurrences within 5 miles of the BSA.
western burrowing owl	*Athene cunicularia*	—/SSC	Grasslands, agricultural fields, and ruderal habitats with mammal burrows.	Moderate. The BSA contains ruderal areas with suitable nesting and foraging habitats. There are five CNDDB occurrences within approximately 500 feet of the BSA. Species was not observed during protocol level surveys of the project area. In 2021
white-tailed kite	*Elanus leucurus*	—/SFP	Nests in tall shrubs and trees. Forages in grasslands, agricultural fields, and marshes.	Present. White-tailed kite was observed foraging at the eastern end of the BSA during the survey on January 12, 2021. Multiple observations were made within 500 feet of the BSA during the Swainson's hawk surveys in March and April 2021. The most recent CNDDB occurrence is from 1993 approximately 3 miles northwest of the BSA documenting an active nest near Davis.
grasshopper sparrow	*Ammodramus savannarum*	—/SSC	Breeds in dry, dense grasslands with a variety of grasses and tall forbs and scattered shrubs for singing perches.	Moderate. The BSA contains suitable habitat for the species within grassland habitat. No CNDDB occurrences within 5 miles of the BSA.
purple martin	*Progne subis*	—/SSC	Colonial nester in tree cavities, under bridges and culverts, and occasionally nesting boxes. Often nests in tall, old trees near a body of water.	High. The BSA contains suitable habitat within tree cavities, bridges, and culverts. One CNDDB occurrence from 2003 documents 29 pairs observed nesting in weep holes under the I-5 freeway and street overpasses within 1 mile of the BSA.
song sparrow "Modesto population"	*Melospiza melodai*	—/SSC	Extensive wetlands and riparian forests.	High. Habitat is present in the BSA within the Yolo Bypass, Sacramento River, Putah Creek, and agricultural areas. One CNDDB occurrence from 2013 approximately 3.5 miles south of the BSA within the Yolo Bypass.

Common Name	*Scientific Name*	Status[1] (Fed/State)	General Habitat Description	Potential to Occur within the BSA[2]
yellow-headed blackbird	*Xanthocephalus*	—/SSC	Nests in colonies located in dense emergent wetland of cattails, tules, etc., often along the border of the lake or pond.	Low. The BSA contains suitable habitat for the species mostly between the east end of the Yolo Bypass and Davis city limits. No CNDDB occurrences within 5 miles of the BSA.
pallid bat	*Antrozous pallidus*	—/SSC	Day roosts typically include rocky outcrops, cliffs, large-diameter live and snag trees, and crevices. Also roost in caves, mines, bridges, culverts, barns, porches, and bat boxes.	High. Suitable winter hibernation and maternity roost habitat is present in the bridges throughout the BSA. The most recent CNDDB occurrence is from 1964, 1 mile north of the BSA in Davis.
western red bat	*Lasiurus blossevillii*	—/SSC	Typically roost solitarily in dense tree foliage, particularly in willows, cottonwoods, and sycamores. Strongly associated with riparian habitats, particularly mature stands of cottonwood/sycamore.	High. Suitable roost habitat within the BSA located along the Sacramento River, Putah Creek, and South Fork Putah Creek. No recorded CNDDB occurrences within 5 miles of the BSA.
American badger	*Taxidea taxus*	—/SSC	Most abundant in drier open stages of most shrub, forest, and herbaceous habitats, with friable soils. Several hundred undisturbed acres are required for home range.	None. Suitable undisturbed habitat is not present within or adjacent to the BSA. The most recent CNDDB occurrence was approximately 3.5 miles northeast of the BSA documenting a dead badger collected in 1997.

[1] Status Codes: Federal Proposed (FP); State Fully Protected (SFP); CDFW Species of Special Concern (SSC).
[2] Assessment Codes:

Present: The species is known to be present or has been recently observed in the BSA. **High:** The species has been observed and documented within 5 miles of the BSA within the last 5 years and habitat for the species is present in the BSA. **Moderate:** The BSA is located within the range of the species, there are documented occurrences within 5 miles of the BSA, and potential habitat for the species exists in the BSA. **Low:** The BSA is located within the range of the species, but no past documented occurrences have been recorded within 5 miles and only low quality (e.g., small fragmented patches or habitats under the influence of frequent anthropogenic disturbances) are present in the BSA. **None:** Focused surveys determined the species is absent from the BSA, the species is acknowledged to be extirpated locally or the BSA is located outside of the species range, or potential habitat to support the species is not present in the BSA.

Key: BSA – Biological Study Area, CNDDB – California Natural Diversity Database

Bird species observed in the area during site visits include SWHA, bald eagle (*Haliaeetus leucocephalus*), red-tailed hawk (*Buteo jamaicensis*), red-shouldered hawk (*Buteo lineatus*), osprey (*Pandion haliaetus*), American kestrel (*Falco sparverius),* white-tailed kite (*Elanus leucurus*), northern harrier (*Circus hudsonius*), prairie falcon (*Falco mexicanus*), peregrine falcon (*Falco peregrinus*), Cooper's hawk (*Accipiter cooperii*), California scrub jay (*Aphelocoma coerulescens*), northern mockingbird (*Mimus polyglottos*), great egret (*Ardea alba*), turkey vulture (*Cathartes aura*), yellow rumped warbler (*Setophaga coronata*), Nuttall's woodpecker (*Picoides nuttallii*), black phoebe (*Sayornis nigricans*), Brewer's blackbird (*Euphagus cyanocephalus*), red-winged blackbird (*Agelaius phoeniceus*), California towhee (*Pipilo crissalis*), spotted towhee (*Pipilo maculatus*), European starling (*Sturnus vulgaris*), American crow (*Corvus brachyrhynchos*), house finch (*Carpodacus mexicanus*), barn swallow (*Hirundo rustica),* brown-headed cowbird (*Molothrus ater),* Canada goose (*Branta canadensis*), greater white-fronted goose (*Answer albifrons*), killdeer (*Charadrius vociferus*), mallard (*Anas platyrhynchos*), mourning dove (*Zenaida macroura*), northern flicker (*Colaptes auratus*), rock pigeon (*Columba livia*), western meadowlark (*Sturnella neglecta*), white-crowned sparrow (*Zonotrichia leucophrys*), American avocet (*Recurvirostra americana*), common raven (*Corvus corax*), great horned owl (*Bubo virginianus*), American robin (*Turdis migratoriu*s), yellow-billed magpie (Pica nuttalli), American white pelican (*Pelecanus erythrorhynchos*), Anna's hummingbird (*Calypte anna*), western kingbird (*Tyrannus verticalis*), double-crested cormorant (*Phalacrocorax auritus*), and marsh wren (*Cistothorus palustris*).

The following special-status bird species have been identified as having a potential to occur within or adjacent to the BSA.

Northern Harrier

Northern harrier is listed as a species of special concern by CDFW. Northern harrier nests on the ground and forages in and near wet habitats such as freshwater marsh; wet meadows; grasslands; lightly grazed pastures; some croplands; and weedy borders of lakes, rivers, and streams. The northern harrier breeding range extends from sea level in the Central Valley and Sierra Nevada to 5,700 feet. The BSA occurs within the year-round range of northern harrier and the annual grasslands habitat provides potential nesting/foraging habitat for the species. Breeding season is typically from early April to September.

Mountain Plover

Mountain plover (*Charadrius montanus)* is designated as a species of special concern by CDFW. They winter in California's Central Valley from Sutter and Yuba Counties southward and breed from northern Montana and North Dakota south through the Great Plans to southeastern New Mexico and Texas. The BSA is within the winter range (September to March) for the species. Mountain plover prefers habitats with open grassland, plowed fields with little vegetation, and open sagebrush areas. The annual grassland and cropland habitats provide potential foraging habitat for the species from September to March.

Burrowing Owl

BUOW is designated as a species of special concern by CDFW. BUOW is a year-round resident typically wintering in the same locations as their breeding territory. The species nests in dry grassland, desert, and ruderal habitats. They often nest on the banks of canals and levees. They inhabit small mammal burrows or other suitable underground cavities for nesting. Breeding typically takes place from March to August. The BSA occurs within the year-round range of BUOW. There are five CNDDB occurrences within approximately 500 feet of the BSA.

Protocol-level surveys for BUOW were performed according to methodology described in the *Habitat Assessment of the Burrowing Owl Survey Protocol and Mitigation Guidelines* (BUOW Survey Protocol) (The California Burrowing Owl Consortium 1993). Per the BUOW Survey Protocol, the BSA was established with a 150-meter buffer around the BSA to survey for suitable habitat and potential burrows in areas where impacts from factors such as noise and vibration could impact BUOWs. Surveys were performed on February 10, April 16, May 13, May 20, and June 3, 2021, and January 13, 20–21, and 25, 2022. The survey efforts identified grassland and ruderal areas within 150 meters of the BSA that provide suitable nesting and foraging habitat for BUOW. Approximately 10.3 acres of suitable habitat and 0.3 acre of concentrated burrows where BUOW have the potential to nest were identified and mapped during the surveys. Further details of the BUOW surveys can be found in Appendix I of the NES.

White-Tailed Kite

White-tailed kite (*Elanus leucurus)* is fully protected by CDFW. White-tailed kites are found throughout California in coastal and valley lowlands. White-tailed kites typically nest in dense stands of tall shrubs and trees located adjacent to foraging habitat (i.e., undisturbed open grasslands, meadows, farmlands, and emergent wetlands), and are seldom observed more than 0.5 mile from an active nest during the breeding season (Zeiner et al. 1990). The BSA occurs within the year-round range of white-tailed kite. The valley oak woodland, valley foothill riparian, coastal oak woodland, and interior oak woodland habitats all provide nesting habitat for white-tailed kite. The annual grassland and cropland habitats provide potential foraging habitat for the species. Breeding season can take place from early February to October, typically peaking from May to August.

Grasshopper Sparrow

Grasshopper sparrow (*Ammodramus savannarum*) is designated as a species of special concern by CDFW. The breeding range is in the foothills and valley west of the Cascade-Sierra Nevada crest from Mendocino and Trinity Counties south to San Diego County. The winter range is along the southern coast of California. They nest in dense grasslands with thick cover of grasses and forbs. Nests are built in a slight depression in the ground hidden at the base of overhanging vegetation for concealment. Grasshopper sparrow also requires a mix of taller vegetation for singing perches. The annual grassland habitat provides potential nesting and foraging habitat for the species. Breeding season occurs between early April to mid-July, with a peak in May and June.

Purple Martin

Purple martin (*Progne subis*) is designated as a species of special concern by CDFW. Their current breeding range within California includes the coastal mountains, Sierra Nevada, Cascades, and two locations in the Central Valley. The Yolo and Sacramento portions of the BSA is located within one of these breeding ranges. They are a migratory bird typically arriving in their breeding range from South America in late March and departing by late September. They typically nest in old woodpecker cavities and human-made structures such as nesting boxes, under bridges, and culverts. Nests are typically located in open forest or woodland; and foraging over riparian areas and woodland habitats. The bridges and culverts provided potential nesting habitat and the valley foothill riparian habitat provides potential foraging habitat for the species. Breeding season is typically from early April to August.

Song Sparrow "Modesto Population"

The song sparrow "Modesto population" (*Melospiza melodai)* is designated as a species of special concern by CDFW. They are year-round residents of the Sacramento Valley, Sacramento-San Joaquin Delta, and northern San Joaquin Valley. They nest in emergent freshwater marshes, riparian forests, along vegetated irrigation canals and levees, and in recently planted valley oak restoration sites. The fresh emergent wetland and valley foothill riparian habitats provide potential nesting and foraging habitat for the species. Breeding season is typically from early April to July.

Yellow-Headed Blackbird

Yellow-headed blackbird (*Xanthocephalus xanthocephalus*) is designated as a species of special concern by CDFW. In California, the breeding range is in the Central Valley and selected locations in the coast ranges west of the Central Valley. The winter range includes parts of California and Mexico. Yellow-headed blackbird typically forages on insects, spiders, and seeds. The fresh emergent wetland habitat provides potential foraging habitat for the species. Breeding typically occurs from mid-April through July with nests built in dense vegetation such as cattails (*Typha* sp.), tules (*Scirpus* sp.), willow thickets (*Salix* spp.), and blackberry (*Rubus* sp.).

Bat Species

Townsend's big-eared bat (*Corynorhinus townsendii*), pallid bat (*Antrozous pallidus*), and western red bat (*Lasiurus blossevillii*) are all designated as species of special concern by CDFW. Bat species may roost individually or in small groups in tree cavities, in rock crevices, in riparian vegetation, or in man-made structures (e.g., bridges). Townsend's big-eared bat typically roosts in cavities such as caves, tree basal hollows, mines, tunnels, buildings, bridges, or other human-made structures. Pallid bats typically roost in rocky outcrops, cliffs, large-diameter live and snag trees, spacious crevices with access to open habitats for foraging, caves, mines, bridges, barns, porches, tree crevice roosts, bat boxes, and on the ground in stone piles, debris piles, baseboards, and rocks. Western red bats typically roost in dense riparian tree foliage. Although not a special-status species, Mexican free-tailed bat (*Tadarida brasiliensis*) is a species of local importance to the public and communities within/near the BSA

and commonly roosts in caves and rock crevices on cliff faces, abandoned mines and tunnels, highway bridges and large culverts, buildings, and bat houses.

Surveys were performed on December 18, 21, and 22, 2020, to identify suitable roosting habitat for bats within the BSA. Foliage roost habitat for western red bat and human-made structures (i.e., bridges, culverts) that contain suitable roosting habitat for Townsend's big-eared bat and pallid bat are present in the BSA. The BSA contains trees, specifically within the riparian areas along the Sacramento River, Putah Creek, and South Fork Putah Creek, that may contain suitable roosting habitat (e.g., cavities, exfoliating bark) for bats. In addition, the existing bridge over the Yolo Bypass contains one of the largest maternal colonies of Mexican free-tailed bats in the state of California and is well known to the residences and non-governmental agencies in the region. The most recent CNDDB recorded occurrence of pallid bat is from 1964 located 1 mile north of the BSA in Davis. There are no CNDDB occurrences of western red bat or Townsend's big-eared bat within 5 miles of the BSA. Mexican free-tailed bat is not reported in the CNDDB.

2.3.4.3 Environmental Consequences

No Build Alternative 1

Construction and Operation

No Build Alternative 1 would make no physical or operational improvements within the BSA. Therefore, No Build Alternative would not affect special-status animal species.

Build Alternatives 2a and 2b

Construction

Western Pond Turtle

Construction activities are not likely to directly or indirectly impact breeding and nesting activities since construction would occur outside the turtle nesting season; and certain construction activities, such as vegetation removal and soil compaction stemming from grading, would not affect areas where potential nesting habitat is present (e.g., open water and valley foothill riparian habitats along Putah Creek). Standard Measures BIO-1, BIO-2, BIO-3, and BIO-4, listed in Appendix E, would minimize potential impacts to western pond turtle. In addition, AMM BIO-4 would allow for construction to cease until western pond turtles have left the work area, and AMM BIO-5 would require species-specific training for workers.

Burrowing Owl

None of the potential BUOW habitat identified is located within the permanent construction footprint, but approximately 0.03 acre of concentrated burrows is located within the staging area adjacent to Kidwell Road at the west end of the BSA. However, if BUOWs are present within the 500-foot buffer during construction activities, the project could result in temporary displacement of individuals due to the noise and vibration of project activities near potential burrow sites. The area currently has high noise levels from existing heavy traffic conditions; therefore, adverse

effects on BUOW as a result of noise and vibration from construction are anticipated to be minimal. Although no BUOWs were observed during the 2021 nesting season, they have potential to nest in areas mapped as suitable habitat and concentrated burrows, as well as other areas, depending on-site conditions. Standard Measure BIO-1 would require the species to be covered in the Worker Environmental Awareness Training. AMMs BIO-7 through 9 would require pre-construction surveys for BUOW and the implementation of avoidance buffers if active burrows are identified.

Other Special-Status and Migratory Birds and Raptors

Tree and vegetation removal would result in a temporary loss of nesting and foraging habitat for raptors, nesting birds, and migratory birds. Approximately 2.828 acres of nesting habitat would be temporarily impacted and include 0.453 acre of coastal oak woodland, 0.505 acre of valley oak woodland, and 1.87 acres of valley foothill riparian habitat could potentially be impacted. The temporary impact from the loss of nesting and foraging habitat would be minimal given the ample habitat in the vicinity of the BSA. Tree and vegetation removal may also affect foraging success, food sources for herbivorous birds, and reduction in prey density for carnivorous or insectivorous birds. Birds could also abandon nests from noise and construction activities nearby. Following completion of construction, trees would be replanted and the surrounding habitat would be restored. Standard Measure BIO-2 would require pre-construction nesting surveys and the establishment of avoidance buffers for active nests. AMM BIO-2 would require minimizing the amount of riparian vegetation removed. Standard Measure BIO-4 would require replanting, reseeding, and restoration of disturbed areas along with minimizing vegetation removal. AMM BIO-10 would require consultation with CDFW if creating a no disturbance buffer around a white-tailed kite or northern harrier nest is not practicable. AMM BIO-11 would prohibit activities that would result in take of a white-tailed kite nest.

Bat Species

Build Alternatives 2a and 2b would result in temporary displacement of bats and temporary loss of potential bat roosting habitat for locations where culvert removal and tree trimming/removal would occur. If culvert work or tree removal would take place during the reproductive season (early May to August), there is a potential for direct mortality of young bats to occur. Bats typically give birth to young in May but form maternity colonies as early as March. Permanent impacts could occur from bat mortality resulting from the removal of maternity roost habitat. No construction would occur on the existing bridge over the Yolo Bypass, so the maternity colony that roosts under the bridge would not be directly impacted. Temporary impacts on bats would result from construction related noise, lights during night work, and vibration disturbance to bats roosting adjacent to active construction. These impacts have the potential to impact the bats by disturbing their behavior, growth, reproduction, or survival. With the implementation of Standard Measures BIO-1 and BIO-2, adverse effects on special-status bat species would be reduced. In addition, AMM BIO-12 would require trees to be removed after young bats are volant to avoid impacts to maternity colonies, AMM BIO-13 would require pre-construction bat surveys, AMM BIO-14 would require a bat protection plan, and AMM BIO-15 minimizes impacts to bats from structural changes to potential roosting habitat.

Operation

Once construction is completed, Build Alternatives 2a and 2b would carry two more travel lanes than existing conditions. However, the impacts to special-status animal species would not increase from existing conditions.

Build Alternatives 3a and 3b

Construction and Operation

Build Alternatives 3a and 3b would involve adding an HOT2+ lane in each direction. Build Alternatives 3a and 3b propose similar project components within the same project area as Build Alternatives 2a and 2b, respectively; therefore, the effects would be the same as effects described under Build Alternatives 2a and 2b.

Build Alternatives 4a and 4b

Construction and Operation

Build Alternatives 4a and 4b would involve adding an HOT3+ lane in each direction. Build Alternatives 4a and 4b propose similar project components within the same project area as Build Alternatives 2a and 2b, respectively; therefore, the effects would be the same as effects described under Build Alternatives 2a and 2b.

Build Alternatives 5a and 5b

Construction and Operation

Build Alternatives 5a and 5b would involve adding an express lane in each direction. Build Alternatives 5a and 5b propose similar project components within the same project area as Build Alternatives 2a and 2b, respectively; therefore, the effects would be the same as effects described under Build Alternatives 2a and 2b.

Build Alternatives 6a and 6b

Construction and Operation

Build Alternatives 6a and 6b would involve adding a transit-only lane in each direction. Build Alternatives 6a and 6b propose similar project components within the same project area as Build Alternatives 2a and 2b; therefore, the effects would be the same as effects described under Build Alternatives 2a and 2b.

Build Alternatives 7a and 7b

Construction and Operation

Build Alternatives 7a and 7b would involve repurposing the current number 1 general purpose lane to HOV 2+. No new lanes would be constructed. Build Alternatives 7a and 7b propose similar project components within the same project area as Build Alternatives 2a and 2b,

respectively; therefore, the effects would be the same as effects described under Build Alternatives 2a and 2b.

2.3.4.4 Avoidance, Minimization, and/or Mitigation Measures

Caltrans would implement the following AMMs to reduce impacts to special-status animals.

- **AMM BIO-4: Western Pond Turtle.** If western pond turtles are encountered within the BSA during construction, work activity in the immediate vicinity will cease until any turtles have left the work area on their own or a CDFW-approved biologist moves the individual out of harm's way.

- **AMM BIO-5: Worker Training for Western Pond Turtle.** Prior to initiation of construction activities, workers will participate in environmental awareness training provided by a qualified biologist. The training will instruct workers regarding: (1) how to identify the turtle; (2) the habitats used by the turtle; (3) the potential for turtle egg clutches (i.e., nest sites) to be discovered during vegetation clearing; and (4) what to do if a turtle or suspected egg clutch is encountered during construction activities.

- **AMM BIO-6: Pre-Construction Tricolored Blackbird and Yellow-Headed Blackbird Surveys.** Pre-construction surveys for tricolored blackbird and yellow-headed blackbird should be conducted prior to any ground-disturbing activities within 500 feet of mapped potentially suitable habitat. Pre-construction surveys should be conducted in mid-March, mid-April, mid-May, and mid-June given that the dates of nesting in Northern California are not consistent from year to year and given that the species may nest twice in the same nesting season at the same or different locations. The recommendation of a survey every 30 days during the nesting season is based on the potential length of the nesting season in the Sacramento Valley (i.e., mid-March to mid-July) and total time required for incubation and fledging (i.e., 21 to 25 days). Note that the full complement of four survey visits can be reduced accordingly if work starts after mid-March, and surveys can be avoided entirely if work starts between August 1 and March 1 (i.e., outside the nesting season).

- **AMM BIO-7: Pre-Construction BUOW Surveys.** A minimum of one pre-construction survey for occupied BUOW burrows within 500 feet of the BSA in suitable habitat (e.g., grasslands) will be conducted by a qualified biologist within 15 days prior to the initiation of construction activities, regardless of the timing of construction. If any occupied burrows are identified, appropriate conservation measures as determined by a qualified biologist will be implemented. No disturbance will occur within 150 feet of occupied burrows during the nonbreeding season (September 1–January 31) or within 250 feet during the breeding season (February 1–August 31). These measures may also include establishing a construction-free buffer zone around the active nest site in coordination with the CDFW, biological monitoring of the active nest site, and delaying construction activities in the vicinity of the active nest site until the young have fledged.

- **AMM BIO-8: BUOW Exclusion Plan.** If BUOW are detected within the BSA during the nonbreeding season and maintaining a 150-foot no disturbance buffer is not practicable,

a qualified biologist will submit an exclusion plan to CDFW. The exclusion plan will generally follow the guidelines outlined in Appendix E of the *Staff Report on Burrowing Owl Mitigation* (CDFG 2012). The exclusion plan will consist of installing one-way doors in potential burrows, daily monitoring, and collapsing burrows once it is determined that the burrows are unoccupied. Exclusion may only take place during the nonbreeding season (September 1 to January 31) and may be an ongoing effort during this time period. This will allow the owls to exit burrows if they are present, but not return.

- **AMM BIO-9: Burrowing Owl Direct Disturbance.** If occupied burrows are detected during the breeding season and maintaining a 250-foot no disturbance buffer is not practicable, CDFW will be consulted to determine alternative measures to minimize the potential for disturbance to occupied burrows and nesting activities. Measures may include, but are not limited to, continuous biological monitoring by a qualified biologist until it has been determined that the young have fledged and are no longer reliant on the nest for parental care or survival, or the construction is complete. No direct disturbance of burrows with eggs or young can be conducted without written authorization from the CDFW.

- **AMM BIO-10: White-Tailed Kite Consultation.** If an active white-tailed kite nest is observed, CDFW will be consulted to determine alternative measures to minimize the potential for project-related disturbance to the nest site that could result in nest abandonment or other forms of take. Measures may include but are not limited to continuous biological monitoring by a qualified biologist until it has been determined that the young have fledged and are no longer reliant on the nest or parental care for survival or the construction is complete. If the nesting pair shows signs of distress as a result of project-related activities (e.g., adults leaving the nest when eggs or young chicks are present), the monitoring biologist will have authority to stop work until it is determined that the adults have returned and are no longer showing signs of distress.

- **AMM BIO-11: White-Tailed Kite Avoidance.** If consultation with CDFW results in a determination that take of a white-tailed kite nest may not be avoidable, then all activities that are likely to result in such take will be delayed until a qualified biologist has determined that the young have fledged and are no longer reliant on the nest or parental care for survival. White-tailed kites are a fully protected species, and CDFW may provide an Incidental Take Permit for this species if impacts are unavoidable.

- **AMM BIO-12: Tree Removal.** To the extent practicable, removal of large trees with cavities will occur before bat maternity colonies form (i.e., prior to March 1) or after young bats are volant (i.e., after August 31). To the greatest extent practicable, trees would be removed in pieces, rather than felling the entire tree. It is recommended that removal take place late in the day or in the evening (to reduce the likelihood of evicted bats falling prey to diurnal predators) and during warm weather conditions conducive to bat activity.

- **AMM BIO-13:** Pre-construction Bat Surveys. If construction (including the removal of large trees) occurs during the non-volant season (March 1 through August 31), a qualified biologist will conduct a pre-construction survey of the areas identified as high

and moderate maternity roosting potential in the bat habitat assessment for maternity colonies. The pre-construction survey will be performed no more than 14 days prior to the implementation of construction activities, including staging and equipment access. If a lapse in construction activities for 14 days or longer occurs between those dates, another pre-construction survey will be performed. If any maternity colonies are detected, a qualified biologist will determine and implement appropriate conservation measures. These measures may include but are not limited to establishing a construction-free buffer zone around the maternity colony site, biological monitoring of the maternity colony, and delaying construction activities in the vicinity of the maternity site.

- **AMM BIO-14: Bat Protection Plan.** A bat species protection survey plan will be developed. The plan will include items such as having a qualified biologist on-site to conduct monitoring during construction in or near bat roosting habitat.

- **AMM BIO-15: Structural Changes to Bat Roosting Habitat.** To the greatest extent practicable, structural changes may be made to any known roost proposed for removal (as determined by pre-construction surveys) to create conditions in the roost that are undesirable to roosting bats and that will encourage the bats to leave on their own (e.g., open additional portals so that the temperature, wind, light, and precipitation regimes change in the roost). Structural changes to the roost would be performed during the appropriate exclusion timing (listed above) to avoid harming bats.

2.3.5 Threatened and Endangered Species

2.3.5.1 Regulatory Setting

The primary federal law protecting threatened and endangered species is the Federal Endangered Species Act (FESA): 16 United States Code (USC) Section 1531, et seq. See also 50 Code of Federal Regulations (CFR) Part 402. This act and later amendments provide for the conservation of endangered and threatened species and the ecosystems upon which they depend. Under Section 7 of this act, federal agencies, such as the FHWA (and the Department, as assigned), are required to consult with the U.S. Fish and Wildlife Service (USFWS) and the National Oceanic and Atmospheric Administration's National Marine Fisheries Service (NOAA Fisheries) to ensure that they are not undertaking, funding, permitting, or authorizing actions likely to jeopardize the continued existence of listed species or destroy or adversely modify designated critical habitat. Critical habitat is defined as geographic locations critical to the existence of a threatened or endangered species. The outcome of consultation under Section 7 may include a Biological Opinion with an Incidental Take Statement or a Letter of Concurrence. Section 3 of FESA defines take as "harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect or any attempt at such conduct."

California has enacted a similar law at the state level, the California Endangered Species Act (CESA), California Fish and Game Code Section 2050, et seq. CESA emphasizes early consultation to avoid potential impacts to rare, endangered, and threatened species and to develop appropriate planning to offset project-caused losses of listed species populations and

their essential habitats. The California Department of Fish and Wildlife (CDFW) is the agency responsible for implementing CESA. Section 2080 of the California Fish and Game Code prohibits “take” of any species determined to be an endangered species or a threatened species. Take is defined in Section 86 of the California Fish and Game Code as “hunt, pursue, catch, capture, or kill, or attempt to hunt, pursue, catch, capture, or kill.” CESA allows for take incidental to otherwise lawful development projects; for these actions an incidental take permit is issued by CDFW. For species listed under both FESA and CESA requiring a Biological Opinion under Section 7 of FESA, the CDFW may also authorize impacts to CESA species by issuing a Consistency Determination under Section 2080.1 of the California Fish and Game Code.

Another federal law, the Magnuson-Stevens Fishery Conservation and Management Act of 1976, was established to conserve and manage fishery resources found off the coast, as well as anadromous species and Continental Shelf fishery resources of the United States, by exercising (A) sovereign rights for the purposes of exploring, exploiting, conserving, and managing all fish within the exclusive economic zone established by Presidential Proclamation 5030, dated March 10, 1983, and (B) exclusive fishery management authority beyond the exclusive economic zone over such anadromous species, Continental Shelf fishery resources, and fishery resources in special areas.

2.3.5.2 Affected Environment

The BSA provides sufficient habitat for various state and federally listed plant and wildlife species. This section addresses the regionally occurring listed species. The potential for these listed plant species to occur within the BSA are presented in Table 2.3-8 and the potential for listed wildlife species to occur are presented in Table 2.3-9.

Table 2.3-8. Federal or State Listed Plants Potentially Occurring or Known to Occur in the Biological Study Area

Common Name	*Scientific Name*	Status[1] (Fed/State/ CRPR)	General Habitat Description	Potential to Occur within the BSA[2]
palmate-bracted bird's-beak	*Chlorophyron palmatum*	FT/SE/1B.1	Found in valley and foothill grassland with alkaline soil. Blooms: May–October Elevation: 85 to 90 feet	None. No suitable alkaline soils are present within the BSA to support the species. No CNDDB occurrences within 5 miles of the BSA. This species was not observed during the May 2021 botanical surveys.
Bogg's Lake hedge-hyssop	*Gratiola heterosepala*	—/SE/1B.2	Found in marshes and swamps (lake margins) and vernal pools. Clay soil. Blooms: April–August Elevation: 33 to 7,800 feet	Low. Suitable habitat may be present in the fresh emergent marsh wetlands. No CNDDB occurrences within 5 miles of the BSA. This species was not observed during the early or late season botanical surveys and is presumed to be absent from the BSA.
Colusa grass	*Neostapfia colusana*	FT/SE/1B.1	Found in vernal pools. Blooms: May–August Elevation: 16-656 feet	None. No vernal pool habitat is present within the BSA to support the species. The most recent CNDDB occurrence is from year 2013 approximately 4 miles southwest of the BSA. This species was not observed during the May 2021 botanical surveys.
Keck's checkerbloom	*Sidalcea keckii*	FE/—/1B.1	Found in valley and foothill grassland and cismontane woodland. Serpentinite, clay soil. Blooms: April–May (June) Elevation: 245 to 2,100 feet	Low. Marginal habitat is present within the grasslands, which have limited distribution in the BSA and are dominated by non-native and invasive species. The most recent CNDDB occurrence is from year 2019 approximately 5 miles west of the BSA. This species was not observed during the May 2021 botanical surveys and is presumed to be absent from the BSA.
Crampton's tuctoria or Solano grass	*Tuctoria mucronata*	FE/SE/1B.1	Found in valley and foothill grassland (mesic) and vernal pools. Blooms: April–August Elevation: 15 to 33 feet	Low. Marginal habitat is present within the grasslands, which have limited distribution in the BSA and are dominated by non-native and invasive species. The most recent CNDDB occurrence is from year 2011 approximately 4 miles southwest of the BSA within created vernal pools. However, this species was not observed during the early or late season botanical surveys and is presumed to be absent from the BSA.

1 Status Codes: Federal Endangered (FE); Federal Threatened (FT); State Endangered (SE) / 1 CRPR Codes and Extensions: 1B Plants rare, threatened, or endangered in California and elsewhere; xx.2 Fairly endangered in California; xx.1 Seriously endangered in California

2 Assessment Codes: Present: The species is known to be present or has been recently observed in the BSA. High: The species has been observed and documented within 5 miles of the BSA within the last 5 years and habitat for the species is present in the BSA. Moderate: The BSA is located within the range of the species, there are documented occurrences within 5 miles of the BSA, and potential habitat for the species exists in the BSA. Low: The BSA is located within the range of the species, but no past documented occurrences have been recorded within 5 miles and only low quality (e.g., small fragmented patches or habitats under the influence of frequent anthropogenic disturbances) are present in the BSA. None Focused surveys determined the species is absent from the BSA, the species is acknowledged to be extirpated locally or the BSA is located outside of the species range, or potential habitat to support the species is not present in the BSA.

Key: BSA – biological study area, CNDDB – California Natural Diversity Database

Table 2.3-9. Federal or State Listed Wildlife and Critical Habitat Potentially Occurring or Known to Occur in the Biological Study Area

Common Name	*Scientific Name*	Status[1] (Fed/State)	General Habitat Description	Potential to Occur within the BSA[2]
Invertebrates				
Conservancy fairy shrimp	*Branchinecta conservatio*	FE/—	Large to very large vernal pools with turbid water in grasslands on old alluvial soils underlain by hardpan.	None. Not expected to occur. Species occurs in large vernal pools and are not currently known to occur in any waters or wetlands that intersect the BSA. No suitable habitat is present within the BSA. No CNDDB recorded occurrences within 5 miles of the BSA.
vernal pool fairy shrimp	*Branchinecta lynchi*	FT/—	Vernal and intermittent freshwater pools.	Low. Not expected to occur. Species occurs in large vernal pools and are not currently known to occur in any waters or wetlands that intersect the BSA. No suitable habitat is present within the BSA. The most recent CNDDB occurrence is from year 1995 approximately 5 miles northeast of the BSA documenting 10 adults in a seasonal pond near the Natomas East Main Drainage Canal in Sacramento.
vernal pool tadpole shrimp	*Lepidurus packardi*	FE/—	Vernal and intermittent freshwater pools.	Low. Not expected to occur. Species occurs in vernal pools and are not currently known to occur in any waters or wetlands that intersect the BSA. No suitable habitat is present within the BSA. The most recent CNDDB occurrence is from year 1979 approximately 2 miles northwest of the BSA documenting specimens found in a vernal pool adjacent to agricultural land on the north side of Davis.
valley elderberry longhorn beetle	*Desmocerus californicus dimorphus*	FT/—	Life cycle depends on elderberry shrubs (*Sambucus* spp.), which are typically associated with riparian forests that occur along rivers and streams.	High. Sixty-seven suitable elderberry shrubs were mapped within 165-feet of the BSA; 52 of which are located within the BSA. Three CNDDB occurrences within 2,526 feet of the BSA.

Common Name	*Scientific Name*	Status[1] (Fed/State)	General Habitat Description	Potential to Occur within the BSA[2]
Delta green ground beetle	*Elaphrus viridis*	FT/—	Found in the vicinity of vernal pools within Solano County.	None. Not expected to occur. Species occurs in large vernal pools and are not currently known to occur in any waters or wetlands that intersect the BSA. No suitable habitat is present within the BSA. The most recent CNDDB occurrence is from year 1979 approximately 2 miles northwest of the BSA documenting specimens found in a vernal pool adjacent to agricultural land on the north side of Davis.
Crotch's bumble bee	*Bombus crotchii*	—/CE	Open grasslands and scrub areas in hot and dry climates. Requires underground nesting habitat, abundant flowering plants for foraging, and overwintering habitat (soft, disturbed soil or leaf litter). Crotch's bumble bee has been nearly extirpated from the Central Valley.	None. The BSA is within highly disturbed right-of-way and adjacent land use is mostly urban and agriculture. The floristic resources and underground nesting habitat required for the species are not present within or adjacent to the BSA. In addition, the adjacent agriculture provides competition with managed bees, disease, and pesticides that are detrimental to and have been a factor in the decline of the species. The most recent CNDDB occurrence is from year 1998 approximately 0.5 mile north of the BSA along Putah Creek.
western bumble bee	*Bombus occidentalis*	—/CE	Blooming flowers along streams, meadows, roadsides, and burned or logged areas. Nests found underground in abandoned rodent burrows.	None. The BSA is not within the current range of the species. Most recent CNDDB occurrence is from year 1965 in the general vicinity of Davis.
Fish				
green sturgeon southern DPS	*Acipenser medirostris*	FT/SSC	Spawns in mainstem Sacramento and Feather rivers; juveniles are thought to rear mainly throughout the San Francisco Bay estuary.	Moderate. Suitable spawning habitat is present within the BSA in the Sacramento River. No CNDDB occurrences within 5 miles of the BSA. The BSA is in designated critical habitat.

Common Name	*Scientific Name*	Status[1] (Fed/State)	General Habitat Description	Potential to Occur within the BSA[2]
steelhead- Central Valley DPS	*Oncorhynchus mykiss irideus* pop. 11	FT/—	Spawns and rears in the Sacramento River and its tributaries. Requires cool, swift shallow water; clean, loose gravel for spawning.	High. Suitable habitat is present within the BSA in the Sacramento River and Prospect Slough. The most recent CNDDB documented occurrence is from year 2011 approximately 0.5 mile east of the BSA documenting many migrating and stranded steelhead between 1998-2011 at the eastern edge of the Yolo Bypass; including the toe drain, Sacramento Deep Water Ship Channel, and Sacramento Bypass. The BSA is in designated critical habitat.
Chinook salmon- Central Valley spring-run ESU	*Oncorhynchus tshawytscha* pop. 11	FT/ST	Sacramento and San Joaquin Rivers and tributaries with cool summer water temperatures, deep pools, and suitable spawning substrate.	High. Suitable habitat is present within the BSA in the Sacramento River. The most recent CNDDB documented occurrence is from year 2004 less than 1 mile east of the BSA documenting one adult and 26 juveniles captured in the Sacramento Deep Water Ship Channel in West Sacramento. The BSA is in designated critical habitat.
Chinook salmon- Sacramento River winter-run ESU	*Oncorhynchus tshawytscha* pop. 7	FE/SE	Adults and juveniles occur in the Sacramento River during seasonal migration periods.	High. Suitable habitat is present within the BSA in the Sacramento River. The most recent CNDDB documented occurrence is from year 2004 less than 1 mile east of the BSA documenting 36 adults and 11 juveniles captured in the Sacramento Deep Water Ship Channel in West Sacramento. The BSA is in designated critical habitat.
Delta smelt	*Hypomesus transpacificus*	FT/SE	Estuarine systems in the Sacramento-San Joaquin Delta, in reaches with slow flow.	Moderate. The BSA contains suitable habitat for the species within the Sacramento River. There are no CNDDB occurrences within 5 miles of the BSA. The BSA overlaps designated critical habitat for the species.
longfin smelt	*Spirinchus thaleichthys*	FC/ST	Open water channels and bays in salinities ranging from freshwater to seawater.	High. The BSA contains suitable habitat for the species within the Sacramento River. One CNDDB occurrence was identified in the Sacramento River within the BSA, where a single adult was collected in year 2004.

Common Name	*Scientific Name*	Status[1] (Fed/State)	General Habitat Description	Potential to Occur within the BSA[2]
Amphibians				
California tiger salamander	*Ambystoma californiense*	FT/ST	Breeding habitat consists of vernal or temporary pools in annual grasslands, or open stages of woodlands. Requires underground refugia, such as mammal burrows, within 1 mile of breeding habitat.	None. The BSA does not contain suitable breeding habitat or underground refugia (e.g., small mammal burrows) within annual grassland habitat. The seasonal wetlands within the BSA are not inundated for a sufficient duration to support breeding and development of the species in the features. Further, the BSA is within a highly disturbed right-of-way and adjacent land use is mostly urban and agriculture with frequent anthropogenic disturbances. The most recent CNDDB occurrence is from year 1993 approximately 2.5 miles northwest of the BSA documenting a live individual captured in the parking lot of an apartment complex at the north edge of Davis.
California red-legged frog	*Rana draytonii*	FE/SSC	Requires aquatic habitat for breeding, also uses a variety of other habitat types, including riparian and upland areas. Adults prefer dense, shrubby, or emergent vegetation associated with deep water pools with fringes of cattails and dense stands of overhanging vegetation. This species also breeds in ephemeral ponds that support little or no vegetation.	None. The BSA is not within the current range of the species.
Reptiles				
giant garter snake	*Thamnophis gigas*	FT/ST	Freshwater marshes and low gradient streams with emergent vegetation. Adapted to drainage canals and irrigation ditches with mud substrate.	High. Suitable aquatic and upland habitat is present within the Yolo Bypass, and other areas throughout the BSA. There are five CNDDB occurrences within 5 miles of the BSA.

Common Name	*Scientific Name*	Status[1] (Fed/State)	General Habitat Description	Potential to Occur within the BSA[2]
Birds				
Swainson's hawk	*Buteo swainsoni*	—/ST	Breeds in stands with few trees in juniper-sage flats, riparian areas, and oak savannah; forages in adjacent livestock pasture, grassland, or grain fields.	Present. Protocol-level Swainson's hawk surveys revealed 132 potential nests within 0.5 mile of the BSA; 24 of which were active SWHA nests during the 2021 nesting season. There are 75 CNDDB occurrences within 0.5 mile of the BSA. Tall trees throughout the BSA provide suitable nesting habitat. In addition to nesting, seven observations of overwintering SWHAs were made during the surveys on January 12, and February 17, 2021, in the vicinity of Davis.
bald eagle	*Haliaeetus leucocephalus*	—/SE, FP	Breeds and winters in riparian woodland with large trees, often old-growth or open canopy. Typically nests near large bodies of permanent water or perennially flowing rivers with abundant fish.	Present. One bald eagle was observed flying through the BSA during SWHA surveys. However, no suitable nesting habitat for the species was identified within 0.5 mile of the BSA during the surveys.
California black rail	*Laterallus jamaicensis coturniculus*	—/ST, FP	Resides in saline, brackish, and freshwater wetlands in the San Francisco Bay Area, Sacramento-San Joaquin Delta, coastal Southern California at Morro Bay.	None. The BSA is not within the current range of the species.
western snowy plover	*Charadrius nivosus nivosus*	FT/SSC	Nests in sandy marine and estuarine shores. Inland nesting areas include the Salton Sea, Mono Lake, and at isolated sites on the shores of alkali lakes in northeastern California, in the Central Valley, and the southeastern deserts.	None. No suitable habitat is present for the species.
western yellow-billed cuckoo	*Coccyzus americanus occidentalis*	FT/SE	Requires dense deciduous riparian thickets or woodland with dense, low-level or understory foliage adjacent to slow-moving watercourses, backwaters, or seeps.	Moderate. The BSA is not within the current breeding range of the species. However, migratory stopover habitat is present within the riparian habitat in the BSA. A single CNDDB occurrence documents observances made September 2012 and August 2013 along Putah Creek less than 2 miles west of the BSA.

Common Name	*Scientific Name*	Status[1] (Fed/State)	General Habitat Description	Potential to Occur within the BSA[2]
least Bell's vireo	*Vireo bellii pusillus*	FE/SE	Riparian forest, scrub, or woodland; nests along margins of bushes or twigs projecting; usually willow, mulefat, or mesquite. Requires dense cover within 3-6 feet of the ground for nesting and a dense, stratified canopy for foraging.	Moderate. Although the BSA is within the current breeding range of the species, breeding habitat (i.e., the riparian vegetation lacks the structure and vegetative density required by the species for nesting) is not present within the BSA. The most recent CNDDB occurrence is from year 2011 approximately 3.5 miles south of the BSA in the Yolo Bypass documenting a nesting pair in undisturbed riparian scrub habitat. The species may use riparian habitat within the BSA for foraging or migratory stopover habitat.
bank swallow	*Riparia riparia*	—/ST	Colonial nester on vertical banks or cliffs with fine-textured soils near water.	None. The BSA does not contain suitable habitat for the species. Vertical banks and cliffs are not present within the BSA. The most recent CNDDB occurrence is from year 1986 along the American River approximately 3.5 miles east of the BSA.
tricolored blackbird	*Agelaius tricolor*	—/ST	Breeds in large colonies in freshwater marshes in dense stands of cattails or bulrushes. Forages in open habitats such as farm fields and pastures.	Moderate. Potential habitat for nesting colonies mostly between the east end of the Yolo Bypass and Davis city limits. The most recent CNDDB occurrence is from year 2014 approximately 5 miles south of the BSA in the Yolo Bypass and documents approximately 100 individuals within a nesting colony.

[1] Status Codes: Federal Endangered (**FE**); Federal Threatened (**FT**); State Endangered (**SE**); State Threatened (**ST**); Candidate Endangered (**CE**) State Fully Protected (**FP**); CDFW Species of Special Concern (**SSC**).
[2] Assessment Codes: **Present:** The species is known to be present or has been recently observed in the BSA. **High:** The species has been observed and documented within 5 miles of the BSA within the last 5 years and habitat for the species is present in the BSA. **Moderate:** The BSA is located within the range of the species, there are documented occurrences within 5 miles of the BSA, and potential habitat for the species exists in the BSA. **Low:** The BSA is located within the range of the species, but no past documented occurrences have been recorded within 5 miles and only low quality (e.g., small fragmented patches or habitats under the influence of frequent anthropogenic disturbances) are present in the BSA. **None:** Focused surveys determined the species is absent from the BSA, the species is acknowledged to be extirpated locally or the BSA is located outside of the species range, or potential habitat to support the species is not present in the BSA.
Key: Key: BSA – biological study area, CNDDB – California Natural Diversity Database, DPS – distinct population segment, ESU – evolutionarily significant unit

Valley Elderberry Longhorn Beetle

The valley elderberry longhorn beetle (VELB; *Desmocerus californicus dimorphus*) is federally listed as threatened. VELB is an insect endemic to the Central Valley of California that inhabits riparian and associated upland habitats where elderberry (*Sambucus* spp.), its host plant, grows. Specifically, its range includes the upper Sacramento Valley from the vicinity of Redding to the central San Joaquin Valley, and generally below 500 feet elevation (USFWS 1991). VELB habitat typically consists of riparian forests.

In addition to the field survey, a review of CNDDB records found that there are three occurrences of VELB within 2,526 feet of the BSA. The project falls within the Sacramento River Management Unit and the Putah Creek Management Unit (USFWS 2019). A VELB habitat assessment survey was performed on February 19 and 21–24, 2021, and July 7, 2022, to identify the location of elderberry shrubs within 165 feet of the BSA. Sixty-seven elderberry shrubs were identified within 165 feet of the BSA, of which 53 shrubs were located within the BSA. Of the 53 shrubs observed within the BSA, exit holes were observed in eight shrubs.

Central Valley Distinct Population Segment Steelhead, Central Valley Spring-Run Evolutionarily Significant Unit Chinook Salmon, Sacramento River Winter-Run Evolutionarily Significant Unit Chinook Salmon, and Green Sturgeon

Central Valley distinct population segment (DPS) steelhead (*Oncorhynchus mykiss irideus)* is listed as threatened under FESA. Central Valley steelhead generally leave the ocean from August through April and spawn from December through April in small streams and tributaries of the Sacramento River where cool, well-oxygenated water is available year-round. Timing of upstream migration is correlated with higher flow events, such as freshets or seasonal flow increases, and associated lower water temperatures. Steelhead spawn in gravel and small cobble substrates usually associated with riffle and run habitat types.

Central Valley spring-run evolutionarily significant unit (ESU) Chinook salmon (*Oncorhynchus tshawytscha* pop. 6) is listed as threatened under FESA and CESA. Adult spring-run Chinook salmon migrate upstream from the ocean during the spring, beginning in March, and hold over in deep pools of the mainstem Sacramento River and its large perennial tributaries, where fish can access cold headwaters during the summer months, and then spawn in Mill, Deer, Clear, and Butte creeks and the Feather River from mid-August through mid-October.

Sacramento River winter-run ESU Chinook salmon (*Oncorhynchus tshawytscha* pop. 7) is listed as endangered under FESA and CESA. Adult winter-run Chinook salmon begin their migration from the ocean in December and may spawn from mid-April through mid-August. Spawning primarily occurs in the upper mainstem Sacramento River near Redding. Most of each year's winter-run salmon young migrate downstream and rear in the Delta and portions of the Yolo Bypass before emigrating to the ocean.

Green sturgeon (*Acipenser medirostris)* is listed as threated under FESA and is designated as a species of special concern by CDFW. Adults begin spawning migrations from the ocean in March and typically reach their spawning destinations in the Sacramento River from roughly Colusa to above Red Bluff and in the Feather River near Oroville between March and July

(Heublein et al. 2009; Seeholtz et al. 2015). Spawning takes place between April and June in deep, turbulent pools and fast water, when temperatures range from 46 degrees Fahrenheit (°F) to 60°F (Adams et al. 2002). Following reproduction, some adults promptly migrate downstream back to the estuary and ocean, while others may over-summer and move out of the river during the first fall freshets (Heublein et al. 2009). Juveniles may rear in the river for 1 to 3 years before emigrating downstream to the estuary, primarily during the summer and fall.

Suitable migration habitat is present for all four fish species in the Sacramento River at the eastern end of the BSA and in Prospect Slough within the Yolo Bypass. The following is a summary of the general timing each species is expected to occur in the BSA and the CNDDB documented occurrences within 5 miles.

Central Valley DPS steelhead could be present in the BSA from August to April. The most recent CNDDB documented occurrence is from year 2011 approximately 0.5 mile east of the BSA documenting many migrating and stranded steelhead between 1998–2011 at the eastern edge of the Yolo Bypass, including the toe drain, Sacramento Deep Water Ship Channel, and Sacramento Bypass. The BSA is in designated critical habitat.

Central Valley spring-run ESU Chinook salmon could be present in the BSA between March and April. The most recent CNDDB documented occurrence is from year 2004 less than 1 mile east of the BSA documenting one adult and 26 juveniles captured in the Sacramento Deep Water Ship Channel in West Sacramento. The BSA is in designated critical habitat.

Sacramento River winter-run ESA Chinook could be present in the BSA in December during fall upstream migration and potentially year-round for rearing before returning to the ocean. The most recent CNDDB documented occurrence is from year 2004 less than 1 mile east of the BSA documenting 36 adults and 11 juveniles captured in the Sacramento Deep Water Ship Channel in West Sacramento. The BSA is in designated critical habitat.

Essential Fish Habitat (EFH) for Chinook salmon occurs within the BSA. However, the project does not involve work within or adjacent to EFH. The project would have no effect to EFH. No Magnuson-Stevens Fishery Conservation and Management Act consultation with the NMFS is anticipated to be required.

Green sturgeon could be present in the BSA between March and April and again during the late summer and fall months. No CNDDB occurrences have been documented within 5 miles of the BSA. The BSA is in designated critical habitat.

Delta Smelt and Longfin Smelt

Delta smelt (*Hypomesus transpacificus*) is listed as threatened under FESA. Delta smelt are somewhat anadromous and undergo a spawning migration from brackish water to freshwater annually (Moyle 2002). In early winter, mature Delta smelt migrate from brackish, downstream rearing areas in and around Suisun Bay and the confluence of the Sacramento and San Joaquin rivers upstream to freshwater spawning areas in the Sacramento-San Joaquin Delta. They are found only from Suisun Bay upstream through the Delta in Contra Costa, Sacramento, San Joaquin, and Yolo Counties. Their historic range is thought to have extended from Suisun

Bay upstream to at least Sacramento on the Sacramento River and Mossdale on the San Joaquin River.

Longfin smelt (*Spirinchus thaleichthys*) is listed as a candidate for listing under FESA and threatened under CESA. Longfin smelt reside in the Bay Delta and spawn yearly in the Delta, Suisun Marsh, and Suisun Bay. In dry years, longfin smelt can spawn in the upper Sacramento River and have been observed as far up as Colusa State Park.

Suitable habitat is present for both smelt species in the Sacramento River at the eastern end of the BSA and Prospect Slough within the Yolo Bypass. Prospect Slough may provide suitable spawning habitat for longfin melt. The BSA is within designated critical habitat for Delta smelt.

Giant Garter Snake

The giant garter snake (GGS) (*Thamnophis gigas*) is listed as threatened under FESA and CESA. This species is found in a wide range of aquatic habitats with emergent structure for basking and feeding. GGS also uses adjacent upland sites for nesting and hibernation. The species is generally considered active from May 1 to September 30. The period from October 1 to April 30 is considered the snakes' hibernation period, and they are typically found in underground refugia (e.g., burrows, riprap, debris piles) during this time.

Habitat assessment surveys were performed between December 18 and 30, 2020, and June 12, 2022, to identify the location of potential GGS habitat within 200 feet of the BSA. A total of 101.2 acres of suitable aquatic habitat and 87 acres of marginal aquatic habitat were identified within 200 feet of the BSA (Appendix E of the NES). No GGSs were observed during the surveys.

Swainson's Hawk

SWHA (*Buteo swainsoni*) is listed as threatened under CESA. SWHA nests in stands with few trees in juniper-sage flats, riparian areas, oak savannah, and open agricultural habitats. They require adjacent open fields for foraging, including livestock pastures, grasslands, alfalfa, or grain fields. According to a study performed by Estep (2009) regarding the suitability of vegetation structure on SWHA foraging habitat, different habitats offer either high, moderate, or low suitability for SWHA foraging. Their preferred prey items are voles (*Microtus* sp.), pocket gophers (*Thomomys bottae*), birds, and insects such as grasshoppers (*Caelifera* sp.) (Estep 1989). SWHAs are migratory and typically begin arriving in their breeding territory in the Central Valley in early March to April and immediately begin reconstructing previously used nests or constructing new ones (Estep 2009). They typically begin their southerly migration in early August to mid-September (Estep 2009). The BSA occurs within the current range of SWHA.

Protocol-level SWHA surveys were performed according to the SWHA Survey Protocol described in the Recommended Timing and Methodology for Swainson's Hawk Nesting Surveys in California's Central Valley (Swainson's Hawk Technical Advisory Committee 2000). Per the SWHA Survey Protocol, the BSA was established with a 0.5-mile buffer around the BSA to survey for nesting SWHAs. Initial surveys were performed by Stantec biologists on January 12

and February 17, 2021, to identify suitable nests that could be utilized by SWHAs and other raptor species.

The surveys identified 95 potential nests that SWHAs and other raptor species (e.g., white-tailed kite) could use for nesting within 0.5-mile of the BSA. The survey efforts identified Fremont cottonwoods, valley oaks, and other tall trees within and immediately adjacent to the BSA that provide suitable nest trees for SWHAs and white-tailed kites. The annual grassland, agriculture, and ruderal habitat within the BSA provides potential foraging habitat for the species. Surveys were performed between March 22–26 and 29 and April 5–9 and 12, 2021, to document SWHA activity and identify territories. The SWHA survey identified a total of 24 active SWHA nests and 14 other raptor (i.e., 10 red-tailed hawks, one red-shouldered hawk, two great horned owls, and one osprey) nests within 0.5-mile of the BSA. Post-fledgling surveys conducted on July 7–9, 2021, identified 13 successful fledglings. Further details of the SWHA surveys can be found in Appendix H of the NES.

Bald Eagle

Bald eagles (*Haliaeetus leucocephalus)* are typically found near large bodies of water or free flowing rivers with abundant fish and adjacent snags. They build large nests in large trees in open areas. The BSA occurs within the wintering range of bald eagles. There are no CNDDB recorded occurrences within 5 miles of the BSA. However, one bald eagle was observed soaring over the Yolo Bypass on April 6, 2021, during the SWHA survey. The aquatic habitat within and adjacent to the Yolo Bypass provides potential foraging habitat for migratory bald eagles. Given the potential foraging habitat present in the BSA, no documented occurrences within 5 miles of the BSA, and no eagles or eagle-size nests observed during the 2021 field surveys, there is low potential for this species to nest within or adjacent to the BSA. The species may forage in the vicinity of the BSA or be present in the winter during migration.

Western Yellow-Billed Cuckoo

Western yellow-billed cuckoo (*Coccyzus americanus occidentalis)* is listed as threatened under FESA and endangered under CESA. It is a migratory bird wintering in South America. Within California, breeding populations are rare and scattered through the state, with the closest breeding habitat along the Sacramento River, approximately 40 miles north of the BSA near Colusa. Western yellow-billed cuckoo breeds in dense wooded riparian habitat, typically large, contiguous areas of undisturbed habitat.

The BSA is not within the current breeding range of western yellow-billed cuckoos, and large stands of dense wooded riparian habitat that could provide nesting habitat are absent from the BSA. However, western yellow-billed cuckoos could utilize the riparian habitat surrounding Putah Creek, Sacramento River, and portions of the Yolo Bypass within and adjacent to the BSA as migratory stopover habitat. A single CNDDB recorded occurrence of the species documents observances made in September 2012 and August 2013 along Putah Creek less than 2 miles west of the BSA. As such, based on the reconnaissance-level survey efforts and CNDDB record, the riparian habitats present in the BSA may provide potential foraging and migratory stopover habitat for western yellow-billed cuckoos.

Least Bell's Vireo

Least Bell's vireo (*Vireo bellii pusillus)* is listed as endangered under FESA and CESA. It is a migratory bird wintering in southern Baja California. Within California, breeding populations are mostly in the southern portion of the state with a small breeding habitat in the Yolo Bypass, approximately 3.5 miles south of the BSA. Least Bell's vireo is known to nest in riparian woodlands dominated by willow and Fremont's cottonwood. Suitable willow woodlands are typically dense with well-defined vegetative strata or layers. The most critical structural component of nesting habitat in California is a dense shrub layer 2 to 10 feet above the ground. Ideal least Bell's vireo nesting habitat consists of a riparian corridor at least 800 feet wide. Individuals may forage in adjacent scrub or chaparral habitat; and during winter, they utilize scrub vegetation adjacent to watercourses or riparian gallery forests along the west coast of northern and central Mexico. Foraging typically takes place within riparian habitat but may also extend into adjacent upland vegetation; in particular, elderberry may be important food sources for the species (USFWS 1998).

The BSA is within the current breeding range of least Bell's vireo. However, specific habitat requirements for breeding are not present within the riparian habitat identified within the BSA since the riparian areas lack the vegetative density and cover required by the species for nesting; however, the riparian habitat in the BSA may serve as foraging habitat for the species. The most recent CNDDB recorded occurrence is from year 2011, approximately 3.5 miles south of the BSA in the Yolo Bypass Wildlife Area, documenting a nesting pair in undisturbed riparian scrub habitat. Based on the reconnaissance-level survey efforts and the CNDDB occurrence, the riparian habitats present in the BSA may provide potential foraging and migratory stopover habitat for least Bell's vireo.

Tricolored Blackbird

Tricolored blackbird (*Agelaius tricolor)* is listed as a threatened species under CESA. They are colonial nesters, with tricolored blackbirds forming the largest colonies of any North American passerine bird. Thousands of birds may occur at a single site. Breeding typically occurs from mid-April through July with nests built in dense vegetation such as cattails (*Typha* sp.), tules (*Scirpus* sp.), willow thickets (*Salix* spp.), and blackberry (*Rubus* sp.). The average clutch size is 3 to 4 eggs, and two clutches may be produced per year. Tricolored blackbirds forage on insects, cultivated grains, seeds, and fruits, depending on the season (Beedy and Hamilton 1999).

The most recent CNDDB recorded occurrence of tricolored blackbird is from year 2014, approximately 5 miles south of the BSA in the Yolo Bypass and documents approximately 100 individuals within a nesting colony. Habitat assessment surveys were performed on January 5 and 7, 2021, and July 7, 2022, to identify potential tricolored blackbird nesting habitat within 500 feet of the BSA. A total of 498.7 acres of potentially suitable habitat for tricolored blackbird is within 500 feet of the BSA. Potentially suitable habitat was identified as lands that are planted in alfalfa, natural or semi-natural lands (e.g., grassland, ruderal/grassland, willow scrub, and emergent marsh) on larger parcels (generally greater than approximately 20 acres) that border other open lands. No tricolored blackbirds were observed during the surveys. Further details of the tricolored blackbird habitat assessment can be found in Appendix G of the NES.

2.3.5.3 Environmental Consequences

No Build Alternative 1

Construction and Operation

No Build Alternative 1 would make no physical or operational improvements within the BSA. Therefore, No Build Alternative 1 would not affect state or federally listed plant or animal species.

Build Alternatives 2a and 2b

Construction

Effects determinations for federally listed species and designated critical habitat are listed in Table 2.3-10. A discussion of potential project impacts on both state and federally listed species is also provided below.

Table 2.3-10. Effects on Federally Listed Species – Build Alternatives 2a and 2b

Common Name	Scientific Name	Status	Effect Finding	Effect Finding for Critical Habitat (if applicable)
Plants				
palmate-bracted bird's-beak	*Chlorophyron palmatum*	FT	No Effect	N/A
Colusa grass	*Neostapfia colusana*	FT	No Effect	N/A
Keck's checkerbloom	*Sidalcea keckii*	FE	No Effect	No Effect
Crampton's tuctoria or Solano grass	*Tuctoria mucronate*	FE	No Effect	No Effect
Invertebrates				
conservancy fairy shrimp	*Branchinecta conservatio*	FE	No Effect	N/A
vernal pool fairy shrimp	*Branchinecta lynchi*	FT	No Effect	N/A
vernal pool tadpole shrimp	*Lepidurus packardi*	FE	No Effect	N/A
valley elderberry longhorn beetle	*Desmocerus californicus dimporphus*	FT	May affect, likely to adversely affect	No Effect
Delta green ground beetle	*Elaphrus viridis*	FT	No Effect	N/A
Fish				
green sturgeon southern DPS	*Acipenser medirostris*	FT	No Effect	No Effect
steelhead- Central Valley DPS	*Oncorhynchus mykiss irideus* pop. 11	FT	No Effect	No Effect

Common Name	Scientific Name	Status	Effect Finding	Effect Finding for Critical Habitat (if applicable)
Chinook salmon- Central Valley spring-run ESU	*Oncorhynchus tshawytscha* pop. 11	FT	No Effect	No Effect
Chinook salmon- Central Valley winter-run ESU	*Oncorhynchus tshawytscha* pop. 7	FE	No Effect	No Effect
Delta smelt	*Hypomesus transpacificus*	FT	No Effect	No Effect
longfin smelt	*Spirinchus thaleichthys*	FC	No Effect	No Effect
Amphibians and Reptiles				
California tiger salamander	*Ambystoma californiense*	FT	No Effect	N/A
western pond turtle *Emys marmorata*		FP	No Effect	N/A
California red-legged frog	*Rana draytonii*	FE	No Effect	N/A
western spadefoot	*Spea hammondii*	FP	No Effect	N/A
giant garter snake	*Thamnophis gigas*	FT	May affect, likely to adversely affect	N/A
Birds				
western snowy plover	*Charadrius nivosus nivosus*	FT	No Effect	N/A
western yellow-billed cuckoo	*Coccyzus americanus occidentalis*	FT	No Effect	No Effect
least Bell's vireo	*Vireo bellii pusillus*	FE	No Effect	No Effect

Federally listed Plants

Protocol-level botanical surveys were performed during the blooming period of federally listed plants that had potential habitat within the BSA. No federally listed plants occur within the BSA; therefore, no adverse effects would occur. However, Standard Measure BIO-4 (Appendix E) has been incorporated into the project to further reduce the potential for impacts to listed plants outside the BSA to occur as a result of the project, including the spread or introduction of non-native plants within the BSA.

Wildlife

VALLEY ELDERBERRY LONGHORN BEETLE

A total of six elderberry shrubs would be directly affected, and 28 shrubs, located within 165 feet of impact areas, would be indirectly affected by the project. This corresponds with approximately 2.4 acres of temporary impacts and 3.1 acres of permanent impacts to suitable non-riparian (e.g., annual grasslands, ornamental) VELB habitat. Indirect impacts could result from dust,

from removal of terrestrial vegetative cover that could increase microclimate temperatures, increase in hazardous materials, and the potential introduction of invasive plant species by construction equipment. With implementation of Standard Measures BIO-1, BIO-3, and BIO-4, adverse effects on VELB would be avoided/minimized. In addition, the implementation of AMMs BIO-16 through BIO-21 would minimize and mitigate for impacts on VELB and their habitat.

Caltrans initiated formal consultation with USFWS on May 12, 2023, for effects to VELB. The Department received a Biological Opinion for the species on April 12, 2024. The Biological Opinion is in Appendix M.

CENTRAL VALLEY DPS STEELHEAD, CENTRAL VALLEY SPRING-RUN ESU CHINOOK SALMON, SACRAMENTO RIVER WINTER-RUN ESU CHINOOK SALMON, AND GREEN STURGEON

No work is taking place within or near aquatic habitat of listed fish species. Implementation of the project would not result in direct or indirect impacts on Central Valley DPS steelhead, Central Valley spring-run ESU Chinook salmon, Sacramento River winter-run ESU Chinook salmon, or green sturgeon.

DELTA SMELT AND LONGFIN SMELT

No work is taking place within or near aquatic habitat for listed fish species. Implementation of the project would not result in direct or indirect impacts on Delta smelt or longfin smelt.

GIANT GARTER SNAKE

Approximately 4.265 acres of GGS habitat would be permanently impacted. Permanent habitat impacts would result from the bike path improvements. Approximately 3.669 acres of temporary habitat impacts would result from installation of the fiber optic line, bike path improvements, and staging areas. Direct impacts on GGS could result from an increase of hazardous materials, habitat loss, and the crushing of individuals from construction equipment. Indirect impacts could result from removal of terrestrial vegetative cover, which could increase microclimate temperatures and the potential introduction of invasive plant species, which would degrade the quality of potential habitat, by construction equipment and materials.

With implementation of Standard Measures BIO-1, BIO-2, BIO-3, and BIO-4, any adverse effect on GGS would be avoided/minimized. In addition, AMMs BIO-22 through BIO-30 would minimize impacts on GGS.

Caltrans initiated formal consultation with USFWS on May 12, 2023, for effects to GGS. The Department received a Biological Opinion for the species on April 12, 2024. The Biological Opinion is in Appendix M.

SWAINSON'S HAWK

The project could result in a temporary and permanent loss of foraging habitat and displacement of nesting SWHA due to project activities. Direct disturbance from construction activities, such as pile driving, operation of vehicles, heavy equipment operation, and earth-moving operations around active nests could result in stress, injury, or mortality to individuals. The project would

have temporary impacts on foraging habitat through the staging of equipment, temporary construction access, and other construction activities. Permanent loss of foraging habitat would result from the proposed Park and Ride, proposed bike path improvements, connector structure, and other road widening. A total of approximately 10.0 acres of SWHA foraging habitat consisting of grassland and croplands (i.e., hayfield) would be permanently lost. Based on current project designs and the protocol survey results, no trees with active SWHA nests have been slated for removal.

With implementation of Standard Measures BIO-1 and BIO-2, adverse effects on SWHAs would be avoided. In addition, AMMs BIO-31 through BIO-32 would minimize impacts on SWHA.

WESTERN YELLOW-BILLED CUCKOO AND LEAST BELL'S VIREO

The suitable migratory stopover and foraging habitat (i.e., riparian vegetation) for western yellow-billed cuckoo and least Bell's vireo is located within existing Caltrans right-of-way where there are currently frequent anthropogenic disturbances from vehicles and ongoing maintenance activities (e.g., grass mowing, tree trimming, trash pickup). The riparian vegetation within these areas would not be removed, and the activities proposed in the staging areas would be similar to those already occurring in the area (e.g., high volumes of traffic and other disturbances associated with the highway). Therefore, there will be no impact on western yellow-billed cuckoo or least Bell's vireo as a result of project implementation.

Implementation of Standard Measures BIO-1 and BIO-2 would further reduce the potential for impacts on western yellow-billed cuckoo and least Bell's vireo.

TRICOLORED BLACKBIRD

Nesting habitat identified for tricolored blackbirds consists of small isolated patches within and adjacent to the BSA. The species typically nests in more extensive patches of vegetation. With limited habitat available, the likelihood of tricolored blackbirds nesting within or adjacent to the BSA is low. However, if nesting tricolored blackbirds are present within or adjacent to construction areas, they could be disturbed and abandon their nests.

Standard Measures BIO-1 and BIO-2 would avoid/minimize adverse effects on tricolored blackbird. In addition, implementation of AMMs BIO-6 would minimize impacts on tricolored blackbird.

Operation

Once construction is completed, the Build Alternative 2a and 2b would carry two more travel lanes than existing conditions. However, the impacts to federal and state listed animal species would not increase from existing conditions.

Build Alternatives 3a and 3b

Construction and Operation

Build Alternatives 3a and 3b would involve adding an HOT2+ lane in each direction. Build Alternatives 3a and 3a propose similar project components within the same project area as Build Alternatives 2a and 2b, respectively; therefore, the effects would be the same as effects described under Build Alternatives 2a and 2b.

Build Alternatives 4a and 4b

Construction and Operation

Build Alternatives 4a and 4b would involve adding an HOT3+ lane in each direction. Build Alternatives 4a and 4b propose similar project components within the same project area as Build Alternatives 2a and 2b, respectively; therefore, the effects would be the same as effects described under Build Alternatives 2a and 2b.

Build Alternatives 5a and 5b

Construction and Operation

Build Alternatives 5a and 5b would involve adding an express lane in each direction. Build Alternatives 5a and 5b propose similar project components within the same project area as Build Alternatives 2a and 2b, respectively; therefore, the effects would be the same as effects described under Build Alternatives 2a and 2b.

Build Alternatives 6a and 6b

Construction and Operation

Build Alternatives 6a and 6b would involve adding a transit-only lane in each direction. Build Alternatives 6a and 6b propose similar project components within the same project area as Build Alternatives 2a and 2b; therefore, the effects would be the same as effects described under Build Alternatives 2a and 2b.

Build Alternatives 7a and 7b

Construction and Operation

Build Alternatives 7a and 7b would involve repurposing the current number 1 general purpose lane to HOV 2+. No new lanes would be constructed. Build Alternatives 7a and 7b propose similar project components within the same project area as Build Alternatives 2a and 2b, respectively; therefore, the effects would be the same as effects described under Build Alternatives 2a and 2b.

2.3.5.4 Avoidance, Minimization, and/or Mitigation Measures

Caltrans would implement the following AMMs to reduce impacts to threatened and endangered species.

- **AMM BIO-16: VELB Avoidance Area.** Activities that may damage or kill an elderberry shrub (e.g., trenching, paving) may need an avoidance area of at least 6 meters (20 feet) from the drip line, depending on the type of activity.

- **AMM BIO-17: Worker Education for VELB.** Prior to initiation of construction activities, workers will participate in environmental awareness training provided by a qualified biologist. The training will include VELB-specific information to all contractors, work crews, and any on-site personnel on the status of the VELB, its host plant and habitat, the need to avoid damaging the elderberry shrubs, and the possible penalties for noncompliance.

- **AMM BIO-18: VELB Timing.** As much as feasible, all activities that could occur within 50 meters (165 feet) of an elderberry shrub will be conducted outside of the flight season of the VELB (March–July).

- **AMM BIO-19: Erosion Control and Re-Vegetation.** Erosion control will be implemented, and the affected area will be revegetated with appropriate native plants.

- **AMM BIO-20: Elderberry Shrub Transplanting.** If the elderberry shrub cannot be avoided, or if indirect effects will result in the death of stems or the entire shrub, then it should be relocated following the transplanting guidelines:

    - **Monitor.** A qualified biologist will be on-site for the duration of transplanting activities to check for compliance with avoidance and minimization measures and other conservation measures.

    - **Exit Holes.** Exit-hole surveys will be completed immediately before transplanting. The number of exit holes found, GPS location of the plant to be relocated, and the GPS location of where the plant is transplanted will be reported to USFWS and CNDDB.

    - **Timing.** Elderberry shrubs will be transplanted when the shrubs are dormant (November through the first 2 weeks in February) and after they have lost their leaves. Transplanting during the non-growing season will reduce shock to the shrub and increase transplantation success.

    - **Transplanting Procedure.** Transplanting will follow the most current version of the American National Standards Institute A300 (Part 6) guidelines for transplanting (http://www.tcia.org/).

    - **Trimming Procedure.** Trimming will occur between November and February and should minimize the removal of branches or stems that exceed 1 inch in diameter.

- **AMM BIO-21: Compensation for Loss of VELB Habitat.** To mitigate for the removal of elderberry shrubs, Caltrans will purchase credits at a 1:1 ratio at a USFWS-approved conservation bank.

- **AMM BIO-22: GGS Timing.** Construction outside of paved areas will be conducted between May 1 and October 1, which is the active season for GGS, in order to minimize impacts to the species.

- **AMM BIO-23: GGS Exclusionary Fencing.** Where practicable, GGS exclusion fencing will be placed around the BSA before construction during the active period for GGS (May 1–October 1) and will be maintained through the construction period until the project has been completed.

- **AMM BIO-24: Agency Notification for GGS.** Caltrans will notify CDFW and USFWS seven days prior to when construction is scheduled to commence.

- **AMM BIO-25: Worker Education for GGS.** A Worker Environmental Awareness Training Program for construction personnel will be conducted by a USFWS and CDFW-approved biologist for all construction workers, including contractors, prior to the start of construction activities. This training will instruct workers to recognize GGS and their habitats.

- **AMM BIO-26: Pre-construction Survey for GGS.** Twenty-four hours prior to construction activities, the BSA will be surveyed for GGS by a USFWS and CDFW-approved biologist. Surveys of the BSA will be repeated if a 2-week or greater lapse in construction activity occurs. If GGS is encountered during construction, activities will cease until appropriate corrective measures have been completed or it has been determined that the GGS will not be harmed. Any sightings and any incidental take will be reported to USFWS and CDFW immediately by telephone at (916) 414-6600 or (916) 358-2900, respectively, and email or written letter addressed to the Chief, Sacramento Division (USFWS) or North Central Region (CDFW), within 1 working day of the incident.

- **AMM BIO-27: GGS Environmentally Sensitive Area.** The canals and rice fields adjacent to the BSA will be flagged and designated as an environmentally sensitive area during the construction period.

- **AMM BIO-28: GGS Post-Construction Reporting.** Upon completion of the project, all disturbed areas within the BSA will be revegetated using native plant species, and post-monitoring work and pictures will be reported to USFWS and CDFW showing that temporary impacts have been restored to pre-construction conditions.

- **AMM BIO-29: GGS Escape Ramp.** At the end of each workday, Caltrans will place an escape ramp at each end of any open trenches. This will allow any animals that may have been trapped in the trench to climb out overnight. The escape ramp may be constructed of dirt fill, wood planking, or other suitable material and placed at an angle no greater than 30 degrees.

- **AMM BIO-30: Compensation for Loss of GGS Habitat.** Caltrans will mitigate for the permanent loss of GGS habitat through the purchase of GGS mitigation bank credits. These mitigation credits will be purchased from a USFWS- and CDFW-approved GGS mitigation bank possessing a conservation easement in perpetuity with available credits

located in the Sacramento County service area prior to impacts to the species. Caltrans will purchase these credits and provide a bill of sale acceptable and approved by CDFW/USFWS before construction begins. To compensate for the permanent loss of approximately 4.264 acres of GGS habitat, Caltrans will purchase 12.792 acres (a 3:1 ratio) of GGS credits.

- **AMM BIO-31: Pre-construction SWHA Survey.** If construction is to occur between February 1 and September 30, a qualified biologist will conduct pre-construction surveys for nesting SWHA, white-tailed kite, and northern harrier. The pre-construction surveys will include the project footprint and a 0.5-mile buffer for SWHA. The survey will be conducted no more than 15 days prior to the initiation of construction so that no active nests will be disturbed.

- **AMM BIO-32: SWHA Agency Consultation.** If a no disturbance buffer around an active SWHA is not practicable, CDFW will be consulted to determine alternative measures to minimize the potential for project-related disturbance to the nest site that could result in nest abandonment or other forms of take. Measures may include, but are not limited to, continuous biological monitoring by a qualified biologist until it has been determined that the young have fledged and are no longer reliant on the nest or parental care for survival or until the construction is complete. If the nesting pair show signs of distress as a result of project-related activities (e.g., adults leaving the nest when eggs or young chicks are present), the monitoring biologist will have authority to stop work until it is determined that the adults have returned and are no longer showing signs of distress.

2.3.6 Invasive Species

2.3.6.1 Regulatory Setting

On February 3, 1999, President William J. Clinton signed Executive Order (EO) 13112 requiring federal agencies to combat the introduction or spread of invasive species in the United States. The order defines invasive species as “any species, including its seeds, eggs, spores, or other biological material capable of propagating that species, that is not native to that ecosystem whose introduction does or is likely to cause economic or environmental harm or harm to human health.” Federal Highway Administration (FHWA) guidance issued August 10, 1999 directs the use of the State’s invasive species list, maintained by the California Invasive Species Council to define the invasive species that must be considered as part of the National Environmental Policy Act (NEPA) analysis for a proposed project.

2.3.6.2 Affected Environment

The botanical surveys and vegetation characterization conducted on May 10–14 and 18–20, 2021, and July 14, 2022, within the BSA. Eleven distinct vegetation communities were identified within the BSA; these are described in Section 2.3.1, Natural Communities.

Several non-native invasive plant species are present within or adjacent to the BSA, as listed in Table 2.3-11. These species dominate much of the roadway shoulder landscape within the BSA as well as much of the landscape being affected by grading or filling.

Table 2.3-11. Invasive Plant Species Present within the BSA

Cal-IPC Rating[1]	Scientific Name[2]	Common Name[2]
High	*Arundo donax*	giant reed
	Centaurea solstitialis	yellow starthistle
	Hedera helix	English ivy
	Lepidium latifolium	perennial pepperweed
	Ludwigia hexapetala	six petal water primrose
	Rubus armeniacus	Himalayan blackberry
	Tamarix parviflora	tamarisk
Moderate	*Ailanthus altissima*	tree of heaven
	Avena fatua	wildoats
	Brassica nigra	black mustard
	Bromus diandrus	ripgut brome
	Centaurea melitensis	tocalote
	Conium maculatum	poison hemlock
	Cynodon dactylon	Bermuda grass
	Dipsacus fullonum	wild teasel
	Festuca arundinacea	reed fescue
	Festuca myuros	rattail sixweeks grass
	Hirschfeldia incana	mustard
	Hordeum marinum ssp. *gussoneanum*	barley
	Hordeum murinum	foxtail barley
	Lythrum hyssopifolia	hyssop loosestrife
	Mentha pulegium	pennyroyal
	Nicotiana glauca	tree tobacco
	Oxalis pes-caprae	Bermuda buttercup
	Phalaris aquatica	harding grass
	Torilis arvensis	field hedge parsley
	Vinca major	vinca
Limited	*Bromus hordeaceus*	soft chess
	Carduus tenuiflorus	slender flowered thistle
	Dactylis glomerata	orchardgrass
	Erodium cicutarium	coastal heron's bill
	Geranium dissectum	wild geranium
	Hypochaeris glabra	smooth cat’s ear
	Medicago polymorpha	California burclover
	Phoenix canariensis	Canary Island date palm
	Plantago lanceolata	ribwort

Cal-IPC Rating[1]	Scientific Name[2]	Common Name[2]
	Polypogon monspeliensis	annual beard grass
	Raphanus sativus	jointed charlock
	Robinia pseudoacacia	black locust
	Rumex crispus	curly dock
	Salsola tragus	Russian thistle
	Schinus molle	Peruvian pepper tree
	Silybum marianum	milk thistle
	Stipa miliacea var. *miliacea*	smilo grass
	Trifolium hirtum	rose clover

Notes:
1. California Invasive Plant Inventory. Available at https://www.cal-ipc.org/plants/inventory/. Accessed February 28, 2021. (Cal-IPC. 2021)
High: Species has severe ecological impacts on physical processes, plant and animal communities, and vegetation structure. Its reproductive biology and other attributes are conducive to moderate to high rates of dispersal and establishment. Most are widely distributed ecologically. **Moderate**: Species have substantial and apparent, but generally not severe, ecological impacts on physical processes, plant and animal communities, and vegetation structure. Their reproductive biology and other attributes are conducive to moderate to high rates of dispersal, though establishment is generally dependent upon ecological disturbance. Ecological amplitude and distribution may range from limited to widespread. **Limited**: Species are invasive but its ecological impacts are minor on a statewide level or there was not enough information to justify a higher score. The species reproductive biology and other attributes result in low to moderate rates of invasiveness. Ecological amplitude and distribution are generally limited, but these species may be locally persistent and problematic.
2. Taxonomic nomenclature for plant species followed Baldwin, B. G.,D. H. Goldman,R. P. D. J. Keil,T. J. Rosatti, and D. H. Wilken, editors. 2012. *The Jepson Manual: Vascular Plants of California.* Second Edition. University of California Press. Berkeley, California. (Baldwin 2012)

2.3.6.3 Environmental Consequences

No Build Alternative 1

Construction and Operation

No Build Alternative 1 would make no physical or operational improvements within the BSA. Therefore, No Build Alternative 1 would not affect invasive species.

Build Alternatives 2a and 2b

Construction

Build Alternatives 2a and 2b have the potential to contribute to the spread or introduction of invasive species within the BSA from seeds being present on construction equipment and vehicles. The BSA is currently colonized by a relatively large amount of invasive plant species that may be removed or spread around during construction. Overall, the project has the potential to result in the colonization of additional species. Implementation of Standard Measure BIO-3 (see Appendix E) would further avoid the potential for the spread of invasive species in the BSA.

Operation

Once construction is completed, Build Alternatives 2a and 2b would carry two more travel lanes than existing conditions. However, the effects on invasive species would not increase from existing conditions.

Build Alternatives 3a and 3b

Construction and Operation

Build Alternatives 3a and 3b would involve adding an HOT2+ lane in each direction. Build Alternatives 3a and 3a propose similar project components within the same project area as Build Alternatives 2a and 2b, respectively; therefore, the effects would be the same as effects described under Build Alternatives 2a and 2b.

Build Alternatives 4a and 4b

Construction and Operation

Build Alternatives 4a and 4b would involve adding an HOT3+ lane in each direction. Build Alternatives 4a and 4b propose similar project components within the same project area as Build Alternatives 2a and 2b, respectively; therefore, the effects would be the same as effects described under Build Alternatives 2a and 2b.

Build Alternatives 5a and 5b

Construction and Operation

Build Alternatives 5a and 5b would involve adding an express lane in each direction. Build Alternatives 5a and 5b propose similar project components within the same project area as Build Alternatives 2a and 2b, respectively; therefore, the effects would be the same as effects described under Build Alternatives 2a and 2b.

Build Alternatives 6a and 6b

Construction and Operation

Build Alternatives 6a and 6b would involve adding a transit-only lane in each direction. Build Alternatives 6a and 6b propose similar project components within the same project area as Build Alternatives 2a and 2b; therefore, the effects would be the same as effects described under Build Alternatives 2a and 2b.

Build Alternatives 7a and 7b

Construction and Operation

Build Alternatives 7a and 7b would involve repurposing the current number 1 general purpose lane to HOV 2+. No new lanes would be constructed. Build Alternatives 7a and 7b propose similar project components within the same project area as Build Alternatives 2a and 2b,

respectively; therefore, the effects would be the same as effects described under Build Alternatives 2a and 2b.

2.3.6.4 Avoidance, Minimization, and/or Mitigation Measures

No AMMs or MMs are required to reduce effects related to invasive plant species.

2.4 Cumulative Impacts

The analysis in this section is supported by the Project-specific Cumulative Impact Assessment prepared for the Project (GPA Consulting 2023)

2.4.1 Regulatory Setting

Cumulative impacts are those that result from past, present, and reasonably foreseeable future actions, combined with the potential impacts of the proposed project. A cumulative impact assessment looks at the collective impacts posed by individual land use plans and projects. Cumulative impacts can result from individually minor but collectively substantial impacts taking place over a period of time.

Cumulative impacts to resources in the project area may result from residential, commercial, industrial, and highway development, as well as from agricultural development and the conversion to more intensive agricultural cultivation. These land use activities can degrade habitat and species diversity through consequences such as displacement and fragmentation of habitats and populations, alteration of hydrology, contamination, erosion, sedimentation, disruption of migration corridors, changes in water quality, and introduction or promotion of predators. They can also contribute to potential community impacts identified for the project, such as changes in community character, traffic patterns, housing availability, and employment.

The California Environmental Quality Act (CEQA) Guidelines Section 15130 describes when a cumulative impact analysis is necessary and what elements are necessary for an adequate of cumulative impacts. The definition of cumulative impacts under CEQA can be found in Section 15355 of the CEQA Guidelines. A definition of cumulative impacts under the National Environmental Policy Act (NEPA) can be found in 40 Code of Federal Regulations (CFR) Section 1508.7.

The CEQA definition of cumulative impact refers to two or more individual effects which, when considered together, are considerable or which compound or increase other environmental impacts. The individual effects may be changes resulting from a single project or multiple projects. The cumulative impact from several projects is the change in the environment, which results from the incremental impact of the Project when added to other closely related past, present, and reasonably foreseeable probable future projects. Cumulative impacts can result from individually minor but collectively significant projects taking place over a period of time.

Cumulative impacts were previously defined under the Council on Environmental Quality (CEQ) Regulations for Implementing the Procedural Provisions of the NEPA at Title 40 Code of CFR Section 1508.7. The CEQ is responsible for developing Federal procedures to comply with

NEPA. In July 2020, CEQ comprehensively updated the NEPA regulations, repealing the definition of cumulative impacts. Subsequently, Executive Order 13990, Protecting Public Health and the Environment and Restoring Science to Tackle the Climate Crisis (January 2021) directed all agencies to "immediately review and, as appropriate and consistent with applicable law, take action to address the promulgation of Federal regulations and other actions during the last four years that conflict with these important national objectives" to tackle climate change.

2.4.2 Methodology

The cumulative impact study for the Project was developed by following the eight-step process set forth in the California Department of Transportation's (Caltrans) *Guidance for Preparers of Cumulative Impact Analysis* (Caltrans 2005):

1. Identify resources to consider in the cumulative impact analysis
2. Define the resource study area
3. Describe the current condition and historical context of each resource
4. Identify Project impacts that might contribute to cumulative impacts
5. Identify other reasonably foreseeable future actions that affect each resource
6. Assess potential cumulative impacts
7. Report the results
8. Assess the need for avoidance, minimization, and/or mitigation measures

The cumulative impacts study area (study area) was selected to identify other current or reasonably foreseeable future actions. The study area is generally bounded by the I-80 corridor between PM 40.7 and 44.7 in Solano County, between PMs 0.00 and 11.72 in Yolo County, and between PMs 0.00 and 1.36 in Sacramento County; and US-50 between PMs 0.00 and 3.12 in Yolo County and between PMs 0.00 and 0.617 in Sacramento County. The boundaries of the study area were delineated by reviewing the area within a 2- to 4-mile radius of the Project area, and then adjusting the boundaries based on major roadways and land use/neighborhood boundaries. The current and reasonably foreseeable future actions are listed in Table 2.4-1and shown in Figure 2.4-1 may not be an exhaustive list of every planned project within the study area's cities and communities. The list contains projects that have the possibility of contributing to a cumulative effect because 1) the projects would result in similar permanent impacts within the Project Resource Study Area (RSA) or 2) the projects would be constructed within the same time period as the Project (anticipated to begin in spring 2025 and end in 2028) and may result in temporary impacts at the same time as Project construction. Current and reasonably foreseeable actions include relevant transportation projects that overlap the study area. Minor development projects were not included in this analysis because they are part of overall urban development already planned for the study area and consistent with existing land use plans and policies. Therefore, their contribution to cumulative impacts is not expected to be adverse.

Table 2.4-1. List of Relevant Foreseeable Projects

Project ID	Project Name	Jurisdiction	Location	Project Description	Status
Transportation Projects					
T-1	Yolo Pavement Rehabilitation Project 03-4F650	Caltrans District 3	Yolo 80 PM 4.3/R11.4 and Yolo 50 PM 0.0/2.5	This project proposes constructing the median on the I-80 West Capitol Avenue Under Crossing (UC) and the I-80 Reed Avenue UC bridges to accommodate stage construction. Additionally, the 03-4F650 project proposes improvements for critical bridge locations within the corridor to upgrade deck surfaces, approach slabs, and slope paving. The proposed median improvement occurs throughout most of the project to accommodate for stage construction. The median concrete barrier would remain in place at other locations, and the median restriped as part of the 3H900 project to provide managed lanes, with one managed lane in each direction. The project proposes new fiber-optic lines throughout, along with some ramp metering and upgrades to other existing roadway features. These fiber-optic lines would improve the ITS monitoring capability within the corridor.	Planned construction March 2023 to December 2027.
T-2	Sac River Bridge Over Head Bryte Bend Bridge Rehabilitation 03-0F250	Caltrans District 3	Yol 80 PM R11.1/R11.7 and Sac 80 PM M0.0/M0.5: In Yolo and Sacramento Counties and near West Sacramento from 0.1 mile west of Reed Avenue UC to 0.1 mile east of Bryte Bend Bridge.	This project proposes to rehabilitate the Sacramento River Bridge and Overhead (BOH), Br.# 22-0026 L/R, on I-80 at the Yolo/Sacramento County Line in West Sacramento about three miles west of I-5. The project would rehabilitate the Sacramento River Bridge, OH, including replacing the bridge rail, replacing the deck drain system, building barrier pedestals for future electroliers, and installing conduits.	Construction completed in January 2023.

Project ID	Project Name	Jurisdiction	Location	Project Description	Status
T-3	US 50 ICM Infrastructure 03-3H330	Caltrans District 3	US-50 in El Dorado County from the El Dorado County/ Sacramento County line to Stateline Avenue in South Lake Tahoe	This project is on US-50 in and near the cities of Sacramento, Rancho Cordova, and Folsom, from the Yolo/Sacramento County line to Folsom Boulevard; and in Yolo County in West Sacramento along US-50, from the I-80/US-50 interchange to the Yolo/Sacramento County line (PM 0.0 to 3.156), and on I-80 from Enterprise Boulevard to US-50 (PM 9.2 to R9.552). Installation of TMS field elements.	Planned construction September 2021 to December 2023.
T-4	Sac 50 Design-Build 03-0H08U	Caltrans District 3	Sacramento, Sacramento River bridge, Airport Boulevard, SR-99, I-80, US-50	In Sacramento County on US 50 from PM L0.20 to PM R6.10, from the I-5 Junction to Watt Avenue. The project proposes to construct managed lanes and rehabilitate the pavement.	Construction anticipated to be complete in December 2024.
T-5	Richards Boulevard / Olive Drive Circulation Improvements 03-0H360	City of Davis	Sol 80 PM 44.5/44.7 and Yolo 80 PM 0.0/0.5	Davis, in cooperation with Caltrans, has completed a Project Study Report-Project Development Support and would be circulating Draft Project Report / Environmental Document in Early 2022 that evaluates the safety and operational functions of the interchange at Richards Boulevard and I-80. The Davis project proposes to reconfigure the westbound I-80 off-ramp and westbound I-80 on-ramp to a tight diamond; construct additional turn lanes to the eastbound I-80 on-ramp; eliminate the westbound I-80 slip off-ramp to Olive Drive; construct a two-way shared use path on the west side of Richards Boulevard that would pass under the westbound I-80 on-ramp from Richards Boulevard and cross over I-80.	Planned construction December 2023 to June 2025.
T-6	US 50 Metal Beam Guardrail Upgrade 03-1H870	Yolo County	US 50 from PM 0.0 to 3.0 and on I-80 from PM 9.0 to R10.7	The project would replace the guardrail and place vegetation control.	Construction completed December 2021.
T-7	Sac/Placer 80 Fiber Optics 03-0H540	Sacramento County	Sac PM M0.3/18.0 & Pla 80 PM 0.0/0.7	Install fiber-optic conduit, cable and pull boxes, replace sign panels, transition railing, modify ramp metering systems. limits proposed fiber-optic conduits and pull boxes along the I-80 median and eastbound I-80 outside shoulder, along westbound I-80 diagonal and loop on-ramps from West El Camino Ave, along eastbound I-80 off-ramp to West El Camino Real Ave and eastbound I-80 loop on-ramp from West El Camino Real.	Construction completed August 2022.

Project ID	Project Name	Jurisdiction	Location	Project Description	Status
T-8	Yol 80 Olive Drive Bike/Ped connection 03-4H260	City of Davis	PM 0.841/0.851	Bike/Ped structure from Olive Hill Lane to Pole Line RD OC bridge. Closure of eastbound I-80 off-ramp to Olive Hill Road.	Planned construction January 2021 to June 2023.
T-9	Yol 80 Davis 80 Rehabilitation project 03-2J260	City of Davis	PM 0.0/4.40	Remove portion of pavement and replace with RHMA-G and RHMA-O for I-80 mainline and Mace Blvd ramps. Upgrade Mace Blvd drainage facilities, metal beam guard rail, cross walks, ADA ramps and pedestrian push buttons. Install HOV ramp metering systems at Mace Blvd eastbound on-ramps to I-80. Project Initiation Document was signed December 2022.	Planned construction May 2027 to May 2028.
T-10	Sac 5/50 Interchange Painting 03-1H100	City of Sacramento	Sacramento River Viaduct (Pioneer Bridge) to 4th Street; also, on I-5 from 0.2 mile south of Broadway to S Street (PM 22.15 to PM 22.91)	Proposed painting at interchange on Sacramento River Viaduct and on I-5.	Construction completed February 2023.
T-11	Sycamore Trail Pedestrian Overcrossing 03-3H840	City of West Sacramento	City of West Sacramento	City of West Sacramento plans to construct a trail and pedestrian crossing over US-50 that would extend south from the newly developed pedestrian and bicycle trail at Joseph “Joey” Lopes Park to Westmore Oaks Elementary School. The project site is located between Evergreen Avenue and Stone Boulevard along the Sacramento Regional County Sanitation District lower northwest interceptor sewer easement. The width of the overcrossing would be either 16 or 22 feet.	Planned construction March 2023 to April 2024.

Project ID	Project Name	Jurisdiction	Location	Project Description	Status
T-12	Yolo Rail Relocation	City of Davis, along with City of West Sacramento, City of Woodland and Yolo County	City of Davis, City of West Sacramento, City of Woodland, and Yolo County	The Yolo Rail Realignment Project proposes to relocate the existing rail access from the Union Pacific Railroad mainline current alignment along the eastern edge of West Sacramento to a new location west of the I-80/US-50 split. The project would allow for the West Sacramento riverfront to fully realize its redevelopment potential, alleviate significant traffic impact from the existing freight rail alignment, and provide for the opportunity to expand freight rail service to West Sacramento's industrial areas with minimum community impact. It has been proposed to combine a new railroad overhead under I-80 as part of the combined projects 03-4F650 and 03-3H900 between the Yolo Causeway and Enterprise Boulevard to tie into existing tracks leading to/from the Port of West Sacramento.	Planning phase
T-13	County Road 32A Crossing	Yolo County	CR-32A is located north of I-80 and east of the Mace Boulevard interchange	CR-32A to improve bike path connectivity between CR-105 (just east of Davis) and the western terminus of the proposed new Class I bicycle/pedestrian facility of the Managed Lanes Project (03-3H900) that would connect with CR-32A, just west of the westbound CR-32A Off-Ramp. The County recently completed a Project Study Report and is seeking funding for this project.	Planning Phase
T-14	Bridge Preventive Maintenance on Route 505 at Horse Creek Bridge and on Route 80 at McCune Creek Bridge	Caltrans District 4 SHOPP Projects	Vacaville (Solano I-505 and I-80)	In and near Vallejo, Dixon, and Vacaville, at I-80/SR-29 Separation Bridge (No. 23-008), McCune Creek Bridge (No. 23-0084L/R) and Horse Creek Bridge (No. 23-0077L). Bridge preventive maintenance.	Environmental analysis completed in December 2020.
T-15	SOL SR 37, 80 & 780 RRFB 0P760; SOL-Var. 2020 SHOPP	Caltrans District 4 SHOPP Projects	Solano County, Various post markers	Install rectangular rapid flashing beacons in Solano County on various routes (Routes 37, 80, and 780) at various locations.	Construction anticipated to begin in 2022/2023
T-16	SOL-VAR; 2020 SHOPP	Caltrans District 4 SHOPP Projects	Solano County, Various post markers	Install best management practices (stormwater mitigation) at Routes 37, 80, 780, 101, and 121.	Construction anticipated to begin 2023/2024

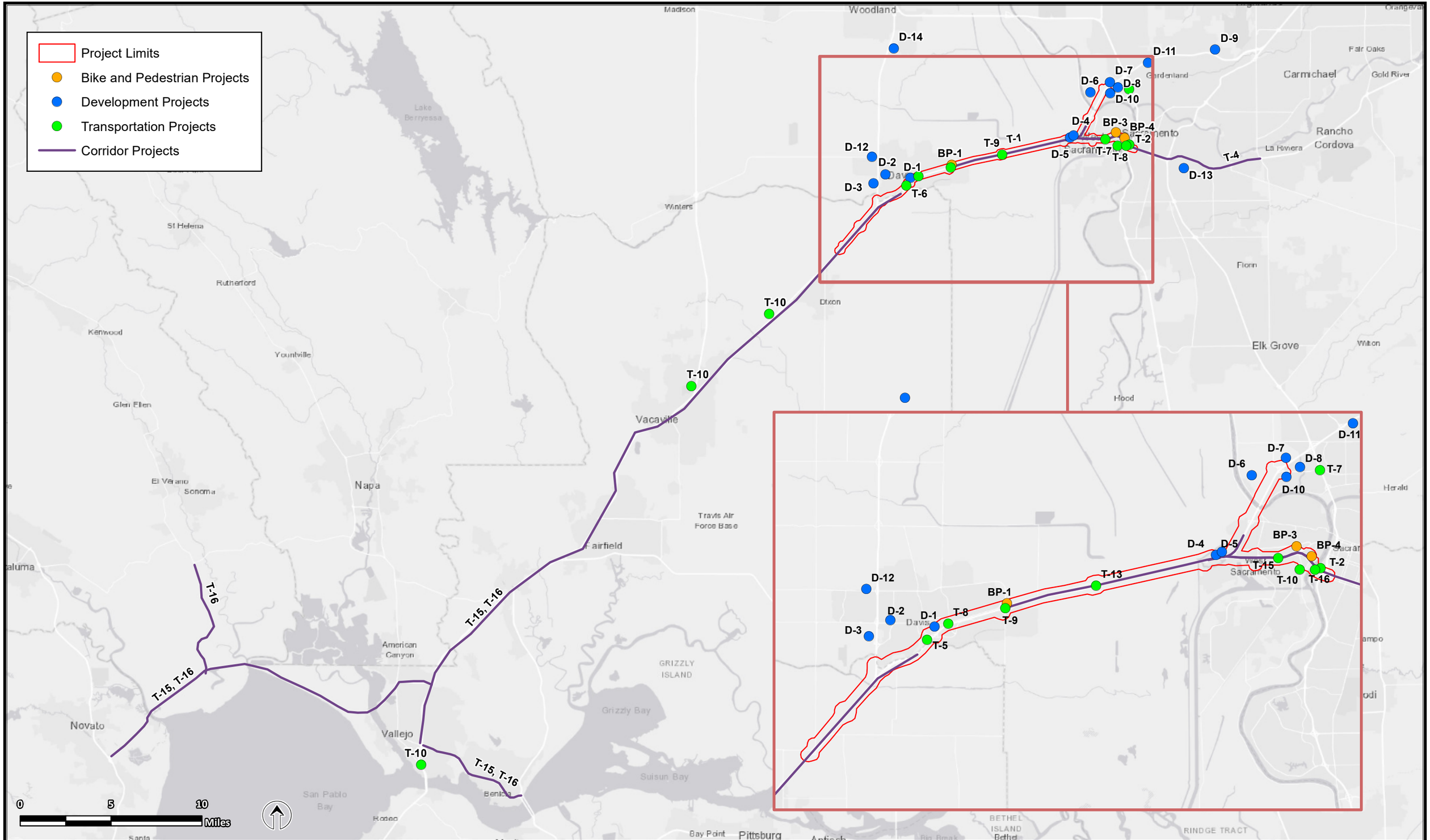
Project ID	Project Name	Jurisdiction	Location	Project Description	Status
T-17	I-5 Corridor Improvement Project 03-4H580	Caltrans D3	SAC 5 22.4-34.4	Caltrans proposes to make improvements on I-5 between post miles 22.4 and 34.4 in Sacramento County. The Proposed Action would address mobility on I-5 from the I-5/State Route (SR) 50 Interchange (south of Downtown Sacramento) to the Yolo County line, including Airport Boulevard, providing a vital link to SMF. This mobility improvement would be accomplished with northbound (NB) and southbound (SB) managed lane strategies. The Project would help relieve current traffic congestion, which would result in improved traffic flow, mobility, travel time, and reliability. In addition, the Project would improve transit access and reduce vehicle emissions and travel costs. Ramps, shoulders and gores would be reconstructed at various locations in the Project area. Some widening of or replacement of existing structures in the Project area would be required. Drainage modifications would be required due to median reconstruction where sheet flow currently drains. Addition of (or modification of existing) intelligent transportation system (ITS) elements and infrastructure including ramp meters, fiber-optic conduit and cables, and overhead signs would be part of the scope of work. Utility relocation is expected.	Project Approval and Environmental Document Phase, anticipated to be complete late 2023
T-18	SAC 51 Managed Lanes Project 03-0H931	Caltrans D3	SAC 51, PM 07-4.8	On SR 51, from N Street to 0.5 mile north of El Camino Ave (PM 0.7/4.8): Extend managed lanes, widen the American River Bridge to 10 lanes (4 lanes NB and SB plus managed lane in both directions) and add new Class I bike path on the American River Bridge, new auxiliary lane from Exposition Blvd to E St in both directions, SB auxiliary lane from Arden Way on-ramp to Exposition Blvd off-ramp, replace B St UP, A St OC, and Elvas UP, construct new Capital Corridor 3rd Track UP, widen EB SR 160/SR 51 separation structure, and widen Tribute Rd UC.	Construction planned for Nov 26 through Dec 30
Bicycle and Pedestrian Facility Projects					
BP-1	Mace Boulevard Corridor Project	City of Davis	City of Davis	Addition of green bicycle lane conflict markings where each westbound freeway ramp intersects with Mace Boulevard. Provision of bicycle intersection crossing markings at the signalized intersection of the I-80 westbound ramps and Mace Boulevard and addition of green bike lane conflict markings where each eastbound freeway ramp intersects with Mace Boulevard.	Planning phase; community meeting to be held on January 20, 2022.
BP-3	Jefferson Boulevard interchange area	City of West Sacramento	City of West Sacramento	Addition of Class II bicycle lanes. The pavement on Jefferson under the US 50 interchange structure was not widened for bicycle lanes. The pavement was recently rehabilitated as part of the West Capitol Avenue Safety Enhancement and Road Rehabilitation project.	Project construction complete.

Project ID	Project Name	Jurisdiction	Location	Project Description	Status
BP-4	S. River Road interchange area	City of West Sacramento	City of West Sacramento	The widening of 5th Street for Class II bicycle lanes through the US 50 interchange area would be constructed as part of the Riverfront Street Extension / Fifth Street Widening project.	Construction to begin soon.
I-80 Corridor Major Developments/General Plans/Specific Plans					
D-1	Olive Drive	City of Davis	City of Davis	The project would develop existing single-family homes to high density multifamily apartments.	Environmental documents approved in November 2019
D-2	University Mall/ University Commons Redevelopment Project	City of Davis	City of Davis	Transit-oriented infill project, commercial and residential.	Final City Council Approval granted on August 25th, 2020
D-3	UC Davis West Village Expansion	UC Davis	City of Davis	200-acre mixed use neighborhood integrating student, faculty, and staff housing and educational and research facilities, all centered on a civic village square.	Under construction, anticipated completion in fall of 2021
D-4	West Sacramento Corporation Yard Relocation Project	City of West Sacramento	City of West Sacramento	West Sacramento proposes to construct a new Municipal Corporation Yard Facility at 4300 West Capitol Avenue, a parcel which the city anticipates purchasing from the Port of West Sacramento.	Phase I of the project is complete.
D-5	West Capitol Avenue Road Rehabilitation and Safety Enhancement Project	City of West Sacramento	City of West Sacramento	West Capitol Avenue is envisioned as the West Sacramento‘s downtown: a central core with a vibrant main street that takes advantage of its prime location; providing an attractive setting for a variety of land uses including the Civic Center, Community Center, Transit Hub; and providing residential, commercial and urban parks that are accessible via multiple modes of transportation. The primary goals are to repair deteriorating pavement; complete scalloped street sections; install drainage improvements, sidewalks, access ramps, signal modifications, separated/buffered bike lanes, street lighting, high-visibility crosswalks for safer pedestrian crossings; and reduce unnecessary vehicular travel lanes.	Construction is complete.

Project ID	Project Name	Jurisdiction	Location	Project Description	Status
D-6	Upper Westside Specific Plan	Sacramento County	Sacramento County	The project would be a transportation-oriented development due to its location and proximity to transportation infrastructure and major employment regions in the region. It would also incorporate many "complete streets" aspects such as pedestrian- and bicycle-friendly infrastructure, transit services, and some compact housing to encourage alternative modes of transportation within the area. The project area is currently zoned for agricultural use, but a general plan amendment is underway to alter the land use designations for the Upper Westside Plan area.	Application accepted on February 26th, 2019. Environmental analysis in progress.
D-7	The Core Natomas 300-unit Apartments	City of Sacramento	City of Sacramento	This project provides a 300-unit apartment complex with 506 parking spaces (including 203 garage types), two accesses (orchard and via planned cul-de-sac).	Construction completed in 2020.
D-8	River Oaks Phase 2: 591 Single Family	City of Sacramento	City of Sacramento	This project provides 591 single-family lots on 83.3 acres of vacant land within the River Oaks planned unit development.	Planning phase; environmental documents submitted in 2018.
D-9	Bell Avenue Warehouses Project	City of Sacramento	City of Sacramento	The project would include development of the project site with two warehouse structures totaling approximately 339,549 sf as well as various other site improvements related to internal vehicle circulation, stormwater management, and landscaping. The warehouse situated on the eastern parcel would be approximately 259,749 sf and contain two depressed loading docks on the western face of the building. The warehouse on the western parcel would be approximately 79,800 sf and contain two depressed loading docks on the western face of the building. On-site parking would be provided by 277 proposed parking spaces.	Planning phase; environmental documents submitted in February 2020.
D-10	Rivers Oaks Marketplace	City of Sacramento	City of Sacramento	There is a plan amendment for four new commercial structures on a 3.91-acre parcel in the C-2-PUD (General Commercial-Park El Camino) Zone. This requires a Commission-level review for site plan and design review, conditional use permits, a tentative map, and a planned unit development Schematic Plan Amendment.	Project construction would be anticipated to last approximately 16 months, beginning in April of 2021 and concluding in July of 2022. Construction would proceed in a single phase.
D-11	ParkeBridge Phase 4	City of Sacramento	City of Sacramento	The project proposes to construct 108 new detached, single-unit dwellings with four house plans on approximately 22 acres in the ParkeBridge Panned Unit Development.	Subdivision is currently under development

Project ID	Project Name	Jurisdiction	Location	Project Description	Status
D-12	Bretton Woods	City of Davis	City of Davis	Davis is annexing land from Yolo County and rezoning land from agricultural intensive to medium density residential, high density residential, residential greenspace overlay, urban agriculture transition area, and mixed use. This would pave the way for 325 single-family homes, 260 of which are for senior citizens, and an additional 150 are affordable senior apartments. The project also includes an approximately 3-acre activity and wellness center. The project is on a site north of Covell Boulevard and west of SR-113, at the intersection of Shasta Drive and West Covell Boulevard.	Currently undergoing planning review of the subdivision phases.
D-13	UC Davis Long Range Development Plan	University of California, Davis	Sacramento, located off US-50 near the Highway 99/Business 80 interchange	The 2020 LRDP Update proposes general types of campus development and land uses to support projected campus population growth and enable expanded and new program initiatives. The proposed Aggie Square Phase I project consists of approximately 1,384,500-gross square feet of building space for education, research, residential and commercial uses and parking structure space.	Planning phase; environmental documents submitted in November 2020.
D-14	Woodland Research & Technology Park Specific Plan	City of Woodland	City of Woodland	Woodland is pursuing a specific plan detailing a commercial mixed use town center with 2.15 million square feet of non-residential building space for approximately 6,100 employees and 1,600 housing units. The project is located in the southern portion of Woodland's planning area, adjacent to the existing city limits, in an area bound by Farmers Central Road to the north, CR-101 to the east, SR-113 to the west, and CR-25A to the south.	Environmental analysis in progress.

Notes:
CCTV = closed-circuit television; CMS = changeable message signs; CR = County Road; I-80 = Interstate 80; LRDP = long-range development plan; sf = square feet
SHOPP = State Highway Operation and Protection Program; SR = State Route; TCE = temporary construction easement; TMS = transportation management system
U.C. = University of California; US-50 = U.S. Route 50



Sources: ESRI 2023.

Figure 2.4-1 Map of Reasonably Foreseeable Future Actions
Yolo 80 Corridor Improvement Project

2.4.3 Resources Excluded from Cumulative Impacts Analysis

The following resources have been excluded from the cumulative impacts analysis:

- **Existing and Future Land Uses:** Project improvements would mostly occur within the existing Caltrans right-of-way and would not result in any direct changes to land use adjacent to the Project area. Under all Build Alternatives, there would be some TCEs and staging outside of the Caltrans right-of-way including one small area of permanent right-of-way acquisition under Build Alternatives 2a through 7b. The area of proposed permanent right-of-way acquisition is currently undeveloped, vacant land; and would not result in the displacement of any residences or businesses. Therefore, the Project is not expected to result in cumulatively considerable impacts on land use.

- **Consistency with State, Regional, and Local Plans:** Project-related construction activities would be temporary and would not result in long-term effects that would conflict with state, regional, and local plans. Therefore, the Project would not contribute to temporary cumulative impacts related to consistency with state, regional, and local plans.

- **Farmlands:** Build Alternatives 2a through 7b would include one permanent acquisition right-of-way for construction of a Park-and-Ride Facility; however, the property is currently vacant, undeveloped land that is not categorized as an agricultural or farmland area. The alternatives with additional lanes in each direction would only expand into existing Caltrans right-of-way. Therefore, the Project would not result in cumulatively considerable impacts from the conversion of any important farmland or Williamson Act land to non-agricultural uses.

- **Population and Housing:** Build Alternatives 2a through 6b would accommodate planned regional growth but would not remove any impediments to growth, provide new public facilities, or provide new access to previously unserved areas. Build Alternatives 7a and 7b would repurpose existing lanes as managed lanes and would not add capacity. However, Alternative 7b would include the construction of the I-80 connector ramp, which would add operational capacity. Under all Build Alternatives, no residential property acquisition or relocation would be required. Project-related construction would occur primarily within the existing Caltrans right-of-way and would require acquisition of a vacant parcel to construct a Park-and-Ride Facility. The Project would not affect land uses, residential or commercial property, or any minority residences or businesses. There would be no disruption or effect on the existing community features in the surrounding areas. Therefore, the Project is not expected to result in cumulatively considerable impacts on regional population and housing.

- **Economic Conditions**: All Build Alternatives are anticipated to have a positive impact on the regional economy by improving access, travel time, and highway capacity. There would be no adverse effects on the regional economy, such as acquiring or relocating businesses, changing property or sales tax revenue for the cities or counties involved, or

altering property values. Therefore, the Project is not expected to result in cumulatively considerable impacts on economic conditions.

- **Timberlands:** The Project area does not contain timberlands. Therefore, this resource has been excluded from the cumulative impacts analysis.

- **Coastal Zone:** The Project area is not located in a coastal zone. Therefore, this resource has been excluded from the cumulative impacts analysis (California Coastal Commission 2019).

- **Wild and Scenic Rivers:** The Project area does not cross any rivers designated as part of the National Wild and Scenic Rivers System. The nearest Wild and Scenic River is the Lower American River which is located approximately two miles south of the Project (U.S. Fish and Wildlife Service 2021). Therefore, no wild or scenic rivers would be affected by construction or operation of the Project.

- **Plant Species:** The RSA was determined to have potential habitat for 25 special-status plant species. However, focused botanical surveys conducted in May and August 2021 and July 2022 found no special-status plant species within the RSA. Construction activities associated with the Project would not result in permanent or temporary disturbances of potential habitat for special-status plant species. Therefore, the Project is not expected to result in cumulatively considerable impacts on special-status plants.

- **Invasive Species:** According to the ratings in the California Invasive Plant Inventory produced by California Invasive Plant Council (Cal-IPC), there are currently 45 invasive plant species within the Biological Study Area (BSA) (CAL-IPC 2021). Cal-IPC categorizes non-native invasive plants into three categories of overall negative ecological impact in California: High, Moderate, and Limited. Invasive species found in the RSA with a Cal-IPC rating of “High” include seven species, 20 species with a rating of “Moderate,” and 18 species with a rating of “Limited.” The Project could result in the spread of invasive species during Project construction through ground-disturbing activities, improper disposal of graded and excavated soils on-or off-site, or landscaping with invasive species. To prevent the spread of invasive species, Caltrans Standard Specification 14-6.05A(1) would be included in the contract. Section 14-6.05A(1) includes specifications for preventing the introduction and spread of invasive species to and from the job site. Therefore, the potential for spread of invasive species is very low with implementation of Caltrans Standard Specifications. Therefore, the Project is not expected to result in cumulatively considerable impacts related to invasive species.

2.4.4 Resources Evaluated for Cumulative Impacts

The following resources have been evaluated for cumulative impacts that would result from implementation of the Project:

- Parks and Recreation
- Growth
- Environmental Justice

- Utilities and Emergency Services
- Traffic and Transportation
- Visual and Aesthetics
- Cultural Resources
- Hydrology and Flood Plain
- Water Quality
- Geology/Soils/Seismic/Topography
- Paleontology
- Hazardous Waste or Materials
- Air Quality
- Noise
- Energy
- Natural Communities
- Wetlands and Other Waters
- Animal Species
- Threatened and Endangered Species

2.4.5 Resource Study Area

The study area was selected to identify other current or reasonably foreseeable future actions. The study area is generally bounded by the I-80 corridor between PMs 40.7 and 44.7 in Solano County, between PMs 0.00 and 11.72 in Yolo County, and between PMs 0.00 and 1.36 in Sacramento County; and US-50 between PMs 0.00 and 3.12 in Yolo County and between PMs 0.00 and 0.617 in Sacramento County. The boundaries of the study area were delineated by reviewing the area within a.5- to 4-mile radius of the Project area, and then adjusting the boundaries based on major roadways and land use/neighborhood boundaries.

The geographic boundaries of the RSA for each resource were considered by the Project study area and the study areas delineated by each technical report prepared for the Project. Therefore, a unique RSA was identified for each resource, rather than a single consolidated study area and is defined for each resource in the following sections.

2.4.5.1 Parks and Recreation

The analysis in this section is based on the Community Impact Assessment completed for the Project (Caltrans 2023b) and the Section 4(f) evaluation (Caltrans 2023d).

Resource Study Area

The RSA for Parks and Recreation is consistent with the cumulative study area as described in section 2.4.5, plus a 1,000-foot buffer. The RSA includes the population most likely to experience direct impacts associated with the Project's direct physical improvements.

Cumulative Impacts

Current and reasonably foreseeable future actions could result in land use activities that would result in impacts on parks and recreation during construction and operation. Of the

transportation projects within the RSA, the construction timing for Yolo Pavement Rehabilitation Project (T-1) and Richards Boulevard / Olive Drive Circulation Improvements (T-5) could overlap with the Project. Of the development projects within the RSA, the construction timing for River Oaks Phase (D-8), Bell Avenue Warehouses Project (D-9), and Bretton Woods (D-12), and UC Davis Long Range Development Plan (D-13) could overlap with Project construction. Land use and transportation plans may also include planned and programmed projects that overlap with Project construction.

All Build Alternatives would include improvements to bike infrastructure, which would provide several benefits to the community, including enhancing the safety and accessibility of bicycle travel in the area, potentially reducing traffic congestion, air pollution, and greenhouse gas emissions. The improvements include replacing and extending existing bicycle pathways, improving crosswalks and signage, and constructing a new bike path extension. These benefits would lead to safer and more accessible transportation options, improved public health, and recreational opportunities for the community. Project construction and operation would have positive permanent cumulative effects due to the improvements made to bicycle/pedestrian infrastructure within the RSA.

The Project in conjunction with other projects would contribute to temporary impacts on parks and recreational facilities during construction activities, such as reduced access, loss of parking, local road closures, localized air quality impacts, and increased noise and vibration levels. These temporary impacts could affect public enjoyment of the resources, but standard BMPs, such as temporary detours, would be provided for any closed recreational trails or walkways. Changes in noise levels experienced by park and recreational facility users due to project operation would be barely perceptible and consistent with existing conditions. Similarly, there would be no perceptible long-term changes in air quality at parks and recreational facilities resulting from project operation. Future projects may require right-of-way acquisitions from parks and recreation facilities which may contribute to cumulative impacts; however, the Project does not require additional right-of-way acquisitions from parks and recreation facilities. As a result, the Project, in conjunction with related projects, would not result in cumulatively considerable permanent impacts to parks and recreation.

Human Environment Section 2.1.3 states that no AMMs would be required for parks and recreation and no additional AMMs are required for cumulative impacts.

2.4.5.2 Growth

The analysis in this section is based on the Community Impact Assessment completed for the Project (Caltrans 2023b).

Resource Study Area

The RSA for Growth is consistent with the cumulative study area as described in section 2.4.5, plus a 1,000-foot buffer. The RSA includes the population most likely to experience direct impacts associated with the Project's direct physical improvements.

Cumulative Impacts

Current and reasonably foreseeable future actions could result in land use activities that would result in impacts on growth during construction and operation. Of the transportation projects within the RSA, the construction timing for Yolo Pavement Rehabilitation Project (T-1) and Richards Boulevard / Olive Drive Circulation Improvements (T-5) could overlap with the Project. Of the development projects within the RSA, the construction timing for River Oaks Phase (D-8), Bell Avenue Warehouses Project (D-9), and Bretton Woods (D-12), and UC Davis Long Range Development Plan (D-13) could overlap with Project construction. Land use and transportation plans may also include planned and programmed projects that overlap with Project construction.

The enhancements planned in Build Alternatives 2 through 5 would help accommodate planned growth on a regional level. However, these alternatives are not anticipated to improve opportunities for growth or provide new access to previously unserved areas. New residential development along the I-80 corridor is limited by floodplain conditions, long-term wildlife refuge and agricultural preserves, and built-out conditions in city limits. Improving travel times and capacity along I-80 is not expected to stimulate growth into nearby areas where development is not planned, as other factors such as market conditions and local land use policies have a greater influence on land use change than roadway capacity. Furthermore, new development in the RSA would occur in areas already planned for growth, with smart growth policies prioritizing infill and redevelopment projects. Planned new development in previously undeveloped or agricultural areas is limited by land use policies, agricultural preserves, and floodplains.

Therefore, the Project's contribution to permanent and temporary cumulative impacts on growth would be minimal. The Project's contribution to temporary cumulative impacts would also cease following construction. As a result, the Project, in conjunction with related projects, would not result in cumulatively considerable permanent growth impacts.

Human Environment Section 2.1.5 states that no AMMs would be required for growth and no additional AMMs are required for cumulative impacts.

Community Facilities and Services

The information in this section is based on the Community Impact Assessment completed for the Project (Caltrans 2023b).

Resource Study Area

The RSA for community facilities, utilities, and emergency services includes the Project limits, plus a 1,000-foot buffer. The RSA includes 20.8 miles along the I-80 corridor between Kidwell Road and the Solano/Yolo county line, between the Solano/Yolo county line and the Yolo/Sacramento county line, and between the Yolo/Sacramento county line and West El Camino Avenue; and on the US-50 corridor between the I-80/I-50 interchange and the Yolo/Sacramento county line and between the Yolo/Sacramento county line and the US-50/I-5 interchange.

Cumulative Impacts

Community Facilities

Current and reasonably foreseeable future actions could result in activities that would result in impacts on community facilities during construction and operation. Of the transportation projects within the RSA, the construction timing for Yolo Pavement Rehabilitation Project (T-1) and Richards Boulevard / Olive Drive Circulation Improvements (T-5) could overlap with the Project. Of the development projects within the RSA, the construction timing for River Oaks Phase (D-8), Bell Avenue Warehouses Project (D-9), and Bretton Woods (D-12), and UC Davis Long Range Development Plan (D-13) could overlap with Project construction.

It is anticipated that several of the foreseeable projects may require right-of-way acquisitions, resulting in long-term impacts on community amenities. As a result, these significant transportation projects may lead to cumulative impacts on community facilities that could persist over time. Moreover, the relevant projects planned for construction at the same time as the Project may cause temporary impacts, such as access difficulties, reduced visual aesthetics, air pollution, and noise that could impact community facilities Therefore, the additional projects in conjunction with the Project may contribute to temporary cumulative impacts on community facilities. However, they would not be anticipated to result in cumulatively considerable permanent impacts.

Human Environment Section 2.1.8 states that no AMMs would be required for community facilities and no additional AMMs would be required for cumulative impacts.

Utilities

Current and reasonably foreseeable future actions could result in activities that would result in impacts on utilities during construction and operation. Of the transportation projects within the RSA, the construction timing for Yolo Pavement Rehabilitation Project (T-1) and Richards Boulevard / Olive Drive Circulation Improvements (T-5) could overlap with the Project. Of the development projects within the RSA, the construction timing for River Oaks Phase (D-8), Bell Avenue Warehouses Project (D-9), and Bretton Woods (D-12), and UC Davis Long Range Development Plan (D-13) could overlap with Project construction.

The Project would comply with Caltrans standards and involve coordination with utility providers to minimize temporary construction impacts. In addition, utilities would be restored upon completion of utility relocation activities. The Project would comply with Caltrans standards and coordinate with utility providers; therefore, the Project's contribution to temporary cumulative impacts on utilities would be substantially minimized. In addition, the Project's contribution to temporary cumulative impacts would cease following construction. Each relevant project would be required to consider avoidance, minimization, and/or mitigation measures to reduce impacts on utilities and service systems. Therefore, the Project, in conjunction with related projects, would not result in cumulatively considerable impacts on utilities and service systems.

Human Environment Section 2.1.8 states that no AMMs would be required for utilities and no additional AMMs would be required for cumulative impacts.

Emergency Services

Current and reasonably foreseeable future actions could result in activities that would result in impacts on community facilities during construction and operation. Of the transportation projects within the RSA, the construction timing for Yolo Pavement Rehabilitation Project (T-1) and Richards Boulevard / Olive Drive Circulation Improvements (T-5) could overlap with the Project. Of the development projects within the RSA, the construction timing for River Oaks Phase (D-8), Bell Avenue Warehouses Project (D-9), and Bretton Woods (D-12), and UC Davis Long Range Development Plan (D-13) could overlap with Project construction.

Construction activities of the relevant projects, in conjunction with Project, could result in traffic delays that could affect the ability of fire, law enforcement, and emergency service providers to meet response-time goals. However, construction of the Build Alternatives would include implementation of a TMP and coordination with emergency service providers to minimize temporary construction impacts. The cumulative impacts on emergency services would be temporary and each project would be required to consider avoidance, minimization, and/or mitigation measures to reduce temporary impacts. With implementation of these measures, the Project's contribution to temporary cumulative impacts on emergency services would be substantially minimized. In addition, the Project's contribution to temporary cumulative impacts would cease following construction. Therefore, the Project, in conjunction with related projects, would not result in cumulatively considerable impacts on emergency services.

Human Environment Section 2.1.8 states that no AMMs would be required for emergency services and no additional AMMs would be required for cumulative impacts.

2.4.5.3 Environmental Justice and Equity

The information in this section is based on the Community Impact Assessment completed for the Project (Caltrans 2023b).

Resource Study Area

The RSA for environmental justice consists of 37 census blocks surrounding the Project study area. The SACOG Planning Area is used as a regional comparison.

Cumulative Impacts

Current and reasonably foreseeable future actions could result in activities that would result in impacts on utilities during construction and operation. Of the transportation projects within the RSA, the construction timing for Yolo Pavement Rehabilitation Project (T-1) and Richards Boulevard / Olive Drive Circulation Improvements (T-5) could overlap with the Project. Of the development projects within the RSA, the construction timing for River Oaks Phase (D-8), Bell Avenue Warehouses Project (D-9), and Bretton Woods (D-12), and UC Davis Long Range Development Plan (D-13) could overlap with Project construction.

Several of the relevant projects did not have environmental documents available to determine potential impacts on environmental justice populations in the RSA. There is potential that

relevant projects could result in environmental effects that could result in disproportionately high and adverse effects on minority or low-income populations. The relevant projects, as listed above, that would be constructed within the Project construction period could result in temporary construction impacts related to access, visual/aesthetics, air quality, and noise that could result in disproportionately high and adverse effects on minority or low-income populations. While the Project would also contribute to temporary construction impacts, these impacts would not be disproportionately borne on environmental justice communities and would affect all adjacent communities. The Project's construction impacts would be minimized by adhering to Caltrans' standard specifications and BMPs for noise abatement and fugitive dust control. Each relevant project would also be required to implement measures to minimize temporary impacts on environmental justice and equity. Therefore, the Project would not result in temporary cumulatively considerable impacts on environmental justice and equity.

As discussed above, Build Alternatives 2 through 7 would improve traffic conditions, to varying degrees, on I-80/US-50. Although the congestion relief and enhanced accessibility associated with the Project would benefit all I-80/US-50 travelers, environmental justice travelers may not realize the full benefit from Build Alternatives 3 through 5 because of tolling. Relevant projects have the potential to result in disproportionately high and adverse effects on environmental justice communities. Each relevant project would be subject to approval and be required to consider these impacts and provide measures to avoid or minimize impacts. Therefore, the Project would not result in permanent cumulatively considerable impacts on environmental justice and equity.

The AMMs in Human Environment Section 2.1.7 would be implemented to reduce the direct effects on environmental justice and equity communities, no additional AMMs are required for cumulative impacts.

2.4.5.4 Traffic and Transportation/Pedestrian and Bicycle Facilities

The analysis in this section is based on the Draft Travel Demand Modeling Report (TDMR) (Fehr & Peers 2021), Draft TMP Data Sheet (Caltrans 2021e) and the Draft Pedestrian and Bicyclist Travel Impact Assessment prepared for the Project (Caltrans 2021a).

Resource Study Area

The RSA for traffic, transportation, and pedestrian and bicycle facilities is consistent with the cumulative study area as described in section 2.4.5. The RSA also includes areas required to accommodate construction activities, mobilization, staging, and access, such as city-owned areas where right-of-way acquisition and TCEs would be required. Staging areas would cover approximately 53.3 acres and be located at the I-80/West El Camino Avenue interchange, South River Road, I-80/Richards Boulevard interchange, the I-80 and SR-113 interchange, and the along Kidwell Road.

Cumulative Impacts

Construction of the relevant projects would occur either simultaneously or partially during the construction period of the Project which could increase traffic congestion and delays, potential

lane closures, reduced speed-limits, staging, and detours. However, concurrent construction would be temporary, and projects would be at various stages throughout the 400 working day construction period of the Project. Each transportation project would be required to implement measures as necessary to avoid and minimize traffic impacts.

Based on the above-mentioned travel demand modelling, the Project is anticipated to result in permanent beneficial improvements to the Project area by reducing overall long-term traffic flow and access to highway facilities. The relevant projects are also intended to permanently improve local infrastructure by reducing traffic congestion, increasing access to transit and transportation alternatives within the RSA, and contributing to overall beneficial cumulative impacts on the area. Therefore, the Project, in conjunction with related projects, would not result in cumulatively considerable temporary impacts on traffic and transportation.

The AMMs provided in Human Environment Section 2.1.9 would be implemented to reduce the direct effects of the Build Alternatives on Traffic and Transportation/Pedestrian and Bicycle Facilities. No additional AMMs would be required for cumulative impacts.

2.4.5.5 Visual/Aesthetics

The analysis in the following section is based on the Draft Visual Impact Assessment (VIA) and the supplemental VIA prepared for the Project (Stantec Consulting Services Inc. 2022).

Resource Study Area

The RSA comprises four visual assessment units along the Project corridor as described in the VIA prepared for the Project. Each visual assessment unit (VAU) is typically defined by the limits of a particular viewshed and has its own character and visual quality and is defined as follows:

- Solano County VAU: located within the limits of Solano County from the Project's western terminus northeast along I-80 to south of the Yolo County/Davis city limits
- Davis VAU: located along I-80 from the UC Davis just south and east of the Davis city boundary and extends through Davis to the eastern limits of the city
- Yolo County VAU: located along I-80 from the eastern limits of Davis spanning the Yolo Bypass to the western limits of West Sacramento
- West Sacramento VAU: located along the I-80/US-50 corridor within the city limits of West Sacramento and Sacramento, extending from the west boundary of West Sacramento to the eastern termini of the Project.

Cumulative Impacts

Cumulative impacts are those resulting from past, present, and reasonably foreseeable future actions, combined with the potential visual impacts of this Project. For this Project, it has been determined that the following cumulative visual impacts may occur.

In combination with the Project, the Yolo Pavement Rehabilitation Project (T-1), Sac 50 Design-Build Project (T-4), City of Davis Richards Boulevard Ramps Reconfiguration Project (T-5), the I-5 Auxiliary Lanes Project, and I-5 Managed Lanes Project, would contribute to permanent cumulative visual impacts. These projects would widen highways and structures, remove existing plantings in the center median, reconfigure on/off-ramps, replace guardrails, paint structures, and impact associated vegetation. The transportation projects and proposed development of adjacent parcels would also contribute to an increase in lighting levels and glare in the area by infilling unlit open space areas and adding reflective surfaces. However, the Project would be somewhat compatible with the existing visual environment. Overall Resource Change would vary throughout the corridor, with some areas visually unchanged and other areas that would experience more noticeable visual changes.

The Project under the Build Alternatives would result in permanent visual/aesthetic impacts by making the freeway larger and more dominant in the landscape, changing views for both freeway travelers and adjacent land uses. The combined visual effect of this Project and other development projects planned, recently in construction, or currently in construction would collectively change the visual character of the region. As described in planning documents such as the General Plans for the cities of Davis, Sacramento, and West Sacramento and County RTPs, there is development anticipated within and surrounding the Project area. These plans, once implemented, would improve existing and create new/reconfigured transportation facilities as well as induce development and infill of open space areas and vacant lots within the RSA.

Approximately half of the overall corridor is within municipalities which have identified land development and urban growth patterns adjacent to the Project. Over time, the highway users and highway neighbors may experience the gradual transition of undeveloped lots, the redevelopment of existing developed lots, and the modification of transportation corridors to support these developments within the landscape. As such, the contribution of the Project is minimal in the context or visual impacts through the Project area. Permanent visual impacts would be consistent with the visual environment goals and objectives established by local and regional planning documents and ordinances.

The Project could potentially result in a cumulatively considerable visual impact if multiple projects are constructed concurrently. Nighttime construction lighting, glare, construction equipment, staging areas, demolition, and other construction-related activities from multiple projects may contribute to cumulative visual impacts. However, construction-related visual impacts would be temporary. Furthermore, to minimize potential visual impacts, the Project would implement AMMs that would incorporate aesthetic treatment design considerations to avoid visual resource removal and implement replacement planting as needed. As a result, the Project's contribution to a potential cumulative visual impact would not be cumulatively considerable.

The AMMs provided in Human Environment Section 2.1.10 would be implemented to reduce the direct effects on visual resources. No additional AMMs would be required for cumulative impacts.

2.4.5.6 Cultural Resources

The information in this section is based on the Historic Property Survey Report (Caltrans 2021j) and the Section 4(f) Report (Caltrans 2023d) prepared for the Project.

Resource Study Area

The RSA for cultural resources is defined as the Area of Potential Effects (APE). In accordance with PA Stipulation VIII.A, the APE for the Project was established in consultation with Connor Buitenhuys, Professionally Qualified Staff of Prehistoric and Historical Archaeology, and Jess Avilla, Project Manager on June 30, 2020. Although the APE is almost entirely in Caltrans ROW, five TCEs would be required along the project alignment. The APE occupies approximately 360 acres along the 9.5-mile-long Project.

Cumulative Impacts

Current and reasonably foreseeable future actions could result in land use activities that could result in impacts on cultural resources. Of the transportation projects within the RSA, the construction timing for Yolo Pavement Rehabilitation Project (T-1) and Richards Boulevard / Olive Drive Circulation Improvements (T-5) could overlap with the Project. Of the development projects within the RSA, the construction timing for River Oaks Phase (D-8), Bell Avenue Warehouses Project (D-9), and Bretton Woods (D-12), and UC Davis Long Range Development Plan (D-13) could overlap with Project construction. Land use and transportation plans may also include planned and programmed projects that overlap with Project construction.

Similar to the Project, all projects and plans listed in Table 2.4-1 that would involve ground disturbance could result in damage to or destruction of previously undiscovered subsurface archaeological deposits or unmarked burials. The related projects would be required to conduct applicable surveys and take necessary precautions if determined to be in an area known to have potential for cultural resources. All related projects would also be required to consider avoidance, minimization, and/or mitigation measures. As a result, the Project, in conjunction with related projects, would not result in cumulatively considerable impacts on cultural resources.

The AMMs provided in the Human Environment Section 2.1.11 would be implemented to reduce the direct effects of the Build Alternatives on cultural resources. No additional AMMs would be required for cumulative impacts.

2.4.5.7 Hydrology and Floodplains

The information in this section is based on the Floodplain Hydraulic Study (FHS) prepared for the Project (Wood Rodgers Inc. 2021).

Resource Study Area

The RSA for hydrology and floodplains is consistent with the cumulative study area as described in Section 2.4.5. The RSA also includes the Project area as depicted on the following FEMA FIRM panel numbers:

- 06067C0157J and 06067C0160J for Sacramento County, California and Incorporated Areas dated 06/16/2015.
- 0607280005B for City of West Sacramento, California, Yolo County dated 01/19/1995.
- •06095C0075E and 06095C0100E for Solano County, California and Incorporated Areas dated 05/04/2009.
- 06113C0610G, 06113C0611G, 06113C0620G, and 06113C0630G for Yolo County, California and Incorporated Areas dated 06/18/2010.

Cumulative Impacts

Current and reasonably foreseeable future actions could result in land use activities that could result in impacts on hydrology and floodplains. Of the transportation projects within the RSA, the construction timing for Yolo Pavement Rehabilitation Project (T-1) and Richards Boulevard / Olive Drive Circulation Improvements (T-5) could overlap with the Project. Of the development projects within the RSA, the construction timing for River Oaks Phase (D-8), Bell Avenue Warehouses Project (D-9), and Bretton Woods (D-12), and UC Davis Long Range Development Plan (D-13) could overlap with Project construction. Land use and transportation plans may also include planned and programmed projects that overlap with Project construction.

All relevant projects would be required to determine any potential impacts on the existing floodplain and document any floodplain impacts. Relevant projects would also be required to undergo review by the applicable Lead Agency for compliance with National Pollutant Discharge Elimination System (NPDES) permits for construction, operation, and maintenance activities as well as compliance with local urban stormwater and non-stormwater runoff ordinances for temporary and permanent impacts. Therefore, in conjunction with relevant projects, the Project would not result in a cumulatively considerable impact on hydrology and floodplains.

The AMMs provided in the Physical Environment Section 2.2.1 would be implemented to reduce the direct effects of the Build Alternatives on hydrology and floodplains. No additional AMMs would be required for cumulative impacts.

2.4.5.8 Water Quality and Storm Water Runoff

The analysis in this section is based on the Water Quality Assessment (Caltrans 2022a) and the Floodplain Hydraulics Study (Wood Rodgers Inc. 2021) that were prepared for the Project.

Resource Study Area

The RSA for water quality and storm water runoff includes the entire Solano, Yolo, and Sacramento watersheds. The RSA includes the areas of Project improvements, maintenance access, soundwalls, and other peripheral features owned and maintained by Caltrans, and the cities of Davis, West Sacramento and Sacramento. The RSA also includes areas required to accommodate construction activities, mobilization, staging, and access, such as city-owned right-of-way acquisition and TCEs.

Cumulative Impacts

Development of the Project and the reasonably foreseeable projects within the RSA may have the potential to create sources of short-term and long-term water pollution. Each project would be required to mitigate impacts by providing stormwater pollution prevention measures. Additionally, adverse cumulative water quality impacts to resources in this Project area could result from residential, commercial, agricultural, and highway development. The Project would involve short-term construction activities that would have the potential to degrade water quality in downstream water bodies. While the Project would not change existing land uses in the area, mitigation is proposed that would require implementation of various construction and operational water quality control measures that would prevent the release of pollutants into downstream waterways.

Projects T-1 and T-2 would correct the wash-out and ponding drainage issues that are occurring on both sides of the Bryte Bend Bridge resulting in permanent beneficial impacts on water quality in the Project area (Wood Rodgers Inc. 2021).

It is anticipated that the Project in combination with the projects listed in Table 2.4-1 would contribute to temporary adverse cumulative impacts on water quality. However, each project that disturbs one or more acres would comply with NPDES and install BMPs during construction to minimize potential adverse impacts on water resources.

The AMMs provided in the Physical Environment Section 2.2.2 would be implemented to reduce the direct effects of the Build Alternatives on water quality and stormwater runoff. No additional AMMs would be required for cumulative impacts.

2.4.5.9 Geology/Soils/Seismic/Topography

The information in this section is based on the Structure Preliminary Geotechnical Report for I-80 HOV Connector RW No. 1 & 2 (Caltrans 2021f). Structure Preliminary Geotechnical Report for Richards Blvd. OC RW No. 3 (Caltrans 2021d), and Structure Preliminary Geotechnical Report for I-80 HOV Connector (Caltrans 2020c) prepared for the Project.

Resource Study Area

The RSA for geology/solid/seismic/topography comprises the Project study area which is approximately 20.8 miles on the I-80 corridor between PMs 40.7 and 44.7 in Solano County, between PMs 0.00 and 11.72 in Yolo County, and between PMs 0.00 and 1.36 in Sacramento County; on the US-50 corridor between PMs 0.00 and 3.12 in Yolo County and between PMs 0.00 and 0.617 in Sacramento County.

The RSA includes the areas of Project improvements, construction staging areas, Project-related signage, maintenance access, sound walls, stormwater features, and other peripheral features owned and maintained by Caltrans.

Cumulative Impacts

Current and reasonably foreseeable future actions could result in land use activities that could result in impacts on geology, soils, seismic, and topography. Of the transportation projects within the RSA, the construction timing for Yolo Pavement Rehabilitation Project (T-1) and Richards Boulevard / Olive Drive Circulation Improvements (T-5) could overlap with the Project. Of the development projects within the RSA, the construction timing for River Oaks Phase (D-8), Bell Avenue Warehouses Project (D-9), and Bretton Woods (D-12), and UC Davis Long Range Development Plan (D-13) could overlap with Project construction. Land use and transportation plans may also include planned and programmed projects that overlap with Project construction. Similar to the Project, the relevant projects have the potential to impact water quality temporarily and permanently; however, all projects would be required to implement measures and BMPs to reduce impacts on geology, soils, seismic, and topography.

Each relevant project would be subject to geotechnical analysis and cannot be constructed unless each project is determined to be geotechnically feasible. Similar to the Project, the relevant projects would be designed and built to current standards. Construction activities for the Project would increase the possibility for erosion, slope instability from seismic shaking, and soil expansion/collapse. Similar to the Project, relevant projects would be required to comply with seismic requirements of the California Building Code. The potential for landslides would be considered when planning grading or excavation activities in areas known to be prone to landslides. Relevant projects would also be required to implement measures as necessary if they would result in impacts on geology or soils. Therefore, in conjunction with relevant projects, the Project would not result in a cumulatively considerable impact on geology, soils, seismic, and topography.

The AMMs provided in the Physical Environment Section 2.2.3 would be implemented to reduce the direct effects of the Build Alternatives on Geology/Soils/Seismic/Topography. No additional AMMs would be required for cumulative impacts.

2.4.5.10 Paleontology

This information in this section is based on the PIR prepared for the Project (Caltrans 2021c).

Resource Study Area

The RSA for paleontology comprises the Project study area which is approximately 20.8 miles on the I-80 corridor between PMs 40.7 and 44.7 in Solano County, between PMs 0.00 and 11.72 in Yolo County, and between PMs 0.00 and 1.36 in Sacramento County; on the US-50 corridor between PMs 0.00 and 3.12 in Yolo County and between PMs 0.00 and 0.617 in Sacramento County. The RSA includes the areas of Project improvements, construction staging areas, Project-related signage, maintenance access, sound walls, stormwater features, and other peripheral features owned and maintained by Caltrans.

Cumulative Impacts

Specific impacts on paleontological resources that would result from other relevant projects in the RSA were not readily available for all of the projects. However, the projects listed in Table 2.4-1 would likely require earth-moving activities over a large cumulative surface area with the potential to encounter paleontological resources. Therefore, these relevant projects may contribute to permanent cumulative impacts on paleontological resources. Any impact on paleontological resources would be permanent and irreversible. Consequently, there would be no temporary adverse impact under any of the relevant projects.

As discussed above, the Project has the potential to impact paleontological resources from earth-moving activities greater than 4 feet in depth during Project construction. However, the Project would implement appropriate mitigation measures that would be identified in Paleontological Evaluation Report (PER) for the recovery and treatment of any fossil remains exposed by those earth-moving activities. This report will be prepared during the plans, specifications and estimate (PS&E) development phase when more design details are known.

Any impact on paleontological resources would be permanent and irreversible. With implementation of measures within the PER, the Project's contribution to permanent cumulative impacts on paleontological resources would be substantially minimized.

The AMMs provided in the Physical Environment Section 2.2.4 would be implemented to reduce the direct effects of the Build Alternatives on Paleontological resources. No additional AMMs would be required for cumulative impacts.

2.4.5.11 Hazardous Waste or Materials

The analysis in this section is based on the Hazardous Waste Initial Site Assessment (ISA) prepared for the Project (Caltrans 2021b).

Resource Study Area

The RSA for hazardous waste and materials includes the Project area which is approximately 20.8 miles on the I-80 corridor between PMs 40.7 and 44.7 in Solano County, between PMs 0.00 and 11.72 in Yolo County, and between PMs 0.00 and 1.36 in Sacramento County; on the US-50 corridor between PMs 0.00 and 3.12 in Yolo County and between PMs 0.00 and 0.617 in Sacramento County. The RSA includes the areas of Project improvements, maintenance access, soundwalls, stormwater features, and other peripheral features owned and maintained by Caltrans.

Cumulative Impacts

As mentioned above there are at least 11 relevant projects that could contribute to impacts from hazardous waste and materials. As each of the identified projects are related to transportation, bicycle and pedestrian, or development, it is anticipated that impacts would occur during construction and would be temporary. Hazards may occur from construction materials, fuels, lubricants, solvents, and other possible contaminants during construction. Contaminated soil or

groundwater may also be encountered during Project construction. Construction workers would be required to take appropriate precautions to minimize their exposure, which includes using the appropriate protective clothing and equipment.

With implementation of avoidance and minimization measures listed in the Physical Environment Section 2.2.5, the contribution to temporary adverse cumulative impacts related to hazardous waste or materials would be substantially minimized. In addition, contribution to temporary cumulative impacts would cease following construction.

The operation and maintenance of the relevant projects would not introduce new sources of hazardous wastes or materials.

The AMMs provided in the Physical Environment Section 2.2.5 would be implemented to reduce the direct effects of the Build Alternatives on Hazardous Waste or Materials. No additional AMMs would be required for cumulative impacts.

2.4.5.12 Air Quality

The information in this section is based on the Air Quality Report (Caltrans 2023a) completed for the Project.

Resource Study Area

The RSA for permanent cumulative impacts on air quality includes the Sacramento Valley Air Basin (SVAB), which includes Sacramento, Shasta, Tehama, Butte, Glenn, Colusa, Sutter, Yuba, Yolo, and parts of Solano and Placer counties.

The RSA for temporary cumulative impacts on air quality includes the Project study area, which includes 20.8 miles along the I-80 corridor between Kidwell Road and the Solano/Yolo county line, between the Solano/Yolo county line and the Yolo/Sacramento county line, and between the Yolo/Sacramento county line and West El Camino Avenue; and on the US-50 corridor between the I-80/I-50 interchange and the Yolo/Sacramento county line and between the Yolo/Sacramento county line and the US-50/I-5 interchange. The RSA includes the areas of Project improvements, maintenance access, soundwalls, stormwater features, and other peripheral features owned and maintained by Caltrans.

Cumulative Impacts

Current and reasonably foreseeable future actions could result in land use activities that would result in air quality impacts on adjacent sensitive receptors during construction and operation. Of the transportation projects within the RSA, the construction timing for Yolo Pavement Rehabilitation Project (T-1) and Richards Boulevard / Olive Drive Circulation Improvements (T-5) could overlap with the Project. Of the development projects within the RSA, the construction timing for River Oaks Phase (D-8), Bell Avenue Warehouses Project (D-9), and Bretton Woods (D-12), and UC Davis Long Range Development Plan (D-13) could overlap with Project construction. Land use and transportation plans may also include planned and programmed projects that overlap with Project construction.

During construction of the Project, there would be an increase in localized air quality and GHG impacts due to emissions from generation of dust and equipment exhaust. Control measures would be implemented as specified in Caltrans 2018 Standard Specifications Section 10-5 “Dust Control,” Section 14-9 “Air Quality” and Section 18 “Dust Palliatives.” Similar to the Project, all relevant projects would be required to comply with applicable air quality standards and implement BMPs as necessary to avoid and minimize impacts. Therefore, in conjunction with relevant projects, the Project would not result in a cumulatively considerable impact on temporary air quality and GHG emissions.

Physical Environment Section 2.2.6 states that no AMMs would be required for air quality and no additional AMMs are required for cumulative impacts.

2.4.5.13 Noise and Vibration

The information in this section is based on the Noise Study Report (NSR) completed for the Project (Caltrans 2022).

Resource Study Area

The RSA for noise and vibration consist of the Noise Analysis Areas as described in the NSR prepared for the Project. The analysis focuses on locations with defined outdoor activity areas, such as residential backyards, patios and balconies, common use areas at multifamily residences, outdoor sports and recreation areas, outdoor dining areas of restaurants, and school playgrounds. The RSA includes the areas of Project improvements, maintenance access, sound barriers, stormwater features, and other peripheral features owned and maintained by Caltrans.

Cumulative Impacts

The results of this analysis indicate that past, current, and reasonably foreseeable actions, in combination with the Project, are contributing to adverse cumulative impacts on noise.

Current and reasonably foreseeable future actions could result in land use activities that would increase the typical noise and vibration levels and result in impacts on adjacent sensitive receptors during construction and operation. The Project is anticipated to begin in spring of 2025, the following projects within the RSA may overlap in construction time frame of the Project, the Richards Boulevard / Olive Drive Circulation Improvements 03-0H360 (T-5), and the Yol 80 Davis 80 Rehabilitation Project 03-2J260 (T-9). Project construction of multiple other projects listed in Table 2.4-1 may overlap with the Project, however, the timelines are not yet determined. Land use and transportation plans may also include planned and programmed projects that could potentially overlap with Project construction.

The NSR identified three additional development projects within 500 feet of the Project footprint, the University Research Park development, the Plaza 2555 development, and the 3820 Chiles Road Apartments development. It was determined that the development projects would not contribute cumulatively to noise within the Project area.

The Project would not result in operational noise impacts with implementation of noise mitigation and the installation of the recommended sound barrier. Additionally, vibration levels are not anticipated to increase largely above existing conditions. Therefore, the Project would not contribute to permanent cumulative impacts on noise and vibration.

During construction of the Project, there would be an increase in noise and vibration due to the use of construction equipment. BMPs would be implemented to avoid and/or minimize impacts, which may include the following: providing that equipment is properly maintained and equipped with mufflers, limiting idling, installing temporary noise barriers, and locating staging and queuing areas away from noise-sensitive land uses. All relevant projects would be required to comply with local noise ordinances and implement BMPs as necessary to avoid and minimize temporary impacts on noise. Therefore, in conjunction with relevant projects, the Project would not result in a cumulatively considerable impact on noise and vibration.

The AMMs provided in the Physical Environment Section 2.2.7 would be implemented to reduce the direct effects of the Build Alternatives on noise and vibration. No additional AMMs would be required for cumulative impacts.

2.4.5.14 Energy

The information in this section is based on the Energy Memorandum (Caltrans 2023c) completed for the Project.

Resource Study Area

The RSA for energy is the overall SACOG region. SACOG is a designated Metropolitan Planning Organization that encompasses 28 cities and counties in the Sacramento region. Land use change and the transportation system would influence the demand for future energy development or the location and need for new or additional energy infrastructure across the Sacramento region. The provision of energy can be linked to jurisdictions, but often service providers and their infrastructure cover large areas. Therefore, it is necessary to consider the Sacramento region as a whole and the overall amount of development that would generate additional pressure and demand on energy use and generation facilities.

Cumulative Impacts

Current and reasonably foreseeable future actions could result in land use activities that would result in increased energy consumption during construction and operation. Of the transportation projects within the RSA, the construction timing for Yolo Pavement Rehabilitation Project (T-1) and Richards Boulevard / Olive Drive Circulation Improvements (T-5) could overlap with the Project. Of the development projects within the RSA, the construction timing for River Oaks Phase (D-8), Bell Avenue Warehouses Project (D-9), and Bretton Woods (D-12), and UC Davis Long Range Development Plan (D-13) could overlap with Project construction. Land use and transportation plans may also include planned and programmed projects that overlap with Project construction.

The demands on energy associated with the Project would be temporary and cease with completion of construction-related activities and appropriate BMPs would be implemented to reduce the demand on energy. According to the Energy Memorandum, energy consumption associated with Build Alternatives 2 through 7 represents a small demand on local and regional fuel and supplies that would be accommodated by local energy suppliers (Caltrans 2023c). Development of the projects listed in Table 2.4-1 would be required to assess project-specific impacts related to energy consumption and include design measures consistent with the most recent building code as it relates to energy use. Therefore, in conjunction with relevant projects, the Project would not result in a cumulatively considerable impact on energy.

The AMMs provided in the Physical Environment Section 2.2.7 would be implemented to reduce the direct effects of the Build Alternatives on energy. No additional AMMs would be required for cumulative impacts.

2.4.5.15 Natural Communities

The analysis in this section is based on the Natural Environment Study (NES) prepared for the Project (Caltrans 2023).

Resource Study Area

The RSA for natural communities is consistent with the BSA established for the Project, which is located in the counties of Solano, Yolo, and Sacramento and is approximately 1,137-acres in size. The RSA includes all areas needed for the currently proposed Project improvements and ancillary construction areas (e.g., staging areas, access roads).

Cumulative Impacts

Current and reasonably foreseeable future actions could result in land use activities that could result in impacts on Sensitive Natural Communities. Of the transportation projects within the RSA, the construction timing for Yolo Pavement Rehabilitation Project (T-1) and Richards Boulevard / Olive Drive Circulation Improvements (T-5) could overlap with the Project. Of the development projects within the RSA, the construction timing for River Oaks Phase (D-8), Bell Avenue Warehouses Project (D-9), and Bretton Woods (D-12), and UC Davis Long Range Development Plan (D-13) could overlap with Project construction. Land use and transportation plans may also include planned and programmed projects that overlap with Project construction.

As discussed above, the Project would result in permanent or temporary impacts on Sensitive Natural Communities. The Project would include standard measures to reduce impacts on Sensitive Natural Communities. Information on impacts on Sensitive Natural Communities were not available for several of the current and reasonably foreseeable future actions. However, if these relevant projects result in impacts on the same Sensitive Natural Communities that would be impacted by the Project, there could be a cumulative impact. Similar to the Project, relevant projects that would result in impacts on Sensitive Natural Communities, as defined by CDFW, would be required to conduct biological surveys and evaluation as applicable. If a relevant project would result in impacts on Sensitive Natural Communities, that project would be required to implement measures as required to avoid and minimize impacts. Therefore, in conjunction

with relevant projects, the Project would not result in a cumulatively considerable impact on Sensitive Natural Communities.

The AMMs provided in Biological Section 2.3.1 would be implemented to reduce the direct effects of the Build Alternatives on Sensitive Natural Communities. While the Project would not be expected to have cumulative impacts on Sensitive Natural Communities, implementation of the listed measures would avoid direct impacts on individuals and protect habitat to the extent practicable. No additional AMMs would be required for cumulative impacts.

2.4.5.16 Wetlands and Other Waters

The analysis in this section is based on the NES (Caltrans 2023), Aquatic Resources Survey Report and Preliminary Jurisdictional Assessment (Stantec Consulting Services Inc. 2021), and the Water Quality Assessment (Caltrans 2022a) prepared for the Project.

Resource Study Area

The RSA for wetlands and other waters is consistent with the BSA established for the Project, which is located in the counties of Solano, Yolo, and Sacramento and is approximately 1,137-acres in size. The RSA includes all areas needed for the currently proposed Project improvements and ancillary construction areas (e.g., staging areas, access roads).

Cumulative Impacts

Current and reasonably foreseeable future actions could result in land use activities that could result in impacts on wetlands and other waters. Of the transportation projects within the RSA, the construction timing for Yolo Pavement Rehabilitation Project (T-1) and Richards Boulevard / Olive Drive Circulation Improvements (T-5) could overlap with the Project. Of the development projects within the RSA, the construction timing for River Oaks Phase (D-8), Bell Avenue Warehouses Project (D-9), and Bretton Woods (D-12), and UC Davis Long Range Development Plan (D-13) could overlap with Project construction. Land use and transportation plans may also include planned and programmed projects that overlap with Project construction.

As discussed above, the Project would result in minor temporary impacts on wetlands and other waters. The Project would comply with the requirements of Nationwide Permit No. 14 for Linear Transportation Projects. A preconstruction notification would be required due to the discharge of fill into a wetland. In addition, a Section 401 Water Quality Certification would be obtained from the RWQCB. The Project would include avoidance and minimization measures and would follow all regulatory requirements to reduce impacts on wetlands and other waters. Wetland and aquatic resource delineations were not available for several of the current and reasonably foreseeable future actions. Similar to the Project, all relevant projects would be required to conduct delineations of aquatic resources under the guidance of the USACE, CDFW, and/or the RWQCB, as applicable. If a relevant project would result in impacts on wetlands or other waters, that project would be required to consult with the applicable agencies and implement measures as required to avoid and minimize impacts. Therefore, in conjunction with relevant projects, the Project would not result in a cumulatively considerable impact on wetlands and other waters.

The AMMs provided in the Biological Environment Section 2.3.2 would be implemented to reduce the direct effects of the Build Alternatives on wetlands and other waters. No additional AMMs would be required for cumulative impacts.

2.4.5.17 Animal Species

The analysis in this section is based on the NES prepared for the Project (Caltrans 2023).

Resource Study Area

The RSA for animal species is consistent with the BSA established for the Project, which is located in the counties of Solano, Yolo, and Sacramento and is approximately 1,137-acres in size. The RSA includes all areas needed for the currently proposed Project improvements and ancillary construction areas (e.g., staging areas, access roads).

Cumulative Impacts

Current and reasonably foreseeable future actions could result in land use activities that could result in impacts on animal species. Of the transportation projects within the RSA, the construction timing for Yolo Pavement Rehabilitation Project (T-1) and Richards Boulevard / Olive Drive Circulation Improvements (T-5) could overlap with the Project. Of the development projects within the RSA, the construction timing for River Oaks Phase (D-8), Bell Avenue Warehouses Project (D-9), and Bretton Woods (D-12), and UC Davis Long Range Development Plan (D-13) could overlap with Project construction. Land use and transportation plans may also include planned and programmed projects that overlap with Project construction.

The relevant projects that would be constructed within the Project construction period could result in permanent and temporary impacts on animal species if these projects would require vegetation removal, grubbing and grading, pile driving, operation of vehicles, heavy equipment operation, and earth-moving operations. Each relevant project would be required to implement avoidance, minimization, and mitigation measures as necessary. Therefore, in conjunction with relevant projects, the Project would not result in a cumulatively considerable impact on animal species.

The AMMs provided in the Biological Environment Section 2.3.4 would be implemented to reduce the direct effects of the Build Alternatives on animal species. No additional AMMs would be required for cumulative impacts.

2.4.5.18 Threatened and Endangered Species

The analysis in this section is based on the NES prepared for the Project (Caltrans 2023).

Resource Study Area

The RSA for threatened and endangered species is consistent with the BSA established for the Project, which is located in the counties of Solano, Yolo, and Sacramento and is approximately 1,137-acres in size. The RSA includes all areas needed for the currently proposed Project improvements and ancillary construction areas (e.g., staging areas, access roads).

Cumulative Impacts

Current and reasonably foreseeable future actions could result in land use activities that could result in impacts on threatened and endangered species through degradation of habitat. Of the transportation projects within the RSA, the construction timing for Yolo Pavement Rehabilitation Project (T-1) and Richards Boulevard / Olive Drive Circulation Improvements (T-5) could overlap with the Project. Of the development projects within the RSA, the construction timing for River Oaks Phase (D-8), Bell Avenue Warehouses Project (D-9), and Bretton Woods (D-12), and UC Davis Long Range Development Plan (D-13) could overlap with Project construction. Land use and transportation plans may also include planned and programmed projects that overlap with Project construction.

Detailed biological studies were not available for several of these projects. However, if these relevant projects result in impacts on giant garter snake, valley elderberry longhorn beetle, or Swainson's hawk, there could be a cumulative impact on these species. Similar to the Project, all relevant projects would be required to conduct biological surveys if the project or plan would be developed in an area where sensitive species may occur. If threatened and endangered species or suitable habitat is found within a project site, that project would be required to consult with the applicable agencies and implement measures as required to avoid and minimize impacts. Therefore, in conjunction with relevant projects, the Project would not result in a cumulatively considerable impact on threatened and endangered species.

The AMMs provided in the Biological Environment Section 2.3.5 would be implemented to avoid and minimize impacts on threatened or endangered species. No additional AMMs would be required for cumulative impacts.

Chapter 3 California Environmental Quality Act Evaluation

3.1 Determining Significance Under CEQA

The proposed project is a joint project by the California Department of Transportation (Caltrans) and the Federal Highway Administration (FHWA) and is subject to state and federal environmental review requirements. Project documentation, therefore, has been prepared in compliance with both the California Environmental Quality Act (CEQA) and the National Environmental Policy Act (NEPA). FHWA's responsibility for environmental review, consultation, and any other actions required by applicable Federal environmental laws for this project are being, or have been, carried out by Caltrans pursuant to 23 United States Code Section 327 (23 USC 327) and the Memorandum of Understanding dated December 23, 2016, and executed by FHWA and Caltrans. Caltrans is the lead agency under CEQA and NEPA.

One of the primary differences between NEPA and CEQA is the way significance is determined. Under NEPA, significance is used to determine whether an Environmental Impact Statement (EIS), or a lower level of documentation, will be required. NEPA requires that an EIS be prepared when the proposed federal action (project) *as a whole* has the potential to "significantly affect the quality of the human environment." The determination of significance is based on context and intensity. Some impacts determined to be significant under CEQA may not be of sufficient magnitude to be determined significant under NEPA. Under NEPA, once a decision is made regarding the need for an EIS, it is the magnitude of the impact that is evaluated and no judgment of its individual significance is deemed important for the text. NEPA does not require that a determination of significant impacts be stated in the environmental documents.

CEQA, on the other hand, does require the Department to identify each "significant effect on the environment" resulting from the project and ways to mitigate each significant effect. If the project may have a significant effect on any environmental resource, then an Environmental Impact Report (EIR) must be prepared. Each and every significant effect on the environment must be disclosed in the EIR and mitigated if feasible. In addition, the CEQA Guidelines list a number of "mandatory findings of significance," which also require the preparation of an EIR. There are no types of actions under NEPA that parallel the findings of mandatory significance of CEQA. This chapter discusses the effects of this project and CEQA significance.

3.2 CEQA Environmental Checklist

This checklist identifies physical, biological, social, and economic factors that might be affected by the proposed project. In many cases, background studies performed in connection with the projects will indicate that there are no impacts to a particular resource. A NO IMPACT answer in the last column reflects this determination. The words "significant" and "significance" used throughout the following checklist are related to CEQA, not NEPA, impacts. The questions in

this form are intended to encourage the thoughtful assessment of impacts and do not represent thresholds of significance.

Standard Measures, which can include both design elements of the project, and standardized measures that are applied to all or most Caltrans projects such as Best Management Practices (BMPs) and measures included in the Standard Plans and Specifications or as Standard Special Provisions, are considered to be an integral part of the project and have been considered prior to any significance determinations documented below; see Chapters 1 and 2 for a detailed discussion of these features. All Standard Measures are included in Appendix E. The annotations to this checklist are summaries of information contained in Chapter 2 in order to provide the reader with the rationale for significance determinations; for a more detailed discussion of the nature and extent of impacts, please see Chapter 2. This checklist incorporates by reference the information contained in Chapters 1 and 2.

Where potential impacts are anticipated to be significant, mitigation measures (MMs) will be required, so that impacts may be avoided or reduced to insignificant levels. MMs are included in Appendix C.

3.2.1 Aesthetics

Chapter 2.1.10 provides a comprehensive discussion of the visual/aesthetic resources in the project area. The following is an evaluation of the potential impacts on aesthetics from the Build Alternatives. The No-Build Alternative would not change existing conditions and would not impact aesthetics in the project area and is therefore not discussed further.

a) Have a substantial adverse effect on a scenic vista?

a) Less-than-Significant Impact

Solano County considers views of the Coast Range and nearby hills as scenic vistas. The project does not propose features in Solano County that would substantially impact this vista. No locally or state-designated scenic vistas were identified in Yolo or Sacramento counties from which the project would be visible. Rice Point in the Yolo Bypass Wildlife Area (YWBA) is a wildlife viewing area but is not designated scenic. Some project temporary construction and overhead signage components would have visibility from Rice Point; however, at a distance of 0.5 mile or more, it would not have a substantial effect on views from this location.

The visual impact assessment (VIA) completed for the project (Caltrans 2022a) identified skyline views of downtown Sacramento to be a visual resource for southbound travelers and pedestrians using overpasses within the corridor. The project proposes to introduce new or replaced overhead signage elements that would constitute visual intrusions that could partially obscure the skyline from select vantage points, primarily on the Yolo Causeway and US-50. However, the infrequency of these elements, short duration of visual obstruction, the elevated position of pedestrians and cyclists on bridges above the structures would not result in a substantial visual change on a scenic vista.

The impact on scenic vistas would be less than significant for all Build Alternatives. AMMs 1 through 5 (Appendix C) will be used to avoid or reduce potential project impacts on visual resources and aesthetics associated with the project.

b) Substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a state scenic highway?

b) No Impact

The project corridor is not designated scenic or eligible by Caltrans. For purposes of this analysis, eligible and designated State Scenic Highways, as well as locally designated highways/roadways/corridors near the project were identified and reviewed for potential visual impacts that could result from the project. A summary of each county follows.

3.2.1.1 Solano County

Caltrans has not officially designated any State Scenic Highways in Solano County. However, both I-80 and SR-113 have been designated by the County as local scenic roadways. Temporary construction staging activities are proposed at the I-80/Kidwell Road loop ramp, which is within the County-designated scenic roadway segment of I-80. While tree and vegetation removal would occur as part of the project, it is unlikely that trees would be removed from this staging area since ample staging areas are available within the project corridor; and Caltrans policy is to preserve these resources where feasible.

3.2.1.2 Yolo County

In Yolo County, Caltrans has not officially designated any State Scenic Highways within or near the project limits.

3.2.1.3 Sacramento County

In Sacramento County, the County has designated I-80, I-5 (at US-50), Garden Highway and the Sacramento River as scenic corridors. Sacramento County states that beautifying the freeways makes travel more pleasant and creates a more attractive environment.

As discussed above, the project would have no impact on state-designated or eligible scenic highways.

c) In non-urbanized areas, would the project substantially degrade the existing visual character or quality of public views of the site and its surroundings? (Public views are those that are experienced from a publicly accessible vantage point). If the project is in an urbanized area, would the project conflict with applicable zoning and other regulations governing scenic quality?

c) Less-than-Significant Impact

The project traverses both non-urbanized and urbanized areas. The Solano County visual assessment unit (VAU) mostly includes agricultural lands uses, and the Yolo County VAU mostly includes wildlife preserve land uses. Therefore, the Solano County VAU and the Yolo County VAU are in non-urbanized areas. The Davis VAU and the West Sacramento VAU mostly include suburban land uses such as residential, commercial, and industrial. Therefore, the Davis VAU and the West Sacramento VAU are in urbanized areas.

Build Alternatives 2a and 2b

Highway users would experience short-term visual impacts due to construction. Short-term impacts would add visual intrusion and disturbances to the corridor and would reduce the intactness and unity of the visual resources in the visual resources study area. Equipment and machinery would be stationed at staging areas within the project limits, and traffic control signage would be used as needed. Temporary visual effects from the construction would be typical of any major corridor improvement.

Build Alternative 2a would expand paving, add managed traffic components, add overhead signage, remove trees, install rock slope treatments, and remove existing median plantings, all of which would degrade the visual character and quality of the site/corridor and its surroundings through the increased urbanized aesthetic change. However, in non-urbanized areas, the project components would be less than in urbanized areas.

Tree and median vegetation removal proposed has the potential to degrade the existing visual character and quality of public views of the site and its surroundings. Trees and bushes would be removed to accommodate off-ramp widening (Davis/Richards Boulevard), bike path extension (at CR 32A in the Yolo VAU), the Park-and-ride facility (east of Harbor Boulevard in West Sacramento), the I-80 connector ramp (West Sacramento), and a drainage facility in West Sacramento. The precise number of trees and bushes proposed to be removed is included in the Natural Environment Study and other documents associated with biological resources prepared for the project.

In the Davis VAU, median oleander vegetation removal would occur over 3.6 miles. Their value as a visual resource is moderate-high, and the visual impacts of their removal would be moderate-high. This value is related to their position within the visual environment and the notable effect they have of breaking down the scale of the roadway for highway users by screening oncoming traffic with a living vegetative visual barrier. They also add a defining element of vegetative character to the VAU and introduce year-long seasonal interest by being evergreen in the winter when most of the vegetation region-wide is deciduous, and by flowering from spring through fall.

Implementation of AMM AES-3 would replace highway plantings and vegetation, including oleander. Landscaping and revegetation plans would be prepared to maintain, repair, and expand corridor landscaping and vegetation where proper setbacks exist and where feasible. Plantings would occur as close to the original impacts as possible. When native, naturally occurring, or specimen trees are removed, replacement plantings would reflect the visual importance of the plantings lost. This measure would reintroduce the lost vegetative character to the corridor which would recover and improve as the plantings mature.

Overhead signage has the potential to degrade the existing visual character and quality of public views of the site and its surroundings. As depicted in several KVs, new overhead signage can reduce the character and quality of a view. The proposed managed traffic components and overhead signage would be consistent with existing similar features in the corridor, but they would also increase the dominance of the freeway in the visual environment of the corridor. However, sensitivity to these additional signs would be moderate for many highway users since they are consistent with expectations of traveling on an interstate, and proposed signage elements are visually comparable with existing signage elements. Implementation of AMM AES-4 would avoid or minimize views of new overhead signage from visually sensitive locations. Where new overhead signage is proposed, refinements to their final location would be considered to avoid or screen direct views from sensitive viewsheds such as those of homeowners and recreationalists.

The rock slope protection strategies proposed have the potential to degrade the existing visual character and quality of public views of the site and its surroundings. However, these impacts would be less than significant. This is primarily in the area of the new bike lane extension at CR-32A that is proposed under Bicycle Option “b” (see KV YO 1). AMM AES-2 would minimize high-contrast rock slope protection by specifying rock colors and/or stains which match or complement the predominant, immediately adjacent landscape color. Alternatively, planted options at this location would be considered.

Many of the project corridor improvements proposed by the project would be largely consistent with the existing visual environment. However, in the Davis VAU (approximately 3.6 miles) the removal of the median vegetation would have the impact of increasing the dominance of the existing highways features. When combined with the increase in signage and paving, the project would alter the character of the roadway. Although the 42-inch-tall concrete median would buffer some of those views, its character is not comparable with the character of the existing vegetation. However, as described previously, implementation of AMMs AES-1 through AES-4 would reduce the magnitude of these effects.

Build Alternative 2b would include the proposed I-80 connector structure in the West Sacramento VAU. The visual condition through this 1-mile segment of the project would be altered by the addition of an elevated, I-80 connector structure which would include significant tree removal (70 trees), grading, new landforms, aerial structures, columns, and walls. Elements on the structure may be visible from adjacent residential areas, though this visibility is expected to be limited by combinations of distance, vegetative screening, and screening of existing built forms such as other homes and existing sound walls. The proposed I-80 connector structure would introduce walls of significant height into the center median of the freeway, which is unprecedented in the VAU, the project corridor, and the broader regional freeway system. This landform and the walls in the center median of the mainline would reduce visual access in segments of the corridor which are currently open. Additionally, existing overhead power lines and structures may need to be relocated or increased in height to maintain required clearances.

Implementation of AMMs would reduce the magnitude of these effects. AMM AES-3 would require replacement trees be planted on the I-80 connector structure’s earthen berm. AMM AES-4 would reduce views of any new overhead signage that may be proposed on the I-80

connector structure. AMM AES-5 would refine the design of the I-80 connector structure to prioritize solutions which reduce visual impacts and limit potential to require power line relocation.

Build Alternatives 3a and 3b

In addition to the impacts noted in Build Alternative 2a, Build Alternative 3a includes the installation of 35 additional overhead signs and read points. These signs would be similar in scale to existing signage; but they would be inconsistent with existing signage color and would result in an increased frequency of signage throughout the corridor. The read points are mounted on poles similar to pole lighting; however, the equipment mounted to them and their pronounced position over the number one lane every 0.5 mile would be a notable and unprecedented visual intrusion. Sensitivity to these additional signs and read points would be moderate for many highway users since they are somewhat consistent with expectations of traveling on an interstate through an urbanized area. For highway neighbors, new overhead signs visible from sensitive locations would degrade the character and quality of the surroundings. Implementation of AMM AES-4 would reduce the magnitude of these effects by requiring that the location of all new overhead signage and read points be reviewed and that sensitive locations are avoided or screened to the extent possible. Furthermore, read points would be integrated into existing and proposed overhead structures where feasible.

Build Alternative 3b would include the proposed I-80 connector structure. Accordingly, with implementation of AMMs AES-3 through AES-5, impacts on visual character and quality in the project area would be reduced. Impacts would be less than significant.

Build Alternatives 4a and 4b

Build Alternatives 4a and 4b propose similar project components within the same project area as Build Alternatives 3a and 3b. Therefore, impacts would be similar to those described for Build Alternatives 3a and 3b.

Build Alternatives 5a and 5b

Build Alternatives 5a and 5b propose similar project components within the same project area as Build Alternatives 3a and 3b. Therefore, impacts would be similar to those described for Build Alternatives 3a and 3b.

Build Alternatives 6a and 6b

Build Alternatives 6a and 6b propose similar project components within the same project area as Build Alternatives 2a and 2b. Therefore, impacts would be similar to those described for Build Alternatives 2a and 2b.

Build Alternatives 7a and 7b

For Build Alternative 7a the visual character and quality of the site and its surroundings would be altered by the project, but to a lesser degree than Build Alternatives 2a–6a since this alternative does not propose impacts on the median vegetation in the Davis VAU nor does it

propose an I-80 connector structure in the West Sacramento VAU (Alternative 7b). Impacts and measures noted above, which Alternative 7a shares with other “a” Alternatives would apply. With implementation of AMMs AES-3 through AES-4, effects would be reduced.

Build Alternative 7b would also include the proposed I-80 connector structure in the West Sacramento VAU. With implementation of AMMs AES-3 through AES-5, effects would be reduced. Impacts would be less than significant.

d) Would the project create a new source of substantial light or glare that would adversely affect day or nighttime public views?

d) Less-than-Significant Impact

For Build Alternatives 2a and 2b through 6a and 6b, temporary sources of light and glare would occur during the construction phase which would include nighttime work. Permanent bridge deck lighting with Type 21 Barrier-Rail-Mounted Lighting Standards would be added to the Bryte Bend Bridge at approximately 150 feet on center along the outside barrier rails. Lighting may also be added at proposed auxiliary lane locations and the new bike lane near CR-32A. The luminary style is set by Caltrans standards for roadway safety and maintenance and has standard features to limit light and glare impacts. In some instances, such as at the Bryte Bend Bridge, new lights may be visible from sensitive public viewing areas, such as residential areas, at angles which bypass standard cut-off and shielding features. This new lighting would introduce views of new sources of light into nighttime public views. These views currently include lights associated with vehicle traffic, though most direct views are shielded by the bridge barrier rail. The level of lighting would not be substantial, and only a few residents would be in proximity to the light.

Where median vegetation is not present, or the current barrier height is being raised by the project, exposure to light and glare from oncoming traffic is anticipated to decrease. However, throughout most of the Davis VAU, the changes proposed by the project to remove center median vegetation would permanently expose users to increased sources of light and glare (except Build Alternatives 7a and 7b). The center median vegetation currently provides a dense evergreen visual buffer through segments of the project corridor. Its removal would create or increase exposure to light and glare associated with vehicles and their headlights. The barrier itself may also become a source of glare on bright sunny days if the concrete color is too light. Glare impacts would occur to highway users during the day and would be primarily associated with sunlight reflecting off vehicles or the barrier rail. Light and glare impacts would also occur in the evening and would primarily be associated with vehicle headlights. Impacts would be variable by time of day, weather conditions, traffic volume, and other factors. Impacts would be experienced primarily and most notably by highway users. The 42-inch center median barrier would provide an effective screen for some highway users where the barrier blocks their line of sight to sources of light and glare. The center median concrete barrier would also provide some screening for lower profile vehicles but less for higher profile vehicles. The barrier would provide reduced screening where variations in any combination of topography, distance, vehicle size, vehicle profile (user position), superelevation, and/or roadway grading create lines of sight greater than its height from the perspective of a given observer. The median vegetation in the Davis VAU is most commonly more than 42 inches, and through some segments of the corridor

exceeds 12 feet; therefore, exposure is anticipated to increase. These conditions would be similar to the immediately adjacent segments of the corridor and are common throughout the interstate system. Although light and glare exposure would increase, the impact would be less than significant. AMM AES-1 would require the concrete color selected reduce glare potential and the impact would remain less than significant.

Build Alternatives 7a and 7b light and glare impacts would be similar to the other Build Alternatives, except that changes to the median are not proposed so impacts in the Davis VAU would be reduced. Impacts would be less than significant.

3.2.2 Agriculture and Forest Resources

Section 2.1.4, Farmlands, provides a comprehensive discussion of the agricultural resources (farmland) in the project area. The project area is not located within areas designated for forest land or timberlands. The following is an evaluation of the potential impacts on agricultural resources from the Build Alternatives. The No-Build Alternative would not change existing conditions and would not impact agricultural resources and is therefore not discussed further.

In determining whether impacts to agricultural resources are significant environmental effects, lead agencies may refer to the California Agricultural Land Evaluation and Site Assessment Model (1997) prepared by the California Department of Conservation as an optional model to use in assessing impacts on agriculture and farmland. In determining whether impacts to forest resources, including timberland, are significant environmental effects, lead agencies may refer to information compiled by the California Department of Forestry and Fire Protection regarding the state's inventory of forest land, including the Forest and Range Assessment Project and the Forest Legacy Assessment Project, and the forest carbon measurement methodology provided in Forest Protocols adopted by the California Air Resources Board.

a) Convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Farmland), as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency, to non-agricultural use?

b) Conflict with existing zoning for agricultural use, or a Williamson Act contract?

e) Involve other changes in the existing environment which, due to their location or nature, could result in conversion of Farmland, to non-agricultural use or conversion of forest land to non-forest use?

a), b), e) No Impact.

As summarized in Section 2.1.3 and shown in Figure 2.1-1, the Land Use Study Area includes several farmland areas, mostly located within unincorporated portions of Sacramento, Yolo, and Solano Counties. Build Alternatives 2a through 7a would occur almost entirely within the Caltrans right-of-way and would include a new permanent easement for construction of a Park-and-Ride Facility. However, because this area is not designated as agricultural, the project would not result in the conversion of any important farmland or Williamson Act land to non-

agricultural uses. Therefore, there would be no impacts on agriculture or forestry using Build Alternatives 2a and b through 7a and b.

c) Conflict with existing zoning for, or cause rezoning of, forest land (as defined in Public Resources Code Section 12220(g)), timberland (as defined by Public Resources Code Section 4526), or timberland zoned Timberland Production (as defined by Government Code Section 51104(g))?

d) Result in the loss of forest land or conversion of forest land to non-forest use?

c), d) No Impact.

Because the project area is not located within areas designated for forest land or timberlands, there would be no impact on forest land or timberlands resulting from Build Alternatives 2a and 2b through 7a and 7b.

3.2.3 Air Quality

Section 2.6, Air Quality, provides a comprehensive discussion of the air quality in the project area. The following is an evaluation of the potential impacts on air quality from the Build Alternatives. The No-Build Alternative would not change existing conditions and would not impact air quality and is therefore not discussed further.

Where available, the significance criteria established by the applicable air quality management district or air pollution control district may be relied upon to make the following determinations.

a) Conflict with or obstruct implementation of the applicable air quality plan?

a) Less than Significant Impact.

The goal of the project is to improve mobility by implementing managed lane strategies and improving transit access along the corridor, which would reduce traffic congestion, improve traffic flow, reduce travel time, and increase travel time reliability by actively managing recurrent and non-recurrent congestion. Construction associated with the project would result in short-term emissions of criteria pollutants, and long-term operations for Alternatives 2 through 7 are expected to result in increases of criteria pollutants, primarily due to associated increases in VMT.

The project area is in the Sacramento Valley Air Basin (SVAB) and under the jurisdiction of the Sacramento Metro Air Quality Management District (SMAQMD), Yolo-Solano Air Quality Management District (YSAQMD), and Sacramento Area Council of Governments (SACOG). The SMAQMD and YSAQMD are the designated local authorities responsible for monitoring air pollution within the applicable portion of the SVAB, where the project would occur.

Ambient air quality standards have been established at both the state and federal levels. The area meets all federal ambient air quality standards except for ground-level ozone and fine

particulate matter (PM2.5). At the state level, the region meets all ambient air quality standards except those for ground-level ozone and respirable particulate matter (PM10).

The SMAQMD and YSAQMD develop and administer plans and programs, including state implementation plans and redesignation requests, to reduce air pollution levels below the health-based standards established by the state and federal governments. SMAQMD has developed a construction mitigation protocol and standard levels. SMAQMD has also prepared several implementation/maintenance plans and redesignation requests for multiple criteria pollutants. Both the PM2.5 Implementation/ Maintenance Plan and Redesignation Request and the Sacramento Regional 2008 NAAQS 8-Hour Ozone Attainment Plan and Reasonable Further Progress Plan have exhaust and dust control measures for construction-related emissions. The U. S. Environmental Protection Agency (USEPA) and California Air Resources Board (CARB) have adopted rules and emission standards that would reduce diesel particulate matter emissions from on-road and off-road engines for construction equipment.

For project operations, future emissions would generally decrease as older vehicles are replaced by newer vehicles with more stringent emissions and fuel economy standards. Based on the operational period emission data in Table 2.2-9 and Table 2.2-10 in Section 2.2.6 Air Quality, the magnitude of the emissions estimates for each of the Build Alternatives is very similar.

Project implementation will include Standard Measures GHG-1 through GHG-6 (see Appendix E), which would minimize emissions associated with construction activities. As such the project would not conflict with or obstruct implementation of the applicable air quality plan, and impacts would be less than significant.

b) Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non- attainment under an applicable federal or state ambient air quality standard?

b) Less-than-Significant Impact

An analysis of the regional emissions that would result from each Build Alternative was conducted using CT-EMFAC 2021 (Version 2) and regional traffic projections, truck percentages, and speeds from the SACOG SACSIM regional travel demand model to compute an emission “burden.” The analysis, presented in in Table 2.2-9 and Table 2.2-10 in Section 2.2, includes the cumulative and indirect travel demand impacts of the project, and shows that the Build Alternatives would have emissions similar to, or lower emissions than those of the No-Build Alternative and lower emissions than the baseline; therefore, impacts would be less than significant.

c) Expose sensitive receptors to substantial pollutant concentrations?

c) Less-than-Significant Impact

The areas adjacent to the project corridor primarily include both single-family and multifamily residential developments, commercial developments (e.g., restaurants, retail spaces, and

offices), and some light industrial uses. Emissions from construction equipment and on-road vehicles powered by gasoline and diesel engines are anticipated. Construction activities in the area may also temporarily increase traffic congestion and slow the speed of traffic, resulting in a temporary increase in on-road emissions. These emissions would be limited to the immediate areas (about 500 feet from the project footprint).

There are a limited number of receptors within 500 feet of the project footprint. Additionally, project construction will include Standard Measures GHG-1 through GHG-6, which would minimize emissions associated with construction activities, and impacts would be less than significant.

While minor alignment shifts in the roadway would occur with implementation of the project, the project would not change the traffic mix. Additionally, all Build Alternatives would improve traffic operations and efficiency, which would help to reduce pollutant emissions, and impacts would be less than significant.

d) Result in other emissions (such as those leading to odors) adversely affecting a substantial number of people?

d) Less-than-Significant Impact

The project would not create objectionable odors affecting many people. Minor sources of odors (e.g., diesel engines) would be present during construction of the project. However, because odors would be temporary and would disperse rapidly with distance from the source, construction-generated odors are not anticipated to result in the adverse exposure of receptors to objectionable odorous emissions. Operational odors would be consistent with those under existing conditions, and impacts would be less than significant.

3.2.4 Biological Resources

Chapter 2.3, Biological Environment, provides a comprehensive discussion of the biological resources that occur, or have the potential to occur in the project area. The following is an evaluation of the potential impacts on biological resources from the Build Alternatives.

a) Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special-status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Game or U.S. Fish and Wildlife Service?

a) Less-than-significant impact with mitigation.

3.2.4.1 Special-Status Plant Species

As discussed in Chapter 2.3, Biological Environment, during the site surveys conducted in May 2021 and July 2022, none of the 25 special-status plant species that have potential to occur in the project area were observed. Standard Measure BIO-4 has been incorporated into the project

to prevent the potential for the spread or introduction of non-native plants in the biological study area (BSA).

During construction, vegetation would be cleared only where necessary, and grubbing would be minimized to the maximum extent possible as required by Standard Measure BIO-11. Once construction is completed, disturbed areas would be replanted, reseeded, and restored in accordance with Standard Measure BIO-4. As such, impacts on special-status plant species would be less than significant for Build Alternatives 2a and 2b through 7a and 7b.

3.2.4.2 Special-Status Animal Species

During the site surveys conducted throughout 2021, Swainson's hawk, white-tailed kite, and northern harrier were identified in the BSA during the protocol-level Swainson's hawk and burrowing owl surveys. One bald eagle was incidentally observed flying over the BSA during the field surveys. None of the other 20 special-status animal species that have potential to occur in the project area were observed. However, the project area contains suitable habitat for these species; therefore, there is potential for these special-status animal species to occur within the project footprint.

Valley Elderberry Longhorn Beetle

The project would result in direct and indirect impacts on valley elderberry longhorn beetle (VELB). Standard Measures BIO-1, BIO-3, and BIO-4 have been incorporated into the project that would help to avoid adverse effects on VELB; however, impacts could be significant. AMMs BIO-16 through BIO-21 would further minimize impacts on VELB and impacts would be less than significant for Build Alternatives 2a and 2b through 7a and 7b.

Giant Garter Snake

Approximately 4.265 acres of giant garter snake (GGS) habitat would be permanently impacted. Permanent habitat impacts would result from the bike path improvements. Approximately 3.669 acres of temporary habitat impacts would result from installation of the fiber-optic line, GSRD installation, bike path improvements, and staging areas. Direct impacts on GGS could result from the increase in hazardous materials, habitat loss, and the crushing of individuals from construction equipment. Indirect impacts could result from removal of terrestrial vegetative cover, which could increase microclimate temperatures and the potential introduction of invasive plant species by construction equipment, which would reduce potential habitat for the species. Standard Measures BIO-1, BIO-2, BIO-3, and BIO-4 have been incorporated into the project that would help to avoid adverse effects on GGS; however, impacts could be significant. AMMs BIO-22 through BIO-30 would be implemented to further minimize impacts on GGS and impacts on GGS would be reduced to less than significant for Build Alternatives 2a and 2b through 7a and 7b.

Western Pond Turtle

Construction activities are not likely to impact breeding and nesting activities directly or indirectly since construction would occur outside the turtle nesting season; and certain construction

activities, such as vegetation removal and soil compaction stemming from grading, would not affect areas where potential nesting habitat is present (e.g., open water and valley foothill riparian habitats along Putah Creek). Standard Measures BIO-1, BIO-2, BIO-3, and BIO-4, listed in Appendix E, would minimize potential impacts to western pond turtle. In addition, AMM BIO-4 would allow for construction to cease until western pond turtles have left the work area, and AMM BIO-5 would require species-specific training for workers and impacts on western pond turtle would be reduced to less than significant for Build Alternatives 2a and 2b through 7a and 7b.

Burrowing Owl

Suitable burrowing owl habitat was identified during protocol-level surveys. However, no active burrowing owl nests were observed during the nesting season surveys. None of the potential burrowing owl habitat identified is located within the permanent construction footprint and approximately 0.03 acre of concentrated burrows is located within the staging area adjacent to Kidwell Road at the west end of the BSA. However, if burrowing owls are present within the 500-foot buffer during construction activities, the project could result in temporary displacement due to project activities affecting potential burrow sites. Although no burrowing owl were observed during the 2021 nesting season, burrowing owl have a potential to nest in the areas mapped as suitable habitat and concentrated burrows as well as other areas, depending on-site conditions, in the future. Standard Measure BIO-1 requires the species to be covered in the Worker Environmental Awareness Training, which would help to avoid impacts on burrowing owl, but impacts could be significant. AMMs BIO-7 through 9 would be implemented, which require preconstruction surveys for burrowing owl and the implementation of buffers if active burrows are identified. As such, impacts on burrowing owl would be less than significant for Build Alternatives 2a and 2b through 7a and 7b.

Swainson’s Hawk

Twenty-four active Swainson’s hawk nests were observed within 0.5-mile of the BSA during the protocol-level surveys in 2021. The project could result in a temporary and permanent loss of foraging habitat and displacement of nesting Swainson’s hawk (SWHA) due to project activities. Direct disturbance from construction activities, such as pile driving, operation of vehicles, heavy equipment operation, and earth-moving operations around active nests could result in stress, injury, or mortality to individuals. The project would have temporary impacts on foraging habitat through the staging of equipment, temporary construction access, and other construction activities. Permanent loss of foraging habitat would result from the proposed Park-and-Ride Facility, proposed bike path improvements, connector ramp, and other road widening. About 10.0 acres of Swainson’s hawk foraging habitat consisting of grassland and croplands (hayfield) would be permanently lost. Based on current project designs and the protocol survey results, no trees with active Swainson’s hawk nests have been slated for removal. Standard Measures BIO-1 and BIO-2 have been incorporated into the project that would help to avoid adverse effects on Swainson’s hawk; however, impacts could be significant. Implementation of AMMs BIO-31 through BIO-32 would minimize impacts on Swainson’s hawk and as such, impacts on Swainson’s hawk would be less than significant for Build Alternatives 2a and 2b through 7a and 7b.

Western Yellow-Billed Cuckoo and Least Bell's Vireo

Western yellow-billed cuckoo and least Bell's vireo could use the riparian habitat surrounding Putah Creek, Sacramento River, and portions of the Yolo Bypass within and adjacent to the BSA as migratory stopover habitat. The suitable migratory stopover and foraging habitat (i.e., riparian vegetation) for western yellow-billed cuckoo and least Bell's vireo is located within existing Caltrans right-of-way where there are frequent anthropogenic disturbances from vehicles. The riparian vegetation within these areas would not be removed and the activities proposed in the staging areas would be similar to those already occurring in the area (e.g., high volumes of traffic and other disturbances associated with the highway). Therefore, there will be no impact on western yellow-billed cuckoo or least Bell's vireo.

Additionally, Standard Measures BIO-1 and BIO-2 have been incorporated into the project, which will further minimize potential impacts on migratory stopover and foraging habitat for western yellow-billed cuckoo and least Bell's vireo. As such, impacts on western yellow-billed cuckoo and least Bell's vireo would be less than significant for Build Alternatives 2a and 2b through 7a and 7b.

Tricolored Blackbird and Yellow-Headed Blackbird

Nesting habitat identified for tricolored blackbird and yellow-headed blackbird within and adjacent to the BSA is minimal and in small, isolated patches. The most suitable nesting habitat identified during the assessment is the patch of willows, labeled as valley foothill riparian, at the northwest corner of the Kidwell Road interchange at the western end of the BSA. Both species typically nest in more extensive patches of vegetation. With limited habitat available, the likelihood of tricolored blackbird or yellow-headed blackbird nesting within or adjacent to the BSA is low. However, if nesting tricolored blackbird or yellow-headed blackbird are present within or adjacent to construction areas, they could be disturbed and abandon their nests.

Standard Measures BIO-1 and BIO-2 have been incorporated into the project which will help to minimize adverse effects on tricolored blackbird and yellow-headed blackbird; however, impacts could be significant. AMMs BIO-6 would minimize impacts on tricolored blackbird and yellow-headed blackbird, and as such, impacts on tricolored blackbird and yellow-headed blackbird would be reduced to less than significant for Build Alternatives 2a and 2b through 7a and 7b.

Raptors, Other Nesting Birds, and Migratory Birds

Tree and vegetation removal would result in a temporary loss of nesting and foraging habitat for raptors, nesting birds, and migratory birds. Tree and vegetation removal may also affect foraging success, food sources for herbivorous birds, and reduction in prey density for carnivorous or insectivorous birds. Following completion of construction, trees would be replanted, and the surrounding habitat would be restored. Standard Measure BIO-2 would require preconstruction nesting surveys and the establishment of buffers for nesting raptors and all other birds. AMM BIO-2 would require minimizing the amount of riparian vegetation removed. Standard Measure BIO-4 require replanting, reseeding, and restoration of disturbed areas along with minimizing vegetation removal. Standard Measures would minimize the temporary impact from the loss of nesting and foraging habitat; however, impacts on raptors and migratory birds

could potentially be significant. AMM BIO-10 would require consultation with California Department of Fish and Wildlife (CDFW) if creating a no disturbance buffer around a white-tailed kite or northern harrier nest is not practicable. AMM BIO-11 would prohibit activities that would result in take of a white-tailed kite nest. Implementation of Standard Measure BIO-2, Standard Measure BIO-4, AMM BIO-2, AMM BIO-10, and AMM BIO-11 would further reduce impacts and as such, impacts on raptors, other nesting birds, and migratory birds would be less than significant for Build Alternatives 2a and 2b through 7a and 7b.

Special-Status Bat Species

Construction would lead to temporary increases in noise, dust, and human disturbance. The project would result in temporary displacement of bats and temporary loss of bat roosting habitat due to culvert removal and tree removal. Standard Measures BIO-1 and BIO-2 have been incorporated into the project and would reduce impacts on special-status bat species; however, impacts could be potentially significant. Implementation of AMM BIO-12 would require trees to be removed after young bats are volant to avoid impacts to maternity colonies, AMM BIO-13 would require preconstruction bat surveys, AMM BIO-14 would require a bat protection plan, and AMM BIO-15 minimizes impacts to bats from structural changes to potential roosting habitat.

Standard Measure BIO-4 would also be required to further reduce impacts on special-status species. Once construction is completed, all disturbed areas will be restored to the maximum extent feasible. Therefore, impacts on special-status animal species would be less than significant with mitigation incorporated. As such, impacts on special-status bats would be less than significant for Build Alternatives 2a and 2b through 7a and 7b.

b) Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations or by the California Department of Fish and Game or US Fish and Wildlife Service?

b) Less-than-significant impact.

Impacts on CDFW sensitive natural communities would only occur on those within the valley foothill riparian and valley oak woodland California Wildlife Habitat Relationships (CWHR) communities. Temporary and permanent impacts on CDFW sensitive natural communities and the riparian communities considered sensitive by the U.S. Army Corps of Engineers (USACE) and the Regional Water Quality Control Board (RWQCB) are summarized in Table 3.2-1. Impacts are expected to be similar between all build alternatives. Impacts on riparian habitat and sensitive natural communities would be minimal and would therefore be less than significant for Build Alternatives 2a and 2b through 7a and 7b.

Table 3.2-1. Summary of Sensitive Natural Community Approximate Impacts within the Biological Study Area

CWHR Community Type	CDFW Sensitive Natural Community	Temporary Impact (Acres)	Permanent Impact (Acres)
Valley Foothill Riparian	Oregon ash groves California sycamore woodlands Fremont cottonwood forest and woodland	1.87	—
Valley Oak Woodland	Valley oak woodland and forest	0.51	0.14
Annual/Perennial Grassland	Gum plant patches	0.007	—
Total	—	**2.39**	**0.14**

c) Have a substantial adverse effect on federally protected wetlands as defined by Section 404 of the Clean Water Act (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means?

c) Less-than-significant impact.

The project includes roadway improvements such as replacing culverts and installing a fiber-optic line and vaults. As discussed in Section 2.3.2, Wetlands and Other Waters, 0.12 acre (58.296 linear feet) of jurisdictional waters is estimated to be temporarily affected, and approximately 0.055 acre (377.98 linear feet) is estimated to be permanently affected by the project. Prior to construction, Caltrans would obtain a Section 404 permit from the USACE, a Section 401 Water Quality Certification from the RWQCB, which would require the purchase of compensatory mitigation for the permanent loss of waters. Caltrans would also obtain a Section 1602 Lake and Streambed Alteration Agreement from CDFW.

Also, Standard Measures BIO-1, BIO-3, and BIO-4 have been incorporated into the project, including measures to minimize water quality and erosion during construction, as such impacts would be less than significant. Further, with incorporation of AMMs BIO-1, BIO-2, and BIO-3, impacts on aquatic resources would be minimized; and the project would not result in substantial adverse effects to aquatic resources.

d) Interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites?

d) Less-than-significant impact with mitigation.

The project is located in areas with high levels of anthropogenic disturbances within and near the Caltrans right-of-way. The project would not remove a substantial amount of habitat. The project would not interfere with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors or impede the use of native wildlife nursery sites and impacts would be less than significant.

Further, bat maternity roosts are located within the project area. With implementation of Standard Measures BIO-1 and BIO-2 as well as AMM BIO-12 through BIO-15, the project would not result in substantial adverse effects to bat maternity roosts.

e) Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance?

e) Less-than-significant impact

Tree ordinances and policies protecting trees are in place in the City of Sacramento, City of West Sacramento, City of Davis, and Sacramento County. Caltrans will comply with local tree ordinances.

f) Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan?

f) Less-than-significant impact with mitigation.

The project is located within the boundaries of the Yolo Habitat Conservation Plan/Natural Community Conservation Plan (HCP/NCCP) and abuts the boundaries of the Natomas Basin Habitat Conservation Plan (NBHCP). With implementation of Standard Measures BIO-1 through BIO-4 and AMMs BIO-1 through BIO-32, construction and operation of the project would not conflict with either HCP/NCCP or other approved local, regional, or state habitat conservation plans, and there would be no impact under these criteria.

The following goals and policies under the Yolo HCP/NCCP Conservation and Open Space Policies would be applicable to the project:

City of Davis

Goal HAB 1: Identify, protect, restore, enhance, and create natural habitats. Protect and improve biodiversity consistent with the natural biodiversity of the region.

- **Policy HAB 1.1.** Protect existing natural habitat areas, including designated Natural Habitat Areas.

City of West Sacramento

Goal NRC-2: To protect sensitive native vegetation and wildlife communities and habitats in West Sacramento.

- **NRC-2.7 Rare, Threatened, & Endangered Species Protection.** The City shall preserve rare, threatened, and endangered species by ensuring that development does not adversely affect such species or by fully mitigating adverse effects. For developments where adverse impacts cannot be mitigated, the City shall not approve the project.

- **NCR-2.9 No Net Loss.** The City shall require new development to ensure no net loss of State and Federally regulated wetlands, other waters of the United States (including creeks, rivers, ponds, marshes, vernal pools, and other seasonal wetlands), and associated functions and values by regulating development in and near these habitats and promoting projects that avoid sensitive areas. Where habitat loss is unavoidable, the City shall require replacement consistent with State and Federal regulations protecting wetland resources.

- **NCR-2.10 Wetland and Riparian Habitat Protection.** The City shall seek to minimize the loss or degradation of wetland and riparian habitats at the following sites: Lake Washington and associated wetlands, Bee's Lake and associated riparian woodlands, riparian woodlands along the Sacramento River north of the I Street Bridge and south of the barge canal, and riparian woodlands along the Deep Water Ship Channel and the Yolo Bypass.

County of Yolo

Goal CO-2. Biological Resources. Protect and enhance biological resources through the conservation, maintenance, and restoration of key habitat areas and corresponding connections that represent the diverse geography, topography, biological communities, and ecological integrity of the landscape.

- **Policy CO-2.1.** Consider and maintain the ecological function of landscapes, connecting features, watersheds, and wildlife movement corridors.

- **Policy CO-2.3.** Preserve and enhance those biological communities that contribute to the county's rich biodiversity including blue oak and mixed oak woodlands, native grassland prairies, wetlands, riparian areas, aquatic habitat, agricultural lands, heritage valley oak trees, remnant valley oak groves, and roadside tree rows.

- **Policy CO-2.9.** Protect riparian areas to maintain and balance wildlife values.

- **Policy CO-2.10.** Encourage the restoration of native habitat.

- **Policy CO-2.13.** Promote the use of oak woodlands conservation banks to mitigate for losses due to development impacts and to provide carbon sequestration for greenhouse gas emissions under applicable State programs.

- **Policy CO-2.14.** Ensure no net loss of oak woodlands, alkali sinks, rare soils, vernal pools or geological substrates that support rare endemic species, with the following exception. The limited loss of blue oak woodland and grasslands may be acceptable, where the fragmentation of large forests exceeding 10 acres is avoided, and where losses are mitigated.

- **Policy CO-2.16.** Existing native vegetation shall be conserved where possible and integrated into new development if appropriate.

- **Policy CO-2.30.** Protect and enhance streams, channels, seasonal and permanent marshland, wetlands, sloughs, riparian habitat and vernal pools in land planning and community design.

- **Policy CO-2.31.** Protect wetland ecosystems by minimizing erosion and pollution from grading, especially during grading and construction projects.

- **Policy CO-2.34.** Recognize, protect, and enhance the habitat value and role of wildlife migration corridors for the Sacramento River, Putah Creek, Willow Slough, the Blue Ridge, the Capay Hills, the Dunnigan Hills and Cache Creek.

- **Policy CO-2.37.** Where applicable in riparian areas, ensure that required State and Federal permits/approvals are secured prior to development of approved projects.

- **Policy CO-2.41.** Require that impacts to species listed under the State or Federal Endangered Species Acts, or species identified as special-status by the resource agencies, be avoided to the greatest feasible extent. If avoidance is not possible, fully mitigate impacts consistent with applicable local, State, and Federal requirements.

- **Policy CO-2.42.** Projects that would impact Swainson's hawk foraging habitat shall participate in the Agreement Regarding Mitigation for Impacts to Swainson's Hawk Foraging Habitat in Yolo County entered into by the CDFG and the Yolo County subsequent adopted mitigation requirements consistent with applicable local, State, and federal requirements.

3.2.5 Cultural Resources

Section 2.1.11, Cultural Resources, provides a comprehensive discussion of the cultural resources in the project area. The following is an evaluation of the potential impacts on cultural resources from the Build Alternatives. The No-Build Alternative would not change existing conditions and would not impact cultural resources and is therefore not discussed further.

a) Cause a substantial adverse change in the significance of a historical resource pursuant to in §15064.5?

a) Less-than-significant impact.

A Reclamation District (RD) 900 canal was identified within the area of potential effect (APE) and was assumed eligible for inclusion in the National Register of Historic Places (NRHP) for the purpose of this undertaking, under Criterion A, as a large linear resource associated with historic themes of agriculture/irrigation and land reclamation in the Sacramento Valley.

Construction would result in temporary visual impacts, increased noise levels, and increased air pollutants such as dust and particulate matter due to excavation, grading, hauling, and other ground-disturbing activities. In addition, all "B" Build Alternatives would include pile driving for construction of the I-80 connector structure, which would be undertaken for installation of footings. Each cast-in-place drilled footing would be excavated to a depth of up to 40 feet.

However, Caltrans determined that construction of the project, regardless of alternative would not adversely effect the RD 900. The Finding of No Adverse Effect Document was submitted to the State Historic Preservation Officer (SHPO) in November 2021. The SHPO Determination of Eligibility and Finding of No Adverse Effect concurrence were received September 30, 2021 and January 12, 2022, respectively (Appendix K).

Caltrans, pursuant to Section 106 PA Stipulation X.B.2, found that there will be no adverse effect. The undertaking will not destroy or alter any contributing feature of RD 900 and will not affect the resource's integrity or ability to convey its historical significance.

The overall impact for the project, regardless of alternative, was determined to be less than significant.

b) Cause a substantial adverse change in the significance of an archaeological resource pursuant to §15064.5? or

c) Disturb any human remains, including those interred outside of dedicated cemeteries?

b), c) Less-than-significant impact.

Seven built environment resources were identified within the APE: MR1, MR2, MR3, MR4, MR5, MR6, and MR7. Caltrans PQS evaluated the built environment resources and determined that they were not eligible for inclusion in the NRHP/CRHR. On September 30, 2021, Caltrans received concurrence from SHPO that the seven built environment resources were ineligible (Appendix K).

Project construction would create subsurface disturbances that could result in damage to or destruction of previously undiscovered subsurface archaeological deposits or unmarked burials. Although all the areas of construction and access roads have been subject to the cultural resources survey, the potential remains for previously unidentified archaeological remains to be discovered below the visible ground surface. If cultural materials are discovered during construction, all earth-moving activity within and around the immediate discovery area would be diverted until a qualified archaeologist can assess the nature and significance of the find as outlined in Standard Measure CR-3. Standard Measure CR-4 outlines requirements in the event human remains are discovered. If human remains are discovered, all work within 60 feet of the discovery would halt and Caltrans' Cultural Resource Studies office would be called. Caltrans' Cultural Resources Studies Office Staff would assess the remains and, if determined human, would contact the County Coroner as per Public Resources Code (PRC) Sections 5097.98, 5097.99, and 7050.5 of the California Health and Safety Code. If the Coroner determines the remains to be Native American, the Coroner will contact the Native American Heritage Commission who would then assign and notify a Most Likely Descendant. Caltrans would consult with the Most Likely Descendant on respectful treatment and reburial of the remains. Further provisions of PRC 5097.98 are to be followed as applicable.

With the implementation of Standard Measure CR-3 and CR-4, Build Alternatives 2a and 2b through 7a and 7b would have a less-than-significant impact.

AB52 consultation was initiated in 2020 with California Native American tribes included on the Native American Heritage Commission's (NAHC) list of groups and individuals that may have a traditional or cultural affiliation with the geographic area of the project. Tribes that have requested that they be included on the NAHC list were sent written notification of the project on June 4, 2020. The record of correspondence, including a consultation log are presented in Appendix L.

3.2.6 Energy

Section 2.2.8, Energy provides a comprehensive discussion of energy resources. The following is an evaluation of the potential impacts on energy from the Build Alternatives. The No-Build Alternative would not change existing conditions and would not impact energy and is therefore not discussed further.

a) Result in potentially significant environmental impact due to wasteful, inefficient, or unnecessary consumption of energy resources, during project construction or operation?

a) Less-than-significant impact with mitigation.

The project would result in short-term energy consumption related to related to manufacturing of construction materials, the use of construction equipment that requires petroleum fuels, and the use of construction workers' motor vehicles as they travel to and from the site. Construction is anticipated to take approximately 24 to 42 months to complete, depending on the Build Alternative. Thus, construction-related energy consumption would be finite and limited and would have an incremental impact on area energy supplies. As indicated above, energy use associated with project construction under Build Alternatives is conservatively estimated to result in the short-term consumption of 370,520 gallons of diesel and 164,688 gallons of gasoline from construction equipment. This represents a small demand on local and regional fuel supplies that would be easily accommodated, and this demand would cease once construction is complete. Moreover, construction-related energy consumption would be temporary and not a permanent new source of energy demand, and demand for fuel would have no noticeable effect on peak or baseline demands for energy.

Indirect energy consumption would result from traffic delays due to construction. The project's Transportation Management Plan (TMP), as required per Standard Measure TT-1, would reduce construction-related traffic impacts. The TMP would help manage traffic congestion and provide signage to affected residents and businesses if temporary closures or detours are warranted during construction. Compared with direct energy use by construction vehicles and equipment, indirect energy use due to construction-related traffic delays would be minimal and would be reduced with implementation of the TMP. Additionally, AMM Energy-1 would be implemented to help conserve energy during construction, which would further reduce impacts. For indirect energy, the project would incorporate the use of energy efficient lighting, such as LED traffic signals and streetlights, to the extent feasible. LED lights consume 10 percent of the electricity of traditional lights.

The project would increase capacity, and thus add more traffic using the managed lanes and associated I-5/US 50 interchange and I-80/US 50 connectors, so a net increase in energy consumption is anticipated for Build Alternatives 2a and 2b through 6a and 6b. No new lanes would be constructed as part of Build Alternatives 7a and 7b and thus there would be no increase in capacity. Furthermore, intelligent transportation system (ITS) elements within the project limits would give travelers information about special events such as traffic congestion, accidents, and other incidents that may impact traffic flow on a specific highway segment. Such ITS would save energy by notifying vehicles to take alternative routes, limit travel speed, warn of duration and location of the incidents, or inform of the traffic conditions. Therefore, the project would not result in an inefficient, wasteful, and unnecessary consumption of energy and impacts would be less than significant with mitigation incorporated.

b) Conflict with or obstruct a state or local plan for renewable energy or energy efficiency?

b) Less-than-significant impact.

The project is within the jurisdiction of the SACOG, which is the Regional Transportation Planning Agency for Sacramento, Sutter, Yolo, and Yuba Counties. The 2020 MTP identifies a path for improving air quality, preserving open space and natural resources, and helping California achieve its goal to reduce GHG emissions that contribute to climate change (SACOG 2019). The regional reduction target for passenger vehicle GHG emissions per person from 2005 levels for SACOG is 19 percent by 2035 (ARB 2019c). The project is included in the SACOG MTP/SCS 2020.

Estimates of energy consumption indicated that the Build Alternatives 2 and 3 result in a minimal increase less than 1 percent in energy consumption and Build Alternatives 4-7 would result in a nominal decrease ranging between 0.8 to 7 percent in energy consumption in opening year 2029. Although there is a modeled increase in VMT identified in Section 2.2.8, Energy, during operation of the project over the long-term, newer and more fuel-efficient vehicles and electric vehicles would enter the fleet, resulting in an overall lower potential for an increase in energy consumption due to vehicle traffic. Additionally, as noted above, the project would incorporate energy efficient lighting, to the extent feasible, and ITS elements that would save energy. The project would implement managed lanes to manage traffic congestion, accommodate travel demands, and improve modality and travel time reliability. By helping to provide a continuous managed lane system, the project, combined with other in-progress and proposed managed lane projects, would provide reliable travel times, and help contribute to the completion of the regional transportation network envisioned in the SACOG MTP/SCS. Energy consumption during project construction would be temporary and minimized to the maximum extent practicable. Operation of the project would not conflict with a state or local plan for renewable energy or energy efficiency. Project construction would not conflict with a state or local plan for renewable energy or energy efficiency.

3.2.7 Geology and Soils

Section 2.2.3, Geology, Soils, Seismic, Topography, provides a comprehensive discussion of geology and soil resources. In addition, the section provides a comprehensive discussion of the paleontological resources that occur in the project area. The following is an evaluation of the potential impacts on geology and soils and paleontological resources from the Build Alternatives. The No-Build Alternative would not change existing conditions and would not impact geology and soils and is therefore not discussed further.

a) Directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury, or death involving:

i) Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault? Refer to Division of Mines and Geology Special Publication 42.

a)i) No Impact.

The potential for surface fault rupture at the site is absent since there are no known faults of Holocene or younger age that fall within 1,000 feet of the project limits, or trend toward the project limits, nor does the project limits fall within an Alquist-Priolo Fault Zone. Therefore, there would be no impact under these criteria for Build Alternatives 2a and 2b through 7a and 7b.

ii) Strong seismic ground shaking?

a)ii) Less-than-significant impact.

The project is not located within an Alquist-Priolo Fault Zone. Construction of the project would be designed, engineered, and built in accordance with applicable standards and within the recommended ground motion parameters for each section described in the Geotechnical Report. With implementation of these design, engineering, and building standards, impacts related to ground shaking would be less than significant for Build Alternatives 2a and 2b through 7a and 7b.

iii) Seismic-related ground failure, including liquefaction?

a)iii) Less-than-significant impact with mitigation.

Soil liquefaction can occur when saturated, loose to semi-compact, granular soils, or specifically defined cohesive soils are subjected to ground shaking sufficient to increase pore pressures to trigger liquefaction. In general, liquefaction hazard is most severe within the upper 50 feet of the ground surface.

The depth of groundwater varies throughout the project area due to variations in ground surface elevations and groundwater conditions. Based on groundwater depths and elevations, depth of groundwater decreases from west to east along the project route. Measured groundwater during

the April 2021 and August 2020 subsurface investigation and review of the existing log of test borings show that the groundwater depth is shallow in most of the project area, except the west section where groundwater was measured to be deeper than 25 feet.

The groundwater depth is shallow in most of the project area, and the soil throughout comprises clayey or fill material with layers of medium dense to dense silts and sands. There are also isolated thin layers of saturated, loose, granular soils present. Combined, these factors indicate the potential for liquefaction. There is low potential for seismic activity to occur during construction due to the distance from active faults. Seismic shaking creates opportunities for liquefaction, which could impact construction workers during construction, or result in safety issues to people and structures because of soil erosion, subsidence, expansive soils, corrosive soils, surface fault rupture, seismic shaking, liquefaction, and landslides.

Standard Measures GS-1 and WQ-1 through WQ-3 have been incorporated into the project and would be implemented during construction to minimize soil erosion or the loss of topsoil. Additionally, AMM GEO-2 would reduce potential impacts from construction-related to worker safety and AMM GEO-3 would help ensure any new or modified structure is designed and constructed to current standards, including seismic design standards, and includes consideration of liquefaction potential in the design of foundation and retaining systems. With implementation of these Standard Measures and AMMs, impacts related to liquefaction are less than significant for all Build Alternatives.

iv) Landslides?

a)iv) No Impact.

The project is not located in an area that has historically been prone to landslides. All earthwork will be in conformance with Section 19 of the Caltrans 2018 Standard Specifications, which reduces the potential for impacts related to landslides for all Build Alternatives.

b) Result in substantial soil erosion or the loss of topsoil?

b) Less-than-significant impact.

Construction of Build Alternatives 2a and 2b through 7a and 7b would involve land-disturbing activities such as clearing and grading, excavation, and temporary staging or stockpiling of materials. Build Alternatives 2a and 2b through 7a and 7b could result in disruptions, displacements, compaction, or overcrowding of on-site soils, and changes in topography or ground surface features that could result in wind or water erosion of on-site or off-site soils.

In accordance with Standard Measure WQ-1, Caltrans would implement a Stormwater Pollution Prevention Plan (SWPPP) during construction which would include implementation of site BMPs to avoid and reduce potential impacts related to erosion or siltation. The SWPPP would include BMPs to protect sensitive areas. With implementation of Standard Measure WQ-1, potential construction and operational impacts on erosion, siltation, and runoff would be minimal and impacts under Build Alternatives 2a and 2b through 7a and 7b would be less than significant.

c) Be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction, or collapse?

c) Less-than-significant impact with mitigation.

The project is not in an Alquist-Priolo Fault Zone or in an area that has historically been prone to landslides, lateral spreading, or subsidence. However, soil characteristics and shallow groundwater within the project area contribute to the potential for liquefaction. AMM GEO-3 would help ensure any new or modified structure is designed and constructed to current standards, including seismic design standards, and includes consideration of liquefaction potential in the design of foundation and retaining systems. With implementation of these design, engineering, and building standards, impacts related to liquefaction would be less than significant for Build Alternatives 2a and 2b through 7a and 7b.

d) Be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (1994), creating substantial direct or indirect risks to life or property?

d) Less-than-significant impact.

Expansive soils are not present within the project area. New embankment fill would be required for the bike pathway extension from I-80 along the Yolo Causeway to connect to CR-32A for Build Alternatives 2a and 2b. The Build Alternative 2b connector structure would include a retaining wall on either side and would travel underneath the existing eastbound connector from US-50 to I-80. Accordingly, the connector structure would require new embankment fill. The underlining clay layer which extends up to 16 to 20 feet below the original ground ranges in consistency from medium stiff to very stiff and is less susceptible to consolidation settlements. However, the proposed large embankment fill consolidation settlement could be considerable. All earthwork on the connector structure would be done in conformance with Section 19 of the 2018 Standard Specifications and would follow the recommendations associated with construction settlement in the geotechnical analyses (AMM GEO-3). With implementation of these design and building specifications, impacts related to expansive soil would be less than significant for all Build Alternatives.

e) Have soils incapable of adequately supporting the use of septic tanks or alternative waste water disposal systems where sewers are not available for the disposal of waste water?

e) No Impact.

No on-site wastewater treatment systems are proposed. There would be no impacts to waste water disposal systems for Build Alternatives 2a and 2b through 7a and 7b.

f) Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?

f) Less-than-significant impact with mitigation.

Caltrans uses a tripartite system to rank the risk of encountering significant fossil resources: no, low, and high risk. If significant fossil resources have been previously discovered within a geologic unit (formation), then that formation in its entirety is considered high risk. Searches of the University of California, Berkeley, Museum of Paleontology, and the PaleoBiology databases were performed and returned records of numerous fossil collections from the vicinity of the project in both Solano and Yolo Counties. In the immediate vicinity of the project boundary, significant fossil discoveries have occurred in formations. While the discoveries were not found at the surface directly beneath the project activities, the depth of excavation required for structures work increases the risk of encountering these formations.

Build Alternative 2b proposes pile driving during construction for installation of connector ramp footings to about 40 feet deep. Such activities would be deep enough to reach potentially unknown sensitive paleontological resources. In addition, foundation work for signs, structures, underground utilities, and culvert/drainage installations deeper than 4 feet could also encounter sensitive paleontological resources. Standard Measures GS-2, Unanticipated Discovery of Paleontological Resources, has been incorporated into the project that outlines actions to be taken in the event of a paleontological discovery during construction. If unanticipated paleontological resources are discovered during construction, they would not be disturbed. Work within a 60-foot radius of the discovery would stop; the area would be secured; and the work would not resume until appropriate measures are taken. However, the inadvertent discovery of a unique paleontological resource during construction could be significant.

AMM PALEO-1 would require preparation of a Paleontological Evaluation Report (PER) during the design phase and AMM PALEO-2 would require that a Paleontological Mitigation Plan be prepared and executed during project construction in areas of high sensitivity. In addition, paleontological construction monitoring would be required in areas with high paleontological sensitivity with implementation of AMM PALEO-3. With implementation of AMMs PALEO-1 through PALEO-3, construction of Build Alternatives 2a and 2b would not have significant impact on paleontological resources.

3.2.8 Greenhouse Gas Emissions

Chapter 3.4, Climate Change, provides a comprehensive discussion of greenhouse gas. The following is an evaluation of the potential impacts on greenhouse gas emissions from the Build Alternatives. The No-Build Alternative would not change existing conditions and would not impact greenhouse gas and is therefore not discussed further.

a) Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment?

a) Less-than-significant impact.

A quantitative analysis of daily CO_2 emissions was performed using the Caltrans CT-EMFAC2021. GHG emissions and VMT comparisons were calculated for the Build Alternatives the existing year (2019), in opening year (2029), and design year (2049). As anticipated with new fleet and electric vehicles penetration, in design year 2049, GHG emissions of the Build Alternatives were assessed to be less, with the greatest reduction being Build Alternative 7a

with 6.3 percent difference and the least reduction being Build Alternative 2a with 2.6 percent difference. Operational emissions would be less than significant.

GHG emissions would be generated during construction and this impact would be less than significant due to implementation of standard measures. As discussed in Section 2.2.9, Energy, the project would implement measures to reduce construction emissions, such as using newer, more energy efficient equipment, where feasible, and promotion of employee carpooling. As noted in Section 2.2.9, Energy, a TMP would be required to reduce construction-related traffic impacts and manage traffic congestion. GHG emissions impacts would be less than significant with the implementation of the Standard Measures (Appendix E) already incorporated into the project. GHG Standard Measures would include GHG-1: Comply with local regulations, GHG-2: Idling restrictions, GHG-3: Comply with CARB regulations, GHG-4: Use of a TMP, GHG-5: Revegetation, GHG-6: Maintain pedestrian and bicycle access.

b) Conflict with an applicable plan, policy or regulation adopted for the purpose of reducing the emissions of greenhouse gases?

b) Less-than-significant impact.

Section 3.2.8 question “a” and Section 3.2.6, describes the various plans, policies, and regulations adopted for the purpose of reducing the emissions of greenhouse gases that are applicable to the project and describes how the project would be consistent. By helping to provide a continuous managed lane system, the project, combined with other in-progress and proposed managed lane projects, would provide reliable travel times, and help contribute to the completion of the regional transportation network envisioned in the SACOG MTP/SCS and would be consistent with it. GHG emissions for the Build Alternatives would be lower for design year 2049 compared to existing year (see Table 3.4-2); therefore, the project would align with policies to keep the state on a trajectory for progress toward the Executive Order (EO) S-3-05 2050 emission reduction target. Additionally, Caltrans is involved on the Governor’s Climate Action Team as the ARB works to implement EOs S-3-05 and S-01-07 and help achieve the targets set forth in AB 32. EO B-30-15, issued in April 2015, and SB 32 (2016), set an interim target to cut GHG emissions to 40 percent below 1990 levels by 2030. The project would not conflict with an applicable plan, policy or regulation adopted for the purpose of reducing the emissions of greenhouse gases and there would be no impact.

3.2.9 Hazards and Hazardous Materials

Section 2.2.5, Hazardous Waste and Materials, provides a comprehensive discussion of the hazards and hazardous materials in the project area. The following is an evaluation of the potential impacts on hazards and hazardous materials from the Build Alternatives. The No-Build Alternative would not change existing conditions and would not impact hazards and hazardous materials and is therefore not discussed further.

a) Create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials?

b) Create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment?

a and b) Less-than-significant impact.

Initial Site Assessment was completed for this project in February 2021 (Caltrans 2021h). The Initial Site Assessment included assessments pertaining to naturally occurring asbestos (NOA), aerially deposited lead (ADL), Lead-Containing Paint (LCP) and thermoplastic traffic striping and pavement markings, and treated wood waste (TWW). A geologic evaluation did not indicate the presence of altered ultramafic bedrock, alluvium derived from ultramafic rock, or rock commonly associated with NOA. ADL also exists along roadways throughout California from the historical use of leaded gasoline and has the potential to be encountered during project construction. LCP and asbestos-containing materials have the potential to be encountered during project construction. TWW has the potential to be encountered during construction in the form of posts associated with metal beam guard railing three-beam barrier, and roadside signs. Construction would also involve the use and storage of fuels, lubricants, solvents, and other possible contaminants.

Standard Measures HW-1, HW-2 and HW-3 and AMM HAZ-1, AMM HAZ-2, AMM HAZ-3, and AMM HAZ-4 have been incorporated into the project that minimizes potential impacts related to hazards during construction of Alternatives 2a and 2b through 7a and 7b, and impacts would be less than significant.

c) Emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school?

c) Less-than-significant impact.

Standard Measures HW-1, HW-2 and HW-3 and AMM HAZ-1, AMM HAZ-2, AMM HAZ-3, and AMM HAZ-4 have been incorporated into the project that minimizes potential impacts related to hazards during construction of Alternatives 2a and 2b through 7a and 7b, and impacts would be less than significant.

d) Be located on a site which is included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5 and, as a result, would it create a significant hazard to the public or the environment?

d) No Impact.

The Cortese List was reviewed as part of the Initial Site Assessment (see Section 2.2.5, Hazardous Waste and Materials). Neither Envirostor and Geotracker databases returned hazardous waste/sources within the project footprint, therefore, there would be no impact.

e) For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project result in a safety hazard or excessive noise for people residing or working in the project area?

e) No Impact.

The project is not located within an airport land use plan or within 2 miles of a public airport therefore, there would be no impact.

f) Impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan?

f) Less-than-significant impact.

Yolo County's office of emergency services and the City of West Sacramento's Emergency Management division have identified evacuation zones and routes for given neighborhoods. US-50 and I-80 are dedicated evacuation routes in Yolo and Sacramento Counties. City of Sacramento has detailed maps showing hypothetical levee breaks at various locations for a 200-year flood event[1] and the recommended flood evacuation routes (Caltrans 2021a). I-80 and US-50 are identified evacuation routes on the Yolo County evacuation zone maps and under many levee break scenarios for the City of Sacramento. I-80 is a critical route for the West Sacramento area.

Temporary traffic delays and ramp closures on I-80/US-50 during construction of all Build Alternatives could result in temporary delays in emergency services or evacuations. Because Build Alternatives 7a and 7b would not add new lanes, but would rather repurpose existing lanes as managed lanes, the Build Alternatives 7a and 7b construction period may have shorter duration and therefore result in fewer delays than those under than those under Build Alternatives 2a and 2b, respectively. Since Build Alternative 2b, 3b, 4b, 5b, and 6b would construct the elevated I-80 connector structure, the construction period would have a longer duration and require additional lane closures than Build Alternatives 2a, 3a, 4a, 5a, and 6a. All Build Alternatives would improve circulation and reduce congestion along I-80/US-50 in the project corridor, which could result in improved efficiency for evacuations and emergency services.

Standard Measures TT-3 has been incorporated as part of the project, which requires that a traffic management plan be developed by Caltrans consistent with Caltrans' standard procedures to maintain access for emergency services throughout all phases of construction. The TMP would include elements such as traffic controls to minimize speeds/congestion and other measures to maintain access for police, fire, and medical services along I-80/US-50 in the project area during construction, and as such impacts from all Build Alternatives would be less than significant. Standard Measure UE-3 would require that all emergency response agencies in

[1] A 200-year flood event is the probability of a flood level or peak that has a one in two hundred, or 0.5 percent, chance of being equaled or exceeded in any year.

the project area would be notified of the project construction schedule and would have access to I-80 and US 50 throughout the construction period.

g) Expose people or structures, either directly or indirectly, to a significant risk of loss, injury or death involving wildland fires?

g) Less-than-significant impact with mitigation.

The project area is surrounded by mostly developed areas near the City of Davis and City of West Sacramento, but traverses natural open space, vegetation, and agricultural lands within unincorporated Solano County near the City of Dixon as well as the near the Yolo Causeway. The project is not located within a very high fire hazard severity zone and would be entirely within a local responsibility area (LRA).

As discussed in Section 3.3, Wildfire, the project may be located near and around vegetated areas and would involve the use of flammable materials including fuels such as gasoline or diesel, hydraulic oils, paints, solvents, or other industrial chemicals necessary for maintaining vehicles and equipment. The risk of fire associated with these materials is generally related to improper use or storage which could increase the potential for wildfire ignition. During construction, Build Alternatives 2a and 2b through 7a and 7b would incorporate fire prevention practices during construction (AMM WF-1) to reduce wildfire impacts. The project would not expose people or structures to post-fire instability or change drainage patterns and would comply with Caltrans Standard Specifications for electrical systems (Section 87) for installation and operation.

Additionally, Standard Measure TT-3 has been incorporated as part of the project, which would maintain emergency access during construction. Build Alternatives 2a and 2b through 7a and 7b also propose a Park-and-Ride Facility that could provide areas for emergency vehicle staging during wildfires or other emergencies. Standard Measure UE-3 would require the contractor to submit a jobsite fire prevention plan as required by Cal OSHA before starting job site activities. In the event of an emergency or wildfire, the contractor would cooperate with fire prevention authorities. Build Alternatives 2a and 2b would also implement bioswales and other drainage features that could potentially provide firebreaks during a wildfire event. Therefore, operation of the project would not exacerbate wildfire risks or result in temporary or ongoing impacts to the environment. Once project construction is completed, the roadway corridor would continue to serve the same use as existing conditions and would not create a new roadway alignment within a high fire severity zone. Therefore, impacts related to wildfire would be less than significant for Build Alternatives 2a and 2b through 7a and 7b.

3.2.10 Hydrology and Water Quality

Section 2.2.1, Hydrology and Floodplain, provides a comprehensive discussion of hydrology and Section 2.2.2 provides a comprehensive discussion of water quality in the project area. The following is an evaluation of the potential impacts on hydrology and water quality from the Build Alternatives. The No-Build Alternative would not change existing conditions and would not impact hydrology and water quality and is therefore not discussed further.

a) Violate any water quality standards or waste discharge requirements or otherwise substantially degrade surface or ground water quality?

or

e) Conflict with or obstruct implementation of a water quality control plan or sustainable groundwater management plan?

a), e) Less-than-significant impact.

The discharge of storm water runoff from construction sites can affect water quality standards and degrade surface or ground water quality. Potential pollutants and sources would include sediment; non-storm water (groundwater, waters from cofferdams, dewatering, water diversions) discharges from vehicle and equipment cleaning agents, fueling, and maintenance; and waste materials from storage activities.

The primary pollutant of concern is sediment and siltation from the disturbed construction areas. Standard Measure WQ-1 has been incorporated as part of the project, which requires the preparation of a SWPPP that includes construction site BMPs to avoid potential water quality impacts. The SWPPP would include BMPs to protect sensitive areas and to prevent and minimize stormwater and non-stormwater discharges. Standard Measure WQ-1 requires that Caltrans follows all applicable guidelines and requirements in the 2018 Caltrans Standard Specifications (2018 CSS), Section 13, regarding water pollution control and general specifications for preventing, controlling, and abating water pollution to Caltrans-owned storm sewers, streams, waterways, and other bodies of water.

In addition, as required by Standard Measure WQ-2, Caltrans would comply with the National Pollutant Discharge Elimination System (NPDES) Construction General Permit. Standard Measure WQ-3 requires the coordination with the Caltrans District NPDES coordinator during design to prepare a dewatering and discharge work plan if dewatering is anticipated as a construction activity.

All Build Alternatives would result in an increase of impervious surfaces, as described in Section 2.2.2, Water Quality and Stormwater Runoff. In accordance with the Caltrans MS4 permit, Standard Measure WQ-1 incorporates post-construction water quality treatment BMPs and low-impact development controls to reduce non-point source pollutants as needed. Additionally, Standard Measure WQ-4 has been incorporated into the project and requires the preparation of a Stormwater Data Report (SWDR) during the design phase to describe whether permanent treatment BMPs will be considered.

Temporary construction impacts related to water quality would be less than significant for Build Alternatives 2a and 2b through 7a and 7b.

b) Substantially decrease groundwater supplies or interfere substantially with groundwater recharge such the project may impede sustainable groundwater management of the basin?

b) Less-than-significant impact.

The depth of groundwater varies throughout the project limits due to variations in ground surface elevations and groundwater conditions. Based on groundwater depths and elevations, depth of groundwater decreases from west to east along the project route.

Groundwater is anticipated to be encountered in excavations as shallow as 1 to 2 feet below ground surface within the Yolo Bypass, and 5 feet below ground surface east of the Yolo Bypass. Groundwater is expected to be deeper than 25 feet in the project's western section. However, groundwater conditions can be expected to fluctuate in response to seasons, storm events, and other factors. Dewatering may be required if encountered during construction of the connector structure. AMM GEO-1 states that during construction, all trenching and earthwork will be performed in accordance with Section 19 of the 2018 Standard Specifications.

None of the Build Alternatives would substantially decrease groundwater supplies since groundwater extraction would only be conducted during excavation and would cease once construction is complete and impacts would be less than significant.

All Build Alternatives would result in an increase of impervious surfaces, as described in Section 2.2.2, Water Quality and Stormwater Runoff, and would slightly reduce the total permeable area for groundwater recharge. The amount of new, impermeable surfaces Build Alternatives 2a and 2b through 7a and 7b would add is negligible. In accordance with the Caltrans MS4 permit, the Build Alternatives would implement Standard Measure WQ-1 and incorporate post-construction water quality treatment BMPs and low-impact development controls to reduce non-point source pollutants as needed. Additionally, Standard Measure WQ-4 requires preparation of a Stormwater Data Report during the design phase, which would describe whether permanent treatment BMPs should be incorporated. Therefore, construction and operation of the project would not substantially decrease groundwater supplies or interfere substantially with groundwater recharge such the project may impede sustainable groundwater management of the basin, and impacts would be less than significant.

c) Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river or through the addition of impervious surfaces, in a manner which would:

i) result in substantial erosion or siltation on- or off-site;

ii) substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or off-site;

iii) create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff; or

c)i), ii), iii) Less-than-significant impact with mitigation.

Construction of all Build Alternatives would involve land-disturbing activities, use of construction equipment, clearing and grading, excavation, and temporary staging of materials. As a result, during construction, all Build Alternatives would potentially result in changes in topography or ground surface features; an increase in wind or water erosion of on-site or off-site soils, resulting in changes to soil deposition and/or erosion; and the discharge of storm water runoff and pollutants which have the potential to affect water quality in Putah Creek, Willow Slough Bypass, Sacramento River, and Delta Waterways.

In addition, Build Alternatives 2a and 2b through 7a and 7b All Build Alternatives would result in an increase of impervious surfaces, as described in Section 2.2.2, Water Quality and Stormwater Runoff. During construction, the Build Alternatives would require full structural reconstruction and cut/fill of embankments. New culverts or culvert replacements would be installed to accommodate additional runoff due to the increased pavement area. Construction activities related to culvert replacement may contribute to soil instability. As previously described, Standard Measures WQ-1 through WQ-4 have been incorporated into the project, which would minimize construction-related erosion and siltation. Additionally, AMM GEO-1 (monitoring during culvert replacement) will be implemented to reduce adverse effects related to erosion, siltation, and runoff for all Build Alternatives. Potential construction and operational impacts related to erosion, siltation, and runoff would be less than significant.

iv) Impede or redirect flood flows?

c)iv) Less-than-significant impact.

The project is in areas designated by the Federal Emergency Management Agency (FEMA) as Special Flood Hazard Area (SFHA) Zone A, SFHA Zone AE, and SFHA Zone 99A. Additionally, the project limits are also located within areas designated by FEMA as Other Areas of Flood Hazard Zone X (both shaded and unshaded). The shoulder widening planned for the bike path for Alternative 2 will occur within a SFHA, specifically within Zone A floodplains. This encroachment into the floodplain will be identical at each bridge location. The current scope of the project encroaches transversely into the floodplain and will not raise or change the profile of any of the highway, thus it is anticipated that there would be no negative impacts on the FEMA mapped floodplain in this area.

The Hydrology Study (Wood Rodgers 2022) determined the magnitude of increased peak flow rates arriving at existing drainage infrastructure caused by the project improvements. Under Build Alternatives 2a and 2b, AMM HF-1 would be used to reduce the potential for adverse impacts resulting from increased peak flow. AMM HF-1 would require installation of a detention basin riser to tie into existing storm drains on the upstream side at two locations in Davis—one detention basin rise inlet is proposed at the storm drain crossing on Mace Boulevard south of I-80 and the other will be at the westbound I-80 off-ramp to Chiles Road.

All “B” Build Alternatives propose to construct a concrete median barrier on I-80 in Yolo County from PM 0.21 to PM 4.3. (A median barrier is not proposed under Build Alternative 2a.) At this location, I-80 is in a Zone A floodplain. This location is behind the west levee of the Yolo Bypass, and the floodplain was determined using the above methodology. Flooding at this location is likely due to a failure of the Yolo Bypass, upstream and/or downstream of I-80.

Therefore, to determine the depth of flooding on I-80 from PM 0.21 to PM 4.3, the published base flood elevation (BFE) in the Yolo Bypass adjacent to the project was used. An elevation of 29.5 feet (NAVD 88) was used to determine that this area of I-80 is completely submerged during the 100-year flood event and would continue to be so after the construction of the proposed concrete median under “B” Build Alternatives. Thus, Build Alternative 2a or 2b would have no effect on the FEMA mapped floodplain in this area. The project does not constitute a significant floodplain encroachment as defined in 23 CFR, Section 650.105.

Although there is a potential for short-term adverse effects to riparian habitat during construction activities, no long-term effects to natural and beneficial floodplain values are anticipated as a result of the Build Alternatives. The bike path extension would involve rehabilitation of the existing bike path on the crown of the west levee of the Yolo Bypass, which classifies the project as falling under the jurisdiction of Section 408. Therefore, Caltrans would get an encroachment permit from Central Valley Flood Protection Board (CVFPB) and Section 408 permission from USACE before the project's construction.

Potential construction and operational impacts related to flooding would be minimal for all Build Alternatives and impacts would be less than significant.

d) In flood hazard, tsunami, or seiche zones, risk release of pollutants due to project inundation?

d) Less-than-significant impact.

The project is not in an area that could be inundated by seiche, tsunami, or mudflow. Project limits are in areas designated by the FEMA as SFHA Zone A, SFHA Zone AE, and SFHA Zone 99A, and SFHA Zone X, which FEMA characterizes as areas subject to inundation by the 100-year flood event. Though unlikely to occur, inundation of the project area during construction or operations could result in the release of sediment, non-storm water (groundwater, waters from cofferdams, dewatering, water diversions) discharges, and pollutants (fuels, lubricants, solvents, and other possible contaminants) and waste materials (construction debris). Standard Measures WQ-1 through WQ-4 and HAZ-5 have been incorporated as part of the project to reduce the potential for erosion and pollutant discharge during construction. Following construction, all construction-related sediment, wastes, and pollutants would be removed from the project area, leaving no risk of discharge in the event of inundation during operations. As a result, the project would not increase the risk of the release of pollutants due to inundation and impacts would be less than significant for all Build Alternatives.

3.2.11 Land Use and Planning

Section 2.1.1, Existing and Future Land Use, provides a comprehensive discussion of land use in the project area. The following is an evaluation of the potential impacts on land use and planning from the Build Alternatives. The No-Build Alternative would not change existing conditions and would not impact land use or planning and is therefore not discussed further.

a) Physically divide an established community?

a) Less-than-significant impact.

As discussed in Section 2.1, Human Environment, the project would not physically divide an established community. Under Build Alternatives 2a and 2b through 7a and 7b, there would be minimal changes to the community character or neighborhoods present. Build Alternatives 2a and 2b through 7a and 7b would occur almost entirely within the existing Caltrans right-of-way and would not result in access changes.

Since all "b" Build Alternatives would construct the elevated I-80 connector, the construction period for Build Alternatives 2b, 3b, 4b, 5b, and 6b would have a longer duration and require additional lane closures than "a" Build Alternatives. With "a" Build Alternatives, a temporary full closure may be needed on westbound US-50; the primary detour for westbound US-50 traffic would be to use northbound I-5 to westbound I-80. With a planned public outreach program to keep the area residents, businesses, emergency service providers, and transit operators informed of the project construction schedule (Standard Measure COM-1), impacts would be less than significant.

b) Cause a significant environmental impact due to a conflict with any land use plan, policy, or regulation adopted for the purpose of avoiding or mitigating an environmental effect?

b) Less-than-significant impact.

As discussed in Section 2.1, Human Environment, Build Alternatives 2a and 2b, 3a and 3b, 4a and 4b would be consistent or partially consistent with local and regional plans and policies.

Overall, Build Alternatives 5a and 5b are partially consistent with local policies related to improved transportation infrastructure. Build Alternatives 5a and 5b would create an express lane in each direction where all users pay a fee regardless of vehicle occupancy. Therefore, it would not encourage increased vehicle occupancy unless there were discounted fees for carpools and would be inconsistent with the City of Sacramento 2035 General Plan policies to encourage increased vehicle occupancy. Build Alternatives 6a and 6b would add a transit lane in each direction which could improve the attractiveness of riding transit. Build Alternatives 6a and 6b would be consistent or partially consistent with a majority of local and regional plans and policies; however, they remain inconsistent with several policies because they would result in degraded functionality in the project corridor compared to the No-Build Alternative 1. For Build Alternatives 7a and 7b, consistency with local and regional plans would be mostly the same as described under Build Alternatives 2a and 2b, respectively, because Build Alternatives 7a and 7b do not propose a priced lane. However, they are inconsistent with several policies because they would result in degraded functionality in the project corridor compared to the No-Build Alternative 1. If inconsistency with land use policies will require Caltrans to work with local agencies to update existing land use plans to achieve consistency. With implementation of AMM EJ-1, EJ-2, and EJ-3, and VMT reducing measures, impacts would be less than significant.

3.2.12 Mineral Resources

The following is an evaluation of the potential impacts on mineral resources from the Build Alternatives. The No-Build Alternative would not change existing conditions and would not impact mineral resources and is therefore not discussed further.

a) Result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the state?

b) Result in the loss of availability of a locally important mineral resource recovery site delineated on a local general plan, specific plan or other land use plan?

a), b) No Impact.

The project area does not contain any known mineral resource zones but does traverse several gas fields near the Cities of Davis and West Sacramento (Yolo County 2009, Sacramento County 2011). Implementation of Build Alternatives 2a or 2b through 7a or 7b would not change or convert existing land uses resulting in new development activity that would potentially disrupt continued management of mineral resources. Accordingly, Build Alternatives 2a or 2b through 7a or 7b would not conflict with a resource recovery plan and would not result in the loss of availability of a locally important mineral resource recovery site. There would be no impact.

3.2.13 Noise

Noise Section 2.2.8, Noise, provides a comprehensive discussion of noise in the project area. The No-Build Alternative would not change existing conditions and would not impact noise and is therefore not discussed further.

Generation of a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?

a) Less-than-significant impact with mitigation.

Construction activities would result in temporary increases to noise levels at adjacent sensitive receptors. Project construction would include road cut/fill, grinding, grubbing/land cleaning, grading/excavation, drainage/utilities, and paving. Pile driving would be planned to be used for the construction of I-80 connector structure under Build Alternatives 2b, 3b, 4b, 5b, 6b, and 7b. Construction noise would result from heavy construction equipment and the arrival and departure of heavy-duty trucks. Noise levels would not exceed quantitative noise limits established by Caltrans except for nighttime work, which could result in an exceedance.

Except for possible nighttime construction involving heavy equipment, construction noise levels would not be expected to exceed the quantitative noise limits established by Caltrans. AMM NOI-1 would require noise-generating construction activities to be restricted to between 7:00 a.m. and 7:00 p.m. on weekdays, with no construction occurring on weekends or holidays, reducing the potentially significant impact to a less-than-significant level. If work is necessary

outside of these hours, a construction noise monitoring program and additional noise controls would be implemented.

Caltrans Standard Specifications Section 14-8.02 would require that noise levels not exceed 86 dBA within 50 feet of the job site from the hours of 9:00 p.m. to 6:00 a.m. (Standard Measure NOI-1). Build Alternatives 2a and 2b would also implement Standard Measures NOI-2 through NOI-5 to further reduce temporary construction noise levels. Therefore, temporary construction noise would have a less-than-significant impact on nearby receptors for Build Alternatives 2a and 2b through 7a and 7b.

As discussed in Section 2.2.8, Noise, under CEQA a noise impact is assessed using increase over baseline conditions, while under NEPA, noise impacts are measured against noise levels for land uses.

Modeled noise levels under Build Alternatives 2a and 2b through 7a and 7b would result in noise level increases of up to 2 dBA over existing conditions and over No Build conditions under future year 2049 conditions, with one residential receptor experiencing up to a 3 dBA. These noise level increases are barely perceptible and therefore would be less than significant.

Under Build Alternatives 2a and 2b through 7a and 7b, traffic noise levels would approach or exceed the Noise Abatement Criteria (NAC) at Category B receptors located north of US-50 westbound travel lanes between Harbor Boulevard and Jefferson Boulevard, south of US-50 eastbound travel lanes between Harbor Boulevard and Jefferson Boulevard, east of the US-50 and I-5 interchange, east of the US-50 westbound ramp onto I-80 eastbound, to the east and west of I-80 at the Sacramento River, and to the east of I-80 eastbound between Sacramento River and West El Camino Avenue. Some of these receptors are behind existing noise barriers. Traffic noise levels are predicted to approach or exceed the NAC at Category C receptors located east of the US-50 westbound ramp onto I-80 eastbound and south of US-50 eastbound travel lanes between Harbor Boulevard and Jefferson Boulevard. For context, these are the Federal, or NEPA, standards that are contained herein as “other agency.”

Build Alternatives 2b, 3b, 4b, 5b, 6b, and 7b propose the I-80 connector structure. Accordingly, these Build Alternatives would have a slight increase in noise levels in comparison to Build Alternatives 2a, 3a, 4a, 5a, 6a, and 7a as further described in Section 2.2.8. Noise. Accordingly, noise abatement was considered for impacted receptors. Noise barriers are the only form of noise abatement considered for exterior land uses in the project area (Caltrans 2022b).

Generation of excessive groundborne vibration or groundborne noise levels?

b) Less-than-significant impact.

Due to the short-term nature of construction, the primary concern is the potential for vibration to damage a structure. Critical factors pertaining to the impact of construction vibration on sensitive receptors include the proximity of the existing structures to the project site, soil conditions, the soundness of the structures, and the methods of construction used.

Construction activities with the greatest potential of generating perceptible vibration levels would include the removal of pavement and soil, the dropping of heavy objects, and the movement of heavy tracked equipment. As further described in Section 2.2.8, Noise, construction vibration limits would not be exceeded during periods of construction. Therefore, temporary construction vibration would have a less-than-significant impact on nearby receptors for Build Alternatives 2a and 2b through 7a and 7b.

For a project located within the vicinity of a private airstrip or an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project expose people residing or working in the project area to excessive noise levels?

c) Less-than-significant impact.

The project is in the Sacramento International Airport Land Use Compatibility Plan area (SACOG 2013). However, the project would not result in a conversion of land uses as the project area would continue to serve as a transportation corridor. As described under a) and b), Build Alternatives 2a and 2b through 7a and 7b would not expose people residing or working in the project area to excessive noise levels during construction or during the operation phase. Therefore, the impact would be less than significant.

3.2.14 Population and Housing

Section 2.1.5, Growth, provides a comprehensive discussion of growth related to population and housing in the project area. The following is an evaluation of the potential impacts on population and housing from the Build Alternatives. The No-Build Alternative would not change existing conditions and would not impact population and housing and is therefore not discussed further.

a) Induce substantial unplanned population growth in an area, either directly (for example, by proposing new homes and businesses) or indirectly (for example, through extension of roads or other infrastructure)?

a) Less-than-significant impact.

It is anticipated that, for Build Alternatives 2a and 2b through Build Alternatives 7a and 7b, construction workers would be drawn from either existing Caltrans staff or contractors in the local area who would commute from the neighboring cities. Therefore, the construction workforce would relocate to the area and thus would not result in an increased demand for housing. As discussed in Section 2.1, although implementing Build Alternatives 2a and 2b through 6a and 6b would increase freeway capacity, it would not alter planned regional development or growth trends. Build Alternatives 7a and 7b would repurpose an existing lane to HOV but would not increase capacity.

By improving access and highway capacity, Build Alternatives 2a and 2b through 7a and 7b would accommodate planned growth on a regional level and could indirectly change development patterns surrounding the project area by changing the rate at which planned development would occur along the corridor. However, Build Alternatives 2a and 2b through 7a

and 7b would not directly increase development of residential land uses, encourage growth outside of existing growth boundaries, or alter existing access to residential and employment areas; therefore, associated with population growth would be less than significant for Alternatives 2a and 2b through 7a and 7b.

b) Displace substantial numbers of existing people or housing, necessitating the construction of replacement housing elsewhere?

b) No Impact.

As discussed in Section 2.1, construction of Build Alternatives 2a and 2b through 7a and 7b would occur mostly within existing Caltrans right-of-way, with one permanent right-of-way easement and five temporary construction easements. No displacement of any residences would be required. There would be no impact.

3.2.15 Public Services

Section 2.1.8, Utilities and Emergency Services, provides a comprehensive discussion of the public services, including emergency services, in the project area. The following is an evaluation of the potential impacts on public services from the Build Alternatives. The No-Build Alternative would not change existing conditions and would not impact public services and is therefore not discussed further.

a) Would the project result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times or other performance objectives for any of the public services:

Fire protection?

Police protection?

Schools?

Parks?

Other public facilities?

a) Less-than-significant impact.

Temporary traffic delays and ramp closures on I-80/US-50 during construction of Build Alternatives 2a and 2b through 7a and 7b could result in temporary delays in emergency services. As described in Section 2.1.6, Community Character and Cohesion, Standard Measure TT-3 has been incorporated into the project that would require preparation of a TMP which would maintain access for emergency services throughout all phases of construction. The TMP would include elements such as traffic controls to minimize speeds/congestion and other

measures to maintain access for police, fire, and medical services along I-80/US-50 in the project area during construction. Standard Measure COM-1 would require a planned public outreach program to keep the area residents, businesses, emergency service providers, and transit operators informed of the project construction schedule.

The project would help accommodate planned growth on a regional level. However, Build Alternatives 2a and 2b through 7a and 7b would not result in a use that would directly induce population and employment growth in Sacramento, Yolo, or Solano Counties. Therefore, the project would not result in the need for new or physically altered schools, parks, or other public facilities. Impacts on fire and police protection services would be less than significant for Build Alternatives 2a and 2b through 7a and 7b.

3.2.16 Recreation

Section 2.1.3, Parks and Recreational Facilities, provides a comprehensive discussion of parks and recreational facilities in the project area. The following is an evaluation of the potential impacts on recreation from the Build Alternatives. The No-Build Alternative would not change existing conditions and would not impact recreation and is therefore not discussed further.

a) Would the project increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated?

a) No Impact.

The project would help accommodate planned growth on a regional level. However, the project would not increase demand or use of surrounding recreational facilities. There would be no impact for any of the Build Alternatives.

b) Does the project include recreational facilities or require the construction or expansion of recreational facilities which might have an adverse physical effect on the environment?

b) Less-than-significant impact.

The project does not involve the construction or expansion of recreational facilities. The project would occur almost entirely within the existing Caltrans right-of-way; however, several parks and recreational facilities are located within proximity of the project area and thus, users could be subject to potential air quality and noise impacts during construction. Build Alternatives 2b, 3b, 4b, 5b, and 6b would have a longer duration of construction than Build Alternative 2a, 3a, 4a, 5a, and 6a and thus result in longer duration of exposure to potential impacts. All Build Alternatives would also implement visual (Standard Measures AR-1, AR-2, and AR-3, and AMM AES-4), noise (Standard Measure NOI-1, AMM NOI-1), and air quality (Standard Measure GHG-1) Standard Measures and AMMs during construction.

Construction activities may result in temporary traffic delays and ramp closures on I-80/US-50 that could cause temporary delays in accessing recreation facilities in and near the project area.

However, Standard Measure TT-3 would require a traffic management plan to maintain access. The TMP would plan construction in sections, with no more than one lane closed at a time and no successive ramp closures. The contractor would implement a planned public outreach program to keep area residents, businesses, emergency service providers, and transit operators informed of the project construction schedule as part of Standard Measure COM-1. With these standard practices, no AMMs are required.

As a result, potential impacts to recreational facilities would be less than significant for Build Alternatives 2a and 2b through 7a and 7b.

3.2.17 Transportation

Section 2.1.9, Traffic and Transportation, provides a comprehensive discussion of transportation in the project area. The following is an evaluation of the potential impacts on transportation from the Build Alternatives. The No-Build Alternative would not change existing conditions and would not impact transportation and is therefore not discussed further.

a) Conflict with program, plan, ordinance or policy addressing the circulation system, including transit, roadway, bicycle and pedestrian facilities

a) Less-than-Significant Impact

The project area is surrounded by rural and urban areas in Yolo, Sacramento, and Solano County. While Yolo, Sacramento and Solano County have plans and policies regarding local circulation; I-80, and US 50 are part of the California State Highway System and under Caltrans Jurisdiction. The segment of the I-80 and US 50 corridor within the project limits are identified as requiring capital improvements in the SACOGMTP/SCS.

Build Alternatives 2a through 7b would add capacity to I-80, US 50 within the project area. The purpose of the project is to improve traffic flow and help relieve congestion on the highway network; therefore, the project would not conflict with a program, plan, ordinance, or policy related to transportation, and impacts would be less than significant.

b) Conflict or be inconsistent with CEQA Guidelines Section 15064.3, subdivision (b)

b) Significant and Unavoidable Impact

SB 743 (2013) requires the Office of Planning and Research (OPR) to identify new metrics for identifying and mitigating transportation impacts under CEQA. Under SB 743, CEQA Guidelines Section 15064.3(b) was revised to identify VMT as the most appropriate measure of assessing transportation impacts.

Based on the estimates in the project Traffic Analysis Report (TAR), although Build Alternatives 2a through 7b would result in improved vehicular operational conditions that would result in reduced vehicular delays and congestion within the project corridor; however, these alternatives, with the exception of Alternatives 6a and 6b (which add a transit-only lane), would result in induced VMT (Section 2.2.10.7 Table 2.1-26), which would represent a significant

impact. The annual induced auto vehicle miles traveled (VMT) from the build alternatives (roughly 106-110 million annual auto VMT for the added-lane alternatives and roughly 2.6-7 million annual auto VMT for the general-purpose lane conversions to HOV) would need to be reduced through the action of VMT reducing measures. Caltrans has identified the following approaches to reduce regional VMT.

- Implement a Voluntary Trip Reduction Program in Yolo County
- Expand Capitol Corridor Frequency between Martinez and Sacramento
- Implement Microtransit in Yolo County
- Expand YoloBus Route 42
- Expand Causeway Connection Route 138
- Expand Unitrans
- Expand Putah Creek Trail to connect to Future Nishi Student Housing Development Site

Caltrans proposes to work with the California Department of Housing and Community Development, the City of Sacramento Housing Trust, and the City of Davis Housing Trust by providing various amounts of funding to help facilitate the measures mentioned above. If the measures are completed as expected, regional VMT would be reduced by approximately 57.1 million annual auto VMT. Caltrans is making a commitment to the above-mentioned agencies to contribute $55 million toward the indicated measures. However, full implementation of these VMT reducing measures is outside the regulatory authority of Caltrans and is not sufficient to fully offset the induced VMT impact of Alternatives 2a/b through 5a/b. It would be sufficient to fully offset only the alternatives that would convert an existing lane to an HOV-only lane (Alternatives 7a and 7b).

AMMs TRANS-1 will be used to avoid or reduce potential project impacts on transportation associated with the project. Caltrans also actively encourages smart growth principles through its Local Development-Intergovernmental Review processes with the local agencies responsible for such actions, and Caltrans facilitates improvements in transit service by providing facilities that improve transit headways, such as the managed lanes that are a part of some project alternatives. However, none of the above strategies and measures are certain to occur. As such, Build Alternatives 2a/b through 5a/b would conflict or be inconsistent with CEQA Guidelines Section 15064.3, subdivision (b), and impacts would be significant and unavoidable.

c) Substantially increase hazards due to a geometric design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment)

c) No Impact

Although the Build Alternatives would involve adding a lane and/or connecting ramps, the alignment of I-80 and US 50 would not change. The project would not increase hazards due to design features, and there would be no impact.

d) Result in inadequate emergency access

d) Less-than-Significant Impact

See Impact Discussion 3.2.9 (f).

3.2.18 Tribal Cultural Resources

Section 2.1.12, Cultural Resources, provides a comprehensive discussion of the tribal resources that occur, or have the potential to occur, in the project area. Chapter 2.1.12 also includes a discussion of AB 52 consultation efforts for the project. The following is an evaluation of the potential impacts on tribal resources from the Build Alternatives. The No-Build Alternative would not change existing conditions and would not impact tribal resources and is therefore not discussed further.

Would the project cause a substantial adverse change in the significance of a tribal cultural resource, defined in Public Resources Code Section 21074 as either a site, feature, place, cultural landscape that is geographically defined in terms of the size and scope of the landscape, sacred place, or object with cultural value to a California Native American tribe, and that is:

a) Listed or eligible for listing in the California Register of Historical Resources, or in a local register of historical resources as defined in Public Resources Code Section 5020.1(k),

b) A resource determined by the lead agency, in its discretion and supported by substantial evidence, to be significant pursuant to criteria set forth in subdivision (c) of Public Resources Code Section 5024.1. In applying the criteria set forth in subdivision (c) of Public Resource Code Section 5024.1, the lead agency shall consider the significance of the resource to a California Native American tribe.

a), b) Less-than-significant impact.

Consultation efforts with Native Americans who were identified as having an interest in projects within this area by the Native American Heritage Commission (NAHC) did not reveal any known tribal cultural resources that occur within the project area. However, subsurface construction activities associated with the project could potentially damage or destroy previously undiscovered unique tribal cultural resources. Standard Measure CR-3 and CR-4 have been incorporated as part of the project that would prevent previously undiscovered tribal cultural resources from being impacted during construction. Standard Measure CR-3 and CR-4 require that all construction activities be completed within and around the immediate discovery area. If human remains are discovered within the project site, Caltrans Cultural Resources Studies Office Staff would assess the remains and contact the County Coroner per PRC Sections 5097.98, 5097.99, and 7050.5 of the California Health and Safety Code. If the Coroner determines the remains to be Native American, the Coroner will contact the NAHC, who will then assign and notify the most likely descendant (MLD). Caltrans would consult with the MLD on respectful treatment and reburial of the remains. Further provisions of PRC 5097.98 would be followed as applicable. Therefore, the impact would be less than significant for all Build Alternatives.

3.2.19 Utilities and Service Systems

Chapter 2.1.8 provides a comprehensive discussion of the utilities in the project area. The following is an evaluation of the potential impacts on utilities from the Build Alternatives. The No-Build Alternative would not change existing conditions and would not impact utilities and is therefore not discussed further.

a) Require or result in the relocation or construction of new or expanded water, wastewater treatment or stormwater drainage, electric power, natural gas, or telecommunications facilities, the construction or relocation of which could cause significant environmental effects?

a) Less-than-significant impact.

Build Alternatives 2a and 2b through 7a and 7b would result in conflicts with existing utilities present along the I-80/US-50 corridor. Caltrans would provide verification and notify utilities of proposed construction work in accordance with Standard Measure UE-2. Under Build Alternative 2b, 3b, 4b, 5b, 6b, and 7b, overhead lines near the new managed lane connector at the I80/US-50 separation in West Sacramento may have to be relocated. Under all Build Alternatives, utility verification would be coordinated with all applicable utility providers, as required under Standard Measure UE-2.

Additionally, all Build Alternatives would result in an increase of impervious surfaces, as described in Section 2.2.2, Water Quality and Stormwater Runoff. In accordance with the Caltrans MS4 permit, Standard Measure WQ-1 incorporates post-construction water quality treatment BMPs and low-impact development controls to reduce non-point source pollutants as needed. Additionally, Standard Measure WQ-4 has been incorporated into the project and requires the preparation of a Stormwater Data Report (SWDR) during the design phase to describe whether permanent treatment BMPs will be considered. New culverts or culvert replacements would be installed to accommodate additional runoff due to the increased pavement area. AMM PALEO-3 (monitoring during culvert replacement) will be implemented to reduce adverse effects related to culvert replacement for all Build Alternatives. As such, impacts would be less than significant for Build Alternatives 2a and 2b through 7a and 7b.

b) Have sufficient water supplies available to serve the project and reasonably foreseeable future development during normal, dry and multiple dry years?

c) Result in a determination by the wastewater treatment provider which serves or may serve the project that it has adequate capacity to serve the project's projected demand in addition to the provider's existing commitments?

b), c) No Impact.

The project would not directly increase the number of residents in the area because residential land uses are not proposed. By improving access and highway capacity, Build Alternatives 2a and 2b through 7a and 7b would accommodate planned growth on a regional level; however, the project would not increase the demand for additional water or wastewater treatment beyond

existing planned growth in surrounding development areas. There would be no impact for Build Alternatives 2a and 2b through 7a and 7b.

d) Generate solid waste in excess of State or local standards, or in excess of the capacity of local infrastructure, or otherwise impair the attainment of solid waste reduction goals?

e) Comply with federal, state, and local management and reduction statutes and regulations related to solid waste?

d), e) Less-than-significant impact.

The project would not generate excessive solid waste and would comply with all management and reduction statutes and regulations. Standard Measure UE-2 has been incorporated into the project that requires solid waste generated during construction be collected and transported to an appropriate recycling, disposal, or processing facility that is properly equipped and capable of handling solid waste materials. The impact would be less than significant for Build Alternatives 2a and 2b through 7a and 7b.

3.2.20 Wildfire

Chapter 3.3 provides a comprehensive discussion of wildfire in the project area. The following is an evaluation of the potential impacts on wildfire from the Build Alternatives. The No-Build Alternative would not change existing conditions and would not impact wildfire and is therefore not discussed further.

If located in or near state responsibility areas or lands classified as very high fire hazard severity zones, would the project:

a) Substantially impair an adopted emergency response plan or emergency evacuation plan?

b) Due to slope, prevailing winds, and other factors, exacerbate wildfire risks, and thereby expose project occupants to, pollutant concentrations from a wildfire or the uncontrolled spread of a wildfire?

c) Require the installation or maintenance of associated infrastructure (such as roads, fuel breaks, emergency water sources, power lines or other utilities) that may exacerbate fire risk or that may result in temporary or ongoing impacts to the environment?

and

d) Expose people or structures to significant risks, including downslope or downstream flooding or landslides, as a result of runoff, post-fire slope instability, or drainage changes?

a), b), c), d) Less-than-significant impact.

The project area is surrounded by mostly developed areas near the City of Davis and City of West Sacramento, but traverses natural open space, vegetation, and agricultural lands within unincorporated Solano County near the City of Dixon as well as the near the Yolo Causeway. The project is not located within a very high fire hazard severity zone and would be entirely within a LRA.

Portions of the project are located near and around vegetated areas and would involve the use of flammable materials including fuels such as gasoline or diesel, hydraulic oils, paints, solvents, or other industrial chemicals necessary for maintaining vehicles and equipment. The risk of fire associated with these materials is related to improper use or storage, which could increase the potential for wildfire ignition. During construction, Build Alternatives 2a and 2b through 7a and 7b would incorporate fire prevention practices during construction (AMM WF-1) to reduce wildfire impacts. The project would not expose people or structures to post-fire instability or change drainage patterns and would comply with Caltrans Standard Specifications for electrical systems (Section 87) for installation and operation.

Additionally, Standard Measure TT-3-has been incorporated into that project that will maintain emergency access and communications with emergency service providers during construction. Build Alternatives 2a and 2b through 7a and 7b also include a Park-and-Ride Facility that could provide areas for emergency vehicle staging during wildfires or other emergencies. Therefore, operation of the project would not exacerbate wildfire risks or result in temporary or ongoing impacts on the environment. Once construction of the project is completed, the roadway corridor would continue to serve the same use as existing conditions. Therefore, impacts related to wildfire would be less than significant for Build Alternatives 2a and 2b through 7a and 7b.

3.2.21 Mandatory Findings of Significance

a) Does the project have the potential to substantially degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, substantially reduce the number or restrict the range of a rare or endangered plant or animal or eliminate important examples of the major periods of California history or prehistory?

a) Less-than-significant impact.

The project area contains suitable habitat for special-status plant and wildlife species and nesting birds, CDFW Sensitive Natural Communities, and federally protected wetlands. Project construction would create subsurface disturbances that could result in damage to or destruction of previously undiscovered subsurface archaeological deposits or unmarked burials. With implementation of Standard Measures and AMMs, impacts to these resources would be less than significant for all Build Alternatives.

b) Does the project have impacts that are individually limited, but cumulatively considerable? ("Cumulatively considerable" means that the incremental effects of a project are considerable when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects)?

b) Less-than-significant impact.

As discussed in Chapter 2.4, Cumulative Impacts, the project would not have a cumulatively significant impact on any impacted resources. All potential impacts would be minimized through the Standard Measures and AMMs. Therefore, this impact would be less than significant.

c) Does the project have environmental effects which will cause substantial adverse effects on human beings, either directly or indirectly?

c) Less-than-significant impact.

Construction activities would temporarily increase criteria pollutant emissions and ambient noise levels. These impacts would be temporary, and the project would incorporate Standard Measures and AMMs to minimize potentially adverse effects to humans resulting from construction activities. Therefore, the project would not have a substantial direct or indirect impact on the human environment, and impacts would be less than significant for all Build Alternatives.

3.3 Wildfire

3.3.1 Regulatory Setting

Senate Bill 1241 required the Office of Planning and Research, the Natural Resources Agency, and the California Department of Forestry and Fire Protection to develop amendments to the "CEQA Checklist" for the inclusion of questions related to fire hazard impacts for projects located on lands classified as very high fire hazard severity zones. The 2018 updates to the CEQA Guidelines expanded this to include projects "near" these very high fire hazard severity zones.

3.3.2 Affected Environment

Climate and landscape characteristics are among the most important factors influencing hazard levels. Weather characteristics such as wind, temperature, humidity, and fuel moisture content affect the potential for fire. A fire typically burns faster and with more intensity when the air temperature is high, relative humidity is low, and winds are strong. Accordingly, urban and rural fires have the potential to cause damage, injury, or harm (Solano County 2008).

The project area is surrounded by mostly developed areas near the City of Davis and City of West Sacramento, but traverses natural open space, vegetation, and agricultural lands within unincorporated Solano County near the City of Dixon as well as the near the Yolo Causeway.

Wildland fire protection in California is the responsibility of either the State, local government, or the federal government. LRA fire protection is typically provided by city fire departments, fire protection districts, counties, and by CAL FIRE under contract to local government. According to the California Department of Forestry and Fire Protection, the project is not located within a very high fire hazard severity zone and would be located entirely within an LRA. However, several

areas along the Sacramento River are mapped as moderately hazardous for wildland fires (CAL FIRE 2021).

3.3.3 Environmental Consequences

3.3.3.1 No-Build Alternative 1

Construction and Operation

Under the No-Build Alternative, managed lanes would not be added to the I-80 or US-50 corridors and existing capacity would not increase. I-80 and US-50 would continue to serve the same use as existing conditions, which is not located within a very high fire severity zone and there would be no effects related to wildfire.

3.3.3.2 Build Alternatives 2a and 2b

Construction

Build Alternatives 2a and 2b would involve adding an HOV lane in each direction for use by HOV 2+. Construction of the project would require use of heavy and light equipment to modify ramps, widen roadway shoulders, install fiber-optic cable and electrical conduit, etc. The project is located along an existing transportation right-of-way that is maintained, creating an intrinsic fuel break. Equipment usage during construction would be temporary. However, such activities may be located near and around vegetated areas and would involve the use of flammable materials including fuels such as gasoline or diesel, hydraulic oils, paints, solvents, or other industrial chemicals necessary for maintaining vehicles and equipment. The risk of fire associated with these materials is related to improper use or storage which could increase the potential for wildfire ignition. During construction, Caltrans would implement a TMP (Standard Measure TT-3) to maintain emergency access during construction. Therefore, project construction activities would not impair an adopted emergency response plan or emergency evacuation plan. Standard Measure UE-3 would require the contractor to submit a jobsite fire prevention plan as required by California Division of Occupational Safety and Health Administration (Cal OSHA) before starting job site activities. In an emergency or wildfire, the contractor would cooperate with fire prevention authorities. Additionally, Standard Measure COM-1 would require a planned public outreach program to keep the area residents, businesses, emergency service providers, and transit operators informed of the project construction schedule; however, even with implementation of these Standard Measure TT-3, impacts from wildfire could still be significant. Therefore, during construction of Build Alternatives 2a and 2b, AMM WF-1 would be implemented that includes fire prevention practices to reduce the potential for wildfires to occur in the project area.

Operation

Caltrans would restore the project area to preconstruction conditions in accordance with applicable permits and Caltrans requirements. The project would involve the installation of fiber-optic and electrical conduit within existing transportation right-of-way. Once in operation, electrical components would be underground and tie-in to existing distribution lines. In addition,

Caltrans would comply with Caltrans Standard Specifications for electrical systems (Section 87) for installation and operation. While Build Alternatives 2a and 2b would add capacity to the I-80 and US-50 corridors and would increase the edge of pavement through shoulder widening, operation of Build Alternatives 2a and 2b would continue to serve the same use as existing conditions and would not create a new roadway alignment within a very high fire severity zone.

In addition, Build Alternatives 2a and 2b proposes a Park-and-Ride Facility with approximately 300 parking spaces that could provide areas for emergency vehicle staging during wildfires or other emergencies. Build Alternatives 2a and 2b would implement drainage features that could potentially provide firebreaks during a wildfire event. The project would not exacerbate wildfire risks or result in temporary or ongoing impacts to the environment, and impacts would be less than significant from project operations.

Impacts from Build Alternatives 2a and 2b would be less than significant with mitigation.

3.3.3.3 Build Alternatives 3a and 3b

Construction and Operation

Build Alternatives 3a and 3b would involve adding a HOT lane in each direction for use by HOT 2+ and Build Alternatives 3a and 3b propose similar project components within the same project area as Build Alternatives 2a and 2b, respectively; therefore, the impact would be the same as impacts described under Build Alternatives 2a and 2b.

3.3.3.4 Build Alternatives 4a and 4b

Construction and Operation

Build Alternatives 4a and 4b would involve adding an HOT lane in each direction for use by vehicles with three or more riders (HOT 3+). Build Alternatives 4a and 4b propose similar project components within the same project area as Build Alternatives 2a and 2b, respectively; therefore, the impact would be the same as impacts described under Build Alternatives 2a and 2b.

3.3.3.5 Build Alternatives 5a and 5b

Construction and Operation

Build Alternatives 5a and 5b would create an express lane in each direction where all users pay a fee regardless of vehicle occupancy. Build Alternatives 5a and 5b propose similar project components within the same project area as Build Alternatives 2a and 2b, respectively; therefore, the impact would be the same as impacts described under Build Alternatives 2a and 2b.

3.3.3.6 Build Alternatives 6a and 6b

Construction and Operation

Build Alternatives 6a and 6b would involve adding a transit-only lane in each direction. Build Alternatives 6a and 6b propose similar project components within the same project area as Build Alternatives 2a and 2b, respectively; therefore, the impact would be the same as impacts described under Build Alternatives 2a and 2b.

3.3.3.7 Build Alternatives 7a and 7b

Construction and Operation

Build Alternatives 7a and 7b would involve repurposing the current #1 general purpose lane to HOV 2+. No new lanes would be constructed. Build Alternatives 7a and 7b propose similar project components within the same project area as Build Alternatives 2a and 2b, respectively; therefore, the impact would be the same as impacts described under Build Alternatives 2a and 2b.

3.3.4 Avoidance, Minimization, and/or Mitigation Measures

AMM WF-1: **Implement Fire Prevention Practices During Construction**. During the construction, Caltrans would implement the following fire prevention practices to reduce the potential for wildfire.

- Prepare names and emergency telephone numbers of the nearest fire suppression agencies before the start of job site activities and post at a prominent place at the job site.
- Prepare a fire prevention plan required by the California Division of Occupational Safety and Health before the start of job site activities.
- Cooperate with fire prevention authorities in performance of the work.
- Immediately report fires occurring within and near the project limits by dialing 911 and to the nearest fire suppression agency by using the emergency phone numbers retained at the job site.
- Prevent project personnel from setting open fires that are not part of the work.
- Prevent the escape of and extinguish fires caused directly or indirectly by job site activities.

3.4 Climate Change

Climate change refers to long-term changes in temperature, precipitation, wind patterns, and other elements of the Earth's climate system. The Intergovernmental Panel on Climate Change, established by the United Nations and World Meteorological Organization in 1988, is devoted to

greenhouse gas (GHG) emissions reduction and climate change research and policy. Climate change in the past has generally occurred gradually over millennia, or more suddenly in response to cataclysmic natural disruptions. The research of the Intergovernmental Panel on Climate Change and other scientists over recent decades, however, has unequivocally attributed an accelerated rate of climatological changes over the past 150 years to GHG emissions generated from the production and use of fossil fuels.

Human activities generate GHGs consisting primarily of carbon dioxide (CO2), methane (CH4), nitrous oxide (N2O), tetrafluoromethane, hexafluoroethane, sulfur hexafluoride (SF6), and various hydrofluorocarbons (HFCs). CO2 is the most abundant GHG; while it is a naturally occurring and necessary component of Earth's atmosphere, fossil fuel combustion is the main source of additional, human-generated CO2 that is the main driver of climate change. In the U.S. and in California, transportation is the largest source of GHG emissions, mostly CO2.

The impacts of climate change are already being observed in the form of sea level rise, drought, more intense heat, extended and severe fire seasons, and historic flooding from changing storm patterns. Both mitigation and adaptation strategies are necessary to address these impacts. The most important mitigation strategy is to reduce GHG emissions. In the context of climate change (as distinct from CEQA and NEPA), "mitigation" involves actions to reduce GHG emissions or to enhance the "sinks" that store them (such as forests and soils) to lessen adverse impacts. "Adaptation" is planning for and responding to impacts to reduce vulnerability to harm, such as by adjusting transportation design standards to withstand more intense storms, heat, and higher sea levels. This analysis will include a discussion of both in the context of this transportation project.

3.4.1 Regulatory Setting

This section outlines federal and state efforts to comprehensively reduce GHG emissions from transportation sources.

3.4.1.1 Federal

To date, no national standards have been established for nationwide mobile source GHG reduction targets, nor have any regulations or legislation been enacted specifically to address climate change and GHG emissions reduction at the project level.

The National Environmental Policy Act (NEPA) (42 United States Code [USC] Part 4332) requires federal agencies to assess the environmental effects of their proposed actions prior to making a decision on the action or project.

The Federal Highway Administration (FHWA) recognizes the threats that extreme weather, sea level change, and other changes in environmental conditions pose to valuable transportation infrastructure and those who depend on it. FHWA therefore supports a sustainability approach that assesses vulnerability to climate risks and incorporates resilience into planning, asset management, project development and design, and operations and maintenance practices (FHWA 2022). This approach encourages planning for sustainable highways by addressing climate risks while balancing environmental, economic, and social values— "the triple bottom

line of sustainability" (FHWA n.d.). Program and project elements that foster sustainability and resilience also support economic vitality and global efficiency, increase safety and mobility, enhance the environment, promote energy conservation, and improve the quality of life.

The federal government has taken steps to improve fuel economy and energy efficiency to address climate change and its associated effects. The most important of these was the Energy Policy and Conservation Act of 1975 (42 USC Section 6201) as amended by the Energy Independence and Security Act (EISA) of 2007; and Corporate Average Fuel Economy (CAFE) Standards. This act established fuel economy standards for on-road motor vehicles sold in the United States. The U.S. Department of Transportation's National Highway Traffic and Safety Administration (NHTSA) sets and enforces the CAFE standards based on each manufacturer's average fuel economy for the portion of its vehicles produced for sale in the United States. The Environmental Protection Agency (U.S. EPA) calculates average fuel economy levels for manufacturers, and also sets related GHG emissions standards under the Clean Air Act. Raising CAFE standards leads automakers to create a more fuel-efficient fleet, which improves our nation's energy security, saves consumers money at the pump, and reduces GHG emissions (U.S. DOT 2014).

U.S. EPA published a final rulemaking on December 30, 2021, that raised federal GHG emissions standards for passenger cars and light trucks for model years 2023 through 2026, increasing in stringency each year. The updated GHG emissions standards will avoid more than three billion tons of GHG emissions through 2050. In April 2022, NHTSA announced corresponding new fuel economy standards for model years 2024 through 2026, which will reduce fuel use by more than 200 billion gallons through 2050 compared to the old standards and reduce fuel costs for drivers (U.S. EPA 2022a; NHTSA 2022).

3.4.1.2 State

California has been innovative and proactive in addressing GHG emissions and climate change by passing multiple Senate and Assembly bills and executive orders (EOs) including, but not limited to, the following:

EO S-3-05 (June 1, 2005): The goal of this EO is to reduce California's GHG emissions to: (1) year 2000 levels by 2010, (2) year 1990 levels by 2020, and (3) 80 percent below year 1990 levels by 2050. This goal was further reinforced with the passage of Assembly Bill (AB) 32 in 2006 and Senate Bill (SB) 32 in 2016.

Assembly Bill (AB) 32, Chapter 488, 2006, Núñez and Pavley, The Global Warming Solutions Act of 2006: AB 32 codified the 2020 GHG emissions reduction goals outlined in EO S-3-05, while further mandating that the California Air Resources Board (CARB) create a scoping plan and implement rules to achieve "real, quantifiable, cost-effective reductions of greenhouse gases." The Legislature also intended that the statewide GHG emissions limit continue in existence and be used to maintain and continue reductions in emissions of GHGs beyond 2020 (Health and Safety Code [H&SC] Section 38551(b)). The law requires ARB to adopt rules and regulations in an open public process to achieve the maximum technologically feasible and cost-effective GHG reductions.

Senate Bill (SB) 375, Chapter 728, 2008, Sustainable Communities and Climate Protection: This bill requires ARB to set regional emissions reduction targets for passenger vehicles. The Metropolitan Planning Organization (MPO) for each region must then develop a "Sustainable Communities Strategy" (SCS) that integrates transportation, land use, and housing policies to plan how it will achieve the emissions target for its region.

EO B-30-15 (April 2015) establishes an interim statewide GHG emission reduction target of 40 percent below 1990 levels by 2030 to ensure California meets its target of reducing GHG emissions to 80 percent below 1990 levels by 2050. It further orders all state agencies with jurisdiction over sources of GHG emissions to implement measures, pursuant to statutory authority, to achieve reductions of GHG emissions to meet the 2030 and 2050 GHG emissions reductions targets. It also directs ARB to update the Climate Change Scoping Plan to express the 2030 target in terms of million metric tons of carbon dioxide equivalent (MMTCO2e). [GHGs differ in how much heat each traps in the atmosphere, called global warming potential, or GWP. CO2 is the most important GHG, so amounts of other gases are expressed relative to CO2, using a metric called “carbon dioxide equivalent,” or CO2e. The global warming potential of CO2 is assigned a value of 1, and the GWP of other gases is assessed as multiples of CO2.] Finally, it requires the Natural Resources Agency to update the state’s climate adaptation strategy, Safeguarding California, every 3 years, and to ensure that its provisions are fully implemented.

SB 32, Chapter 249, 2016, codifies the GHG reduction targets established in EO B-30-15 to achieve a mid-range goal of 40 percent below 1990 levels by 2030.

SB 1386, Chapter 545, 2016, declared “it to be the policy of the state that the protection and management of natural and working lands … is an important strategy in meeting the state’s greenhouse gas reduction goals, and would require all state agencies, departments, boards, and commissions to consider this policy when revising, adopting, or establishing policies, regulations, expenditures, or grant criteria relating to the protection and management of natural and working lands.”

SB 743, Chapter 386 (September 2013): This bill changes the metric of consideration for transportation impacts pursuant to CEQA from a focus on automobile delay to alternative methods focused on vehicle miles traveled, to promote the state’s goals of reducing greenhouse gas emissions and traffic related air pollution and promoting multimodal transportation while balancing the needs of congestion management and safety.

SB 150, Chapter 150, 2017, Regional Transportation Plans: This bill requires ARB to prepare a report that assesses progress made by each metropolitan planning organization in meeting their established regional greenhouse gas emission reduction targets.

EO B-55-18 (September 2018) sets a new statewide goal to achieve and maintain carbon neutrality no later than 2045. This goal is in addition to existing statewide targets of reducing GHG emissions.

AB 1279, Chapter 337, 2022, The California Climate Crisis Act: This bill mandates carbon neutrality by 2045 and establishes an emissions reduction target of 85% below 1990 level as part of that goal. This bill solidifies a goal included in EO B-55-18. It requires ARB to work with

relevant state agencies to ensure that updates to the scoping plan identify and recommend measures to achieve these policy goals and to identify and implement a variety of policies and strategies that enable carbon dioxide removal solutions and carbon capture, utilization, and storage technologies in California, as specified.

3.4.2 Environmental Setting

The project area is surrounded by mostly developed areas near the City of Davis and City of West Sacramento, but traverses natural open space, vegetation, and agricultural lands within unincorporated Solano County near the City of Dixon as well as the near the Yolo Causeway. County. The I-80/US-50 corridor experiences heavy congestion during commute periods due to high vehicular demand. Traffic congestion during peak hours is common in the project area.

The SACOG Metropolitan Transportation Plan/Sustainable Communities Strategy (MTP/SCS) 2020 update prioritizes multiple transportation options to connect people with places. As a result, the plan forecasts less time spent in congestion, cleaner air, fewer GHG emissions per capita, a modernized, more productive transit system, and more ways for residents to choose walking or cycling for some of their daily trips. SACOG sees managed lanes as a critical component of the regional strategy to raise revenue sufficient to build and maintain the region's transportation system, provide mobility benefits to residents, manage traffic and congestion, and help to achieve the state mandated GHG reduction targets. The full scope of the Yolo County section of the project is included in the 2020 MTP/SCS and is identified as requiring capital improvements in the Corridor System Management Plans, the Sacramento Region Managed Lane Network Vision, and the I-5 Transit Corridor Report. The Solano County portion of the project is in the Solano County Metropolitan Transportation Commission area.

3.4.3 GHG Inventories

A GHG emissions inventory estimates the amount of GHGs discharged into the atmosphere by specific sources over a period of time. Tracking annual GHG emissions allows countries, states, and smaller jurisdictions to understand how emissions are changing and what actions may be needed to attain emission reduction goals. U.S. EPA is responsible for documenting GHG emissions nationwide, and the ARB does so for the state, as required by H&SC Section 39607.4. Cities and other local jurisdictions may also conduct local GHG inventories to inform their GHG reduction or climate action plans.

3.4.3.1 National GHG Inventory

The annual GHG inventory submitted by the U.S. EPA to the United Nations provides a comprehensive accounting of all human-produced sources of GHGs in the United States. The 1990-2019 inventory found that overall GHG emissions were 6,558 million metric tons (MMT) in 2019, down 1.7 percent from 2018 but up 1.8% from 1990 levels. Of these, 80 percent were CO2, 10 percent were CH4, and 7 percent were N2O; the balance consisted of fluorinated gases. CO2 emissions in 2019 were 2.2 percent less than in 2018, but 2.8 percent more than in 1990. As shown on Figure 3.4-1, the transportation sector accounted for 29 percent of U.S. GHG emissions in 2019 (U.S. EPA 2021b, 2021c).

The annual GHG inventory submitted by the U.S. EPA to the United Nations provides a comprehensive accounting of all human-produced sources of GHGs in the United States. Total GHG emissions from all sectors in 2020 were 5,222 million metric tons (MMT), factoring in deductions for carbon sequestration in the land sector. Of these, 79 percent were CO2, 11 percent were CH4, and 7 percent were N2O; the balance consisted of fluorinated gases. Total GHGs in 2020 decreased by 21% from 2005 levels and 11% from 2019. The change from 2019 resulted primarily from less demand in the transportation sector during the COVID-19 pandemic. The transportation sector was responsible for 27 percent of total U.S. GHG emissions in 2020, more than any other sector (Figure 3.4-1, and for 36% of all CO2 emissions from fossil fuel combustion. Transportation CO2 emissions for 2020 decreased 13 percent from 2019 to 2020, but were 7 percent higher than transportation CO2 emissions in 1990 (Figure 3.4-1) (U.S. EPA 2022b).

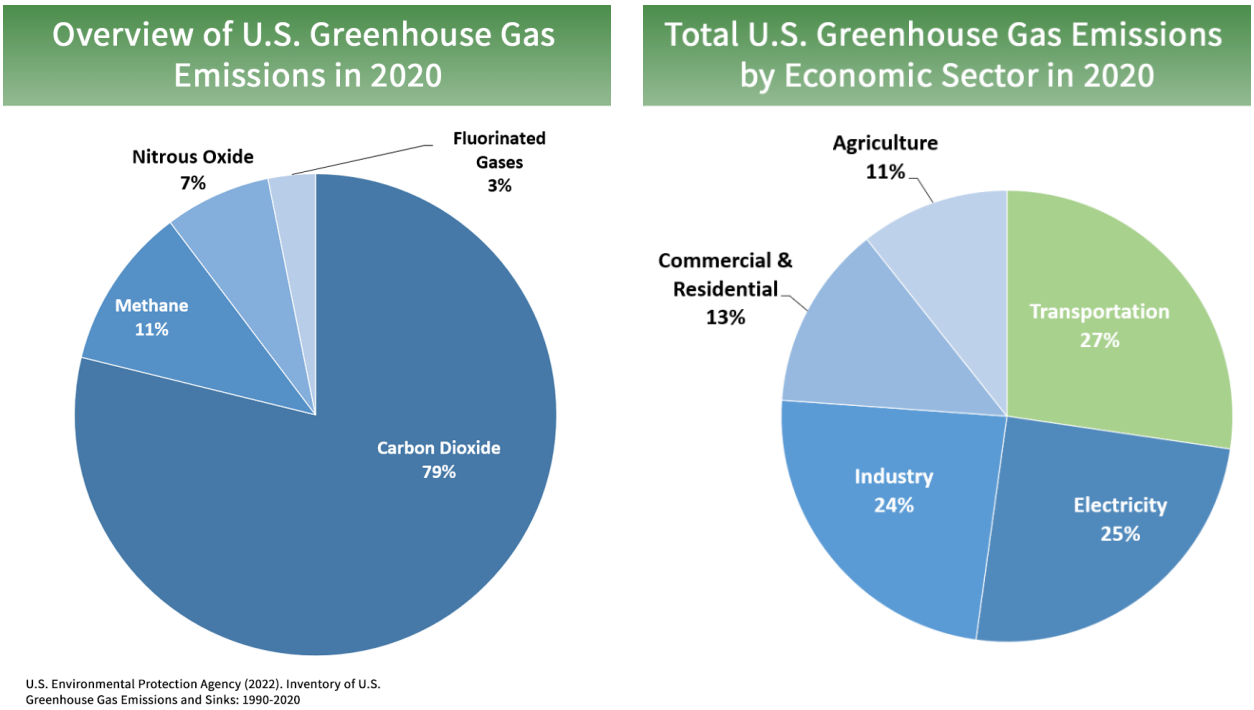


Figure 3.4-1. U.S. 2020 Greenhouse Gas Emissions (Source: U.S. EPA 2022d)

3.4.3.2 State GHG Inventory

ARB collects GHG emissions data for transportation, electricity, commercial/residential, industrial, agricultural, and waste management sectors each year. It then summarizes and highlights major annual changes and trends to demonstrate the state's progress in meeting its GHG reduction goals. The 2022 edition of the GHG emissions inventory reported emissions trends from 2000 to 2020. Total California GHG emissions in 2020 were 369.2 MMTCO2e, a reduction of 35.3 MMTCO2e from 2019 and 61.8 MMTCO2e below the 2020 statewide limit of 431 MMTCO2e. Much of the decrease from 2019 to 2020, however, is likely due to the effects of the COVID-19 pandemic on the transportation sector, during which vehicle miles traveled declined under stay-at-home orders and reductions in goods movement. Nevertheless, transportation remained the largest source of GHG emissions, accounting for 37 percent of

statewide emissions (Figure 3.4-2). (Including upstream emissions from oil extraction, petroleum refining, and oil pipelines in California, transportation was responsible for about 47 percent of statewide emissions in 2020; however, those emissions are accounted for in the industrial sector.) California's gross domestic product (GDP) and GHG intensity (GHG emissions per unit of GDP) both declined from 2019 to 2020 (Figure 3.4-3). It is expected that total GHG emissions will increase as the economy recovers over the next few years (ARB 2022a).

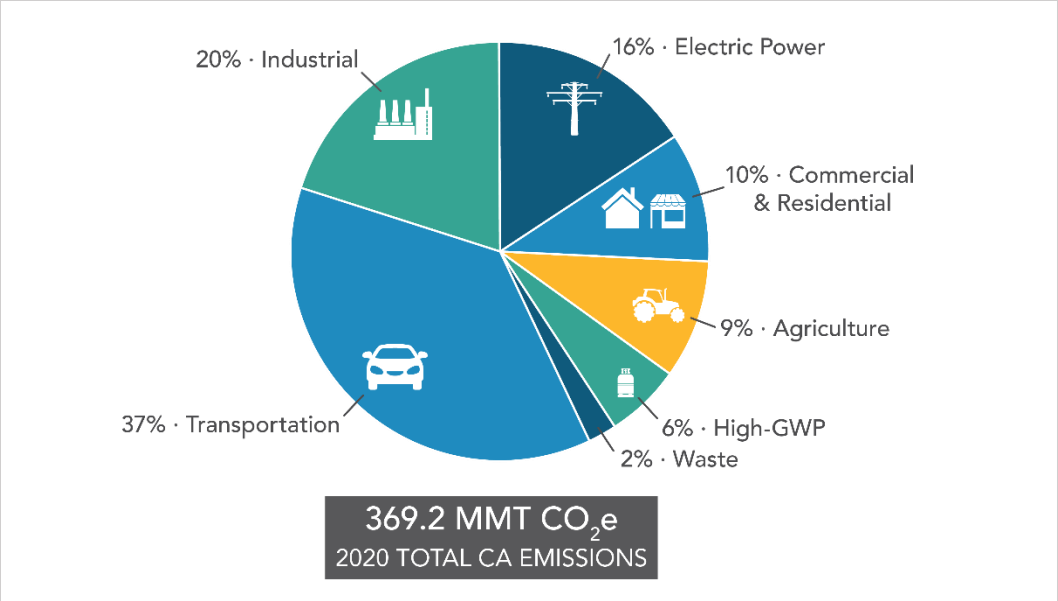


Figure 3.4-2. California 2019 Greenhouse Gas Emissions by Scoping Plan Category (Source: ARB 2022a)

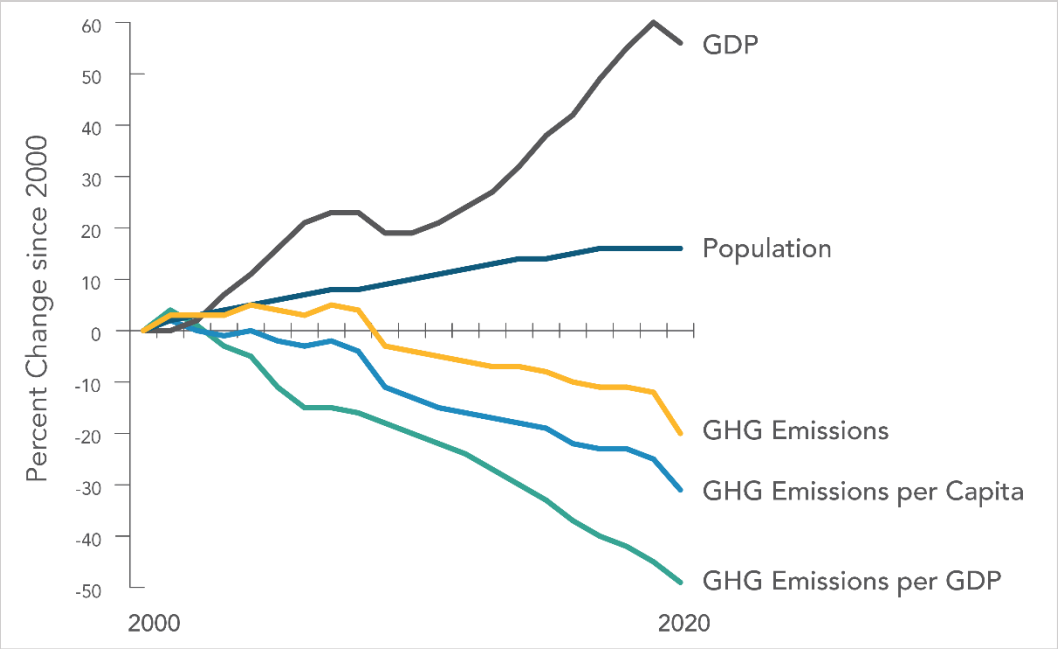


Figure 3.4-3. Change in California GDP, Population, and GHG Emissions since 2000 (Source: ARB 2021a)

AB 32 required ARB to develop a Scoping Plan that describes the approach California will take to achieve the goal of reducing GHG emissions to 1990 levels by 2020, and to update it every 5 years. ARB adopted the first scoping plan in 2008. The second updated plan, California's 2017 Climate Change Scoping Plan, adopted on December 14, 2017, reflects the 2030 target established in EO B-30-15 and SB 32. The draft 2022 Scoping Plan Update additionally lays out a path to achieving carbon neutrality by 2045 (ARB 2022b).

3.4.3.3 Regional Plans

ARB sets regional GHG reduction targets for California's 18 metropolitan planning organizations (MPOs) to achieve through planning future projects that will cumulatively achieve those goals, and reporting how they will be met in the Regional Transportation Plan/Sustainable Communities Strategy (RTP/SCS). Targets are set at a percent reduction of passenger vehicle GHG emissions per person from 2005 levels. SACOG MTP/SCS 2020. The regional reduction target for SACOG is 19 percent by 2035 (ARB 2022b).

The project is within the jurisdiction of the SACOG, which is the Regional Transportation Planning Agency (RTPA) for Sacramento, Sutter, Yolo, and Yuba Counties. The 2020 MTP identifies a path for improving air quality, preserving open space and natural resources, and helping California achieve its goal to reduce GHG emissions that contribute to climate change (SACOG 2019) (Table 3.4-1).

Table 3.4-1. Regional and Local Greenhouse Gas Reduction Plans

Title	GHG Reduction Policies or Strategies
SACOG 2020 Metropolitan Transportation Plan/Sustainable Communities Strategy	• Policy 3: Implement pilot projects aimed at making microtransit and micromobility (such as bike and scooter share) work for urban, suburban, rural, and low-income areas of the region. • Policy 4: Pursue flexibility in state and federal funding sources to enable testing and implementation of innovative mobility solutions that are affordable, accessible, and reduce greenhouse gas emissions. • Policy 5: Support innovative education and transportation demand management programs covering all parts of the region, to offer a variety of alternatives to driving alone. • Policy 6: Pursue new funding and planning opportunities to support electric vehicle infrastructure and programs for both private vehicles and public transit fleets. • Policy 7: Support transit agencies and local governments looking to secure funds to improve the frequency, hours of service, and coverage of productive bus service (including bus rapid transit, express bus, and more frequent fixed-route service). • Policy 8: Support more seamless travel through better traveler information for trip planning, reliable service and coordination between operators for transit, shared mobility and other first/last mile connections. • Policy 9: Pursue new and reformed transportation funding methods and sources to implement the MTP/SCS that are stable, predictable, flexible, and adequate to operate, maintain, and expand the transportation system. Mileage-based fees/PayGo should replace, not be on top of, existing state fuel taxes. • Policy 11: Initiate a leadership role in testing and piloting roadway pricing mechanisms, such as facility-based tolling and mileage-based fees, in partnership with the state, federal, and local agencies and private sector organizations. • Policy 12: Take steps to implement tolling or pricing of specific lanes on major facilities, such as freeways, to improve traffic management, reliability, and operations of those facilities and to help raise funding for the cost of building and maintaining large capital investments. • Policy 13: All new major expansion projects on the region's freeways and expressways should be planned for eventual deployment of pricing options to both manage demand and provide a financing mechanism for capital costs. Any pricing strategy pursued should be sensitive to changes in roadway demand during different parts of the day (peak/off-peak) with the objective of managing demand and providing travel choice. • Policy 14: Revenues generated from facility-based pricing should be used to build and maintain a regional network of paid express lanes and, where surplus revenue is available, on strategic transit services (e.g., express buses) or other mobility solutions that can reduce vehicle miles traveled and provide multiple travel options along priced corridors. • Policy 15: New taxes and fees, including mileage-based fees, intended to raise additional funding for transportation purposes should prioritize closing the gap for system maintenance and state-of-good repair needs before investing in system expansion. • Policy 16: When implementing pricing strategies, both paid express lanes and mileage-based fees/PayGo, the region should make every effort to avoid negatively impacting lower income and rural households. For regional implementation of PayGo, explore innovative options for setting fees, such as including off-setting incentives for non-vehicular travel, off-sets to fees for disadvantaged households, and keying fee rates to maintenance and fix-if-first goals. • Policy 22: Invest in bicycle and pedestrian infrastructure to encourage healthy, active transportation trips and provide recreational opportunities for residents and visitors. • Policy 25: Prioritize investments in transportation improvements that reduce greenhouse gas emissions and vehicle miles traveled.

Title	GHG Reduction Policies or Strategies
Yolo County Climate Action Plan	• Increase vehicle fuel efficiency. • Reduce carbon content. • Reducing number of vehicles miles traveled. • Optimizes vehicle operations and driver behavior, including strategies such as speed management, ecodriving, and vehicle maintenance.
Sacramento County Climate Action Plan	• Increase the average fuel efficiency of County-owned vehicles powered by gasoline and diesel and encourage increased fuel efficiency in community vehicles. • Increase use of alternative and lower carbon fuels in the County vehicle fleet and facilitate their use in the community. • Reduce total vehicle miles traveled per capita in the community and the region.
Solano County Climate Action Plan	• TC-1: Solano County will work with STA to enhance countywide rideshare infrastructure and services. • TC-3: Work with cities and STA to improve bicycle and pedestrian connectivity in the county. • TC-4: Educate residents and businesses about options to reduce motor vehicle emissions.

3.4.4 Project Analysis

GHG emissions from transportation projects can be divided into those produced during operation and use of the State Highway System (SHS) (operational emissions) and those produced during construction. The primary GHGs produced by the transportation sector are CO2, CH4, N2O, and HFCs. CO2 emissions are a product of burning gasoline or diesel fuel in internal combustion engines, along with relatively small amounts of CH4 and N2O. A small amount of HFC emissions related to refrigeration is also included in the transportation sector.

The CEQA Guidelines generally address greenhouse gas emissions as a cumulative impact due to the global nature of climate change (Pub. Resources Code, § 21083(b)(2)). As the California Supreme Court explained, “because of the global scale of climate change, any one project's contribution is unlikely to be significant by itself.” (Cleveland National Forest Foundation v. San Diego Assn. of Governments (2017) 3 Cal.5th 497, 512.) In assessing cumulative impacts, it must be determined whether a project’s incremental effect is “cumulatively considerable” (CEQA Guidelines Sections 15064(h)(1) and 15130).

To make this determination, the incremental impacts of the project must be compared with the effects of past, current, and probable future projects. Although climate change is ultimately a cumulative impact, not every individual project that emits greenhouse gases must necessarily be found to contribute to a significant cumulative impact on the environment.

3.4.4.1 Operational Emissions

CO2 from fossil fuel combustion is the largest component of U.S. GHG emissions, and transportation is the largest contributor of CO2. The largest emitters of transportation CO2 emissions in 2020 were passenger cars (38.5 percent), freight trucks (26.3 percent), and light-duty trucks (18.9 percent). The remainder came from other modes of transportation, including aircraft, ships, boats, and trains, as well as pipelines and lubricants (U.S. EPA 2022b). Because

CO2 emissions represent the greatest percentage of GHG emissions, it has been selected as a proxy for the following analysis of potential climate change impacts.

The highest levels of CO_2 from mobile sources such as automobiles occur at stop-and-go speeds (0–25 miles per hour) and speeds over 55 miles per hour; the most severe emissions occur from 0–25 miles per hour (see Figure 3-4-4). To the extent that a project enhances operational efficiency and improves travel times in high-congestion travel corridors, GHG emissions, particularly CO_2, may be reduced, provided that improved travel times do not induce additional VMT.

Four primary strategies can reduce GHG emissions from transportation sources: (1) improving the transportation system and operational efficiencies, (2) reducing travel activity (e.g., vehicle miles traveled), (3) transitioning to lower GHG emitting fuels, and (4) improving vehicle technologies and efficiency. To be most effective, all four strategies should be pursued concurrently.

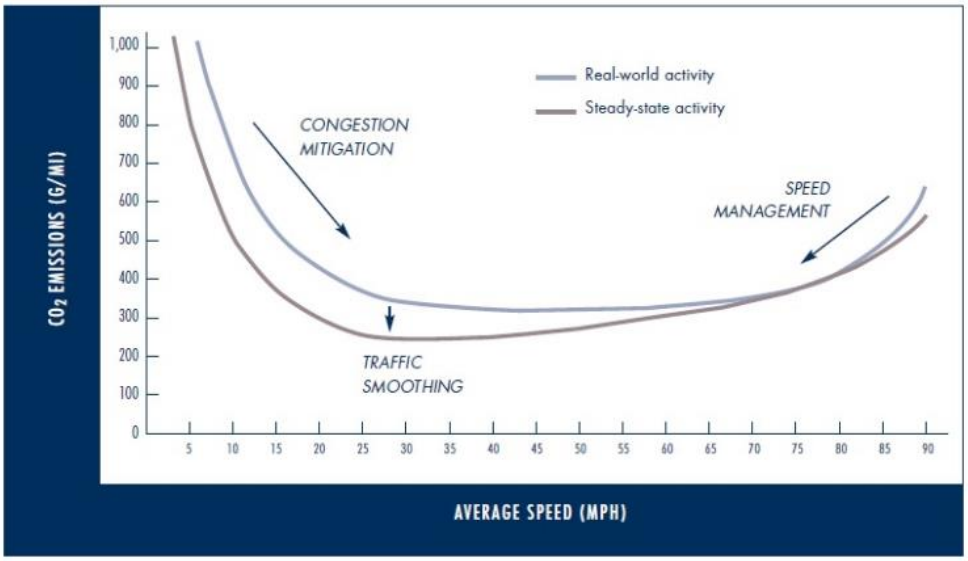


Figure 3.4-4. Possible Use of Traffic Operation Strategies in Reducing On-road CO_2 Emissions

Source: Real-World Carbon Dioxide Impacts of Traffic Congestion. Berkeley, CA: University of California Transportation Center. UCTC-FR-2010-11. Available: https://www.researchgate.net/publication/46438207. (Barth and Boriboonsomsin 2010)

The project is within the jurisdiction of the SACOG, which is the RTPA for Sacramento, Sutter, Yolo, and Yuba Counties. The 2020 MTP identifies a path for improving air quality, preserving open space and natural resources, and helping California achieve its goal to reduce GHG emissions that contribute to climate change (SACOG 2019). The regional reduction target for passenger vehicle GHG emissions per person from 2005 levels for SACOG is 19 percent by 2035 (ARB 2019c). The project is included in the SACOG MTP/SCS 2020.

The Build Alternatives would implement managed lanes to manage traffic congestion, accommodate travel demands, and improve modality and travel time reliability. By helping to provide a continuous managed lane system, the project, combined with other in-progress and

proposed managed lane projects, would provide reliable travel times, and help contribute to the completion of the regional transportation network envisioned in the SACOG MTP/SCS.

3.4.4.2 Quantitative Analysis

A quantitative analysis of daily GHG emissions was performed using the Caltrans CT-EMFAC2021. CT-EMFAC2021 is an emission model developed by Caltrans that calculates project-level emissions using data from the California Air Resources Board's EMFAC 2021 model. GHG emissions were calculated for the Build Alternatives under existing (2019), opening (2029), and design (2049) year conditions. As shown in Table 3.4-2, GHG emissions for some alternatives would increase (up to 11.0 percent) under opening year conditions. However, under long-term design year conditions, GHG emissions improve with the project and all alternatives would achieve an emissions reduction (up to 16.9 percent) (Table 3.4-2).

ARB developed the EMission FACtors (EMFAC) model to facilitate preparation of statewide and regional mobile source emissions inventories. The model generates emissions rates that can be multiplied by vehicle activity data from all motor vehicles, including passenger cars to heavy-duty trucks, operating on highways, freeways, and local roads in California. EMFAC has a rigorous scientific foundation, has been approved by U.S. EPA, and has been vetted through multiple stakeholder reviews. Caltrans developed CT-EMFAC to apply project-specific factors to ARB's model.

EMFAC's GHG emission rates are based on tailpipe emissions test data and the model does not account for factors such as the rate of acceleration and vehicle aerodynamics, which influence the amount of emissions generated by a vehicle. GHG emissions quantified using CT-EMFAC are therefore estimates and may not reflect actual on-road emissions. Furthermore, the model does not account for induced travel. Modeling GHG estimates with EMFAC or CT-EMFAC nevertheless remains the most precise means of estimating future greenhouse gas emissions. While CT-EMFAC is currently the best available tool for calculating GHG emissions from mobile sources, it is important to note that the GHG results are only useful for a comparison of alternatives. Federal CAFE and GHG emissions standards continue to evolve, and models will be updated to account for regulatory changes.

Table 3.4-2. Modeled Annual Carbon Dioxide Equivalent (CO_2e) Emissions by Alternative

Year	CO_2e Emissions	Baseline (Existing Yr 2019)	Alt 1 (No Build)	Alt 2a	Alt 2b	Alt 3a	Alt 3b	Alt 4a	Alt 4b	Alt 5a	Alt 5b	Alt 6a	Alt 6b	Alt 7a	Alt 7b
Opening Year 2029	CO_2e (Metric ton)	1,039.5	1,040.6	1,005.1	1,154.0	986.4	1,148.0	970.5	1,132.0	915.7	1,117.5	902.1	1,063.4	1,062.7	1,097.9
	%Change between Build/No-Build	N/A	N/A	-3.4	10.9	-5.2	10.3	-6.7	8.8	-12.0	7.4	-13.3	2.2	2.1	5.5
	%Change between Existing/Build	N/A	0.1	-3.3	11.0	-5.1	10.4	-6.6	8.9	-11.9	7.5	-13.2	2.3	2.2	5.6
Design Year 2049	CO2e (Metric ton)	1039.5	1,031.4	939.0	1,017.2	931.2	1,006.6	920.5	993.4	909.5	979.2	880.2	996.4	*863.6	981.3
	%Change between Build/No-Build	N/A	N/A	-9.0	-1.4	-9.7	-2.4	-10.8	-3.7	-11.8	-5.1	-14.7	-3.4	-16.3	-4.9
	%Change between Existing/Build	N/A	-0.8	-9.7	-2.1	-10.4	-3.2	-11.5	-4.4	-12.5	-5.8	-15.3	-4.1	-16.9	-5.6

Source: CT-EMFAC 2021
Notes:
CO_2 = carbon dioxide
CO_2e = carbon dioxide equivalent
carbon dioxide (CO_2), nitrous oxide (N_2O), methane (CH_4): all GHGs included in the model's calculation of CO_2e
N/A = not available

3.4.4.3 Construction Emissions

Construction GHG emissions would result from material processing and transportation, on-site construction equipment, and traffic delays due to construction. These emissions will be produced at different levels throughout the construction phase; their frequency and occurrence can be reduced through innovations in plans and specifications and by implementing better traffic management during construction phases.

Use of long-life pavement, improved traffic management plans, and changes in materials can also help offset GHG emissions produced during construction by allowing longer intervals between maintenance and rehabilitation activities.

GHG emissions from project construction were estimated using CAL-CET2020 version 1.0.1. There will be about 5,532 tons of CO2 generated over the entire construction project.

All construction contracts include Caltrans Standard Specifications related to air quality. Section 7-1.02A and 7 1.02C, Emissions Reduction, requires contractors to comply with all laws applicable to the project and to certify they are aware of and will comply with all ARB emission reduction regulations. Section 14-9.02, Air Pollution Control, requires contractors to comply with all air pollution control rules, regulations, ordinances, and statutes. Certain common regulations, such as equipment idling restrictions, that reduce construction vehicle emissions also help reduce GHG emissions.

3.4.5 CEQA Conclusion

The Build Alternatives would result in GHG emissions during construction. In addition, the Build Alternatives would result in additional vehicle capacity that would result in an increase of VMTs. Therefore, long-term operational GHG emissions would potentially increase from existing conditions under 2029 opening year assumptions. However, as projected under the 20-year horizon design assumptions (2049), although VMTs were estimated to increase, GHG emissions were estimated to decrease for the Build Alternatives as compared to conditions under 2029, which is attributed to newer more fuel-efficient fleets and the increase in electric vehicles by the year 2049. The project does not conflict with any applicable plan, policy, or regulation adopted for the purpose of reducing the emissions of GHGs. With the implementation of construction GHG reduction mitigation measures, the impact would be less than significant.

Caltrans is firmly committed to implementing measures to help reduce GHG emissions. These measures are outlined in the following section.

3.4.6 Greenhouse Gas Reduction Strategies

3.4.6.1 Statewide Efforts

In response to AB 32, California is implementing measures to achieve emission reductions of GHGs that cause climate change. Climate change programs in California are effectively reducing GHG emissions from all sectors of the economy. These programs include regulations, market programs, and incentives that will transform transportation, industry, fuels, and other

sectors, to take California into a sustainable, low-carbon and cleaner future, while maintaining a robust economy (ARB 2022d).

Major sectors of the California economy, including transportation, will need to reduce emissions to meet 2030 and 2050 GHG emissions targets. The Governor's Office of Planning and Research identified five sustainability pillars in a 2015 report: (1) increasing the share of renewable energy in the State's energy mix to at least 50 percent by 2030; (2) reducing petroleum use by up to 50 percent by 2030; (3) increasing the energy efficiency of existing buildings by 50 percent by 2030; (4) reducing emissions of short-lived climate pollutants; and (5) stewarding natural resources, including forests, working lands, and wetlands, to ensure that they store carbon, are resilient, and enhance other environmental benefits (OPR 2015). OPR later added strategies related to achieving statewide carbon neutrality by 2045 in accordance with EO B-55-18 and AB 1279 (OPR 2022).

The transportation sector is integral to the people and economy of California. To achieve GHG emission reduction goals, it is vital that the state build on past successes in reducing criteria and toxic air pollutants from transportation and goods movement. GHG emission reductions will come from cleaner vehicle technologies, lower carbon fuels, and reduction of vehicle miles traveled (VMT). Reducing today's petroleum use in cars and trucks by 50% is a key state goal for reducing greenhouse gas emissions by 2030 (California Environmental Protection Agency 2015).

In addition, SB 1386 (Wolk 2016) established as state policy the protection and management of natural and working lands and requires state agencies to consider that policy in their own decision-making. Trees and vegetation on forests, rangelands, farms, and wetlands remove carbon dioxide from the atmosphere through biological processes and sequester the carbon in above- and below-ground matter.

Subsequently, Governor Gavin Newsom issued Executive Order N-82-20 to combat the crises in climate change and biodiversity. It instructs state agencies to use existing authorities and resources to identify and implement near- and long-term actions to accelerate natural removal of carbon and build climate resilience in our forests, wetlands, urban greenspaces, agricultural soils, and land conservation activities in ways that serve all communities and in particular low-income, disadvantaged, and vulnerable communities. To support this order, the California Natural Resources Agency (2022a) released Natural and Working Lands Climate Smart Strategy, with a focus on nature-based solutions.

Caltrans Activities

Caltrans continues to be involved on the Governor's Climate Action Team as the ARB works to implement EOs S-3-05 and S-01-07 and help achieve the targets set forth in AB 32. EO B-30-15, issued in April 2015, and SB 32 (2016), set an interim target to cut GHG emissions to 40 percent below 1990 levels by 2030. The following major initiatives are underway at Caltrans to help meet these targets.

California Action Plan for Transportation Infrastructure

The California Action Plan for Transportation Infrastructure (CAPTI) builds on executive orders signed by Governor Newsom in 2019 and 2020 targeted at reducing GHG emissions in transportation, which account for more than 40 percent of all polluting emissions, to reach the state's climate goals. Under CAPTI, where feasible and within existing funding program structures, the state will invest discretionary transportation funds in sustainable infrastructure projects that align with its climate, health, and social equity goals (California State Transportation Agency 2021).

California Action Plan for Transportation Infrastructure

The California Transportation Plan (CTP) is a statewide, long-range transportation plan to meet our future mobility needs and reduce GHG emissions. It serves as an umbrella document for all the other statewide transportation planning documents. The CTP 2050 presents a vision of a safe, resilient, and universally accessible transportation system that supports vibrant communities, advances racial and economic justice, and improves public and environmental health. The plan's climate goal is to achieve statewide GHG emissions reduction targets and increase resilience to climate change. It demonstrates how GHG emissions from the transportation sector can be reduced through advancements in clean fuel technologies; continued shifts toward active travel, transit, and shared mobility; more efficient land use and development practices; and continued shifts to telework (Caltrans 2021a).

Caltrans Strategic Plan

The Caltrans 2020–2024 Strategic Plan includes goals of stewardship, climate action, and equity. Climate action strategies include developing and implementing a Caltrans Climate Action Plan; a robust program of climate action education, training, and outreach; partnership and collaboration; a VMT monitoring and reduction program; and engaging with the most vulnerable communities in developing and implementing Caltrans climate action activities (Caltrans 2021b).

Caltrans Policy Directives and Other Initiatives

Caltrans Director's Policy 30 (DP-30) Climate Change (June 22, 2012) established a Department policy to ensure coordinated efforts to incorporate climate change into Departmental decisions and activities. Caltrans Greenhouse Gas Emissions and Mitigation Report (Caltrans 2020) provides a comprehensive overview of Caltrans' emissions. The report documents and evaluates current Caltrans procedures and activities that track and reduce GHG emissions and identifies additional opportunities for further reducing GHG emissions from Department-controlled emission sources, in support of Departmental and State goals.

3.4.6.2 Project-Level GHG Reduction Strategies

The following measures will also be implemented in the project to reduce GHG emissions and potential climate change impacts from the project.

The following measures would be implemented to reduce GHG emissions and potential climate change impacts from the project.

Construction contractors will comply with Caltrans Standard Specifications Section 7-1.02A and 71.02C, Emissions Reduction, and Section 14-9.02, Air Pollution Control, which requires contractors to comply with all air pollution control rules, regulations, ordinances, and statutes. As outlined in Appendix E, the project would implement Standard Measures GHG-1 through GHG-6 to reduce GHG emissions. GHG-6 would require Caltrans to maintain access for bicycle and pedestrians throughout construction. GHG-5 commits Caltrans to revegetating disturbed areas to offset any potential CO2 emissions increase through carbon sequestration.

3.4.7 Adaptation

Reducing GHG emissions is only one part of an approach to addressing climate change. Caltrans must plan for the effects of climate change on the state's transportation infrastructure and strengthen or protect the facilities from damage. Climate change is expected to produce increased variability in precipitation, rising temperatures, rising sea levels, variability in storm surges and their intensity, and in the frequency and intensity of wildfires. Flooding and erosion can damage or wash out roads; longer periods of intense heat can buckle pavement and railroad tracks; storm surges combined with a rising sea level can inundate highways. Wildfire can directly burn facilities and indirectly cause damage when rain falls on denuded slopes that landslide after a fire. Effects will vary by location and may, in the most extreme cases, require that a facility be relocated or redesigned. Accordingly, Caltrans must consider these types of climate stressors in how highways are planned, designed, built, operated, and maintained.

3.4.7.1 Federal Efforts

Under NEPA Assignment, Caltrans is obligated to comply with all applicable federal environmental laws and FHWA NEPA regulations, policies, and guidance.

The Fourth National Climate Assessment, published in 2018, presents the foundational science and the "human welfare, societal, and environmental elements of climate change and variability for 10 regions and 18 national topics, with particular attention paid to observed and projected risks, impacts, consideration of risk reduction, and implications under different mitigation pathways."

The U.S. DOT Policy Statement on Climate Adaptation in June 2011 committed the federal Department of Transportation to "integrate consideration of climate change impacts and adaptation into the planning, operations, policies, and programs of DOT in order to ensure that taxpayer resources are invested wisely, and that transportation infrastructure, services and operations remain effective in current and future climate conditions" (U.S. DOT 2011).

FHWA order 5520 (Transportation System Preparedness and Resilience to Climate Change and Extreme Weather Events, December 15, 2014) established FHWA policy to strive to identify the risks of climate change and extreme weather events to current and planned transportation systems. FHWA has developed guidance and tools for transportation planning that foster resilience to climate effects and sustainability at the federal, state, and local levels (FHWA 2019).

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- Use best available science
- Prioritize the most vulnerable
- Preserve ecosystems
- Build community relationships
- Engage globally

U.S. DOT developed its climate action plan pursuant to the federal EO 14008, Tackling the Climate Crisis at Home and Abroad (January 27, 2021). EO 14008 recognized the threats of climate change to national security and ordered federal government agencies to prioritize actions on climate adaptation and resilience in their programs and investments (White House 2021).

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3.4.7.2 State Efforts

Climate change adaptation for transportation infrastructure involves long-term planning and risk management to address vulnerabilities in the transportation system. A number of state policies and tools have been developed to guide adaptation efforts.

California's Fourth Climate Change Assessment (Fourth Assessment) (2018) is the state's effort to "translate the state of climate science into useful information for action." It provides information that will help decision makers across sectors and at state, regional, and local scales

protect and build the resilience of the state's people, infrastructure, natural systems, working lands, and waters. The State's approach recognizes that the consequences of climate change occur at the intersections of people, nature, and infrastructure. The Fourth Assessment reports that if no measures are taken to reduce GHG emissions by 2021 or sooner, the state is projected to experience a 2.7 to 8.8 degrees Fahrenheit increase in average annual maximum daily temperatures, with impacts on agriculture, energy demand, natural systems, and public health; a two-thirds decline in water supply from snowpack and water shortages that will impact agricultural production; a 77% increase in average area burned by wildfire, with consequences for forest health and communities; and large-scale erosion of up to 67% of Southern California beaches and inundation of billions of dollars' worth of residential and commercial buildings due to sea level rise (State of California 2018).

Sea level rise is a particular concern for transportation infrastructure in the coastal zone. Major urban airports will be at risk of flooding from sea level rise combined with storm surge as early as 2040; San Francisco airport is already at risk. Miles of coastal highways vulnerable to flooding in a 100-year storm event will triple to 370 by 2100, and 3,750 miles will be exposed to temporary flooding. The Fourth Assessment's findings highlight the need for proactive action to address these current and future impacts of climate change.

In 2008, then-governor Arnold Schwarzenegger recognized the need when he issued EO S-13-08, focused on sea level rise. Technical reports on the latest sea level rise science were first published in 2010 and updated in 2013 and 2017. The 2017 projections of sea level rise and new understanding of processes and potential impacts in California were incorporated into the State of California Sea Level Rise Guidance Update in 2018. This EO also gave rise to the California Climate Adaptation Strategy (2009), updated in 2014 as Safeguarding California: Reducing Climate Risk (Safeguarding California Plan), which addressed the full range of climate change impacts and recommended adaptation strategies. The Safeguarding California Plan was updated in 2018 and again in 2021 as the California Climate Adaptation Strategy, incorporating key elements of the latest sector-specific plans such as the Natural and Working Lands Climate Smart Strategy, Wildfire and Forest Resilience Action Plan, Water Resilience Portfolio, and the CAPTI (described above). Priorities in the 2021 California Climate Adaptation Strategy include acting in partnership with California Native American Tribes, strengthening protections for climate-vulnerable communities that lack capacity and resources, nature-based climate solutions, use of best available climate science, and partnering and collaboration to best leverage resources (California Natural Resources Agency 2022b).

EO B-30-15, signed in April 2015, requires state agencies to factor climate change into all planning and investment decisions. This EO recognizes that effects of climate change in addition to sea level rise also threaten California's infrastructure. At the direction of EO B-30-15, the Office of Planning and Research published Planning and Investing for a Resilient California: A Guidebook for State Agencies in 2017, to encourage a uniform and systematic approach.

AB 2800 (Quirk 2016) created the multidisciplinary Climate-Safe Infrastructure Working Group to help actors throughout the state address the findings of California's Fourth Climate Change Assessment. It released its report, Paying it Forward: The Path Toward Climate-Safe Infrastructure in California, in 2018. The report provides guidance to agencies on how to

address the challenges of assessing risk in the face of inherent uncertainties still posed by the best available science on climate change. It also examines how state agencies can use infrastructure planning, design, and implementation processes to address the observed and anticipated climate change impacts (Climate Change Infrastructure Working Group 2018).

3.4.7.3 Caltrans Adaptation Efforts

Caltrans Vulnerability Assessments

Caltrans completed climate change vulnerability assessments to identify segments of the State Highway System vulnerable to climate change effects of precipitation, temperature, wildfire, storm surge, and sea level rise.

The climate change data in the assessments were developed in coordination with climate change scientists and experts at federal, state, and regional organizations at the forefront of climate science. The findings of the vulnerability assessments guide analysis of at-risk assets and development of Adaptation Priority Reports as a method to make capital programming decisions to address identified risks.

3.4.7.4 Project Adaptation Analysis

Sea Level Rise

The project is outside the coastal zone and not in an area subject to sea level rise. Therefore, direct impacts to the project due to projected sea level rise are not expected. However, according to the Caltrans District 3 Climate Change Vulnerability Assessment Map (2021), the Yolo Causeway would be vulnerable to sea level rise if exposed to a scenario of sea level rise of 2 meters or up, see Figure 3.4-5.

Precipitation and Flooding

The District 3 Climate Change Vulnerability Assessment indicates the potential for a 0-4.9 percent increase in 100-year storm precipitation depth in the project vicinity by 2025 and through 2085 (Caltrans 2019). Many local geomorphic variables affect how a given precipitation event would affect streamflow, making it difficult to assess potential impacts at a particular location. The current scope of the project will not raise or change the profile of any of the highways within Segment 1, and it is anticipated that there will be no negative impacts to the FEMA mapped floodplain in this area. Therefore, the project is not likely to be affected by future changes in storm precipitation, and risk of interrupting traffic flow or emergency vehicles or access on I-80 is low.

Wildfire

The project is not in a high fire hazard severity zone. The Caltrans Climate Change Vulnerability Assessment for District 3 evaluated roads at risk for future wildfire. Mapping of wildfire risk shows a portion of the project area is in an area of wildfire concern and was not characterized as exposed roadway through 2085. As described in Section 3.3, Wildfire, the project would serve the same use as the existing use and would not exacerbate wildfire risks. Caltrans would

implement AMM WF-1 to reduce the potential wildfire risks during construction. Accordingly, the project is not likely to be subject to effects of wildfire that could occur under climate change.

Temperature

The District Climate Change Vulnerability Assessment does not indicate temperature changes during the project's design life that would require adaptive changes in pavement design or maintenance practices.

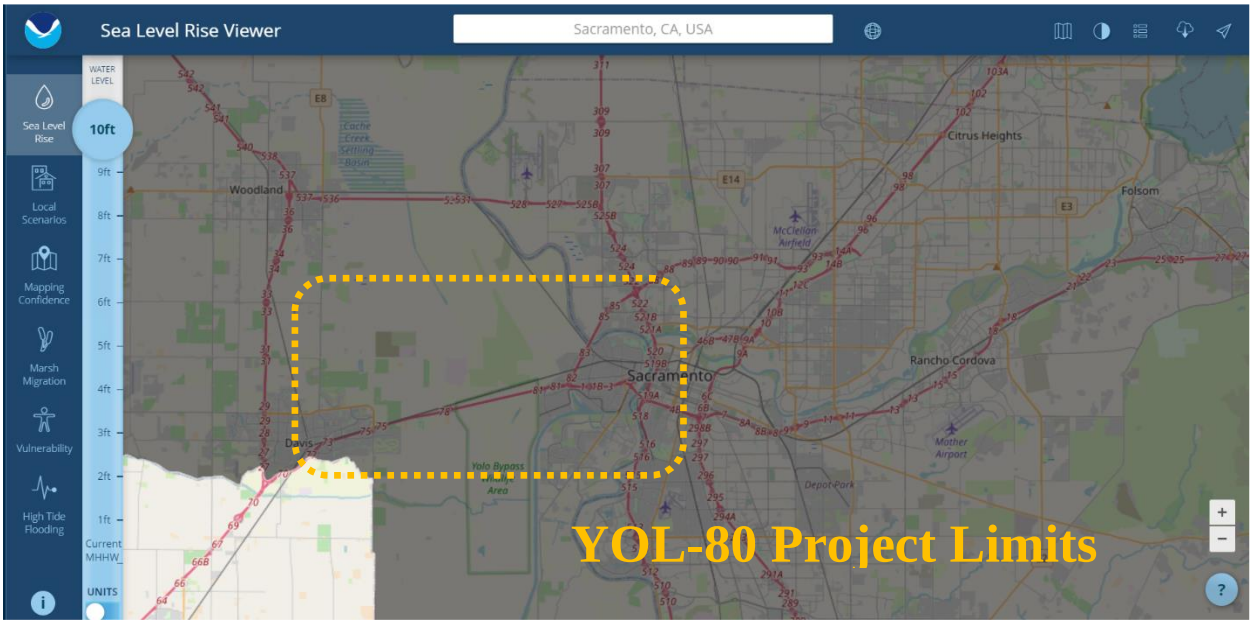


Figure 3.4-5. Project Limits with Sea Level Rise

Chapter 4 Comments and Coordination

Early and continuing coordination with the general public and appropriate public agencies is an essential part of the environmental process to determine the scope of environmental documentation, the level of analysis, potential impacts and mitigation measures, and related environmental requirements. Agency consultation and public participation for the Yolo 80 Corridor Improvements Project have been accomplished through a variety of formal and informal methods, including project development team meetings, interagency coordination meetings, and correspondence with other interested parties. This chapter summarizes the results of Caltrans' efforts to fully identify, address, and resolve project-related issues through early and continuing coordination.

4.1 Public Scoping and Participation

A Notice of Preparation (NOP) memorandum was filed with the State Clearinghouse on June 6, 2021, which was revised on August 17, 2021, to notify that the scoping meeting was rescheduled. Caltrans accepted scoping comments until September 24, 2021. A revised NOP was also distributed on October 17, 2022, that included clarification of the proposed managed lane strategies and Build Alternatives. A copy of the NOP is included in Appendix G.

Scoping was noticed through newspaper advertisements that ran in the *Davis Enterprise* on August 18, 2021, and the *Sacramento Bee* on August 23, 2021, and via Facebook, Twitter (now X), and Caltrans' project website. In addition, Caltrans notified members of the community and media through email.

Two public scoping meetings were held virtually through WebEx on August 25, 2021, at 6:00 p.m. and at 7:00 p.m. The purpose of these meetings was to discuss the scope of the EIR/EA and the potential effects of the project. Each meeting included a brief presentation on the project and the environmental review process. Attendees were encouraged to submit comments during the meeting or to Caltrans staff via mail or email.

Comments from the public that were submitted during the meeting included questions regarding proposed bicycle facilities, project funding, projects in the nearby area, project timing, proposed lane configuration, proposed sound wall locations, and proposed work within the Yolo causeway. In addition, written comment letters included requests to consider potential air quality effects to sensitive receptors, increased flood risks, potential fish passage impacts, Native American Tribal consultation, utility relocation, etc.

Additional public outreach took place during the circulation period of the Draft EIR/EA.

4.1.1 Stakeholder Meetings

In addition to the public scoping, Caltrans established a steering committee for the project that included local stakeholders, such as the Cities of Davis and West Sacramento, Yolo County,

Sacramento Area Council of Governments (SACOG), Yolo Transportation District (YoloTD), University of California (UC) Davis, Bicycle Coalition, etc. The steering committee held several public meetings within the Cities of Davis, Sacramento, and West Sacramento to discuss the project and receive input from the community. The meetings occurred as follows:

- June 6, 2018, Davis Senior Center, 646 A Street, Davis, CA 95616, 6:00 p.m.–7:30 p.m.
- June 14, 2018, West Sacramento City Hall, 1110 West Capitol Avenue, West Sacramento, CA 95691, 6:00 p.m.–7:30 p.m.
- June 21, 2018, Sacramento City Hall, 915 I Street, Sacramento, CA 95814, 6 p.m.–7:30 p.m.
- November 21, 2019, Mary L. Stephens Davis Library Blanchard Room, 315 East 14th Street, Davis, CA 95616, 6:30 p.m.–7:30 p.m.
- February 27, 2020, West Sacramento City Hall, 1110 West Capitol Ave, West Sacramento, CA 95691, 6:30 p.m.–7:30 p.m.
- August 25, 2021, Virtual (via WebEx), 6:00 p.m. and 7:00 p.m.
- Weekly meetings with YoloTD, SACOG, and CTC.
- December 1, 2023, YoloTD Board presentation preparation.
- December 7, 2023, SACOG Transportation Committee Meeting.
- December 7, 2023, YoloTD Board presentation preparation.
- December 11, 2023, SACOG Board meeting.
- December 11, 2023, YoloTD Board meeting.
- December 13, 2023, Yolo County annual coordination meeting with cities and counties surrounding Yolo County (Yolo County, City of Davis, City of West Sacramento, City of Winters, Yocha Dehe Wintun Nation tribe).
- December 18, 2023, Sacramento Transportation Authority Board meeting.
- January 8, 2024, City of Davis project coordination.

The purpose of these meetings was to discuss potential project activities and answer questions. Comments received from the public included bicycle improvements, potential toll lane pricing, sound wall locations, design alternatives, construction impacts to bat species, and other questions regarding project design elements.

4.1.2 Project Development Team Meetings

Project Development Team (PDT) meetings provided the forum for coordination, issue resolution, and information feedback between Caltrans, Sacramento Council of Governments, West Sacramento, Davis, Yolo County, UC Davis, and YoloTD.

PDT meetings have occurred monthly since October 3, 2017, and will continue to occur throughout the remainder of the environmental and project approval process. The PDT represents various fields of expertise including design, environmental review, traffic operations, right-of-way, and project management. Accordingly, the PDT convenes to review the project status, address issues as they arise, and provide overall direction throughout the project development process.

4.1.3 Coordination with Wildlife Professionals

Caltrans conducted outreach to Corky Quirk and Dave Johnston about the bat population on the causeway during July of 2020. Caltrans conducted outreach to Eric Hansen to discuss habitat suitability for giant garter snake during June of 2023.

4.1.4 Public Meetings During Circulation of Draft EIR/EA

Caltrans held two public outreach/open house gatherings during the comment period for the Draft EIR/EA. A news release announcing the meetings was posted to social media feeds on Facebook and X (previously Twitter) with a link to the news release. A copy of the release announcing the meetings was sent to the Sacramento television stations listed below. The public notice about the meetings also ran in the Davis Enterprise newspaper. Additionally, a Caltrans Spanish interpreter was available during the public gatherings.

Local television stations to which news releases were sent.

KCRA Channel 3 - NBC
KUVS Channel 19 – Spanish
KMAX Channel 31
KOVR Channel 13 - CBS
KTXL Channel 40 – Fox

The first outreach/open house meeting was on November 28, 2023, from 5:30 p.m. to 7:30 p.m. in West Sacramento at the Arthur F. Turner Community Library (1212 Merkley Ave, West Sacramento, CA). Thirty-four attendees signed the registration sheet at the meeting. The second was on December 13, 2023, from 5:30 p.m. to 7:30 p.m. in the City of Davis at the Mary L. Stephens Davis Branch Library (315 E 14th St, Davis, CA). Forty-three attendees signed the registration sheet. Additional people attended both meetings without signing in. Each meeting was an open house style gathering with information boards placed about the room depicting various aspects of the project. Technical experts were on hand to respond to questions from attendees. Comment forms were available for attendees to complete during the meeting and provide to Caltrans staff or to complete afterward and submit via mail. The forms also allowed commenters to indicate their preferred alternative. At or after the November meeting, 7

comment forms were returned, and at or after the December meeting, 17 forms were returned. The forms are included with other public comment letters in Section 4.3.1, *Comments Received*.

4.2 Consultation and Coordination with Public Agencies

4.2.1 Federal Agencies

On January 28, 2021, a list of federal listed anadromous fish species with the potential to occur in the Sacramento West, Davis, Merritt, and Dixon, California USGS 7.5- minute topographic quadrangles was obtained from the National Marine Fisheries Services (NMFS). Early correspondence with U.S. Fish and Wildlife Service (USFWS) via email was done during June and July of 2021. On July 27, 2021, Adam Stewart, a biologist with the USFWS Sacramento Office, met with Caltrans staff to conduct a site visit and review of key habitat areas in the project footprint, and to discuss potential effects and avoidance measures for each species.

On October 19, 2022, a list of federally listed species with the potential to occur in the Biological Study Area (BSA) was obtained from the Sacramento USFWS Office. An updated species list was obtained on March 27, 2023.

A Biological Assessment (BA) was prepared for Section 7 consultation under the ESA. Caltrans sent a letter and the BA to USFWS on May 12, 2023, to initiate formal consultation.

Email correspondence with USFWS regarding the content and details of the BA between May and August of 2023. Email correspondence with USFWS regarding questions about species habitat and construction during January and February of 2024. Email correspondence with USFWS regarding status of the Biological Opinion and conservation measures occurred in February of 2024.

USFWS issued their Biological Opinion on April 12, 2024.

4.2.2 State Agencies

Early correspondence with California Department of Fish and Wildlife (CDFW) occurred via email during June and July of 2021. A field visit was conducted with CDFW staff on July 27, 2021, to discuss potentially sensitive areas and gather information from CDFW based on their recommended course of action for project planning. Many Caltrans staff and the project consultant were in attendance. Caltrans is in ongoing coordination with CDFW to explore the options for obtaining a consistency determination (CD) for the Project. If a CD is deemed inappropriate for this Project, Caltrans would proceed in obtaining an incidental take permit (ITP) for giant garter snake (GGS) as further discussed in Section 2.3.

As further described in Section 2.1, Caltrans evaluated the built environment resources and determined that they were not eligible for inclusion in the National Register of Historic Places (NRHP)/California Register of Historic Resources (CRHR). On September 30, 2021, Caltrans received concurrence from State Historic Preservation Officer (SHPO) that the seven built environment resources were ineligible.

Caltrans held weekly meetings with the California Transportation Commission and project partner agencies YoloTD and SACOG.

4.2.3 Native American Tribal Consultation

As further described in Section 2.1.7, Cultural Resources, the Native American Heritage Commission (NAHC) was contacted May 14, 2020, to request a search of the Sacred Land Files and request a list of Native American tribes or individuals with potential interests, concerns, and/or knowledge regarding cultural resources or traditional cultural properties that may be affected by the project. Of the 11 tribes originally identified by the NAHC, all responded and requested to continue consultation except for the Ione Band of Miwok Indians, the Nashville Enterprise Miwok-Maidu-Nishinam Tribe, the Ts'i Akim Maidu, and the Cortina Rancheria-Kletsel Dehe Band of Wintun Indians.

Formal consultation began on June 4th, 2020, and was followed up by phone calls and/or emails to the Native American contacts who were identified as having an interest in projects within this area by the NAHC:

- Rhonda Morningstar Pope, Chairperson, Buena Vista Rancheria of Me-Wuk Indians
- Clyde Prout, Chairman, Colfax-Todds Valley Consolidated Tribe
- Sara Dutschke Setchwaelo, Chairperson, Ione Band of Miwok Indians
- Cosme Valdez, Chairperson, Nashville Enterprise Miwok-Maidu-Nishinam Tribe
- Regina Cuellar, Chairperson, Shingle Springs Band of Miwok Indians
- Grayson Coney, Cultural Director, Ts'i Akim Maidu
- Gene Whitehouse, Chairperson, United Auburn Indian Community of the Auburn Rancheria
- Raymond Hitchcock, Chairperson, Wilton Rancheria
- Anthony Roberts, Chairperson, Yocha Dehe Wintun Nation
- Charlie Wright, chairperson, Cortina Rancheria-Kletsel Dehe Band of Wintun Indians
- Marlene Sanchez, Chairperson, Guidiville Indian Rancheria

The Colfax-Todds Valley Consolidated Tribe noted that they would like to defer to a tribe more familiar with the project area. Buena Vista Rancheria of Me-Wuk Indians reviewed the project and did not request additional consultation but requested to be notified if any cultural resources are documented. Guidiville Indian Rancheria had no concerns and requested copies of the reports to add to their records.

Shingle Springs noted areas of concern and asked for continued consultation. United Auburn Indian Community (UAIC) notes areas of concern and requested to monitor testing. The Yocha Dehe Wintun Nation noted areas of concern and requested to monitor testing. Wilton Ranchera also noted areas of concern and a desire to continue consultation. A joint meeting was held with concerned tribes; and project details and areas of concern were discussed. Consultation continued in the form of emails, phone calls, and online meetings with all concerned parties as the project developed.

The Yocha Dehe Wintun Nation provided a monitor for the XPI trenching, and UAIC monitored the geotechnical work at Bryte Bend bridge. Following the negative results from surveys and

subsurface testing, no additional concerns were raised about the potential to affect tribal cultural resources within the project limits.

4.2.4 Consultation with Stakeholders for Vehicle Miles Traveled Mitigation

According to the Caltrans VMT Program Bulletin 21-01: VMT Mitigation Funding Status & Additionality (2021), Caltrans strategy seeks to minimize any induces traffic that would generate vehicle miles traveled (VMT), which would reduce or eliminate the need for mitigation. However, when state highway system projects do generate VMT, mitigation strategies must be employed per CEQA. According to Bulletin 21-01, projects or programs must be able to demonstrate a negative effect on VMT and be relatively likely to come to fruition to qualify as feasible mitigation.

Consultation occurred during circulation of the Draft EIR/EA to ensure strict timelines for the final document could be met. Consultation continued after Draft EIR/EA circulation in response to public comments to finalize VMT mitigation for the Final EIR/EA. Consultation was accomplished through written communications and virtual meetings.

A summary of VMT mitigation correspondences, meetings, and other notable discussions with stakeholders to-date is provided as Table 4.2-1.

Table 4.2-1. Yolo 80 Managed Lanes VMT Mitigation Correspondences, Meetings, Good Faith Efforts

Date	Type	People/Agencies	Discussion Topics
12/20/2022	PDT - Project Wide Discussion	Caltrans Staff, YCTD, Stantec (Env consultant), City of West Sacramento, Yolo County, Wood Rodgers, City of Davis, UC Davis, SACOG	Project overview, VMT Mitigation Plan, Draft environmental document Schedule.
12/28/2022	Environmental Status	Caltrans Staff (P.M., Environmental)	Environmental schedule, risks, target dates.
1/5/2023	Consultant Task Order Review	Caltrans Staff (PM, Traffic Ops), Fehr & Peers	VMT Mitigation Plan, mitigation measures, schedule for F&P to complete updated Mitigation Memo.
1/9/2023	Discussion of HQ Sustainability Mitigation Memo Response	Caltrans Staff (PM, Environmental, Traffic Ops), Fehr & Peers, DKS Associates	Page-by-page overview of HQ Sustainability's Dec 28th response/comments of Draft Mitigation Memo submitted on Dec 16th.
1/10/2023	PDT - Project Wide Discussion	Caltrans Staff	Project overview, VMT Mitigation Plan.
1/10/2023	Monthly Managed Lanes Status Update for Executives	Caltrans Executive Staff	Project overview, VMT Mitigation Plan, Draft environmental document Schedule.

Date	Type	People/Agencies	Discussion Topics
1/12/2023	VMT Mitigation Plan Discussion	Caltrans Executive Level Staff (PM, Traffic Ops, Planning Forecasting)	Discuss Mitigation Plan and how to move forward, and what direction to provide to consultants (F&P). Outcome was list of 12 transit-related projects for F&P to analyze for VMT reduction, based on highest percentage available of VMT reducing projects and past precedent from D6 Managed Lanes project using transit-oriented projects over a 20-year period for their mitigation plan.
1/12/2023	Managed Lane Brainstorm prior to Consultant Meeting	Caltrans Staff (PM, Traffic Ops, Environmental, Planning Forecasting)	Discuss Mitigation Plan and how to move forward, and what direction to provide to consultants (F&P). Outcome was list of 12 transit-related projects for F&P to analyze for VMT reduction, based on highest percentage available of VMT reducing projects and past precedent from D6 Managed Lanes project using transit-oriented projects over a 20-year period for their mitigation plan.
1/12/2023	Consultant Task Order Review	Caltrans Staff (PM, Traffic Ops), Fehr & Peers	Provide F&P with mitigation strategy and direction on 12 projects to analyze for VMT reduction and give schedule of return of Draft Mitigation Memo by 2/16/23.
1/18/2023	VMT Mitigation Plan Discussion with HQ Sustainability	Caltrans Staff (PM, Traffic Ops, Environmental, HQ Sustainability), Fehr & Peers	Discuss and seek guidance on HQ Sustainability's comments from Dec 28th response letter, provide updates for the mitigation plan, and discuss feasibility of mitigation measures being presented.
1/24/2023	Yolo 80 Managed Lanes Update with partner agency, YoloTD (Brian Abbanat)	Caltrans (PM) & YoloTD	Provide update to partner agency, YoloTD, on project schedule, risks, and deficiencies with public outreach.
1/25/2023	March California Transportation Commission Meeting Reception	Caltrans Staff (PM) & CTC Commissioners/Staff	Discuss Managed Lanes projects with CTC Staff and specifically Yolo 80 project with Commissioner Joe Lyou for input, opinion, and feedback.
1/30/2023	Housing for VMT Mitigation	Caltrans Staff (PM, Environmental) and Affordable Housing Consultant (Brian Bulaga from Thurmond Consulting)	Obtain information on affordable housing opportunities within Sac and Yolo Counties, based on Brian's City of Woodland affordable housing project using Housing and Community Development Homekey grant funds. Discussed Sac-5 and Yol-80 Managed Lanes projects and VMT mitigation requirements, and desire to obtain more information for potentially adding low-income infill housing as a VMT mitigation measure.
1/30/2023	DED/DPR Schedule Focus Meeting	Caltrans Staff (P.M., Environmental, Design, Traffic Ops, Planning Forecasting)	Team discussion to update the DED/DPR schedule and reconcile different alternative descriptions.

Date	Type	People/Agencies	Discussion Topics
2/2/2023	Consultant Task Order Review	Caltrans Staff (P.M., Traffic Ops), Fehr & Peers	Review VMT Mitigation plan and memo status. Still on track for 2/16/23 delivery by F&P.
2/6/2023	Draft environmental document Schedule Meeting	Caltrans Staff (P.M. and Environmental)	Status update on Environmental delivery for DED and schedule impacts with VMT memo on mitigation measures anticipated for 2/16/23.
2/9/2023	Draft environmental document Status Update	Caltrans Staff (P.M., Environmental, Traffic Ops), Stantec, Fehr & Peers	Discuss Stantec's status on Draft environmental document and outstanding issues/needs for them to complete studies. Also discussed DED schedule and need to push Admin Draft environmental document circulation back from 2/13/23 to 4/14/23.
2/13/2023	PDT - Project Wide Discussion	Caltrans Staff	Project overview, VMT Mitigation Plan.
2/14/2023	Housing for VMT Mitigation	Caltrans Staff (P.M., Environmental) and Department of Housing and Community Development (HCD)	Obtain information on HCD grant funding and partnering opportunities for Caltrans to help implement affordable housing with Sac-5 and Yol-80 region as a VMT mitigation measure.
2/14/2023	Monthly Managed Lanes Status Update for Executives	Caltrans Executive Staff	Project overview, VMT Mitigation Plan, DED Schedule.
3/1/2023	Mitigation Plan Discussion	Caltrans Staff (P.M. and Environmental)	Updated Fehr & Peers Mitigation Memo with VMT reduction numbers provided for the mitigation measures identified. And also, how the mitigation plan fits into the DED schedule.
3/6/2023	City of Davis, YoloTD, Caltrans Partnering	City of Davis, YoloTD, Caltrans Staff (P.M. and Environmental)	Partnering opportunities from a financial contribution perspective for the 3 City of Davis mitigation measures identified in the project plan. Also discussed timeline for needing the partnership to be documented in the project environmental document, and mechanism for solidifying partnership (i.e., MOU to start but actionable plan with City Council recommendation and approval).
3/6/2023	Mitigation Plan Discussion	YoloTD, Caltrans Staff (P.M. and Environmental)	Analyzed each mitigation measure and effectiveness, feasibility, reasonableness for the plan.
3/7/2023	VMT Mitigation Discussion with D4	Caltrans Staff (P.M., Planning, D4 Planning)	D4's situations and discussions for their managed lanes projects and VMT mitigation measures, and how they juxtapose with D3's proposed mitigation plans (for I-5 and Yol-80).

Date	Type	People/Agencies	Discussion Topics
3/8/2023	Caltrans, Housing and Community Development (HCD), DGS Partnering	HCD, DGS, Caltrans Staff (District P.M., HQ Sustainability, HQ 743 Team)	Partnering opportunities from a financial contribution perspective for housing projects that HCD and DGS provide funding programs for. Also discussed timeline for needing the partnership to be documented in project environmental document, and mechanism for solidifying partnership (i.e., MOU to start but actionable plan with financial contributions obligated by certain dates).
3/9/2023	Mitigation Plan Discussion	Fehr & Peers, YoloTD, Caltrans Staff (P.M., Environmental, Traffic Ops)	Analyzed each mitigation measure and effectiveness, feasibility, reasonableness for the plan, including the additional measures identified by YoloTD.
3/10/2023	Sacramento Regional Transit (SacRT), YoloTD, Caltrans Partnering	SacRT, YoloTD, Caltrans Staff (P.M. and Environmental)	Partnering opportunities from a financial contribution perspective for the Causeway Connection expansion program mitigation measure identified in the project plan. Also discussed timeline for needing the partnership to be documented in project environmental document, and mechanism for solidifying partnership (i.e., MOU to start but actionable plan with City Council recommendation and approval).
3/13/2023	City of West Sacramento, YoloTD, Caltrans Partnering	City of West Sacramento and YoloTD (Caltrans Staff unavailable)	
11/29/2023	Coordination	Caltrans staff (P.M. and Environmental), YoloTD	VMT mitigation final documentation
12/1/2023	Coordination	Caltrans staff (P.M. and Environmental), YoloTD and SacRT	VMT mitigation final documentation
12/4/2023	Coordination	Caltrans staff (P.M. and Environmental), UC Davis	VMT mitigation final documentation
12/6/2023	Coordination	Caltrans staff (P.M. and Environmental), Capital Corridor Joint Powers Authority (CCJPA)	VMT mitigation final documentation
12/11/2023	Coordination	Caltrans staff (P.M. and Environmental), YoloTD and SacRT	VMT mitigation calculations and assumptions
12/14/2023	Coordination	Caltrans staff (P.M. and Environmental), CCJPA	VMT mitigation calculations and assumptions
12/18/2023	Coordination	Caltrans staff (P.M. and Environmental), UC Davis and City of Davis	VMT mitigation calculations and assumptions

Date	Type	People/Agencies	Discussion Topics
12/18/2023	Coordination	Caltrans staff (P.M. and Environmental), YoloTD	VMT mitigation calculations and assumptions
1/3/2024	Coordination	Caltrans staff (P.M. and Environmental), YoloTD and SacRT	VMT mitigation calculations and assumptions
2/22/2024	Coordination	Caltrans staff (P.M. and Environmental), YoloTD	VMT mitigation calculations and assumptions
2/29/2024	Coordination	Caltrans staff (P.M. and Environmental), YoloTD	VMT mitigation calculations and assumptions
3/4/2024	Coordination	Caltrans staff (P.M. and Environmental), YoloTD	VMT mitigation calculations and assumptions

4.2.5 Stakeholder-Specific Actions – Equitable Outreach

Caltrans is committed to meaningfully engage communities most impacted by structural racism in the creation and implementation of the programs and projects that impact their daily lives by creating more transparent, inclusive, and ongoing consultation and collaboration processes. Equity will achieve this through an engagement process where everyone is treated with dignity and justice. Based on public input, Caltrans considered changes to the project to avoid harm to frontline and vulnerable communities. Caltrans prioritizes projects that improve access for and provide meaningful benefits to underserved communities. The proposed project will reduce GHG emissions, which in turn will promote greater environmental health factors for frontline and vulnerable communities. In addition to the environmental health improvements economically, a fare reduction program will be arranged, as noted in the project's VMT mitigation measures in Section 3.2.17 *Transportation.*

Accordingly, Caltrans took the following actions to increase public interest and participation in the outreach process, particularly to seek input on the equity of the managed lanes systems alternatives presented in this document during the public circulation phase of the Draft EIR/EA.

1. Caltrans used public service announcements and publication notifications of Draft EIR/EA availability by posting alerts on social media (i.e., Facebook and X [previously Twitter]), and used local news outlets such as local news television, radio stations, and newspapers to target communities of color and underserved communities most likely to be affected by changes to I-80 and Hwy 50 in the project area.

2. Caltrans held two public outreach/open house gatherings during the comment period for the Draft EIR/EA. A news release announcing the meetings was posted to social media feeds on Facebook and X (previously Twitter) with a link to the news release. A copy of the release announcing the meetings was sent to the Sacramento television stations listed below. The public notice about the meetings also ran in the Davis Enterprise newspaper. Additionally, a Caltrans Spanish interpreter was available during the public gatherings. Notices for the public gatherings that Caltrans conducted, were made

available via the Caltrans project website and by social media posts (i.e., Instagram and Facebook). During the gatherings subject matter experts from Caltrans were available to verbally answer questions from participants. Caltrans displayed project renderings and exhibits. Additionally, all participants were given the opportunity to provide comments and questions in writing. The questions and comments are part of the Final Environmental Document.

4.3 Circulation of Draft EIR/EA and Comments Received

A Notice of Completion form and copies of the Draft EIR/EA were submitted to the State Clearinghouse on November 13, 2023. A notice of the availability of the Draft EIR/EA and of the public meetings was published in the Davis Enterprise and mailed to the distribution list of agencies, organizations and individuals identified in Chapter 6, Distribution List.

The Draft EIR/EA was available for public review starting November 13, 2023, with the initial comment period ending January 5, 2024, a 53-day review period. On December 1, 2023, Caltrans extended the public circulation and comment period to January 12, 2024, for a total review period of 60 days. A printed copy and flash drive copy were provided at the Mary L. Stephens Davis Branch Library in Davis on December 5, 2023 and the Arthur F. Turner Community Library in West Sacramento on December 6, 2023. On December 22, 2023, a news release about the extended comment period was circulated to local news outlets and emails were sent to those entities who had already provided comments on the Draft EIR/A via email.

4.3.1 Comments Received

Table 4.3-1 contains a list of the individuals, organizations, and agencies that submitted comments on the Draft EIR/EA during the public comment period.

Table 4.33-1. Comments Received During Public Comment Period for Draft EIR/EA

Date Received	Commenter	Format of Comment (e.g., email, comment card)
Agencies		
11/13/2023	California Air Resources Board	email
11/21/2023	City of Davis	letter
12/8/2023	California Air Resources Board	email
12/15/2023	Yolo Transportation District	letter
12/18/2023	City of Sacramento	letter
1/4/2024	Environmental Protection Agency Region 9	letter
1/10/2024	California Air Resources Board	letter
1/10/2024	City of West Sacramento	letter
1/12/2024	California Department of Fish and Wildlife	letter
1/12/2024	City of Davis	letter
1/12/2024	Sacramento Metropolitan Air Quality Management District	letter
1/12/2024	City of Sacramento	letter

Date Received	Commenter	Format of Comment (e.g., email, comment card)
Organizations		
11/16/2023	Natural Resources Defense Council	email
11/27/2023	Natural Resources Defense Council	email
11/28/2023	ILWU Local 18	meeting comment card
12/1/2023	Planning & Conservation League	email
12/8/2023	Natural Resources Defense Council	letter
12/13/2023	Davis Democratic Club/Davis Oddfellows #169	meeting comment card
12/19/2023	Planning & Conservation League	letter via email
12/21/2023	Center for Biological Diversity	letter via email
1/8/2024	Sierra Club Yolano Group	letter
1/9/2024	Yolo Basin Foundation	letter
1/11/2024	Center for Biological Diversity	letter
1/11/2024	Environmental Council Of Sacramento	letter
1/11/2024	Evergreen Action	letter
1/12/2024	Davis Community Action Network	email
1/12/2024	Graduate Student Association of UC Davis	letter
1/12/2024	Natural Resources Defense Council	letter
1/12/2024	NextGen California, et.al.	letter
1/12/2024	Planning & Conservation League	letter
1/12/2024	Sacramento Area Bicycle Advocates	letter
Individuals		
11/14/2023	Ian Ratliff	email
11/14/2023	Jim Ratliff	email
11/14/2023	Hannah Taube	email
11/15/2023	Uday Bhat	email
11/15/2023	David Edwards	email
11/15/2023	Robert Halldorson	email
11/15/2023	David Lee	email
11/15/2023	Tony Manzanetti	email
11/16/2023	Debra Price	email
11/17/2023	Evan Lyon of TTL Automotive Enterprises	email
11/17/2023	Jaya Shah	email
11/18/2023	Ryan Lively	email
11/18/2023	Neil Redenbaugh	email
11/19/2023	Albert	email
11/19/2023	Steve Dennison	email
11/19/2023	Kevin Hale	email
11/19/2023	Polly Harris	email
11/19/2023	Faisal Imran	email

Date Received	Commenter	Format of Comment (e.g., email, comment card)
11/19/2023	Darci King	email
11/19/2023	Alicia Llanos	email
11/20/2023	Joy Abaya	email
11/20/2023	Susan Baxter	email
11/20/2023	Michael Bloss	email
11/20/2023	Kira Garvey	email
11/20/2023	Jacob Haueter	email
11/20/2023	Jessica Heiser	email
11/20/2023	Tameka Island	email
11/20/2023	Steve Korvink	email
11/20/2023	Carly Maltby	email
11/20/2023	Elizabeth Marin	email
11/20/2023	mrsingh01	email
11/20/2023	Arleen Powers	email
11/20/2023	Jaypreet Singh	email
11/21/2023	Pamela Davis	email
11/21/2023	Joseph Fleskes	email
11/21/2023	Jerry Jewell	email
11/22/2023	Christina Parker	email
11/22/2023	Barbara Zeller	email
11/25/2023	Joel Mandel	email
11/27/2023	Kevin Lee	email
11/27/2023	Ravi Narayanan	email
11/28/2023	Heather Baugh	email
11/28/2023	Kevin Cohee	meeting comment card
11/28/2023	Katherine Dutro	email
11/28/2023	Kenni-Marie Fitzgerald	meeting comment card
11/28/2023	Eric Helseth	meeting comment card
11/28/2023	Steve Horne of Silver Lining Trans	meeting comment card
11/28/2023	Will Leber	email
11/28/2023	Mike Maulhardt	email
11/28/2023	Forrest Pasturel	meeting comment card
11/28/2023	Tiffany Pelkey	meeting comment card
11/28/2023	Aaron Sampson	email
11/28/2023	Andrew Woodward	email
11/29/2023	Rands Calvin	email
11/29/2023	Pat D	email
11/29/2023	Patricia Erigero	email
11/29/2023	Matt Foreman	email

Date Received	Commenter	Format of Comment (e.g., email, comment card)
11/29/2023	Alan Jackman	email
11/29/2023	Eugene Novak	email
11/29/2023	Mike Silveira	email
12/1/2023	Jason Bundy	email
12/5/2023	Laila Penny	email
12/5/2023	Sonja Wooley	email
12/6/2023	David Block	email
12/9/2023	Jerry Jewell	email
12/11/2023	Betty Berteaux	email
12/12/2023	Alan Hirsch	email
12/12/2023	Alan Hirsch	email
12/13/2023	Bonnie Berman	meeting comment card
12/13/2023	Cyle Botelho	meeting comment card
12/13/2023	Julie Burgal	meeting comment card
12/13/2023	Jeff Buscheck	meeting comment card
12/13/2023	John Cooper	meeting comment card
12/13/2023	Beth Foraker	meeting comment card
12/13/2023	Dr. Kelsey Fortune	meeting comment card
12/13/2023	Deborah Gale	meeting comment card
12/13/2023	Glenn Gmoser	meeting comment card
12/13/2023	Ellen Kolarik	letter
12/13/2023	Ellen Kolarik	meeting comment card
12/13/2023	no name	meeting comment card
12/13/2023	Lise Smidth	meeting comment card
12/13/2023	Albert Soares	meeting comment card
12/13/2023	Andea Soares	meeting comment card
12/13/2023	Katrina Sulton	meeting comment card
12/13/2023	Eunice Tjon	meeting comment card
12/13/2023	Ky-An Tran	meeting comment card
12/14/2023	Chris and Ann Majestic	email
12/18/2023	Joel Guzman	email
12/19/2023	Nick Bates	email
12/24/2023	Chris Higgins	email
12/24/2023	Meredyth Reinhard	email
12/25/2023	Dan Parfitt	letter
12/27/2023	Ken Britten	email
1/8/2024	Yolo County Supervisor Jim Provenza	letter
1/9/2024	Grace Armstrong	email
1/10/2024	John Keller	letter

Date Received	Commenter	Format of Comment (e.g., email, comment card)
1/10/2024	Anthony Palmere	letter
1/11/2024	Edie Marshall	letter
1/12/2024	Dr. Susan Handy, Dr. Amy Lee, Dr. Jamey Volker	letter
1/12/2024	Alan Hirsch	email
1/12/2024	Alan Hirsch	letter
1/12/2024	Alan Hirsch	email
1/12/2024	John Johnston	letter
1/12/2024	Catherine Keller	email
1/12/2024	Sarah Kolarik	email
1/12/2024	Bapu Vaitla	letter
1/12/2024	Rekha Vaitla	email
1/12/2024	Koen Van Rompay	email

4.3.2 Responses to Comment

On the following pages are copies of the comments and responses to each. The comment letters are included in the order shown in Table 4.3-1.

Master responses were prepared to address similar comment issues raised by multiple commenters. When an individual comment raises an issue discussed in a master response, the response to that individual comment will cross reference to the appropriate master response (e.g., “see Master Response A”).

The Master Responses address the following topics.

- Master Response A: Induced Travel Demand and VMT Mitigation
- Master Response B: Alternatives Considered
- Master Response C: Segmentation and Piecemealing Concerns
- Master Response D: Transportation Modeling Methodology (Static versus Dynamic Traffic Assignment)
- Master Response E: Environmental Justice and Equity of Toll Lanes
- Master Response F: Additional Improvements to Existing Bicycle/Pedestrian Path
- Master Response G: Mobility Hub
- Master Response H: Improved Traffic Flow and Weaving with the Addition of Intelligent Transportation Systems Elements, Auxiliary Lanes, and Ramp Metering
- Master Response I: Traffic Data Used for Impact Analyses

4.3.2.1 Master Responses

Master Response A: Induced Travel Demand and VMT Mitigation

Vehicle Miles Traveled (VMT) is an essential traffic metric that calculates vehicle travel within a certain area. Tracking, forecasting, and mitigating VMT are critical components in reducing VMT. This master response addresses comments on induced travel demand and VMT.

Induced VMT Analysis Tools and Methodology:

Several commenters provided feedback, questions, and opinions related to the Induced VMT calculation methodologies and tools used to evaluate project alternatives. The induced travel impacts of the project were analyzed using travel forecasting and modeling techniques conforming to existing standards, guidance, policies, and best practices. Caltrans used the National Center for Sustainable Transportation (NCST) Induced Travel Calculator to analyze long-term induced vehicle travel effects on VMT. This calculator is used to "estimate the VMT induced annually as a result of adding general-purpose lane miles, high-occupancy vehicle (HOV) lane miles, or high-occupancy toll (HOT) lane miles…"[1]

The use of the NCST Induced VMT tool (calculator) is consistent with the Transportation Analysis under CEQA (TAC) and the Transportation Analysis Framework (TAF), as referenced in the Draft EIR/EA (Section 2.1.10, *Traffic and Transportation*). The TAC and TAF documents are the product of a collaborative effort among State government partners, including the Governor's Office of Planning and Research (OPR), the California State Transportation Agency, and the California Air Resources Board.

The literature used to develop the NCST calculator estimates the induced VMT to be realized in about 3 to 10 years after the project is built. As the population increases (by the horizon year 2049), the magnitude of induced VMT is expected to be marginalized, ensuring the projections account for the evolving demographic landscape. Impacts on VMT due to land use changes are also incorporated into this calculator.

The NCST estimates and the exclusion of truck VMT from those estimates were limited to induced VMT impact analysis and mitigation targets, which are consistent with CEQA Guidelines Section 15064.3 and the OPR Technical Advisory which note that "automobile" refers to cars and light trucks for the purposes of estimating induced travel attributed to transportation projects. The NCST Calculator does not automatically exclude heavy duty trucks from the induced travel estimates. Therefore, the Caltrans Hot Topic entitled "NCST Calculator Truck Adjustment" further details reduction adjustments to NCST-generated elasticity values for Class 1 facilities by 29%, and Class 2 and 3 facilities by 22% as per the research supporting the NCST tool.

SACSIM19 activity-based travel demand model VMT (including truck VMT) was used to assess the project's environmental impacts as the NCST tool does not provide the level of detail

[1] National Center for Sustainable Transportation. 2024. Induced Travel Calculator. Available: https://ncst.ucdavis.edu/research-product/induced-travel-calculator. Accessed: February 22, 2024.

required for the environmental impact analysis. The Draft EIR/EA transportation analysis used the approved SACOG Metropolitan Transportation Plan/Sustainable Communities Strategy (MTP/SCS) fiscally constrained SACSIM model. The use of the model is consistent with current modeling standards, guidelines, and practices and was approved for use by SACOG as detailed in the Transportation Analysis Report prepared for the project, as summarized in Draft EIR/EA Section 2.1.10, *Traffic and Transportation*, and Section 3.2.17 *Transportation.* The TAR is available on the project website with the Final EIR/EA (https://dot.ca.gov/caltrans-near-me/district-3/d3-projects/d3-i80-corridor-improvements).There is a difference in the VMT data utilized for environmental impact analysis of operational impacts from induced VMT such as air quality and noise, and for the induced VMT analysis to determine consistency with CEQA Guidelines Section 15064.3. As noted in Section 2.1.10, *Traffic and Transportation,* since the SACSIM model was identified as not passing the checklist for travel demand model adequacy, the NCST tool is utilized per Caltrans policy to remain consistent with the TAC and TAF.

The Draft EIR/EA induced VMT amount of roughly 188 million assumed a 300-day conversion factor, based on outdated Performance Measurement System data, to convert from NCST annual induced VMT to daily VMT. Then the daily induced value used a factor of 365 to convert again to annual in the Draft EIR/EA. Hence, the annual induced VMT was artificially inflated by a factor of 365 divided by 300.

VMT mitigation measure financial contribution amounts and timelines differ from the Draft EIR/EA due to a redistribution of funding for some measures and the removal of other measures completely from the proposed plan. These changes were the product of multiple outreach meetings with each partner agency proposed to receive financial contribution to implement or construct their respective programs.

Induced VMT Mitigation:

Mitigating for induced VMT is an important part of the project. Caltrans has ensured that the resources available to mitigate VMT were maximized and help promote carpooling, transit, and other modes of travel that help reduce reliance on single occupancy vehicles. Prior to analyzing the mitigation measures listed in Tables 2.1-27 and 2.1-28 of the Draft EIR/EA (and 1 and 2 of the VMT Mitigation Plan Executive Summary), a solicitation effort was conducted by Caltrans with all local agencies and stakeholders to identify VMT reducing measures that were deemed feasible and implementable. Following the solicitation process, the list was evaluated for highest VMT reduction, and further analyzed for feasibility and implementation ability. When analyzing proposed and rejected mitigation measures regarding induced VMT and mitigation, the feasibility of mitigation measures must be considered. Feasibility factors included reasonable cost-to-VMT benefit ratios, specific measures included in a local agency planning document, whether the measure is within the realm of responsibility of another public agency or jurisdiction, inclusion in SACOG's MTP/SCS, (which would rule out the ability to claim VMT reduction credit), or whether the project's proposed financial contribution would be sufficient enough to make a reasonable and feasible claim for full VMT credit. The proposed VMT mitigation measures were determined after a solicitation process with local partner agencies and stakeholders prior to circulation of the Draft EIR/EA. The results of the solicitation yielded the measures listed in Tables 2.1-27 and 2.1-28 of the Draft EIR/EA. Conversations with local

agencies and stakeholders have been ongoing and Tables 2.1-27 and 2.1-28 have been revised in the Final EIR/EA to show refinements to the VMT mitigation.

The mitigation funding contribution is 14–15% due to a funding limitation on the project as a whole. The grant funding available and provided for the project is enough to build the project plus the proposed amount of VMT mitigation funding. The total project cost is the reason for providing the 14–15% VMT funding contribution.

No changes to the Draft EIR/EA are necessary to address induced travel or VMT mitigation.

Master Response B: Alternatives Considered

A Notice of Preparation (NOP) was filed with the State Clearinghouse on June 6, 2021, which was revised on August 17, 2021, to notify that the scoping meeting was rescheduled. Caltrans accepted scoping comments until September 24, 2021. A revised NOP was also distributed on October 17, 2022, that included clarification of the proposed managed lane strategies and Build Alternatives. A copy of the NOPs are included in Appendix G of the Draft EIR/EA.

Notice of project scoping was noticed through newspaper advertisements that ran in the Davis Enterprise on August 18, 2021, and the Sacramento Bee on August 23, 2021, and via Facebook, Twitter, and Caltrans' project website. In addition, Caltrans notified members of the community and media through email.

Two public scoping meetings were held virtually through WebEx on August 25, 2021, at 6:00 p.m. and at 7:00 p.m. The purpose of these meetings was to discuss the scope of the EIR/EA and the potential effects of the project. Each meeting included a brief presentation on the project and the environmental review process. Attendees were encouraged to submit comments during the meeting or to Caltrans staff via mail or email.

The outcome of the discussions and feedback gained from the public and all state and local partner agencies, including SACOG and YoloTD, yielded the alternatives that were listed in the Draft EIR/EA. Alternatives such as converting existing capacity to priced lanes and pricing all lanes were not part of NOP comments received from partner agencies and the public. The alternatives included in the Draft EIR/EA were deemed feasible for analysis, from a legal and implementational perspective at the time of the NOP process.

Section 1.5 of the Draft EIR/EA discusses alternatives that were considered but eliminated from further consideration during earlier phases of the project development process. The alternatives considered different footprints and types of managed lanes, including a transit only lane.

The following section presents alternatives not considered in the Draft EIR/EA but suggested by multiple agencies and members of the public in formal, written comments on the Draft EIR/EA. Additional information as to why these alternatives may not be feasible is also provided. Additional alternatives mentioned in single comments have been responded to on an individual basis. Multiple comments included various suggestions for improvements to the bicycle facilities along the project corridor. Please refer to Master Response F for more information on bicycle facility improvements.

Suggested Alternative: Tolling All Lanes

Converting all existing capacity to priced lanes would cause diversion to non-priced routes, potentially increasing trip length and VMT, and impairing mobility of people and freight on other routes. This alternative would not meet the purpose and need of the project, as noted in the Summary Section of the Draft EIR/EA "*Support reliable transport of goods and services throughout the region*." There are project alternatives in the Draft EIR/EA that meet the project's purpose and need and are feasible for implementation. Additionally, pricing all lanes raises equity and environmental justice issues that would involve challenging inter-governmental coordination and monitoring. For more information on equity, please see Master Response E. More information is provided below regarding the feasibility of these types of alternatives.

Suggested Alternative: Toll Two Lanes in Each Direction

This suggested alternative proposes to construct a new toll lane in each direction, and converting the #1 general-purpose lane (i.e., the leftmost general-purpose lane) to a toll lane. Many commenters noted that this alternative is consistent with the SACOG MTP/SCS. It should be noted that the Draft EIR/EA transportation analysis used the approved SACOG MTP/SCS fiscally constrained SACSIM model. The use of the model is consistent with current modeling standards, guidelines, and practices and was approved for use by SACOG as detailed in the Transportation Analysis (TAR) and Appendices for the project, as summarized in Section 3.2.17, *Transportation*. The TAR is available on the project website with the Final EIR/EA (https://dot.ca.gov/caltrans-near-me/district-3/d3-projects/d3-i80-corridor-improvements).

However, as mentioned above, Caltrans conducted an NOP outreach process to discuss potential alternatives. The feedback gained from the public and all State and local partner agencies, including SACOG and YoloTD, yielded the alternatives that were included in the Draft EIR/EA. Further, this alternative was considered infeasible for the following reasons:

1. This alternative would likely result in many of the diversion, VMT, equity, and environmental justice issues that would result from the Tolling All Lanes alternative, but perhaps to a lesser degree. These issues would result because existing general-purpose capacity would require a fee for use if this alternative were implemented. (For more information on environmental justice and equity, please see Master Response E).

2. This alternative would potentially negatively impact heavy freight vehicle movement through the region. The conversion of the #1 general-purpose lane to a toll lane would lead to more demand and less reliability on the existing #2 and #3 general-purpose lanes, which would impair the mobility of freight and lead to unreliable travel times. Due to these impacts on freight, the purpose and need of the project would not be met.

3. Current State and Federal regulations currently prohibit conversion of a general-purpose lane to a tolled lane. Section 64112, Toll Facilities, of Assembly Bill (AB) 798: California Transportation Financing Authority, states:

> *(b) Each highway project for which tolls are imposed shall have non-tolled alternative lanes available for public use in the same corridor as the proposed toll project. Nothing*

> *in this division shall allow the conversion of any existing non-tolled or non-user fee lanes into tolled or user-fee lanes, except for the conversion of high-occupancy vehicle lanes into high-occupancy toll lanes, consistent with the authorizations in Sections 149.1, 149.4, 149.5, 149.6, and 149.7 of the Streets and Highways Code.*

In addition, Section 129 of Title 23 of the US Code restricts tolling to initial construction or reconstruction of a toll highway, bridge or tunnel, of one or more lanes or other improvements that increase capacity of a highway, bridge, or tunnel.

Suggested Alternative: Add a General-Purpose Lane in Each Direction

This alternative conflicts with the purpose and need of the project. The project aims to improve modality (i.e., the variety of modes of transportation). The alternatives considered in the Draft EIR/EA that add vehicular capacity to the corridor include minimum occupancy requirements in an effort to promote carpooling and transit use.

Suggested Alternative: Improved Rail Service or Local Mass Transit

Alternatives to improve rail and bus service would reduce VMT and increase person throughput, but railroads, light rail, and bus services are not within the jurisdiction of Caltrans and therefore, they cannot be feasible alternatives. Mitigation Measure TRANS-1 in the Draft EIR/EA does include Caltrans contributions to Capitol Corridor Railway and local bus transit organizations such as the City of West Sacramento, Yolobus, SacRT, and other transit operators that traverse the corridor. The purpose of these contributions is to facilitate more ridership and increase the frequency of transit services.

Project alternatives were analyzed specifically in relation to existing conditions using the tools available with the requirement of meeting the purpose and need of the project for this particular segment of highway. As outlined above, the suite of proposed alternatives may result in equity and environmental justice issues, are unable to be constructed due to current legislation, may not meet the purpose and need of the project, or are outside of Caltrans jurisdiction. However, these alternatives may still be viable for other projects in the future as the corridor is developed.

Master Response C: Segmentation and Piecemealing Concerns

Some commenters expressed concerns regarding the perception of piecemealing or segmenting the Yolo 80 Corridor Improvements Project. It appears that these commenters are associating this managed lane project with other projects currently in construction. Projects currently under construction are separate projects with independent scope, purpose, and need that were evaluated for environmental impacts under CEQA and NEPA. Caltrans does not segment projects or scopes of work between two separate projects. For instance, the pavement rehabilitation project that is currently under construction (from east of Mace Boulevard to the I-80/US 50 split, and on I-80 to Reed Avenue and on US 50 to Jefferson Boulevard) is its own scope of work that will install continuously reinforced concrete pavement and asphalt concrete. It is different from this project, the Yolo 80 Corridor Improvements Project, that proposes to add a managed lane. The Yolo 80 Corridor Improvement Project is not dependent upon the pavement rehabilitation project and could have been constructed without it. The environmental

impacts of adding a managed lane have been fully assessed in the Draft EIR/EA. These two projects are independent of each other and offer their own independent utility. This project is one of many outlined in the Sustainable Communities Strategy as referenced in Section 1.1.1.2 State/Regional Planning of the Draft EIR/EA that may also be in construction.

No changes are necessary to the Draft EIR/EA to address segmenting, piecemealing.

Master Response D: Transportation Modeling Methodology (Static versus Dynamic Traffic Assignment)

Multiple commenters suggested an alternate transportation modeling methodology to evaluate project alternatives. The travel forecasting and modeling techniques used in the analysis conform to existing standards, guidance, policies, and best practices. The SACSIM19 model is an activity-based model that was developed by SACOG and covers the six-county SACOG region and was used to conduct travel demand modeling for the project. This model performs static traffic assignment (STA), instead of dynamic assignment (DTA). The SACSIM19 model was also tested for sensitivity to land use variables, fuel prices and auto operating costs, added highway capacity, and transit fares.

There are no travel demand models with DTA for this region. While the SACSIM19 model performs static assignment, instead of dynamic assignment, the model was calibrated on both a static and dynamic basis. In order to conduct an analysis using DTA, a new tool or significant additions to SACSIM 19 would be needed, which was outside the scope of this project. The travel forecasting and modeling techniques used in the analysis conform to existing standards, guidance, policies, and best practices.

Additionally, the DTA has limited benefits when estimating daily VMT changes. While the assumption is that the DTA has larger implications in the future No-Build Alternative due to drivers changing the time of departure rather than taking a lengthy route to avoid a jammed facility, many trips cannot shift the time of travel on weekday peak conditions due to work/school times, delivery schedule, etc., thereby limiting any potential benefit of employing a DTA. Any change in departure time and related VMT effect is captured in the daily VMT, which is used to assess other environmental impacts of the project (i.e. air quality and GHG impacts), further limiting any potential benefit of employing a DTA.

As there is no dynamic assignment travel demand model for the region, the methodology used for impact analysis was deemed appropriate by SACOG and Caltrans headquarters rather than developing such a model/tool or performing mesoscopic modeling.

No changes to the Draft EIR/EA are necessary to address traffic modeling methodology.

Master Response E: Environmental Justice and Equity of Toll Lanes

Addition of Toll Lanes

Some commenters suggested the addition of toll lanes may not be equitable for all users, specifically those of lower-income communities.

Sections 2.1.7 and Section 2.1.8 of the Draft EIR/EA discusses Environmental Justice and Equity, respectively. Adding a toll lane gives members of the traveling public choices for navigating the corridor. The toll lane will provide benefits to transit, freight trucks, carpools, vanpools, and single-occupancy vehicles through the reduction of congestion and increased travel time reliability. Reducing congestion and increasing travel time reliability across the corridor provides members of lower-income communities with the option to utilize transit and arrive to their daily commuting destination in a timely manner. By adding a toll lane, these benefits are realized by both toll lane and general-purpose lane users. Utilizing carpools and vanpools are further encouraged with the addition of the toll lane, where vehicles that meet the minimum occupancy requirements can utilize the lane free-of-charge. The addition of the toll lane provides benefits for all users, in that it provides all users with the freedom to make their own transportation choices and still arrive at their destinations in a safe and timely manner. As stated in Section 2.1.7.4, *Avoidance, Minimization, and/or Mitigation Measures* and shown in Table 2.1-27, Caltrans plans to use a portion of future excess toll revenue to fund multi-modal transportation improvements that distribute benefits more equitably among communities (applicable to Build Alternatives 3a, 3b, 4a, 4b, 5a, and 5b that involve tolling). Section 2.1.7.4 of the Draft EIR/EA lists additional measures that have been included in the project to minimize impacts to minority or low-income populations. Standard measure EQ-1 would be included in the project if the alternative with the toll lane is selected as the preferred alternative. This measure would accommodate use of toll lane options by limited English proficiency community members.

Pricing All Lanes

Some commenters suggested pricing, or tolling, all lanes. Pricing all lanes raises equity and environmental justice issues, as it limits the traveling public with choices for how to navigate the corridor. Pricing all lanes would require the traveling public to pay a toll to use the facility, which may be a financial burden on them, and which some commuters may not be able to afford. As a result, some travelers may choose not to make the trip, which may limit their job and housing prospects and opportunities.

Additionally, tolling all lanes would cause diversion to non-priced routes, potentially increasing trip length and VMT, and impairing mobility on other routes, potentially affecting priority communities. Therefore, lower-income communities would be negatively affected by the reduction of efficient and cost-effective transportation choices if all lanes required a toll. This alternative would also not meet the purpose and need of the project: "*Support reliable transport of goods and services throughout the region*".

Master Response F: Additional Improvements to Existing Bicycle/Pedestrian Path

Some commenters suggested deficiencies in the existing bicycle/pedestrian facility across the corridor, and further suggested the project would not provide sufficient improvements to address these concerns. Four bicycle and pedestrian related studies were conducted by Caltrans to assess bicycle and pedestrian routes and the number of bicyclists that traveled the Yolo Causeway on a regular basis to determine if a Class IV bike path was needed parallel to the existing Yolo Causeway. The results of the study did not support providing a Class IV facility. The results of the studies are discussed in Sections 1.3.1.1 and 2.1.10.7 of the Draft EIR/EA.

However, the project proposes to add an additional bicycle/pedestrian path along the westbound I-80 off-ramp to Chiles Road/County Road (CR) 32A and will connect to the existing Yolo Causeway bridge bicycle/pedestrian path. The construction of the bicycle/pedestrian path along westbound I-80 off-ramp to Chiles Road/CR 32A will allow bicyclists traveling eastbound from the City of Davis to access the Yolo Causeway bridge bicycle/pedestrian path without crossing the Chiles Road/CR 32A traveled way. Bicyclists traveling westbound on the existing Yolo Causeway bridge bicycle/pedestrian path will find that if they travel on the existing western Yolo Causeway levee bike path, they will not have to cross the Chiles Road/CR 32A traveled way to get to the City of Davis. The project would also construct an Americans with Disabilities Act (ADA) ramp with a curb ramp detectable surface, as well as additional lighting at the CR 32A/I-80 westbound off-ramp intersection. Rectangular rapid flashing beacons are being considered at this location in coordination with Yolo County.

The project also proposes to replace existing Hot Mix Asphalt pavement and provide additional bike path signs at both entry points of the Yolo Causeway bicycle/pedestrian path, enhancing surface rideability and safety for all users.

Widening of the path within the City of West Sacramento jurisdiction and connecting West Capitol Avenue to the Yolo Causeway were determined to be unnecessary because the existing bike path currently meets the maximum American Association of State Highway and Transportation Officials (AASHTO) standards. The shared path width is 12 feet.

The pavement rehabilitation project that is currently under construction proposes to remove and replace the existing concrete pedestrian rail and fencing between the bicycle/pedestrian path and westbound Yolo Causeway traffic lanes. Additionally, the Hot Mix Asphalt pavement of the path will be removed and replaced.

No changes to the Draft EIR/EA are necessary to address bicycle/pedestrian path improvements.

Master Response G: Mobility Hub

Some commenters suggested that there are deficiencies in the multi-modal transfer system along the corridor. The project proposes to construct a Mobility Hub south of I-80 and east of Enterprise Boulevard. This Mobility Hub (described in Section 1.3.1.1 as a Park-in-Ride Facility in the Draft EIR/EA) would provide an opportunity for bicyclists and carpoolers to connect with their preferred transit option at the bus transfer station. Further design enhancements are under consideration and discussion with the City of West Sacramento, Yolobus, SacRT, and other transit operators that traverse the corridor. Design enhancements under consideration are electric vehicle charging stations, electric bus charging stations, bike lockers and racks, and potentially shade covers for transferring transit users.

No changes to the Draft EIR/EA are necessary to address mobility hub features or multi-modal transfer options.

Master Response H: Improved Traffic Flow and Weaving with the Addition of Intelligent Transportation Systems Elements, Auxiliary Lanes, and Ramp Metering

Several commenters referenced existing system operational deficiencies, such as lane drops and a lack of Intelligent Transportation Systems (ITS) elements in the project area. The proposed toll lane will improve traffic flow and the mobility of people and freight through the project area, in addition to auxiliary lanes and ramp meters. One specific area of concern on Eastbound I-80 are the several lane drops associated with existing acceleration and general-purpose lanes. The project would add an eastbound auxiliary lane on I-80 between Old Davis Road and Richards Boulevard and standardize acceleration lanes to help improve weaving/merging along the corridor, improving person and freight mobility, in addition to providing safety benefits. Further, a westbound auxiliary lane is proposed on US 50 between Harbor Boulevard and Jefferson Boulevard.

Additionally, the project would add several ramp meters to help regulate traffic flow on I-80. These ramp meters would help facilitate safer and easier merging while reducing bottleneck intensity and duration. Other ITS improvements, including the addition of changeable message signs (CMS) and closed-circuit television (CCTV) cameras, would help reduce non-recurrent congestion by expediting traveler information and reducing incident identification, response, and clearance time. No changes to the Draft EIR/EA are necessary to address ITS/operational improvement elements.

Master Response I: Traffic Data Used for Impact Analyses

Caltrans analyzed impacts of the proposed project using traffic data provided from Caltrans District 3 Traffic Forecasting. The National Center for Sustainable Transportation (NCST) Induced Travel Calculator was also applied to estimate induced demand. In addition, the CT-EMFAC2021 emission model, developed by Caltrans, calculates project-level emissions using data from the California Air Resources Board's EMFAC 2021 model. The Draft EIR/EA also included 2020 SACOG MTP/SCS land use projections in which the project is included in the future year network, to estimate induced traffic and growth.

Air

Air pollutant emissions associated with the roadways in the project area were estimated using specific traffic data and conditions provided by the Caltrans District 3 traffic forecasting and the CT-EMFAC2021 emission tool.

The operational emissions analysis compares emissions for existing/baseline conditions to the forecasted conditions for the No Build alternative given the project's opening year (2029), RTP horizon year (2040), and design year (2049). The increase of air pollutants compared to baseline year and year 2049 regarding the No Build alternative are not considered to be substantial in all the alternatives. Table 2.2-10 in Section 2.2.6.3 of the Draft EIR/EA lists the change in emissions for each alternative. Alternative 3 has the highest change in emissions at 26.9%. This change (26.9% by 2049, over 30 years) is a less than 1% change per year. Less than 1% increase per year is not considered to be substantial.

Caltrans determined “less than significant” air quality impacts for all other project alternatives as each of the Build alternatives would improve operations, reduce congestion, and increase vehicle occupancy within the travel corridor as compared to the No Build alternative.

GHG

The Draft EIR/EA analyzed the impacts of the proposed project on GHG emissions by comparing the Build Alternatives at the existing year (2019) to the No Build alternative. Generally, HOV and HOT lanes build alternative emissions are lower than No Build emissions due to a reduction in congestion (i.e., higher travel speeds throughout the modeled region) and an estimated future reduction in truck traffic percentages. In addition, California's transportation energy consumption has become increasingly efficient due to technological growth, environmental policies, and innovation. Gasoline and diesel represent the largest fraction of fuel consumed by the transportation sector in California. To meet stringent emission standards, equipment and vehicle manufacturers install emission control systems to reduce emissions in addition to increasing engine efficiency. However, it is anticipated that Corporate Average Fuel Economy (CAFE) regulations, Low Carbon Fuel Standard regulation, and zero-emission vehicle regulations will gradually displace gasoline and diesel engines in favor of more energy-efficient systems with lower GHG emissions[2].

The Draft EIR/EA analysis of GHG emissions used Caltrans CT-EMFAC which is based on CARB’s EMFAC, the only model approved by the U.S. Environmental Protection Agency (EPA) for use by California and local governments to meet CAA requirements. As discussed in the Draft EIR/EA Section 3.4.4.2 *Quantitative Analysis*, “GHG emissions quantified using CT-EMFAC… CT-EMFAC is currently the best available tool for calculating GHG emissions from mobile sources.”

As stated in the Draft EIR/EA, Section 3.4.5 *CEQA Conclusion*, "Long-term operational GHG emissions would potentially increase from existing conditions under 2029 opening year assumptions. However, as projected under the 20-year horizon design assumptions (2049), although VMTs were estimated to increase, GHG emissions were estimated to decrease for the Build Alternatives as compared to conditions under 2029, which is attributed to newer more fuel-efficient fleets and the increase in electric vehicles by the year 2049.” GHG emissions were estimated to decrease for the Build Alternatives as compared to existing conditions by opening year 2049. The project does not conflict with any applicable plan, policy, or regulation adopted for the purpose of reducing the emissions of GHGs.

GHG emissions of the project related to vehicle travel are not underestimated. Caltrans determined that GHG increases are “less than significant” as the proposed project will improve traffic flow and reduce congestion.

[2] California Department of Transportation. 2024. Highway Performance Monitoring System (HPMS) Data. Available: https://dot.ca.gov/programs/research-innovation-system-information/highway-performance-monitoring-system. Accessed: February 23, 2024.

Energy

Energy impacts were analyzed in Section 2.2.9 of the Draft EIR/EA. Energy consumption from mobile sources were analyzed by calculating fuel consumption using CT-EMFAC in conjunction with Caltrans Construction Emission Tool (CAL-CET). Fuel consumption can be derived from running the model prepared for the criteria pollutant and GHG emissions analyses. The procedure for analyzing direct energy consumption from construction activities is to obtain fuel consumption projections in gallons from the CAL-CET. Construction-related energy consumption would be temporary and not a permanent new source of energy demand and the demand for fuel would have no noticeable effect on peak or baseline demands for energy.

The VMT data for the existing, no build, and build alternatives, along with the CT-EMFAC emission rates, were used to calculate the fuel consumptions for the existing 2019, opening 2029, and horizon 2049 conditions. With the construction of additional managed lanes, an increase in VMT is expected causing an initial increase in fuel consumption. However, at year 2049, fuel consumption would decrease due to the fleet turnover (more fuel-efficient vehicles) and electric vehicle increases.

Noise

Field investigations and measurements were conducted between March and July of 2021, to identify land uses that could be subject to project related construction and traffic noise impacts. Existing land uses in a project area were categorized by land use type and activity category, and the extent of frequent human use areas were also documented. Noise receptor locations in the project area were identified through a review of project mapping, aerial photos, and field reconnaissance.

All land uses are evaluated, but the focus is on locations of frequent human use that would benefit from a lowered noise level. The noise impact analysis focused on locations with defined outdoor activity areas, including residential backyards, common use areas at multi-family residences, common use areas at hotels and motels, places of worship, schools, parks, restaurants, offices, and retail.

The roadway geometry of the project relative to nearby existing and planned land uses is also identified. Long-term measurement sites are selected to capture the daily traffic noise level pattern in the project area. Short-term measurement locations were selected to serve as model validation points for existing highway conditions and representative modeling locations. Additional non-measurement locations are selected as modeling locations as required by 23CFR772.

Field noise measurements were conducted in accordance with recommended procedures in Caltrans Traffic Noise Analysis Protocol, For New Highway Construction, Reconstruction, and Retrofit Barrier Projects, dated April 2020 and Caltrans Technical Noise Supplement, dated September 2013. Noise measurements were made with sound level meters calibrated before and after each of the measurements. The response of the sound level meter is checked before and after each measurement session to ensure the response is within 0.2 dBA. All

instrumentation used during a noise survey meet the requirements of the American National Standards Institute (ANSI) SI 4-1983 for Type 1 or 2 use.

Traffic noise levels are predicted using the mandated Federal Highway Administration (FHWA) Traffic Noise Model (TNM) 2.5 software. As per 23CFR772, analysis must use the FHWA Traffic Noise Model, which is described in “FHWA Traffic Noise Model” Report No. FHWA-PD-96-010, including Revision No. 1, dated April 14, 2004.

Due to the reliability constraints of TNM 2.5 to accurately calculate noise levels at great distances from the roadway, Caltrans limits noise assessments to approximately 500 feet of the roadway source.

TNM 2.5 calculates traffic noise levels based on the roadway geometry of the sites, which includes the positioning of travel lanes, receptors, barriers, terrain, ground type, buildings, etc. The noise source is the traffic flow, as defined by the user, in terms of hourly volumes of automobiles, medium-duty trucks, heavy-duty trucks, buses, and motorcycles. Existing traffic and Design Year peak hour traffic volume data and speed estimates are used as model inputs for local roads and ramps.

To summarize, the Noise analysis was conducted consistent with current modeling standards, guidelines, and practices for FHWA, and Caltrans Traffic Noise Analysis Protocol for New Highway Construction, Reconstruction, and Retrofit Barrier Projects (Protocol) as summarized in EIR/EA, Section 3.2.13, *Noise*. The Noise Study is available on the project website with the Final EIR/EA (https://dot.ca.gov/caltrans-near-me/district-3/d3-projects/d3-i80-corridor-improvements).

4.3.3 Agencies

20231113, California Air Resources Board

From: Ganson, Chris@ARB <Christopher.Ganson@arb.ca.gov>
Sent: Monday, November 13, 2023 4:48 PM
To: Bhattal, Gurtej@DOT; Patwary, Masum@DOT; Keaton, Dennis L@DOT
Cc: Sundquist, Eric@DOT; Ketchum, Jeremiah S@DOT
Subject: Request for Yolo 80 technical appendixes

EXTERNAL EMAIL. Links/attachments may not be safe.

Hello Gurtej, Masum, Dennis,

Chris Ganson here. I will be reviewing the Yolo 80 DEIR for the California Air Resources Board. I'm writing to request you email me electronic copies of all transportation technical appendixes for this project, including:

- Transportation Analysis Report
- VMT Mitigation Estimates – Executive Summary
- VMT Mitigation Plan
- Fehr and Peers. 2022. I-80/US 50 Managed Lanes – Phase B Forecasts and Performance Measures
- Managed Lanes Traffic Forecasts Memorandum
- Managed Lanes Traffic Data Memorandum
- Managed Lanes Travel Demand Modeling Report
- Travel Pattern Data Memorandum
- Origin destination report
- Traffic forecasting report
- Traffic and revenue forecasting report

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Because of CARB's internal review requirements, I will need to review these documents and draft our comments within the next seven business days. So, I am requesting they be sent ASAP, and am hoping you will be able to provide them today or tomorrow.

Many thanks!
Chris

CALIFORNIA AIR RESOURCES BOARD

Chris Ganson
Air Resources Engineer
California Air Resources Board
1001 I St.
Sacramento, CA 95814

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Response to Comment 1 in 20231113, California Air Resources Board

The commenter requests copies of transportation-related technical studies. During an email exchange over the subsequent days after this email, the commenter's list of unavailable appendices and studies were delivered to the commenter by Caltrans. No changes to the Draft EIR/EA are necessary.

20231121, City of Davis

November 21, 2023

Gurtej Bhattal
Project Manager
Caltrans, District 3
703 B Street
Marysville, CA 95901

Subject: Request to extend the comment period for the Yolo 80 Corridor Improvements Project draft EIR

Dear Mr. Bhattal;

Thank you for the opportunity to review and provide feedback on the Draft EIR for the I-80 Corridor Improvements Project. The City of Davis respectfully requests that the comment period for the Yolo 80 Corridor Improvements Project draft EIR be extended to at least January 10, 2024. The request is being made for two key reasons, as articulated below:

1) As of the date of this letter Caltrans has not posted the Technical Studies listed in Appendix H to the DEIR. While Caltrans staff has provided City staff with the requested materials, the City feels that it is crucial for full disclosure and transparency that all of the Technical Studies that are used or referenced in the draft EIR be available to the public in the same manner that the draft EIR is, both on the project website and as hard copies where the draft EIR have been made available to the public. As of today it has also come to our attention that old documents (prior drafts) have been posted to the Caltrans project web page, which required changes to correct the documents. Transparency and accuracy of the posted information is especially important for the traffic studies given the interest from the City and from members of the public to review and understand the methodologies used in the Vehicle Miles Traveled (VMT) CEQA analysis. Posting the Technical Studies by no later than November 25, 2023 AND providing a review period extension to at least January 10, 2024 will ensure that the Draft EIR AND the Technical Studies have been available for a full minimum 45-day review period. A modest five-day extension can remedy this concern. 1

2) An extension of the comment period to January 10, 2024 will allow for the City Council to review and approve the City of Davis DEIR comment letter at the regularly scheduled January 9th City Council meeting. Should the Caltrans comment period not be extended past the current January 5, 2024 deadline, the City Council will need to schedule a

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City Manager's Office
23 Russell Boulevard, Davis, CA 95616

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special meeting the week of January 1st to review and approve the City comment letter. To do so will necessitate posting of the City Council meeting agenda and report during the holiday closure. The review schedule necessitated by the current Caltrans comment deadline is not ideal in terms of public transparency and access, especially in the midst of holidays. Again, a modest five-day extension to January 10, 2024 can remedy this concern.

1 cont.

We understand that the overall project schedule is important to Caltrans and is likely the impetus for the current January 5th comment deadline. However, the positive gesture to extend the comment period to January 10th we believe is very reasonable and in the best interest of public transparency of process, and document accessibility. Thank you for your consideration of this and please feel free to reach out to me or to Ryan Chapman on our team if you have any questions. I can be reached at mwebb@cityofdavis.org and Ryan can be reached at rchapman@cityofdsavis.org

Sincerely,



Mike Webb
City Manager

cc: Tony Tovares, DOT Director
Masum A Patwary, Environmental Coordinator
Dennis Keaton, Public Information Officer
Davis City Council
Ryan Chapman, Assistant Director, Public Works Engineering & Transportation

Response to Comment 1 in 20231121, City of Davis

This comment requests an extension of the Draft EIR/EA comment period to January 10, 2024, and requests technical studies listed in Appendix H be posted to the project website. The technical studies requested in this comment were provided to the commenter and a response to this comment was provided in a letter dated December 7, 2023, in which the extension of the comment period was addressed.

The original end date of the 45-day review period would have been December 27, 2023. However, when the Draft EIR/EA was released for public review, Caltrans ended the initial comment period on January 5, 2024, to account for the holiday season. Caltrans subsequently extended the public circulation and comment period to January 12, 2024. No changes to the Draft EIR/EA are necessary.

20231208, California Air Resources Board

From: Gress, Jennifer@ARB
To: Benipal, Amarjeet S@DOT
Cc: Yolo80Corridor@DOT; Bhattal, Gurtej@DOT; Patwary, Masum@DOT
Subject: Yolo 80 Corridor DEIR – Request for Public Comment Period Extension
Date: Friday, December 8, 2023 11:03:05 AM

EXTERNAL EMAIL. Links/attachments may not be safe.

Dear Mr. Benipal,

We are reviewing the Draft Environmental Impact Report (DEIR) for the Yolo 80 Corridor Improvements Project. We appreciate you making the DEIR publicly available on your website and sharing the technical appendices with us by email. We noticed, however, that many of the appendices have not been posted publicly. Specifically, we see that these appendices have not been posted:

- Interstate 80/US Highway 50 Managed Lanes Transportation Analysis Report
- Interstate 80/US Highway 50 Managed Lanes Transportation Analysis Report Appendix
- Interstate 80/U.S. Highway 50 Managed Lanes Traffic and Revenue Report
- I-80/US 50 Managed Lanes – Phase B Forecasts and Performance Measures
- I-80/US 50 Managed Lanes – Phase B Forecasts and Performance Measures Appendix
- Interstate 80/U.S. Highway 50 Managed Lanes Travel Demand Modeling Report
- Interstate 80/U.S. Highway 50 Managed Lanes Travel Demand Modeling Report Appendix
- Air Quality Report, Yolo 80 Corridor Improvements Project
- Environmental Impact Evaluation – Energy
- I-80/US 50 Origin-Destination Study: Additional Data Needs
- I-80/US 50 Managed Lanes Traffic Data
- I-80/US 50 Managed Lanes – Traffic Forecasts
- I-80/US 50 Travel Pattern Data

1

We are concerned that the public does not have adequate information to evaluate and comment on the DEIR. In addition, given that a number of major holidays fall within the comment period, we are further concerned that the public will not have sufficient time to review and comment as CEQA allows.

With these concerns in mind, we request that Caltrans post all appendices and extend the public review and comment period to at least 45 days from the date when the last appendix is posted.

As you are aware, the DEIR and associated comment period is the only time when the public has opportunity to provide written comments and when the public agency must provide a response to those comments. Failing to provide full public disclosure of the appendices for an adequate amount of time undercuts the public's ability to engage on a major project of regionwide significance. 1 cont.

Thank you for your consideration.

Sincerely,

Jennifer Gress, Ph.D., Chief
Sustainable Transportation and Communities Division
California Air Resources Board

Response to Comment 1 in 20231208, California Air Resources Board

Caltrans submitted the Draft EIR/EA to the State Clearinghouse on November 13, 2023, through CEQANet. The Draft EIR/EA was published on the same day and simultaneously made available on the Caltrans Website. The original end date of the 45-day review period would have been December 27, 2023. However, when the Draft EIR/EA was released for public review, Caltrans ended the initial comment period on January 5, 2024, to account for the holiday season. Caltrans subsequently extended the public circulation and comment period again to January 12, 2024.

Appendices to the Draft EIR/EA were available on the Caltrans website and on the State Clearinghouse website. Additionally, hard copies of the Draft EIR/EA were delivered to the Yolo County Library on December 5, 2023, and the West Sacramento Library on December 6, 2023.

The commenter's list of unavailable "appendices" are studies listed in Appendix H. These studies were available upon request as indicated on the Caltrans website. Caltrans provided the Air Quality and Energy evaluation reports, sent via email, on December 8, 2024. Requested traffic studies were sent via an online file transfer link.

20231215, Yolo Transportation District

Yolo Transportation District

TO
Amarjeet Benipal
District 3 Director

Caltrans District 3
703 B Street
Marysville, CA 95901

December 15, 2023

Yolo 80 Managed Lanes Alternatives

Dear Mr. Benipal,

On December 11, 2023 the YoloTD Board received a presentation from District 3 on the Yolo 80 Managed Lanes Draft Environmental Document (DED). An outcome of that meeting was the YoloTD Board directed us to advise Caltrans that Alternative #4 (HOT 3+ Lane) is YoloTD's preferred alternative for the Yolo 80 Managed Lanes project.

Consistent with the October 5, 2022 Memorandum of Understanding (MOU) between YoloTD and District 3, YoloTD firmly believes that, of the alternatives analyzed in the Environmental Impact Report (EIR), a tolled managed lane (in this case, HOT 3+) offers the best combination of operational improvements, improved transportation access, environmental and sustainability outcomes, improved transportation access, and equity considerations. 1

Autumn Bernstein
Executive Director

Tom Stallard
Chair

(530) 402-2812
abernstein@yctd.org
350 Industrial Way
Woodland, CA 95776
YoloTD.org

Response to Comment 1 in 20231215, Yolo Transportation District

This comment summarizes the preference of the Yolo Transportation District Board for Build Alternative 4 (HOT 3+). This agency preference is noted. No changes to the Draft EIR/EA are necessary.

20231218, City of Sacramento

From: Cheryle Hodge
To: Yolo80Corridor@DOT; Patwary, Masum@DOT
Subject: Yolo 80 Managed Lanes Project - Review Time Extension Request
Date: Monday, December 18, 2023 4:55:18 PM
Attachments: City Ltr of Time Ext Yolo 80 Improvements Prj EIR.pdf

EXTERNAL EMAIL. Links/attachments may not be safe.

Masum Patwary,

Please see the City of Sacramento attached letter requesting an extension of time to review the Draft Environmental Impact Report/Environmental Assessment prepared for the proposed Yolo 80 Managed Lanes Project. Let me know if you have any questions. Thank you in advance for consideration of our request.

Thanks,

Cheryle Hodge, LEED Green Associate
Principal Planner/New Growth Manager
300 Richards Blvd. 3rd Floor
Sacramento, CA 95811
(916) 808-5971

City of SACRAMENTO
Community Development

E-mail correspondence with the City of Sacramento (and attachments, if any) may be subject to the California Public Records Act, and as such may therefore be subject to public disclosure unless otherwise exempt under the Act.

Response to Comment 1 in 20231218, City of Sacramento

This comment requests a 30-day extension of the Draft EIR/EA comment period. The original end date of the 45-day review period would have been December 27, 2023. However, when the Draft EIR/EA was released for public review, Caltrans ended the initial comment period on January 5, 2024, to account for the holiday season. Caltrans subsequently extended the public circulation and comment period to January 12, 2024. No changes to the Draft EIR/EA are necessary.

Response to Comment 2 in 20231218, City of Sacramento

This comment summarizes several of the reasons the City of Sacramento is reviewing the Draft EIR/EA and does not include specific comments on the document. No changes to the Draft EIR/EA are necessary.

20240104, Environmental Protection Agency Region 9

REGION 9
SAN FRANCISCO, CA 94105

January 4, 2024

Masum Patwary
Environmental Scientist C
California Department of Transportation, District 3
703 B Street
Marysville, California 95901

Subject: EPA comments for the Yolo 80 Corridor Improvements Project Draft Environmental Assessment, Yolo, Solano and Sacramento Counties, California

Dear Masum Patwary:

The U.S. Environmental Protection Agency has reviewed the above-referenced document pursuant to the National Environmental Policy Act, Council on Environmental Quality regulations (40 CFR Parts 1500-1508), and our NEPA review authority under Section 309 of the Clean Air Act.

The Draft EA includes 12 build alternatives to ease traffic congestion across 20.8 miles of the Interstate 80/US-50 corridor from Kidwell Road on the Solano/Yolo County line to West El Camino Avenue on the Yolo/Sacramento County line by adding managed lanes through a combination of converting general purpose lanes, restriping, and reconstructing shoulders and medians with concrete barriers. Sheet flow drainage modifications for repurposed medians were analyzed, and lane management would be accomplished through expanded use of Intelligent Transportation System, ramp meters, overhead signs, high-occupancy lanes, and possibly dynamically-priced high-occupancy tolls lanes, and transit-only lanes. 1

We acknowledge that the EPA and the Federal Highways Administration concurred that the project was found not to be a Project of Air Quality Concern on October 15 and 18, 2021, based on information that concluded that the estimated percentage of diesel truck traffic resulting from the project, both with and without HOV-HOV connectors, would be estimated to remain under an 8% threshold of significance. We also note Caltrans environmental justice and equity analysis in the project area, the commitment to BMPs to reduce noise and dust impacts during construction, and to exploring fee-setting options including offsetting incentives and keying fee rates for disadvantaged households disproportionately and adversely impacted by tolling build alternatives. Given potential outstanding issues for disadvantaged households, including possible inequitable tolling costs, we continue to 2

encourage Caltrans to meaningfully engage impacted communities to materially address concerns as the project design is finalized.

Thank you for the opportunity to review this combined Draft Environmental Impact Report/Environmental Assessment. Please coordinate with EPA should Caltrans determine that further environmental analysis is warranted to assess additional design considerations and further refine the 12 build alternatives. We would appreciate receiving an electronic copy of the final environmental document once it is publicly available. If you have any questions, please contact me at 415-947-4167, or contact Zac Appleton, the lead reviewer for this project, at 415-972-3321 or appleton.zac@epa.gov.

Sincerely,

CONNELL DUNNING

Digitally signed by CONNELL DUNNING
Date: 2024.01.04 12:37:14 -08'00'

for Jean Prijatel
Manager
Environmental Review Branch

cc: Sandra Rosas,
North Region Environmental Coordinator, Caltrans

Karen Jang,
Environmental Management Office, Caltrans

Alexis Tarantino,
Environmental Management Office, Caltrans

2

Response to Comment 1 in 20240104, Environmental Protection Agency Region 9

Thank you for your comment on the Draft EIR/EA. This introductory comment summarizes the authority of the EPA's review and the build alternatives being considered. The comment does not discuss the adequacy of the EIR/EA. No changes to the Draft EIR/EA are necessary.

Response to Comment 2 in 20240104, Environmental Protection Agency Region 9

This comment encourages Caltrans to consider continuing to have meaningful engagement with impacted communities, within the project area, to address concerns as the project is finalized. Caltrans will take into consideration the possibility of continuing engagement with impacted communities as project design is finalized. Sections 2.1.7 and Section 2.1.8 of the Draft EIR/EA discusses Environmental Justice and Equity, respectively. Please refer to Master Response E for responses related to environmental justice and equity. No changes to the Draft EIR/EA are necessary.

20240110, California Air Resources Board

CALIFORNIA AIR RESOURCES BOARD

Gavin Newsom, Governor
Yana Garcia, CalEPA Secretary
Liane M. Randolph, Chair

January 10, 2024

Tony Tavares
Director
California Department of Transportation (Caltrans)
1120 N St
Sacramento, CA 95814
Tony.Tavares@dot.ca.gov

Dear Director Tavares,

Thank you for the opportunity to provide comments on the Draft Environmental Impact Report (DEIR) for the Yolo 80 Corridor Improvements Project (Yolo 80, or project). We appreciate the opportunities that we have had to collaborate with Caltrans to support the success of California's *2022 Scoping Plan for Achieving Carbon Neutrality*. As the agency entrusted with environmental review of our largest transportation infrastructure investments, Caltrans' decisions carry unparalleled weight. The need to improve travel through the Yolo 80 Corridor presents an opportunity to advance the State's climate, air quality, and equity goals, and be a model for effectively managing the state highway system.

CARB staff have identified that the Yolo 80 proposal adds substantial new roadway capacity. This can increase vehicle miles traveled (VMT) and greenhouse gas (GHG) emissions. The DEIR omits project alternatives that could better meet the project's objectives with less environmental impact. Specifically, it only examines alternatives that add lanes and no project alternatives that convert existing lanes to priced lanes, even though converting an existing lane is in the Sacramento region's current sustainable communities strategy for achieving its GHG reduction target. In addition, the DEIR uses a traffic assessment approach that is expected to underestimate the project's impacts and exaggerate its benefits. This could lead to inaccurate DEIR significance determinations on GHG emissions, air quality, energy, noise, and safety, as well as influence whether the project achieves its objectives. Finally, the DEIR's proposal to mitigate less than half of its induced travel impact is inadequate, when additional mitigation is feasible. 1

Taken as a whole, the project would substantially increase VMT and GHGs, more so than the DEIR discloses, hampering achievement of the State's climate and air quality goals. Several State documents, including the Scoping Plan, CARB's *Progress Report on Implementation of the Sustainable Communities and Climate Protection Act*, and the *Climate Action Plan for Transportation Infrastructure*, call for reimagining or deprioritizing roadway projects that increase VMT to create a more sustainable transportation system. Reducing VMT also benefits health, traffic safety, equity, and the environment. By expanding capacity while

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improperly assessing and insufficiently mitigating impacts, the Yolo I-80 project is inconsistent with these State plans.

Procedurally, CARB had previously requested that Caltrans extend the public review period for this DEIR due to the current comment period being effectively truncated by several major holidays and because Caltrans has not posted the technical appendices to its website or otherwise made them available through the full comment period. I appreciate that Caltrans extended the deadline by one week. You may wish to consider further extension to mitigate concerns we are hearing from some stakeholders. Specifically, while Caltrans has committed to making the technical appendices available upon request, we are aware that these documents were not made immediately available to some members of the public who had requested them, leaving members of the public without adequate information and without the full time to evaluate and comment on the DEIR.

1 cont.

Thank you for the opportunity to comment. The attachment to this letter describes our comments in more detail and offers recommendations on how to address the DEIR's inadequacies. We would welcome the opportunity to work together to strengthen the project in ways that achieve its intended purpose while also addressing our shared climate and air quality goals.

If you have any questions, please feel free to contact me or Dr. Jennifer Gress, Chief of the Sustainable Transportation and Communities Division, at (916) 764-0747 or *jennifer.gress@arb.ca.gov*.

Sincerely,

Steven S. Cliff, Ph.D., Executive Officer

Attachment

cc: See next page.

cc: Comment submission email portal
Yolo80corridor@dot.ca.gov

Eric Sundquist, Acting Deputy Director for Sustainability, Caltrans
Eric.Sundquist@dot.ca.gov

Chris Kuzak, VMT Program Manager, Caltrans Sustainability
Chris.Kuzak@dot.ca.gov

Amarjeet Benipal, Director, Caltrans District 3
Amarjeet.Benipal@dot.ca.gov

Gurtej Bhattal, Project Manager, Caltrans District 3
Gurtej.Bhattal@dot.ca.gov

Masum A Patwary, Environmental Coordinator, Caltrans District 3
Masum.Patwary@dot.ca.gov

Darwin Moosavi, California State Transportation Agency
Darwin.Moosavi@calsta.ca.gov

Jennifer Gress, Ph.D., Division Chief, Sustainable Transportation and Communities Division, CARB
Jennifer.Gress@arb.ca.gov

Attachment: CARB's detailed comments on the Yolo 80 Corridor Improvements Project

Background

The 2022 Scoping Plan[1] charts a path to achieving carbon neutrality by 2045 and describes why significant vehicle miles travelled (VMT) reduction is needed to achieve the State's greenhouse gas (GHG) emissions reduction targets. California's infrastructure investment choices play a central role in achieving those reductions.[2] Adding highway capacity leads to substantial increases in VMT, generally in proportion to the amount of capacity added,[3,4,5,6] moving California in the opposite direction from its climate and air quality goals. The induced VMT caused by highway expansion also has serious impacts on human health[7] and the natural environment.[8] Further, such investments lead to dispersed land use patterns, which move destinations further apart and exclude non-drivers (including people who are too old or young to drive, who cannot afford a car, or who are not physically able to drive) from economic and social opportunities. Exacerbating such land use and transportation patterns by expanding roadways rather than better managing the existing system and

2

[1] *2022 Scoping Plan for Achieving Carbon Neutrality*, available at *https://ww2.arb.ca.gov/our-work/programs/ab-32-climate-change-scoping-plan/2022-scoping-plan-documents*

[2] *AB 32 2022 Scoping Plan*. **Page 194. Available at: https://ww2.arb.ca.gov/sites/default/files/2023-04/2022-sp.pdf**

[3] *The Fundamental Law of Road Congestion: Evidence from US Cities*. **Duranton and Turner, 2011. Available at: https://pubs.aeaweb.org/doi/pdfplus/10.1257/aer.101.6.2616**

[4] *If you build it, they will drive: Measuring induced demand for vehicle travel in urban areas*. **Hymel, 2019. Available at: https://www.sciencedirect.com/science/article/abs/pii/S0967070X18301720**

[5] *Impact of Highway Capacity and Induced Travel on Passenger Vehicle Use and Greenhouse Gas Emissions: Policy Brief*. **Handy and Boarnet, 2014. Available at: https://ww2.arb.ca.gov/sites/default/files/2020-06/Impact_of_Highway_Capacity_and_Induced_Travel_on_Passenger_Vehicle_Use_and_Greenhouse_Gas_Emissions_Policy_Brief.pdf**

[6] *Updating the Induced Travel Calculator*. **Volker, 2022. Available at: https://ncst.ucdavis.edu/research-product/updating-induced-travel-calculator**

[7] *Increasing Walking, Cycling, and Transit: Improving Californians' Health, Saving Costs, and Reducing Greenhouse Gases*. **Maizlish, 2016. Available at: https://www.cdph.ca.gov/Programs/OHE/CDPH%20Document%20Library/Maizlish-2016-Increasing-Walking-Cycling-Transit-Technical-Report-rev8-17-ADA.pdf**

[8] *Cutting Greenhouse Gas Emissions Is Only the Beginning: A Literature Review of the Co-Benefits of Reducing Vehicle Miles Traveled*. **Fang et al., NCST, 2017. Available at: https://rosap.ntl.bts.gov/view/dot/32254**

investing public funds to provide more housing and transportation options that reduce the need to drive moves us further away from building an equitable and just society.

Meanwhile, pricing alone, without expansion, can relieve congestion while improving equity,[9] with less induced travel and reduced impact on the environment. Congestion often reduces vehicle flows by a third to a half, and congestion pricing can relieve congestion and return facilities to their full capacity flow. For this reason, pricing can obviate the need for expansion.

Several State documents, including the Scoping Plan, CARB's Progress Report on implementation of the Sustainable Communities and Climate Protection Act,[10] and the Climate Action Plan for Transportation Infrastructure,[11] call for reimagining or deprioritizing roadway projects that increase VMT to create a more sustainable transportation system. Most of the DEIR's proposed alternatives are out of alignment with these State goals, but that is obscured by issues with the analysis. Continuing on this path will not achieve our GHG emissions reduction targets. 2 cont.

This attachment provides CARB's comments on the proposed project in greater detail and offers recommendations for resolving the issues identified in those comments.

I. DEIR omits key project alternatives

The DEIR omits key alternatives that could better address congestion, have less impact on the environment, and in some cases cost less to build.

The SACOG 2020 Metropolitan Transportation Plan / Sustainable Communities Strategy (MTP/SCS), the region's blueprint for transportation infrastructure investment, is designed to achieve the region's transportation GHG emissions reduction goals. It specifies two express lanes for the corridor, one added and the other converted from an existing lane. In the travel demand model SACOG used to assess passenger vehicle GHG per capita reduction in its regional plan, the corridor was specified as follows: 3

[9] **Pricing can improve access to opportunity for low-income populations by funding improved transit (and, with income-based pricing, improved auto-mobility), and it can reduce environmental, health, and safety burdens by reducing traffic volumes and relieving congestion in neighborhoods near major roadways. See** *Pricing Roads, Advancing Equity*. **Transform, 2019. Available at: https://drive.google.com/file/d/1cnuJVoDfiKa04l9PhxjktOt4Er03RMuf/view**

[10] *2022 Progress Report: California's Sustainable Communities and Climate Protection Act*, available at https://ww2.arb.ca.gov/sites/default/files/2023-05/2022-SB150-MainReport-FINAL-ADA.pdf

[11] *Climate Action Plan for Transportation Infrastructure*, available at https://calsta.ca.gov/-/media/calsta-media/documents/capti-july-2021-a11y.pdf

Dual express lane each direction. SOVs tolled. One lane added, one converted from GP lane during peak hours (7am-10am and 3pm-6pm).

The Yolo County Transportation District also requested that Caltrans evaluate this configuration, showing further regional support for this alternative.

However, Caltrans declined to include this configuration in the DEIR as an alternative. None of the alternatives Caltrans included in the DEIR feature pricing of more than a single lane. Without the revenue a second priced lane would generate, the DEIR claims funds are unavailable to fully mitigate VMT impacts. Without that mitigation, the project would undermine the region's VMT and GHG emissions reduction efforts. Also, pricing only a single lane reduces congestion substantially less, and would therefore be less effective in achieving the project's purpose (as stated on DEIR page summary-2) to:

1. Ease congestion and improve overall person throughput
2. Improve freeway operation on the mainline, ramps, and at system interchanges
3. Support reliable transport of goods and services throughout the region
4. Improve modality and travel time reliability
5. Provide expedited traveler information and monitoring systems

3 cont.

The DEIR could focus on alternatives that achieve more greenhouse gas emissions reduction and cause less environmental impact while achieving the project's objectives. For example, Caltrans could study an alternative that adds congestion pricing on existing lanes. Pricing all three existing lanes in each direction without adding a lane could address traffic congestion and improve vehicle throughput to a similar extent as building a new priced lane,[12] cause less impact to the environment, greatly reduce cost, and generate more revenue to fully mitigate the harms of the project and provide additional benefits to the region. All-lane tolling has been considered elsewhere in California, including recently in District 4 for Highway 37, is feasible given the features of the corridor, and should be considered and studied as an alternative here, too.

Furthermore, consideration of additional project alternatives is likely needed, given that the DEIR's traffic assessment fails to assess travel patterns resulting from the project with reasonable accuracy (as discussed in the next section) throwing into doubt whether the

[12] Congestion typically reduces vehicle flows to 1000-1400 vehicles per hour per lane. A lane operating at free flow lane can carry 1700-1900 vehicles per hour. Therefore, addressing congestion with pricing can adjust vehicle flows during peak periods by roughly +600 vehicles per lane. Because relieving congestion with pricing can increase vehicle flows by 600 vehicles per hour per lane, adding congestion pricing to two congested lanes can add as much to flow as adding one lane that congests (+600 vehicles per hour per lane x 2 lanes = +1200 vehicles per hour). Adding congestion pricing to three congested lanes can add as much to vehicle flow as a lane priced to maintain free flow travel (+600 vehicles per hour per lane x 3 lanes = +1800 vehicles per hour).

project alternatives presented would achieve the project's stated purpose and need. Before building a project of this expense and impact, Caltrans should have better evidence that the project will accomplish what is intended. 3 cont.

II. DEIR uses a traffic assessment that underestimates impacts

A. Caltrans chose to assess traffic impacts using a travel demand modeling approach that does not accurately capture the impacts of this project

Despite having reportedly been advised to do so,[13] Caltrans did not apply a modeling approach that would more accurately capture the impacts of this project. As a result, the DEIR's traffic assessment likely underestimates the project's impact on VMT. Induced VMT generally manifests over the five years after delivery of a highway expansion project,[14] but the travel demand model Caltrans used for this project shows a different trajectory. On opening year (2029), the model predicts a high amount of induced VMT (about four times what the induced travel studies would predict over the long run), increasing VMT of the entire region approximately 3%. But in the long run, the model predicts the effect of the project would be to *reduce* VMT by approximately 3.5%. 4

The DEIR's technical appendixes note that static traffic assignment travel demand models, like the one used in the Yolo 80 DEIR, have difficulty with assessment in congested conditions:

> Another limitation of the SACSIM19 model is the use of static assignment rather than dynamic assignment of vehicle trips. With congested conditions, static assignment can result in volumes that exceed capacity for the analysis period. With dynamic assignment, trips are rerouted or shifted in time so that capacity is met. If dynamic assignment were used, VMT could be lower if trips are shifted in time to more direct routes or if trips are shifted to different destinations due to congested conditions. VMT could also be higher if longer routes must be used to avoid congested links. (Transportation Analysis Report, Interstate 80/US Highway 50 Managed Lanes, November 2023, page 78)

[13] *The Policy and Politics of Highway Expansions*, Amy Lee, 2023, Page 279. Available at: https://escholarship.org/uc/item/13x3n8zr

[14] *If you build it, they will drive: Measuring induced demand for vehicle travel in urban areas*. **Hymel, 2019. Available at: https://www.sciencedirect.com/science/article/abs/pii/S0967070X18301720**

Another technical appendix corroborates the concerns raised in the Transportation Analysis Report, acknowledging that static modeling is likely to exaggerate future year traffic volumes on the facility:

> Based on the static validation and knowledge that the model relies on static assignment of vehicle trips instead of dynamic traffic assignment, the model's peak period (and peak hour) forecasts may be higher than would occur. (Interstate 80/U.S. Highway 50 Managed Lanes Travel Demand Modeling Report, p. 27)

Other appendixes raise additional issues that may be compounding the problem:

> "[The model] has a limitation from its use of static traffic assignment instead of dynamic traffic assignment (DTA). For example, the model completes all origin-destination (OD) trips during peak hours even if the congested travel time would require longer than one hour to complete the trip (see Appendix A). This is not realistic and would not occur with a DTA. Instead, trips would only travel as far as congested speeds would allow within one hour. This type of limitation may overestimate peak hour demand." (Interstate 80/U.S. Highway 50 Managed Lanes Traffic and Revenue Report, p. 8)

4 cont.

Assessed with a travel demand model, induced travel is the difference between VMT assessed with the project and VMT assessed without the project. Research shows that static traffic assignment modeling approaches can over-predict future congestion in congested conditions.[15] The approach used here does not model the likelihood that drivers may vary departure time in the face of existing congestion, so in the horizon year, without the project it shows drivers piling onto and jamming the congested facility. The model then shows the jammed facility pushing subsequent drivers to take a lengthy route around the project corridor (in this case, via Woodland and I-5 about 10 miles to the north), adding substantial VMT to those trips. In the horizon year with the project, the model shows the facility accommodating that traffic. Comparing scenarios with and without the project, then, building the project appears to reduce VMT.

Dynamic traffic assignment modeling approaches, meanwhile, aim to better reflect the reality that many drivers would change their departure to a less congested time and forego the longer route. As a result, they would not generate the intensity of the congestion shown in the static traffic assignment modeling approach used for the project assessment. Without that intensity of congestion, and with the ability to change departure time, less traffic would re-route around the facility, so the VMT in the no-project scenario would be lower and the

[15] *Forecasting the impossible: The status quo of estimating traffic flows with static traffic assignment and the future of dynamic traffic assignment*. **Marshall, 2018. Available at: https://www.sciencedirect.com/science/article/pii/S2210539517301232?via%3Dihub**

comparison between VMT in the project and no project scenarios–the induced VMT–would be more accurate.

Meanwhile, other states are bringing dynamic traffic assignment modeling techniques into use for complex projects and projects that, like Yolo 80, have congested traffic conditions and parallel routes. The Colorado Department of Transportation offers the following guidance, which would appear to apply to a project like Yolo 80:

> DTA is useful when the analyst's study area includes a congested transportation facility as well as its parallel facilities (or parallel capacity). …[I]t may inform how much traffic redistribution to expect from one facility to another. DTA's assignment methods is more sophisticated than a traditional travel demand model as it accounts for bottlenecks. DTA also allows for temporal spreading (peak-hour spreading)[16] [i.e., changing of departure times to avoid congestion].

Caltrans did not apply a dynamic traffic assignment modeling approach that would more accurately capture the effect of the project on travel behavior and its impacts on the environment, and to have nevertheless opted for static modeling. *The Policy and Politics of Highway Expansions*[17] describes an interview with a transportation expert with knowledge of the modeling for the project: 4 cont.

> …a transportation expert also discussed the travel modeling analysis of HOT lanes on I-80. They discussed the various modeling approaches and scenarios that had been used to analyze the project, including scenarios to estimate long-term changes in VMT that included land use changes and used dynamic traffic assignment. Caltrans rejected these scenarios that showed long-term increases in VMT in favor of scenarios that used static traffic assignment, which showed that VMT would decrease with the highway expansion project because people would re-route off of a longer, parallel route through Woodland and back onto I-80. Caltrans 'liked' the model run using static assignment because it gave quantitative support for the expansion project. Comparisons of dynamic versus static assignment are well-documented in academic literature – generally, static assignment fails to account for the tendency of people to change their departure time as a result of travel time. But in reality, "way more people would change their departure time before they would go all the way around through Woodland." (p. 279, emphasis added)

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[16] *Traffic Analysis and Forecasting Guidelines, Colorado Department of Transportation*, 2023, Pages 129-131. Available at: https://www.codot.gov/safety/traffic-safety/assets/traffic_analysis_forecasting_guidelines/traffic_analysis_forecasting_guidelines

[17] *The Policy and Politics of Highway Expansions*, Amy Lee, 2023, available at: https://escholarship.org/uc/item/13x3n8zr

This account seems to document three important points:

1. For this project, the static trip assignment modeling approach showed exaggerated traffic congestion and VMT in the no-project scenario.
2. Applying static trip assignment modeling in this way helped justify the project and reduce the appearance of environmental impacts associated with the project's induced VMT.
3. Caltrans reportedly considered and rejected dynamic traffic assignment modeling approaches because those would have revealed the environmental impacts of the project and because static trip assignment modeling exaggerated the need for a project it preferred to build (see underlined portion of *Lee 2023* excerpt above).

4 cont.

For this project, using static trip assignment modeling in this way causes crucial information about the intensity of the impact to be omitted; that omitted information is necessary for an informed understanding of the project's impacts.

In addition to the limitations of this static trip assignment approach, the model used for this project appears not to be validated to meet the standard of current practice. For example, in Table 5 of the *Interstate 80/U.S. Highway 50 Managed Lanes Travel Demand Modeling Report*, the Sacramento River screen line does not meet the minimum expectation of "percent within Caltrans maximum deviation" established in the RTP Guidelines. This adds to concerns with the quality of the forecast. Further, there is no speed validation at the corridor level.

B. Caltrans omits the effects of project-caused land use changes in its assessment of the project's effect on travel patterns

Ample research has documented highway expansion changes on land use development patterns,[18] and those changes comprise a substantial portion of the overall induced travel effect of highway projects.[19] This is well understood, and Caltrans' own guidance on assessing induced travel requires that land use development effects be assessed.[20] Guidance from the Governor's Office of Planning and Research also establishes the need to assess land use effects of highway capacity projects.[21]

5

[18] *Highway-Induced Development: Research Results for Metropolitan Areas.* Ewing 2008.
[19] Many induced travel studies distinguish short-term effects, generally caused by change in destination, mode, route, or number of trips, from long-term effects, generally caused by changes in land use patterns, and find the long-term component adds substantially to the short-term component.
[20] *Caltrans Transportation Analysis Framework*. 2020. Page 21. Available at: https://dot.ca.gov/-/media/dot-media/programs/transportation-planning/documents/sb-743/2020-09-10-1st-edition-taf-fnl-a11y.pdf.
[21] *Technical Advisory on Evaluating Transportation Impacts in CEQA*, Governor's Office of Planning and Research, 2018, pages 33-34. Available at: https://opr.ca.gov/docs/20190122-743_Technical_Advisory.pdf

However, in its traffic analysis, Caltrans district staff excluded the land use effects of this project, applying the same land use scenario with and without the project:

> Caltrans district staff directed that the model land uses be maintained without changes from the MTP/SCS versions for all alternatives, including the no build alternative. (*Interstate 80/US Highway 50 Managed Lanes Transportation Analysis Report,* p. 26)

When modeling a project, applying the same land use scenario with and without the project omits the project's effect on land use from the analysis entirely. Omitting the land use effect of the project would likely lead to a substantial underestimate of the amount of induced vehicle travel, as it is generally among the largest of the components of the induced travel effect, as is stated in the Traffic and Revenue Report for the DEIR:

> The development of the SACSIM19 model to represent 2029 and 2049 conditions is documented in the I-80/US 50 Managed Lanes – Forecasts Methodology Memorandum (November 23, 2020) and the I-80/US 50 Managed Lanes – Travel Demand Modeling Report (September 2021). Reviewers should note that the model inputs for land use growth have the largest effect on future travel demand. (Interstate 80/U.S. Highway 50 Managed Lanes Traffic and Revenue Report, p. 10)

5 cont.

Despite its importance to the analysis, Caltrans maintained the same land use scenario across all alternatives, including no-build:

> Land use inputs were not developed for each individual alternative. Instead, the SACOG 2020 MTP/SCS land use forecasts associated with specific model years 2016, 2027, and 2040 were used without modification. Then the resulting vehicle trip tables from the SACSIM19 model were factored to produce 2029 and 2049 vehicle trip tables that were used in the final assignment. This approach limits the sensitivity of the traffic and revenue forecasts to any unique land use effects associated with each alternative. (Interstate 80/U.S. Highway 50 Managed Lanes Traffic and Revenue Report, p. 10)

Excluding land use effects resulted in the exclusion of a major source of additional vehicle travel in the assessment. Omitting land use changes from the project, and the extra vehicle travel they would cause, exaggerates the transportation benefits of the project by showing that it improves traffic more and over a longer period of time than it actually will.

Omitting land use changes also leads to understating the environmental impacts of the project related to vehicle travel. Underestimating VMT will lead to an underestimate of GHG emissions, air pollutant emissions, energy, and noise, likely mischaracterizing the directionality, magnitude, and significance of impacts.

C. Caltrans applies differing values for induced truck VMT in different parts of the DEIR in ways that minimize appearance of environmental impacts

Caltrans claims differing amounts of induced truck travel in different impact analyses in the DEIR. For VMT impacts, it discounts a large amount of induced truck travel from its assessment of induced auto travel, making that impact appear substantially smaller. Assessing other impacts, it assumes less additional truck travel, making those impacts, too, appear substantially smaller. Using truck VMT inconsistently in the manner that Caltrans does minimizes the appearance of environmental impacts of the project.

For VMT assessment under SB 743, truck travel may be either included or excluded.[22] In its VMT analysis, Caltrans chooses to exclude truck travel from induced VMT. To establish the amount of truck travel to omit, the DEIR references the Caltrans advisory *NCST Calculator Truck Adjustment*.[23] That guidance references Duranton & Turner (2011): "…we estimate that trucks account for between 19 and 29 percent of the total increase in interstate VKT [vehicle kilometers travelled],"[24] and suggests applying the maximum value in that range to reduce the amount of induced auto VMT it reports as a transportation impact. 6

When assessing impacts other than VMT, truck travel must be included. However, the traffic analyses feeding into these assessments report much less induced truck travel.[25] We analyzed the discrepancy between induced truck VMT, as reported in the Transportation Analysis Report for the project[26], and found it ranged from 201% and 565% across the capacity-adding alternatives (see table below).

In sum, Caltrans applies lower estimates feeding into assessment of project impacts such as GHG emissions, air pollutant emissions, energy, and noise, making those impacts appear smaller. Meanwhile, it applies higher estimates where those estimates are subtracted from

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[22] *Technical Advisory on Evaluating Transportation Impacts under CEQA*. **Governor's Office of Planning and Research, 2020, pages 4-5. Available at: https://opr.ca.gov/docs/20190122-743_Technical_Advisory.pdf**

[23] *NCST Calculator Truck Adjustment: Method for adjusting NCST Calculator results to account for heavy-duty trucks*. **Available at: https://dot.ca.gov/programs/esta/sb-743/resources/ncst-truck-adjustment**

[24] **Page 2644**

[25] Further, the technical appendixes make conflicting claims about discussing air quality impacts, the DEIR states, "The project would not change the traffic mix" (p. 3-11). In its assessment of air quality, the share of trucks listed for the no build and build alternatives is the same, indicating that none of the project alternatives would affect truck volumes compared to the no-build (Table 2.2-9, Pages 2-194 – 2-195). It is not possible that 29 percent of the project's induced travel is truck travel, and also that the project does not affect the share of truck travel.

[26] (Interstate 80/US Highway 50 Managed Lanes Transportation Analysis Report, November 2023, Table 31 and Table 32, pages 81-82)

the total induced VMT, making those impacts also appear smaller. The table below shows the magnitude of the discrepancy for each alternative.

Alternative	Long-Term Induced Truck VMT (used to calculate GHG, Air Quality, Energy, and Noise Impacts) (Transportation Analysis Report, Nov. 2023, Table 35, p. 83)	Long-Term Induced Truck VMT (subtracted from VMT impacts)* (Transportation Analysis Report Nov 2023, Table 32, p. 82.)	Difference
1 (No Build)	0	-	-
2 (Add HOV)	67,500	143,600	213%
3 (Add HOT2+)	41,600	143,600	345%
4 (Add HOT3+)	25,400	143,600	565%
5 (Add Toll)	29,200	143,600	492%
6 (Add Transit)	1,200	-	-
7 (Convert HOV)	6,500	3,600	55%
8 (Add HOV with Median Ramps)	61,000	149,600	245%
9 (Add HOV without Enterprise Crossing)	71,400	143,600	201%

Induced truck travel for each alternative used to assess different impacts. (*Caltrans NCST Calculator Truck Adjustment Guidance (available at https://dot.ca.gov/programs/esta/sb-743/resources/ncst-truck-adjustment))

CEQA requires factual conclusions reached in an EIR to be supported by substantial evidence.[27] Here, using different amounts of truck travel in different sections of the document is internally inconsistent, and can therefore inaccurately – and improperly – reduce the appearance of environmental impacts. Substantial evidence under CEQA is that which includes "facts, reasonable assumptions predicated upon facts, and expert opinion supported by facts."[28] The CEQA statute goes on to state that substantial evidence does not include unsubstantiated opinion or narrative, or evidence which is clearly inaccurate or erroneous.[29] Given the EIR is internally inconsistent in support for its key determinations regarding truck-related VMT, these determinations lack substantial evidence. Furthermore, if impacts are underestimated, they will be under-mitigated, and the environment will not be protected as the law envisions.

6 cont.

[27] See Cal. Pub. Resources Code § 21168.5.
[28] Cal. Pub. Resources Code § 21082.2(c).
[29] See *id.*

III. DEIR relies on the traffic assessment for its impact assessment and significance determinations, including the GHG emissions assessment

The DEIR's assessment of GHG emissions, air quality, energy, and noise are all based on the traffic assessment discussed earlier. Therefore, these impacts are likely underestimated, calling the DEIR's significance determinations into question.

CARB staff found this to be the case with the DEIR's assessment of GHG emissions. Table 8 in the Air Quality Report (August 2023) (pages 30 and 31) provides GHG emissions that it claims would result from each alternative. The DEIR's claim on p. 3-26 – 3-27 that "GHG emissions of the Build Alternatives were assessed to be less" than the no-build appears to be based on data from that table. However, data from the table appear to be based upon the output of the static trip assignment modeling approach of comparing scenarios without land use variations, discussed above.

Furthermore, the DEIR GHG assessment appears to incorrectly factor in emissions reductions from vehicle efficiency improvements to justify the project's effect on GHG emissions, stating: 7

> A quantitative analysis of daily CO2 emissions was performed using the Caltrans CTEMFAC2021. GHG emissions and VMT comparisons were calculated for the Build Alternatives the existing year (2019), in opening year (2029), and design year (2049). As anticipated with new fleet and electric vehicles penetration, in design year 2049, GHG emissions of the Build Alternatives were assessed to be less.

However, the decarbonization of the vehicle fleet is not what this DEIR is supposed to analyze. The DEIR is supposed to analyze the effects *of the project*,[30] which must be determined by comparing emissions with and without the project using the same year.[31] Caltrans' own guidance on assessing transportation projects under CEQA articulates the importance of focusing on the impacts of the project by comparing impacts with and without the project in the same year:

> Transportation projects are typically built years after the CEQA analysis is completed, and comparing to existing conditions would combine the project's VMT effects with other effects…in effect misleading the public and decision-makers by obscuring the impacts of the project itself. When comparing future build conditions to future no-

[30] See CEQA Guidelines § 15126.2(a).
[31] See *id*; see also § 15125(a).

build conditions, the difference is the addition of the project itself and associated changes that may occur to land use and travel behavior.[32]

7 cont.

For these reasons, the DEIR's claim that adding a lane will decrease GHG emissions is not supported by substantial evidence and is likely incorrect.

IV. Amount of VMT mitigation in the DEIR is inadequate

CEQA requires significant impacts to be fully mitigated where feasible. However, while the project as proposed will induce substantial amounts of new VMT, the DEIR proposes to mitigate only 43% of it.[33] Inadequate mitigation of VMT makes it harder to achieve the State's climate goals, which depend on VMT reduction.

Cost is the only reason cited for offering incomplete mitigation, but neither the DEIR nor its appendixes offer reasoning or substantial evidence for setting the ceiling of mitigation funds at 14-15% of construction cost. Also, because the DEIR omits consideration of viable, key pricing alternatives (discussed earlier) the cost of VMT mitigation should not be allowed as justification for less than full mitigation. Considering conversion of existing lanes to priced lanes would bring in more revenue that could be invested to mitigate the impacts of the project and provide additional benefits to the public, including investment in additional low-VMT housing[34] and/or capacity reduction elsewhere on the system (e.g., via road diet or conversion to transit-only lanes).

8

V. Recommendations

Flowing from the comments on the DEIR presented above, CARB staff have the following recommendations:

Alternatives. Pricing, not expansion, can address congestion and achieve the objectives set forth in the DEIR for this project. Pricing also generates less impact to the environment than expansion. Therefore, Caltrans should study conversions of existing lanes to priced lanes, at a minimum including:

9

- the configuration specified in the MTP/SCS (i.e., an addition of one express lane plus the conversion of one existing general-purpose lane to an express lane),

[32] *See Caltrans Transportation Analysis Under CEQA*, page 17, available at https://dot.ca.gov/-/media/dot-media/programs/transportation-planning/documents/sb-743/2020-09-10-1st-edition-tac-fnl-a11y.pdf
[33] Yolo 80 Managed Lanes Project Draft VMT Mitigation Plan, October 25, 2023, p. 8.
[34] **Housing generating less than 85 percent of regional average household VMT, per** *Technical Advisory on Evaluating Transportation Impacts under CEQA*, **Governor's Office of Planning and Research, 2020. Available at: https://opr.ca.gov/docs/20190122-743_Technical_Advisory.pdf**

- pricing existing lanes without any lane expansion.

Caltrans should revisit the question of whether each alternative achieves the stated objectives for the project (i.e., the purpose and need).

Redo the traffic assessment. Given the three major flaws identified in the traffic assessment and given the importance of accuracy in that assessment to impact assessments and significance determinations, we recommend the travel modeling for the project be redone using a modeling approach that is more appropriate for this analysis with the project's effects on land use included, and taking care to use consistent assumptions on induced truck VMT. 9 cont.

Reassess impacts and significance determinations. Redoing the traffic assessment is likely to show different traffic outcomes both with and without the project than the traffic assessment currently in the DEIR. Therefore, GHG, air quality, energy, safety, and noise impact assessments and significance determinations need to be revisited. When revising the impact assessment and significance determination for GHG emissions, please only compare emissions with and without the project, removing the impact of vehicle efficiency improvements.

Provide full mitigation for induced VMT. VMT impacts of the project should be fully mitigated. Pricing of existing lanes can serve both as mitigation itself and to finance other mitigation strategies to achieve full mitigation.

Response to Comment 1 in 20240110, California Air Resources Board

This comment generally summarizes issues that are presented in the detailed comments attached to the letter and are addressed below.

The Draft EIR/EA was circulated for the required length of time (45 days), plus an additional 11 days to accommodate the holiday season. Due to multiple requests during the circulation process for additional review time, the Draft EIR/EA was further extended an additional 7 days to January 12, 2024, for a total of 62 days.

Response to Comment 2 in 20240110, California Air Resources Board

This comment provides background information and summarizes CARB's comments on the Draft EIR/EA. These comments are responded to in greater detail in Response to Comments 3-9 below. No changes to the Draft EIR/EA are necessary.

Please refer to Master Responses A, B, and E for responses related to induced travel, project alternatives considered, and equity, respectively.

Response to Comment 3 in 20240110, California Air Resources Board

The commenter recommended that Caltrans consider other alternatives that could reduce VMT and generate additional funds to mitigate VMT impacts, such as adding one express lane plus convert an existing general-purpose lane to an express lane, or pricing existing lanes without any lane expansion, and provided calculations of this at footnote 12.

The theoretical calculation provided by the commenter on footnote 12 is an inaccurate estimation of the impact to vehicular flow per lane by pricing existing capacity. While ideal capacity of a priced lane may be 1,700-1,900 vehicles per hour, the calculation ignored the impacts to vehicular flow due to friction between general purpose and priced lanes, turbulence caused by ingress/egress, and congestion caused by downstream bottlenecks. As the priced lanes in the example provided would not operate in a vacuum, the factors listed above, along with other factors, would reduce the vehicular throughput impacts due to pricing stated by the commenter.

Regarding the project's circulated and preferred alternative(s), Caltrans offers the following:

The Project's alternatives were developed by Caltrans and its partners. In 2018, Caltrans established a steering committee for the project that included local stakeholders, such as the Cities of Davis and West Sacramento, Yolo County, Sacramento Area Council of Governments (SACOG), Yolo Transportation District (YoloTD), University of California (UC) Davis, Bicycle Coalition, etc. The steering committee held over 14 public meetings within the Cities of Davis, Sacramento, and West Sacramento to discuss the project and receive input from the community.

Additionally, the Project Development Team (PDT) conducted meetings that provided the forum for coordination, issue resolution, and information feedback between Caltrans, Sacramento Council of Governments, West Sacramento, Davis, Yolo County, UC Davis, and YoloTD. PDT

meetings occurred monthly, starting on October 3, 2017, and continued well into the remainder of the environmental and project approval process, ending in Spring of 2024. Table 4-2.1, Chapter 4, Final EIR/EA captures notable meetings from 2023-24. Given the project's 6-year development period, about 60 PDT meetings were conducted with participation from Agency partners.

A Notice of Preparation (NOP) memorandum was filed with the State Clearinghouse on June 6, 2021, which was revised on August 17, 2021, to notify that the scoping meeting was rescheduled. Caltrans accepted scoping comments until September 24, 2021. A revised NOP was also distributed on October 17, 2022, that included clarification of the proposed managed lane strategies and Build Alternatives.

Project alternatives were analyzed specifically in relation to existing conditions using the tools available with the requirement of meeting the purpose and need of the project for this segment of highway. Additionally, the suite of proposed alternatives may not meet the purpose and need of the project. However, these alternatives may still be viable for other projects in the future. As new projects are developed in the Yolo 80 corridor, Caltrans will ensure these projects are consistent with the SACOG Sustainable Communities Strategy.

Please refer to Master Response B for responses related to project alternatives considered. No changes to the Draft EIR/EA are necessary.

Response to Comment 4 in 20240110, California Air Resources Board

The commenter recommended Caltrans use a dynamic assignment modeling approach, instead of the SACSIM19, a static assignment, asserting that it underreports environmental impacts. Please refer to Master Response D for responses related to modeling methodologies.

Response to Comment 5 in 20240110, California Air Resources Board

The commenter stated that Caltrans failed to consider project-caused land use changes in assessing the project's effects on travel patterns, thereby understating the project's impacts. This is inaccurate. Caltrans used the NCST's California Induced Travel Calculator to analyze long-term induced vehicle travel effects on VMT, in which the impact to VMT due to land use changes is implied. The use of the calculator is consistent with the TAC and TAF.

The land use information used in the project analysis is indicative of Build conditions as the 2020 SACOG MTP/SCS land use projections include the project in the future year network. Therefore, the environmental impacts of the project related to vehicle travel are not understated. No changes to the Draft EIR/EA are necessary.

Please refer to Master Response A for additional responses related to induced travel and VMT calculation methodologies.

Response to Comment 6 in 20240110, California Air Resources Board

The commenter stated Caltrans used truck VMT in an inconsistent manner which minimized the appearance of the project's environmental impacts.

Caltrans VMT analysis of automobile travel attributable to the project legally complied with CEQA Guideline Section 15064.3. Please refer to Master Response A for responses related to induced travel and VMT calculation methodologies and Master Response I for responses related to the use of traffic data in analyses of impacts related to other resource areas.

Response to Comment 7 in 20240110, California Air Resources Board

The commenter stated the Draft EIR/EA's GHG assessment was incorrect because it factored in emission reductions from vehicle efficiency improvements.

California Environmental Protection Agency and CARB have noted in addition to reducing VMT, other appropriate measures to reduce GHG emissions include improved fuel standards for cars, trucks, and buses, and adopting state regulations for zero emission vehicles (ZEV). (California EPA/Air Resources Board Technical Advisory: Strategies to Reduce Air Pollution, April 2017, pp. 3, 5, 9.) Technological innovations to reduce air pollution and GHG emissions are consistent with laws to improve air quality and ensuring net zero greenhouse gas emissions. (42 U.S.C. § § 7404(a)(1), 7534. Health & Safety Code § 38500, et. seq. Health & Safety Code §§ 38562.2(c), 38566.) Thus, the Draft EIR/EA's consideration of the vehicle efficiency improvements as a factor in the analysis of GHG emission reduction is appropriate.

The land use information used in the project analysis is indicative of build conditions as the 2020 SACOG MTP/SCS land use projections include the project in the future year network. Therefore, GHG emissions of the project related to vehicle travel are not underestimated.

Please refer to Master Response I for response related to GHG analysis methods.

Response to Comment 8 in 20240110, California Air Resources Board

The commenter states the Draft EIR/EA, which proposes to mitigate 43% of the VMT in inadequate. The commenter also states the mitigation funding which is 14-15% of the project is inadequate and insufficient.

Please refer to Master Response A for responses related to VMT mitigation.

Conversion of existing lanes to priced lanes was already discussed in Comment 3, above and in Master Response B.

Response to Comment 9 in 20240110, California Air Resources Board

This commenter offers recommendations on alternatives, requests new traffic assessments, new impact/significance determinations, and asks for full mitigation for induced VMT. Please refer to Master Responses A, B, and D for responses related to induced travel, VMT mitigation, project alternatives considered, and modeling, respectively. Caltrans deems the Draft EIR/EA to contain adequate analyses regarding traffic and related resources issues and appropriate mitigation for VMT impacts.

20240110, City of West Sacramento

CITY OF WEST SACRAMENTO

January 10, 2024

Masum A Patwary, Environmental Scientist C
California Department of Transportation, District 3
703 B Street
Marysville, CA 95901
VIA Email: Yolo80Corridor@dot.ca.gov

Subject: Yolo 80 Corridor Improvements Project: Draft Environmental Impact Report/Environmental Assessment (DEIR/EA)

Dear Mr. Patwary,

The City of West Sacramento has had an opportunity to review the Draft Environmental Impact Report/ Environmental Assessment (DEIR/EA) for the Yolo 80 Corridor Improvement Project. Please see staff's comments below:

City of West Sacramento Comments:

1. Has there been a consideration of Bus Rapid Transit (BRT) to minimize traffic impacts between I-80 Yolo Causeway between Davis and West Sacramento. 1
2. Will there be an increase in the frequency of public transit (i.e., more buses) to serve commuters using these connectors. 2
3. Are the managed lanes intended to be active seven days a week or limited to weekdays only? There is major traffic build up along this corridor on weekends also. 3
4. In section 3.2.17 (Transportation) (b), what measures would be taken to implement a voluntary trip reduction program in Yolo County? How involved will Yolo County be in potentially implementing this program along with the other stakeholders? 4
5. On Pages 2-51 and 2-52 the document states that the Southport area of West Sacramento is "nearly built out." This is incorrect as there are more than 6,500 dwelling units yet to be built in addition to the Port of West Sacramento's Seaway and Stone Lock properties, which will be developed with a mix of uses. The analysis must account for this growth. 5
6. On Page 2-83 the document states that use of toll lanes (Alternatives 3-5) would cause a higher financial burden on low-income travelers and "is a disproportional impact." Despite AMMS there would be a "reduction in benefits by low-income groups... and inequitable distribution of project benefit." How can this be remedied so that the disadvantaged residents of West Sacramento, which make up the majority of disadvantaged residents in the project area, are not ever further disproportionately impacted by the project. 6
7. On Page 2-119 the document states that "alternatives 2a, 3a, 6a, 7a, and 2b would also have a bottleneck at the Jefferson Boulevard off-ramp. Alternatives 2a through 4a and 6a, 7a and 2b would also have a bottleneck at the I-80 off-ramp. The Reed Avenue off-ramp would also have high demand volumes 7

leading to congested conditions for the ramp diverge under all project alternatives." How can these impacts be mitigated sufficiently? 7 cont.

8. On Page 2-44 the document states that a "total of approximately 10.0 acres of SWHA foraging habitat consisting of grassland and croplands (i.e., hayfield) would be permanently lost." Why is there no mention of mitigation through the Yolo Habitat Conservancy? 8
9. On Pages 3-20 and 3-43, please add the requirement to contact West Sacramento police and Community Development if human remains of Native American origin are found in West Sacramento. 9
10. On Page 3-36, the document is unclear if West Sacramento sensitive receptors (Valhalla, Meadowdale, Sikh Temple school, etc.) would be impacted. 10
11. On Page 3-39, include more detail on emergency access per the West Sacramento Fire Dept. 11
12. The document should discuss all potential locations for stockpiles, construction staging, batch plants, and traffic associated with construction on local roadways, and identify potential impacts from these activities on local streets, residents, air quality, traffic, noise, etc. Local land use and construction permitting may be required, and if this Project DEIR does not adequately address the impacts of construction-related activities on the local community, the City of West Sacramento may determine that such activities are considered "projects" under CEQA and require environmental review and a determination as part of the construction-related project's analysis and evaluation. 12
13. On Page 3-4, the document includes a reference to a "drainage facility in West Sacramento. Please identify the drainage facility, indicate who is responsible for it, and if there would any upstream or downstream impacts. 13
14. The City of West Sacramento has met on two occasions with Caltrans pertaining to the proposed Park and Ride lot at the northeast corner of Lake Road and Enterprise Boulevard and the existing Park and Ride lot at the corner of Enterprise Blvd./West Capitol Avenue. The preliminary design of the new Park and Ride facility proposed by Caltrans on Lake Road was not supported as it did not meet a significant number of landscape, security, pedestrian safety, EV charging, and mobility requirements as dictated by the West Sacramento Parking Area Design Standards and the West Sacramento Mobility Action Plan. At the most recent meeting between the City of West Sacramento, Yolo County Transportation District (YTD), Sacramento Area Council of Governments (SACOG), and Caltrans, the city made it clear that a park and ride was not meeting local expectations for supporting transit, mobility, and active transportation goals. The City provided design recommendations including, but not limited to the following: 14
    a) Parking lot design must conform with Chapter 17.27.090 of the Municipal Code. Construction of this facility is only compatible with the current land use designation when designed in accordance with city standards.
    b) Proposed 300 parking spaces must be shaded by canopy trees to reduce the urban heat island effect, and landscaping must be proposed in accordance with the Landscape Development Guidelines of the City of West Sacramento.
    c) Parking lot design must include efficient lighting for public safety.
    d) Pedestrian circulation and access must be planned to accommodate those with disabilities.

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e) EV charging must be provided at a minimum standard of 1 Level 2 (L2) EV charge port for every 5 parking spaces by code. The City is amenable to discussing a swap of Direct Current Fast Chargers (DCFC) in place of the L2 ports required in the amount of 1 DCFC port for every 50 parking spaces minimum in exchange for the required 60 Level 2 Chargers with approval of the Community Development Director. At least one DCFC port must be accessible for transit vehicles (pull through space) to support regional electric bus and local electric micro-transit service.

f) As supported by SACOG and as policy dictated in the City's Mobility Action Plan, this park and ride facility must include transit, pedestrian, and bicycle access and support amenities consistent with a Regional Mobility Hub designed to promote transit use, support active transportation, and reduce VMT/GHG. Mobility hub amenities include the following:

   i. Secure Bicycle lockers (1 per 10 spaces)
   ii. Bus Shelter(s)
   iii. Bike/Scooter Share Racks supporting regional micro-mobility
   iv. Passenger Pickup and Waiting Areas
   v. Transit Vehicle Turn Out
   vi. EV Charging
   vii. Real Time passenger information systems
   viii. CCTV Security Cameras

The City provided an electronic mark-up of the initial design submitted by Caltrans to city staff showing how the City's requirements can be met without reducing the number of spaces available. No follow-up for discussion was scheduled by Caltrans.

14 cont.

15. In 2018, early in the community engagement process for this project, the City of West Sacramento communicated the need to connect bicycle facilities on Enterprise Boulevard with West Capitol Avenue where I-80 currently prohibits bicycle connectivity. There are no bicycle lanes under I-80 on Enterprise Blvd., and sidewalk exists only on the north side. Caltrans expressed a firm commitment to improving bicycle and pedestrian connectivity north and south of the state highway which the City proposed evaluating three options at the community workshop:

    a. Connect the existing bike path under Yolo Causeway by way of Tule Jake Road, under I-80 adjacent to Prospect Slough to Lake Road.
    b. Widen the Enterprise Blvd. underpass to provide NB and SB bike lanes.
    c. Provide a single multiuse path (tunnel) from under I-80 on the east side of Enterprise.

    The last option would have the benefit of connecting Caltrans' north park and ride facility with that proposed on the south. The City reminded Caltrans of this important issue multiple times, including to the Project Manager months prior to the release of the EIR/EA, which does not address this issue or evaluate any options expressed. This is concerning because Caltrans' own study completed February 2023 (Yolo 80 Corridor Improvements Project Draft Pedestrian and Bicyclist Travel Impact Assessment) recommends the following to be implemented with this project:

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"At the Enterprise Boulevard/West Capitol Boulevard interchange area where traffic volume changes are less substantial, but where the interchange represents a significant gap in pedestrian and bicycle infrastructure that significantly limits access to the Yolo Causeway bicycle path, the following recommendations were identified to close the current pedestrian and bicycle infrastructure gap:

• At eastbound ramp intersection: reconstruct pedestrian ramps to current ADA standards. (A pedestrian ramp upgrade is planned as part of the 03-4F650 project to be completed prior to construction of this project.)

• At westbound direct on-ramp: enhance the marked crosswalk with rapid rectangular flashing beacons; reconstruct pedestrian ramps to current ADA standards.

• At westbound ramp intersection: provide marked crosswalks and pedestrian crossing warning signs for free-flowing right-turns; reconstruct pedestrian ramps to current ADA standards. (A pedestrian ramp upgrade is planned as part of the 03-4F650 project to be completed prior to construction of this project).

• On Enterprise Boulevard/West Capitol Avenue: restripe roadway between the westbound ramps and Lake Road within project work area to provide Class II bike lanes in accordance with current CA MUTCD standards. Outcomes could be enhanced in future planning efforts by coordinating with West Sacramento to provide bicycle facilities between Lake Road and the existing bike lanes at the intersection of Industrial Boulevard and/or the potential future bridge crossing over the existing shipping channel."

15 cont.

The proposed resurfacing of the existing bike path north of West Capitol Avenue does not address a mobility deficiency, contribute to reducing VMT/GHG, nor does it address a serious safety concern created by the state highway system. We request that the options proposed by the City be evaluated and considered with this project, and at minimum, Caltrans' own recommendations be implemented with this project to protect the safety, health and welfare of West Sacramento residents.

16. Travel Forecasts and VMT evaluated for the project that are included in the Travel Demand Modeling Report do not appear to include the Enterprise Crossing in the future condition. The Enterprise Crossing is a planned 2 to 4-lane multi-modal bridge crossing connecting Enterprise Boulevard with Southport Parkway over the existing Deep-Water Ship Channel serving the Port of West Sacramento. The project is identified in the Metropolitan Transportation Plan-Sustainable Communities Strategy (MTP-SCS) as YOL19434 – Enterprise Crossing with a completion timing of 2026-2030. The project has also been included in the West Sacramento General Plan since the 1990s. The Project Approvals and Environmental Document (PA&ED) Project Development Phase has been initiated with contract approval anticipated January 2024. Traffic analysis for the bridge was evaluated by the Port of West Sacramento in April 2022 (Mott MacDonald) which showed an opening day of 7,700 AADT with a Year 2040+ of 16,000 AADT. Enterprise Boulevard from Channel Drive to I-80/US 50 interchange at Enterprise to grow from the existing 18,400 AADT to 33,000 AADT in Cumulative year 2040+. For years the General Plan has anticipated an estimated 20,000 to 40,000 daily trips to the I-80/US 50 corridor at Enterprise/West Capitol Avenue on/off ramps, including a shift in truck trips from Harbor Blvd to Enterprise as this new bridge would reduce VMT for trips to Southport Industrial Park. 16

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This projected travel data does not appear to correspond with the data provided in the travel forecasting information for the Managed Lane Project prepared by Fehr and Peers. There is very little difference between the 2019 Existing Condition and the 2029 No Build Alternative, amounting to a difference of only 5,487 trips. For 2040 the volumes only increase 100 trips, and in some alternatives, they actually drop below 2029 levels. Although the City of West Sacramento on multiple occasions informed Caltrans of the Enterprise Bridge Project, and although it is identified in the Forecasts report, it does not appear that the EIR considers the Enterprise Bridge Project. Please confirm that the Enterprise Crossing project and the estimated AADT has been included in the Traffic analysis for the EIR. 16 cont.

If you have any questions, please contact me at (916) 617-4645 or via email at: andreao@cityofwestsacramento.org.

Sincerely,

Andrea Ouse, AICP
Community Development Director

Cc: Aaron Laurel, City Manager
Amanda Berlin, Assistant City Manager
Daniel Berumen, AICP, Senior Planner
David Tilley, Principal Planner
Jason McCoy, Supervising Transportation Planner

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Response to Comment 1 in 20240110, City of West Sacramento

The commenter asks if Bus Rapid Transit has been considered to minimize traffic impacts. While Bus Rapid Transit was not specifically considered, increased transit service and Capital Corridor Rail frequency have been included as part of the VMT mitigation plan which is summarized in AMM TRANS-1 in Section 2.1.10 and Section 3.2.17 of the Draft EIR/EA. Subsequent coordination with local agencies and stakeholders have resulted in a contribution to expand YoloBus Route 42 has been added to measures to reduce VMT in Table 2.1-27 of the Final EIR/EA.

Response to Comment 2 in 20240110, City of West Sacramento

The commenter asks if there will be an increase in the frequency of public transit. Yes, increased service frequency for multiple public transit routes, including the Causeway Connection Route 138, Capitol Corridor, and Unitrans services, are included in AMM TRANS-1 which is described in Section 2.1.10 and Section 3.2.17 of the Draft EIR/EA. Measures have been updated in the Final EIR/EA to reflect refinement that has occurred through coordination with local agencies and stakeholders.

Response to Comment 3 in 20240110, City of West Sacramento

The commenter asks if managed lanes will be active all week. A Concept of Operations for the corridor is currently being developed to help identify potential hours of operations for the managed lane alternatives. However, if a toll lane alternative is selected, 7 days a week operation would be a serious consideration due to the traffic impacts mentioned by the commenter. The transportation analysis for the project was conducted using typical weekday traffic data in order to capture the peak travel periods of the corridor, as the magnitude of weekday traffic is much higher than weekends. Further analysis will be conducted to evaluate the potential for weekend managed lane hours of operation. No changes to the Draft EIR/EA are necessary.

Response to Comment 4 in 20240110, City of West Sacramento

The commenter asks what measures would be taken to implement a Voluntary Trip Reduction Program in Yolo County. As part of mitigation measures TRANS-1, Caltrans would contribute to the Voluntary Trip Reduction Program, which would help fund the current approved program implemented by Yolo Commute, the Yolo County transportation management association. As indicated in Table 2.1-27 of the Draft EIR/EA, the program includes features such as community-based travel planning, ridesharing, transit pass subsidies, and pay-per-mile auto insurance. Yolo County would not be the implementing agency for this program, as Yolo Commute is the implementing agency for the Voluntary Trip Reduction Program. However, Yolo Commute coordinates with all its local stakeholders and constituents when performing outreach and implementing the program.

Response to Comment 5 in 20240110, City of West Sacramento

The commenter is correct that the Southport area is not built out. The referenced sentence in Section 2.1.5.1 of the Draft EIR/EA was revised for clarity by removing the statement "and is now nearly built out."

The growth analysis includes the assumptions for growth contained in the City of West Sacramento 2035 General Plan and associated Specific Plans. As noted in the City of West Sacramento 2035 General Plan Policy Document: "*The city is at a major crossroads as the new 2035 General Plan focuses the city's future growth within the existing city limits. The pace of future growth is not likely to slow. As remaining development capacity in the Southport villages continues to be absorbed, new development and redevelopment will also begin in the city's waterfront mixed-use districts.*"[3] As noted in the Draft EIR/EA, the growth analysis and SACOG forecast model include assumed growth in West Sacramento consistent with the General Plan and Specific Plans for residential and mixed-use development, including development plans in Southport and the Port of West Sacramento areas.

Response to Comment 6 in 20240110, City of West Sacramento

Please refer to Master Response E for responses related to equity.

Response to Comment 7 in 20240110, City of West Sacramento

The bottleneck at US 50/Jefferson Boulevard is a result of the short weave distance between the US 50/I-5 and US 50/Jefferson Boulevard interchanges. Furthermore, there is heavy traffic demand that enters US 50 from I-5. This congestion could be reduced by interchange reconfiguration and/or improvements that are not within the scope of this project.

The bottlenecks at US 50/I-80 and I-80/Reed Avenue are also due to high demand (i.e., large traffic volume) for both the US 50 WB to I-80 EB connector and I-80 WB to Reed Avenue off-ramp. These bottlenecks improve with multiple project alternatives; however, the congestion could also be further alleviated with interchange reconfiguration and/or improvements that are not within the scope of this project.

Response to Comment 8 in 20240110, City of West Sacramento

The commenter asks about mitigation for Swainson's hawk foraging habitat. Draft EIR/EA Section 3.2.4, *Swainson's Hawk* summarizes the technical findings of Caltrans environmental analysis on potential impacts to Swainson's hawk. Based on technical review, foraging habitat that would be impacted is already degraded by proximity to roadways and other forms of anthropogenic disturbance. Caltrans has proposed two species-specific measures (AMM BIO-31 and Mitigation Measure BIO-32) that are expected to reduce impacts to below the level of

[3] City of West Sacramento. 2016. City of West Sacramento 2035 General Plan Policy Document. November. Updated January 2024. Available: https://www.cityofwestsacramento.org/home/showpublisheddocument/18212/638421374385370000. Accessed: February 22, 2024.

significance. Based on this finding, Caltrans has determined that compensatory mitigation for the loss of foraging habitat is not required.

Additionally, please see Response to Comment 16 in 20240112, California Department of Fish and Wildlife, regarding Caltrans participation in habitat conservation plans (HCPs). No changes to the Draft EIR/EA are necessary.

Response to Comment 9 in 20240110, City of West Sacramento

Caltrans standard protocol if human remains are found during construction activities is provided in Standard Measure CR-4 which is listed in Appendix E of the Draft EIR/EA. This measure conforms with the State Health and Safety Code and the Native American Graves Protection Act. This measure is referenced and summarized in Section 2.1.12 of the Draft EIR/EA. No changes to the Draft EIR/EA are necessary.

Response to Comment 10 in 20240110, City of West Sacramento

The commenter states that Chapter 3 of the document is unclear if West Sacramento sensitive receptors (Valhalla, Meadowdale, Sikh Temple school, etc.) would be impacted. Chapter 3 summarizes analysis from Chapter 2 and provides impact conclusions under CEQA, as indicated in the introductory text to Section 3.2.13 directing the reader to the Noise Section in Chapter 2. This was misnumbered as 2.2.7, rather than 2.2.8, in the Draft EIR/EA. That typographical error is revised in the Final EIR/EA.

Valhalla, Meadowdale, and the Sikh Temple school are included in the noise analysis as Category 3, noise-sensitive land uses. Section 2.2.8 provides greater detail about the analysis and impacts related to noise. The locations the commenter refers to specifically are illustrated in Figures 2.2-13 and 2.2-14 in the Draft EIR/EA. Noise modelling results are provided in Table 2.2-18 of the Draft EIR/EA. The table indicates no noise increase at Valhalla (ST-34), an increase of 1dBA under Alternative 2A and no increase under other alternatives at Meadowdale Park (ST-38), and minimal noise increase under all alternatives except Alternative 7A at the school near the Sikh Temple (R-69). The impact is less than significant.

Response to Comment 11 in 20240110, City of West Sacramento

The commenter states that more detail should be included on emergency access per the West Sacramento Fire Department. Standard measures have been incorporated into the project to maintain access for emergency services and are listed in Appendix E of the Draft EIR/EA.Standard Measure TT-3 would require the preparation of a TMP to maintain access for emergency services throughout all phases of construction. The TMP is prepared before construction to plan for maintaining access for police, fire, and medical services along I-80/US-50 in the project area during construction.

Standard Measure COM-1 has also been implemented into the project and would require a planned public outreach program to keep the area emergency service providers, including the West Sac Fire Department, informed of the project construction schedule.

Response to Comment 12 in 20240110, City of West Sacramento

Construction-related impacts were evaluated in the Draft EIR/EA. Temporary Construction Easements (TCE) and staging areas were identified in Section 1.3.1.1, Common Design Features of the Build Alternatives (Right of Way and Temporary Construction Easements and Staging). As these locations were identified, they were included in Caltrans' review for environmental impacts. No changes to the Draft EIR/EA are necessary.

Response to Comment 13 in 20240110, City of West Sacramento

The commenter states in Section 3.2.1.3, Build Alternatives 2a and 2b, of the Draft EIR/EA that a drainage facility in West Sacramento is mentioned. The commenter asks to identify the drainage facility, indicate who is responsible for it, and if there would be any upstream or downstream impacts.

Please refer to the Draft EIR/EA Chapter 1, Figure 1.3-1, sheet 3 of 16 indicates a temporary construction easement (TCE) on the north and the south side of Yolo 80, just west of the 50/80 interchange, which are located on the upstream and downstream sides of an existing 8-feet by 6-feet Reinforced Concrete Box (RCB) culvert. The culvert work, as included in the Environmental Study Limit (ESL) and environmentally reviewed in the Draft EIR/EA, will allow for future maintenance of the RCB by the City of West Sacramento or Caltrans. On the same Figure 1.3-1, sheet 6 of 16, a construction easement south of I-80 near Lake Road, is for cleaning the downstream end of an existing storm drain culvert. Upstream or downstream impacts from the culverts are not expected.

Response to Comment 14 in 20240110, City of West Sacramento

Caltrans will take the design elements and constraints presented by the commenter into consideration as the design of the Mobility Hub progresses. Caltrans will implement all or as many design features listed as possible, within sound engineering reasoning and within existing constraints. Caltrans will coordinate with the City as design progresses to ensure all parties are satisfied with the Mobility Hub design and features. In addition, please refer to Master Response G for responses related to mobility hub Improvements.

Response to Comment 15 in 20240110, City of West Sacramento

Caltrans will evaluate the potential active transportation enhancement options presented by the commenter, to fit within sound engineering reasoning and existing constraints, as design progresses. Caltrans will also be sure to have coordination meetings with the City to ensure all parties are satisfied with improvements proposed for the project. Also, please refer to Master Response F for responses related to improvements to the existing Bicycle/Pedestrian Path.

Response to Comment 16 in 20240110, City of West Sacramento

Forecasted volumes were prepared using the SACSIM travel demand model. Opening year 2029 forecasts were prepared using a linear interpolation of final vehicle trip matrices between each alternative-specific 2027 and 2040 scenario, accounting for 2 out of 13 years of growth. Interpolated growth between 2029 and 2040 vehicle trip matrices was calculated on the matrix

total and then applied to each origin and destination Traffic Analysis Zone (TAZ) pair in the study area. Trip assignment of the final 2029 vehicle trip matrices was then run on each project-specific 2029 network. Similarly, the horizon year 2049 forecasts were developed using extrapolation of final vehicle trip matrices beyond the refined 2040 scenario. The growth rate between the base year 2016 and future year 2040 might not follow a linear growth pattern within the study area. Therefore, the vehicle trip matrices among the available SACSIM model years (2027, 2035, and 2040) were reviewed to compare growth rates. Based on this review, the growth rate between 2035 and 2040 was selected to extrapolate to 2049.

The numbers cited in the comment cannot be verified as the comment does not provide the source of these numbers.

In Section 2.1.10, *Traffic and Transportation*, and Section 3.2.17, *Transportation,* of the Draft EIR/EA include a summary of analysis of Alternative 2 (addition of an HOV2 lane with the Enterprise Crossing) and Alternative 9 (addition of an HOV2 lane without the Enterprise Crossing). Forecasts, including project ADT, for each alternative are included in the appendix of the Traffic Analysis Report (TAR). The TAR is available on the project website with the Final EIR/EA (https://dot.ca.gov/caltrans-near-me/district-3/d3-projects/d3-i80-corridor-improvements).

No changes to the Draft EIR/EA are necessary.

20240112, California Department of Fish and Wildlife

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January 12, 2024

Mike Bartlett
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Subject: YOLO 80 CORRIDOR IMPROVEMENTS PROJECT
DRAFT ENVIRONMENTAL IMPACT REPORT (DEIR)
SCH No. 2021060117

Dear Mike Bartlett:

The California Department of Fish and Wildlife (CDFW) received and reviewed the Notice of Availability of a DEIR from the State of California Department of Transportation (Caltrans) for the Yolo 80 Corridor Improvements Project (Project) pursuant the California Environmental Quality Act (CEQA) statute and guidelines.[1]

Thank you for the opportunity to provide comments and recommendations regarding those activities involved in the Project that may affect California fish, wildlife, native plants, and their habitat. Likewise, we appreciate the opportunity to provide comments regarding those aspects of the Project that CDFW, by law, may need to exercise its own regulatory authority under the Fish and Game Code (Fish & G. Code).

CDFW ROLE 1

CDFW is California's Trustee Agency for fish and wildlife resources and holds those resources in trust by statute for all the people of the State (Fish & G. Code, §§ 711.7, subd. (a) & 1802; Pub. Resources Code, § 21070; CEQA Guidelines § 15386, subd. (a)). CDFW, in its trustee capacity, has jurisdiction over the conservation, protection, and management of fish, wildlife, native plants, and habitat necessary for biologically sustainable populations of those species. (Fish & G. Code, § 1802.) Similarly for purposes of CEQA, CDFW provides, as available, biological expertise during public agency environmental review efforts, focusing specifically on projects and related activities that have the potential to adversely affect fish and wildlife resources.

[1] CEQA is codified in the California Public Resources Code in section 21000 et seq. The "CEQA Guidelines" are found in Title 14 of the California Code of Regulations, commencing with section 15000.

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CDFW may also act as a Responsible Agency under CEQA. (Pub. Resources Code, § 21069; CEQA Guidelines, § 15381.) CDFW expects that it may need to exercise regulatory authority as provided by the Fish and Game Code. As proposed, for example, the Project may be subject to CDFW's lake and streambed alteration regulatory authority. (Fish & G. Code, § 1600 et seq.) Likewise, to the extent implementation of the Project as proposed may result in "take" as defined by State law of any species protected under the California Endangered Species Act (CESA) (Fish & G. Code, § 2050 et seq.), the project proponent may seek related take authorization as provided by the Fish and Game Code.

PROJECT DESCRIPTION SUMMARY

The Project site is located along Interstate 80 (I-80) and U.S. Route 50 (US-50) from Kidwell Road near the eastern Solano County boundary (near Dixon), through Yolo County, and to West El Camino Avenue on I-80 and Interstate 5 (I-5) on US-50 in Sacramento County. 1 cont.

The Project consists of constructing improvements consisting of managed lanes, pedestrian/bicycle facilities, and an Intelligent Transportation System (ITS) element. The project would add managed lanes on I-80 and US-50 by a combination of lane conversion, restriping, and shoulder and median reconstruction with a concrete barrier. Drainage modifications would be required due to median reconstruction in the locations to which sheet flow currently drains. The existing ITS elements and infrastructure would be expanded and modified and would include ramp meters, fiber-optic conduit and cables, and overhead signs. Utility relocation would also occur.

COMMENTS AND RECOMMENDATIONS

CDFW offers the comments and recommendations below to assist Caltrans in adequately identifying and, where appropriate, mitigating the Project's significant, or potentially significant, direct and indirect impacts on fish and wildlife (biological) resources. Based on the potential for the Project to have a significant impact on biological resources, CDFW concludes that an Environmental Impact Report is appropriate for the Project.

COMMENT 1: Chapter 2: Bat Species, page 2-324.

Issue: Bats are considered non-game mammals and are protected by state law from take and/or harassment (Fish and Game Code §4150, CCR §251.1). Impacts may be considered potentially significant unless adequate mitigation is incorporated. The Bat Species section acknowledges the presence of the known bat maternity colony within the Yolo Causeway bridge structure and states that, "No construction would occur on the existing bridge over the Yolo Causeway, so the maternity colony that roosts under the bridge would not be directly impacted." However, the proximity of the project to the colony would likely cause disturbance to the colony if effective avoidance measures are 2

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not included in the EIR. Disturbance of roost sites during the maternity and hibernation seasons are considered primary factors that may negatively impact bats and have the potential to result in take. During the hibernation period, bats are very slow to respond to disturbance and can lose fat stores needed to survive the winter while pups in the maternity colony may not have the ability to fly. The EIR does not have sufficient and enforceable avoidance measures to reduce impacts to the colony to a less than significant level. For mitigation measures to be effective, they must be specific, enforceable, and feasible actions that will reduce the environmental impacts from the project to a less than significant level. 2 cont.

Recommendation: CDFW recommends the EIR include a fully enforceable avoidance measure restricting all construction activities within 500 feet of the Yolo Causeway bridge structure from March 1 through August 31 annually. CDFW does not support eviction of bats during the maternity or hibernation periods (March 1 through August 31 annually). Construction activities and/or installation of bat exclusion devices on the Yolo Causeway structure between March 1 and August 31 annually is considered a significant impact.

COMMENT 2: Chapter 1: Table S-2 Biological Resources Summary, page 17.

Issue: The Biological Resources section, environmental topic (d) of Table S-2 Summary of California Environmental Quality Act (CEQA) Impacts reads, "[will the Project] interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors or impede the use of native wildlife nursery sites." All alternatives are listed as having "No Impact." The maternity colony in the Yolo Causeway bridge is considered a native wildlife nursery site. Proposed temporary disturbances from construction, cumulative impacts from past, on-going, and reasonably foreseeable projects, as well as long-term impacts from maintenance and light pollution have the potential to impact this nursery site.

Recommendation: CDFW recommends the EIR include a scientifically supported discussion of potential direct, indirect, and cumulative impacts to nursery sites from lighting, noise, human activity, and wildlife-human interactions created by Project activities. The EIR should define the threshold of significance for each impact and describe the criteria used to determine whether the impacts are significant (CEQA Guidelines, § 15064, subd. (f)). The EIR must demonstrate that the significant environmental impacts of the Project were adequately investigated and discussed, and it must permit the significant effects of the Project to be considered in the full environmental context. 3

The EIR should include scientifically supported appropriate and adequate avoidance, minimization, and/or mitigation measures for all direct, indirect, and cumulative impacts that are expected to occur as a result of construction and long-term operation and maintenance of the Project. Mitigation must be roughly proportional to the level of

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impacts, including cumulative impacts, in accordance with the provisions of CEQA (Guidelines § § 15126.4(a)(4)(B), 15064, 15065, and 16355). 3 cont.

COMMENT 3: Chapter 2: Section 2.4.5.17, Animal Species, Cumulative Impacts, page 2-384.

Issue: This section acknowledges current and reasonably foreseeable future actions that could result in land use activities and impacts on animal species. It goes on to state that the relevant projects that would be constructed within the Project construction period could result in permanent and temporary impacts on animal species if vegetation removal, grubbing and grading, pile driving, operation of vehicles, heavy equipment operation, and earth-moving operations are required. It concludes that because "…each relevant project would be required to implement avoidance, minimization, and mitigation measures as necessary, the Project would not result in a cumulatively considerable impact on animal species. Thus, this section does not recommend additional avoidance and minimization measures for cumulative impacts to animal species."

The EIR's cumulative impacts analysis describes increased noise and vibration levels to parks and recreation facilities and also states that nighttime construction lighting, glare, construction equipment, staging areas, demolition, and other construction-related activities from multiple projects may contribute to cumulative visual impacts. However, the EIR does not analyze the impact of construction related noise, vibration, or lighting on animal species including but not limited to day roosting bats and purple martin. 4

Bats
For roosting bats, on-going construction related noise, light, and vibration impacts from the Yolo Pavement Rehabilitation Project (EA 03-4F650) are of particular concern. The Yolo Pavement Rehabilitation Project is in active construction on the Yolo Causeway bridge deck. Construction activities were continuous through the 2023 maternity season. Routine monitoring of the Yolo Causeway bridge maternity colony by local bat researchers resulted in the anecdotal observation of abnormal and unpredictable colony egress pathways in areas where active construction was taking place on the bridge deck (Quirk, Mary Jean of the Yolo Basin Foundation. Interview. Conducted by Melissa Stanfield. Jan. 3, 2024). This change in behavior was previously undocumented at the Yolo Causeway bridge. Although a change in egress pathways cannot be definitively linked to construction activities, behavioral changes as a response to construction should be analyzed as potential impacts. Additionally, it is well documented that construction related disturbance has the potential to impact day roosting bats (Johnston et. al 2004, Johnston et. al 2019).

Disturbance caused by project implementation that results in post-construction roost abandonment is considered a permanent impact (Johnston et. al, 2019). The most common type of permanent, post-construction disturbance is from light pollution. Any direct or indirect artificial lighting has the potential to degrade or eliminate roosts or potential roosting habitat (Johnston et. al, 2019). Noise disturbance and displacement of

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bats from roosts or important foraging areas can potentially result in reduced survivability of individuals from increased susceptibility to predation, reduced quality of thermal and social environments, and decreased foraging efficiencies (Johnston et. al, 2019).

Purple Martin
The EIR should also analyze cumulative impacts to the Sacramento population of purple martins regarding the US-50 Multimodal Corridor Enhancement and Rehabilitation Project, I-5 Corridor Improvement Project (FixSac5), and I Street Bridge Replacement. During this analysis, Caltrans should discuss when the Project's incremental effect is cumulatively considerable and examine impacts that are created as a result of the combination of the project evaluated in the EIR together with other projects that may cause or have already caused related impacts. There are multiple colonies throughout the Sacramento area that nest in highway overpasses and elevated freeway sections and have been subject to transportation related construction activity during the nesting season (i.e., 35th Street, S Street, 29th and R Streets, and Redding Avenue colonies). This project and the FixSac5 project could further subject local colonies (i.e., 19th Street/Freeport Boulevard) to continued disturbance during the nesting season. The I Street Bridge replacement project will result in the permanent removal of a known nesting colony. Protection of colonies from construction disturbance is a critical component to a longer-term conservation program for the species (Airola 2020). Caltrans District 3 is familiar with the impacts associated with colonies that were disturbed during the US-50 Multimodal Corridor Enhancement and Rehabilitation Project and has coordinated with CDFW and local experts on purple martins in the past. 4 cont.

Recommendation: The EIR should analyze the impact of construction related noise, vibration, or lighting on animal species including but not limited to day roosting bats and purple martin.

Bats
CDFW recommends the EIR provide scientifically supported discussions regarding adequate analysis, and avoidance, minimization, and/or mitigation measures to address the Project's significant impacts upon any resident or maternity colonies within the biological study area (BSA). The cumulative effects of construction noise on bats, the frequency of noise generated and the hearing sensitivity of the bat species at risk should be evaluated in the EIR and mitigated to a less than significant level. Mitigation must be roughly proportional to the level of impacts, in accordance with the provisions of CEQA (Guidelines § § 15126.4(a)(4)(B), 15064, 15065, and 16355). In order for mitigation measures to be effective, they must be specific, enforceable, and feasible actions.

Purple Martin
CDFW recommends the EIR provide scientifically supported discussions regarding adequate analysis, avoidance, and/or mitigation measures to address the Project's significant impacts upon purple martin. Nest exclusion can cause declines and

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permanent abandonment of colony sites (Airola and Grantham 2003) and should not be prescribed as a mitigation measure without first consulting with CDFW and local species experts. In addition, if the Project has the potential to impact nests or colonies, the installation of nest boxes as a form of compensatory mitigation should not be considered as they have shown to be ineffective in the Sacramento Valley (Airola, Dan. Interview. Conducted by Melissa Stanfield. Feb. 16, 2023). CDFW recommends continued coordination occur for this and other upcoming projects to identify and implement additional conservation efforts for the species that at a minimum should include full avoidance of known nest sites and funding purple martin research. 4 cont.

COMMENT 4: Chapter 2, Section 2.3.4.4 Avoidance, Minimization, and/or Mitigation Measures. AMM BIO-13 Pre-construction Bat Surveys, page 2-327.

Issue: As currently written, the pre-construction bat survey appears to apply only to maternity colonies and areas identified as moderate or high presence potential for maternity colonies; however, all bats are considered non-game mammals and are afforded protection by state law from take and/or harassment, not just maternity colonies (Fish & G. Code, § 4150; Cal. Code of Regs, § 251.1). The purpose of pre-construction surveys should be to confirm the presence or absence of colonies and/or individuals within the entirety of the Project footprint. Given the size of the Project footprint, one pre-construction survey prior to the start of construction activities may not be sufficient to detect occupied roosts. Furthermore, the measure states "if any maternal colonies are detected, a qualified biologist will determine and implement appropriate conservation measures." This measure is not enforceable as it defers development of conservation measures to a future time, when it is known that a maternal colony is present. 5

Recommendation: CDFW recommends AMM BIO-13 be revised to phase pre-construction surveys and ensure they are conducted prior to the start of construction activities in all previously undisturbed areas or areas where no construction has occurred for 14 days or longer. In addition, pre-construction survey methods consistent with *Caltrans Bat Mitigation: A Guide to Developing Feasible and Effective Solutions (Johnston et. al, 2019)* should be included in BIO-13. The qualified biologists performing pre-construction surveys should be approved by CDFW prior to initiating surveys. Survey results including personnel, timing, methods, and results should be provided to CDFW no later than 10 days following the survey and prior to the start of construction. If an occupied roost site is detected, construction should not commence until CDFW has been consulted and provided written concurrence that construction may commence. The EIR should include fully enforceable measures to mitigate potentially significant impacts and should not defer these measures to a future time (CEQA Guidelines § 15126.4).

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COMMENT 5: Chapter 2, Section 2.3.4.4 Avoidance, Minimization, and/or Mitigation Measures. AMM BIO-14 Bat Protection Plan, page 2-328.

Issue: The EIR should include fully enforceable measures to mitigate potentially significant impacts and should not defer these measures to a future time (CEQA Guidelines § 15126.4). As currently written, the measure does not outline or set minimum standards of what should be included in the Bat Protection Plan (plan). The measure does not identify when the plan would be prepared, or who would be responsible for preparing, reviewing, or implementing it. The measure also does not define the plan area or establish criteria for plan success or contingency measures if implementation fails or cannot be completed. Without specific Bat Protection Plan goals, content, and enforceability, this measure does not mitigate project impacts to a less than significant level. 6

Recommendation: CDFW recommends BIO-14 be reworded as follows:
A bat species protection survey plan will be developed by a qualified biologist and submitted to CDFW for review and approval no later than 60 days prior to the start of construction activities. The plan shall include but not be limited to a description of the plan area, survey methods, surveyor qualifications, recommended protective buffers, construction monitoring, and post-construction monitoring consistent with *Caltrans Bat Mitigation: A Guide to Developing Feasible and Effective Solutions (Johnston et. al, 2019).*

COMMENT 6: Chapter 2, Section 2.3.4.4 Avoidance, Minimization, and/or Mitigation Measures. AMM BIO-15 Structural Changes to Bat Roosting Habitat, page 2-328.

Issue: As BIO-15 is currently written, it is unclear when structural changes to bat roosting habitat would be warranted, who will be performing those activities, what materials are proposed for use, and whether impacts from those activities will require need to be mitigated. Temporary or permanent exclusion efforts may lead to an increase in localized human-wildlife conflict as the bats attempt to find alternative roosting sites; therefore, compensatory mitigation in the form of replacement roost habitat is necessary to mitigate impacts to a less than significant level. 7

Recommendation: CDFW recommends BIO-15 be revised to include a Bat Exclusion Plan be prepared and provided to CDFW for review and approval no later than 10 days prior to the exclusion of any bat roost. Exclusion should only occur when absolutely necessary, be installed by a CDFW-approved qualified biologist, and should never occur during the maternity season (i.e. March 1 – August 31).

COMMENT 7: Potential for Project Activities to Result in Injured Wildlife

Issue: The Project does not describe how bats or other wildlife incidentally injured as a result of construction activities will be addressed. 8

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Recommendation: CDFW recommends that the cost of reasonable, licensed rehabilitation efforts for any injured bats or other wildlife taken to wildlife care facilities from the Project area should be assumed in full by Caltrans. 8 cont.

COMMENT 8: Lighting Impacts on Biological Resources

Issue: All build alternatives appear to propose new temporary and permanent lighting. Temporary nighttime lighting would occur during nighttime construction work activities. Both temporary and permanent signage throughout the Project would use reflective lettering. Permanent street lighting would be added near CR-32A at the proposed bicycle pathway extension adjacent to the westbound off-ramp. Within Segment 2, bridge deck lighting with Type 21 Barrier-Rail-Mounted Lighting Standards would be constructed. Additional street lighting would be added to the Bryte Bend Bridge (I-80 Sacramento River Bridge Overhead), but it may also be added at proposed auxiliary lane locations if determined necessary during the design phase. Existing ITS elements to be installed also include a minimum of 42 overhead signs including changeable message signs. The EIR does not analyze impacts to biological resources resulting from temporary and permanent light pollution.

New lighting, especially in areas where no lighting or low levels of lighting currently exist, has potential for significant impacts to occur that could result in a finding of significance. Artificial light spillage beyond the prism of the roadway into natural areas may result in a potentially significant impact through substantial degradation of the quality of the environment. Artificial light pollution also has the potential to significantly and adversely affect biological resources and the habitat that supports them. Unlike the natural brightness created by the monthly cycle of the moon, the permanent and continuously powered lighting fixtures create an unnatural light regime that produces a constant light output. Continuous light output for 365 days a year can also have cumulatively significant impacts on fish and wildlife populations. 9

Artificial night lighting can disrupt the circadian rhythms of many wildlife species. Many species use photoperiod cues for communication (e.g., bird song), determining when to begin foraging (Stone et al. 2009), behavior thermoregulation (Beiswenger 1977), and migration (Longcore and Rich 2004). Artificial night lighting has also been found to impact juvenile salmonid overwintering success by delaying the emergence of salmonids from benthic refugia and reducing their ability to feed during the winter (Contor and Griffith 1995). For nocturnally migrating birds, direct mortality resulting from collisions with anthropogenic structures due to attraction to light (Gauthreux, 2006) is another direct effect of artificial light pollution. There are also more subtle effects, such as disrupted orientation (Poot et al. 2008) and changes in habitat selection (McLaren et al. 2018). There is also growing evidence that light pollution alters behavior at regional scales, with migrants occupying urban centers at higher-than-expected rates as a function of urban illumination (La Sorte et al. 2021). While artificial light pollution can act as an attractant at both regional (La Sorte et al. 2021) and local (Van Doren et al. 2017)

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scales, there is also evidence of migrating birds avoiding strongly lit areas when selecting critical resting sites needed to rebuild energy stores (McLaren et al. 2018).

Recommendation: Due to the high potential for songbirds, marsh-birds, migratory birds, salmonids and nocturnally active State listed and special status species, CDFW strongly recommends that no new or replacement artificial lighting is installed as a result of Project completion. If the installation of artificial lighting is unavoidable, CDFW recommends the following mitigation measures be incorporated into the EIR:

Recommended Mitigation Measure 1 – Light Output Analysis: Isolux Diagrams that note current light levels present during pre-Project conditions and the predicted Project light levels that will be created upon completion of the Project shall be included in the EIR. If an increase in light output from current levels to the projected future levels is evident, additional avoidance, minimization or mitigation measures shall be developed in coordination with the natural resource agencies to offset indirect impacts to special status species. Within 60 days of Project completion, the lead agency shall conduct a ground survey that compares projected future light levels with actual light levels achieved upon completion of the Project through comparison of Isolux diagrams. If an increase from the projected levels to the actual levels is discovered, additional avoidance, minimization or mitigation measures may also be required in coordination with the natural resource agencies. This analysis should be conducted across all potential alternatives and compared in table and map format.

Recommended Mitigation Measure 2 – Light Output Limits: All LED's or bulbs installed as a result of the Project shall be rated to emit or produce light at or under 2700 kelvin that results in the output of a warm white color spectrum.

Recommended Mitigation Measure 3 – Reflective Signs and Road Striping: Retro-reflectivity of signs and road striping should be implemented throughout the Project to reduce the need for electrical lighting. 9 cont.

Recommended Mitigation Measure 4 – Light Pole Modifications and Shielding: All new or replacement light poles or sources of illumination shall be installed with the appropriate shielding to avoid excessive light pollution into natural landscapes or aquatic habitat within the Project corridor in coordination with CDFW. In addition, the light pole arm length and mast heights should be modified to site specific conditions to reduce excessive light spillage into natural landscapes or aquatic habitat within the Project corridor. In areas with sensitive natural landscapes, aquatic habitat, or within 500 feet of any bat roost, Caltrans should also analyze and determine if placing the light poles at non-standard intervals has the potential to further reduce the potential for excessive light pollution caused by decreasing the number of light output sources in sensitive areas.

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COMMENT 9: Chapter 2: Section 2.3 Biological Environment. Valley Oak Woodland and Forest Impacts

Issue: The EIR does not sufficiently disclose or adequately analyze the potentially significant impacts to fish and wildlife resources that may occur from the removal, limbing or trimming of valley oak woodland and forest. Figures 2.3-1 indicates that all build alternatives will result in 0.51 acre of temporary impacts and 0.14 acre of permanent impacts to valley oak woodland and forest. The removal, limbing or trimming of trees may have a potentially significant impact to fish and wildlife resources by reducing and degrading the quality of habitat for nesting birds, reptiles, amphibians and invertebrates. Red-shouldered hawks, red-tail and white-tailed kites (State Fully Protected) are known to inhabit the Project vicinity, and removal of tree stands could potentially impact nests, nesting behavior and foraging habitat.

Furthermore, the EIR does not define temporary impacts to valley oak woodland. Given the temporal loss of habitat and its impact on wildlife species, removal and/or significant trimming of trees within valley oak woodland and forest habitats should be considered permanent and significant impacts. The EIR proposes removal of trees without significant preservation or replacement of trees on- or off-site.

Proposed mitigation for impacts to both valley oak woodland and valley riparian forest is implementation of BIO-2. BIO-2 commits Caltrans to notifying for and obtaining a Streambed Alteration Agreement prior to the start of construction activities. Not only does this measure defer mitigation based on future approvals through a Streambed Alteration Agreement, but maps presented in the EIR show impacts to valley oak woodland and forest are activities that may occur outside the bed, bank, or channel of streams; therefore, these activities would likely be omitted from the Streambed Alteration Notification. 10

Recommendation: CDFW recommends incorporating the following mitigation measures into the EIR.

Recommended BIO-Measure 1: Off-Site Conservation of Valley Oak Woodland and Forest: If impacts cannot be avoided to valley oak woodland and forest; Caltrans shall permanently preserve valley oak woodland and forest at an off-site location. The off-site location may be lands with habitats that may be rehabilitated, restored, or preserved and maintained to fully mitigate for the potentially significant impacts. The lands must be protected through fee title, transfer or conservation easement to an appropriate conservation entity to ensure long term preservation and successful implementation of the mitigation. The fish and wildlife resources or environments replaced or substituted for those impacted must be maintained in perpetuity.

Recommended BIO-Measure 2: Valley Oak Woodland and Forest On-Site and Off-Site Restoration Plan: CEQA Guidelines §15126.4 (a) requires lead agencies to consider feasible mitigation measures to avoid or substantially reduce a project's significant

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environmental impacts. Caltrans shall develop a more in-depth restoration plan in consultation with the natural resource agencies. Caltrans shall incorporate details that (1) commits itself to the mitigation, (2) adopts specific performance standards that the mitigation will achieve, and (3) identifies the type(s) of potential action(s) that can feasibly achieve that performance standard. Caltrans shall specifically discuss permanent land protection in perpetuity, mitigation/restoration bank credit purchase and requirements in regard to valley oak woodland and forest. Additional actions should be included in the EIR, such as installation of artificial wood rat boxes and bat boxes to reduce potentially significant impacts to fish and wildlife resources. 10 cont.

COMMENT 10: Appendix C, Biological Resources. AMM BIO-19: Erosion Control and Re-Vegetation, page 54

Issue: Monofilament materials found in some erosion control products have been demonstrated to result in snaring and entrapment of snakes, lizards, and small mammals.

Recommendation: CDFW recommends AMM BIO-19 be revised to state the following: 11

Erosion control materials shall be monitored daily and repaired if necessary to ensure maximum erosion and sediment control. All fiber rolls, straw wattles, and/or hay bales utilized within and adjacent to the project site shall be free of non-native plant materials. Fiber rolls or erosion control mesh shall be made of loose-weave mesh that is not fused at the intersections of the weave, such as jute, or coconut (coir) fiber, or other products without welded weaves. Products with plastic monofilament or cross joints in the netting that are bound/stitched (such as found in straw wattles/fiber rolls and some erosion control blankets), which may cause entrapment of wildlife, shall not be allowed. All temporary erosion control and any related material shall be removed upon completion of project activities.

COMMENT 11: Chapter 2: Section 2.3.5.4 Avoidance, Minimization, and/or Mitigation Measures. AMM BIO-31: Pre-construction SWHA Survey, page 2-348.

Issue: This measure states that the qualified biologist will conduct pre-construction surveys if construction is to occur between February 1 and August 31. However, Swainson's Hawk (SWHA) nesting season is March 1 through September 30. The measure also states that pre-construction surveys will be conducted up to 15 days prior to construction. These methods are inconsistent with the Swainson's Hawk Technical Advisory Committee's (TAC) *Recommended Timing and Methodology for Swainson's Hawk Nesting Surveys in California's Central Valley* (2000) and insufficient to avoid impacts to SWHA. 12

Recommendation: CDFW recommends BIO-31 be revised to read:

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"Prior to the initiation of construction activities, the Project proponent have a qualified biologist conduct surveys for Swainson's hawk in accordance with the Swainson's Hawk Technical Advisory Committee's (TAC) *Recommended Timing and Methodology for Swainson's Hawk Nesting Surveys in California's Central Valley* (2000), available on CDFW's webpage at https://wildlife.ca.gov/Conservation/Survey-Protocols#377281284-birds. Survey methods should be closely followed by starting early in the nesting season to maximize the likelihood of detecting an active nest (nests, adults, and chicks are more difficult to detect later in the growing season because trees become less transparent as vegetation increases). Surveys should be conducted within a minimum 0.25-mile radius of the Project area or a larger area, if necessary, to identify potentially impacted active nests. Surveys should occur annually for the duration of the Project. The qualified biologist should have a minimum of two years of experience implementing the TAC survey methodology. If an active nest is identified, a 0.25-mile protective buffer should be maintained around the nest until the young fledge. The protective buffer should be clearly marked and be an area where no project-related activities or personnel are allowed while in place. If the 0.25-mile buffer must be reduced or take of Swainson's hawk cannot be avoided, the Project proponent should be required to obtain an Incidental Take Permit (ITP) as a condition of Project approval." 12 cont.

Issue: The Project area includes a portion of the Swainson's Hawk Zone (SHZ), which the Natomas Basin Habitat Conservation Plan (NBHCP) describes as the area within one mile of the Sacramento River in the Natomas Basin. The SHZ was derived from the high density of Swainson's hawk nests within this area and scientific evidence for the value of the habitat (NBHCP 2003). The NBHCP recognizes the importance of the SHZ to this species and the viability of their plan which resulted in substantial effort from the City of Sacramento and Sutter County to replan development outside of this area. Although Caltrans is not party to the NBHCP, the EIR must consider the Project's 1) biological impact in an ecologically valuable area and 2) the effect that Project development in the SHZ will have on the continued implementation and viability of the NBHCP.

COMMENT 12: Chapter 2: Biological Resources – Swainson's Hawk, page 2-344.

Issue: The EIR states that, "A total of approximately 10.0 acres of SWHA foraging habitat consisting of grassland and croplands (i.e., hayfield) would be permanently lost;" however, compensatory mitigation for the permanent loss of foraging habitat is not included. The primary threat to the Swainson's Hawk population in California continues to be habitat loss, especially the loss of suitable foraging habitat (California Department of Fish and Game 2016). Unmitigated loss of foraging habitat for a CESA listed threatened species is a significant impact. 13

Recommendation: CDFW recommends the following mitigation measure be added to the EIR:

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Compensatory Mitigation for Permanent Impacts to SWHA Foraging Habitat: To mitigate impacts from the permanent loss of 10.0 acres of Swainson's hawk foraging habitat to a less than significant level, CDFW recommends Caltrans either purchase 30.0 acres of SWHA foraging habitat credits from a CDFW-approved conservation bank OR provide for both the permanent protection and management of 30.0 acres of Habitat Management (HM) lands including calculation and deposit of management funds as approved by CDFW. Prior to transfer of SWHA foraging credits, Caltrans shall obtain CDFW approval to ensure the conservation bank is appropriate to compensate for the impacts of the Project. Caltrans shall submit to CDFW a copy of the executed Credit Transfer Agreement prior to initiating construction activities. 13 cont.

COMMENT 13: Chapter 2: Biological Resource - Tricolored Blackbird, page 2-341.

Issue: The EIR acknowledges a total of 498.7 acres of potentially suitable habitat for tricolored blackbird within 500 feet of the BSA. Potentially suitable habitat was identified as lands that are planted in alfalfa, natural or semi-natural lands (e.g., grassland, ruderal/grassland, willow scrub, and emergent marsh) on larger parcels (generally greater than approximately 20 acres) that border other open lands. However, the EIR does not quantify temporary or permanent Project impacts to tricolored blackbird foraging or nesting habitat. The EIR also does not provide appropriate and adequate compensatory mitigation for all direct, indirect, and cumulative impacts to tricolored blackbird foraging and nesting habitat that are expected to occur as a result of construction and long-term operation and maintenance of the Project.

Destruction of the tricolored blackbirds' marsh and grassland homes has reduced its populations to a small fraction of their former enormity. Further loss, conversion, and disturbance, either temporary or permanent, to foraging and nesting habitat is a significant impact. 14

Recommendation: To help mitigate Project impacts to a less than significant level, CDFW recommends the EIR: 1) quantify permanent direct, indirect, and cumulative impacts to tricolored blackbird foraging and nesting habitat, and 2) include an enforceable mitigation measure requiring Caltrans to either purchase tricolored foraging and nesting habitat credits from a CDFW-approved conservation bank OR provide for both the permanent protection and management of Habitat Management (HM) lands including calculation and deposit of management funds as approved by CDFW. Prior to transfer of tricolored blackbird credits, Caltrans shall obtain CDFW approval to ensure the conservation bank is appropriate to compensate for the impacts of the Project. Caltrans shall submit to CDFW a copy of the executed Credit Transfer Agreement prior to initiating construction activities. The number of credits purchased shall be at a ratio appropriate to fully mitigate permanent habitat impacts.

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COMMENT 14: Fish Passage Analysis Senate Bill 857

Issue: The Draft EIR, as it is currently written, does not address many of the locations noted in the CALFISH Database that occur within the Project limits as it pertains to Senate Bill 857 (SB-857), which amended Fish and Game Code 5901 and added section 156 to the Streets and Highways Code states in section 156.3, "For any project using state or federal transportation funds programmed after January 1, 2006, Caltrans shall insure that, if the project affects a stream crossing on a stream where anadromous fish are, or historically were, found, an assessment of potential barriers to fish passage is done prior to commencing project design. Caltrans shall submit the assessment to the CDFW and add it to the CALFISH database. If any structural barrier to passage exists, remediation of the problem shall be designed into the project by the implementing agency. New projects shall be constructed so that they do not present a barrier to fish passage. When barriers to fish passage are being addressed, plans and projects shall be developed in consultation with CDFW."

Recommendation: The Biological Resources section of the EIR should address the following locations noted in the CALFISH Database that occur within the Project limits as it pertains to SB- 857. 15

- Location 1, South Fork Putah Creek (I-80; PM 41.3, Solano County), Fish Passage Assessment Database ID# 761347, fish barrier status: temporal;
- Location 2, Unnamed tributary to Toe Drain (I-80; PM 9.4, Yolo County), Fish Passage Assessment Database ID# 764517, fish barrier status: unassessed; and
- Location 3, Unnamed tributary to Toe Drain (I-80; PM 10.62, Yolo County), Fish Passage Assessment Database ID# 764482, fish barrier status: unassessed.

The EIR should include a fish passage discussion section to address potentially significant impacts. CDFW recommends that the fish passage section, at a minimum, discuss the current status of the crossing locations noted in the California Fish Passage Assessment Database, conduct first pass and or second pass fish assessments, as necessary, as well as provide images of the upstream and downstream ends of water conveyance structures.

COMMENT 15: 2.1.2 Consistency with Regional, and Local Plans and Programs

Issue: CEQA Guidelines section 15125(d) states that EIRs must discuss any inconsistencies between projects and applicable plans (including habitat conservation plans/natural community conservation plans). Portions of the Project are within the boundaries of the Yolo Habitat Conservation Plan/Natural Community Conservation Plan (Yolo Plan) and the Natomas Basin Habitat Conservation Plan (NBHCP). 16

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Recommendation: Because the Yolo Plan and NBHCP are currently being implemented, the EIR must include a discussion on the consistency of each project alternative with the respective plans and how Caltrans will ensure that implementation of the project alternatives do not impede either plan's ability to meet its biological goals and objectives. Furthermore, CDFW recommends that Caltrans coordinate with the implementing agency/plan operators (Yolo Habitat Conservancy/Yolo County and the Natomas Basin Conservancy) of each respective plan to ensure significant environmental impacts assessed in the EIR are adequately investigated. Particular focus in the EIR's analysis should be directed to:

- Analysis of all Yolo Plan and NBHCP Covered Species,
- Assessment of habitat types identified in the Yolo Plan and NBHCP,
- Identification of applicable Yolo Plan and NBHCP avoidance, minimization, or mitigation measures; and
- Analysis of any impacts to land commitments of the Yolo Plan and NBHCP.

16 cont.

CEQA Guidelines section 15125(e) requires the analysis examine both the existing physical conditions at the time of the EIR and the potential future conditions discussed in the adopted plans.

The Project area includes a portion of the Swainson's Hawk Zone (SHZ), which the NBHCP describes as the area within one mile of the Sacramento River in the Natomas Basin. The SHZ was derived from the high density of Swainson's hawk nests within this area and scientific evidence for the value of the habitat (NBHCP 2003). The NBHCP recognizes the importance of the SHZ to this species and the viability of their plan which resulted in substantial effort from the City of Sacramento and Sutter County to replan development outside of this area. Although Caltrans is not party to the NBHCP, the EIR must consider the Project's 1) biological impact in an ecologically valuable area and 2) the effect that Project development in the SHZ will have on the continued implementation and viability of the NBHCP.

COMMENT 16: Throughout EIR.

Issue: Generally, much of the language used to describe avoidance, minimization, and mitigation actions within the EIR use the term "would."

Recommendation: To ensure mitigation measures are both quantifiable and enforceable, CDFW recommends replacing instances of "would" with "shall" within all avoidance, minimization, and mitigation measures.

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ENVIRONMENTAL DATA

CEQA requires that information developed in environmental impact reports and negative declarations be incorporated into a database which may be used to make subsequent or supplemental environmental determinations (Pub. Resources Code, § 21003, subd. (e)). Accordingly, please report any special-status species and natural communities detected during Project surveys to the California Natural Diversity Database (CNDDB). The CNNDB field survey form can be found at the following link: https://www.wildlife.ca.gov/Data/CNDDB/Submitting-Data. The completed form can be submitted online or mailed electronically to CNDDB at the following email address: CNDDB@wildlife.ca.gov.

FILING FEES

The Project, as proposed, would have an impact on fish and/or wildlife, and assessment of filing fees is necessary. Fees are payable upon filing of the Notice of Determination by the Lead Agency and serve to help defray the cost of environmental review by CDFW. Payment of the fee is required in order for the underlying project approval to be operative, vested, and final. (Cal. Code Regs, tit. 14, § 753.5; Fish & G. Code, § 711.4; Pub. Resources Code, § 21089.) 18

CONCLUSION

Pursuant to Public Resources Code § 21092 and § 21092.2, CDFW requests written notification of proposed actions and pending decisions regarding the proposed project. Written notifications shall be directed to: California Department of Fish and Wildlife North Central Region, 1701 Nimbus Road, Rancho Cordova, CA 95670 or emailed to R2CEQA@wildlife.ca.gov.

CDFW appreciates the opportunity to comment on the DEIR for the Yolo 80 Corridor Improvements to assist Caltrans in identifying and mitigating Project impacts on biological resources. CDFW personnel are available for consultation regarding biological resources and strategies to minimize and/or mitigate impacts. Questions regarding this letter or further coordination should be directed to Irina Lopatin, Environmental Scientist at (916) 880-8324 or irina.lopatin@wildlife.ca.gov; or Melissa Stanfield, Senior Environmental Scientist (Supervisory), at (916) 597-6417 or melissa.stanfield@wildlife.ca.gov.

Sincerely,

DocuSigned by:
Morgan Kilgour
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Morgan Kilgour
Regional Manager

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ec: Irina Lopatin, Environmental Scientist
Mary Xiong, Senior Environmental Scientist (Specialist)
Melissa Stanfield, Senior Environmental Scientist (Supervisory)
Jason Faridi, Senior Environmental Scientist (Supervisory)
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Erin Chappell, Regional Manager – Bay Delta Region
Department of Fish and Wildlife

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Response to Comment 1 in 20240112, California Department of Fish and Wildlife

This introductory comment provides the role of the California Department of Fish and Wildlife, provides a summary of the proposed project, and provides a summary of the more detailed comments provided in the letter. This comment does not discuss the adequacy of the EIR/EA. No changes to the Draft EIR/EA are necessary.

Response to Comment 2 in 20240112, California Department of Fish and Wildlife

The only construction activity proposed for the project within 500 feet of the bat maternity colony associated with the Yolo Causeway bridge structure is lane restriping. The Draft EIR/EA specifically states that no structural modification of the Yolo Causeway is proposed (Draft EIR/EA Chapter 1, “The Yolo Causeway would not be structurally modified.”). Based on the type of work activity proposed and in consideration of AMM BIO-12 through AMM BIO-15, no construction activities having the potential to generate impacts to the bat maternity colony are expected to take place within 500 feet of the maternity colony during the maternity period (March 1 to August 31). The proposed measures are considered by Caltrans to be specific, enforceable and feasible. Other potential roosting colonies or individual bats that may be encountered in other portions of the project footprint are expected to be protected by these measures as well. No changes to the Draft EIR/EA are necessary.

Response to Comment 3 in 20240112, California Department of Fish and Wildlife

Caltrans deems that the analysis of direct, indirect, and cumulative impacts presented in the Draft EIR/EA represents a scientifically supported analysis of the potential effects of construction and operational project activities on bats and other sensitive wildlife. Furthermore, Caltrans asserts that the Draft EIR/EA demonstrates that significant environmental impacts were adequately investigated and discussed. Per the response to Comment 2 above, Caltrans deems the Draft EIR/EA to include fully enforceable avoidance, minimization, and mitigation measures. Caltrans concludes that no project-related activities are expected to generate significant direct, indirect, or cumulative impacts on the bat maternity colony or to any other roosting colonies or individual bats that may be encountered within the project footprint. Caltrans is not proposing any direct modification of the Yolo Bypass bridge structure or its attendant facilities, including lighting or signage that would generate excess light within 500 feet of the bat maternity colony.

Additionally, lighting, noise, human activity, and wildlife-human interactions created by project activities are expected to be of a short duration, limited in extent, and taking place in discrete locations within the overall project footprint over a 3-year construction period. Analysis of Noise and Vibration cumulative impacts indicates that with implementation of proposed mitigation measures, impacts from noise and vibration would not be cumulatively considerable (Draft EIR/EA Chapter 2, Section 2.4.5.13: “All relevant projects would be required to comply with local noise ordinances and implement BMPs as necessary to avoid and minimize temporary impacts on noise. Therefore, in conjunction with relevant projects, the Project would not result in a cumulatively considerable impact on noise and vibration.”). Impacts from construction lighting, human activity, and wildlife-human interactions are similarly expected to also not be cumulatively considerable.

No changes to the Draft EIR/EA are necessary.

Response to Comment 4 in 20240112, California Department of Fish and Wildlife

Cumulative impacts associated with Yolo 80, FixSac5, I Street Bridge Replacement, and other transport projects will be distributed both in time and across a broad geographic area, would be limited in duration and typically occur at discrete locations within their respective project footprints. Therefore, cumulative impacts associated with construction related noise, vibration, or lighting are not expected to rise to the level of significance for bats and purple martin.

Per the response to Comment 2 and 3 above, Caltrans asserts that the Draft EIR/EA includes fully enforceable avoidance measures and concludes that project related activities are not expected to generate significant impacts (direct or cumulative) on the known bat maternity colony or to any other roosting colonies or individual bats that may be encountered within the project footprint. Proposed avoidance and minimization measures are expected to reduce direct impacts to below significance and avoid contributing to cumulative impacts.

Caltrans acknowledges the need for ongoing coordination with CDFW on the Yolo 80 and other interrelated projects to identify and implement additional conservation efforts for purple martin.

No changes to the Draft EIR/EA are necessary.

Response to Comment 5 in 20240112, California Department of Fish and Wildlife

Caltrans deems that implementation of AMM BIO-13 (Draft EIR/EA, Chapter 2, Section 2.3.4, and Chapter 3, Section 3.2.4) is adequate to avoid or minimize project effects on sensitive bat species. AMM BIO-13 was written in adherence to the Caltrans Bat Mitigation: A Guide to Developing Feasible and Effective Solutions and conforms with Caltrans standard practice.[4] The project would not be implemented as an intentional act to disrupt normal behavioral patterns to wildlife. No changes to the Draft EIR/EA are necessary.

Response to Comment 6 in 20240112, California Department of Fish and Wildlife

Caltrans deems that implementation of AMM BIO-14 (Draft EIR/EA, Chapter 2, Section 2.3.4, and Chapter 3, Section 3.2.4) is adequate to avoid or minimize project effects on sensitive bat species. AMM BIO-14 was written in adherence to the Caltrans Bat Mitigation: A Guide to Developing Feasible and Effective Solutions and conforms with Caltrans standard practice.[5] No changes to the Draft EIR/EA are necessary.

Response to Comment 7 in 20240112, California Department of Fish and Wildlife

Caltrans does not anticipate needing to exclude bats from built structures because the project does not include impacts to structures with known or expected bat roost occupancy. Caltrans

[4] Johnston, D. and K. Briones. 2019. Final Caltrans Bat Mitigation: A Guide to Developing Feasible and Effective Solutions, Section 5.
[5] Johnston, D. and K. Briones. 2019. Final Caltrans Bat Mitigation: A Guide to Developing Feasible and Effective Solutions, Section 5.

deems that implementation of AMM BIO-13 through 15 (Draft EIR/EA, Chapter 2, Section 2.3.4, and Chapter 3, Section 3.2.4) are adequate to avoid or minimize project effects on sensitive bat species. No changes to the Draft EIR/EA are necessary.

Response to Comment 8 in 20240112, California Department of Fish and Wildlife

Caltrans deems that with implementation of AMM BIO-4 through 32 (Draft EIR/EA, Chapter 2, Section 2.3, and Chapter 3, Section 3.2.4) project activities are not expected to result in injuries to bats or other wildlife. Regardless, any unforeseen human-animal interactions generated by Caltrans contractors related to project-related activities that result in injury to wildlife and necessitating rehabilitation are expected to be covered by the contractor in coordination with Caltrans and CDFW staff. No changes to the Draft EIR/EA are necessary.

Response to Comment 9 in 20240112, California Department of Fish and Wildlife

Regarding the recommended Mitigation Measure 1 - Light Output Analysis: Caltrans has designed the Yolo 80 project to minimize the amount of new lighting being installed when not in conflict with Caltrans design guidelines or public safety standards for roadways. Because of this, Caltrans disagrees that a Light Output Analysis is necessary to avoid incidental impacts to light-sensitive wildlife.

Regarding the recommended Mitigation Measure 2 – Light Output Limits: When practicable, Caltrans plans to use LED’s or bulbs rated to emit or produce light of a warm white color spectrum in areas where impacts to light sensitive natural resources may occur.

Regarding the recommended Mitigation Measure 3 – Reflective Signs and Road Striping: When practicable, Caltrans plans to use retroreflective signs and road striping throughout the project to reduce the need for electrical lighting.

Regarding the recommended Mitigation Measure 4 – Light Pole Modifications and Shielding: When practicable and when not in conflict with public safety standards for roadways, Caltrans will install new or replacement light poles or sources of illumination with the appropriate shielding to avoid excessive light pollution into natural landscapes or aquatic habitat within the project corridor. Commenter recommendations regarding light pole arm length and mast heights are likely to conflict with public safety standards but will be considered when practicable. In areas with sensitive natural landscapes, aquatic habitat, or within 500 feet of any bat roost, Caltrans will determine if placing the light poles at non-standard intervals has the potential to further reduce the potential for excessive light pollution caused by decreasing the number of light output sources in sensitive areas.

No changes to the Draft EIR/EA are necessary.

Response to Comment 10 in 20240112, California Department of Fish and Wildlife

In response to commenter’s recommended BIO-Measure 1: Caltrans intends to minimize impacts to sensitive natural communities, including Valley Oak Woodland, to the maximum extent practicable and Standard Measure BIO-4 in Appendix E of the Draft EIR/EA- details the measures Caltrans will implement as part of the project. Compensatory mitigation for Valley Oak

Woodland is not expected to be necessary given the acreage of permanent impacts (i.e., less than 0.2 acre) within already disturbed areas (i.e., along existing road shoulders within Caltrans right-of-way).

In response to commenter's recommended BIO-Measure 2: Valley Oak Woodland and Forest On-Site and Off-Site Restoration Plan. Standard Measure BIO-4, which is part of the project, states that Caltrans will develop a restoration plan to address impacts to sensitive natural habitats. Based on the conclusions of the environmental analysis in the Draft EIR/EA indicating a less-than-significant impact, Caltrans does not intend to purchase offsite mitigation/restoration bank credits for the expected temporary and permanent impacts to Valley Oak Woodland proposed in the project. Caltrans acknowledges the need for ongoing coordination with CDFW to identify and implement additional conservation efforts for wildlife, including installation of artificial wood rat boxes and bat boxes to reduce impacts to fish and wildlife resources.

No changes to the Draft EIR/EA are necessary.

Response to Comment 11 in 20240112, California Department of Fish and Wildlife

Per the Draft EIR/EA, Section 2.3.5, AMM BIO-19: Erosion Control and Re-Vegetation states the following: "Erosion control will be implemented, and the affected area will be revegetated with appropriate native plants." Contractors will comply with Caltrans standard specification for materials used in erosion control measures. The contractor must submit a certificate of compliance showing their materials conform to Caltrans specifications. Specifically, fiber rolls and mesh are to be made of natural/biodegradable materials and will not use plastic monofilament or cross joints. In the Draft EIR/EA Appendix E, Project Features, Standard Measure BIO-4 includes language stipulating that construction related material shall be removed upon completion of project activities. No changes to the Draft EIR/EA are necessary.

Response to Comment 12 in 20240112, California Department of Fish and Wildlife

The commenter says the pre-construction survey dates are not consistent with the Swainson's Hawk nesting season. BIO-31 has been revised to include the dates between February 1 and September 30 to reflect Caltrans standard nesting bird window. As revised, Caltrans anticipates that implementation of AMM BIO-31 and 32 (Draft EIR/EA, Chapter 2, Section 2.3.5, and Chapter 3, Section 3.2.4) are adequate to avoid or minimize project effects on Swainson's hawk or otherwise already address the recommendations of the commenter. Caltrans intends to implement surveys and buffers in an appropriate fashion and with CDFW consultation. No other changes to the Draft EIR/EA are necessary.

Potential effects of the project on the Swainson's Hawk Zone and conservation lands of the Natomas Basin Habitat Conservation Plan are included twice in the CDFW comment letter. This issue is not addressed here but is addressed in Response to Comment 16 in 20240112, California Department of Fish and Wildlife. No changes to the Draft EIR/EA are necessary.

Response to Comment 13 in 20240112, California Department of Fish and Wildlife

Draft EIR/EA Chapter 3, Section 3.2.4 summarizes the technical findings of Caltrans environmental analysis on potential impacts to Swainson's hawk. Based on technical review, foraging habitat that would be impacted is already degraded by proximity to roadways and other forms of anthropogenic disturbance. Caltrans has proposed two species specific measures (AMM BIO-31 and BIO-32) that are expected to reduce impacts to below the level of significance. Based on this finding, Caltrans has determined that compensatory mitigation for the loss of foraging habitat is not necessary. No changes to the Draft EIR/EA are necessary.

Response to Comment 14 in 20240112, California Department of Fish and Wildlife

Caltrans deems that implementation of AMM BIO-6 (Draft EIR/EA, Chapter 2, Sections 2.3.4 and 2.3.5, and Chapter 3, Section 3.2.4) is adequate to avoid or minimize project effects on tricolored blackbird. Caltrans intends to implement surveys and buffers in an appropriate fashion and with CDFW consultation. No changes to the Draft EIR/EA are necessary.

Response to Comment 15 in 20240112, California Department of Fish and Wildlife

Regarding Location 1, South Fork Putah Creek: Caltrans is not proposing to modify the existing bridge structure crossing Putah Creek at this location. As detailed in the Draft EIR/EA Chapter 1, Proposed Project, work activities at this location are limited to the placement of fiber-optic cable. Because there will be no substantive modification of the existing structure, Caltrans declines to include this location in the requested fish passage analysis on the basis that the project will have no effect on fish passage characteristics.

Regarding Location 2, Unnamed tributary to Toe Drain: Staff familiar with the fish passage characteristics of this location (PAD ID# 764517) indicate that it has extremely low-quality habitat constituents, possesses a low probability for anadromy, and are highly managed and maintained. Though the location has been identified as potential barrier locations in the Fish Passage Assessment Database, further assessments are not justifiable due to the poor quality of habitat present and lack of any extensive fish bearing habitat upstream. Because of the lack of appropriate habitat at or above these crossings, Caltrans declines to include this location in the requested fish passage analysis. No changes to the Draft EIR/EA are necessary.

Regarding Location 3, Unnamed tributary to Toe Drain: According to the California Fish Passage Assessment Database, this location (PAD ID# 764482) was assessed in 2022 and is not considered a barrier as there is no suitable upstream habitat (historic or current) for salmon or steelhead. Because of the 2022 assessment indicating the location is not a barrier, Caltrans declines to include this location in the requested fish passage analysis. No changes to the Draft EIR/EA are necessary.

Response to Comment 16 in 20240112, California Department of Fish and Wildlife

As indicated in the comment, portions of the project are within the Yolo Habitat Conservation Plan/Natural Community Conservation Plan (Yolo Plan) and abuts the boundaries of the Natomas Basin Habitat Conservation Plan (NBHCP). The Swainson's Hawk Zone (SHZ), which

the NBHCP defines as within 1 mile east of the toe of the inside levee of the Sacramento River and extending from the Natomas Cross Canal on the north and I-80 on the south, also abuts the project area. However, Caltrans right-of-way (ROW) only abuts these areas and does not extend into or overlap significantly with them.

Because of the limited overlap and because project effects are not expected to propagate to any significant degree beyond the ROW or significantly alter potential future conditions, with mitigation, analysis of impacts to HCP lands or coordination with agency/plan operators is not considered necessary to fulfil the requirement to discuss consistency of project alternatives with the respective plans. Furthermore, Caltrans is not a signatory to either the Yolo Plan or the NBHCP and does not typically participate in habitat conservation planning at the municipal level. The project would not affect the implementation or viability of the Yolo Plan or NBHCP and SHZ with implementation of Caltrans Standard Measures BIO-1 through BIO-4 and project-specific AMMs and mitigation measures (Draft EIR/EA, Appendix E and Chapter 2, Section 2.3, AMM BIO-1 through BIO 32).

Also see Draft EIR/EA, Chapter 3, Section 3.2.4.2. Special Status Animal Species, for analysis of potential effects to local HCP/NCCPs. For clarity, conclusions from this section have been amended and added to the EIR/EA, Chapter 2, Section 2.3.1.2, Natural Communities: Environmental Consequences.

Response to Comment 17 in 20240112, California Department of Fish and Wildlife

This comment requests a change from the word “would” to “shall” in avoidance, minimization, and mitigation measures. This comment does not discuss the adequacy of the EIR/EA. The word “would” is commonly used in an EIR/EA. No changes to the Draft EIR/EA are necessary.

Response to Comment 18 in 20240112, California Department of Fish and Wildlife

This conclusory comment provides information about uploading species data and payment of filing fees and includes a request for written notification about project decisions. This comment does not discuss the adequacy of the EIR/EA. No changes to the Draft EIR/EA are necessary.

20240112, City of Davis

Masum Patwary
Environmental Scientist
Caltrans District 3
703 B Street,
Marysville, CA 95901

Dear Mr. Patwary:

Thank you for the opportunity to review the Draft Environmental Impact Report ("DEIR") for the Yolo 80 Corridor Improvements Project ("Project"). The City of Davis ("Davis") respectfully submits these comments to help Caltrans to ensure that the Environmental Impact Report complies with the California Environmental Quality Act ("CEQA"). Public Resources Code sections 21000-21889, CEQA Guidelines sections 15000-15387. 1

The City's concerns fall into the following general categories:

Project Description 2

An inaccurate or incomplete project description may render the analysis of significant environmental impacts inherently unreliable. While extensive detail is not necessary, the law mandates that EIRs should describe proposed projects with sufficient detail and accuracy to permit informed decision-making. (CEQA Guidelines section 15124).

1) Chapter 1.3.1.1 does not discuss the phasing of the project. Our understanding of the project is that there is insufficient funding to complete the entire project in one phase so construction will have to be phased. If this is correct, a discussion of project phasing should be included in the project description and is necessary to fully inform the public about the construction timing and project schedule. 3

2) Chapter 1.5 of the DEIR addresses alternatives considered but rejected. The City requests Caltrans include and analyze a project alternative that converts existing general-purpose lanes to a tolling lane or HOT lane. Caltrans should explain why the alternative of converting an existing lane to HOV was considered but the option of toll lanes, which could generate revenue for transit improvements, was not considered. 4
3) The DEIR assumes under Project Alternative 6 (transit-only managed lane) that there will be no increase in transit supply. Davis requests that Caltrans conduct an analysis of Project Alternative 6 (transit-only managed lane) that assumes an increase in transit supply. 5

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Climate Change, Local Plan Consistency

The DEIR determines that the impacts on climate change, including air quality and greenhouse gas emissions ("GHG") will be less than significant after implementation of standard mitigation measures as described in Exhibit E to the DEIR.

4) Chapter 3.4.3.3 describes the applicable Regional Plans that address Greenhouse Gas Emissions ("GHG") reduction policies or strategies. The City of Davis adopted its Climate Action and Adaptation Plan on April 18, 2023 and requests that it be included in the analysis of consistency with local plans. The City understands that Caltrans is not required to include the Davis CAAP in the DEIR analysis as it was adopted after Caltrans released the Notice of Preparation for the Project DEIR. The City recommends that Caltrans do so, however, given that the CAAP represents the City's most recent policy document related to GHG. Specifically, the CAAP includes three climate action goals relevant to the project – (1) expand public transit (TR6), (2) develop Transportation Demand Management (TR9), and (3) strengthen regional transit (TR7). A copy of the CAAP is attached for your convenience. 6

Traffic and Transportation

VMT Mitigation Measures

Vehicles Miles Traveled measures the amount of travel for all vehicles in a geographic region over a given period of time, typically a one-year period. It is calculated as the sum of the number of miles traveled by a vehicle. CEQA requires that an EIR identify "all feasible measures which could minimize significant adverse impacts." CEQA Guidelines Section 15126.4(a)(1). The City submits the following comments related to Caltrans' mitigation measures related to Transportation/VMT impacts. 7

5) The DEIR concludes that the impacts of the project on vehicles miles traveled will be significant and unavoidable even after the implementation of mitigation. The DEIR identifies eight "VMT Reduction Measures." The City notes that these reduction matters are not included in the table of mitigations in Exhibit C, however, and it is unclear if Caltrans intends to adopt them as formal mitigation measures under CEQA. Caltrans is obligated to identify all feasible VMT mitigation measures, even if they will not result in mitigation of VMT impacts to a "less than significant" level. CEQA Guidelines Section 15126.4(a)(1).

6) The DEIR states that Caltrans is making a commitment to contribute $55 million toward the measures. However, full implementation of these VMT-reducing will require substantial additional financial investment. The specific process by which this additional funding will be obtained is not specified in detail, and the DEIR appears to assume the additional funding will come from tolls. CEQA requires that mitigation measures be "fully enforceable through permit conditions, agreements, or other legally binding instruments." CEQA Guidelines Section 15126.4(a)(2). The DEIR's 8

"Mitigation Reduction Measures" fail to meet this requirement, as long-term funding for the mitigation measures is not currently available, and the DEIR fails to propose a legally binding pathway to funding them. The City notes that Caltrans could improve the enforceability of the VMT mitigation measures by seeking to enter binding agreements with the affected agencies who will establish a tolling authority, and developing an agreed upon methodology for establishing toll amounts that would fully fund the ongoing mitigation measures. Finally, it would be important for the tolling agencies to agree to divert revenue towards the mitigation measures. If this is not feasible, then Caltrans could commit to funding the mitigation measures until tolls are established and the mitigation measures could be funded through binding and legally enforceable agreements. 8 cont.

7) Similarly, the City notes that full implementation of the VMT mitigation measures is largely outside the legal jurisdiction of Caltrans as ongoing funding will depend on the intervening actions of multiple other public agencies. While the City understands that Caltrans cannot control the discretionary actions of other public agencies, as noted above, Caltrans could either seek agreement from the affected agencies, or agree to fund the mitigation measures itself until such time as tolling agencies are able to fully fund them. The DEIR does not look at this option or analyze its feasibility. 9

8) In addition to lacking legal enforceability, the proposed VMT Reduction Measures appear to defer mitigation of ongoing VMT impacts to a later date without meeting the requirements of CEQA Guidelines Section 15126.4(a)(1)(B), including the identification of specific performance standards that the mitigation measure should achieve and identifying potential actions that could attain that result. 10

9) Finally, even if the VMT Reduction Measures are fully implemented and funded over the long term, they would not be sufficient to offset the VMT impacts of Build Alternatives 2-5. In addition to revising the 8 VMT Reduction measures to meet CEQA requirements for enforceability and specificity, the City requests that Caltrans review options to further reduce the VMT impacts of the Project. The DEIR does not include any analysis of other potential mitigation measures besides the eight proposed measures, and does not provide a basis for concluding that these are the only feasible mitigation measures to address VMT for the Project. 11

10) Table 2.1-28 states that the cost to increase Route 42A and 42B services for 15-minute headways during morning and afternoon peak hours would be $16 million annually. The City asks that Caltrans reexamine this cost estimate. The City notes that the expansion of the Causeway Connection was estimated to cost less than $1 million per year. It is not clear to the City that expanding the routes of two 42 bus routes would cost 16 times more than the Causeway Connection. If those numbers are correct, the City asks that Caltrans look at expanding other bus routes (e.g. 43, 43R, 230) instead of discarding the measure completely. 12

11) Section 2.1.10.8 includes subsidizing transit passes and/or eliminating fares as a potential VMT reduction measure. Caltrans's methodology for estimating the VMT reduction due to a voluntary trip reduction plan should be more fully described and analyzed. Since the analysis time frame uses 2019 traffic data through both the NCST calculator and SACSIM more analysis should be done to make sure that any mitigation measures that restore transit service to 2019 levels are not double counting or over estimating the VMT benefits that they would provide. 13

12) With respect to Tables 2.1.27 and 2.1.28 related to VMT Reducing Measures, the City requests Caltrans to consider that commuters travel I-80 from Dixon to Davis and Sacramento. Although there is Solano Express bus service between Dixon and Davis, expansion of this service on the blue line to Sacramento with improved frequencies, especially between Dixon and Davis would likely have a beneficial impact on VMT. Another option to consider would be a Capitol Corridor train stop in Dixon. The Yolobus 42 routes cover long distances. Shorter, more frequent routes (particularly during commute times) between Woodland and Davis should also be considered. While the City acknowledges that this latter option would not substantially change the VMT on I-80, it could mitigate some of the I-80 GHG impacts. 14

13) Table 2.1.28 rejected a mitigation calling for increases to parking costs at UC Davis and Downtown Sacramento since currently there are no plans to proceed with this program. The VMT reduction estimate from this measure is significant and the City request that Caltrans consider working with the affected agencies to increase parking costs by a lesser amount in order to provide some VMT mitigation. 15

Induced Demand Analysis

14) The City notes that the DEIR contains contradictory information about whether commercial or truck traffic is considered in the analysis of induced demand and elasticity. The Fehr and Peers memorandum of November 16, 2023 states that increases to commercial traffic would be 19-29% based on induced demand, but later states that "With commercial driving excluded, the automobile daily induced VMT has an elasticity of 0.71." Additional explanation of why commercial traffic should be excluded from this analysis would be helpful in terms of understanding the agency's induced demand methodology. 16

Safety Concerns

15) Section 2.1.10.3 "Collision Data" summarizes the number of collisions and collision rates for the freeway segments of the Project Area. The Project proposes reducing the inner shoulder width in order to create the managed lane through the City of Davis and onto the Causeway. The reduction or elimination of the inner shoulder should be analyzed to determine if this will increase the likelihood of collisions and to 17

evaluate impacts on local first responders, such as police, fire and emergency services. 17 cont.

16) Along the same lines, the DEIR should analyze to the increased risk of collisions during the construction period. The City understands that staged traffic control, such as narrower lanes, no (or minimal) shoulders, and lane shifts have had an impact on collision rates during the current work on I-80 across the Causeway and in West Sacramento. The increased number of collisions has also had an impact on the City of Davis due to the increase in emergency calls for service to assist with incidents on the Causeway. For example, the Davis Fire Department saw an increase in calls to the Causeway between October 12th and November 22nd . The City received calls for service for 9 incidents in that same time frame in 2022, but this figure nearly doubled to 17 incidents in 2023. 18

Air Quality

17) Section 3.4.4.1 "Operation Emissions" as well as Table 3.4.2, analyzes CO2 emissions from fossil fuel combustion and its impact on GHG emissions. But the model used for this calculation does not account for "induced travel." A project that reduces travel time can lead to changes in traveler behavior that can increase the overall amount of travel, and therefore the Project may result in "induced travel." The DEIR needs to either explain how induced travel impacts were evaluated for GHG and air quality impacts or provide a full analysis these impacts. 19

18) Section 3.4.5 CEQA Conclusion determines that the Build Alternative will result in additional vehicle capacity that will result in an increase of impacts from VMT. The Project's very modest decrease in projected GHG emissions in 2049 are attributed to newer more fuel-efficient fleets and the increase in electric vehicles. The City requests a more detailed analysis of the Project's consistency with the State of California's goals of a 40% reduction (below 1990 levels) by 2030 and 85% reduction by 2050 (2022 Scoping Plan, ARB). 20

19) Section 3.4.6.1 (p. 3-64) describes a Governor's Office of Planning and Research report (2015) that identified a 50% reduction in petroleum use in cars and trucks by 2030 as a "key state goal" for reducing greenhouse gas emissions. Here again, the Project should be fully evaluated for consistency with State goals, even where they are not legally binding. 21

Miscellaneous/Non-CEQA Comments

20) The City notes that the public circulation period for the DEIR has been marked by noticing flaws, with incorrect documents loaded to the website at various points, supporting information on the VMT analysis posted later than the rest of the DEIR, 22

and repeated reports that physical copies of the documents were not available for significant periods of time at the Mary L. Stephens Davis Library. For all of these reasons, as well as the additional time it affords for review, the City appreciates the extension of the public comment period to January 12, 2024. However, one may argue that the extension provided may not be sufficient to account for these noticing deficiencies and we continue to have concerns about the adequacy of the availability of documents as noted above, particularly as it pertains to the document access to interested members of the community who may wish to participate in the DEIR review and comment process. 22 cont.

21) Section 2.1.10.7 Environmental Consequences proposes adding Class II bike lanes to County Road 32A, at the intersection of 32A/105 and the Class I bikeway that parallels I-80. When this is designed, the City requests that a safe crossing to access to the Class I bikeway be developed for westbound cyclists to use. 23

22) We note that Project T-8 in Table 1.3-3 incorrectly refers to “Olive Hill Lane” and “Olive Hill Road” instead of “Olive Drive.” 24

In addition, the city received comments from two City commissions: the Bicycling, Transportation, and Street Safety Commission (BTSSC) and the Natural Resources Commission (NRC). Their comments have been attached for your consideration as well. 25

If any of the requested analysis or comments noted above would trigger a recirculation of the DEIR, please recirculate the DEIR as required by CEQA. 26

Thank you again for the opportunity to comment on this DEIR. Please feel free to contact Ryan D. Chapman, P.E., T.E., Assistant Director of Public Works Engineering and Transportation if you have any questions. He can be reached at rchapman@cityofdavis.org.

Sincerely,



Mike Webb
City Manager

Attachments:
NRC Comments
BTSSC Comments

NRC Discussion: Caltrans I-80 Yolo Widening Draft Environmental Impact Report November 27, 2023

NRC Motion

At the regular meeting of the Natural Resources Commission on November 27, 2023, the following motion was approved unanimously (Johnston, Blough, 5-0):

"The NRC recommends that all comments from individual Commissioner review of the Caltrans I-80 Yolo Widening Draft Environmental Impact Report (DEIR), as presented and discussed at the NRC meeting, be compiled and sent to Ryan Chapman, Assistant Director, Public Works Engineering and Transportation, and Mike Webb, City Manager. Further, the NRC requests that the comments in full should be provided to the Bicycling, Transportation and Street Safety Commission in advance of their December 14, 2023 meeting, and that they be appended in full to the BTSSC recommendations to City Council."

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NRC Comments

The following are the compiled NRC comments, both sent in advance of the NRC meeting, and also discussed by all Commissioners during the meeting. Commissioners' review "assignments" in advance of the NRC meeting were as follows:

K Tuso : 2.2.2 Water Quality and Stormwater Runoff
J Byrne: 2.2.6 Air Quality, and 3.4.6 Greenhouse Gas Reduction Strategies
J Blough: 2.2.8 Noise
J Johnston -Transportation/Vehicle Miles Traveled (VMT) Mitigation Measures: 2.1.10 Traffic and Transportation/Pedestrian and Bicycle Facilities; and 3.2.8 Greenhouse Gas Emissions; and 3.4.4 Project Analysis

Comments from Keara Tuso: Stormwater (highlighting included as submitted)

- Under section 2.2.2.3, Environmental Consequences, sections discuss various building options and their impacts on stormwater
  - No Build Alternative 1 would have no changes or impacts to stormwater
  - Build Alternatives 2a and 2b
    - Caltrans will implement a SWPPP, in accordance with Standard Measure WQ-1, which would include construction site BMPs during construction activities to avoid and reduce potential water quality effects. The SWPPP would include BMPs to protect sensitive areas and to prevent and minimize stormwater and non-stormwater discharges. Standard Measure WQ-1 requires Caltrans to follow all applicable guidelines and requirements in the 2018 Caltrans Standard Specifications, Section 13, regarding water pollution control and general specifications for preventing, controlling, and abating water pollution to Caltrans-owned storm sewers, streams, waterways, and other bodies of water.

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NRC Discussion of I-80 Yolo Widening Draft EIR
November 27, 2023

        - Standard Measure WQ-4 requires preparation of a Stormwater Data Report during the design phase, which would describe whether permanent treatment BMPs should be incorporated. Operation of Build Alternatives 2a and 2b would have minimal effects on water quality.
    - All other Build Alternatives would have the similar stormwater impacts as noted for Build Alternatives 2a and 2b
- Under section 2.4.5.8, Water Quality and Storm Water Runoff, it is anticipated that the Project in combination with the projects listed in Table 2.4-1 would contribute to temporary adverse cumulative impacts on water quality. However, each project that disturbs one or more acres would comply with NPDES and install BMPs during construction to minimize potential adverse impacts on water resources. 28 cont.
- CEQA section:
    - All Build Alternatives would result in an increase of impervious surfaces, as described in Section 2.2.2, Water Quality and Stormwater Runoff. In accordance with the Caltrans MS4 permit, Standard Measure WQ-1 incorporates post-construction water quality treatment BMPs and low impact development controls to reduce non-point source pollutants as needed. Additionally, Standard Measure WQ-4 has been incorporated into the project and requires the preparation of a Stormwater Data Report (SWDR) during the design phase to describe whether permanent treatment BMPs will be considered. Temporary construction impacts related to water quality would be less than significant for Build Alternatives 2a and 2b through 7a and 7b.

Overall comment from Keara: Stormwater impacts are less than significant and would not require additional comment from the NRC.

Comments from Jacob Byrne: Air Quality and GHG

- Construction emissions would exceed Yolo and Sacramento air quality standards, but neither district has jurisdiction over Caltrans; a construction project in a local jurisdiction would otherwise be required to reduce emissions through mitigation 29
- Alternatives do result in changes to operational emissions, generally the managed lane direct connector appears to increase emissions, but this may not be true in every case 30
- The no build scenario results in increased emissions; this relates to assumed continued growth in congestion 31
- Vehicle emissions reductions will reduce emissions overtime in opposition to the increase in VMT 32
- page 3-61 states "Furthermore, the model does not account for induced travel." Does this statement mean the induced VMT from the project is not considered in the GHG emissions analysis? If the induced VMT is not being considered, in the GHG analysis, what VMT is used as the basis of this analysis? Is induced VMT 33

NRC Discussion of I-80 Yolo Widening Draft EIR
November 27, 2023

also omitted from the air quality analysis? On page 2-116 it is noted that 'Caltrans determined that induced travel demand, which is synonymous with induced VMT, represents the metric most appropriate for determining a transportation project's impact.' This seems to create a contradiction with the approach taken in the GHG analysis if this induced VMT is not considered. This would similarly be true for the air quality analysis if induced VMT is not used to calculate emissions. In both cases exclusion of induced VMT would lead to lower estimated emissions from build alternatives. 33 cont.

Clerical: Project T-8 in Table 1.3-3 refers to 'Olive Hill Lane' and 'Olive Hill Road' instead of 'Olive Drive'. 34

Comments from Jordan Blough: Noise
As expected, the noise chapters in the EIR are not particularly groundbreaking. The analysis seems adequate, and the potential issues with this project are not related to noise. No major comments from me. 35

Comments from John Johnston: VMT, GHG, and Energy

General

Project Description and Setting:

The relationship between this project and its role in the I-80 Comprehensive Multimodal Corridor Plan needs to be described. The goals are to assure the public that this project is consistent with the recommendations in the CMCP, that it is a necessary part of the CMCP, and that the mitigation measures and strategies proposed in the CMCP are adequately considered in the design of this project. 36

Environmentally Superior Alternative:

CEQA requires that the environmentally superior alternative be identified, and if it is not the preferred alternative, justifications should be included for why the preferred alternative is chosen over the environmentally superior one. These considerations do not appear to be in the subject DEIR. 37

VMT and GHG Comments

Explanatory information for Commissions (next 2 paragraphs).

Completing the Project will cause a 0-12% increase in VMT by induced traffic. Alternative 6 (transit only) is not projected to induce any new traffic; Alternative 7 (conversion of existing lanes) induces about 1%, and all the other alternatives induce about 12% more VMT. For these alternatives, the induced VMT is about 180 million miles/yr total and 128 million mi/yr autos only over existing traffic. That the DEIR would 38

classify this as a *Less-than-significant impact with mitigation* (Sec 3.2.8) probably doesn't ring true to most casual readers and requires some explanation.
While VMT does increase over time, three factors mitigate the GHG effect. One is a VMT reduction program (AMM TRANS-1, Section 2.1.10.8). This is the "mitigation" referred to above (more comments on this below). The second factor is more efficient driving resulting from Project. The third, and most important, is the changing nature of the vehicle fleet toward more electric vehicles. The claim is that GHG emissions are expected to decrease slightly as a result of these changes (Table 3.4-2). Depending on the alternative, changes in GHG emissions compared with the No Build alternative range from –13 to +11% in 2029. The corresponding numbers in 2049 are -16 to -2% (all negative because the fleet has more completely transformed over time). 38 cont.

What follows are comments on the DEIR regarding VMT and GHG.

1. Underestimation of GHG estimates.

In Section 3.4.4.2, it is stated that the AQ model does <u>not</u> account for induced travel. Consequently, the GHG estimates in Table 3.4-2 may be underestimated by an unknown but not negligible amount. Most alternatives result in about 12% greater VMT, which is similar to or greater than percentage reductions in GHG. Consequently, including the induced traffic in the GHG calculation may change the project from one of reducing GHG to one that increases GHG. The GHG emissions should be recalculated to reflect all VMT. 39

2. Significance of GHG emissions.

The DEIR argues that there is no applicable threshold of significance for GHGs, and that Caltrans is not violating any policies (Sec 3.4.4). Why the numerous state laws and executive orders (some of which are described in Sec 3.4.1.2) don't constitute "policy" needs to be justified. Even if they are not state policy according to a technical definition of such, these executive orders, etc. clearly express the intent of the state government over multiple administrations and legislatures (e.g., AB1279). The project's very modest decreases in GHG in 2029 and 2049 contrast sharply with state goals of a 40% reduction (below 1990 levels) by 2030 and 85% reduction by 2050 (2022 Scoping Plan, ARB). <u>The significant inconsistency between the project impacts and state goals should be highlighted for decision-makers</u> and the public. Decision-makers should be properly informed that this particular project will not advance the state toward its stated climate goals. 40

In a similar vein, the DEIR (p 3-64) describes, a Governor's Office of Planning and Research (2015 report) that identified a 50% reduction in petroleum use in cars and trucks by 2030 as a "key state goal" for reducing greenhouse gas emissions. Depending on the alternative, gasoline use by vehicles ranges from -13 to +11% in 2029 and -21 to +0.4% in 2049. Here again, the inconsistency between the project impacts and the state goals should be highlighted, even if they are not legally binding. 41

NRC Discussion of I-80 Yolo Widening Draft EIR
November 27, 2023

Issues with the VMT reduction package

1. Trip reduction plan methodology and double counting.

As noted in the VMT mitigation memo, a subsidizing transit passes and/or eliminating fares may be part of a voluntary trip reduction plan. If so, then the VMT reductions due to these three actions are being double-counted. The methodology for estimating the VMT reduction due to a voluntary trip reduction plan needs to be described. If it is not well enough defined at this point to know whether transit fare changes are included, one wonders how a five significant figure estimate of VMT reductions can be calculated or relied on. These three measures should be examined more closely and the VMT reductions revised accordingly, especially if they overlap. 42

2. Expansion of Yolobus Route 42.

The cost estimate associated with this measure should be reexamined. This measure was rejected because of costs, which were estimated to be $16M/yr. In contrast, the expansion of the Causeway Connection was estimated to cost less than $1M/yr. It is not apparent why expanding the routes of two 42 bus routes should cost 16 times more than the Causeway Connection. Is there a calculation error? If it turns out that the numbers are correct, consider expanding other bus routes (e.g. 43, 43R, 230) instead of discarding the measure completely. 43

3. Promote regional transit service.

Commuters travel I-80 from Dixon to Davis and to Sacramento. Although there is SolanoExpress bus service between Dixon and Davis, consider expanding this service on the blue line to Sacramento and improving frequencies, especially between Dixon and Davis. UCD has data on where its employees live and the potential ridership. Adding a Capitol Corridor train stop in Dixon would be another way to provide this service. The Yolobus 42 routes cover long distances. Shorter, more frequent routes (particularly during commuter times) between Woodland and Davis should also be considered. While this would not change the VMT on I-80, it could mitigate some of the I-80 GHG emissions. All of these ideas are consistent with Davis CAAP climate measures TR6 (expand public transit) and TR7 (strengthen regional transit). 44

4. Nishi overpass accounting.

In the VMT mitigation plan, Caltrans proposes to contribute $5M to the Nishi overpass and in return, takes credit for 14M VMT reduction due to the Nishi project ($0.34/VMT) However, Caltrans does not have control over this project. The Caltrans contribution is only 2.5% of the total project cost (250Kper unit x 700 units + 18M for the overpass). That contribution is not very large, and its presence will not guarantee that the project 45

will be constructed. Accordingly, Caltrans should not claim VMT reduction credit for it. There are other measures that would definitely result in VMT reductions were they to receive the same monetary contribution. Alternatively, Caltrans could propose a substitute measure of equivalent size that would be funded if the Nishi project is not executed within a certain timeframe. 45 cont.

5. Parking price increases.

The proposed measure to increase parking costs was rejected because there were no plans at hand. The VMT reduction estimate from this measure is immense (multiple times larger than other measures proposed). Because of this potential, its feasibility should be reconsidered, even if only a part of the original scope is achieved. 46

6. Criteria for deciding whether the VMT reduction package is adequate.

The proposed VMT reduction package covers only 43% of the induced automobile VMT. It is not explained why the total induced VMT is the basis for comparison. In addition, there is no information in the DEIR to put this into a regulatory context and the criteria for deciding that 43% is good enough is not described. It is stated in the document that the available mitigation funds total roughly 14-15% of the project's capital costs. If cost the limiting factor, or if there are limits on the kinds of projects that can be included in a VMT mitigation package, the regulatory and/or statutory authorities should be clearly stated. If not, the justification for providing only 43% VMT mitigation as opposed to a higher value should be provided. 47

<u>Miscellaneous Davis Issues</u>

1. Consistency with local plans (Table 2.1-1).

The 2023 Davis CAAP was not included in the analysis of consistency with local plans. The 2007 General Plan was considered, but the CAAP is the latest and current thinking on GHG issues. The CAAP has 3 climate actions relevant to the project – expand public transit (TR6), Transportation Demand Management (TR9) and strengthen regional transit (TR7). Add the CAAP to Table 2.1-1 and elsewhere consistency with local plans is discussed. 48

2. Davis cut-through traffic impacts.

Davis "cut-through" traffic (i.e., drivers seeking to avoid congestion by cutting through town) was not addressed. This is a significant problem which the project may or may not alleviate. It turns out that because of induced traffic, the project will improve but not eliminate congestion. Traffic conditions after the project is built are discussed in Section 2.1.10.7. The environmental effects of this side flow and how it might improve or get worse should be included in the EIR. 49

Draft Minutes
City of Davis
Bicycling, Transportation, and Street Safety Commission (BTSSC)
Davis Senior Center Activity Room, 646 A Street, Davis, CA 95616
Thursday, December 14, 2023
5:30 p.m.

Commissioners:	Brook Ostrom (Chair), Andy Furillo, Fei Ma, Nick Bates, Schuyler Campbell. NRC Commissioner John Johnston.
Council Liaisons:	Donna Neville
Staff:	Ryan Chapman, PWET Assistant Director/City Traffic Engineer Jennifer Donofrio, City of Davis
Absent:	Brett Lee

1. Call to Order & Roll Call
   Meeting called to order at 5:34 p.m.

2. Approval of Agenda

   Motion (Bates, Campbell)

   Motion carries: 5-0

3. Brief Announcements from Staff and Liaisons
   A. Council Announcements

      Councilmember Donna Neville arrived after brief announcements.

   B. Staff Announcements

      Jennifer Donofrio shared that the agenda and staff reports are in a binder.

4. Public Comment

   Hiram Jackson stated he was on the school board and informed the commissioners about the school board parcel tax. He shared the importance of this tax and that it funds are used for school programs, electives, athletics, the library, counselors and more. The proposed new tax will be on the ballot and with no sunset date.

   Alan Hirsch thanked Donna Neville for attending the teach-in discussion about I-80 managed lanes EIR. He also spoke about a YoloTD meeting on Monday night

50

where they selected their preferred alternative in advance of the EIR being approved.

5. Consent Calendar

   A. Commission Minutes from September 14, 2023
   Motion (Bates, Furillo):
   Motion carries: 4-0-1.
   Abstain (Commissioner Campbell did not attend at the September meeting)

   B. Commission Minutes from October 12, 2023
   Motion (Furillo, Campbell):
   Motion carries: 4-0-1.
   Abstain (Commissioner Ma, did not attend the October meeting)

6. Regular Items

   A. Review I80 Widening Draft EIR

   Ryan Chapman provided an overview of the draft EIR and highlighted that the comments heard tonight and the Natural Resource Commission's letter will be provided to City Council. He explained what types of comments the City is looking for and what comments belong in the City's comment letter. He shared that the EIR is a disclosure document that looks at alternatives. He stated that if there is an environmental impact, then their needs to be a mitigation measure to respond to that impact.

   Clarifying Questions
   Commissioner Ma asked about the goal for this discussion. Ryan Chapman shared it is letting us know what was deficint or missed in the EIR to include in the letter.

   Councilmember Neville shared that City Council requested an extension of the EIR's due date, but it was denied by Caltrans. She also read what the CEQA laws is and recommended that the commission focus on three areas for EIR comments. The three areas of focus are, (1) sufficient disclosure and analysis, (2) is the Mitigation Adequate and (3) do you want to new or modified alternatives.

   Commissioner Ostrom asked Ryan Chapman about his thoughts about the EIR. Ryan Chapman noted there were challenges with accessing the EIR documents. He pointed out that the an older EIR draft was posted originally on the Caltrans website and at the libraries. He also noted how Caltrans removed the incorrect draft EIR from library and there was a period where the new EIR was not at the library during the comment period. He shared issues with mitigation measures and the project timeline. He noted issues with bicycle facilities during and after construction. He shared that the EIR needs

50 cont.

to included project phasing and how that was not included. He also stated that he did not see how this project would be funded. Finally, he stated that cut through traffic was not analyzed in the EIR and it needs to be included to understand the project impacts on City streets.

NRC Commissioner Johnston asked about how the NRC letter and BTSSC comments will be moved forward. Ryan Chapman shared that the comments will be reviewed by the City Manager's Office and then go to City Council. 50 cont.

Commissioner Furillo asked about how YoloTD voted on a preferred alternative ahead of the EIR approval and asked if this practice is unusual? Ryan Chapman shared that he has seen this before.

Commissioner Johnston asked about a superior alternative. City Councilmember Donna Neville shared that she is looking into this.

Public Comment
Alan Hirsch shared his issues with the EIR including that it was not available at the library, how challenging it was to access the technical reports. He noted that Caltrans did not provide a complete EIR, because they did not provide all the technical reports to the libraries. He recommended that the BTSSC request Caltrans to recirculate the EIR. 51

Commissioner Discussion

Commissioner Campbell shared that more needs to be done to improve transit. He noted that the Capitol Corridor trains are packed and there are not enough train cars. Commissioner Furillo stated that there are two alternatives that highlight transit, but these alternatives are not along transit corridors. He noted at the primary alternative, states there is transit on a portion of the project area. However, there is a 5-mile stretch between 80/50 split and I-5, which has no transit and there are no plans to add transit. The same issue exists with Alternative 6B, which states there is transit, but I-80 has no transit.

Commissioner Bates asked if there is not transit today, how are the models evaluating transit? Ryan Chapman shared information about the models. The UC Davis research model uses induced demand and land use patterns to model transportation. The SACSIM model created by SACOG, evaluates land use and models trips in the region using trip data. We see few people in the region using transit as a result, the model is not showing transit use. The SACOG model does not look at changes in land uses. 52

Commissioner Campbell shared that we have a weak transit system in the Sacramento region and unless we build a strong transit system, we will not see it in the model.

DRAFT

Commissioner Furillo shared that when transit is available along geographical pinch points, there are examples where transit systems can have high transit use.

NRC Commissioner Johnston stated that transit agencies have methods to create models and we should be asking them for this information. Ryan Chapman stated that he is seeing the shift towards transit in the mitigation measures. NRC Commissioner Johnston noted that there was limited information in the EIR about what models that used Caltrans used and what information was included in setting up the model.

Commissioner Ostrom and Commissioner Furillo shared their concerns about the mitigation measure to expand Yolo Bus Route 42A was rejected, because the annual cost would the $16 million. This comment was also picked up by NRC. There was discussion that commissioners believe this is an error with decimal places.

Commissioner Ostrom highlighted how the project area is part of an important east west corridor, however the EIR does not consider impacts to the whole corridor. He also noted that there was no discussion about impacts to local roadways, including Mace and Cowell. He believes that these impacts are being completely ignored. He thinks that the EIR should include mitigation measures from Caltrans to address impacts to our City and County streets. 52 cont.

Commissioner Furillo asked if adding an additional lane in the project area has any impacts on the choke point, where I-80 goes from 8 lanes to 4 lanes. We wants to understand if adding a lane in the project area make a difference with delay?

Commissioner Ma asked about VMT mitigations and how do we know if these mitigation measures will happen in the future. Ryan Chapman shared that Caltrans is entering into MOUs with other agencies to manage the VMT mitigation measures. Commissioner Bates stated that these mitigation measures are good ideas and asked if these ideas would be good to have in place without this project. He also asked about the connection between the mitigation measures and revenue. Ryan Chapman stated that Caltrans will provide money for these mitigation measures to the agencies implementing the measures. He also noted that if they create a tolling authority, then they will also use this revenue to pay for mitigation measures. Ryan Chapman shared that he wants to understand if there is no tolling, then how are the mitigation measures going to be funded.

Commissioner Furillo stated that in order to increase transit service, you need to create a car lane.

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NRC Commissioner Johnston asked why in the mitigation measures VMT reduction stopped at 43%, when the threshold is 0%. He would like clarification on where this number came from? Ryan Chapman suggested that the BTSSC include in their comments that the mitigation measures do not go far enough.

Commissioner Ostrom asked about collisions on the causeway and will this project reduce or keep the collision rates the same. Ryan Chapman shared that there is a paragraph in the EIR that the collision rate will not increase, but he stated that he would like Caltrans to better explain this determination with their plan to add an additional lane and limit the shoulder area. He would also like Caltrans to consider collision impacts during both construction and the build out. Commissioner Furillo shared he wants to consider the safety of the bike path. He has seen fence pieces, bumpers, along the pathway. He also noted areas where the path is currently narrowed due to construction. He noted that there is no viable alternative route for bicyclists and the construction is impacting the pathway. 52 cont.

Commissioner Bates shared that most alternatives include adding a travel lane and a toll lane, but asked why there was no option for not adding a travel lane and adding a toll lane.

The BTSSC completed their general comments about the EIR and then created a BTSSC EIR Comment List, see below. The purpose of this list was to share this list with City Council to help draft a letter to Caltrans. Commissioners provided comments on three topic areas in bold.

<u>BTSSC EIR Comment List</u>

Did the EIR have sufficient disclosure and analysis? 53

1. The EIR did not analyze diversion traffic and cut-through traffic. This needs to be included.

2. The National Center for Sustainable transportation calculator was used to model the toll lane alternative, but the calculator guidelines say not to use this calculator for toll lanes. 54

3. Did Caltrans consider choke points and people using cut-through routes? 55

Was the mitigation adequate? 56

1. The mitigation was not adequate related to transit improvements. The proposed mitigation just restores transit services to pre-pandemic levels. Is Caltrans double counting VMT reduction?

DRAFT

2. There are no identified mitigation measures for the bike path during construction. The roadway shoulder is being eliminated during construction, which means that there will be construction impacts adjacent to the pathway. 57

3. The VMT mitigation should be zero or close to zero in accordance with California Air Resource Board. A project of this scope should not be moving forward without VMT mitigation compliance. 58

Do you want to new or modified alternatives?

1. The EIR is insufficient in explaining the primary alternative and alternative 6B with regards to transit. The BTSSC suggests adding a transit connector from Mace to I-80 instead of at I-80/US 50. The transit lane that is proposed on I-80 between I-5 and 80/50 split does not carry buses and there are no proposals for buses on this route. 59

2. There should be an alternative with one lane being a toll lane and no additional lanes being added. 60

Motion (Bates, Furillo): The BTSSC recommends that City Council consider the list of EIR comments and also include the NRC letter with their letter to Caltrans.

Motion carries: 5-0

7. Subcommittee and Liaison Assignment Updates. This item is for brief updates on subcommittee work or reports from commission liaison(s) on meetings attended, if any.

   Commissioner Furillo shared that there was a YoloTD meeting in November and they are considering a new transit center in downtown Woodland. They also discussed detours to Yolo Bus during events, like Kings games and how closing stops and roads is causing significant impacts. YoloTD will be bringing this up with Sacramento City Manager's office. YoloTD also has three openings on their committee. 61

8. Long Range Calendar: Upcoming Meeting Dates and/or Potential Agenda Items

Commissioner Bates requested staff provide the BTSSC with an update on the downtown parking plan. He would like to understand what moved forward since the plan was adopted and what has stalled. Ryan Chapman shared that this item could be added in a couple of months.

Commissioner Ma asked for an update on the G Street Corridor. Jennifer Donofrio provided a short updated that staff will be bringing an item to City Council in January

sharing the results of the survey and asking them to provide recommendations list of infrastructure improvements and parking.

Commissioner Ostrom asked about an update on Spin. Staff will add this request to the calendar.

Public Comment
Two audience members from Yolo County shared that they are working on a taskforce and might bring something to the BTSSC about this work. They provided their contact information to Jennifer Donofrio to follow-up.

61 cont.

Discussion

9. Adjournment.

Motion (Campbell, Furillo): Adjourned at 7:35 p.m. Motion carries, 5-0.

DRAFT

Below Caltrans responds to the 22 comments of City of Davis, and the additional comments included from BTSSC and NRC for consideration.

Response to Comment 1 in 20240112, City of Davis

Thank you for commenting on the Draft EIR/EA. This introductory comment does not discuss the adequacy of the Draft EIR/EA. No changes to the Draft EIR/EA are necessary.

Response to Comment 2 in 20240112, City of Davis

The commenter states that an inaccurate or incomplete project description may render the analysis of significant environmental impacts inherently unreliable. The project description in the Draft EIR/EA provides sufficient detail of the project to allow for a complete environmental review as it includes important information such as the project location, the scope of work, and methodologies for construction of the project. The inclusion of this information in the project description allows for informed decision-making.

Response to Comment 3 in 20240112, City of Davis

The commenter points out that Chapter 1.3.1.1 does not discuss the phasing of the project, and questions whether there is sufficient funding to complete the entire project in one phase. The Draft EIR/EA discloses and analyzes the entirety of the project that would be constructed, as required by CEQA and NEPA. It is not yet known with certainty if or how construction phasing would occur. No changes to the Draft EIR/EA are necessary.

Response to Comment 4 in 20240112, City of Davis

The commenter asks why Caltrans did not analyze as an alternative converting existing general-purpose lanes to a tolling lane or HOT lane. Current State and Federal regulations currently prohibit conversion of a general-purpose lane to a tolled lane. Please refer to Master Response B for information related to project alternatives considered.

Response to Comment 5 in 20240112, City of Davis

The commenter requested Caltrans to conduct an analysis of Project Alternative 6 (transit-only managed lanes) that assumes an increase in transit supply. The transit assumptions used for future year alternative analysis are provided in the TAR, prepared for the project and summarized in the Draft EIR/EA Section 3.2.17, *Transportation*.

TAR section 3.2.1, Future Year Model Development, notes that the roadway network and transit projects included in the SACSIM19 future year scenarios were reviewed within the project study area. The MTP/SCS provides a range for the implementation timing (typically, a five-year range). Based on the project list, a set of projects to be in place by the opening year of 2029 and the horizon year of 2049 was developed. Key roadway network and transit projects included in the future year models are listed in the TAR.

For more details on the existing transit system and ridership forecasts, see the TAR sections 4.5.1, 5.5.1, and 7.4.1. The TAR was prepared for the project and summarized in the Draft

EIR/EA Section 3.2.17, *Transportation*, and was available upon request. The TAR is available on the project website with the Final EIR/EA (https://dot.ca.gov/caltrans-near-me/district-3/d3-projects/d3-i80-corridor-improvements).

Response to Comment 6 in 20240112, City of Davis

Commenter requests the Climate Action and Adaptation (CAAP) of the City of Davis be included in the analysis of consistency with local plans. Caltrans is not required to include the CAAP in the Draft EIR/EA analysis due to the timing of the Davis CAAP adoption (April 2023) and preparation of the project NOP (October 2022). However, since the project is already proposing expanding public transit, developing Transportation Demand Management (TDM), and strengthening regional transit, certain CAAP goals and policies are met. These project measures, summarized in Section 3.2.17 of the Draft EIR/EA, are found in the VMT Mitigation Plan, which proposes to provide financial contributions to such measures as expanding Unitrans and Yolobus Microtransit frequency, enhancing the YoloCommute TDM program to incentivize and educate the public on the benefits of transit, and expanding Causeway Connection Route 138 (and potentially Yolobus Route 42A/B currently under discussion) frequency.

Response to Comment 7 in 20240112, City of Davis

The commenter asks if Caltrans intends to adopt the VMT Reduction Measures as formal mitigation measures and notes they were not included in the table of mitigations in Exhibit. Caltrans will adopt AMM TRANS-1 (the VMT mitigation measures) presented in Section 2.1.10 of the Draft EIR/EA as formal mitigation measures to comply with CEQA regulations. AMM TRANS-1 was inadvertently left out of Appendix C and has been added to Appendix C in the Final EIR/EA and is included in the Environmental Commitment Record. Please refer to Master Response A for responses related to VMT mitigation.

Response to Comment 8 in 20240112, City of Davis

The commenter questions the long-term funding of the VMT mitigation measures. The proposed VMT mitigation measures are fully enforceable and will be legally binding through the execution of Cooperative Agreements with each partner agency receiving financial contributions. The Cooperative Agreements will be executed only upon receipt of sufficient funding, which is anticipated in the Summer of 2024.

Caltrans will enter into Cooperative Agreements with the Joint Powers Authority (JPA) that will be in charge of the tolling facility and toll revenue collection/expenditure. It will be the decision of the JPA to determine the expenditure plan, but a proposed option is to provide any net excess toll revenue (after initial Operation and Maintenance costs are used from toll revenue) towards transit programs within the region and across the corridor.

Finally, Caltrans will adopt a Statement of Overriding Considerations to comply with CEQA requirements, as the project will not be able to feasibly and reasonably mitigate the fully 100% induced VMT. However, as documented in the VMT Mitigation Plan and summarized in Section 4.2.4, *Consultation with Stakeholders for Vehicle Miles Traveled Mitigation* of the Draft EIR/EA, a good faith effort was put forward to mitigate as much as feasibly and reasonably as possible,

to comply with CEQA requirements. Please refer to Master Response A for further responses related to VMT mitigation. Also, please see Response to Comment 11 in 20240112, City of Davis for a more detailed discussion of this topic.

Response to Comment 9 in 20240112, City of Davis

The commenter questions the feasibility of the VMT mitigation since its implementation requires actions of other public agencies. The toll revenue mentioned in the VMT Mitigation Plan and referenced in Table 2.1-27 of the Draft EIR/EA, as ongoing contributions provided for each mitigation measure would not fully mitigate the induced demand. The projected revenue would not be enough to fully mitigate the induced demand, nor would providing funding for the infeasible and rejected mitigation measures from the VMT Mitigation Plan listed in Table 2.1-28 of the Draft EIR/EA.

As mentioned above in Response to Comment 8 in 20240112, City of Davis, the JPA will make the final decision as to where net excess toll revenue will be expended, but the projected figures do not provide sufficient revenue to fully mitigate the entirety of the induced demand to less-than-significant levels. Hence, a Statement of Overriding Considerations will be adopted to comply with CEQA. However, Caltrans is likely to also have a voting seat on the JPA to help determine where net excess toll revenue is expended. Also, please refer to Master Response A for responses related to VMT mitigation.

Response to Comment 10 in 20240112, City of Davis

The commenter asserts the VMT Reduction Measures will be deferred to a later date and not meet CEQA Guideline Section 15126.4. This assertion is inaccurate. There is no plan to defer mitigation or any indication that mitigation will be deferred. As has been discussed with each partner agency receiving mitigation funding, partner agencies will receive the funds and implement the specific measures by completion of project construction and the opening of the project to traffic, fully complying with CEQA requirements. The financial contributions will be provided through a legal binding agreement, in the form of a Cooperative Agreement. The Cooperative Agreement will outline total amount of funding contributed, annual funding contributed, number of years to provide the funding, and specific activities/programs for which the funding will be used. Additionally, the Draft EIR/EA acknowledges that AMM TRANS-1 would not fully mitigate the VMT impacts of the project and that this impact is significant and unavoidable, and Caltrans will adopt a Statement of Overriding Considerations as part of the project approval process. Also, please refer to Master Response A for responses related to VMT mitigation.

Response to Comment 11 in 20240112, City of Davis

The commenter is concerned about the VMT Reduction Measures are insufficient and requests Caltrans review options to further reduce VMT impacts from the project. As previously mentioned in Response to Comment 8 in 20240112, City of Davis, the project will not fully mitigate the induced VMT. Caltrans will adopt a Statement of Overriding Considerations as part of the project approval process.

The Draft EIR/EA includes Table 2.1-28, a table documenting mitigation measures that were analyzed but rejected, with reasoning provided for each measure. Examples of reasons to reject those measures are that there is no plan in a local agency's General Plan to implement such measures, or the cost to implement/construct a measure is infeasible for this project to implement.

Both the chosen mitigation measures and rejected measures were the product of a region-wide solicitation process from August – December 2022, in which Caltrans requested all potential partner agencies in the Yolo-Sacramento region provide projects that are part of their agency General Plan or part of SACOG's 2020 MTP/SCS. Once a list of measures was established from this public outreach, each measure was discussed with Caltrans' traffic engineering consultant, Fehr and Peers, to determine which measures provided the highest VMT reduction at the most feasible and reasonable cost. Also, please refer to Master Response A for responses related to VMT mitigation.

Response to Comment 12 in 20240112, City of Davis

The commenter asks Caltrans to reexamine cost estimates for the Route 42A and 42B. The cost estimate to expand Route 42 A/B has been examined with YoloTD and is revised to a more realistic annual cost to implement the program. Route 42 A/B expansion is included in the updated VMT Mitigation Plan and to AMM TRANS-1 in the Final EIR/EA. Also, please refer to Master Response A for responses related to VMT mitigation.

Response to Comment 13 in 20240112, City of Davis

The commenter requests more detail on the VMT reduction estimates from voluntary trip reduction. After further consultation with partner agencies, the mitigation measures labeled "Subsidize Monthly Transit Passes in Yolo County" and "Reduce Transit Fares" are removed from the Updated VMT mitigation plan and AMM TRANS-1 in the Final EIR/EA. The mitigation measures labeled "Voluntary Trip Reduction Program in Yolo County" and "Expand Capitol Corridor Frequency between Oakland and Sacramento" encompass bus and train fare subsidies, respectively. Therefore, the effectiveness of each fare subsidy is built into the VMT reduction assumptions for the two remaining measures.

Also, please refer to Master Response A for responses related to VMT mitigation.

Response to Comment 14 in 20240112, City of Davis

The commenter proposes consideration of additional bus services from Dixon to Davis and Sacramento. While the Solano Express bus service traverses across Yolo County, it is not a Yolo County focused transit service. The VMT mitigation in the Draft EIR/EA focuses on the project limits pertaining to the induced VMT when analyzing VMT reduction strategies and where to contribute financial investments. Therefore, transit services operated by Yolobus and SacRT were identified as priority services offering VMT reduction within the project limits. Further, the shorter routes between Woodland and Davis is considered as part of the mitigation measure labeled "Microtransit in Yolo County". And as the commenter notes, measures that do not offer substantial VMT mitigation were rejected as one of the analysis factors, hence the

suggestion of the City's latter option would not yield a successful measure. Also, please refer to Master Response A for responses related to VMT mitigation.

Response to Comment 15 in 20240112, City of Davis

The commenter requests Caltrans to reconsider increases to parking as part of mitigation measures. As previously mentioned in Response to Comment 11 in 20240112, City of Davis, Caltrans cannot partner with agencies on projects that are not currently in an approved General Plan or SACOG's 2020 MTP/SCS. Projects must be in an approved local agency plan to prove it is reasonable, feasible, and enforceable to comply with CEQA requirements. Also, please refer to Master Response A for responses related to VMT mitigation.

Response to Comment 16 in 20240112, City of Davis

The commenter requests additional explanation to understand Caltrans' induced demand methodology. Please refer to Master Response A for responses related to induced travel and VMT calculation methodologies.

Response to Comment 17 in 20240112, City of Davis

The commenter requests an evaluation of whether reducing or eliminating the inner shoulder will increase collisions and impacts on local first responders. A Design Standard Decision Document (DSDD) has been signed for the project to document all non-standard features that are included in the project, including less-than-standard shoulders for certain portions of the project where physical limitations exist. Non-standard features documented in a DSDD are included in most transportation projects where physical limitations and existing footprint constraints exist. The DSDD is reviewed by Caltrans Traffic Safety, Traffic Operations, and signed by executive Design staff. Each non-standard feature is taken seriously to ensure the traveling public is not hindered in safety and operations.

Emergency services and first responders will have priority to utilize the managed lane without meeting occupancy requirements, hence providing a freer-flowing option than the general-purpose lanes. Additionally, the project will maintain standard outside shoulders throughout the project limits.

The project design complies with all state and federal guidance, and it is not anticipated to produce adverse safety impacts for travelers on the corridor and will improve overall safety along the corridor. For the alternatives that reduce congestion, Highway Safety Manual (AASHTO, 2014) equations that predict the safety performance of freeways show that reducing congestion is associated with lower collision frequency per lane for the most frequent collision types within the project limits. As a result, these alternatives would be expected to lower the collision rate.

In addition, the build alternatives make several improvements which will lead to increased safety outcomes, including adding ramp meters, auxiliary lanes, ITS elements that improve incident response time, improved concrete median barrier, and added CCTVs and changeable message signs. Ramp meters will facilitate safer and easier merging and can reduce collisions by 14%,

while auxiliary lanes improve weaving conflicts and can reduce collisions by 21%. ITS elements like CCTVs and CMS's assist in incident monitoring, identification, verification, and provide important traveler information, all of which help reduce incident response and clearance time while reducing secondary collisions.

Response to Comment 18 in 20240112, City of Davis

The commenter requests analysis of increased collision risks during construction. The Draft EIR/EA does not analyze stage construction methodology, as stage construction is determined after completion of the Final EIR/EA and during the design phase. However, the project team will evaluate this incident response data and take appropriate measures during the stage construction design development. As described in Standard Measure TT-3, *Transportation Management Plan*, in the Draft EIR/EA, coordination with local agencies and emergency services will take place for any planned closures that reduce mobility longer than typical construction closures.

Response to Comment 19 in 20240112, City of Davis

The commenter questions whether induced travel impacts were fully analyzed for GHG and air quality impacts. The commenter incorrectly states that the GHG analysis does not account for induced VMT. As discussed in Master Response D, the SACSIM19 model was used to conduct travel demand modeling. SACSIM19 accounts for any changes in departure time and related VMT effects resulting from implementation of the project and future transportation investments in the six-county SACOG region. Thus, the VMT used to support the GHG analysis is not underestimated and was developed using travel forecasting and modeling techniques conforming to existing standards, guidance, policies, and best practices. See also Master Response A, Induced Travel and VMT calculation methodologies.

Response to Comment 20 in 20240112, City of Davis

The commenter requests more detail on the project's consistency with California's reduction goals of GHG of 40% (below 1990 levels) by 2030, and of 85% by 2050 (2022 Scoping Plan, ARB). Caltrans' criteria for determining significance of GHG emissions is whether or not the project *contributes* to overall state reduction goals. A project that results in less GHG emissions compared to existing can be considered to have a less than significant impact. Consistency with the 2022 Scoping Plan and other plans and policies for the reduction of GHG emissions is assessed in Section 3.2.8, *Greenhouse Gases*. Importantly, no single project is expected to achieve the same percent reduction as the goals stated in various policies. As noted in the impact analysis, GHG emissions for the Build Alternatives would be lower for design year 2049 compared to existing year (see Table 3.4-2). Therefore, the project supports the state's long-term climate change goals and plans, including the 2022 Scoping Plan.

Please refer to Master Response I for response related to air quality and GHG analysis methods.

Response to Comment 21 in 20240112, City of Davis

The commenter requests Caltrans to consider OPR's 2015 report identifying a 50% reduction in petroleum in cars and trucks by 2030 as a key goal to reduce GHG. Caltrans strives to ensure that projects contribute to statewide GHG reduction goals to the extent feasible while meeting project purpose and need. The project is not inconsistent between project impacts and state goals as the project contributes to overall state reduction goals by reducing GHG emissions. As stated in the Draft EIR/EA (3.4.5 *CEQA Conclusion*), "…as projected under the 20-year horizon design assumptions (2049), GHG emissions were estimated to decrease for the Build Alternatives as compared to conditions under 2029."

Response to Comment 22 in 20240112, City of Davis

The commenter expressed appreciation that due to technical snafus providing VMT analysis on the website, the public comment period was extended. As the commenter states, Caltrans extended the review period an additional 7 days from the previously announced 53-day review period. The review period was initially given an extra 8 days from the CEQA required 45-day review period due to the holiday season. Due to multiple requests to extend the review period from 53 days, Caltrans extended to 60 days, which is 15 days more than required by law. Further, the project website stated that technical documents were available upon request.

Response to Comment 23 in 20240112, City of Davis

The commenter states in Section 2.1.10.7 there is a proposal for adding Class II bike lanes to County Road 32A. When this is designed the commenter requests that a safe crossing to access Class I bikeway be developed for cyclists to use.

The Class II bike path on County Road (CR) 32A is no longer included as part of the project and was incorrectly included in the Draft EIR/EA. There is no bike path work or shoulder widening proposed on or adjacent to CR 32A. Section 2.1.10.7 of the Draft EIR/EA discusses extending the existing Class I bicycle pathway along the Causeway to connect at the westbound CR 32A offramp.

Further bicycle facility discussions can be had with local agencies and stakeholders as design progresses or as separate, locally-lead projects. Also, please refer to Master Response F for responses related to bicycle and pedestrian improvements.

Response to Comment 24 in 20240112, City of Davis

The commenter notes that Table 1.3-3 refers to "Olive Hill Lane" and "Olive Hill Road" instead of Olive Drive. This typographical error is corrected in the Final EIR/EA.

Response to Comment 25 in 20240112, City of Davis

The commenter states that comments from the Bicycling, Transportation, and Street Safety Commission (BTSSC) and the Natural Resources Commission were included as an attachment. Comments from these commissions were addressed in Responses to Comments 27-49 in 20240112, City of Davis.

Response to Comment 26 in 20240112, City of Davis

The commenter states that if any requested analysis or comments noted from the City of Davis trigger a recirculation of the Draft EIR/EA, that the document would be recirculated as required by CEQA.

Comments from the City of Davis have been addressed, please see Response to Comments 1-25 in 20240112, City of Davis.

Response to Comment 27 in 20240112, City of Davis

The commenter shares the Commission's unanimous motion to recommend all comments at the NRC meeting to the City Council. Caltrans acknowledges said motion.

Response to Comment 28 in 20240112, City of Davis

This is a statement regarding stormwater impacts, acknowledging that they would not be significant, and noting that additional comments are not required from the NRC.

Response to Comment 29 in 20240112, City of Davis

Commenter notes construction emissions would exceed Yolo and Sacramento air quality standards, but that neither district has jurisdiction over Caltrans. As most air district thresholds have not been established by regulation or by delegation from a federal or state agency with regulatory authority over Caltrans, Caltrans is not required to adopt those standard levels in Caltrans' documents. (CEQA Guidelines Sections 15064(b)(2), 15064.7(b).) Thus, the SMAQMD and YSAQMD standard levels are provided for reference only.

Construction-related air quality impacts are discussed in Chapter 6 of the Air Quality Report located in Appendix J of the Draft EIR/EA. Construction impacts on air quality are evaluated based on existing/baseline conditions and include compliance with control measures. Caltrans considers projects that do not implement Caltrans Standard Specifications may result in short-term air quality impacts. Emissions from construction-related activities are considered temporary as defined in 40 CFR 93.123(c)(5).Section 2.2.6 *Air Quality* of the Draft EIR/EA discusses compliance with SMAQMD rules and regulations.

Appendix E of the Draft EIR/EA also lists air quality and GHG Standard Measures that will be implemented as part of the project. Caltrans special provisions and standard specifications include the requirement to minimize or eliminate dust through application of water or dust palliatives. The construction dust and equipment exhaust emissions measures will be implemented when practical, during all phases of construction work:

Response to Comment 30 in 20240112, City of Davis

The commenter states that "alternatives do result in changes to operational emissions and that the managed lane direct connector appears to increase emissions, but this may not be true in every case." Operational emissions are discussed in Section 2.2.6 *Air Quality*. Based on the operational period emission data in Table 2.2-10 in Section 2.2.6 Air Quality, the magnitude of

the emissions estimates for each of the Build Alternatives is very similar (i.e., within 10%). Project implementation will include Standard Measures GHG-1 through GHG-6 (listed in Appendix E), which would minimize emissions associated with construction activities.

Response to Comment 31 in 20240112, City of Davis

The commenter states that the no build scenario will increase emissions. This is documented in the Draft EIR/EA, Section 2.2.6.3, *Environmental Consequences*. The commenter does not discuss the adequacy of the Draft EIR/EA.

Response to Comment 32 in 20240112, City of Davis

The commenter claims the GHG reductions presented in the EIR/EA are in opposition to the VMT findings for the project. An increase in project-level VMT thus does not immediately constitute a significant GHG impact, as suggested by the commenter.

Please refer to Response to Comment 7 in 20240110, California Air Resources Board and *Response to Comment 12 in 20240111, Center for Biological Diversity* for additional discussion.

Response to Comment 33 in 20240112, City of Davis

The commenter asks if the air quality and GHG analyses account for induced VMT. As discussed in Master Response D, the SACSIM19 model was used to conduct travel demand modeling, and this model accounts for changes in departure time and related VMT effects resulting from implementation of the project and future transportation investments in the six-county SACOG region. The quoted text from the commenter is in relation to the CT-EMFAC model, which is an emissions forecasting tool. Please refer to Response to Comment 5 in 20240112, John Johntson for additional discussion. See also Master Response A for information related to induced travel and VMT calculation methodologies.

Response to Comment 34 in 20240112, City of Davis

As in Comment 24 above, the commenter notes that Table 1.3-3 refers to "Olive Hill Lane" and “Olive Hill Road” instead of Olive Drive. This typographical error is corrected in the Final EIR/EA.

Response to Comment 35 in 20240112, City of Davis

The commenter states that the Noise analysis in the Draft EIR/EA is adequate and has no comment. No changes to the Draft EIR/EA are necessary.

Response to Comment 36 in 20240112, City of Davis

The commentor states the relationship between the project and its role in the I-80 Comprehensive Multimodal Corridor Plan (CMCP) needs to be described as the goals to assure the public this project is consistent with CMCP.

The proposed managed lane work on I-80 for this project is discussed in the "Solano/Yolo/Sacramento I-80 Comprehensive Multimodal Corridor Plan" (CMCP, dated January 2023) as one of over two hundred I-80 corridor improvement projects proposed to improve corridor operations, increase travel choices, and close gaps in the existing multimodal transportation system. CMCP includes these segments within our project limits: Segment 6: I-80 from Sol/Yolo County Line to US 50; Segment 7: I-80 from 50/80 Split to West El Camino; and Segment 9: US 50/I-80 Interchange to I-5/ US 50 Interchange. This project will also meet some of the CMCP goals to improve freeway travel time reliability, help close the gaps in Transportation Operation Systems (TOS) elements, by adding Ramp Metering, Vehicle Detection Sites, Closed-Circuit Television Cameras and Changeable Message Signs. The Mobility Hub proposed on this project is also mentioned in the CMCP and that it will help improve access and connections to existing and future multimodal (bus, bike and pedestrian) transportation or Mobility Hubs. *Solano/Yolo/Sacramento I-80 Comprehensive Multimodal Corridor Plan" (CMCP, January 2023)*

Consistency with regional and local plans and programs is discussed in Section 2.1.2 of the Draft EIR/EA.

Response to Comment 37 in 20240112, City of Davis

Commenter questions whether environmentally superior alternative was identified, and if not, why the preferred alternative was chosen over the environmentally superior one. Table S-1 Comparison of Alternatives-Impacts Summary (NEPA) and Table S-2 Summary of CEQA Impacts, located in the Summary section of the Draft EIR/EA, compared project alternatives and their impacts. All the alternatives presented have similar impacts and a particular alternative does not stand out as the environmentally superior alternative. However, Alternative 4b. would involve adding a high-occupancy toll lane in each direction for free use by vehicles with three or more riders (HOT 3+) and would build an I-80 managed lane direct connector. Vehicles with less than three riders would pay a fee for lane usage. As Alternative 4b. would encourage carpooling and transit use, the environmentally superior alternative would be identified as Alternative 4b.

Response to Comment 38 in 20240112, City of Davis

The commenter paraphrases information from the Draft EIR/EA related to the project VMT and GHG analyses. The statements do not discuss the adequacy of the EIR/EA.

Response to Comment 39 in 20240112, City of Davis

The commenter claims the GHG analysis does not account for induced VMT. This is incorrect. Please see Response to Comment 33 in 20240112, City of Davis and Response to Comment 5 in 20240112, John Johntson for additional discussion. See also Master Response A for responses related to induced travel and VMT calculation methodologies

Response to Comment 40 in 20240112, City of Davis

The commenter questions why state laws and executive orders, described in Section 3.4.1.2 are not policies applicable to the project. No single project is expected to achieve the same percent reduction as the goals stated in various policies. Caltrans' criteria for determining significance of greenhouse gas emissions is whether or not the project *contributes* to overall state reduction goals. A project that results in less GHG emissions compared to existing can be considered to have a less than significant impact. Please refer Response to Comment 20 in 20240112, City of Davis for additional discussion.

See also Master Response I for response related to air quality and GHG analysis methods.

Response to Comment 41 in 20240112, City of Davis

The commenter asserts that there is inconsistency between the OPR's goals and the project's impacts, and questions why this was not highlighted in the Draft EIR/EA even if the OPR goals are not legally binding. The Draft EIR/EA's argument that there is no applicable threshold of significance for GHGs is based on the current regulatory framework. While state laws and executive orders express the intent of the state government, they do not necessarily constitute a "policy" in the technical sense that can be enforced on individual projects.

The project's GHG reductions, while modest, are in line with the overall trend of decreasing emissions. It's important to note that achieving state goals is a collective effort that involves numerous projects and initiatives, not just a single project.

The Draft EIR/EA does acknowledge the state's goal of a 50% reduction in petroleum use in cars and trucks by 2030, and that the projected gasoline use by vehicles associated with this project is within the range of -13 to +11% in 2029 and -21 to +0.4% in 2049, depending on the alternative. This range reflects the uncertainty inherent in such long-term projections and the influence of factors beyond the control of this project and beyond the control of Caltrans.

Assembly Bill 1279 (AB 1279) establishes the policy of the State to achieve carbon neutrality as soon as possible, but no later than 2045, and maintain net negative greenhouse gas emissions thereafter. The California Air Resources Board's (CARB) 2022 Scoping Plan lays out a path to achieve these targets.

While these are significant steps towards addressing climate change, they represent broad state-level goals and are not directly enforceable on individual projects. The Draft EIR/EA acknowledges these goals and incorporates them into its analysis where applicable. However, it's important to remember that the achievement of these goals requires a collective effort from all sectors of the economy, not just individual projects.

As stated in the Draft EIR/EA (3.4.5 *CEQA Conclusion*), "…as projected under the 20-year horizon design assumptions (2049), GHG emissions were estimated to decrease for the Build Alternatives as compared to conditions under 2029." As GHG emissions are expected to decrease over the long-term operational use, the project complies with state goals. Standard measures that help reduce project GHG emissions are listed in Appendix E of the Draft EIR/EA.

Response to Comment 42 in 20240112, City of Davis

The commenter asserts three actions are double-counted for mitigation reduction. After further consultation with partner agencies, the mitigation measures labeled “Subsidize Monthly Transit Passes in Yolo County” and “Reduce Transit Fares” are removed from Mitigation Measure TRANS-1 and Table 2.1-27 in the Final EIR/EA and in the updated VMT mitigation plan. The measures labeled “Voluntary Trip Reduction Program in Yolo County” and “Expand Capitol Corridor Frequency between Oakland and Sacramento” encompass bus and train fare subsidies, respectively. Therefore, the effectiveness of each fare subsidy is built into the VMT reduction assumptions for the two remaining measures. Please refer to Master Response A for responses related to VMT mitigation.

Response to Comment 43 in 20240112, City of Davis

The commenter asks for reexamination of expanding Yolobus Route 42. Please refer to Master Response A for responses related to VMT mitigation and Response to Comment 12 in 20240112, City of Davis.

Response to Comment 44 in 20240112, City of Davis

Commenter suggests promoting more regional transit services from Dixon to Davis to Sacramento. Please refer to Master Response A for responses related to VMT mitigation and Response to Comment 14 in 20240112, City of Davis.

Response to Comment 45 in 20240112, City of Davis

The commenter asserts Caltrans is claiming the Nishi overpass as mitigation. The Nishi overpass has been removed as a measure for VMT mitigation after further consultation with the partner agencies involved. Rather, Caltrans will contribute to a bike path project that offers VMT reduction. This revision is shown in changes to Measure Measures TRANS-1 in the Final EIR/EA and in the Final VMT mitigation plan. Please refer to Master Response A for responses related to VMT mitigation.

Response to Comment 46 in 20240112, City of Davis

As the commenter states, parking prices increases would reduce VMT, however this option remains infeasible. Please refer to Master Response A for responses related to VMT mitigation.

Response to Comment 47 in 20240112, City of Davis

The commenter questions whether the VMT reduction package is adequate. Please refer to Master Response A for responses related to VMT mitigation.

Response to Comment 48 in 20240112, City of Davis

The commenter questions the project’s consistency with local plans. Please refer to response to comment 6 in 20240112, City of Davis.

Response to Comment 49 in 20240112, City of Davis

The commenter suggested that the Draft EIR/EA include a specific analysis on “cut-through” traffic in the City of Davis. This was addressed in a separate analysis but is outside the scope of the analysis of the Draft EIR/EA. The analysis found that conditions at local interchanges often used as a part of typical cut-through routes improve with the add-a-lane alternative of the project on an overall basis.

The project aims to reduce cut-through traffic within the City of Davis by providing a more reliable, direct route between Davis and West Sacramento. Encouraging drivers of regional trips to remain on the freeway will leave surface streets available to those making local trips in the modes available to them. Drivers using off-ramps in Davis will be using them to access land uses in Davis, instead of accessing local roads to avoid congestion on I-80. No changes to the Draft EIR/EA are necessary.

Response to Comment 50 in 20240112, City of Davis

Comment numbers 50 to 61 are from the City of Davis meeting minutes and not direct comments on the Draft EIR/EA. The meeting minutes include their discussion on the proposed project and how to proceed with commenting on the Draft EIR/EA.

The discussion included time extension request, issues accessing the documents, availability of the documents, sufficient disclosure and analysis, adequate mitigation, proposed alternatives, preferred alternative selection, phasing, funding, local traffic impacts and bicycle facilities during and after construction (see City of Davis response to comment 57).

Caltrans extended the initial comment period beyond the holidays to January 5, 2024. Caltrans subsequently extended the public circulation and comment period again to January 12, 2024.

Response to Comment 51 in 20240112, City of Davis

This is a public comment by Alan Hirsch recommending a recirculation of the Draft EIR/EA due to the EIR/EA not being available at the library and it being challenging to access the technical studies. Technical studies listed in Appendix H to the Draft EIR/EA were made available upon request as indicated on the Caltrans website. Draft EIR/EA appendices were available for download on the State Clearinghouse website. Additionally, hard copies of the Draft EIR/EA were delivered to the Yolo County Library on December 5th, 2023, and the West Sacramento Library on December 6, 2023. CEQA does not require that all technical studies be available at public libraries during the public comment period. There is no need to recirculate the EIR/EA.

Response to Comment 52 in 20240112, City of Davis

Commissioners discussed that more be done to improve transit and questioned the VMT mitigation measures. Please refer to Master Response A and Master Response H for responses related to induced travel, VMT calculation methodologies, VMT mitigation, and auxiliary lane improvements. Also, see Response to Comment 17 in 20240112, City of Davis for information related to this comment.

The commenter suggested an alternative in which an existing lane would be converted to toll. Master Reponses B addresses this potential alternative's potential impacts related to diversion, freight mobility, implementation feasibility, and trip length. Due to these factors, this alternative would not meet the project's purpose and need. No changes to the Draft EIR/EA are necessary.

Response to Comment 53 in 20240112, City of Davis

This comment asked for analysis of diversion traffic and cut-through traffic. Please refer to Response to Comment 49 in 20240112, City of Davis for information regarding cut-through traffic analysis.

Response to Comment 54 in 20240112, City of Davis

This comment noted the NCST calculator guidelines do not address toll lanes. Please refer to Master Response A for responses related to induced travel and VMT calculation methodologies.

Response to Comment 55 in 20240112, City of Davis

This comment asked whether Caltrans considered choke points and people using cut-through routes. Please refer to Response to Comment 49 in 20240112, City of Davis for information regarding cut-through traffic analysis.

Response to Comment 56 in 20240112, City of Davis

This comment questioned the adequacy of the mitigation related to transit improvements. Please refer to Master Response A for responses related to VMT mitigation.

Response to Comment 57 in 20240112, City of Davis

The commenter references impacts to the existing bike lane during construction. Stage construction plans have not been developed for the project. Once plans have been developed, notifications of potential long-term closures will be sent to allied agencies and the traveling public. Standard measure TT-1 has been incorporated into the project and is listed in Appendix E of the Draft EIR/EA. Standard measure TT-1 requires pedestrian and bicycle access to be maintained during construction. No changes to the Draft EIR/EA are necessary.

Response to Comment 58 in 20240112, City of Davis

This comment asserted under CARB the VMT mitigation should be zero or close to zero. Please refer to Master Response A for responses related to VMT mitigation.

Response to Comment 59 in 20240112, City of Davis

The commenter suggests an alternative that would add a transit connector to Mace Boulevard in lieu of adding a connector at the I-80/US 50 interchange. The proposed connector at the I-80/US 50 interchange provides significant regional benefits including improving freight mobility and enhancing operations by improving weaving. The I-80/US 50 interchange connector would be a critical part of meeting the project's purpose and the proposed alternative would eliminate

that scope. The proposed alternative would not meet the project's purpose and need. For more information on alternatives please see Master Response B. No changes to the Draft EIR/EA are necessary.

Response to Comment 60 in 20240112, City of Davis

This comment asserted there should be an alternative with one lane being toll lane and no additional lanes added. Please see Response to Comment 52 in 20240112, City of Davis for information related to this comment.

Response to Comment 61 in 20240112, City of Davis

This comment documents the City Council's unanimous decision to submit comments to and attach the NRC letter. The comment also includes closing meeting minutes and agenda items for their next meeting.

20240112, Sacramento Metropolitan Air Quality Management District

SACRAMENTO METROPOLITAN AIR QUALITY MANAGEMENT DISTRICT

January 12, 2024

Masum Patwary, Environmental Planner
Caltrans, 703 B Street, Marysville, CA 95901
Yolo80Corridor@dot.ca.gov

Subject: **I-80 Corridor Improvement Project Draft Environmental Impact Report**
State Clearinghouse # 2021060117

Dear Masum Patwary:

Thank you for providing the Sacramento Metropolitan Air Quality Management District (Sac Metro Air District) with the opportunity to review the Draft Environmental Impact Report (EIR) under the California Environmental Quality Act (CEQA) for the proposed I-80 Corridor Improvement Project. This project consists of roadway improvements including managed lanes, pedestrian and bicycle facilities, and Intelligent Transportation System elements along Interstate 80 (I-80) and United States Route 50 (US-50) in the counties of Sacramento, Yolo, and Solano. Please accept our comments on air quality and climate considerations for CEQA review, consistent with methods recommended in our Guide to Air Quality Assessment in Sacramento County (CEQA Guide), available on our website. 1

Air Quality
We were unable to find the following elements of CEQA air quality analysis in the Draft EIR: (1) quantification of operational emissions of reactive organic gases (ROG) or oxides of nitrogen (NOx); (2) evaluation of construction emissions against a threshold of significance; (3) air quality modeling runs with clear, consistent numeric correspondence to the emissions tables in the Draft EIR text. As an example of the third point, the Draft EIR text cites Caltrans' CAL-CET2021 as the source of construction emissions projections in Table 2.2-8; however, the construction emissions model run in the appendix is for the Road Construction Emissions Model, a model that is not referenced in the Draft EIR text. 2

- Sac Metro Air District recommends that the Final EIR include a quantification of ROG, NOx, and Particulate Matter (PM) emissions for project operations and a quantification of NOx and PM emissions for project construction, and evaluate all project emissions against the applicable air quality management district threshold of significance. We recommend that a final EIR support these emissions projections with air quality modeling runs that are cited clearly in the Draft EIR text's quantification tables, and have clear, consistent numeric correspondence to the projections.

- Sac Metro Air District recommends use of the CalEEMod linear construction module to quantify construction emissions. 3

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AirQuality.org

- Sac Metro Air District recommends that the Final EIR include our Basic Construction Emission Control Practices (BCECP), available on our website, as mitigation for construction emissions. Please note that all projects undergoing CEQA review must implement the BCECP to use our non-zero PM CEQA thresholds of significance. Without incorporating the BCECP, any project construction PM emissions will have significant environmental impacts in Sacramento County. 3 cont.

- We maintain the recommendation, from our comments on the EIR Notice of Preparation, that the EIR include an analysis of health effects that may result from project emissions, pursuant to the "Friant Ranch" decision. In December 2018 the California Supreme Court issued a decision in the Sierra Club v. County of Fresno case regarding the "Friant Ranch" project ((2018) 6 Cal. 5th 502). The Court determined that CEQA air quality analysis must include a reasonable effort to connect a project's air quality impacts to likely health consequences or explain in meaningful detail why it is not feasible to do so. To analyze health effects pursuant to the Friant Ranch decision, consult Sac Metro Air District's Guidance to Address the Friant Ranch Ruling for CEQA Projects in the Sac Metro Air District. 4

Public Exposure to Substantial Pollutant Concentrations

The Draft EIR claims that the project's exposure of sensitive receptors to substantial pollutant concentrations will be less than significant because "There are a limited number of receptors within 500 feet of the project footprint," and "The project would not change the traffic mix and would not move major roadways closer to sensitive receptors. Additionally, all Build Alternatives would improve traffic operations and efficiency, which would help to reduce pollutant emissions."



5

Please note that Draft EIR Figure 1.3-1 (above) shows project boundaries near dozens of homes in Sacramento County, and one of the project mitigation measures is to build an overcrossing at the Nishi

Student Housing Development site which is adjacent to the project in Yolo County. These are examples of sensitive receptors within 500 feet of the project footprint. Moreover, the project uses shoulder space at the outer edge of the existing roadway area to accommodate proposed managed lanes, thereby decreasing space between emitting motor vehicles and sensitive receptors such as residences. 5 cont.

Project analysis indicates that "The project would not substantially increase the percentage of trucks traveling along I-80 of the project limits, and local truck emissions may in fact decrease in future analysis years 2029 and 2049 due to penetration of electric heavy duty trucks." The project will induce truck trips, for example according to Table 2.1-26. Further, electric truck penetration is not a basis of comparison between no-build and build alternatives because it applies regardless of whether the project is built. 6

Draft EIR Table 2.2-12 shows operational emissions of Deisel PM, a Toxic Air Contaminant, that are greatly reduced from existing conditions, but with some increases over the "No Build" alternative. However, Table 2.2-12 is not labeled for units of measurement, and no corresponding model run is provided. We could not find quantification for construction emissions specific to Deisel PM.

- Sac Metro Air District recommends that the Final EIR include a quantification of Deisel PM emissions and associated concentrations for both project construction and operations, with units of measurement clearly labeled, and supplement this quantification with model runs and clearly defined assumptions about electric truck penetration. We further recommend use of Office of Environmental Health Hazard Assessment guidance to quantify the health risk that these emissions pose to nearby sensitive receptors, and a determination of the significance of health risk impacts. 7

Greenhouse Gas Emissions

The Draft EIR claims that project operational greenhouse gas (GHG) emission impacts will be less than significant because "GHG emissions were estimated to decrease for the Build Alternatives as compared to conditions under 2029, which is attributed to newer more fuel-efficient fleets and the increase in electric vehicles by the year 2049. The project does not conflict with any applicable plan, policy, or regulation adopted for the purpose of reducing the emissions of GHGs." 8

The Draft EIR's operational emissions quantifications are not consistent, and no model run is provided. Numbers in Table 3.4-2 of the Draft EIR text do not correspond with Table 7 of the Air Quality Report in the appendices. Operational emissions are not evaluated against a threshold of significance. We could not find a quantification of construction emissions in the Draft EIR text.

This project induces motor vehicle miles traveled (VMT) as noted in the Draft EIR transportation analysis, and as such does not support GHG reduction targets established for the California Global Warming Solutions Acts of 2006 and 2016 (AB 32 and SB 32). As discussed in the "Transportation and Vehicle Miles Traveled" section herein, emissions reduction plans for AB 32 and SB 32 stipulate VMT reductions, because fuel and vehicle efficiencies alone cannot achieve the targets under necessary timelines. The Draft EIR text does not clarify why the project is consistent with applicable plans despite inducing VMT. 9

- Sac Metro Air District recommends that the Final EIR include a quantification of GHG emissions for project construction and operations, and evaluate all emissions projections against a

threshold of significance. This threshold should consider California GHG reduction targets pursuant to Global Warming Solutions Acts. We recommend that a final EIR support these projections with air quality modeling runs that are cited clearly in tables in Draft EIR text, and that have clear, consistent numeric correspondence to the projections. 9 cont.

- We recommend that the Final EIR clearly explain why the project is consistent with the California Global Warming Solutions Acts despite inducing VMT, mitigating GHG emissions accordingly if there is no clear basis for this claim of consistency.

The Draft EIR references mitigation measures for GHG emissions impacts including "GHG-1: Comply with local regulations, GHG-2: Idling restrictions, GHG-3: Comply with CARB regulations, GHG-4: Use of a TMP, GHG-5: Revegetation, GHG-6: Maintain pedestrian and bicycle access." Please note that compliance with existing regulations is not a mitigation measure; it is a legal requirement. Further, measures such as "idling restrictions" and "pedestrian and bicycle access" are not specifically defined and quantified, and there is no implementation responsibility assigned to them. 10

- Sac Metro Air District recommends that the Final EIR include specific, clearly enforceable GHG mitigation, with quantified emissions reductions to the full extent possible, that does not overlap with existing regulations, and is generally consistent with CEQA Statute and Guidelines.

Transportation and Vehicle Miles Traveled

Proper analysis of project vehicle miles traveled (VMT), including induced VMT, is critical to proper assessment of project GHG emissions impacts. The California Global Warming Solutions Acts of 2006 and 2016 ultimately aim to reduce GHG emissions to 40% below the 1990 levels by 2030, and California's Mobile Source Strategy sets VMT reduction goals to meet this aim. Fuel and vehicle efficiencies alone cannot achieve the reduction targets under the necessary timelines, and VMT reductions are necessary. The 2020 Mobile Source Strategy sets a goal "to reduce light-duty VMT by 15 percent by 2050 compared to business as usual."

Table 2.1-26 in the Draft EIR text indicates that induced VMT is the same for the all the add-a-lane project alternatives except the alternative to add a transit lane; it indicates that the "Express Lanes" alternative (Alternative 5) would induce as much VMT as high occupancy vehicle (HOV) and high occupancy toll (HOT) lanes. The Draft EIR text indicates that these projections come from the California Induced Travel Calculator from the National Center for Sustainable Transportation (NCST). 11

The NCST calculator website indicates that "The Calculator is limited to use for capacity expansions (lane additions, roadway lengthening, and new facility construction)," although Table 2.1-26 (and corresponding Table 1 in the project consultant's November 16, 2023 VMT mitigation memo) indicates that the project alternative to *convert* an existing general purpose lane to HOV (Alternative 7), rather than add a HOV lane, would induce VMT. No source is cited for this calculation outside of the NCST calculator.

Further, the NCST calculator website also indicates that the calculator "should not be used to estimate induced VMT from additions of pure toll lanes without supplemental analysis." It is therefore unclear why the Express Lanes alternative is listed as having the same amount of VMT as the HOV and HOT add-a-lane alternatives, without evident supplemental analysis documented. The NCST calculator website

further indicates that "available empirical evidence suggests that new HOV and HOT lanes might have similar induced travel effects as general-purpose lane expansions."

It is important to note that, according to the Draft EIR text, among common design features of the project alternatives that add managed lanes, "The lanes have flexibility to be used by different types of vehicles, depending on the need, and can be actively managed to accommodate peak travel demands." Further, the project alternative allowing two or more users in a HOV lane (HOV 2+) (Alternative 2) would "operate only during peak commute hours." Outside of peak hours, presumably these lanes would be added general purpose lanes.

- Sac Metro Air District recommends added documentation for the induced VMT projections in the Draft EIR text, including supplemental analysis for the Express Lane alternative (Alternative 5) and the source of information for induced VMT in the lane conversion alternative (Alternative 7).

11 cont.

Table 2.1-25 evaluates project alternatives according to criteria including "Regional VMT." It gives the highest rating for Regional VMT to the Express Lane alternative (Alternative 5), and the second highest rating to the lane conversion alternative (Alternative 7). According to Table 2.1-26, Alternative 5 induces more VMT than Alternative 7. The Table 2.1-25 evaluation criteria are not clearly described in the Draft EIR text.

- Sac Metro Air District recommends added information on the Table 2.1-25 evaluation criteria, for example the definition of "Regional VMT" that seemingly excludes induced VMT, and an exact definition of "Corridor PMT."

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The Draft EIR text repeatedly claims that "reduced travel time" and "improved traffic flow" are a benefit of added roadway capacity (added lanes and roadway widening), without discussing the negating effect of induced VMT on the travel time and flow. Due to induced VMT associated with added roadway capacity, travel time reductions and improved flow may ultimately be counteracted by added VMT, creating possible incentive to add more capacity, a potentially on-going and unsustainable accommodation.

- Sac Metro Air District recommends that the Final EIR provide clear public disclosure of the impacts of induced VMT on travel times and traffic flow, and clarify that the benefits of added roadway capacity may be temporary due to induced VMT. We recommend clarifying that adding roadway capacity to improve travel times and traffic flow has strong potential to create further congestion in the future.

13

TRANS-1, the VMT mitigation measure, only mitigates 43% of induced VMT. Other mitigation is not found to be reasonable or feasible, and the remaining induced VMT is found to be a significant, unavoidable environmental impact. The project alternatives assumed in the determination that TRANS-1 mitigates only 43% of induced VMT were Alternatives 2 through 5. According to the Draft EIR, TRANS-1 "would be sufficient to fully offset only the alternatives that would convert an existing lane to an HOV-only lane (Alternatives 7a and 7b)."

- Sac Metro Air District contends that if the project alternatives with the lowest VMT (for example Alternative 7 and Alternative 5 pending further analysis and information) are not selected for implementation, then a final EIR should explain why they are not selected and therefore why

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most of the project's induced VMT is an unavoidable impact. It should clearly delineate why rejected alternatives do not meet project objectives. If they are not selected due to factors such as travel time and traffic flow, then the explanation should document projections of how each alternative would accommodate improved travel times and traffic flow over time, given the impacts of induced VMT. 14 cont.

Alternatives Analysis
CEQA review must include a reasonable range of alternatives to a proposed project that could feasibly attain most of the basic project objectives, and would avoid or substantially lessen any of the proposed project's significant effects. Evidence suggests that HOT lanes operating in tandem have strong potential to maximize managed lane use and alleviate motor vehicle congestion. Further, the Sacramento Area Council of Governments submitted a proposal to the California Air Resources Board to maintain its requirements under California's Sustainable Communities and Climate Protection Act (SB 375), which includes a designation for "Multilane Express Lane during Peak Periods" in the project area. 15

- Sac Metro Air District recommends analysis of the following project alternatives in the Final EIR:
  - Consistent with our letter on the first Notice of Preparation for the EIR, an alternative with two HOT lanes in each direction, including one that uses an existing lane.
  - An alternative with a multilane express lane during peak periods.

Pedestrian / Bicycle Facilities
Sac Metro Air District has contracted with staff from Sacramento's Civic Thread for recommendations on project active transportation facilities. Their recommendations address safety and comfort concerns about the existing multi-modal path in the project area and are attached. 16

The referenced November 16, 2023 VMT mitigation memo indicates that "The enhancement of the existing [bicycle and pedestrian] connection may encourage additional bicycle and pedestrian trips. However, VMT reduction has been found only for new bicycle and pedestrian connections, not for simply enhancement of existing connections." The California Climate Investments report Quantifying Reductions in Vehicle Miles Traveled from New Bike Paths, Lanes, and Cycle Tracks, prepared by scholars at the University of California at Davis's Institute of Transportation Studies, summarizes outcomes from a literature review on emerging data and methods for estimating VMT from new bicycle facilities. While it assesses new facilities rather than enhancements to existing facilities, it does suggest substitution rates for determining what percent of bicycle trips on a given facility are not simply added bicycle trips but instead replace motor vehicle trips.

If the current bicycle facilities are not being fully utilized because they are unpleasant and perceived as unsafe, for example due to confusing or incomplete connections with a history of damaging bicycle accidents as noted in the attached Civic Thread report, then their ability to divert motor vehicle trips to bicycle trips is compromised. The project's induced VMT will further exacerbate this situation with added speeding motor vehicles in proximity to bicyclists. 17

Moreover, major Caltrans improvement projects affecting Sacramento have resulted in increased collisions and congestion during the construction period, as reported by the Sacramento Bee for US 50[1] 18

[1] Lange, Ariane and Reese, Phillip. *More death, more traffic. How Highway 50 construction in Sacramento went horribly wrong.* Sacramento Bee. November 3, 2023. https://www.sacbee.com/news/local/article280083809.html

and by KCRA3 for the Yolo Causeway.[2] Increased collisions and congestion may cause motorists to seek nearby parallel routes, which also serve as the bicycle corridors between Davis and Sacramento. Per CEQA Appendix G, Caltrans must determine if the project would "Conflict with adopted policies, plans, or programs regarding public transit, bicycle, or pedestrian facilities, or otherwise decrease the performance or safety of such facilities." Currently, there is no consistent protected bikeway between Davis and Sacramento and this project may impact bicycle safety along the project area. 18 cont.

As a reminder, CEQA requires projects with significant and unavoidable impacts to implement all feasible mitigation. Mitigation that is not fully quantified may achieve emissions reductions and co-benefits on their own or may enhance the ability of quantified measures to attain reductions and co-benefits. The Sacramento region has had success in upgrading Class II bicycle lanes to protected Class IV lanes, and with increased eBike ownership and access, protected inter-city bicycle routes have definite potential to increase sustainable miles traveled that replace motor vehicle miles traveled.

- Sac Metro Air District recommends that a final EIR incorporate the attached pedestrian / bicycle facility recommendations into project construction as mitigation where applicable. We also recommend that the Final EIR include analysis of project impacts on pedestrian and bicycle safety. Further, while the VMT-reducing potential of improvements to the existing multi-modal path may currently primarily qualitative due to the modeling that is available to Caltrans, it is incumbent upon Caltrans to apply all feasible project mitigation to supplement the current 43% of induced VMT mitigated. 19

Conclusion
As a reminder, all projects are subject to Sac Metro Air District rules and regulations at the time of construction. Please visit our website to find a list of the most common rules that apply at the construction phase of projects. Thank you for your attention to our comments. If you have questions about them, please contact me at mwright@airquality.org or (279) 207-1157. 20

Sincerely,

Molly Wright

Molly Wright, AICP
Air Quality Planner / Analyst

Attachment: Civic Thread Pedestrian / Bicycle Facility Recommendations

cc: Paul Philley, AICP, CEQA and Land Use Program Supervisor
Raef Porter, Transportation and Climate Change Division Program Manager
Jaime Lemus, Transportation and Climate Change Division Manager

[2] Michelle Bandur. *Causeway construction crashes prompt the California Highway Patrol to increase patrols*. KCRA3. August 10, 2023. https://www.kcra.com/article/yolo-causeway-construction-california-highway-patrol/44789395#

Response to Comment 1 in 20240112, Sacramento Metropolitan Air Quality Management District

This introductory comment briefly summarizes the proposed project and does not discuss the adequacy of the EIR/EA. No changes to the Draft EIR/EA are necessary.

Response to Comment 2 in 20240112, Sacramento Metropolitan Air Quality Management District

The comment requests quantification of operational ROG and NOx emissions and an evaluation of project-generated criteria pollutants against local air district thresholds. The comment also requests air quality modeling runs be appended to the Final EIR/EA and seeks clarification on the model used to quantify construction emissions. Construction related emissions including ROG and NOx are shown in Table 2.2-8 Maximum Construction Emissions. The tables below show operational emissions estimates and will be included in the Final EIR/EA.

The Draft EIR/EA discussed air quality impacts in Section 2.2.6.2 *Affected Environment* and 2.2.6.3 *Environmental Consequences*. Operational emissions associated with the roadways in the project area were estimated using specific traffic data and conditions provided by the Caltrans District 3 traffic forecasting and the CT-EMFAC2021 emission tool. Operational PM10 and PM2.5 emissions are specifically presented in Tables 2.2-10 and 2.2-11. Emissions results for additional pollutants, including ROG and NOx, are included in Appendix G of the Air Quality Technical Report. Tables 2 through 4 below summarize the additional operational emissions results for Opening 2029, MTIP 2040, and Design 2049.

As shown in Table 2, to compare air pollutants between Opening Year 2029 and Baseline 2019, PM2.5 is expected to decrease by approximately 0.5% to 8.4%; PM10 would increase by approximately 3.5% to 13%; NOx reduction is estimated to be 59.3% to 63.8%; ROG reduction is estimated to be 27% to 36.9%; Diesel PM reduction is estimated to be 64.8% to 70.2%.

As shown in Table 4, to compare air pollutants between Design Year 2049 and Baseline 2019, PM2.5 is estimated to decrease by 1.9% to increase by 6.7%; PM10 would increase by 16.1% to 26.9%; NOx reduction is estimated to be 73.3% to 79.5%; ROG reduction is estimated to be 38.1% to 53.8%; Diesel PM reduction is estimated to be 76.8% to 81.3%.

Table 3. Estimate of Air Pollutants by the Project Operations for MTIP Year 2040

MTIP Year 2040		Baseline (Existing Year 2019)	Alt 1 (No Build)	Alt 2 (HOV)	Alt 3 (HOT)	Alt 4 (HOT 3+)	Alt 5 (Express Lane)	Alt 6 (Transit)	Alt 7 (Take-A-Lane)
PM2.5 (lbs/day)		139.25	128.18	135.35	135.03	132.52	131.39	128.21	124.76
PM10 (lbs/day)		610.76	660.65	702.97	702.42	690.88	686.30	660.85	642.31
NOx (lbs/day)		1996.39	430.98	455.54	440.23	426.05	419.07	430.29	490.45
ROG (lbs/day)		402.65	194.51	191.55	187.51	182.80	180.49	194.10	212.38
Diesel PM (lbs/day)		24.57	5.21	6.37	6.32	6.21	6.19	5.21	5.83
Comparison between Existing and Build (%)	$PM_{2.5}$		-7.9	-2.8	-3.0	-4.8	-5.6	-7.9	-10.4
	PM_{10}		8.2	15.1	15.0	13.1	12.4	8.2	5.2
	NOx		-78.4	-77.2	-77.9	-78.7	-79.0	-78.4	-75.4
	ROG		-51.7	-52.4	-53.4	-54.6	-55.2	-51.8	-47.3
	Diesel PM		-78.8	-74.1	-74.3	-74.7	-74.8	-78.8	-76.3
Comparison Between Build and No Build (%)	$PM_{2.5}$			5.6	5.3	3.4	2.5	0.0	-2.7
	PM_{10}			6.4	6.3	4.6	3.9	0.0	-2.8
	NOx			5.7	2.1	-1.1	-2.8	-0.2	13.8
	ROG			-1.5	-3.6	-6.0	-7.2	-0.2	9.2
	Diesel PM			22.3	21.4	19.4	18.9	0.1	12.0

Table 4. Estimate of Air Pollutants by the Project Operations in Design Year 2049

Design Year 2049		Baseline (Existing Year 2019)	Alt 1 (No Build)	Alt 2 (HOV)	Alt 3 (HOT)	Alt 4 (HOT 3+)	Alt 5 (Express Lane)	Alt 6 (Transit)	Alt 7 (Take-A-Lane)
PM2.5 (lbs/day)		139.25	145.40	148.09	148.51	146.75	146.73	141.52	136.59
PM10 (lbs/day)		610.76	746.33	771.97	774.99	764.38	762.81	729.06	708.99
NOx (lbs/day)		1996.39	533.36	436.59	418.64	412.55	409.46	496.49	470.30
ROG (lbs/day)		402.65	249.29	191.80	187.09	186.14	187.00	230.44	213.14
Diesel PM (lbs/day)		24.57	4.58	5.70	5.61	5.38	5.18	4.63	5.16
Comparison between Existing and Build (%)	$PM_{2.5}$		4.4	6.3	6.7	5.4	5.4	1.6	-1.9
	PM_{10}		22.2	26.4	26.9	25.2	24.9	19.4	16.1
	NOx		-73.3	-78.1	-79.0	-79.3	-79.5	-75.1	-76.4
	ROG		-38.1	-52.4	-53.5	-53.8	-53.6	-42.8	-47.1
	Diesel PM		-81.3	-76.8	-77.2	-78.1	-78.9	-81.1	-79.0
Comparison Between Build and No Build (%)	$PM_{2.5}$			1.8	2.1	0.9	0.9	-2.7	-6.1
	PM_{10}			3.4	3.8	2.4	2.2	-2.3	-5.0
	NOx			-18.1	-21.5	-22.7	-23.2	-6.9	-11.8
	ROG			-23.1	-25.0	-25.3	-25.0	-7.6	-14.5
	Diesel PM			24.4	22.5	17.4	13.1	1.1	12.6

As discussed in Section 2.2.6.2, *Affected Environment, "...*most air district thresholds have not been established by regulation or by delegation from a federal or state agency with regulatory authority over Caltrans, Caltrans is not required to adopt those standard levels in Caltrans' documents." (CEQA Guidelines §§ 15064(b)(2), 15064.7(b).) Caltrans does not evaluate impacts based on thresholds of significance.

Construction-related air quality impacts are discussed in Chapter 6 of the Air Quality Report located in Appendix J of the Draft EIR/EA. Construction impacts on air quality are evaluated based on existing/baseline conditions and include compliance with control measures. Caltrans considers projects that do not implement Caltrans Standard Specifications may result in short-term air quality impacts. Emissions from construction-related activities are considered temporary as defined in 40 CFR 93.123(c)(5).

Operational impacts on air quality are assessed based on the project's contribution to regional emissions and potential to contribute to localized emissions hot-spots. Caltrans determined less than significant air quality impacts as each of the Build Alternatives would improve operations, reduce congestion, and increase vehicle occupancy within the travel corridor as compared to the No Build alternative. The Build Alternatives were also found not to contribute to localized emissions hot-spots.

The Draft EIR/EA summarizes the air quality technical analysis prepared for the project. Quantification methods and model outputs are provided in the Air Quality Report. Construction emissions were quantified using Caltrans' CAL-CET2021. While Appendix E of the Air Quality Report is generally titled "Road Construction Emission Model," the included model output is from CAL-CET2021. This is the same model cited in the Draft EIR/EA text for construction emissions projections in Table 2.2-8.

Response to Comment 3 in 20240112, Sacramento Metropolitan Air Quality Management District

The comment requests construction emissions be quantified using CalEEMod and recommends the project implement best management practices to reduce construction generated emissions. As requested, the CalEEMOD was used to quantify construction emissions and is included in the Final EIR/EA.

As noted in Response to Comment 2 in 20240112, Sacramento Metropolitan Air Quality Management District, construction emissions were quantified using CAL-CET2021. Caltrans acknowledges that there are many tools available for the quantification of construction emissions. Caltrans developed the CAL-CET to analyze construction emissions for various types of highway improvement projects that Caltrans administers annually statewide. The methodology and assumptions are based on Caltrans-specific data and construction practices, knowledge, and experiences. Thus, it is Caltrans' position that CAL-CET2021 is the most appropriate and accurate tool for the quantification of construction emissions generated by highway improvement projects.

Caltrans will comply with the local Air Quality Management District rules and implement Basic Construction Emissions Control Practices (BCECP). Please see Table 1 above and Table 2.2-8 in Section 2.2.6.3 *Environmental Consequences* for the projected construction emissions. The project would comply with rules and regulations pertaining to the control of fugitive dust and prevention of public nuisance published by the SMAQMD and YSAQMD.

Appendix E of the Draft EIR/EA lists specific air quality and GHG standard measures that will be implemented as part of the project. Caltrans special provisions and standard specifications include the requirement to minimize or eliminate dust through application of water or dust palliatives.

As discussed in Response to Comment 2 in 20240112, Sacramento Metropolitan Air Quality Management District, Caltrans does not evaluate impacts based on local thresholds of significance. Thus, SMAQMD's non-zero PM threshold is not applicable to the project analysis.

Response to Comment 4 in 20240112, Sacramento Metropolitan Air Quality Management District

The comment requests that the Final EIR/EA include an analysis of health effects that may result from project emissions, pursuant to the “Friant Ranch” Decision.

Friant Ranch clarifies that an EIR is required to adequately discuss health and safety problems due to a project’s adverse air impacts, or state why it is not currently feasible at the time of drafting the EIR to provide such an analysis. Caltrans consulted SMAQMD’s guidance to address the Friant Ranch Ruling for this project and utilized the Strategic Area Project Health Screening Tool to adhere to the Friant Ranch Decision. The tables for Opening Year 2029 and Year 2049 are included in the Final EIR/EA.

Criteria pollutants were discussed in Section 2.3 of the Air Quality Report, Appendix J of the Draft EIR/EA. These pollutants include Ozone, Nitrogen dioxide (NO2), PM2.5/10, Carbon monoxide, Sulphur dioxide, and Lead. Ozone and NO2 are discussed in Sections 2.3.1 and 2.3.2 of the Air Quality Report. The Draft EIR/EA included an analysis of health effects that may result from project emissions in Section 2.2.6.3. *Environmental Consequences*, *Mobile Source Air Toxics (MSAT)*.

Some part of PM2.5 is associated with MSAT. In FHWA’s view, information is incomplete or unavailable to credibly predict the project-specific health impacts due to changes in MSAT emissions associated with a proposed set of highway alternatives. The outcome of such an assessment, adverse or not, would be influenced more by the uncertainty introduced into the process through assumption and speculation rather than any genuine insight into the actual health impacts directly attributable to MSAT exposure associated with a proposed action.

Caltrans did consult the SMAQMD’s guidance to address the Friant Ranch Ruling for CEQA projects and determined that the guidance does not apply to mobile sources such as highways. The reasoning is provided in the paragraph above. Currently, there are no readily available models that estimate the health effects of NOX, PM2.5, ROG, SO2, and CO from mobile sources. Hence, at present it is not feasible to provide additional analysis on how human health will be adversely affected by the project’s air impacts.

Response to Comment 5 in 20240112, Sacramento Metropolitan Air Quality Management District

The commenter summarizes conclusions of the Draft EIR/EA and identifies examples of sensitive receptors within 500 feet of the proposed alignment.

The Draft EIR/EA identified sensitive receptors within 500 feet of the project site in Section 2.2.6.2 *Affected Environment* (Table 2.2.7 Sensitive Receptors Located Within 500 feet of the Project Site). These areas were included in the Environmental Study Limit (ESL) and evaluated during environmental review. The project would widen portions of the road to accommodate proposed managed lanes. The maximum width added to the existing outer edge of the road would be between 6 to 10 feet. Only minor alignment shifts (e.g., about 6 to 15 feet) are proposed, and it was determined that a less than significant impact would occur. The Draft

EIR/EA has been updated to clarify that only minor alignment shifts in the roadway would occur with implementation of the project.

Response to Comment 6 in 20240112, Sacramento Metropolitan Air Quality Management District

The commenter expresses concern with the following statements in the Draft EIR/EA: 1) that the project will not substantially increase the percentage of trucks traveling along I-80 of the project limits and 2) that emissions from trucks may decrease in future years due to increased penetration of electric heavy-duty trucks. The Draft EIR/EA acknowledges that implementation of the project will induce truck trips (see Table 2.1-26). However, as shown in Table 2.2-9, implementation of the project will not change the percentage of trucks among the No Build and Build Alternatives. Thus, truck AADT is relatively similar for all alternatives compared to the No Build Alternative. Hence, the statement, “There would be negligible increases in MSAT emissions relative to the No Build Alternative.” The discussion of future electric trucks is not made to justify differences in emissions among the build and no build conditions. Rather, the statement supports the general conclusion that MSAT emission rates are expected to decrease over time.

Response to Comment 7 in 20240112, Sacramento Metropolitan Air Quality Management District

The commenter requests clarity on the units of measurement for Table 2.2-12 and that model outputs be provided. The commenter also requests a heatlh risk assessment be performed to assess receptor exposure to diesel particulate matter (DPM).

Table 2.2-12 has been updated to identify the units of measurement as pounds per day. Quantification methods and model outputs are provided in the Air Quality Report, which is identified in Appendix J to the Draft EIR/EA.

The Draft EIR/EA included an analysis of health effects that may result from project MSATs, including DPM, in Section 2.2.6.3. *Environmental Consequences*. The analysis was conducted consistent with FHWA’s Jan. 18, 2023 guidance for determining when and how to address MSAT impacts in the NEPA process for transportation projects. DPM emissions from construction are assessed in Section 3.2.3, *Air Quality*. The analysis qualitatively evaluates the potential for project construction to expose receptors to substantial DPM concentrations. Given the proximity of receptors and temporary nature of construction, coupled with implementation of best management practices, which would minimize emissions associated with construction activities, impacts would be less than significant.

Response to Comment 8 in 20240112, Sacramento Metropolitan Air Quality Management District

The commenter states that operational GHG emissions results presented in the Draft EIR/EA are not consistent with the Air Quality Report and that no model outputs were provided. The commenter also claims that construction GHG emissions were not quantified and that GHG emissions were not evaluated against a threshold of significance.

Operational GHG emissions are presented in Table 3.4-2 in Section 3.4, *Climate Change* and includes alternatives with (a) and (b). Model outputs are provided in the Air Quality Report.

The claim that construction GHG emissions were not quantified is not consistent with the information presented in the Draft EIR/EA. Table 2.2-8 shows the maximum construction emissions per project phase. In addition, total construction generated GHG emissions are disclosed in Section 3.4.4.3, *Construction Emissions*.

The claim that GHG emissions were not evaluated against a threshold of significance is not correct. Caltrans' criteria for determining significance of GHG emissions is whether or not the project contributes to overall state reduction goals. Please see Response to Comment 41 in 20240112, City of Davis for additional discussion.

Response to Comment 9 in 20240112, Sacramento Metropolitan Air Quality Management District

The commenter requests construction and operational GHG emissions be quantified and compared to a threshold of significance. The commenter also requests project consistency with GHG reduction plans be further explained.

GHG reduction does not require the use of a numerical threshold, but rather consistency with A.B. 32's statewide goals. (*Center for Biological Diversity v. Dept. of Fish & Wildlife* (2015) 62 Cal.4th 204, 221.)

As discussed in Response to Comment 8 in 20240112, Sacramento Metropolitan Air Quality Management District, construction and operational GHG emissions were fully quantified and disclosed in the Draft EIR/EA. Construction emissions were quantified using CAL-CET2021 and are presented in Table 2.2-8 and discussed in Section 3.4.4.3, *Construction Emissions*. Operational GHG emissions were quantified using CT-EMFAC and are presented in Table 3.4-2. The models used to quantify emissions are described in the Draft EIR/EA and the document cites the Air Quality Report as the source for additional information and analysis.

Please see Response to Comment 41 in 20240112, City of Davis for discussion on GHG thresholds. As noted in that response and in Response to Comment 8 in 20240112, Sacramento Metropolitan Air Quality Management District, the Draft EIR/EA GHG threshold considers state GHG reduction targets, consistent with the commenter's suggestion. Caltrans recognizes that AB 1279 establishes the policy of the State to achieve carbon neutrality as soon as possible, but no later than 2045, and maintain net negative GHG emissions thereafter. As GHG emissions are expected to decrease over the long-term operational use, the project directly supports the state's long-term target of carbon neutrality by 2045, as outlined in the 2022 Scoping Plan and pursuant to AB 1279.

Consistency with the Global Warming Solutions Act, SACOG MTP/SCS, and other plans and policies for the reduction of GHG emissions is assessed in Section 3.2.8, *Greenhouse Gases*. Caltrans has determined that by helping to provide a continuous managed lane system, the project, combined with other in-progress and proposed managed lane projects, would provide reliable travel times, and help contribute to the completion of the regional transportation network

envisioned in the SACOG MTP/SCS. The long-term GHG reductions achieved by the project would support the state's climate reduction trajectory established under Global Warming Solutions Act and strengthened by AB 1279.

Response to Comment 10 in 20240112, Sacramento Metropolitan Air Quality Management District

The commenter identifies Standard Measures GHG-1 through GHG-6 as mitigation measures and expresses concern with their implementation and enforcement. The commenter also recommends the Final EIR/EA include additional GHG mitigation.

Section 3.2.8, *Greenhouse Gas Emissions* of the Draft EIR/EA is incorrect in the significance determination. The CEQA determination should list that the project would have a less than significant impact regarding the generation of GHG emissions (a). Mitigation is not proposed for this project as this project is not expected to generate significant levels of GHG emissions.

As discussed in Chapter 1, *Proposed Project,* the project contains several Standard Measures, which are employed on most, if not all, Caltrans projects. The measures were not developed in response to any specific environmental impact resulting from the project. Thus, the Standard Measures are not mitigation. They are required as part of the project design and will be implemented and enforced by Caltrans. The commenter is correct that some components of Standard Measures GHG-1 through GHG-6 included compliance with existing regulations. However, because the measures are part of the project design and not mitigation, reductions achieved through regulatory compliance are not relied upon in making the final determination of significance.

Response to Comment 11 in 20240112, Sacramento Metropolitan Air Quality Management District

Commenter recommended additional documentation and analysis for induced VMT projections relating to alternatives 5 and 7.

Alternative 7 includes induced VMT due to widening needed to transition lanes at the ends of the project. Alternative 7 would add 0.7 lane miles, which would therefore generate induced VMT according to the California Induced Travel Calculator. This addition of lane miles is found in the revised VMT Mitigation Memo and summarized in the Final EIR/EA.

Further, Alternative 7 mainly would convert an existing general-purpose lane to an HOV lane, it includes additional improvements such as construction of auxiliary lanes and, in the case of Alternative 7B, direct connector ramps that are considered added lane-miles. Therefore, induced VMT would result, as per the NCST calculator.

Traffic modeling consultant, Fehr and Peers, habitually participates in industry-updating panels to share their expertise and speak further on pressing induced demand topics. One such topic discussed at a recent expert panel yielded the preliminary conclusion that there is insufficient evidence to support treating fully tolled lanes any differently than general purpose, HOV, or HOT lanes.

Also, as the commenter notes, the NCST calculator website indicates that induced demand would be similar for HOV, HOT, and general-purpose expansion alternatives. This is accurate and evidenced by Alternative 10 in the Induced Demand table found within the Fehr and Peers authored Transportation Analysis Report. The TAR was prepared for the project, as summarized in Draft EIR/EA Section 2.1.10, *Traffic and Transportation*, and Section 3.2.17, *Transportation*. The TAR is available on the project website https://dot.ca.gov/caltrans-near-me/district-3/d3-projects/d3-i80-corridor-improvements).

Response to Comment 12 in 20240112, Sacramento Metropolitan Air Quality Management District

The commenter requested additional information on Table 2.1-25, namely for Caltrans to define "Regional VMT" and "Corridor PMT".

The scoring in Table 2.1-25 is based on the regional VMT estimated by SACSIM19 as a part of the Transportation Analysis Report (TAR), which informed much of the Draft EIR/EA analysis. "Regional VMT" is vehicle miles traveled on a regional scale and "Corridor PMT" is personal miles traveled for the corridor. Both of these are used as performance measures, specifically PMT is a performance measure of mobility that combines both the number and length of trips. These terms are further defined in the TAR. No changes to the Draft EIR/EA are necessary.

Response to Comment 13 in 20240112, Sacramento Metropolitan Air Quality Management District

For more information on induced VMT, please see Master Response A. For more information on forecasting methodologies, please see Master Response D. No changes to the Draft EIR/EA are necessary.

Response to Comment 14 in 20240112, Sacramento Metropolitan Air Quality Management District

The commenter notes some project alternatives (Alternatives 5 and 7) have lower VMTs and recommends if these are not selected for the Final EIR to explain why they were not selected. The project alternatives, including Alternatives 5 and 7, were evaluated on multiple criteria. This evaluation includes regional VMT, Annual Average Daily Traffic (AADT), and truck AADT. For more information on alternatives not considered in this analysis, please refer to Master Response B. No changes to the Draft EIR/EA are necessary.

Response to Comment 15 in 20240112, Sacramento Metropolitan Air Quality Management District

The commenter recommended further analysis addressing their letter on the first Notice of Preparation for the EIR, namely an alternative with two HOT lanes in each direction, including one that uses an existing lane, and an alternative with a multilane express lane during peak periods. For more information on alternatives not considered in this analysis, please refer to Master Response B. No changes to the Draft EIR/EA are necessary.

Response to Comment 16 in 20240112, Sacramento Metropolitan Air Quality Management District

Please refer to Master Response F for more information on improvements to pedestrian/bicycle facilities on the corridor. No changes to the Draft EIR/EA are necessary.

Response to Comment 17 in 20240112, Sacramento Metropolitan Air Quality Management District

The commenter proposes that a plausible argument could be made that enhancing existing bicycle facilities could be considered a VMT reduction. Additionally, the commenter states bicycle facilities may not be fully utilized if unsafe or incomplete, hence reducing their ability to divert motor vehicle trips.

Please refer to Master Response F for more information on the bicycle/pedestrian facilities on the corridor. These improvements, as well as the bicycle/pedestrian-related improvements included in the VMT mitigation plan aim to improve conditions for these system users and complete the bicycle/pedestrian network. No changes to the Draft EIR/EA are necessary.

Response to Comment 18 in 20240112, Sacramento Metropolitan Air Quality Management District

The commenter notes increased collisions and congestions during construction period, and there being no consistent protected bikeway between Davis and Sacramento and questioned the project's impact to bicycle safety.

Please see response to comment 17. Additionally, the project aims to improve conditions on the freeway so there is less diversion to local facilities, which would allow for safer travel on those local facilities for cyclists. No changes to the Draft EIR/EA are necessary.

Response to Comment 19 in 20240112, Sacramento Metropolitan Air Quality Management District

The commenter recommended additional consideration of pedestrian/bicycle facility upgrades and improvements as additional VMT mitigation where applicable.

Please refer to Master Response A for more information on induced VMT mitigation. No changes to the Draft EIR/EA are necessary.

Response to Comment 20 in 20240112, Sacramento Metropolitan Air Quality Management District

This closing comment provides a link to the rules and regulations applicable to project construction and provides commenter contact information. This information is so noted. This comment does not discuss the adequacy of the EIR/EA. No changes to the Draft EIR/EA are necessary.

20240112, City of Sacramento

City of SACRAMENTO
Community Development

COMMUNITY DEVELOPMENT DEPARTMENT

CITY OF SACRAMENTO
CALIFORNIA

300 RICHARDS BLVD.
3RD FLOOR
SACRAMENTO, CA 95811
PH: 916-808-8860

January 12, 2024

Masum Patwary
Environmental Coordinator
California Department of Transportation
District 3
703 B Street
Marysville, CA 95901
Yolo80Corridor@dot.ca.gov
masum.patwary@dot.ca.gov

Subject: Yolo 80 CORRIDOR IMPROVEMENT PROJECT, SCH NO. 2021060117

Dear Mr. Patwary:

The City of Sacramento (City) has reviewed the Draft Environmental Impact Report (EIR)/Environmental Assessment (EA) for the Yolo 80 Corridor Improvements Project (Project) located in Sacramento, Solano, and Yolo counties. The EIR public review period concluded on January 5, 2024, however, on December 18, 2023 we requested a 30-day extension of time to complete our review due to the holidays and late notification that we received. Caltrans has granted a one-week extension of time to January 12, 2024. 1

The Project consists of improvements that directly affect multiple areas of the City of Sacramento. The following provides our comments and recommendations to Caltrans for consideration.

COMMENTS AND RECOMMENDATIONS

Project Alternatives:

The EIR should have considered an alternative that provides the opportunity to toll the existing bridge over the Yolo Causeway and enhance transit parallel to the corridor. 2

Chapter 2: 2.1.6-9 figure labels and paragraph descriptions are off. 2.1.6 is used twice. 3

On the Alternatives Comparison Table 2.1-25, Alt 5a scores the best on Regional VMT even though its increase is 40x that of Alt 7 (1 versus 2). This brings into question the validity of the qualitative scoring methodology.

Table 2.1-25 gives equal weight to all the qualitative scoring criteria to produce the average score which is misleading. The average score should be removed.

Table 2.1-25 has a managed lane peak hour travel time score for Alt 1which does not have managed lanes. This score should be removed.

4

All of the alternatives except for 6a and 6b (assumed 0), 7a (4.5 million) and 7b (12 million) induce 128-133 million annual auto VMT that cannot be fully mitigated. These alternatives have a detrimental effect on the Sacramento region's attempts to reduce VMT in order to meet SB 32, SB 375, and EO-S-3-05 goals for GHG emissions. Projects on the State Highway System should be held to the same standard as local projects if we hope to ever meet our GHG reduction goals.

5

The project seeks to respond to traffic congestion by increasing roadway capacity via building new roadways or adding lanes to existing facilities. Studies examining that approach indicate it is only a temporary fix. The studies consistently show that adding roadway capacity actually increases network-wide vehicle miles traveled (VMT) by a nearly equivalent proportion within a few years, reducing or negating any initial congestion relief. That increase in VMT is called "induced travel." (National Center for Sustainable Transportation)

Caltrans has adopted guidelines in the form of the Transportation Analysis Framework (TAF) and the Transportation Analysis under CEQA (TAC) to guide the process of evaluating transportation impacts of State Highway System projects. Through the process of developing the TAF and TAC, Caltrans determined that induced travel demand, which is synonymous with induced VMT, represents the metric most appropriate for determining a transportation project's impact. The DEIR should clarify that the threshold of significance for induced VMT is any amount greater than zero (0).

6

The Draft EIR/EA indicates that by the horizon year 2049, I-80 and US 50 in the project area would become so congested that travelers would seek longer paths to have a lower travel time. I-5 between Woodland and Sacramento County would have a higher demand volume under Alternative 1. With the additional capacity provided under the other alternatives, travelers would shift back to I-80. The Draft EIR/EA does not make it clear if the higher demand on I-5 between Woodland and the City of Sacramento would lead to demand exceeding capacity under Alternative 1. If it does not then this could be an acceptable outcome even though access to Sacramento International Airport would also need to be considered.

7

January 12, 2024
Page 3

VMT Mitigation:

The Draft EIR/EA indicates that following measures would be implemented by the project to avoid or minimize VMT impacts:

> *AMM TRANS-1: Reduce the induced VMT effects of the project Alternatives 2a/b through 5a/b, and 7a/b by contributing funding to regional VMT reducing measures. Caltrans will contribute $55 million, roughly 15 percent of the total capital construction cost, to the following eight measures:*
>
> *1) Voluntary trip reduction program in Yolo County ($10 million)*
> *2) Expand Capitol Corridor Frequency between Oakland and Sacramento ($15 million)*
> *3) Microtransit in Yolo County ($7.5 million)*
> *4) Subsidize monthly transit passes in Yolo County ($5 million)*
> *5) Reduce transit fares ($5 million)*
> *6) Expand causeway connection Route 138 ($4 million)*
> *7) Expand Unitrans ($3.5 million)*
> *8) Build overcrossing at future Nishi Student Housing Development site.*

8

We note that most of the mitigations are to support transit in Yolo County. We request that mitigations address anticipated areas where additional trips will be induced based on an analysis of origin/destinations of the additional trips. We expect a substantial portion is in the City of Sacramento, yet the primary measure to address VMT that might directly affect Sacramento residents and visitors is to expand Capital Corridor frequency. While we support this measure, it will only be most effective if it also includes support to subsidize trip costs to make it a feasible alternative to driving for those with lower incomes.

The City of Sacramento has been implementing projects to reduce VMT and GHG emissions, including lane reductions, adding more protected bike facilities, adding publicly available EV chargers, and eliminating parking requirements on development. Once vehicles exit the freeway system, they will be entering local streets. Inducing additional vehicle trips on streets designed to accommodate fewer vehicles without mitigating these impacts will offset the benefits of the City's efforts, increase congestion and increase air pollutants and GHG emissions. We would request that the EIR address impacts on local City streets and include appropriate mitigations, including support of increased frequency of transit in Sacramento, to address the increased VMT inducement for trips in the City.

9

All the recommended mitigation measures except for the Nishi Bridge contribution include future funding from tolling but alternatives 1, 2a, 2b, 6a, 6b, 7a, and 7b will not generate toll revenue. The Draft EIR/EA does not address how these mitigation measures be funded if a tolling alternative is not selected.

10

The project would pay $5 million in mitigation towards the $18 million Nishi project without quantifying any VMT benefits. Unless some quantifiable VMT benefit can be attributed to the Nishi project, it should not be considered as a mitigation measure. 11

The Draft EIR/EA does not make it clear whether transit would be allowed on the toll lane options 5a and 5b. This clarification is critical since the bulk of the mitigation measures proposed are to increase transit ridership. 12

Only 43% of the estimated 128-133 million induced VMT would be mitigated by the proposed mitigation contributions. If overridden, the balance would significantly compromise regional efforts to meet statewide GHG reduction goals. Instead, Caltrans should establish and contribute to a mitigation bank that would fund projects calculated to achieve the remaining 57% of their impact. $55 million is the proposed contribution to mitigate 57,130,000 of the induced VMT. Therefore, $72,906,977 should be deposited into a regional mitigation bank for additional projects to mitigate the remaining induced VMT balance. For comparison, Caltrans District 12 is making a one-time payment of $441 million in VMT mitigation in Orange County as well as ongoing contributions to mitigate 22.3 million annual VMT (26.2%). 13

We also note that mitigation measures such as doubling parking fees in Downtown Sacramento were analyzed and rejected without any known coordination with the City of Sacramento. Without understanding the level to which parking demand is anticipated to be increased in Sacramento because of this project, it is difficult for the City to assess whether higher parking fees would provide any mitigation. 14

Electric Vehicle Charging Infrastructure (T-13) is one example of a mitigation measure identified in the CAPCOA Handbook (https://www.caleemod.com/handbook/index.html) that does not appear to have been analyzed despite having VMT reduction co-benefit as well as providing support for achieving California GHG and EV adoption goals. Another CAPCOA mitigation strategy not considered is Providing Real-Time Transit Information (T-41). 15

On-going toll revenue would be necessary to maintain the proposed mitigation measures and the resulting VMT reductions. The Draft EIR/EA does not include toll revenue analysis to suggest that sufficient funding would be generated to continue these mitigation measures beyond the initial contribution. 16

None of the mitigation funds are intended to support affordable housing in the City of Sacramento despite direct VMT impacts to the City. It is unclear why the Draft EIR/EA indicates working with City of Sacramento Housing Trust Fund, as this program is not funded at a level to address these additional VMT impacts. 17

January 12, 2024
Page 5

VMT Memorandum:

The Downtown/Riverfront Streetcar project description is incorrect. The current version of the project does not go into Midtown and it will not run on Broadway. 18

The Truxel Bridge, the Green Line to the Airport, and the Downtown/Riverfront Streetcar should have already been assumed in 2045 SACSIM model runs. Credit towards mitigation would only be applicable if these projects were built ahead of schedule and then only for those additional years. 19

Habitat Conservation Plan:

Portions of the project are within the boundaries of the Yolo Habitat Conservation Plan/Natural Community Conservation Plan (Yolo Plan) and the Natomas Basin Habitat Conservation Plan (NBHCP). For over 25 years, the City of Sacramento has been committed to the success of the NBHCP. It has come to our attention that the California Department of Fish and Wildlife (CDFW) who is a signatory party to the City's NBHCP provided Caltrans with a comment letter dated November 21, 2022 in response to the Notice of Preparation for the subject project. The CDFW letter raised specific issues that have not been adequately addressed in the Draft EIR/EA. Specifically, the prior comments provided to Caltrans state the following:

> *"Because the Yolo Plan and NBHCP are currently being implemented, the EIR must include a discussion on the consistency of each project alternative with the respective plans and how Caltrans will ensure that implementation of the project alternatives do not impede either plan's ability to meet its biological goals and objectives. Furthermore, CDFW recommends that Caltrans coordinate with the implementing agency/plan operators (Yolo Habitat Conservancy/Yolo County and the Natomas Basin Conservancy) of each respective plan to ensure significant environmental impacts assessed in the EIR are adequately investigated. Particular focus in the EIR's analysis should be directed to:*
>
> - *Analysis of all Yolo Plan and NBHCP Covered Species,*
> - *Assessment of habitat types identified in the Yolo Plan and NBHCP,*
> - *Identification of applicable Yolo Plan and NBHCP avoidance, minimization, or mitigation measures; and*
> - *Analysis of any impacts to land commitments of the Yolo Plan and NBHCP.*
>
> *CEQA Guidelines section 15125(e) requires the analysis examine both the existing physical conditions at the time of the NOP and the potential future conditions discussed in the adopted plans."*

20

CDFW recommended that Caltrans coordinate with the implementing agency/plan operators of each respective plan to ensure that the environmental impacts were adequately assessed in the Draft EIR. City staff works very closely with The Natomas

Basin Conservancy (TNBC) who is the operator for the City's NBHCP. It is our understanding that as of January 9, 2024 Caltrans did not coordinate with TNBC staff as recommended by CDFW. We are requesting that Caltrans coordinate with TNBC per CDFW's November 21, 2022 comment letter and that the Biological Resources evaluation and mitigation be revised to address the issues in the CDFW letter.

20 cont.

Parks:

The Draft EIR/EA indicates per the following table that the project is closest to River Otter Park which is adjacent to the Caltrans project site:

Table 2. Public Parks and Wildlife Areas within 500 Feet of the Proposed Project, Listed Generally East to West.

Park Name	Facility Type	Distance/Relationship to Project
River Otter Park	Public Park	Adjacent
Sand Cove Park	Public Park	400 feet
Meadowdale Park	Public Park	Adjacent
Southside Park	Public Park	500 feet
O'Neil Park	Public Park	500 feet
Westacre Park	Public Park	Adjacent
Roland Hensley Bike Park	Public Bike Park	Adjacent
Yolo Bypass Wildlife Area*	Wildlife Area	Adjacent and Underneath
Playfields Park*	Public Park	50 feet
Toad Hallow Dog Park	Public Dog Park	400 feet
Putah Creek Riparian Reserve	Trails/Nature Area	Adjacent
U.C. Davis Arboretum	Trails/ Nature Area	Adjacent

*These resources received funds form the LWCF Act and are therefore also 6(f) resources

21

As stated in the Draft EIR/EA, there would be no acquisition of park property, and therefore no direct use of the park. No construction activities or project components are proposed within River Otter Park. Access to park facilities would not be disrupted, and park users would not be impacted. Standard measures would further reduce potential noise or air quality impacts during construction along the I-80 corridor. However, River Otter park is located adjacent to the Caltrans I-80 right-of-way and is currently subject to indirect air quality and noise impacts.

On p. 3-39 of Chapter 3 CEQA Evaluation, it states: Temporary traffic delays and ramp closures on I-80/US-50 during construction of Build Alternatives 2a and 2b through 7a and 7b could result in temporary delays in emergency services. As described in Section 2.1.6, Community Character and Cohesion, Standard Measure TT-3 has been incorporated into the project that would require preparation of a TMP which would maintain access for emergency services throughout all phases of construction. The TMP would include elements such as traffic controls to minimize speeds/congestion and other measures to maintain access for police, fire, and medical services along I-80/US-50 in the project area during construction. Standard Measure COM-1 would require a

22

planned public outreach program to keep the area residents, businesses, emergency service providers, and transit operators informed of the project construction schedule.

We would like to make sure that TT-3 and TMP include COM-1 which would inform the community of the indirect air quality and noise impacts.

22 cont.

Thank you for the opportunity to review the Draft EIR/EA. If you have follow-up questions, please contact me at 916-808-5971 or at chodge@cityofsacramento.org.

Sincerely,

Cheryle L. Hodge

Cheryle Hodge
Principal Planner/New Growth Manager

Cc:

Matt Eierman, Director, Department of Public Works, City of Sacramento
Tom Pace, Director, Community Development Department
Greg Sandlund, Planning Director
Lucinda Willcox, Assistant Director, Department of Public Works
Jennifer Donlon Wyant, Transportation Planning Manager, Dept of Public Works
Fedolia Harris, Principal Planner, Department of Public Works
Tom Bufford, Principal Planner, Environmental Planner Services
John Roberts, Executive Director, TNBC
Kelley Barker, Environmental Program Manager, CDFW

Response to Comment 1 in 20240112, City of Sacramento

This introductory comment summarizes the public review period for the Draft EIR/EA and Caltrans' extension of that period. No changes to the Draft EIR/EA are necessary.

Response to Comment 2 in 20240112, City of Sacramento

The commenter suggested an alternative that would toll traffic on the existing Yolo Causeway bridge and enhance transit parallel to the corridor. Please refer to Master Response B for responses related to project alternatives considered. Significant enhancements to transit have been identified as part of the mitigation measure TRANS-1 included in the Draft EIR/EA, including increasing transit and rail frequency. However, a toll plus enhanced transit alternative would not meet the project's purpose and need as a standalone project. No changes to the Draft EIR/EA are necessary.

Response to Comment 3 in 20240112, City of Sacramento

The commenter notes typographical errors in Figure 2.1.6-9. No such figure exists in the Draft EIR/EA. The comment is unclear and no change to the Draft EIR/EA is necessary.

Response to Comment 4 in 20240112, City of Sacramento

The commenter questions the validity of the qualitative scoring methodology for the Regional VMT. The alternative scoring criteria in Table 2.1-25 was based on the Regional Daily VMT as calculated by the SACSIM 19 model, which yielded the lowest estimate for Build Alternative 5a. Therefore, this alternative was assigned a "1" in the Alternative Comparison Table.

The purpose and need of this project are multi-faceted, so multiple criteria were used to determine the alternative scoring.

Where a managed lane does not exist, the general-purpose travel time was used. Otherwise, the managed lane travel time for Build Alternative 1 would represent the same distance as the travel times for general-purpose lanes and the travel times for the other alternatives.

No changes to the Draft EIR/EA are necessary.

Response to Comment 5 in 20240112, City of Sacramento

The commenter noted most of the alternatives have detrimental effects on GHG emissions and that the VMT cannot be fully mitigated. Caltrans strives to ensure that projects contribute to statewide GHG reduction goals to the extent feasible while meeting project purpose and need. The project is not inconsistent with state goals as the project contributes to overall state reduction goals by reducing GHG emissions. As stated in the Draft EIR/EA (3.4.5 CEQA Conclusion), "…as projected under the 20-year horizon design assumptions (2049), GHG emissions were estimated to decrease for the Build Alternatives as compared to conditions under 2029."

Please refer to Master Response A for VMT and mitigation and Master Response I for Air Quality and GHG analysis. See also Response to Comment 12 in 20240111, Center for Biological Diversity.

Response to Comment 6 in 20240112, City of Sacramento

The commenter advised that the Draft EIR/EA should clarify that the threshold of significance for induced VMT is any amount greater than zero. Please refer to Master Response A for responses related to induced travel and VMT calculation methodologies. The threshold for significant for induced VMT is any amount greater than zero per Senate Bill 743.

Response to Comment 7 in 20240112, City of Sacramento

The commenter raises concerns about future conditions on I-5 between Woodland and Sacramento. Operational-level analysis and study of these facilities were beyond the scope of this project. Additionally, the cut-through traffic is not only limited to SR 113 and I-5. Cut-through routes include local roads through the cities of Dixon and Davis, which results in increased congestion and vehicular emissions on these facilities, as well as greater regional VMT as these routes are more circuitous than I-80, which provides a direct connection across the Yolo Bypass and Sacramento River.

Response to Comment 8 in 20240112, City of Sacramento

The commenter states most of the mitigations support Yolo County transit. Please refer to Master Response A for responses related to VMT mitigation. In addition to Master Response A, the majority of the project falls within Yolo County limits and the origin-destination analysis shows that AM and PM peak volumes traverse the corridor to enter and exit Yolo County. Therefore, VMT mitigation measures to enhance Yolo County transit was prioritized. Further, Route 138 Causeway Connection is partly operated by Sacramento Regional Transit District (SacRT), which provides for transit in Sacramento County.

Response to Comment 9 in 20240112, City of Sacramento

The commenter requests that the EIR/EA address impacts to local city streets, and appropriate mitigations to address increased VMT inducement for trips in the city. Please refer to Master Response A for responses related to induced travel and VMT calculation methodologies. Caltrans deems the Draft EIR/EA to contain adequate analyses and mitigation for the project's various Build Alternatives impacts and that the document complies with CEQA and NEPA. No changes to the Draft EIR/EA are necessary.

The project aims to improve conditions on the freeway so there is less diversion to local facilities. Encouraging drivers of regional trips to remain on the freeway by providing a more reliable, direct route, will leave surface streets available to those making local trips in the modes available to them.

Response to Comment 10 in 20240112, City of Sacramento

The commenter questions how funding will be generated for the alternatives that do not have funding from tolling. Please refer to Master Response A for responses related to VMT mitigation. In addition to Master Response A, the upfront payment of the VMT mitigation plan (total of $55M) is the amount that will mitigate for 43% of the induced VMT (per Draft EIR/EA), regardless of selected alternative. Future potential toll revenue, if a toll lane is the selected alternative, would continue to provide ongoing mitigation beyond the proposed 43%.

Response to Comment 11 in 20240112, City of Sacramento

The commenter questions why the project did not quantify VMT mitigation benefits from the $5 million for the Nishi overpass. Please refer to Master Response A for responses related to VMT mitigation. In addition to Master Response A, the Draft EIR/EA $5M contribution towards the proposed Nishi Overcrossing provides an added active transportation benefit, regardless of VMT reduction. Please refer to note at bottom of Table 1 in VMT Mitigation Executive Summary attached to Draft EIR/EA. This has since been updated after further consultation with the partner agencies involved, and the overcrossing will no longer be invested in. Rather, a bike path project will be invested in that offers VMT reduction.

Response to Comment 12 in 20240112, City of Sacramento

The commenter requests clarification on whether transit would be allowed on toll lanes in options 5a and 5b. Transit would be allowed to use Express Lanes (Alternative 5) toll free. No changes to the Draft EIR/EA are necessary.

Response to Comment 13 in 20240112, City of Sacramento

The commenter notes that only 43% of induced VMT will be mitigated and recommends Caltrans to contribute $72,906,977 to a mitigation bank for the remaining 57% unmitigated VMT. Commenter states Caltrans has mitigated 26.2% of its VMT in District 12, by paying $441 million into a regional mitigation bank in Orange County. Please refer to Master Response A for responses related to VMT mitigation. In addition to Master Response A, the VMT dollar contributions are not a linear amount for VMT reduction that can yield to full 100% achieved reduction based on the comment. The 43% proposed in the Draft EIR/EA is the amount that can reasonably and feasibly be implemented by each implementing agency. Simply providing a linear dollar amount and asking implementing agencies to utilize these dollars to expand their services is not reasonable or feasible because each agency has individual constraints on service expansion. Further Caltrans District 12 is a different project with different constraints and VMT reduction needs than this project.

Response to Comment 14 in 20240112, City of Sacramento

The commenter states mitigation measures such as double-parking fees in Downtown Sacramento were analyzed and rejected without any known coordination with the City of Sacramento. This option was found to be infeasible. Please refer to Master Response A for responses related to VMT mitigation.

Response to Comment 15 in 20240112, City of Sacramento

The commenter asks if electric vehicle charging infrastructure or providing real-time transit information were considered as mitigation measures. Electric vehicle charging infrastructure alone is not a VMT mitigating measure per CAPCOA guidance. The improved messaging boards across the corridor that are included as part of the project, will provide real-time traffic information for all vehicles, including transit. Please refer to Master Response A for responses related to VMT mitigation. Please refer to Master Response G for electric charging stations.

Response to Comment 16 in 20240112, City of Sacramento

The commenter questions whether a tolling revenue analysis was done. Preliminary revenue analysis was conducted and provided high level estimates of potential net revenue. These estimates do suggest that there would be sufficient net revenue to fund mitigation beyond the initial contribution, depending on alternative. However, more detailed revenue analysis will need to be conducted in the future to determine the level of contribution. No changes to the Draft EIR/EA are necessary.

Response to Comment 17 in 20240112, City of Sacramento

The commenter questions why the Draft EIR/EA indicated it was working with the City of Sacramento Housing Trust Fund, and notes that none of the mitigation funds were used to support affordable housing in the City of Sacramento despite direct VMT impacts to the city. Caltrans coordinated with the California Housing and Community Development (HCD) to aid in potential outreach efforts with local housing trust funds. The outreach was regarding feasibility of providing funds for affordable housing as mitigation, which was not supported by the project contributing a small amount of the total housing costs and claiming full VMT reduction credit. Please refer to Master Response A for responses related to VMT mitigation.

Response to Comment 18 in 20240112, City of Sacramento

The commenter noted an inaccuracy in the Draft EIR/EA description of the Downtown/Riverfront Streetcar project description. The project description of the Downtown/Riverfront Streetcar project has been corrected.

Response to Comment 19 in 20240112, City of Sacramento

The commenter questions the mitigation credits from the Truxel Bridge, the Green Line to the Airport, and the Downtown/Riverfront Streetcar. Please refer to Master Response A for responses related to VMT mitigation. The Truxel Bridge, the Green Line to the Airport, and the Downtown/Riverfront Streetcar projects were evaluated for potential VMT reducing measures. These measures were found to be not reasonable or feasible. (Table 2.1-28. Potential VMT Reducing Measures Analyzed and Rejected).

Response to Comment 20 in 20240112, City of Sacramento

The commenter notes the California Department of Fish and Wildlife had concerns about the potential effects to habitat conservation plans. Please refer to Response to Comment 16 in

20240112, California Department of Fish and Wildlife regarding analysis of potential effects of the Project on HCP lands. No changes to the Draft EIR/EA are necessary.

Response to Comment 21 in 20240112, City of Sacramento

The commenter discusses the project being adjacent to River Otter Park, and that it is currently subject to indirect air quality and noise impacts because it is adjacent to Caltrans right-of-way. Section 2.1.3.2. of the Draft EIR/EA, Table 2.1-2 lists, River Otter Park as a facility that would have indirect air quality and noise impacts due to its proximity to construction activities and changes in long-term traffic volumes. As discussed in Section 2.2.6, *Air Quality*, Standard Measures GHG-1, GHG-2, GHG-3, GHG-4, and GHG-5 would be implemented for air quality. As discussed in Section 2.2.7, *Noise*, AMM NOI-1 would require noise-generating construction activities to be restricted to 7:00 a.m. to 7:00 p.m. on weekdays, with no construction occurring on weekends or holidays. If work is necessary outside of these hours, a construction noise monitoring program and provide additional noise controls would be implemented. Caltrans Standard Specifications Section 14-8.02 would require that noise levels not to exceed 86 dBA within 50 feet of the job site from the hours of 9:00 p.m. to 6:00 a.m. (Standard Measure NOI-1). Standard Measures NOI-2 through NOI-5 would also be implemented to further reduce temporary construction noise levels. Indirect air quality and noise impacts from the proposed project would not result in substantial impairment to any of the facilities' activities, features, or attributes.

Response to Comment 22 in 20240112, City of Sacramento

The commenter questions how Caltrans will address traffic delays, emergency services, and public outreach about the project during construction. The requirements listed in Standard Measure COM-1 will be incorporated in the project via Caltrans Public Information Office communication. A planned public outreach program to keep the area residents, businesses, emergency service providers, and transit operators informed of the project construction schedule does not include direct communication regarding air quality or noise impacts.

4.3.4 Organizations

20231116, Natural Resources Defense Council

From: Rubin, Carter
To: Yolo80Corridor@DOT; Nelson, Steve@DOT
Subject: Request for technical appendices for I-80
Date: Thursday, November 16, 2023 2:39:01 PM

EXTERNAL EMAIL. Links/attachments may not be safe.

Greetings,

I'm writing to please request copies of the technical appendices that are listed in Appendix H of the Yolo 80 Corridor Improvements Project EIR documents, but not included therein.

https://dot.ca.gov/caltrans-near-me/district-3/d3-projects/d3-i80-corridor-improvements

Please share at your earliest convenience so we can prepare informed comments on the EIR.

1

Many thanks!

Best,

Carter

CARTER RUBIN
Senior Transportation Lead
Resilient Communities

NATURAL RESOURCES
DEFENSE COUNCIL
1314 SECOND STREET
SANTA MONICA, CA 90401
T 310.434.2300
CRUBIN@NRDC.ORG
NRDC.ORG

Response to Comment 1 in 20231116, Natural Resources Defense Council

The commenter requested technical studies listed in Appendix H. Those technical studies were delivered to the commenter by Caltrans.

20231127, Natural Resources Defense Council

From: Rubin, Carter
To: Yolo80Corridor@DOT; Nelson, Steve@DOT
Subject: Re: Request for technical appendices for I-80
Date: Monday, November 27, 2023 1:29:05 PM

EXTERNAL EMAIL. Links/attachments may not be safe.

Greetings, hope everyone is well and had a good holiday.

Following up on this request. 1

Best,

Carter

CARTER RUBIN
Senior Transportation Lead
Resilient Communities

NATURAL RESOURCES
DEFENSE COUNCIL
1314 SECOND STREET
SANTA MONICA, CA 90401
T 310.434.2300
CRUBIN@NRDC.ORG
NRDC.ORG

From: Rubin, Carter
Sent: Thursday, November 16, 2023 2:38 PM
To: Yolo80corridor@dot.ca.gov <Yolo80corridor@dot.ca.gov>; steven.nelson@dot.ca.gov <steven.nelson@dot.ca.gov>
Subject: Request for technical appendices for I-80

Greetings,

I'm writing to please request copies of the technical appendices that are listed in Appendix H of the Yolo 80 Corridor Improvements Project EIR documents, but not included therein.

https://dot.ca.gov/caltrans-near-me/district-3/d3-projects/d3-i80-corridor-improvements

Please share at your earliest convenience so we can prepare informed comments on the EIR.

Many thanks!

Best,

Carter

CARTER RUBIN
Senior Transportation Lead
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Response to Comment 1 in 20231127, Natural Resources Defense Council

The commenter followed up on requests for technical studies listed in Appendix H. Those technical studies were delivered to the commenter by Caltrans.

20231128, International Longshore and Warehouse Union (ILWU) Local 18

STATE OF CALIFORNIA — DEPARTMENT OF TRANSPORTATION

Date 11/28/23

Yolo 80 Corridor Improvement Project

Name (please print) Timothy Campbell E-mail/Phone# tcampbelljr@li... 914 500-1084 con...

1017 Balsam St. West Sacramento CA 95691

Address (home) City State Zip Code

Authorized Representative (name of organization or agency) ILWU Local 18

Address (business) City State Zip Code

COMMENTS I am requesting to review the PLA (project labor agreement) for this project 1

Do you have a preferred alternative?

SLOW FOR THE CONE ZONE CALTRANS

Completing and signing this document is voluntary. The Department of Transportation may use this information for statistical purposes, to notify you of any future hearings, or to assist in providing you with further information. This document is a public record and may be subject to inspection and copying by other members of the public.

Response to Comment 1 in 20231128, International Longshore and Warehouse Union (ILWU) Local 18

The commenter requests to review the project labor agreement. Caltrans projects are not considered Federal Construction projects, but rather Federally Assisted Construction projects. As such, Caltrans is not subject to federal labor laws that you were inquiring about and does not have Project Labor Agreements that are part of construction contracts. This is not a comment on the Draft EIR/EA or the project. No changes to the Draft EIR/EA are necessary.

20231201, Planning & Conservation League

From: Matthew Baker
To: Yolo80Corridor@DOT
Subject: Technical Appendices for I-80
Date: Friday, December 1, 2023 2:11:11 PM

EXTERNAL EMAIL. Links/attachments may not be safe.

Good afternoon,

It has come to our attention that there are technical appendices for the I-80 corridor project 03-3H900 that were not published with the rest of the DEIR materials made available to the public.

We request access to these appendices, and would further request that they be made openly available to the public as soon as is possible.

1

Thank you,
Matt

Matthew Baker
Policy Director, Planning & Conservation League
1107 9th Street, Ste 901, Sacramento, California 95814
matthew@pcl.org
(Mobile) 916 202-9093
www.pcl.org

Response to Comment 1 in 20231201, Planning & Conservation League

Appendices to the Draft EIR/EA were available on the Caltrans website and on the State Clearinghouse website. Additionally, hard copies of the Draft EIR/EA were delivered to the Yolo County Library on December 5, 2023, and the West Sacramento Library on December 6, 2023.

Technical studies listed in Appendix H were available upon request, as indicated on the Caltrans website. Caltrans provided these studies to the commenter.

20231208, Natural Resources Defense Council

From: Rubin, Carter
To: Benipal, Amarjeet S@DOT
Cc: Tavares, Tony F@DOT; Omishakin, Toks@DOT; James Hacker; Yolo80Corridor@DOT; Prange, Jackie; Hall, Alex
Subject: Request for additional comment time re: Yolo 80 Corridor Improvements Project DEIR
Date: Friday, December 8, 2023 1:05:07 PM
Attachments: NRDC Yolo I-80 EIR Comment Extension Request.pdf

EXTERNAL EMAIL. Links/attachments may not be safe.

Hello Director Benipal,

I hope this email finds you well. Please see the attached request on behalf of the Natural Resources Defense Council to extend the deadline for comments on the Yolo 80 Corridor Improvements Project DEIR in light of some issues we've encountered with the availability of DEIR documents, and the timing of the holidays. 1

Thank you for your consideration.

Best,

Carter

CARTER RUBIN
Senior Transportation Lead
Resilient Communities

NATURAL RESOURCES
DEFENSE COUNCIL
1314 SECOND STREET
SANTA MONICA, CA 90401
T 310.434.2300
CRUBIN@NRDC.ORG
NRDC.ORG

December 8, 2023

Amarjeet Benipal
District 3/North Region Director
703 B Street
Marysville, CA 95901

RE: Request to Extend Deadline for Public Comment on Yolo 80 Corridor Improvements Project DEIR

Dear Director Benipal:

On behalf of Natural Resources Defense Council (NRDC), I'm writing to request an extension of the deadline for public comment on the Draft Environmental Impact Report (DEIR) for the Yolo 80 Corridor Improvements Project.

Caltrans District 3 has not yet provided necessary information about the project and is not in compliance with the Guidelines for Implementation of the California Environmental Quality Act (CEQA Guidelines). Cal. Code Regs. tit. 14, § 15000 *et seq.* First, Caltrans has not yet made available the technical studies referenced in DEIR Appendix H for public review. In the CEQA Guidelines, Section 15147 requires that technical information "shall be readily available for public examination and shall be submitted to all clearinghouses which assist in public review." These technical studies are not available at either the CEQANET clearinghouse or the Yolo 80 Corridor Improvements Project webpage. NRDC emailed yolo80corridor@dot.ca.gov and the District 3 Chief Public Information Officer on November 16 and November 27 to request copies of the technical studies listed in Appendix H and has not received a response. 1

Second, the DEIR indicates that hard copies of the DEIR will be made available at respective libraries in Davis and Sacramento. NRDC called those libraries on December 6, 2023, and was told that the Davis library had only received the hard copy DEIR that week, and the Sacramento library had not yet received the hard copy. This has deprived the public of the minimum 30-day public review time.

Finally, the public comment period contains the Thanksgiving, Christmas and New Years Day holidays, which shortens an already compressed review period.

Given the complexity of the project and the heightened public interest in this project due to the whistleblower complaints about use of transportation funds along this corridor, NRDC requests that Caltrans extend the deadline for public comment to 45 days from when the full technical studies are published for public review and hard

NATURAL RESOURCES DEFENSE COUNCIL
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copies are available at the locations indicated in the DEIR. 1 cont.

Sincerely,



Carter Rubin
Senior Transportation Lead, NRDC

Cc:

Toks Omishakin, Secretary of Transportation
Tony Tavares, Director of the California Department of Transportation
James Hacker, Deputy Cabinet Secretary, Office of Governor Gavin Newsom

Response to Comment 1 in 20231208, Natural Resources Defense Council

The commenter requested an extension of the public review period. Caltrans submitted the Draft EIR/EA to the State Clearinghouse through CEQANet and posted it on the Caltrans Website on November 13, 2023. The original end date of the 45-day review period required by CEQA would have been December 27, 2023. However, when the Draft EIR/EA was released for public review, Caltrans ended the initial comment period on January 5, 2024, to account for the holiday season. Caltrans subsequently extended the public circulation and comment period to January 12, 2024.

Technical studies listed in Appendix H were available upon request as indicated on the Caltrans website. The commenter requested studies and Caltrans provided them on December 13, 2023. Hard copies of the Draft EIR/EA were delivered to the Yolo County Library on December 5, 2023, and the West Sacramento Library on December 6, 2023. The commenter's list of unavailable appendices and studies were delivered upon request to the commenter by Caltrans.

No changes to the Draft EIR/EA are necessary.

20231213, Davis Democratic Club and Davis Oddfellows #169

STATE OF CALIFORNIA — DEPARTMENT OF TRANSPORTATION

Date 12-12-2023

Yolo 80 Corridor Improvement Project

Name (please print) Rick Gonzales E-mail/Phone# 530 758-2331 etgonzales@sbcglobal.net

2206 Regis Dr — Davis — CA — 95618
Address (home) — City — State — Zip Code

Authorized Representative (name of organization or agency) Davis Democratic Club
Davis Oddfellows #169

415 Second St. — Davis — CA — 95618
Address (business) — City — State — Zip Code

COMMENTS The Nishi Housing Project has been approved & awaiting to begin Construction. You have stated that an Overpass is needed to connect students to the UC Davis campus. I submit that no overpass at $18 million is needed. It is so close to UCD that students living here already have access to UCD through a path running from Nishi to the campus. Check it out! 1

Do you have a preferred alternative? No Overpass needed!

SLOW FOR THE CONE ZONE CALTRANS

Completing and signing this document is voluntary. The Department of Transportation may use this information for statistical purposes, to notify you of any future hearings, or to assist in providing you with further information. This document is a public record and may be subject to inspection and copying by other members of the public.

Response to Comment 1 in 20231213, Davis Democratic Club and Davis Oddfellows #169

This comment provides the commenters opinion that no overpass is needed at the Nishi housing project to connect to the UC Davis campus. After further consultation with the partner agencies involved, the Nishi overpass was removed as a measure for VMT mitigation. This revision is made in Tables 2.1-27 and 2.1-28 in the Final EIR/EA.

20231215, Planning & Conservation League

PLANNING AND CONSERVATION LEAGUE

December 15, 2023

Amarjeet Benipal
District 3 North Region Director
703 B Street
Marysville, CA 95901]

RE: Request to Extend Deadline for Public Comment on Yolo 80 Corridor Improvements Project

Dear Director Benipal:

On behalf of Planning and Conservation League (PCL), I'm writing to request an extension of the deadline for public comment on the Draft Environmental Impact Report (DEIR) for the Yolo 80 Corridor Improvements Project.

As noted in the Natural Resources Defense Council (NRDC) letter dated December 8th 2023, PCL also believes that Caltrans District 3 has violated CEQA, by not complying with its obligations to make relevant documents readily available to the public for the required amount of time.

Despite multiple requests, Caltrans District 3 has not yet provided necessary information about the project and is not in compliance with the California Code of Regulations, Title 14 - Natural Resources, Division 6 - Resources Agency, Chapter 3 - Guidelines for Implementation of the California Environmental Quality Act.

1

Caltrans has not published the technical studies referenced in DIER Appendix H for public review. CEQA Guidelines, Article 10, Section 15147 states:

> The information contained in an EIR shall include summarized technical data, maps, plot plans, diagrams, and similar relevant information sufficient to permit full assessment of significant environmental impacts by reviewing agencies and members of the public. Placement of highly technical and specialized analysis and data in the body of an EIR should be avoided through inclusion of supporting information and analyses as appendices to the main body of the EIR. Appendices to the EIR may be prepared in volumes separate from the basic EIR document, but shall be readily available for public examination and shall be submitted to all clearinghouses which assist in public review.

These technical studies are not available at either the CEQANET clearinghouse or the Yolo 80 Corridor Improvements Project webpage. PCL emailed yolo80corridor@dot.ca.gov on December 1st requesting access to these technical studies and have not received a response. We are aware NRDC made this

request multiple times before this without response as well.

Further, the DEIR indicates that hard copies of the DEIR will be made available at libraries in Davis and Sacramento. NRDC called those libraries on December 6, 2023, and was told that the Davis library had only received the hard copy DEIR that week, and the Sacramento library had not yet received the hard copy as of that date. This has deprived the public of the minimum 30-day public review time, compounded by the comment period's overlap with multiple holidays. 1 cont.

PCL requests along with NRDC that Caltrans extend the deadline for public comment to 45 days from the date the full technical studies are published for public review, and hard copies are available at the locations indicated in the DEIR.

Sincerely,

Matthew Baker, Policy Director
Planning and Conservation League

Response to Comment 1 in 20231215, Planning & Conservation League

The commenter requests an extension of the public review period. Caltrans submitted the Draft EIR/EA to the State Clearinghouse through CEQANet and posted it on the Caltrans Website on November 13, 2023. The original end date of the 45-day review period required by CEQA would have been December 27, 2023. However, when the Draft EIR/EA was released for public review, Caltrans ended the initial comment period on January 5, 2024 to account for the holiday season. Caltrans subsequently extended the public circulation and comment period to January 12, 2024. No changes to the Draft EIR/EA are necessary.

The commenter also follows up with a request for technical studies listed in Appendix H (20231201, Planning & Conservation League). Caltrans provided these studies. Hard copies of the Draft EIR/EA were delivered to the Yolo County Library on December 5, 2023, and the West Sacramento Library on December 6, 2023 and were available for the entire circulation period. The public notice included that the document would be available at these locations for public review.

The commenter provides language from the CEQA Guidelines stating that appendices shall be available for public review and shall be submitted to the Clearinghouse and states that they believe that Caltrans has violated CEQA. All appendices to the Draft EIR/EA were posted on the Caltrans and Clearinghouse websites for review on November 13, 2023. The technical studies listed in Appendix H are not appendices, but technical studies, containing highly technical and specialized analysis. The studies were summarized in the Draft EIR/EA as required and were available upon request. This approach complies with CEQA.

20231221, Center for Biological Diversity



December 21, 2023

Sent via email

Masum A. Patwary
Environmental Scientist
California Department of Transportation
703 B Street
Marysville, CA 95901
Masum.Patwary@dot.ca.gov

Re: Request for 31-Day Comment Deadline Extension on the Draft Environmental Impact Report for the Yolo 80 Corridor Improvements Project

Dear Dr. Patwary,

The Center for Biological Diversity respectfully requests an extension of the comment period for the Draft Environmental Impact Report (DEIR) for the Yolo 80 Corridor Improvements Project (SCH # 2021060117). The current deadline of January 5, 2024 is inadequate to allow full review of the Draft EIR, which covers complex issues in its 596 pages plus almost another 600 pages of appendices. As the DEIR was circulated on November 13, 2023, much of the comment period overlaps with holiday season, which limits the public's ability to adequately review the DEIR. 1

It is simply not possible for the public to meaningfully review and comment on these documents in such a short timeframe. Due to the volume and complexity of the materials, we believe an additional 31 days is required. Extending the deadline to February 5, 2024 would allow for a more comprehensive review and more useful comments. We therefore respectfully request that you consider extending the comment period an additional 31 days.

Thank you for your attention to this matter.

Sincerely,

Tiffany Yap, D.Env/PhD
Senior Scientist
Center for Biological Diversity
tyap@biologicaldiversity.org

Response to Comment 1 in 20231221, Center for Biological Diversity

The commenter requests that the public comment be extended to February 5, 2024. The Draft EIR/EA was posted on the Caltrans website and CEQANet on November 13, 2023. A 45-day review period would have ended on December 27. However, in consideration of the holidays, Caltrans set the end of the initial comment period beyond the holidays to January 5, 2024. Caltrans subsequently extended the public circulation and comment period again to January 12, 2024.

No change to the Draft EIR/EA is necessary.

20240108, Sierra Club Yolano Group

SIERRA CLUB
YOLANO GROUP

January 8, 2024

VIA Email
Yolo80Corridor@dot.ca.gov

Masum A Patwary
Environmental Scientist C
California Department of Transportation
District 3 703 B Street
Marysville, CA 95901

Dear Dr. Patwary:

This letter provides detailed comments on the Yolo 80 Draft Environmental Impact Report (DEIR) on behalf of the Yolano Group of the Motherlode Chapter of the Sierra Club.

I have prepared these comments as an unpaid Technical Advisor to the Yolano Group. In my professional life I am a Professor of Urban Planning and Design in the Department of Human Ecology at the University of California, Davis, and Chair of the UC Davis Community Development Graduate Group. I have studied urban and regional planning topics for more than 35 years, including interactions between transportation systems and regional land use patterns, and was formerly chair of the City of Berkeley Transportation Commission and cofounder of the Bay Area's regional transportation-land use-housing advocacy organization Transform. I am the author of urban planning textbooks used in universities worldwide, including *The Sustainable Urban Development Reader* (Fourth Edition, 2023), *Planning for Sustainability* (Third Edition to be published in late 2024), and *Reimagining Sustainable Cities* (2021). My awards in this field include the Dale Prize for Excellence in Urban and Regional Planning. 1

Let me say first that it's very unfortunate that the Yolo 80 project has proceeded this far without better alternatives being considered. As has been widely known for decades, widening freeways does not fix congestion problems; it just defers them for a few years while increasing overall motor vehicle use, greenhouse gas (GHG) emissions, local air pollution, suburban sprawl, and related problems. The climate crisis gives particular urgency to the need to stop increasing road capacity and vehicle use. Although California is making progress in many sectors towards reducing its GHG emissions, transportation is one area in which it is not. Transportation is also the single largest source of the state's GHG emissions, accounting for 38 percent of the total. 2

In order to meet California's GHG reduction goals, the state has adopted policies that discourage road expansion and its concomitant VMT increases. SB 743, passed in 2013, required agencies to use VMT as a metric for analyzing transportation impacts of new projects after July 1, 2020 instead of Level of Service (LOS). Put another way, this bill made reducing overall motor vehicle use the goal of state policy rather than short-term reductions in road congestion. The California State Transportation Agency (CalSTA)'s Climate Action Plan for Transportation Infrastructure (CAPTI), adopted in 2021, establishes policy that "projects should generally aim to reduce vehicle miles traveled" and counsels agencies that "when addressing congestion, consider alternatives to highway capacity expansion such as providing multimodal options in the corridor, employing pricing strategies, and using technology to optimize operations." However, Caltrans appears to be disregarding the state's new policy framework with multiple projects including Yolo 80. 2 cont.

A certain amount of congestion isn't bad in that it puts realistic constraints on the public's behavior. However, if congestion is deemed to be a problem beyond that point, the academic and professional literature shows that pricing, better land use planning, and other demand management solutions (e.g. working with large employers to promote vanpools and transit use) are the best strategies. But Caltrans never considered those alternatives in the Yolo 80 case. It clearly wanted to widen the freeway from the start, and indeed appears to have illegally begun widening I-80 east of the Mace intersection and west of the I-50 split in early Fall 2023 well before the current environmental review was completed. This action shows a high level of disregard for CEQA/NEPA processes, and we ask Caltrans to suspend construction activities on Yolo 80 until environmental review is completed and the environmental document certified. 3

The Yolo 80 DEIR has a great many deficiencies which require revising and recirculating the document. These include the following:

1. **<u>The environmental review studied an overly narrow range of alternatives</u>**. Almost all alternatives considered in this document add a lane to the freeway, thereby increasing road capacity and likely future VMT associated with Yolo 80. Other realistic alternatives that could address the main rationale for the project (congestion) at far lower cost without widening the freeway and increasing capacity weren't considered.

   The DEIR studies 7 alternatives, with (a) and (b) options listed for most of these depending on whether median ramps and a flyover lane at the eastern end are included. Alternative 1 is the required No Build alternative. Alternatives 2-6 add a lane with various configurations of High Occupancy Vehicle (HOV), High Occupancy Toll (HOT), and transit use on the new lane. Alternative 7 takes an existing lane for HOV use (informed observers know that this is highly unlikely to be chosen since Caltrans has always constructed a new lane for HOVs in the past). 4

   The most obvious alternative not included in the DEIR would be to price all lanes of the existing freeway. Pricing is widely acknowledged to be an effective means to discourage single-occupant vehicle travel (e.g. Small and Gomez-Ibanez, 2005; Clements, Kockelman, and Alexander, 2021). It can be easily implemented in California using FastTrak technology, with either a flat charge or variable congestion tolls, and is currently in use in northern California on the Bay Area bridges. Many other states nationally also use tolls to raise revenue or reduce congestion. Caltrans recently

created an example of the sort of facility that could be built for Yolo 80 when it constructed a new automated toll facility in Martinez for the east-bound I-680 bridge. Equity impacts of pricing can be decreased by direct rebates to low-income vehicle owners and/or by using toll revenue for public transit or other services benefitting low-income communities.

Pricing is also the most cost-effective alternative. Instead of costing up to $465 million, pricing the existing I-80 Yolo causeway would generate in excess of $300 million annually (~150,000 vehicles/day x an $8 toll = $1.2M/day x 365 days/year = $438M). In addition to equity rebates, this money could be used for transit and affordable housing near jobs in the corridor, further reducing traffic.

Pricing strategies are recommended by CalSTA's CAPTI framework as mentioned above as well as by the Sacramento Area Council of Governments (SACOG)'s 2020 Metropolitan Transportation Plan/Sustainable Community Strategy. Policy 11 of the latter document calls for the region to "Initiate a leadership role in testing and piloting roadway pricing mechanisms, such as facility-based tolling and mileage-based fees." That document also states (p. 73) "The roadway pricing mechanisms in the MTP/SCS are a critical component of the regional strategy to raise enough revenue to fund our transportation infrastructure, provide mobility benefits to residents, manage traffic, and help to achieve the region's SB 375 greenhouse gas reduction target." 4 cont.

Pricing alternatives would also have the benefit of improving transit performance. With tolls reducing overall traffic volume, buses would no longer be sitting in congestion. (A managed lane for both HOVs and transit, as proposed under several of the DEIR's alternatives, could easily become congested as HOVs move into it from other lanes.) Pricing itself is not a panacea, and would likely result in a modest increase in VMT over the current situation since free-flowing lanes carry more vehicles than congested lanes. However, such an increase would be far less than that caused by widening the freeway.

A second main alternative would be constructing a dual express lane in each direction with single occupant vehicles tolled (one lane would be added, one existing lane converted). This alternative is used in SACOG's travel demand model as part of its regional planning strategy, which Caltrans should have known about. It was also requested by the Yolo County Transportation District in its letter of May 4, 2022 to Caltrans, asking that "The Project Description...be written broadly enough to consider, and provide environmental clearance for, a multi-laned facility." Tolling two lanes in this way would be more effective at meeting the project's main goal of reducing congestion, and would have the additional advantage of generating additional revenue to mitigate VMT impacts.

A third potential alternative would be "using technology to optimize operations" as suggested by CAPTI. This approach is also a priority of SACOG's Intelligent Transportation Systems (ITS) program, which seeks to use tools such as freeway ramp meters, dynamic message signs, closed-circuit cameras, and real-time information for the public to manage traffic. Congestion on I-80 could conceivably be kept manageable if all entrances featured ramp meters, with transit vehicles and HOVs allowed to bypass ramp queues. Incentives would then be strong for drivers to carpool or take transit, thus reducing VMT and congestion. 5

A fourth category of alternatives in the I-80 corridor would focus on dramatically better public transit. These alternatives might include better and more frequent bus service, better and more frequent rail service, and better feeder bus and van service in local communities connecting to trains and long-distance express buses. 6

A fifth category of alternatives would consist of regional Transportation Demand Management (TDM) programs. Air quality management districts in California have historically implemented these in order to address local air quality programs in locations such as the Bay Area and Los Angeles basin. Such initiatives typically include agreements with large employers to implement carpool and vanpool programs, to subsidize employee transit usage, and to charge employees for parking. They also include public education and informational strategies to decrease drive-alone commuting. To be most effective in the I-80 corridor, TDM programs should be combined with regional and local land use planning to create a better balance of jobs, housing, and services in local communities. Since 2008 California state policy pursuant to SB 375 has encouraged such planning, for example requiring regional planning agencies to prepare Sustainable Community Strategies. 7

Studying all of these alternatives is certainly not necessary for a robust DEIR, and the fourth and fifth would involve challenging inter-governmental coordination. But given the increasingly strong state policy framework against road capacity expansion and VMT increases, we request that the technically simple and cost-effective alternative of pricing all existing lanes be included in a recirculated environmental document.

2. **The DEIR fails to adequately consider induced traffic**. The Yolo 80 DEIR has a major flaw: its analysis fails to consider long-term increases in traffic volume stemming from widening the road, increasing capacity, and in turn influencing land use and behavior patterns. Again, the project would increase road capacity regardless of whether the new lane is an HOV lane, toll lane, or free-flow lane.

   Road widening induces additional traffic in two main ways: 1) by changing short-term behavior, in particular as individuals see reduced congestion and choose to drive rather than using other alternatives such as carpooling, taking transit, or telecommuting; and 2) by changing long-term land-use patterns and behavior, in particular as individuals and businesses perceive that easy availability of commuting makes it possible to locate in certain places rather than others. Induced traffic is a well-established concept in the research literature dating back at least 50 years (e.g. Downs, 1962, Handy and Bournet, 2014; Hymel, 2019; Volker, Lee, and Handy, 2020). Many decades of experience in California also demonstrates the reality of this phenomenon, for example through the rapid growth of communities such as Vacaville, Dixon, and Fairfield which are almost entirely dependent on I-80 for long-distance motor vehicle travel. 8

   Caltrans appears to have employed an identical future land use scenario for all DEIR alternatives. Agency materials state that "Land use inputs were not developed for each individual alternative. Instead, the SACOG 2020 MTP/SCS land use forecasts associated with specific model years 2016, 2027, and 2040 were used without modification....This approach limits the sensitivity of the traffic and revenue forecasts to any unique land use effects associated with each alternative." (Caltrans, 2023b, 10).

Consequently Caltrans' DEIR analysis appears to incorporate the first form of induced traffic but not the second. The DEIR shows a substantial increase in traffic at the 2029 opening, but only modest increases long-term. Table 2.2-9 (pp. 2-194-105) shows an immediate 9.2% increase in VMT for Alternative 2 compared with the No Build alternative, but a 2049 increase of only 4.2%. The corresponding figures for Alternative 3 are 9.2% and 4.3%. If induced traffic due to changing land use and lifestyle patterns were fully taken into account, these long-term figures would likely be significantly higher. Indeed, if NCST induced traffic figures of 495,400 VMT/day were simply added to the No Project alternative for these years, Alternatives 2 and 3 would have had increases of 11% in 2049. Actual increases would certainly be higher, since the DEIR shows the No Project alternative to be highly congested, reducing VMT, whereas alternatives would have greater throughput. 8 cont.

The DEIR flatly states (p. 3-38) that the project would have "less than significant impact" on population growth either directly or indirectly. This is particularly surprising given that the document previously includes the NCST data mentioned above showing more than 495,000 additional VMT/day for most alternatives. Here as in other locations the DEIR appears not to have incorporated the NCST data into analyses.

For this DEIR Caltrans District 3 relied on analysis procedures not compatible with more recent Caltrans Headquarters standards that require induced traffic be considered. Caltrans' 2020 CEQA guidance states that

> "[C]apacity-increasing projects generally need to be evaluated for their potential induced travel. The mechanisms by which induced travel occur include:

- Route changes (may increase or decrease overall VMT)
- Mode shift to automobile use (increases overall VMT)
- Longer trips (increases overall VMT)
- More trips (increases overall VMT)
  - Location and land use changes (increases overall VMT)" (Caltrans, 2020a, 18)

Caltrans HQ adopted the NCST induced travel calculator in 2020 as an official tool, and the agency's *Transportation Analysis Framework* document provides extensive guidance on how it is to be applied (Caltrans, 2020a). Table 2 on page 17 of this document specifically says that the NCST calculator is to be applied to Yolo County. But the DEIR fails to integrate NCST numbers for induced traffic into its analysis of long-term impacts of the project, thus understating VMT and GHG emissions while overstating congestion relief.

3. **The DEIR fails to adequately take into account changing driver behavior**. A second modelling inadequacy of the DEIR is that it uses a simplistic static trip assignment model rather than a more sophisticated dynamic traffic assignment model. The latter type of model takes into account a variety of feedback loops resulting from traffic congestion, including drivers changing the time of their trips so as to avoid congestion. Use of a static trip assignment model can have the effect of understating the increase in VMT. A related problem is that the model wrongly assumes that additional traffic would be routed off the congested highway up through Woodland, which is unlikely given the distance and likely congestion of that alternative route. Again, this points to a 9

model with major inadequacies. Interviews conducted as part of Dr. Amy Lee's dissertation *The Policy and Politics of Highway Expansions* show that Caltrans rejected better models (dynamic traffic assignment) because they would have shown increased VMT (Lee, 2023). The DEIR's own technical appendices acknowledge limitations of the static assignment model:

> "Another limitation of the SACSIM19 model is the use of static assignment rather than dynamic assignment of vehicle trips. With congested conditions, static assignment can result in volumes that exceed capacity for the analysis period. With dynamic assignment, trips are rerouted or shifted in time so that capacity is met." (Transportation Analysis Report, I 80/US 50 Managed Lanes, November 2023, 78).

9 cont.

Dynamic travel assignment models are increasingly used elsewhere in the country for projects in urban areas with congested conditions. For example, Colorado's Department of Transportation has concluded that

> "DTA is useful when the analyst's study area includes a congested transportation facility as well as its parallel facilities (or parallel capacity)....DTA's assignment methods is more sophisticated than a traditional travel demand model as it accounts for bottlenecks. DTA also allows for temporal spreading (peak-hour spreading)." (Colorado Department of Transportation, 2023)

4. **The DEIR relies on inadequate mitigations**. The DEIR assumes that VMT/GHG increases can be mitigated if Caltrans funds projects in local cities. But its project list covers only 43% of its estimated VMT increase (which is likely low in that it appears not to include truck traffic), and it's doubtful that such mitigations would be additional and verifiable. These mitigations would have to be implemented by other entities over which Caltrans has no control, and mitigation funding is questionable, with Caltrans committing to funding only 12.5% of the cost of trip reduction programs, for example. The mitigations therefore do not meet the "fully enforceable" standard required by CEQA.

   At least one mitigation,"Build overcrossing at future Nishi Student Housing Development site" is a project that has long been planned by the developer of the Nishi student housing project and approved by the Davis City Council. This "mitigation" is not an additional GHG reduction and would simply give public funds to a private developer. Many other mitigations focus on increasing use of long-distance express bus services. Such services can have their own traffic-inducing impacts, for example if they encourage households to move to outlying suburban communities thinking that they can use long-distance express buses to commute to jobs in Sacramento. Such households then use their motor vehicles for many other types of trips, increasing VMT in the region. For such reasons Caltrans must identify fully enforceable and fully funded mitigations to offset the full amount of likely VMT and GHG increases in the DEIR.

10

5. **The document falsely concludes no or less-than-significant impact for important topics.** For NEPA and CEQA purposes the DEIR (Tables S-1 and S-2) wrongly states that the alternatives studied would have "no impact" on urban growth and population, air pollutants, and energy demand, and "less than significant" impacts on GHGs and state climate policy. These statements are not true and

11

should be revised based on additional analysis and up-to-date modeling practices within a recirculated document.

A) Urban growth and population: The DEIR states (Summary-7) "Build Alternatives 2a and 2b **would not remove an impediment to growth**, provide an entirely new public facility, or provide new access to previously unserved areas. Build Alternatives 2a and 2b would not directly increase development of residential land uses, encourage growth outside of existing growth boundaries, **or alter existing access to residential and employment areas**; therefore, no adverse effect associated with population growth would be anticipated with implementation of Alternatives 2a and 2b." (Emphasis added. Text for alternatives 3a and b, 4a and b, and 5a and b says "Same as effects described under Build Alternatives 2a and 2b.")

This is not true. Common sense tells us that since no alternative through-route exists congestion on I-80 is a prime determiner of urban growth in the corridor. If the project reduced congestion upon opening, access to residential and employment areas along the corridor would be greatly altered. It could take, for example, 25 minutes rather than 1 hour to get from Vacaville to Sacramento in the morning rush hour. Such a time difference would have a large impact on people's travel and residency decisions, fueling urban growth and population increase in some locations rather than others. 11 cont.

These "no impact" conclusions, like many other DEIR conclusions discussed below, arise in part because Caltrans did not consider induced traffic within its model. However, this is a well-established concept in the research literature, much of which is summarized by Volker, Lee, and Handy, 2020. The DEIR itself acknowledges the induced traffic concept by including data from the National Center for Sustainable Transportation (NCST) showing an additional 495,000 vehicle miles travelled (VMT) for most alternatives (Table 2-1-26). If induced traffic had been considered, the DEIR's conclusions about no effect on urban growth and population would not have been supported.

B) Air pollutants: Sacramento and Yolo counties are state non-attainment areas for 8-hour ozone and PM 2.5 air pollutants. In terms of pollutant increase, the DEIR (Summary-16) finds "no impact" for the No Build alternative. This is unlikely to be true and shows deficiencies in the underlying analysis. Indeed, Table 2-2-34 shows a 19.9% increase in congestion for the No Project alternative in 2049 (idling cars usually increase pollution), and Table 5 In Appendix J shows increases of 3.5% and 22.2% respectively for PM10 in the years 2029 and 2049 versus the baseline year of 2019, and an increase of 4.5% for PM2.5 in 2049. (That appendix does not show results for other pollutants such as carbon monoxide and ozone. The increases for particulate matter are dismissed with the following statement: "the difference between Build and No Build would be not significant in terms of PM10 and PM2.5 in regards to the increase of total AADT [Average Annual Daily Traffic] between Build and No Build with a HOV-HOV connector.") 12

The DEIR also finds "less than significant" air quality impacts for all other project alternatives. This is also unlikely to be true. Table 5 in Appendix J shows increases of between 2.9% and 13.0% for PM10 in the opening year of 2029 for alternatives 2-7b compared with the 2019 baseline. For 2049 it shows PM10 increases of 0.5% to 9.5% for alternatives 2-7a and 6.1% to

26.9% for alternatives 207b. For PM2.5, the increases range from -1.9% to 6.7% for the "b" alternatives. It is hard to see how these increases can be called "less than significant." Such figures also do not take into account induced traffic and likely increases in congestion resulting from that well-documented phenomenon, which would likely increase air pollution further. 12 cont.

C) Energy demand: The DEIR states (Summary-12) "When balancing energy used during construction and operation against energy saved by relieving congestion and other transportation efficiencies, the project would not have substantial energy effects. Therefore, no adverse permanent effects are anticipated."

This statement is likely false, since it assumes congestion would actually be relieved in the long-term which is inconsistent with the literature on induced traffic (much of which is summarized in Volker, Lee, and Handy, 2020), and the historical experience of freeway-building in California.

Even without considering induced traffic stemming from secondary land use change and population/employment location decisions, the DEIR's modeling shows sizeable traffic increases from roadway dynamics alone (less congested lanes attracting more drivers). These VMT increases are in turn likely to require additional energy, making a finding of "no adverse impacts" inappropriate. (The form of energy will of course shift as vehicles electrify, though electric vehicles will still have impacts.) 13

The exact traffic increases from existing conditions under DEIR modeling are difficult to calculate since the DEIR fails to provide existing traffic volume (measured as Average Annual Daily Traffic) anywhere. SACOG gives this figure as 136,700 vehicles in 2017 at the Yolo/Solano county border (https://vitalsigns.mtc.ca.gov/indicators/traffic-volumes-at-gateways). Taking this as the baseline and using Table 4 in Appendix J figures for future AADT, 2029 traffic increases from roadway dynamics compared to the recent baseline would range from 15.0% for the No Project alternative to 14.5%-27.1% for the various alternatives. 2049 traffic increases would range from 31.9% for the No Project alternative to 27.3% to 39.6% for the various alternatives. Again, it is hard to see how such large increases in traffic would produce "no adverse impacts" in terms of energy.

D) GHGs: **The DEIR itself shows that CO2 emissions would increase by between 2.2% and 10.9% for the various project alternatives in the 2029 opening year** (Table 7, Appendix J). That is a substantial amount; it is hard to see how this can be called "less than significant." In the year 2049 the document shows all alternatives reducing GHG emissions versus existing and No Build conditions, but in many cases these reductions are small. For the "b" alternatives, for example, they range between -1.4% and -4.9%. **Most importantly, these modelled GHG emissions reductions do not take into account induced traffic.** 14

If induced traffic is taken into account, the GHG increase would be large. The DEIR itself includes data from NCST modeling showing likely increases of 495,300 vehicle miles traveled daily from most project alternatives (Table 2-1-26). Based on these NCST figures and average GHG emissions figures for passenger motor vehicles, **widening I-80 in Yolo County would add at least 79,545 tons of CO2e emissions annually (218 tons/day)—equivalent to increasing Davis**

citywide emissions by at least 14%, or unincorporated Yolo County emissions by at least 7.3%. (This figure would be higher still if the higher-emitting truck percentage of up to 29% of vehicles were included.) Building on Table 7, **the increase in GHG emissions produced by the I-80 project in 2049 would then range between 15.4% and 29.5% for alternatives 2-5 (those that add a lane) compared with the No Project alternative**. This is a very large amount for a future date when the state plans to be carbon-neutral, and hardly "less than significant." 14 cont.

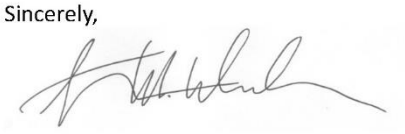
The DEIR analysis of greenhouse gas emissions is thus highly inadequate. Caltrans should bring its model up-to-date by including induced travel from freeway projects, and should revise and recirculate this document based on a more accurate model taking this phenomenon into account.

E) State climate policy: Under its 2022 Scoping Plan, California has a state climate planning goal of achieving carbon neutrality by 2045, which means cutting GHG emissions 85% compared with 1990 as well as sequestering large amounts of emissions in natural landscapes and below-ground. In contrast, the I-80 project is likely to produce sizeable increases in GHGs both in the short-term (2029) and the long-term (2049), as shown above. Thus this project, like other freeway widening projects that Caltrans continues to pursue, cannot be said to have "less than significant" impacts on state climate policy. 15

For the above reasons, the Yolo 80 DEIR should be revised and recirculated.

Thank you very much for your attention.

Sincerely,



Stephen M. Wheeler, Ph.D.
On behalf of the Yolano Group of the Motherlode Chapter of the Sierra Club

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Response to Comment 1 in 20240108, Sierra Club Yolano Group

This introductory comment provides the qualifications of the letter author and does not discuss the adequacy of the EIR/EA. No changes to the Draft EIR/EA are necessary.

Response to Comment 2 in 20240108, Sierra Club Yolano Group

The commenter recommends alternatives to congestion other than widening the freeway, and states the project disregards the state's new policy of considering alternatives to highway capacity expansion which increase GHG and VMT.

Please refer to Master Response B for information related to project alternatives. Additionally, the environmental analysis for the project alternatives conforms to existing standards, guidance, policies, and best practices. No changes to the Draft EIR/EA are necessary.Please refer to Response to Comment 41 in 20240112, City of Davis for more information relating to compliance with state GHG emissions reduction goals.

Response to Comment 3 in 20240108, Sierra Club Yolano Group

Please refer to Master Response C for information related to this comment.

Response to Comment 4 in 20240108, Sierra Club Yolano Group

Please refer to Master Response B for information related to project alternatives.

Response to Comment 5 in 20240108, Sierra Club Yolano Group

As discusses in Section 1.3, *Project Description*, of the Draft EIR/EA, the project proposes to construct the ITS elements listed by the commenter as well as implement other technology to help improve safety and reliability by increasing system monitoring capabilities, actively managing traffic, providing real-time information to the traveling public, and optimizing incident response. Elements such as ramp meters, changeable message signs, closed-circuit television (CCTV), and high-speed fiber-optic communication will be constructed as part of the project. Additionally, new technology will be utilized, including off-pavement detection, high-resolution color changeable message signs, and high mast lowerable CCTV poles, which can house multiple CCTVs on a single pole. Table 1.3-1 of the Draft EIR/EA provides types and locations of proposed ITS improvements for all build alternatives.

No changes to the Draft EIR/EA are necessary.

Response to Comment 6 in 20240108, Sierra Club Yolano Group

The Draft EIR/EA considers a transit-only lane as Alternative 6. This alternative incorporated the expansion of transit services included in the MTP/SCS. Additionally, Mitigation Measure TRANS-1 would require contributions to increase bus and passenger rail service frequency along the corridor, as well as provide fare reductions as part of VMT mitigation for the project. No changes to the Draft EIR/EA are necessary.

Response to Comment 7 in 20240108, Sierra Club Yolano Group

Transporation Demand Management (TDM) strategies are discussed in Section 1.3.1.3 of the Draft EIR/EA. TDM strategies, including voluntary trip reduction programs, are also included in Section 2.1.10, *Traffic and Transportation/Pedestrian and Bicycle Facilities*, of the Draft EIR/EA (see AMM TRANS-1). As discussed in the Draft EIR/EA Section 1.3.1.3, TDM programs on their own would not meet the purpose and need of the project. No changes to the Draft EIR/EA are necessary.

Response to Comment 8 in 20240108, Sierra Club Yolano Group

Please refer to Master Response A for information related to induced travel and VMT mitigation.

The commenter is also skeptical that the project would have a less than significant impact on population growth based on the additional VMT. Section 2.1.5 of the Draft EIR/EA discusses population growth. Also see response to comment 11 below. No changes to the Draft EIR/EA are necessary.

Response to Comment 9 in 20240108, Sierra Club Yolano Group

Please refer to Master Response D for information related to modeling methodologies.

Response to Comment 10 in 20240108, Sierra Club Yolano Group

Please refer to Master Response A for information related to VMT mitigation. Also, see Response to Comment 10 in 20240112, City of Davis relating to funding.

Response to Comment 11 in 20240108, Sierra Club Yolano Group

The growth assessment in the Draft EIR/EA acknowledges the potential influence the Build Alternatives would have on population growth. As stated in the Draft EIR/EA Section 2.1.5.3, “The rate and location of regional growth and land use change may be influenced by travel time and travel cost for residents and workers. Improvements in access, traffic conditions, and lower travel costs can influence the attractiveness of some areas over others for future development.” The Draft EIR/EA concludes that by increasing freeway capacity and reducing travel costs, the Build Alternatives may change the rate of development expected compared to the No Build condition, and because I-80 is a key link between the Sacramento and Bay Area, and homes in the Sacramento area are typically more affordable than homes in the Bay Area, the improved travel times on I-80 in the project corridor could influence more Bay Area residents to move east to the Sacramento area and commute to job centers. The Draft EIR/EA, therefore, discloses potential direct and indirect growth attributable to induced traffic and changes in travel time and cost.

The Draft EIR/EA concludes that the Build Alternatives would influence the pace of planned growth in the region by improving travel times and capacity along I-80. Growth in areas where development is not planned is limited by other impediments (e.g., floodplain conditions, long-term wildlife refuge and agricultural preserves, and built-out conditions in city limits) and local land use policies, which control regional land use changes. The Build Alternatives’ impact on

unplanned population growth is determined to be less than significant. Refer to Sections 2.1.5.3 and 3.2.14 of the Draft EIR/EA. Additionally, please refer to Master Response A for information related to induced demand. No changes to the Draft EIR/EA are necessary.

Response to Comment 12 in 20240108, Sierra Club Yolano Group

Caltrans' no impact determination for the No Build Alternative was based on traffic data provided from Caltrans' traffic forecasting. Air pollutant emissions associated with the roadways in the project area were estimated using specific traffic data and conditions provided by the Caltrans District 3 traffic forecasting and the CT-EMFAC2021 emission model. Operational PM10 and PM2.5 emissions are specifically presented in Tables 2.2-10 and 2.2-11. Emissions results for additional pollutants, including ROG and NOx, are included in Appendix G of the Air Quality Technical Report. See also Response to Comment 2 in 20240112, Sacramento Metropolitan Air Quality Management District for a summary of operational emissions modeling and an analysis of emissions trends among the modeled conditions (i.e., Opening 2029, MTIP 2040, and Design 2049).

Air pollutants in California are closely linked to the state's transportation energy consumption, which has improved due to technological advancements, environmental policies, and innovation. Gasoline and diesel remain the dominant fuels used by the transportation sector. To meet strict emission standards, manufacturers install emission control systems in vehicles, enhancing engine efficiency. However, regulations such as the Low Carbon Fuel Standard, and zero-emission vehicle rules are expected to gradually replace gasoline and diesel engines with more energy-efficient systems, resulting in lower greenhouse gas emissions. Additionally, the anticipated increase in vehicle miles traveled (VMT) once a project is open to the public may not be substantial, as recent estimates show only a modest 1.4 percent rise in statewide VMT compared to the previous year.

Notably, High Occupancy Vehicle (HOV) and High-Occupancy Toll (HOT) lanes with zero emission vehicle penetration are expected to have lower emissions than the No Build scenario, resulting in reduced congestion and projected decreases in truck traffic. This reduction is attributed to reduced congestion (resulting in higher travel speeds across the modeled region) and an anticipated decrease in truck traffic percentages. Overall, this project is expected to reduce greenhouse gas emissions, enhance mobility, and provide traffic relief.

The project is included in the SACOG Metropolitan Transportation Plan/Sustainable Communities Strategy (MTP/SCS), which incorporates air quality standards, including ozone attainment goals, into project planning. SACOG must comply with National Ambient Air Quality Standards (NAAQS).

Caltrans determined less than significant air quality impacts for all other project alternatives as each of the Build Alternatives would improve operations, reduce congestion, and increase vehicle occupancy within the travel corridor as compared to the No Build Alternative.

Please refer to Master Response A for information related to induced travel, including the use of the MTP/SCS SACSIM model. Please refer to Master Response I which includes information related to GHG emissions.

No changes to the Draft EIR/EA are necessary.

Response to Comment 13 in 20240108, Sierra Club Yolano Group

Please refer to Master Response A for information related to induced travel and VMT mitigation and Master Response I for information related to data and modeling used for impacts analyses. The commenter also states that existing traffic volume data is not provided. Traffic data is summarized in Section 2.1.10 *Affected Environment* of the Draft EIR/EA, specifically Section 2.1.10.4 *Roadways* discusses traffic volumes. However, Appendix A of the TAR prepared for the project provides AADT information for existing conditions. The TAR is available on the project website with the Final EIR/EA (https://dot.ca.gov/caltrans-near-me/district-3/d3-projects/d3-i80-corridor-improvements).In terms of emissions, High Occupancy Vehicle (HOV) and High-Occupancy Toll (HOT) lanes with the anticipated non-growth of VMT, the projected emissions are lower than the No Build scenario. This reduction is attributed to reduced congestion (resulting in higher travel speeds across the modeled region) and an anticipated decrease in truck traffic percentages. Overall, this project is expected to reduce greenhouse gas emissions, enhance mobility, and provide traffic relief.

Response to Comment 14 in 20240108, Sierra Club Yolano Group

The commenter questions the accuracy of the Draft EIR/EA's finding of less than significant relating to GHG, in part because CO2 emissions would increase by between 2.2% and 10.9% for the various project alternatives in 2029, and the modelled GHG emission reductions do not take into account induced traffic.

The Draft EIR/EA analysis of GHG emissions was based on CT-EMFAC2021, an emission tool that calculates project-level emissions using data from CARB's EMFAC 2021 model. As discussed in the Draft EIR/EA (Section 3.4.4.2, *Quantitative Analysis*) "GHG emissions quantified using CT-EMFAC are therefore estimates and may not reflect actual on-road emissions. Furthermore, the model does account for induced travel. Modeling GHG estimates with EMFAC or CT-EMFAC nevertheless remains the most precise means of estimating future greenhouse gas emissions. While CT-EMFAC is currently the best available tool for calculating GHG emissions from mobile sources, it is important to note that the GHG results are only useful for a comparison of alternatives. Federal CAFE and GHG emissions standards continue to evolve, and models will be updated to account for regulatory changes."

The NCST Induced Travel Calculator was applied as outlined by the TAF procedures to adequately estimate induced demand. In addition, the Draft EIR/EA included 2020 SACOG MTP/SCS land use projections in which the project is included in the future year network, to estimate induced traffic and growth. Therefore, GHG emissions of the project related to vehicle travel are not underestimated. Caltrans determined that GHG increases are less than significant as the project is expected to improve traffic flow and reduce congestion.

Please also refer to Response to Comment 2 in 20240112, Sacramento Area Bicycle Advocates. No changes to the Draft EIR/EA are necessary.

Response to Comment 15 in 20240108, Sierra Club Yolano Group

As discussed in Section 3.2.8 *Greenhouse Gas Emissions*, “GHG emissions for the Build Alternatives would be lower for design year 2049 compared to existing year (see Table 3.4-2).” Therefore, the project directly supports the state’s long-term target of carbon neutrality by 2045, as outlined in the 2022 Scoping Plan and pursuant to Assembly Bill 1279.

Please refer to Response to Comment 41 in 20240112, City of Davis for more information relating to compliance with state GHG emissions reduction goals.

20240109, Yolo Basin Foundation

YOLO BASIN FOUNDATION

January 9, 2023

Gurtej Bhattal
Project Manager

Masum A Patwary
Environmental Coordinator

Dennis Keaton
Public Information Officer

Re: **Comments on I-80 Corridor Improvement Project EIR/EIS**

Dear Mr. Bhattal, Mr Patwary and Mr. Keaton:

I am writing on behalf of the Yolo Basin Foundation Board of Directors. Yolo Basin Foundation works in partnership with CA Department of Fish and Wildlife (CDFW) to provide educational and public access programs at the Yolo Bypass Wildlife Area (Wildlife Area). The Wildlife Area is a 16,800-acre mosaic of managed wetland habitat and farm and range land located in the Yolo Bypass. The Wildlife Area is located on both sides of the Interstate 80 Causeway.

Yolo Basin Foundation staff and board members participated in two of the public scoping meetings for the proposed project. On October 2, 2023, Foundation staff met with Mr. Bhattal and others in the field to discuss the elements of the improvements related to the Yolo Causeway. We appreciate the opportunity to speak with Caltrans personnel directly involved in the planning and implementation of the proposed project. 1

There are at least three species of bat that live under the Yolo Causeway in the expansion joints and the decking. The majority of these are a large maternal colony of Mexican free-tailed bats.The estimated size of this colony, at its peak, is 250,000. The bat population increases in the spring and spends the summer and early fall at this important roost. In June to early July the bats give birth to their young which become volant in mid-August. This colony is widely known throughout the Sacramento Region and beyond. It may be the largest colony in California. There are many of these bats that reside in the bridge all year and others that leave in the fall.

For over 20 years Yolo Basin Foundation has provided a program called Bat Talk and Walks four to five evenings a week from early June through September. Expert Yolo Basin Foundation staff provide a lecture at the Yolo Bypass Wildlife Area headquarters on County Road 32B and then lead groups of up to 70 individuals in carpools out to view the evening bat emergence of the tens of thousands of Mexican free-tailed bats. We had 4,433 attendees at the events in 2023. For many people it is their first experience viewing a bat emergence and they are truly inspired. 2

During the summer of 2023, as the current construction improvements were being conducted, the bat behavior was very unpredictable from night to night. Normally, during the summer, the bats exit the bridge in the same numbers at the same locations. This past summer, from night to night, they frequently changed the exit location and the number of bats exiting any given location varied substantially.

Yolo Basin Foundation – comment letter
January 9, 2024

We were pleased to read that "No construction would occur on the existing bridge over the Yolo Bypass, so the maternity colony that roosts under the bridge would not be directly impacted." We assume that this means that the Causeway will not be widened and that activities will be limited to lane realignment and installation of toll lanes and signs. 2 cont.

Yolo Basin Foundation does have several concerns regarding the I-80 improvement project since it will involve noisy activities.

1. Conservation of this important bat roost is a high-priority, and we encourage you to consider this during the life of the I-80 improvement project. Monitoring of the bat colony population during the construction phase is important. 3

   Timing of improvements to the Causeway will be key to avoid disturbing the summer roosting and birthing season.

   We request that improvement activities during the summer be limited to daytime hours only. Additionally, we request that activity cease during the months of April through August to protect the maternity colony.

2. The entrance to the Wildlife Area is at the West levee just south of the beginning of the Causeway. Access for management of the Wildlife Area by CDFW personnel at that entrance is crucial. This is the only access road for public uses including: 1) Yolo Basin Foundation's Bat Talk and Walk; 2) YBF's Discover the Flyway school field trip program which brings 3,200 K-12 students from throughout the Sacramento Region. School buses or parent carpools use this entrance Monday through Friday from September through the end of May; 3) This the access for hunters from October through early February; and finally, 4) this is only entrance for other public use of the area for wildlife viewing all year. It is estimated that 30,000 people use this entrance every year to enjoy the multiple values of the Yolo Bypass Wildlife Area. 4

   It is important that the entrance to the Wildlife Area at the East Chiles Exit on County Road 32A be kept open and accessible during all phases of construction on the Causeway.

3. We support improvements to the east and west bike lane entrances. If lighting is installed at the bikeway entrances or along the route, we request that low impact bulbs be used that shine downward. Any additional lighting on the Causeway could disrupt the bats , especially during nursing season when bats return during the night to feed their young. 5

Thank you for the opportunity to make comments on the I-80 Improvement Project EIR/EIS. Please contact Martha Diepenbrock if you have any questions at martha.diepenbrock@gmail.com.

Sincerely,

Martha Diepenbrock, Executive Director

Cc: Assemblywoman Cecilia Aguiar-Curry, Senator Bill Dodd, Supervisor Jim Provenza, Supervisory Lucas Frerichs, Supervisor Oscar Villegas, Garrett Spaan, CDFW, Wildlife Area Manager

2

Response to Comment 1 in 20240109, Yolo Basin Foundation

This introductory comment provides background on the role of the foundation, information on the Yolo Bypass Wildlife Area, and indicates the participation at a field meeting to discuss elements of the project. This comment does not discuss the adequacy of the Draft EIR/EA. No changes to the Draft EIR/EA are necessary.

Response to Comment 2 in 20240109, Yolo Basin Foundation

The commenter expressed concern about the effects to the bat populations during construction.

The only construction activity proposed for the project within 500 feet of the bat maternity colony associated with the Yolo Causeway bridge structure is lane restriping. The Draft EIR/EA specifically states that no structural modification of the Yolo Causeway is proposed (Chapter 1, "The Yolo Causeway would not be structurally modified."). Based on the type of work activity proposed and in consideration of AMM BIO-12 through AMM BIO-15, no construction activities having the potential to generate impacts to the bat maternity colony are expected to take place within 500 feet of the colony within the maternity period (March 1 to August 31). No changes to the Draft EIR/EA are necessary.

Response to Comment 3 in 20240109, Yolo Basin Foundation

Yolo Basin Foundation's concerns regarding timing and effect of construction activities for this project are addressed by the Draft EIR/EA's conservation measures for bats (AMM BIO-12 through AMM BIO-15). No changes to the Draft EIR/EA are necessary.

Response to Comment 4 in 20240109, Yolo Basin Foundation

The commenter questions the public's ability to have access to the Wildlife Area at the East Chiles Exit on County Road 32A during all phases of construction on the Causeway.

The entrance to the Wildlife Area for westbound travelers will be affected during one (1) weekend for a 55-hour ramp closure at the I-80 westbound offramp to Chiles Road/CR 32A. Westbound drivers will be directed to a detour to Mace Boulevard if they wish to access CR 32A and the Wildlife Area entrance during this one weekend closure. The Wildlife Area entrance from eastbound and westbound directions will be open during all other construction activities. No changes to the Draft EIR/EA are necessary.

Response to Comment 5 in 20240109, Yolo Basin Foundation

The commenter requests low impact light bulbs should lighting be installed at the east and west bikeway entrances on the Causeway.

No new lighting is proposed for the Yolo Causeway. When needed, Caltrans plans to use LED's or bulbs rated to emit or produce light output of a warm white color spectrum in areas where impacts to light sensitive natural resources may occur. No changes to the Draft EIR/EA are necessary.

20240111, Center for Biological Diversity



January 11, 2024

Sent via email

Masum A. Patwary
Environmental Scientist
California Department of Transportation
703 B Street
Marysville, CA 95901
Masum.Patwary@dot.ca.gov

Re: Comments on Draft Environmental Impact Report (DEIR) for the Yolo 80 Corridor Improvements Project (SCH # 2021060117)

Dear Mr. Patwary,

These comments are submitted on behalf of the Center for Biological Diversity (Center) regarding the Draft Environmental Impact Report (DEIR) for the Yolo 80 Corridor Improvements Project (SCH # 2021060117). The Center has reviewed the DEIR for the Project and is concerned that the DEIR fails to adequately assess and mitigate the Project's impacts to special-status species, sensitive habitats, wildlife movement, greenhouse gas emissions and climate change, public resources, and existing communities. Adding more lanes to roadways will not reduce vehicular travel nor meet the state's air quality goals. Doing so will only worsen traffic and emissions while harming sensitive wildlife and habitats. The Center strongly urges Caltrans to implement Build Alternative 7a, which would repurpose a general-purpose lane for an HOV 2+ lane and no new lanes would be constructed. A revised DEIR for public review that provides adequate analyses and mitigation for the Project's various build alternatives' impacts and complies with CEQA is required. 1

The Center is a non-profit, public interest environmental organization dedicated to the protection of native species and their habitats through science, policy, and environmental law. The Center has over 1.7 million members and online activists throughout California and the United States. The Center has worked for many years to protect imperiled plants and wildlife, open space, air and water quality, and overall quality of life for people in California.

I. The DEIR Fails to Adequately Assess and Mitigate the Project's Impacts to Biological Resources.

The California Environmental Quality Act (CEQA) requires an EIR to provide decision-making bodies and the public with detailed information about the effect a proposed project is likely to have on the environment, to list ways in which the significant effects of a project might be minimized, and to indicate alternatives to the project. (Pub. Res. Code § 21061.) CEQA further requires a lead agency to mitigate to the extent feasible significant impacts. (CEQA Guidelines § 15064.4.) The DEIR fails to provide sufficient analyses and mitigation for the Project's potential impacts to biological resources and therefore fails to comply with CEQA.

The DEIR fails to adequately assess and mitigate the Project's impacts to biological resources. The Project includes potentially widening portions of and subsequently increasing traffic on approximately 20 miles of roadway that slices through the Yolo Bypass Wildlife Area, the Sacramento River (in two locations), and the Putah Creek. Any new construction in or near the Caltrans right-of-way will impact more than just its footprint. 2

The Project must be considered in context of the landscape it is located in and surrounded by. Limiting the analyses to just the Project footprint undermines the rich biodiversity and connectivity value of the area, which includes the road as it exists now as well as nearby habitats. The area supports a wide variety of special-status species and sensitive habitats that will be significantly impacted by a larger road with more vehicles and traffic and therefore more noise, light, carbon emissions, and runoff pollution. Instead of worsening the road's impacts on the environment, Caltrans has an opportunity to follow the science about induced growth and instead of widening the road to encourage more drivers, traffic, and emissions, the Project should restore degraded habitats and enhance wildlife connectivity at their existing infrastructure to make the landscape and its inhabitants more climate resilient. In fact, doing so is required by Assembly Bill 2344 (AB 2344) (see below for more information). The DEIR fails to adequately assess and mitigate the Project's impacts to wildlife connectivity, special-status species, and sensitive habitats.

A. The DEIR fails to adequately disclose and analyze the Project's impacts to wildlife movement and habitat connectivity.

The DEIR erroneously states the Project's impacts to wildlife movement are less than significant with mitigation without providing substantial evidence to support such claims. Although the DEIR mentions that the Sacramento River, Putah Creek, Yolo Bypass, and adjacent upland forested communities "could provide habitat connectivity within the BSA" (DEIR at 2-291), the DEIR fails to provide a sufficient description of the area's baseline conditions and its importance for wildlife movement and connectivity. Instead, it states that the project is located "in areas with high levels of anthropogenic disturbances within and near the Caltrans right-of-way" (DEIR at 3-16), dismissing the biodiversity and connectivity value of the area. It is also misleading. Although there is an existing road there, the area still provides important habitat and connectivity for numerous special-status animals and plants. Widening the road and increasing traffic will fortify existing barrier effects and significantly affect north-south movement in the Sacramento River and Yolo Bypass Wildlife Area and east-west movement in Putah Creek. The 3

DEIR fails to adequately assess and mitigate the Project's impacts to local, regional, and global wildlife movement and habitat connectivity and is therefore insufficient and fails to comply with CEQA.

Contrary to the DEIR's statements, the California Department of Fish and Wildlife (CDFW) identifies much of the Project area as "ACE Rank 3 – Connections with implementation flexibility" (Figure 1), which are defined as "areas that have been identified as having connectivity importance, but have not been identified as channelized areas, species corridors, or habitat linkages at this time. This may change with future changes in surrounding land use or regional specific information" (CDFW, 2019). It is immediately adjacent to areas identified as "ACE Rank 4 – Conservation Planning Linkages" (Figure 1), which are areas that "represent the best connections between core natural areas to maintain habitat connectivity" (CDFW, 2019). Importantly, CDFW also defines the area as having the highest ecoregion biodiversity ranking (Figure 1), which makes wildlife movement and habitat connectivity critical to protect the area's existing biodiversity. Yet the DEIR fails to adequately disclose, assess, and mitigate the Project's impacts to wildlife movement and habitat connectivity in and near the Project area.

3 cont.

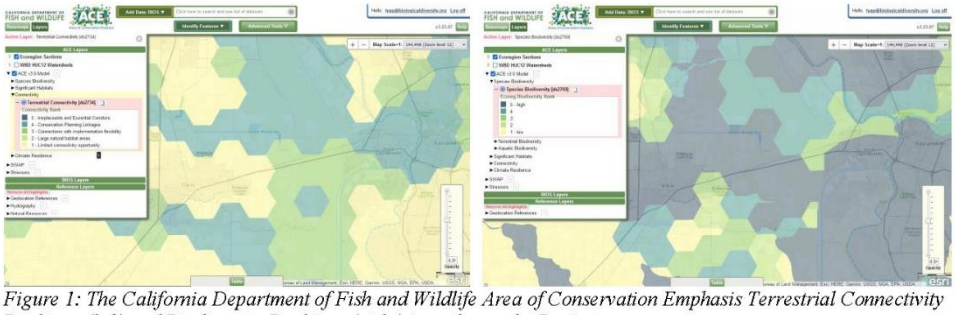


Figure 1: The California Department of Fish and Wildlife Area of Conservation Emphasis Terrestrial Connectivity Rankings (left) and Biodiversity Rankings (right) in and near the Project area.
Source: https://apps.wildlife.ca.gov/ace/. Accessed December 26, 2023.

The DEIR also fails to mention that the Project bisects a Global Priority Important Bird Area (IBA) that has other IBAs nearby (Figure 2). Networks of IBAs are critical for regional, state, and global connectivity particularly for migratory birds that require habitat along their migratory path to find food, shelter, and nesting habitat. Of particular importance are the riparian areas and wetlands in and immediately adjacent to the Project area that likely provide critical nesting and feeding habitat for both resident and migratory birds, including the federally- and state-endangered least Bell's vireo, the state-threatened tricolored blackbird, and state-threatened California black rail, all species that were recorded in the vicinity of the Project area in the California Natural Diversity Database (CNDDB) (see Exhibit A).

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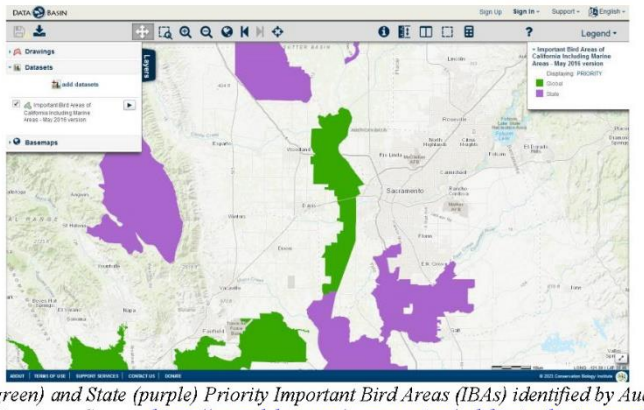


Figure 2: Global (green) and State (purple) Priority Important Bird Areas (IBAs) identified by Audubon California in and near the Project area. Source: https://ca.audubon.org/conservation/california-iba-interactive-site-map and https://databasin.org/maps/new/#datasets=a2a77df9c31c4689b2373fb25d81d9bb. Accessed December 26, 2023.

The DEIR fails to adequately assess and mitigate the Project's impacts to wildlife. As detailed in a 2021 Center Report (Yap et al., 2021), roads and development create barriers that lead to habitat loss and fragmentation, which harms native wildlife, plants, and people. As barriers to wildlife movement, poorly-planned development and roads can affect an animal's behavior, movement patterns, reproductive success, and physiological state, which can lead to significant impacts on individual wildlife, populations, communities, landscapes, and ecosystem function (Brehme et al., 2013; Ceia-Hasse et al., 2018; Haddad et al., 2015; Marsh & Jaeger, 2015; Mitsch & Wilson, 1996; Trombulak & Frissell, 2000; van der Ree et al., 2011). For example, habitat fragmentation from roads and development has been shown to cause mortalities and harmful genetic isolation in mountain lions in southern California (Ernest et al., 2014; Riley et al., 2014; Vickers et al., 2015), increase local extinction risk in amphibians and reptiles (Brehme et al., 2018; Cushman, 2006), cause high levels of avoidance behavior and mortality in birds and insects (Benítez-López et al., 2010; Kantola et al., 2019; Loss et al., 2014), and alter pollinator behavior and degrade habitats (Aguilar et al., 2008; Goverde et al., 2002; Trombulak & Frissell, 2000). 3 cont.

Habitat loss and fragmentation also severely impacts plant communities. An 18-year study found that reconnected landscapes had nearly 14% more plant species compared to fragmented habitats, and that number is likely to continue to rise as time passes (Damschen et al., 2019). The authors conclude that efforts to preserve and enhance connectivity will pay off over the long-term (Damschen et al., 2019). In addition, connectivity is important to allow for range shifts and species migrations as climate changes (Cushman et al., 2013; Heller & Zavaleta, 2009; Krosby et al., 2018). Loss of wildlife connectivity decreases biodiversity and degrades ecosystems. It also prevents the reestablishment of native species, like bald eagles, vernal pool fairy shrimp, and valley elderberry longhorn beetles that may occur in or near the Project area.

Edge effects like noise and light from Project construction and operation will have impacts on wildlife and wildlife movement, particularly next to open space like the IBA as well as the designated critical habitat for numerous fish species, including the federally threatened North American green sturgeon (southern DPS), federally-threatened delta smelt, federally-and 4

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state-threatened Chinook salmon (Central Valley spring run ESU), federally- and state-endangered Chinook salmon (Sacramento winter run ESU), and federally-threatened steelhead (Central Valley DPS).

Negative edge effects from human activity, traffic, lighting, noise, domestic pets, pollutants, and invasive weeds have been found to be biologically significant up to 300 meters (~1000 feet) away from anthropogenic features in terrestrial systems (Environmental Law Institute, 2003). This is important to consider when open space is immediately adjacent to the Project area, as birds and other wildlife have been found to be sensitive to edge effects. For example, field observations and controlled laboratory experiments have shown that traffic noise can significantly degrade habitat value for migrating songbirds (Ware et al., 2015). Subjects exposed to 55 and 61 dBA (simulated traffic noise) exhibited decreased feeding behavior and duration, as well as increased vigilance behavior (Ware et al. 2015). Such behavioral shifts increase the risk of starvation, thus decreasing survival rates. Another study found a 28% decrease in bird abundance in areas when traffic noise was present compared to when there was no traffic noise (McClure et al., 2013). Negative edge effects of roads and development have been documented in wide-ranging predators, such as mountain lions and bobcats (Crooks, 2002; Delaney et al., 2010; Lee et al., 2012; Riley et al., 2006; Smith et al., 2015, 2017; Vickers et al., 2015; Wang et al., 2017), as well as smaller species with poor dispersal abilities, such as song birds, small mammals, and herpetofauna (Benítez-López et al., 2010; Cushman, 2006; Kociolek et al., 2011; Slabbekoorn & Ripmeester, 2008). The Project will result in increased traffic and an increase in associated noise and light. The DEIR fails to analyze these impacts and should be revised to determine the Project's impacts to wildlife connectivity and provide appropriate mitigation. 4 cont.

B. The DEIR fails to adequately mitigate the Project's impacts to wildlife movement and habitat connectivity.

The DEIR concludes that impacts to wildlife movement would be less than significant with mitigation without providing substantial evidence to support such conclusions. The DEIR's proposed mitigation offers only standard measures BIO-1 and BIO-2 and avoidance and minimization measure (AMM) BIO-12 through BIO 15 (DEIR at 3-17), which are vague, inadequate, and improperly deferred mitigation. For example, Standard Measure BIO-1 would have a Caltrans biologist meet with contractors to brief them on environmental permit conditions and requirements, with no information as to what such conditions or requirements might be. Standard Measure BIO-2 includes the preparation of an Aquatic Giant Garter Snake Habitat Dewatering Plan that would include "appropriate measures" for when the contractor dewaters suitable habitat; though the amount and location of dewatered suitable habitat and what those appropriate measures might be are not provided. There is no clear, realistic, and guaranteed plan for accurately documenting the impacts and mitigating damages. 5

AMM BIO-12 through BIO 15 pertain to only bats even though many non-bat species movement will also be affected. These measures are also vague and include an improperly differed bat species protection survey plan. In addition, AMM BIO-15 proposes "to the greatest extent practicable, structural changes may be made" to remove bat roosts without describing what the structural changes would be or providing alternative places for them to roost. This 6

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AMM seems to be an additional impact on bats that keep insect populations in control and help protect crops. According to a 2019 report prepared for Caltrans, providing bat boxes or panels have been shown to be effective bat mitigation (H.T. Harvey and Associates & HDR, Inc., 2019). The DEIR's vague, inadequate mitigation is deferred and unsupported by evidence that it will reduce the relevant impacts to less than significant, and therefore violates CEQA. 6 cont.

The DEIR provides insufficient detail for the public and decision makers to ascertain whether such measures would adequately mitigate the Project's impacts to wildlife movement and habitat connectivity *before* the Project is approved. (See *San Joaquin Raptor Rescue Center v. County of Merced* (2007) 149 Cal.App.4th 645, 670 [EIR inadequate where the success or failure of mitigation efforts "may largely depend upon management plans that have not yet been formulated, and have not been subject to analysis and review within the EIR"]). In the limited circumstances in which deferred mitigation is appropriate, the agency must meet all of the following elements: (1) practical considerations prevented the formulation of mitigation measures during the planning process; (2) the agency committed itself to developing mitigation measures in the future; (3) the agency adopted specific performance criteria prior to project approval; and (4) the EIR lists the mitigation measures to be considered, analyzed, and possibly incorporated into the mitigation plan. (See *POET, LLC v. State Air Resources Bd.* (2013) 218 Cal.App.4th 681, 736-37 [review denied].) The DEIR's proposed mitigation for the Project's impacts to wildlife movement and habitat connectivity fails to meet these criteria. 7

The proposed Project includes the construction of five new culverts and the replacement or improvement of 21 existing culverts underneath the roadway. This is where the Project's impacts to wildlife movement and habitat connectivity could potentially be mitigated. Instead of constructing new culverts or replacing/improving existing culverts only for drainage, the Project could include constructing undercrossings and retrofitting existing culverts to be more wildlife friendly to address drainage issues as well as facilitate wildlife movement. Retrofitting existing culverts could include upsizing them to encourage larger animals or a larger variety of animals to use them, replacing them with undercrossings with restored habitat on both sides, adding ramps and critter shelves for small animals to be able to cross through culverts/underpasses when they are filled with water, or other innovative ways based on the best available science. In addition, placing exclusion/directional fencing that guides wildlife to crossings would help facilitate safe wildlife movement under the road. The Project should incorporate wildlife-friendly measures in its design to mitigate the Project's impacts to wildlife movement and habitat connectivity. Without doing so, the DEIR fails to adequately mitigate the Project's impacts to wildlife connectivity. 8

C. The DEIR fails to comply with AB 2344.

With Assembly Bill 2344 (AB 2344)—The Safe Roads and Wildlife Protection Act—being passed and signed into law in 2022, Caltrans is required to seriously consider and restore wildlife connectivity when there is new construction and/or when improvements are being made to existing transportation infrastructure. The bill specifically states: 9

> It is therefore the policy of the state to protect, restore, and enhance the functioning of fish, wildlife, and habitat connectivity in connection with the planning, construction, and

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improvement of transportation infrastructure throughout the state and, where feasible, the operation and maintenance of transportation infrastructure throughout the state. (AB 2344 Section 1(b)).

9 cont.

Despite this language and the area's high wildlife biodiversity and the applicability of this bill to the proposed Project that will add/improve drainage culverts and, with the exception of Build Alternatives 1, 7a, and 7b, widen freeways by adding new lanes (one in each direction) on I-80 and US-50, the DEIR fails to comply with AB 2344 and fails to adequately assess and mitigate the Project's impacts to wildlife connectivity.

D. The DEIR fails to adequately analyze and mitigate the Project's impacts to special-status species and sensitive habitats.

The DEIR fails to adequately assess and mitigate the Project's impacts to special-status species and sensitive habitats, that occur, have the potential to occur, or historically occurred in and near the Project area. As mentioned previously, the Project area is located within an area that CDFW defines as having the highest ecoregion biodiversity ranking (Figure 1). It is also designated as a global priority IBA (Figure 2). Therefore, it is critical to provide a comprehensive analysis of the species that may be impacted by the proposed Project. Although the DEIR mentions numerous special-status species that are known or have potential to occur in the area, the list is not comprehensive.

Exhibit A provides a list of the species recorded in the CNDDB from a 9-quad query centered around the quad "Sacramento West." Although this is informative, it must be acknowledged that CNDDB is not a comprehensive list. Other databases, like iNaturalist and eBird as well as on-the-ground surveys following the appropriate USFWS- and/or CDFW-approved protocols and guidelines are required to adequately assess the presence or potential presence of special-status species in or near the Project area. For example, the state-threatened greater sandhill crane was documented within the CNDDB 9-quad query (Exhibit A), and on iNaturalist there are many documented observations of sandhill cranes in and near the Project area.[1] This suggests that the Project area is located within potentially suitable habitat for greater sandhill cranes and they, along with the many other birds that may use the IBA, will be significantly affected by the Project. Scientists estimated that up to 340 million birds are killed by car strikes every year in the U.S. (Loss et al., 2014) and North American bird populations have declined by 30% since 1970 (Rosenberg et al., 2019). Widening roads and increasing traffic in and near this IBA could increase the number of birds killed by vehicles as well as reduce suitable habitat due to noise and chemical pollution. The DEIR fails to adequately disclose, assess, and mitigate the Project's impacts to special-status birds.

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Although there are several proposed standard measures and AMMs to minimize the Project's impacts to sensitive bird species, they are insufficient. Most include preconstruction surveys and marking no-disturbance buffers from nests (e.g., AMM BIO-6, AMM BIO-7, AMM BIO-31), though additional AMMs allow for working within those no-disturbance buffers if it "is not practicable" to avoid them (e.g., AMM BIO-9, AMM BIO-10, AMM BIO-32). Although the

[1] iNaturalist Observations of Sandhill Crane: https://www.inaturalist.org/observations?place_id=any&subview=map&taxon_id=508048

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latter requires consultation with CDFW, they generally render the former AMMs meaningless. And despite the Project resulting in more cars and traffic that will lead to more vehicle strikes, noise, and chemical pollution, the DEIR fails to provide mitigation for the resident and migratory species that rely on the IBA. The DEIR fails to adequately mitigate the Project's impacts to special-status birds and other wildlife in and near the Project area. 10 cont.

The DEIR also fails to adequately assess the Project's impacts to special-status fish and other wildlife. Although the DEIR acknowledges that the Project area is located in designated critical habitat for the federally threatened North American green sturgeon (southern DPS), federally-threatened delta smelt, federally-and state-threatened Chinook salmon (Central Valley spring run ESU), federally- and state-endangered Chinook salmon (Sacramento winter run ESU), and federally-threatened steelhead (Central Valley DPS) and that these species have a moderate to high potential to occur in the Project area (DEIR Table 2.3-9), the DEIR argues that "no work is taking place within or near aquatic habitat of listed fish species" and therefore concludes that the Project "would not result in direct or indirect impacts" to these species (DEIR at 2-344). However, the DEIR fails to conduct analyses or provide substantial evidence to support such conclusions.

The DEIR does not take into account that wider freeways with more vehicles and traffic will lead to increased pollution in nearby waterways and wetlands in which these special-status fish species may occur for all or part of their lives. Storm-related runoff containing the chemical 6PPD-quinone from tire dust has led to mass die-offs of Pacific coho salmon in urban areas (Tian et al., 2021). This chemical rubs off of car tires through normal wear and tear. Such pollution from increasing cars and traffic on wider roads could lead to increased pollution in runoff that may be deadly to these closely related special-status fish species that occur in and near the Project area. The increase in this chemical, in addition to microplastics and heavy metal pollution from increased vehicles and traffic, could also harm many of the other sensitive and special-status species that occur in the area, including but not limited to the federally-endangered vernal pool tadpole shrimp, federally- and state-threatened giant garter snake, and state-threatened tricolored blackbird. The DEIR fails to adequately assess and mitigate the Project's impacts to special-status species, including North American green sturgeon (southern DPS), delta smelt, Chinook salmon (Central Valley spring run ESU), Chinook salmon (Sacramento winter run ESU), and steelhead (Central Valley DPS) and their designated critical habitat. 11

II. The Project Would Increase Greenhouse Gas Emissions, Harming State Climate Goals.

A strong, international scientific consensus has established that human-caused climate change is causing widespread harms to human society and natural systems, and climate change threats are becoming increasingly dangerous. In a 2018 *Special Report on Global Warming of1.5°C* from the Intergovernmental Panel on Climate Change (IPCC), the leading international scientific body for the assessment of climate change describes the devastating harms that would occur at 2°C warming, highlighting the necessity of limiting warming to 1.5°C to avoid catastrophic impacts to people and life on Earth. The report provides overwhelming evidence that climate hazards are more urgent and more severe than previously thought, and that aggressive reductions in emissions within the next decade are essential to avoid the most devastating climate change harms. 12

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The impacts of climate change will be felt by humans and wildlife. In California, climate change will transform our climate, resulting in such impacts as increased temperatures and wildfires, and a reduction in snowpack and precipitation levels and water availability. In light of inadequate action on the national level, California has taken steps through legislation and regulation to fight climate change and reduce statewide GHG emissions. (Health & Saf. Code § 38550; *see also* Executive Order B-30-15 (2015); Executive Order S-3-05 (2005); Executive Order B-55-18 (2018).) The Legislature has also passed S.B. 100 which requires renewables to account for 60 percent of electricity sales in 2030. Enforcement and compliance with these state-level actions are essential to help stabilize the climate and avoid catastrophic impacts to our environment.

In a 2022 report, the California Air Resources Board concluded that California is currently not on track to meet its greenhouse gas reduction targets, primarily due to GHG emissions from the transportation sector (CARB, 2022). The DEIR fails to adequately assess and mitigate the Project's impacts to GHGs and climate change. While the DEIR concludes that because of "new fleet and electric vehicles penetration, in design year 2049, GHG emissions of the Build Alternatives were assessed to be less" (DEIR, page 3-26), this simply does not align with the conclusion that "implementing Build Alternatives 2a and 2b through 6a and 6b would increase freeway capacity" (DEIR, page 3-38). 12 cont.

To claim that the Project would increase freeway capacity and vehicle miles traveled (VMT) (DEIR, page 3-41) but somehow *reduce* the region's GHG emissions is unsubstantiated and a misrepresentation of the Project's impacts. Adding new lanes to the roadway would increase the number of single occupancy vehicles on the road. To assert that the project would result in reduced GHG emissions because of State standards on vehicles at the time of the project implementation should not be a relevant factor because it is not something the project has control over. Increasing VMT increases GHG emissions. The DEIR's conclusions are in direct contradiction to one another (U.S. Environmental Protection Agency, 2022).

Projects that increase capacity on existing roads have the potential to widen the gap between where California needs to be to tackle the climate crisis and where it is headed. The DEIR fails to adequately assess and mitigate the Project's impacts to GHGs and climate change.

III. The Project Would Increase Single Occupancy Vehicle Use, Harming Community Health and Wellbeing and Divesting from Sustainable Transportation Methods.

Providing alternatives to single occupancy vehicle travel is essential to building an efficient, sustainable and equitable transportation system. Unfortunately, we have a long way to go if we are going to achieve this vision in the U.S. In 2013, it was reported that of all the U.S. daily commutes to work, 76.4% are of people driving alone (McKenzie, 2015). According to the Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2015, our collective daily transportation in the U.S. constitutes about 27% of the total greenhouse gasses released (U.S. Environmental Protection Agency, 2017). California's annual average emissions associated with 13

passenger vehicles between 2000 and 2020 was approximately 110 million metric tons of CO2e. The Project's build alternatives that include widening the roadway will increase such emissions.

Increasing a region's VMTs isn't just bad planning, it also undermines community health. Increased VMT increases emissions of air pollutants such as nitrogen oxides (NO_x), volatile organic compounds (VOCs), carbon monoxide, heavy metals, carbon dioxide and respirable particulate matter ($PM_{2.5}$). Increased VMT also leads to more ozone (O_3) production through the photochemical reactions of NO_x and VOCs emitted by vehicles.[2] Short- and long-term exposure to several of these pollutants has been linked to premature mortality, compromised birth outcomes, heart disease and a host of respiratory illnesses.[3]

Another serious direct impact of increasing the number of cars on roads, like the Project would do, is automobile crashes, which are the leading cause of death among young people (15 to 19 years old) in the United States.[4] An estimated 42,915 people in the U.S. died in car crashes in 2021 alone and 3.4 million people are injured each year, which costs an estimated $473.2 billion annually as measured by wage and productivity losses, medical expenses, motor-vehicle damage, and employers' uninsured costs (Frumkin et al., 2004; U.S. Department of Transportation, 2022).[5]

Beyond the direct impacts, increased VMT has long term impacts on commuters. In 2019, the duration of the average daily commute in the United States increased to a new high of 55.2 minutes, and a record 9.8 percent of commuters reported daily commutes of at least 2 hours (Burd et al., 2021). These long commutes reduce time available to spend with family, friends, and community, and reduce opportunities for healthy recreation. The increase in inactivity and isolation can also lead to long-term health complications such as pre-diabetes, diabetes, obesity, asthma, isolation, stress and depression (Ewing et al., 2003; Leyden, 2003). 13 cont.

To change these trends, government agencies like Caltrans need to invest in alternative modes of transportation to not only make them cheaper to use, but more efficient than driving. Best practices for transportation options should include providing free public transit services for future residents and workers; implementing bus only lanes; optimizing bus routes to minimize overlap and ensure coverage across the city in line with demand; and providing high-frequency, reliable services with regular bus stops for easy access.

Studies indicate that free public transit services typically result in ridership increase from 20% to 60% in a matter of just a few months (Studenmund and Connor, 1982).[6] Similarly, bus lanes that reduce total transit door-to-door travel times by 5%-15% will increase urban peak

[2] Fu, Franck, Kathleen Purvis-Roberts, and Branwen Williams. "Study of the Effectiveness of VMT Reduction on Air Quality in California, US." *AGU Fall Meeting Abstracts*. Vol. 2021. 2021.
[3] Mujtaba, Ghulam, and Syed Jawad Hussain Shahzad. "Air pollutants, economic growth and public health: implications for sustainable development in OECD countries." *Environmental Science and Pollution Research* 28 (2021): 12686-12698.
[4] Center for Disease Control and Prevention. "Underlying Cause of Death, 2018-2021." https://wonder.cdc.gov
[5] NSC Injury Facts. "Costs of Motor-Vehicle Injuries." 2021. https://injuryfacts.nsc.org/all-injuries/costs/guide-to-calculating-costs/data-details/

ridership 2%-9% (UCLA Institute of Transportation Studies, 2019). Lastly, ensuring accessibility and convenience is essential to increasing ridership. Providing more bus stops decreases the distance residents have to travel to access such services.

However, the DEIR simply acknowledges that "the project would result in induced VMT, which would represent a significant impact" (DEIR, page 3-41), but that "full implementation of the suggested VMT reducing measures is outside the regulatory authority of Caltrans and is not sufficient to fully offset the induced VMT impact" (DEIR, page 3-41). This is woefully insufficient when you consider all the mental and physical harms increased VMT has on residents. 13 cont.

It should be a priority of Caltrans to reduce VMTs with every new project, but instead this Project's build alternatives that include adding additional lanes to the roadways would steer the region in the opposite direction, eroding community and environmental health to build more single-occupancy vehicle infrastructure. The DEIR fails to adequately assess and mitigate the Project's impacts on GHGs, air pollution, and public health and safety due to increased cars on the road and VMT.

IV. The Project Would Not Achieve Its Stated Objective of Reducing Traffic Congestion

The central goal of the project is "to improve mobility by implementing managed lane strategies and improving transit access along the corridor, which would reduce traffic congestion, improve traffic flow, reduce travel time, and increase travel time reliability by actively managing recurrent and non-recurrent congestion" (DEIR, page 3-9). However, conducting business-as-usual and simply adding more lanes to an already congested freeway ignores the science that clearly documents the concept of "induced travel demand." It is widely accepted that building more lanes only creates more traffic long term, despite short term reductions in congestion (Angarita-Zapata et al., 2016). Put simply, increasing lane miles may cause an immediate reduction in traffic density in the region because of the initial feeling of less congestion and decreased average travel times. However, because the cost of travel (in terms of time spent) is initially reduced, more people are inclined to drive, which puts more cars on the road. As traffic volumes rise, travel times start to increase and congestion again becomes prevalent. Eventually there is a new equilibrium met with a higher volume of network traffic than prior to the capacity expansion. Depending on the extent of induced demand, undesirable consequences of road use such as congestion, pollution, and accidents worsen (Hymel, 2019).[7] 14

Thus, not only does the proposed Project's build alternatives that add more lanes go against the State's climate goals that aim to reduce single-occupancy vehicle use, but the Project would not even achieve its stated objective of reducing traffic congestion long term. The Project should be altered to ensure no additional lanes are built and instead, current infrastructure should be adjusted to promote high occupancy vehicle and public transit alternatives that are proven to reduce a region's GHGs, improve air quality and decrease traffic congestion.

The Center urges Caltrans to implement Build Alternative 7a, which would reduce the region's GHG emissions, as well as the associated air quality impacts, by simply re-classifying existing lanes to high occupancy only lanes. 14 cont.

V. Conclusion

Thank you for the opportunity to submit comments on the DEIR for the Yolo 80 Corridor Improvements Project. Due to the shortcomings described above, the Center urges Caltrans to make corrections to the EIR and Project—including properly assessing and mitigating the Project's impacts to special-status species, wildlife connectivity, GHGs, and public health and safety—and recirculate a revised and legally adequate EIR for public review and comment. The Center strongly urges Caltrans to choose Build Alternative 7a as the preferred alternative, which would repurpose a general-purpose lane for an HOV 2+ lane and no new lanes would be constructed. 15

Please include the Center on your notice list for all future updates to the Project and do not hesitate to contact us with any questions at the emails listed below.

Sincerely,



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(*Provided via OneDrive*)

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Exhibit A

List of California Natural Diversity Database (CNDDB) records of sensitive plant and animal species in and near the Project area. This is not a comprehensive list of sensitive species that occur, potentially occur, or historically occurred in and/or near the Project area.

Type	Scientific Name	Common Name
Animals - Birds	*Accipiter cooperii*	Coopers hawk
Animals - Birds	*Buteo swainsoni*	Swainsons hawk
Animals - Birds	*Elanus leucurus*	white-tailed kite
Animals - Birds	*Haliaeetus leucocephalus*	bald eagle
Animals - Birds	*Ardea alba*	great egret
Animals - Birds	*Ardea herodias*	great blue heron
Animals - Birds	*Egretta thula*	snowy egret
Animals - Birds	*Ixobrychus exilis*	least bittern
Animals - Birds	*Nycticorax nycticorax*	black-crowned night heron
Animals - Birds	*Charadrius montanus*	mountain plover
Animals - Birds	*Pica nuttalli*	yellow-billed magpie
Animals - Birds	*Coccyzus americanus occidentalis*	western yellow-billed cuckoo
Animals - Birds	*Falco mexicanus*	prairie falcon
Animals - Birds	*Falco peregrinus anatum*	American peregrine falcon
Animals - Birds	*Progne subis*	purple martin
Animals - Birds	*Riparia riparia*	bank swallow
Animals - Birds	*Agelaius tricolor*	tricolored blackbird
Animals - Birds	*Pandion haliaetus*	osprey
Animals - Birds	*Setophaga petechia*	yellow warbler
Animals - Birds	*Ammodramus savannarum*	grasshopper sparrow
Animals - Birds	*Melospiza melodia pop. 1*	song sparrow (Modesto population)
Animals - Birds	*Spizella breweri*	Brewers sparrow
Animals - Birds	*Nannopterum auritum*	double-crested cormorant
Animals - Birds	*Laterallus jamaicensis coturniculus*	California black rail
Animals - Birds	*Athene cunicularia*	burrowing owl
Animals - Birds	*Plegadis chihi*	white-faced ibis
Animals - Birds	*Vireo bellii pusillus*	least Bells vireo
Animals - Crustaceans	*Branchinecta lynchi*	vernal pool fairy shrimp
Animals - Crustaceans	*Linderiella occidentalis*	California linderiella
Animals - Crustaceans	*Lepidurus packardi*	vernal pool tadpole shrimp
Animals - Fish	*Acipenser medirostris pop. 1*	green sturgeon - southern DPS
Animals - Fish	*Acipenser transmontanus*	white sturgeon
Animals - Fish	*Archoplites interruptus*	Sacramento perch
Animals - Fish	*Lavinia exilicauda exilicauda*	Sacramento hitch
Animals - Fish	*Mylopharodon conocephalus*	hardhead

Animals - Fish	*Pogonichthys macrolepidotus*	Sacramento splittail
Animals - Fish	*Hysterocarpus traskii traskii*	Sacramento-San Joaquin tule perch
Animals - Fish	*Hysterocarpus traskii traskii*	Sacramento-San Joaquin tule perch
Animals - Fish	*Hypomesus transpacificus*	Delta smelt
Animals - Fish	*Spirinchus thaleichthys*	longfin smelt
Animals - Fish	*Entosphenus tridentatus*	Pacific lamprey
Animals - Fish	*Lampetra ayresii*	western river lamprey
Animals - Fish	*Oncorhynchus mykiss irideus pop. 11*	steelhead - Central Valley DPS
Animals - Fish	*Oncorhynchus tshawytscha pop. 13*	chinook salmon - Central Valley fall / late fall-run ESU
Animals - Fish	*Oncorhynchus tshawytscha pop. 7*	chinook salmon - Sacramento River winter-run ESU
Animals - Insects	*Bombus pensylvanicus*	American bumble bee
Animals - Insects	*Cicindela hirticollis abrupta*	Sacramento Valley tiger beetle
Animals - Insects	*Desmocerus californicus dimorphus*	valley elderberry longhorn beetle
Animals - Mammals	*Taxidea taxus*	American badger
Animals - Mammals	*Bassariscus astutus raptor*	northern California ringtail
Animals - Mammals	*Lasiurus cinereus*	hoary bat
Animals - Mollusks	*Margaritifera falcata*	western pearlshell
Animals - Mollusks	*Gonidea angulata*	western ridged mussel
Animals - Reptiles	*Emys marmorata*	western pond turtle
Animals - Reptiles	*Thamnophis gigas*	giant gartersnake
Animals - Reptiles	*Phrynosoma blainvillii*	coast horned lizard
Community - Terrestrial	*Elderberry Savanna*	Elderberry Savanna
Community - Terrestrial	*Great Valley Cottonwood Riparian Forest*	Great Valley Cottonwood Riparian Forest
Plants - Vascular	*Sagittaria sanfordii*	Sanfords arrowhead
Plants - Vascular	*Centromadia parryi ssp. rudis*	Parrys rough tarplant
Plants - Vascular	*Symphyotrichum lentum*	Suisun Marsh aster
Plants - Vascular	*Astragalus tener var. ferrisiae*	Ferris milk-vetch
Plants - Vascular	*Fritillaria agrestis*	stinkbells
Plants - Vascular	*Hibiscus lasiocarpos var. occidentalis*	woolly rose-mallow
Plants - Vascular	*Brodiaea rosea ssp. vallicola*	valley brodiaea

Response to Comment 1 in 20240111, Center for Biological Diversity

This introductory comment provides the role of the Center for Biological Diversity, a summary of the proposed project, and a summary of the more detailed comments provided in the letter. This comment discusses the inadequacy of the Draft EIR/EA in broad terms, indicating that the Draft EIR/EA fails to adequately assess and mitigate the project's impacts to special-status species, sensitive habitats, wildlife movement, GHG emissions and climate change, public resources, and existing communities. The commenter also expresses a preference for Build Alternative 7a.

Caltrans deems the Draft EIR/EA to contain adequate analyses and mitigation for the project's various Build Alternatives and their impacts and that the document complies with CEQA and NEPA. No changes to the Draft EIR/EA are necessary.

Response to Comment 2 in 20240111, Center for Biological Diversity

The commenter states under AB 2344, projects are required to restore degraded habitats and enhance wildlife connectivity at their existing infrastructure to make landscape and its inhabitants more climate resilient, that the Draft EIR/EA failed to do so. The project's initiation date was January 30, 2018. Assembly Bill 2344, codified within Streets & Highways Code, Section 158 et seq., applies to projects, whose initiation phase begins on or after July 1, 2025. (Sts. & Hy. Code, § 158.1(a)(1).)

Caltrans deems the Draft EIR/EA to contain adequate analyses respective to fish and wildlife connectivity and mitigation for the project's Build Alternatives and their impacts and that the document complies with CEQA and NEPA, including determining potential impacts to sensitive natural resources including wildlife connectivity, special-status species, and sensitive habitats. No changes to the Draft EIR/EA are necessary.

Response to Comment 3 in 20240111, Center for Biological Diversity

The commenter states that widening the road and increasing traffic will fortify existing barrier effects and significantly affect north-south movement in the Sacramento River and Yolo Bypass Wildlife Area and east-west movement in Putah Creek, and that the Draft EIR/EA fails to adequately assess and mitigate the Project's impacts to local, regional, and global wildlife movement and habitat connectivity.

Please see Response to Comment 2 in 20240111, Center for Biological Diversity above. No changes to the Draft EIR/EA are necessary.

Response to Comment 4 in 20240111, Center for Biological Diversity

The commenter states the Draft EIR/EA has not complied with CEQA as it fails to address edge effects like noise and light from the Project construction and operation and its impacts on wildlife and wildlife movement.

Lighting and noise created by project activities are expected to be of a short duration, limited in extent, and taking place in discrete locations within the overall project footprint over a 3-year construction period. Analysis of noise and vibration cumulative impacts indicates that with

implementation of proposed mitigation measures, impacts from noise and vibration would not be cumulatively considerable (Draft EIR/EA Chapter 2, “All relevant projects would be required to comply with local noise ordinances and implement BMPs as necessary to avoid and minimize temporary impacts on noise. Therefore, in conjunction with relevant projects, the Project would not result in a cumulatively considerable impact on noise and vibration.”) Impacts from construction lighting, human activity, and wildlife-human interactions are similarly expected to also not be cumulatively considerable. No changes to the Draft EIR/EA are necessary.

Response to Comment 5 in 20240111, Center for Biological Diversity

The commenter states that the Draft EIR/EA fails to adequately mitigate the project’s impacts to wildlife movement and habitat connectivity, and that there is no clear, realistic, and guaranteed plan for accurately documenting the impacts and mitigating damages.

Please see Response to Comment 2 in 20240111, Center for Biological Diversity above. No changes to the Draft EIR/EA are necessary.

Response to Comment 6 in 20240111, Center for Biological Diversity

The commenter states that mitigation measures concerning bats are inadequate and unsupported by evidence that it will reduce the relevant impacts to less than significant.

Caltrans deems the Draft EIR/EA to contain adequate analyses and mitigation for the project’s Build Alternatives and their impacts and that the document complies with CEQA and NEPA, including determining potential impacts to sensitive natural resources including wildlife connectivity, special-status species, and sensitive habitats. In addition, see Response to Comments 5, 6 and 7 in 20240112, California Department of Fish and Wildlife, for details regarding Caltrans standard protocols for handling bats. Also see Response to Comment 2 in 20240109, Yolo Basin Foundation, regarding Caltrans conclusion that construction activities will not have a significant impact on bat roosts. Caltrans does not expect to encounter and exclude bat roosts on built structures within the project footprint and therefore does not expect Avoidance and Minimization Measure (AMM) BIO-15 to generate “additional impacts” to bats. If bat exclusion takes place, Caltrans and its contractors will follow *Caltrans Bat Mitigation: A Guide to Developing Feasible and Effective Solutions* recommendations for implementing bat exclusion which are expected to reduce impacts to below significance.[6] No changes to the Draft EIR/EA are necessary.

Response to Comment 7 in 20240111, Center for Biological Diversity

The commenter states that the Draft EIR/EA does not provide sufficient detail for the public or decision makers to ascertain *before* the project is approved whether the mitigation measures on wildlife movement and habitat connectivity are sufficient.

[6] Johnston, D. and K. Briones. 2019. Final Caltrans Bat Mitigation: A Guide to Developing Feasible and Effective Solutions, Section 5.

Please see Response to Comment 2 in 20240111, Center for Biological Diversity above. No changes to the Draft EIR/EA are necessary.

Response to Comment 8 in 20240111, Center for Biological Diversity

The commenter states that the proposed project includes the construction of five new culverts and the replacement or improvement of 21 existing culverts underneath the roadway, and suggests instead of constructing new culverts or replacing/improving existing culverts only for drainage, the project could include constructing undercrossings and retrofitting existing culverts to be more wildlife friendly to address drainage issues as well as facilitate wildlife movement.

The commenter is proposing that Caltrans implement design changes outside Caltrans standard measures and practices. Caltrans may only consider deviation from standard practice when significant impacts to resources are expected to occur as a result of the considered action, and not as a result of prior actions. Additionally, fill heights along I-80, from Richards Boulevard to Mace Boulevard are not adequate to increase cross culvert sizes to provide for animal crossings. In the absence of analysis indicating significant impacts to wildlife movement as a result of the proposed action and design constraints limiting alternatives, Caltrans declines to consider these proposed design changes.

Caltrans deems the Draft EIR/EA to contain adequate analyses and mitigation for the project's build alternatives and their impacts and that the document complies with CEQA and NEPA, including determining potential impacts to sensitive natural resources including wildlife connectivity, special-status species, and sensitive habitats. No changes to the Draft EIR/EA are necessary.

Response to Comment 9 in 20240111, Center for Biological Diversity

The commenter has proposed that Caltrans comply with Assembly Bill (AB) 2344. Caltrans assesses that this project does not qualify for consideration of implementation of the design criteria specified by AB 2344.

Also please see Response to Comment 2 and 8 in 20240111, Center for Biological Diversity. No changes to the Draft EIR/EA are necessary.

Response to Comment 10 in 20240111, Center for Biological Diversity

The commenter states that the Draft EIR/EA fails to adequately assess and mitigate the project's impacts to special-status species and sensitive habitats, that occur, have the potential to occur, or historically occurred in and near the project area, and fails to provide a comprehensive analysis of the species that may be impacted by the proposed project.

Draft EIR/EA Chapter 3, Section 3.2.4.2, summarizes the technical findings of Caltrans environmental analysis on potential impacts to special-status species. Based on technical review, habitat that would be impacted is already degraded by proximity to roadways and other forms of anthropogenic disturbance. Caltrans has proposed AMM and standard measures (Draft EIR/EA Appendix E, Chapter 2, AMM BIO-1 through BIO-32) that are expected to reduce impacts to special-status species and sensitive habitats to below the level of significance. Based

on this finding, Caltrans deems that impacts to all special status species potentially affected by the project have been adequately analyzed. No changes to the Draft EIR/EA are necessary.

Response to Comment 11 in 20240111, Center for Biological Diversity

The commenter states that the Draft EIR/EA fails to adequately assess the project's impacts to special-status fish and other wildlife, does not take into account that wider freeways increase traffic and pollution in nearby waterways and wetlands where these special-status fish species are found. The commenter also states a concern regarding Storm-related runoff containing the chemical 6PPD-quinone from tire dust.

Draft EIR/EA Chapter 3, Section 3.2.4.2, summarizes the technical findings of Caltrans environmental analysis on potential impacts to special-status species. Based on technical review, impacts to aquatic species would either not occur or occur but at less than significant levels with the incorporated standard measures. In addition, Draft EIR/EA Chapter 3.2.10, states the following:

> "Standard Measure WQ-1 has been incorporated as part of the project, which requires the preparation of a SWPPP that includes construction site BMPs to avoid potential water quality impacts. The SWPPP would include BMPs to protect sensitive areas and to prevent and minimize stormwater and non-stormwater discharges. Standard Measure WQ-1 requires that Caltrans follows all applicable guidelines and requirements in the 2018 Caltrans Standard Specifications (2018 CSS), Section 13, regarding water pollution control and general specifications for preventing, controlling, and abating water pollution to Caltrans-owned storm sewers, streams, waterways, and other bodies of water.
>
> In addition, as required by Standard Measure WQ-2, Caltrans would comply with the National Pollutant Discharge Elimination System (NPDES) Construction General Permit…"

Additionally, the project includes standard measures (Draft EIR/EA Appendix E, Chapter 2, AMM BIO-1 through BIO-32) that are expected to reduce impacts to special-status species and sensitive habitats to below the level of significance. Based on this finding, Caltrans asserts that it has adequately analyzed impacts to all special status species having the potential to be affected by the project. No changes to the Draft EIR/EA are necessary.

Response to Comment 12 in 20240111, Center for Biological Diversity

The commenter questions the legitimacy of Caltrans use and analysis of the GHG reductions resulting from legislation and regulations, and the accuracy of the Draft EIR/EA's finding that the project would result in reduced GHG emissions, when the roadway capacity is increased.

GHG emissions associated with the roadways in the project area were estimated using specific traffic data and conditions provided by the Caltrans District 3 traffic forecasting and the CT-EMFAC2021 emission tool. CT-EMFAC2021 incorporates emission factors from EMFAC. The EMFAC emissions model is developed and used by CARB to assess emissions from on-road

vehicles for regulatory compliance and long-range planning, including the 2022 Climate Change Scoping Plan. EMFAC incorporates all the most recently adopted on-road mobile source regulations. These regulations will reduce the emissions intensity of vehicles, including those using the transportation improvements proposed by the project.

CARB's 2022 Scoping Plan identifies improvement in vehicle technology, low-carbon fuels, and VMT reduction as critical for achieving the state's long-term climate change goals. While reducing statewide VMT is part of the solution, the 2022 Scoping Plan VMT reduction targets are not regulatory requirements nor does the plan assume zero VMT growth in further compliance pathways. An increase in project-level VMT thus does not immediately constitute a significant GHG impact or conflict with statewide GHG reduction policy, as suggested by the commenter. In the context of GHG planning, VMT cannot be analyzed in insolation. It must be considered alongside all variables that influence emissions generation, including vehicle technologies and low-carbon fuels. As discussed in Section 3.2.8 *Greenhouse Gas Emissions*, the emissions modeling performed for the project confirms that while VMT is expected to slightly increase, "GHG emissions for the Build Alternatives would be lower for design year 2049 compared to existing year (see Table 3.4-2)." Therefore, the project directly supports the state's long-term target of carbon neutrality by 2045, as outlined in the 2022 Scoping Plan and pursuant to Assembly Bill 1279.

See also Response to Comment 7 in 20240110, California Air Resources Board and Master Response I for additional discussion of GHG emissions.

Response to Comment 13 in 20240111, Center for Biological Diversity

Consistent with the commenter's suggestion, Caltrans will be investing in alternative transportation with this project. The Draft EIR/EA considers alternatives that would construct a transit-only lane (Build Alternatives 6A and 6B). Moreover, many alternatives improve conditions for transit as well, since transit vehicles would have free access to the managed lane under all alternatives that include a managed lane. The Build Alternatives of the project also include improvements to the pedestrian/bicycle facility adjacent to the Yolo Causeway. These bicycle/pedestrian-related improvements aim to complete the bicycle/pedestrian network and reduce VMT. Please refer to Master Response F for more information about the improvements to the bicycle/pedestrian path. Please refer to Master Response A for more information on VMT and VMT mitigation.

The Draft EIR/EA discussed air quality impacts including an analysis of health effects that may result from project emissions in Section 2.2.6.3 *Environmental Consequences, Mobile Source Air Toxics (MSAT)*. The project is included in the SACOG Metropolitan Transportation Plan/Sustainable Communities Strategy (MTP/SCS), which incorporates air quality standards, including ozone attainment goals, into project planning.

This project proposes to rehabilitate pavement to bring it to a state of long-life pavement and provide other safety benefits such as standard median concrete barrier and additional lighting throughout the project limits. Please refer to Master Response F for more information on how the project proposes to enhance safety and surface rideability.

Response to Comment 14 in 20240111, Center for Biological Diversity

Commenters state that building more lanes creates more traffic long term, despite short term reductions in congestion, and that though the cost of travel (in terms of time spent) is initially reduced, more people are inclined to drive, which puts more cars on the road.

Please refer to Master Responses A and B for responses related to induced travel and project alternatives considered, respectively. Please note that the project alternatives were analyzed using methodologies and techniques conforming to existing standards, guidance, policies, and best practices. Several project alternatives meet the purpose and need of the project, including increasing modality along the corridor.

Response to Comment 15 in 20240111, Center for Biological Diversity

This conclusory comment indicates a preference for Build Alternative 7a and suggests, as a summary to the preceding comments, that the Draft EIR/EA is inadequate. Please see Response to Comments 1 through 14, above. No changes to the Draft EIR/EA are necessary.

20240111, Environmental Council of Sacramento (ECOS)

ECOS
ENVIRONMENTAL COUNCIL OF SACRAMENTO
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Via Email
Yolo80Corridor@dot.ca.gov

Masum A. Patwary
Environmental Scientist C
California Department of Transportation, District 3
703 B Street
Marysville, CA 95901

Dear Dr. Patwary:

This letter provides comments on the Yolo 80 Draft Environmental Impact Report (DEIR) on behalf of the Environmental Council of Sacramento (ECOS), of which I chair its Climate Committee. I also serve on the board of Breathe California-Sacramento Region. I have graduate degrees in chemistry and environmental health. I am a retired chemistry professor, having taught at UC Davis. I am also a retired Air Pollution Research Specialist from the California Air Resources Board (CARB), where I managed research conducted by the University of California on health effects of near-road air pollutants. This includes a 2017 UCLA study (Effectiveness of Sound Wall-Vegetation Combination Barriers as Near-Roadway Pollutant Mitigation Strategies) that concluded "Traffic-related air pollutants are a significant public health concern near freeways." 1

Stephen Wheeler is correct in his January 8, 2024 letter on behalf of Sierra Club's Yolano Group, where he stated that while "California is making progress in many sectors towards reducing its GHG emissions, transportation is one area in which it is not." This is due to increased vehicle-miles traveled (VMT), which the alternatives presented in the DEIR would further exacerbate.

The DEIR fails to consider reasonably feasible alternatives which could avoid or mitigate potential significant environmental impacts. Alternatives which Caltrans should consider are: 2

a) Toll all vehicles using all lanes in each direction (existing freeway and any additional lanes), with accrued revenue to be directed to an independent agency that would assign funds to projects that would reduce VMT. These projects should include funding public transit, such as additional bus and train service, as well as incentives for higher-density housing near transit. It could also include rebates to low-income vehicle owners and/or other services benefiting low-income communities. These projects should be analyzed to determine if they can fully mitigate the emissions from all VMT that would be generated by the additional lanes.
b) Toll all vehicles on two lanes in each direction (existing freeway and any additional lanes), with accrued revenue to be directed … [same as in a) above].
c) Toll single occupant vehicles on two lanes in each direction (existing freeway and any additional lanes), with accrued revenue to be directed … [same as in a) above], as requested by the Yolo County Transportation District in its May 4, 2022 letter to Caltrans.

One or more of these alternatives could provide VMT limitation that is necessary for the Sacramento Area Council of Governments (SACOG) to demonstrate achievement of the State's 19% GHG reduction target pursuant to SB 375. 2 cont.

The DEIR fails to adequately evaluate induced travel. The DEIR shows a substantial increase in travel at the 2029 opening, and smaller increases long-term. Table 2.2-9 shows an immediate 9.2% increase in VMT for Alternative 2 compared with the No Build alternative, but a 2049 increase of only 4.2%. The corresponding figures for Alternative 3 are 9.2% and 4.3%. If induced travel due to changing land use and lifestyle patterns were fully taken into account, these long-term figures would likely be much higher. Caltrans should identify enforceable and funded mitigations to fully offset the likely VMT and GHG increases in the DEIR. The document's data does not support its conclusion of no or less-than-significant impacts. The DEIR states that the alternatives studied would have "no impact" on urban growth and population, air pollutants, and energy demand, and "less than significant" impacts on GHGs and state climate policy. These statements should be revised based on additional analysis and modeling practices that consider induced travel, a recirculated document. 3

The US EPA has designated Sacramento and Yolo counties as "serious" ozone nonattainment classification, meaning that federal transportation funds could be denied if their air quality districts cannot show a path to attaining those standards. In addition, these counties are in non-attainment for health-based State $PM_{2.5}$ and ozone air pollution standards. However, the DEIR finds "no impact" for air pollution for the No Build alternative, even though Appendix J shows PM_{10} increases of 3.5% (2029) and 22.2% (2049) compared to 2019, and an increase of 4.5% for $PM_{2.5}$ in 2049. The DEIR does not show data for ozone, which is correlated with vehicular NO_x emissions. 4

In 2022, CARB issued an "Updated Health Endpoints Bulletin" that shows increased risk from exposure to $PM_{2.5}$, as demonstrated by increased cardiovascular hospital admissions, lung cancer incidence, asthma onset, work loss days, and increased hospitalizations for Alzheimer's and Parkinson's diseases. *See attached:* https:ww2.arb.ca.gov/sites/default/files/2022-11/California%20Air%20Resources%20Board%20Updated%20Health%20Endpoints%20Bulletin%20-%20Edited%20Nov%202022_0.pdf. Last year, based on such health studies, the US EPA proposed revising its annual $PM_{2.5}$ standard from its current level of 12 to 9-10 micrograms per meter^3 (https://www.epa.gov/pm-pollution/national-ambient-air-quality-standards-naaqs-pm).

CARB's guidance document "Strategies to Reduce Air pollution Exposure near High-Volume Roadways" (*see attached:* https://ww2.arb.ca.gov/resources/fact-sheets/strategies-reduce-air-pollution-exposure-near-high-volume-roadways) has "recommendations for siting and building new developments to be protective of public health, including siting schools, day care centers, playgrounds, and housing 500 feet or more from freeways." This is due to the relatively high concentrations of $PM_{2.5}$ near freeways. Also, because the prevailing winds (toward NNW) would direct emissions from the project toward much of the populations of West Sacramento and Davis, the DEIR should provide an estimate of the additional morbidity and mortality that would result from its alternatives. 5

Therefore, the DEIR should be revised to consider US EPA's planned revision, and the DEIR statement "the difference between Build and No Build would be not significant in terms of PM_{10}

and $PM_{2.5}$" should be revised. The DEIR finding of "less than significant" air quality impacts for project alternatives is not accurate. Appendix J shows increases up to 13% for PM_{10} in 2029 for alternatives 2-7b compared with the 2019 baseline. For 2049, it shows PM_{10} increases up to 9.5% for alternatives 2-7a and up to 26.9% for alternatives 2-7b. For $PM_{2.5}$, increases are up to 6.7%. These increases are not "less than significant." These figures also do not take into account induced travel, which would increase emissions of air pollutants and their precursors. 5 cont.

Because diesel vehicles produce approximately 20 per cent of global NO_x emissions, which are key $PM_{2.5}$ and ozone precursors (https://www.nature.com/articles/nature22086), the DEIR should evaluate the NO_x emissions from these vehicles, which are likely to increase with the proposed freeway expansion.

As for greenhouse gases (GHGs), the DEIR shows that CO_2 emissions would increase by between 2.2% and 10.9% for the various project alternatives in the 2029 opening year. Caltrans should include induced travel, which would yield a much larger GHG increase. This is especially necessary considering CARB's 2022 Scoping Plan, which provides a climate planning target to achieve carbon neutrality by 2045 by cutting GHG emissions 85% compared to 1990. The I-80 project is likely to produce large GHG increases, both in the short-term (2029) and the long-term (2049). Therefore, the cited increase in CO_2 emissions is inconsistent with State climate policy. 6

For these reasons, the Yolo I-80 DEIR should be revised and recirculated. Failure to do so would result in a legally deficient environmental analysis.

Sincerely,

Ralph Propper

Ralph Propper
Climate Committee Chair, Environmental Council of Sacramento

California Air Resources Board Updated Health Endpoints Bulletin

1. Introduction

CARB is charged with protecting the public from the harmful effects of air pollution and developing programs and actions to fight climate change. In carrying out this mission, CARB develops and implements programs to achieve state and federal air quality standards and reviews benefits to the public. CARB evaluates, quantifies, and makes publicly available the benefits of actions to reduce air pollution to support plans and regulations. CARB's current approach to health analysis focuses on quantification of a small subset of morbidity and mortality health outcomes associated with air pollution. However, the body of research on air pollution's health effects has grown substantially in the last ten years, and CARB's health analysis needs to be updated in response to the advances in scientific knowledge.

In response to new research, the Board directed staff, in Resolution 20-13 (Health Evaluation of Air Quality and Climate Regulations and Programs) in April 2020 to update and expand health analysis tools, pollutants, and health endpoints to capture a broader and more comprehensive range of benefits from reductions in air pollution.[1]

This document covers the update to the health endpoints for $PM_{2.5}$. Additional health endpoints for $PM_{2.5}$ and health endpoints for other pollutants may be developed or updated in the future. Health endpoints are adverse health outcomes (e.g., heart attacks, asthma attacks, hospitalizations) used for evaluating quantitative or qualitative health impacts from air pollution exposure. In December 2021, CARB held a public workshop proposing new and updated endpoints. Staff finalized the proposed endpoints and methodology, considering comments received both during and after the workshop. This document provides the final endpoints for $PM_{2.5}$, the scientific basis for choosing those endpoints, information on the valuation, and next steps in expanding CARB's health analysis. The endpoints described in this document will be used in subsequent CARB health analyses for plans and regulations.

[1] CARB, Health Evaluation of Air Quality and Climate Regulations and Programs: Resolution 20-13, April 2020. Retrieved March 15, 2022 from: https://ww2.arb.ca.gov/sites/default/files/barcu/board/res/2020/res20-13.pdf

2. Background

CARB currently analyzes the following four mortality and morbidity health endpoints for $PM_{2.5}$:

- Premature mortality (cardiopulmonary)
- Hospital admissions for cardiovascular illnesses
- Hospital admissions for respiratory illnesses
- Emergency room visits for asthma attacks

Staff estimate the change in the number of health outcomes (e.g. premature mortality/deaths) resulting from changes in direct $PM_{2.5}$ emissions and a portion of secondary $PM_{2.5}$ emissions.

While these endpoints represent important health outcomes experienced by the public, they reflect a small subset of the full suite of benefits to the public from reductions in air pollution. Other mortality and morbidity outcomes that impact the public and lead to societal and economic impacts include hospitalizations, emergency room visits, missed work and school days, and other burdens. A wealth of evidence demonstrates that air pollution can cause a wide range of health effects beyond the four endpoints listed above. For instance, the U.S. Environmental Protection Agency (EPA)'s 2019 Integrated Science Assessment (ISA) for Particulate Matter concluded that there are several health outcomes with either a "causal," "likely to be causal," or "suggestive of causal," relationship with long-term $PM_{2.5}$ exposure (**Table 1**).[2] Out of the eight categories of health outcomes listed in **Table 1**, CARB is currently only evaluating endpoints in three categories (mortality, a subset of cardiovascular effects, and a subset of respiratory effects).

[2] U.S. EPA. (2019). *Integrated Science Assessment (ISA) for Particulate Matter (December 2019)* (EPA/600/R-19/188). Retrieved March 15, 2022 from: https://cfpub.epa.gov/ncea/isa/recordisplay.cfm?deid=347534#tab-3

Table 1. Long-term and short-term $PM_{2.5}$ health outcomes and causality links (adapted from U.S. EPA[3])

Causality Links	Health outcomes from $PM_{2.5}$ exposure
Causal	Mortality* Cardiovascular Effects*
Likely to be causal	Respiratory Effects* Nervous Systems Effects (long-term only) Cancer (long-term only)
Suggestive of causal	Metabolic Effects Male and Female Reproduction and Fertility Effects Nervous Systems Effects (short-term only)
*CARB currently calculates this health endpoint	

The U.S. EPA determines the casual relationship using a formal causal framework drawn from a number of federal and international groups such as the National Academy of Sciences and the International Agency for Research on Cancer.[4] This framework considers aspects such as number of studies, consistency of study findings, biological plausibility, and uncertainties to determine the causal relationship (e.g., causal, likely to be causal, etc.). The U.S. EPA has a rigorous review process including a formal independent panel of scientific subject matter experts, the Clean Air Scientific Advisory Committee (CASAC), as well as the public.

As shown in **Table 1**, the U.S. EPA classifies endpoints in hierarchical levels, with "causal" and "likely to be causal" reflecting the most confident relationships between $PM_{2.5}$ and attributable health impacts. "Suggestive of causal" does not necessarily mean the outcome is less associated with air pollution exposure but may reflect a lack of or limited number of studies. In the future, CARB may consider incorporating additional levels of causation. In addition, CARB and other investigators are conducting research to better capture the extent of adverse public health impacts from air pollution (see "Ongoing/Next Steps").

In this memo, CARB presents updated and additional $PM_{2.5}$ -related health endpoints, which will be incorporated into the agency's routine health analysis. CARB is using scientific

[3] Ibid.
[4] U.S. EPA. *Preamble to The Integrated Science Assessments (ISA).* U.S. Environmental Protection Agency, Washington, DC, EPA/600/R-15/067, 2015

evidence reviewed and documented in U.S. EPA health impact analysis and assessments.[5,6] (see the "Health Endpoints, Use of Endpoints and Supporting Studies" section).

CARB held a public workshop in December 2021 to discuss the endpoints. The recording and presentations slides are available online (*https://ww2.arb.ca.gov/events/evaluating-new-health-endpoints-use-carbs-health-analyses*). A summary of the public comments received after this workshop are provided in the "Summary of Submitted Public Comments to December 2021 Public Workshop" section.

3. Health Endpoints, Use of Endpoints and Supporting Studies

CARB is adding 11 health endpoints to the $PM_{2.5}$ health analysis methodology: three are updated endpoints, and eight are new endpoints (**Table 2**). All of these endpoints are currently in use by U.S. EPA, as reported in their analysis for the Cross-State Air Pollution Rule Update.[7] Additional endpoints may be considered in the future. CARB will use these endpoints in calculating health impacts of regulations and plans. For most health analysis, CARB uses these endpoints with a tool called "Incidents Per Ton" (IPT) to calculate the health impacts per ton of pollution reduced. This tool relates changes in emissions projected in specific years to changes in health outcomes for those years. The IPT method is based on approaches such as U.S. EPA's Environmental Benefits Mapping and Analysis Program (BenMAP).[8] More information on the IPT method is available on CARB's website.[9]

To calculate changes in health outcomes, CARB uses a "concentration-response" (CR) function. A CR function calculates a change in the health outcome in the population based on the change in the pollutant concentration to which that population is being exposed. CARB uses inputs to the CR function that are specific to each endpoint. These inputs are the baseline incidence rate (for illness or deaths) and the effect estimate (that calculates the incremental change in health effect) and are derived from epidemiological research. The baseline incidence rate is the number of events of illness or death, or the number of people experiencing that event in the population. Baseline incidence rates can be acquired from health databases such as those from state or federal agencies or also built into the U.S. EPA's BenMAP software.[10] The effect estimate for an endpoint is the incremental increase in health effect per unit of pollution (1 $\mu g/m^3$) and is specifically derived from epidemiological studies. The effect estimates are applicable to all types of $PM_{2.5}$ since currently there is no consensus

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[5] See U.S. EPA. (2019) *ISA for Particulate Matter.*

[6] U.S. EPA. (2021). *Technical Support Document (TSD) for the Final Revised Cross-State Air Pollution Rule Update for the 2008 Ozone Season NAAQS: Estimating PM2.5- and Ozone-Attributable Health Benefits* (EPA-HQ-OAR-2020-0272). Retrieved March 15, 2022 from: *https://www.epa.gov/sites/default/files/2021-03/documents/estimating_pm2.5-_and_ozone-attributable_health_benefits_tsd_march_2021.pdf*

[7] Ibid.

[8] U.S. EPA. (2019). Environmental Benefits Mapping and Analysis Program - Community Edition (BenMAP-CE). Retrieved March 15, 2022 from *https://www.epa.gov/benmap*

[9] CARB's Methodology for Estimating the Health Effects of Air Pollution. Retrieved March 18, 2022 from: *https://ww2.arb.ca.gov/resources/documents/carbs-methodology-estimating-health-effects-air-pollution*

[10] See U.S. EPA. (2019) BenMAP-CE.

among research studies on separate effect estimates for different sources and components of $PM_{2.5}$.[11] The studies described in this document include the effect estimate inputs to the CR function. These effect estimates and related endpoints will be included in CARB's health analysis methodology.

Table 3 lists the studies used by U.S. EPA to quantify the 11 endpoints, including the effect estimates. This list includes new endpoints from respiratory and cardiovascular effects, as well as a new cancer endpoint and two new nervous system effects. The U.S. EPA recently identified and quantified these endpoints in 2021.[12] All 11 of these endpoints were determined by U.S. EPA to have a "causal" or "likely causal" relationship with particulate matter as described in their 2019 ISA and summarized in **Table 1**.[13] Furthermore, additional evidence on the confirmed causal relationships is included in the U.S. EPA's 2021 draft supplement document to their ISA (currently under review).[14] Thus, the health endpoints to be included in CARB's health analysis methodology are based on a body of peer-reviewed health research. Each of these endpoints are described in more detail later in this section.

[11] See U.S. EPA. (2019) *ISA for Particulate Matter.*
[12] See U.S. EPA. (2021) *TSD.*
[13] See U.S. EPA. (2019) *ISA for Particulate Matter.*
[14] U.S. EPA. (2021). *Supplement to the 2019 Integrated Science Assessment for Particulate Matter (External Review Draft)* (EPA/600/R-21/198). Retrieved March 15 2022 from: https://cfpub.epa.gov/ncea/isa/recordisplay.cfm?deid=352823

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Table 2. List of updated and new $PM_{2.5}$ health endpoints in CARB's health analysis methodology

Updated Endpoints	New Endpoints
Cardiovascular hospital admissions*	Cardiovascular ED Visits
Respiratory hospital admissions*	Acute Myocardial Infarction, Nonfatal
Respiratory ED visits**	Asthma Onset
	Asthma Symptoms / Exacerbation
	Work Loss Days
	Lung Cancer Incidence
	Alzheimer's Disease
	Parkinson's Disease

ED = emergency department

*CARB is currently calculating this endpoint but are updating the effect estimate to use a more recent study.

**CARB is currently calculating ED visits for specifically asthma and are updating this endpoint to include all respiratory diseases.

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Table 3. List of health endpoints and summary of studies (adapted from U.S. EPA[15])

	Endpoint(s)	Study	Age Range	Location	Effect Estimate
Cardiovascular	Cardiovascular hospital admissions*	Bell et al. (2015)	Seniors (65-99)	US	0.00065
	Cardiovascular ED visits	Ostro et al. (2016)	All ages 0-99)	US (CA)	0.00061
	Acute myocardial infarction, nonfatal	4 studies: • Pope III et al. (2006) • Sullivan et al. (2005) • Zanobetti et al. (2009) • Zanobetti and Schwartz, (2006)	Adults (18-99)	US	4 studies: • 0.00481 • 0.00198 • 0.00225 • 0.0053
Respiratory	Respiratory hospital admissions*	Bell et al. (2015)	Seniors (65-99)	US	0.00025
	Respiratory ED visits**	Krall et al. (2017)	All ages (0-99)	US	4 locations: • 0.00055 • 0.00097 • 0.00083 • 0.00135
	Asthma onset	Tetreault et al. (2016)	Children (0-13)	Canada	0.04367
	Asthma symptoms	Rabinovitch et al. (2006)	Children (6-13)	US	0.002
	Work loss days	Ostro (1987)	Adults (18-64)	US	0.0046

ED = emergency department

*CARB is currently calculating this endpoint but are updating the effect estimate to use a more recent study.

**CARB is currently calculating ED visits for specifically asthma and are updating this endpoint to include all respiratory diseases.

Note: The full reference for each study in the table is provided in the section describing that endpoint

Table 4 (continued).

	Endpoint(s)	Study	Age Range	Location	Effect Estimate
Cancer	Lung cancer incidence	Gharibvand et al. (2017)	Adults (30-99)	US and Canada	0.03784
Nervous System Effects	Alzheimer's disease	Kioumourtzoglou et al. (2016)	Seniors (65-99)	US	0.13976
	Parkinson's disease	Kioumourtzoglou et al. (2016)	Seniors (65-99)	US	0.07696

While there are many epidemiological studies on all these endpoints, U.S. EPA identified one or more studies for each endpoint for the purpose of health analysis quantification. The studies were chosen based on U.S. EPA's set of criteria listed in **Table 5**. Each criterion had its own list of preferred study attributes, and the U.S. EPA considered these criteria collectively when evaluating studies. For instance, a study location in the US or Canada and a study size with a large population were preferred. More details about these criteria are provided by U.S. EPA in the aforementioned 2021 TSD.[16]

[15] See U.S. EPA. (2019) *ISA for Particulate Matter.*
[16] See U.S. EPA. (2021) *TSD.*

Table 5. Summary of U.S. EPA's criteria for selecting studies and risk estimates (adapted from U.S. EPA[17])

Criterion	Description of Preferred Attributes
Study Period	Longer period of time and more recent studies
Exposure Estimate	Exposures estimated using a combination of approaches (e.g., modeling, monitoring, etc.). Long-term/chronic exposure studies over short-term.
Study Type	For long-term epidemiological studies, cohort studies over case-control studies, and both are preferred over cross-sectional or ecological studies.
Population Attributes	Study populations that are representative of the greater affected population (diverse race/ethnicities, both sexes, broader age groups).
Study Location	US or Canada
Health Endpoints	Broad health endpoints over more specific endpoints.
Study Size	Relatively large sample sizes
Pollutant Concentrations	Evaluate air pollutant exposures that are close to or below current conditions.
Hazard/Risk Estimate	Use of multiple well-established statistical models
Lag Period	Strongest multi-day/distributed lag periods that are more biological plausible

CARB will use the studies identified by U.S. EPA for the quantification of the 11 health endpoints summarized in **Table 3**.[18] In addition, CARB may use other epidemiological studies, including those identified in the EPA 2021 TSD, to provide supplemental information on the 11 health endpoints or other endpoints quantified by CARB. CARB may also update the studies used for the quantification of health endpoints or add more health endpoints in future bulletins. The 11 endpoints are presented in more detail below. Some endpoints are grouped together because they utilize the same study (cardiovascular and respiratory hospital admissions; and hospitalizations for Alzheimer's and Parkinson's diseases). Most of the listed endpoints rely on studies using hospital data of coded diagnoses, and multiple

[17] See U.S. EPA. (2021) *TSD*.
[18] Ibid.

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diseases are categorized under the cardiovascular and respiratory endpoints. CARB has noted the codes from the International Classification of Diseases, Ninth Revision (ICD-9) for each endpoint, with their specific definitions provided in **Table 6**, for reference.[19] Each endpoint listed below is noted as either being *Updated* or *New* for CARB's health analysis methodology (also summarized in **Table 2**). The endpoints will use the new or updated effect estimates in the studies noted for that endpoint.

3.1. Cardiovascular Hospital Admissions and Respiratory Hospital Admissions – Both Updated

Hospital admissions for cardiovascular disease and hospital admissions for respiratory disease both use the same quantification study. CARB currently calculates both endpoints in our regular analyses, but we are updating the study to Bell et al., 2015.[20] This study utilized a Medicare cohort (>65 years of age) from 1999-2010 that spanned the U.S. Because of its large cohort size, relatively long study period, and location in the U.S., this study was identified by the U.S. EPA as being robust for quantification of hospital admissions for both cardiovascular and respiratory outcomes.[21] The cardiovascular diseases included are ischemic heart disease, heart failure, and other cardiovascular outcomes (ICD-9 code 410, omitting 410.x2; 410-414; 426-427; 428; 429; 430-438; and 440-448), while the respiratory diseases included asthma, chronic obstructive pulmonary disease (COPD), respiratory infections, and others (ICD-9 codes 464-466, 480-487, 490-492, 493). Quantification of these endpoints provides the number of events (hospital admissions for either cardiovascular disease or respiratory disease), not the number of individuals admitted to the hospital for these diseases.

3.2. Cardiovascular Emergency Department (ED) Visits – New

Emergency Department (ED) visits differ from hospital admissions in that the former are often unscheduled visits that occur more frequently and are usually for less serious medical events.[22] The cardiovascular diseases included in this endpoint are similar to those in the hospital admissions endpoint and include ischemic heart disease, heart failure, and other cardiovascular-related outcomes (ICD-9 codes 390-459). To quantify this endpoint, CARB will use the Ostro et al., 2016 study selected by the U.S. EPA. Ostro et al., 2016 conducted a case cross-over analysis of eight cities in California, using the Office of Statewide Health

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[19] Centers for Disease Control and Prevention (CDC): National Center for Health Statistics. International Classification of Diseases, Ninth Revision, Clinical Modification (ICD-9-CM). Retrieved March 15, 2022 from: *https://www.cdc.gov/nchs/icd/icd9cm.htm*

[20] Bell, M. L., Son, J. Y., Peng, R. D., Wang, Y., & Dominici, F. (2015). Ambient PM2.5 and Risk of Hospital Admissions: Do Risks Differ for Men and Women? *Epidemiology*, 26(4), 575-579. doi:10.1097/ede.0000000000000310

[21] See U.S. EPA. (2021) *TSD*.

[22] Winquist A, Klein M, Tolbert P, Flanders WD, Hess J, Sarnat SE. Comparison of emergency department and hospital admissions data for air pollution time-series studies. *Environ Health*. 2012 Sep 21; 11:70. doi: 10.1186/1476-069X-11-70.

Planning and Development (OSHPD) data between 2005 and 2008.[23] Among the several epidemiological studies that U.S. EPA evaluated for quantifying this endpoint, this was the only study with short-term exposure specifically investigating cardiovascular ED visits.[24]

3.3. Acute Myocardial Infarction (AMI), Nonfatal – New

An Acute Myocardial Infarction (AMI) is also called a heart attack; this endpoint refers to hospitalizations from heart attacks (ICD-9 code 410) and does not include deaths resulting from heart attacks. Among the many epidemiological studies available on this endpoint, U.S. EPA identified several studies that met the robust criteria for quantification of impacts from $PM_{2.5}$. These studies included Sullivan et al., 2005 from King County, WA; Pope III et al., 2006, from Wasatch Range, UT; Zanobetti and Schwartz, 2006, from Boston, MA; and Zanobetti et al., 2009, which looked at 26 U.S. communities.[25,26,27,28] These studies spanned different areas across the U.S. and analyzed all adults (18-99 years old). Three of these studies used hospital discharge data for AMI, while Pope III et al., 2006 used data from angiographically characterized patients, which is known to be a more precise indicator of AMI.[29] If there are multiple robust studies for characterizing risks, U.S. EPA uses pooling methods to account for the information from these multiple studies, consistent with advice from the National Academies of Sciences.[30,31] The results from application of effect estimates in these four studies will be used together, or "pooled", in CARB's approach to estimate hospitalizations for nonfatal acute myocardial infarctions. The method for pooling is described in U.S. EPA's BenMAP manual.[32]

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[23] Ostro B, Malig B, Hasheminassab S, Berger K, Chang E, Sioutas C. Associations of Source-Specific Fine Particulate Matter with Emergency Department Visits in California. *Am J Epidemiol.* 2016 Sep 15;184(6):450-9. doi: 10.1093/aje/kwv343.

[24] See U.S. EPA. (2021) *TSD.*

[25] Sullivan J, Sheppard L, Schreuder A, Ishikawa N, Siscovick D, Kaufman J. Relation between short-term fine-particulate matter exposure and onset of myocardial infarction. *Epidemiology.* 2005 Jan;16(1):41-8. doi: 10.1097/01.ede.0000147116.34813.56.

[26] Pope CA 3rd, Muhlestein JB, May HT, Renlund DG, Anderson JL, Horne BD. Ischemic heart disease events triggered by short-term exposure to fine particulate air pollution. *Circulation.* 2006 Dec 5;114(23):2443-8. doi: 10.1161/CIRCULATIONAHA.106.636977.

[27] Zanobetti A, Schwartz J. Air pollution and emergency admissions in Boston, MA. *J Epidemiol Community Health.* 2006 Oct;60(10):890-5. doi: 10.1136/jech.2005.039834.

[28] Zanobetti A, Franklin M, Koutrakis P, Schwartz J. Fine particulate air pollution and its components in association with cause-specific emergency admissions. *Environ Health.* 2009 Dec 21; 8:58. doi: 10.1186/1476-069X-8-58.

[29] See U.S. EPA. (2021) *TSD.*

[30] Ibid.

[31] NRC (2002). Estimating the public health benefits of proposed air pollution regulations. 0309086094. National Academies Press.

[32] U.S. EPA. (2022). Environmental Benefits Mapping and Analysis Program - Community Edition: User's Manual. Retrieved March 22, 2022 from *https://www.epa.gov/sites/default/files/2015-04/documents/benmap-ce_user_manual_march_2015.pdf?VersionId=7BSmKlIr0O6KccspW4pA.nMsu4EeLlrt*

3.4. Respiratory ED Visits – Updated

For previous analyses, CARB calculated ED visits specifically for asthma; however, CARB is updating this endpoint to include all respiratory diseases, which encompasses not just asthma, but also COPD, respiratory infections, and other respiratory outcomes (ICD-9 codes (460-465, 466, 477, 480-486, 491, 492, 493, 496, 786.07). As mentioned earlier, ED visits differ from hospital admissions in that the former are often unscheduled visits that occur more frequently and are usually for less serious medical events.[33] CARB is using Krall et al., 2017 to quantify this endpoint, which the U.S. EPA identified as a robust study since it covered a wide geographic area across four major U.S. cities (Atlanta, GA; Birmingham, AL; St. Louis, MO; and Dallas, TX) and included all ages (0-99-year-old individuals).[34]

3.5. Lung Cancer Incidence – New

CARB has not previously quantified cancer incidence as part of the health analysis. The U.S. EPA had determined that there is a "likely to be causal" relationship between cancer and long-term $PM_{2.5}$ exposure.[35] Also, an International Agency for Research on Cancer (IARC) Working Group concluded that outdoor air pollution, and specifically PM, is carcinogenic (cancer-causing).[36] Both the U.S. EPA and the IARC Working Group based their determinations on a wealth of epidemiological studies on humans as well as experimental studies on model organisms showing increased risks for tumor development and other carcinogenic effects with exposure to air pollution.[37,36] In addition, CARB found that diesel particulates were linked to lung cancer incidence based on a combination of human epidemiological and animal studies.[38,39] For this endpoint, "Lung cancer incidence" refers to diagnoses of lung cancer (ICD-O-3 codes C34.0-C34.9) and does not include deaths. Among the many studies available, U.S. EPA identified four lung cancer incidence studies that met its criteria but ultimately chose Gharibvand et al., 2017 for quantification because of its study population and location.[40] The authors analyzed a cohort of over 80,000 people (composed of females and males with non-smoking history) from the Adventist Health and Smog Study-2

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[33] See Winquist A et al. *Environ Health*. 2012.

[34] Krall JR, Mulholland JA, Russell AG, Balachandran S, Winquist A, Tolbert PE, Waller LA, Sarnat SE. Associations between Source-Specific Fine Particulate Matter and Emergency Department Visits for Respiratory Disease in Four U.S. Cities. *Environ Health Perspect*. 2017 Jan;125(1):97-103. doi: 10.1289/EHP271.

[35] See U.S. EPA. (2019) *ISA for Particulate Matter*.

[36] IARC. "Outdoor Air Pollution: Volume 109." In IARC Monographs on the Evaluation of Carcinogenic Risks to Humans. Lyon, France: International Agency for Research on Cancer, 2016. Retrieved March 15, 2022 from: *https://monographs.iarc.who.int/monographs-available/*

[37] See U.S. EPA. (2019) *ISA for Particulate Matter*.

[38] CARB. "Overview: Diesel Exhaust & Health." Retrieved March 15, 2022 from: *https://ww2.arb.ca.gov/resources/overview-diesel-exhaust-and-health*

[39] CARB. "Summary: Diesel Particulate Matter Health Impacts." Retrieved March 15, 2022 from: *https://ww2.arb.ca.gov/resources/summary-diesel-particulate-matter-health-impacts*

[40] See U.S. EPA. (2021) *TSD*.

(AHSMOG-2) across the U.S.[41] The quantification for this endpoint considers the lag or latency period between exposure and the onset of the cancer and considers adults at least 30 years of age. CARB will be using the effect estimate from Gharibvand et al., 2017.

3.6. Asthma Onset – New

While CARB has previously calculated ED visits for asthma, "asthma onset" itself is a new endpoint in CARB's methodology. Asthma is a disease that is characterized by inflammation of the airways, and "onset" refers to new diagnoses. The 2019 ISA also indicated asthma onset to be a key clinically relevant health endpoint when considering plausible biological pathways.[42] For quantification, U.S. EPA chose Tetreault et al., 2016, which looked at children (0-13 years of age) in Quebec, Canada, using medical administrative databases for hospital discharged diagnosis of asthma or reported asthma cases by physicians.[43] The U.S. EPA considered studies in Canada to be applicable to the U.S. because both countries have similar ambient $PM_{2.5}$ concentrations, pollutants transport between the two countries, and most Canadians live less than 100 miles from the U.S.[44] While there were other studies available on this endpoint, the U.S. EPA identified this study as being particularly robust because of its more recent time period and larger cohort size. Therefore, CARB will utilize the Tetreault study.

3.7. Asthma Symptoms/Exacerbation – New

While CARB has previously calculated ED visits for asthma, "asthma symptoms/exacerbation" is a new endpoint in our methodology. Asthma symptoms and exacerbation refers to the worsening of asthma, as measured by use of albuterol medication. Albuterol inhalers are considered to be a rescue medication and are a useful endpoint when considering asthma symptoms. Rabinovitch et al., 2006 followed asthmatic children (ages 6-13) in Denver, Colorado for two consecutive winters from 2001-2003 to capture the albuterol use frequency within a 24-hour period.[45] The authors also used hourly $PM_{2.5}$ concentration from the Colorado Department of Health Air Pollution Control Division's Tapered Element Oscillating Microbalance (TEOM) monitor as well as a Federal Reference Monitor (FRM) located next to the TEOM. The authors found that there was a consistent association between ambient $PM_{2.5}$ levels and increased albuterol use in asthmatic children. CARB will utilize the effect estimates from this study.

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[41] Gharibvand L, Shavlik D, Ghamsary M, Beeson WL, Soret S, Knutsen R, Knutsen SF. The Association between Ambient Fine Particulate Air Pollution and Lung Cancer Incidence: Results from the AHSMOG-2 Study. *Environ Health Perspect.* 2017 Mar;125(3):378-384. doi: 10.1289/EHP124.

[42] See U.S. EPA. (2019) *ISA for Particulate Matter.*

[43] Tétreault LF, Doucet M, Gamache P, Fournier M, Brand A, Kosatsky T, Smargiassi A. Childhood Exposure to Ambient Air Pollutants and the Onset of Asthma: An Administrative Cohort Study in Québec. *Environ Health Perspect.* 2016 Aug;124(8):1276-82. doi: 10.1289/ehp.1509838.

[44] See U.S. EPA. (2021) *TSD.*

[45] Rabinovitch N, Strand M, Gelfand EW. Particulate levels are associated with early asthma worsening in children with persistent disease. *Am J Respir Crit Care Med.* 2006 May 15;173(10):1098-105. doi: 10.1164/rccm.200509-1393OC.

3.8. Work loss days – New

Work loss days refers to the time unable to work due to health conditions. The U.S. EPA identified the Ostro 1987 study on work loss days as the most robust study for quantifying this endpoint because it was conducted at the nationwide level covering several thousand subjects; no other studies published since were identified for quantification.[46] The authors estimated the impacts of PM2.5 on the incidence of work loss days using a survey dataset of the working adult population (age range of 18-65, with 162 million survey results) living in U.S. metropolitan areas between 1976-1981.[47] CARB will be using this paper to quantify this endpoint. CARB also has an ongoing research contract evaluating the effects of air pollution on work loss days in California. The results of this study are expected next year, and CARB expects to workshop the results to inform any potential update this endpoint at that time.

3.9. Hospitalizations for Alzheimer's disease and hospitalizations for Parkinson's disease – Both New

Nervous system effects (Alzheimer's and Parkinson's) are new endpoints in CARB's methodology. The U.S. EPA determined there was a "likely to be causal" relationship between nervous system effects and long-term $PM_{2.5}$ exposure based on the increasing number of epidemiological as well as animal studies in the last decade.[48] These two health endpoints are neurodegenerative diseases, with Alzheimer's disease being a form of dementia and Parkinson's disease being a serious movement disorder. For the hospitalization endpoints for Alzheimer's disease and Parkinson's disease, U.S. EPA chose the paper by Kioumourtzoglou et al, published in 2016.[49] CARB will use this study for both endpoints. The authors investigated annual average $PM_{2.5}$ impacts on Alzheimer's and Parkinson's diseases among more than 9.8 million Medicare enrollees (65+ years old) in 50 northeastern U.S. cities during the 1999-2010 time period. The investigators analyzed annual follow up records and considered just the first case of hospital admission for Parkinson's disease (ICD-9, 332), and Alzheimer's disease (ICD-9, 331.0).

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[46] See U.S. EPA. (2021) *TSD*.

[47] Ostro, B. D. (1987). Air pollution and morbidity revisited: A specification test. *Journal of Environmental Economics and Management*, 14(1), 87-98. doi: https://doi.org/10.1016/0095-0696(87)90008-8

[48] See U.S. EPA. (2019) *ISA for Particulate Matter*.

[49] Kioumourtzoglou MA, Schwartz JD, Weisskopf MG, Melly SJ, Wang Y, Dominici F, Zanobetti A. Long-term PM2.5 Exposure and Neurological Hospital Admissions in the Northeastern United States. *Environ Health Perspect*. 2016 Jan;124(1):23-9. doi: 10.1289/ehp.1408973.

Table 6. Selected relevant codes from the International Classification of Diseases, Ninth Revision (ICD-9) (adapted from CDC[50])

ICD-9 Code	Disease
331.0	Alzheimer's disease
332	Parkinson's disease
390	Rhematic fever without mention of heart involvement
410	Acute myocardial infarction
411	Other acute and subacute forms of ischemic heart disease
412	Old myocardial infarction
413	Angina pectoris
414	Other forms of chronic ischemic heart disease
426	Conduction disorders
427	Cardiac dysrhythmias
428	Heart failure
429	Ill-defined descriptions and complications of heart disease
430-438	Cerebrovascular disease
440	Atherosclerosis
441	Aortic aneurysm and dissection
442	Other aneurysm
443	Other peripheral vascular disease
444	Arterial embolism and thrombosis
445	Atheroembolism
446	Polyarteritis nodosa and allied conditions

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Table 7 (continued).

ICD-9 Code	Disease
447	Other disorders of arteries and arterioles
448	Disease of capillaries
460-466	Acute respiratory infections
477	Allergic rhinitis
480	Viral pneumonia
481	Pneumococcal pneumonia
482	Other bacterial pneumonia
483	Pneumonia due to other specified organism
484	Pneumonia in infectious diseases classified elsewhere
485	Bronchopneumonia, organism, unspecified
486	Pneumonia, organism unspecified
487	Influenza
490	Bronchitis, not specified as acute or chronic
491	Chronic bronchitis
492	Emphysema
493	Asthma
496	Chronic airway obstruction, not elsewhere classified
786.07	Wheezing

[50] See CDC: National Center for Health Statistics. ICD-9-CM.

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4. Valuation

As part of updating the health endpoints, CARB will use new valuations for the health endpoints. Valuation refers to placing a monetary value on an estimated health incidence. Improvements in air quality will lower the risk of developing adverse health effects, resulting in fewer cases of the adverse health effects across society. Monetizing the benefits of reduced air pollution involves estimating society's willingness to pay (WTP) to avoid these adverse outcomes or estimating the observed Cost of Illness (COI) of the health endpoint.[51] CARB's process for valuing endpoints is largely based on U.S. EPA's methodology, but considers California demographic and economic data.

The statewide valuations of health benefits for specific endpoints associated with a proposed regulation or scenario are calculated by multiplying the value per incident by the statewide total number of incidents avoided. The value of the health benefits may be compared with other costs and benefits of a proposed regulation or scenario to better understand a regulation or plan's total impacts. **Table 6** provides the value per incident currently used in CARB analyses for categories of endpoints.

The savings for avoided hospitalizations and emergency room visits are based on a combination of typical costs associated with hospitalization and the willingness of surveyed individuals to pay to avoid adverse outcomes that occur when hospitalized. These include hospital charges, post-hospitalization medical care, out-of-pocket expenses, and lost earnings of both individuals and family members, lost recreation value, and lost household production (e.g., valuation of time-losses from inability to maintain the household or provide childcare).[52,53] Currently, valuation for hospitalizations draws on published estimates of California illness costs while the valuation for emergency department visits draws on national estimates.

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[51] COI includes the direct medical costs and lost earnings associated with illness. COI may understate the true economic value of reductions in risk of health effects, as it may not include other factors such as avoided pain and suffering. WTP estimates may include these other factors but may be less readily available.

[52] Chestnut, Lauraine G., et al. "The economic value of preventing respiratory and cardiovascular hospitalizations." Contemporary Economic Policy 24.1 (2006): 127-143. *https://onlinelibrary.wiley.com/doi/pdf/10.1093/cep/byj007?casa_token=HUk1nm6UtUgAAAAA:tDnCaydUWJFYfY1oWFn_D33oUcc6m4Haazv5c_wPNQGe9QP-f9Mw4EdBb3mUwoWXENC3qda1Xps4-w*

[53] Smith, David H., et al. "A national estimate of the economic costs of asthma." American journal of respiratory and critical care medicine 156.3 (1997): 787-793. https://www.atsjournals.org/doi/full/10.1164/ajrccm.156.3.9611072

Table 6. Valuation per Incident for Avoided Health Outcomes Currently Used in CARB Analyses

Outcome	Value per incident (2020$)
Avoided Cardiovascular Hospitalizations	$59,247
Avoided Acute Respiratory Hospitalizations	$51,678
Avoided Emergency Room Visits	$848

CARB will update and transparently document the valuations that are currently used and use new valuations for the newly added health endpoints. CARB's methodology will use the same valuation studies that are included in U.S. EPA's BenMAP.[54,55]

More information on the valuation of health endpoints and specific studies relied upon is provided in a recent U.S. EPA's analysis as part of the Cross-State Air Pollution Rule Update.[56] Using BenMAP, the estimates from these valuation studies will be used as inputs into CARB staff's analysis. This analysis will rely on the IPT estimation (see "Health Endpoints, Use of Endpoints and Supporting Studies" section) and incorporate California specific data on inflation, wages, income, and demographics, where applicable. This will provide a total valuation by endpoint for the specific scenario, which can then be normalized by the number of incidents to derive a value per incident for each endpoint.

5. At-Risk Populations

There is a growing body of literature showing some populations are more susceptible to air pollutants and are at higher risk of air pollution-related illnesses. Understanding health and exposure disparities is critical to reducing air pollution exposure and health risks among low income and communities of color. These communities are often heavily burdened by higher levels of pollution from traffic and other industrial sources.[57,58] They also often simultaneously

[54] U.S. EPA. (2019) BenMAP-CE.
[55] See U.S. EPA. (2021) *TSD.*
[56] Ibid.
[57] Apte, Joshua. "A Method to Prioritize Sources for Reducing High PM2.5 Exposures in Environmental Justice Communities in California." (CARB Contract Number 17RD006). Retrieved March 15, 2022 from: *https://ww3.arb.ca.gov/research/single-project.php?row_id=67021*
[58] Tessum CW, Paolella DA, Chambliss SE, Apte JS, Hill JD, Marshall JD. PM2.5 polluters disproportionately and systemically affect people of color in the United States. *Sci Adv.* 2021 Apr 28;7(18):eabf4491. doi: 10.1126/sciadv.abf4491

face other stressors such as poor nutrition, economic insecurity, and sub-optimal living conditions that adds to vulnerability to air pollution impacts.[59,60]

The U.S. EPA's ISA and ISA supplement documents discuss factors contributing to an increased risk of $PM_{2.5}$ related health effects including: life stage, race/ethnicity, and socioeconomic status.[61,62] For example, the U.S. EPA concludes that the evidence is adequate to show that nonwhite groups, in particular the black population, are at higher risk for air pollution-related health impacts based on exposure and health studies analyzing different race/ethnic groups. Based on this evidence, CARB may implement additional quantitative methods for evaluating health impacts by race or ethnicity. There is also adequate evidence showing that children are at increased risk.

In addition, the aforementioned U.S. EPA documents report a suggestive relationship between low socioeconomic status (SES) populations and increased risk for adverse health effects from $PM_{2.5}$ exposures in comparison with higher SES populations. All of the above factors as well as others are important in considering the health impacts from air pollution exposure. The research into the relationship between $PM_{2.5}$ health impacts and specific subpopulations continues to grow as well as the analytical tools to quantify these relationships. Moving forward, CARB may use epidemiological studies demonstrating health outcomes in specific sub-populations together with data on race and ethnicity to provide disaggregated health outcome information that better reflects vulnerabilities in sub-populations. While CARB does not currently have a method to incorporate localized data on at-risk populations, staff are also considering how to incorporate population vulnerability information from existing scientific evidence and tools that demonstrate health and exposure disparities at smaller spatial scales into our health analysis approach.

6. Summary of Submitted Public Comments to December 2021 Public Workshop and Responses

CARB held a public workshop titled "Evaluating New Health Endpoints for Use in CARB's Health Analyses" in December 2021, and written comments from the public were received post-workshop. Public commenters asked about the literature and data sources used for the health analysis methodology, including study selection for the updated/new health endpoints as well as the health, air quality, and emissions data. There were also questions about the agency's approval process for the updated/new endpoints. Also, CARB received suggestions for future directions of expanding the health analysis methodology, including adding other pollutants and additional economic analyses, as the commenter stated that economic impacts also affect health.

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[59] OEHHA. CalEnviroScreen. California Office of Environmental Health Hazard Assessment. Retrieved March 15, 2022 from: *https://oehha.ca.gov/calenviroscreen/about-calenviroscreen*

[60] Braveman P, Gottlieb L. The Social Determinants of Health: It's Time to Consider the Causes of the Causes. Public Health Reports. 2014;129(1_suppl2):19-31. doi:10.1177/00333549141291S206

[61] See U.S. EPA. (2019) *ISA for Particulate Matter.*

[62] See U.S. EPA. (2021) *Supplement to the 2019 ISA for Particulate Matter (External Review Draft).*

In the current identification of new and updated endpoints described in this memo, CARB is relying on research reviewed as part of U.S. EPA's recent update of health endpoints , which included a set of criteria (summarized in **Table 4**) to select studies for quantification of $PM_{2.5}$ health impacts, as reported in their 2021 TSD.[63] CARB is using available information and data (both quantitative and qualitative) from state agencies and U.S. EPA whenever possible. CARB is also undertaking research contracts to provide updated California-specific data and effect estimates that may be used going forward. This update of the health endpoints used in CARB's analysis methodology is part of a process that was initiated in line with Board direction in an April 2020 Board hearing and resolution. Since then, CARB has provided an opportunity for public comment on the proposed endpoints through a public workshop and comment period, and the methodology updates will be posted online on CARB's health analysis methodology website as well as referenced in the health assessment sections of future regulatory documents. Lastly, CARB appreciates the public input on additional directions to expand our methodology. CARB is actively working internally and through research contracts to evaluate additional pollutants, health outcomes, and causation categories.

7. Ongoing/Next Steps

The new and updated endpoints provided in this document are a first step in expanding the agency's health analysis. The endpoints will provide a more comprehensive analysis for CARB's plans and regulations. CARB will be pursuing additional updates and improvements in future bulletins, including consideration of additional causation categories for the endpoints and endpoints for additional pollutants. CARB will also continue to evaluate approaches to provide both quantitative and qualitative information on health outcomes in low-income communities and communities of color. As part of that process, CARB has contracted with several science advisors from public and private universities, who have backgrounds in epidemiology, environmental health, environmental justice, and exposure assessment. They are individually providing CARB staff with input on approaches to expand the agency's health analysis. CARB plans to hold a public meeting, where the advisors will discuss and provide recommendations on our health analysis work.

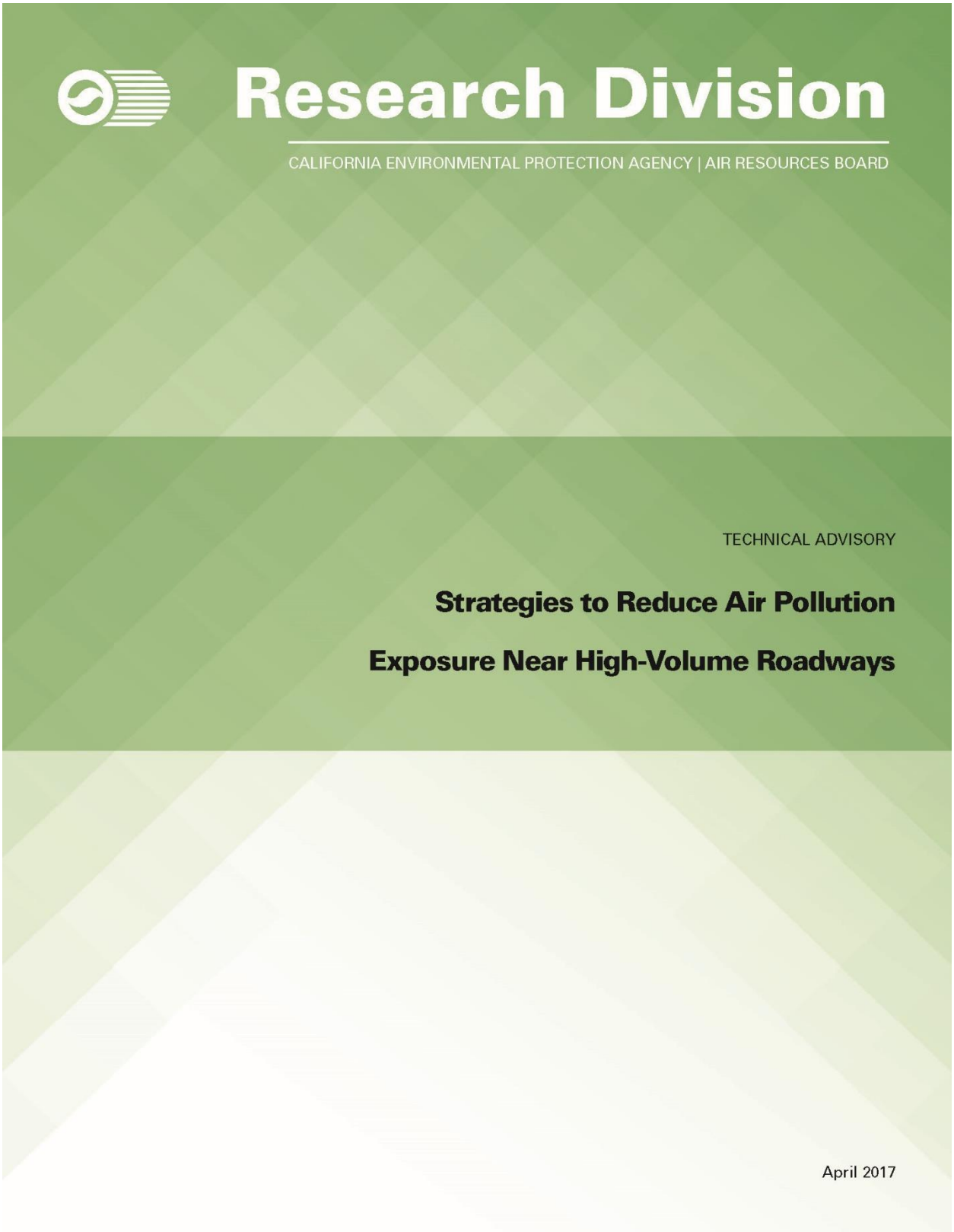
Additionally, for longer-term work, CARB is continuing to develop California-specific health endpoint data for use in our health analysis. For example, CARB has current and upcoming contracts and research for neurological and birth outcomes, asthma, and work loss days. Some of these contracts are investigating outcomes by race and ethnicity as feasible and depending on data availability. Staff are also evaluating possible methods for more local-scale analysis, and incorporating qualitative methods to discuss community factors affecting health, especially where CARB does not have quantitative methods. Further information on the ongoing contracts can be found on CARB's online research page (*https://ww2.arb.ca.gov/our-work/programs/research-planning/research-division-contracts*).

[63] See U.S. EPA. (2021) *TSD.*

All CARB's efforts to expand the health analysis endpoints and methodology, including the underlying research, will continue to rely on the best available science.

Please see the CARB health analysis webpage for further background on our health analysis work and future updates (*https://ww2.arb.ca.gov/resources/documents/carbs-methodology-estimating-health-effects-air-pollution*).

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Research Division
CALIFORNIA ENVIRONMENTAL PROTECTION AGENCY | AIR RESOURCES BOARD
TECHNICAL ADVISORY
Strategies to Reduce Air Pollution
Exposure Near High-Volume Roadways
April 2017



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California Strategic Growth Council (SGC)
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Executive Summary

This advisory is a technical supplement to ARB's *Air Quality and Land Use Handbook: A Community Health Perspective* (hereafter referred to as the Land Use Handbook).[1] Published in 2005 under the auspices of ARB's Environmental Justice Stakeholders Group, the Land Use Handbook provides information for local elected officials and land use agencies to consider regarding the siting of new sensitive uses near pollution sources, including (but not limited to) freeways and high-volume roadways, when site-specific air quality information is not available. Since its publication, research has demonstrated the public health, climate, financial, and other benefits of compact, infill development along transportation corridors. Moreover, new research has demonstrated promising strategies to help decrease pollution exposure near their sources. These strategies are the focus of this Technical Advisory.

ARB intends for this Technical Advisory to provide planners and other stakeholders involved in land use planning and decision-making with information on scientifically based strategies to reduce exposure to traffic emissions near high-volume roadways in order to protect public health and promote equity and environmental justice. Many communities in California exist near high-volume roadways. This is both because freeways and other busy traffic corridors have been built adjacent to and through existing neighborhoods in California, and because new developments have been built near existing roadways. Near-roadway development is a result of a variety of factors, including economic growth, demand for built environment uses, and the scarcity of developable land in some areas.

This Technical Advisory demonstrates that planners, developers, and local governments can pursue infill development while simultaneously reducing exposure to traffic-related pollution by implementing the strategies identified here and in other statewide guidance and policies that promote sustainable communities. The State Planning Priorities[2] emphasize infill development, since this pattern of development can help attain goals to promote equity, strengthen the economy, protect the environment, and promote public health and safety. ARB acknowledges that there are many existing developments near high-volume roadways and other sources of air pollution throughout the state, and many of these strategies apply in those situations, as well.

Strategies to reduce exposure include practices and technologies that reduce traffic emissions, increase dispersion of traffic pollution, or remove pollution from the air. Recent research documents the effectiveness of a variety of strategies. Based on a review of this body of research, ARB staff compiled a list of recommended strategies, which this document describes in detail.

This document does not include all potential pollution reduction measures, but rather the options that are well supported by scientific findings and which meet all of the following criteria:

1. Consistent findings from multiple studies support the strategy as a means for reducing pollution concentrations, or emissions rates, or improving air flow to disperse pollutants.
2. The scientific literature documents evidence of significantly effective exposure reduction.
3. Diversity in the study methods supports consistent findings (such that strategy efficacy does not exclusively rely on one method of investigation).

1 *http://www.arb.ca.gov/ch/handbook.pdf*
2 California Government Code Section 65041.1.

Appendix A outlines strategies that did not meet the ARB's three criteria, but were nonetheless identified in ARB's literature review. In some cases, these strategies represent nascent technologies or designs that require more study before ARB can recommend them for general application. In other cases, studies do not present consistent results or strategies have only been studied via modeling or simulation, and it is uncertain if these strategies will perform similarly in real world settings.

Benefits of compact, infill development

Infill and compact development characterizes many communities located near freeways and other busy traffic corridors. This development pattern has many benefits. It promotes physical activity by facilitating active transportation (biking and walking) and by shortening the distances that people must travel for their daily activities [1]. It also provides density of development that helps support transit operations [2]. The car trips that are shortened or replaced by these other modes result in greenhouse gas (GHG) emissions reductions, and GHGs are further reduced in these communities because they are also associated with reduced energy and water use [3]. Importantly, compact and infill development can also improve people's quality of life by facilitating community connectivity. For these reasons, planners often favor infill and compact development and other stakeholders involved in land use planning and real estate development. Additionally, these types of developments are encouraged by regions striving to achieve greenhouse gas emissions reductions from land use and transportation planning in accordance with Senate Bill (SB) 375.

The foremost strategy for reducing pollution exposure near high-volume roadways is to minimize traffic pollution in the first place. A key mechanism for this is the reduction of vehicle miles traveled (VMT). State legislation including Senate Bills 375 and 743, are specifically designed to facilitate VMT reductions from passenger cars by encouraging and facilitating the replacement of vehicle trips with walk, bike, and transit trips. There is evidence from research and real-world measurement that,

KEY TERMS

traffic emissions

Primary emissions/pollution from motor vehicles, including carbon monoxide, hydrocarbons, nitrogen oxides, particulate matter, toxic air contaminants, brake dust, and tire wear.

high-volume roadways

Roadways that, on an average day, have traffic in excess of 50,000 vehicles in a rural area and 100,000 vehicles in an urban area (Source: California Public Resources Code Section 21151.8).

at-risk populations/communities

Children, pregnant women, the elderly, and those with serious health problems affected by air pollution.

sensitive uses

Land uses where sensitive individuals are most likely to spend time include schools and schoolyards, parks and playgrounds, daycare centers, nursing homes, hospitals, and residential communities.

sustainable communities

Communities that foster conditions under which humans and nature can exist in productive harmony, that permit fulfilling the social, economic, and other requirements of present and future generations.

disadvantaged communities

Communities that score at or above the 75th percentile in the CalEnviroScreen Tool. The tool scores tracts according to their proximity to multiple sources and their vulnerability to the effects of pollution and also account for socioeconomic characteristics and underlying health status.

dispersion (of air pollution)

Distribution of air pollution into the atmosphere.

when vehicle miles and trips are greatly reduced—for example, when streets are temporarily closed to motorized vehicles for car-free open-streets or "ciclovia" events—air quality is significantly improved [4, 5].[3]

Coordinated land use and transportation planning that results in more compact neighborhoods can help reduce VMT by making transit and active transportation viable and reducing the need for personal cars. Travel demand management strategies that improve the efficient use of transportation resources (e.g., teleworking, car-sharing, and carpooling) also reduce vehicle trips. ARB's partners also promote other innovative ideas for increasing the availability and appeal of alternative modes of transportation. At Caltrans, for example, the newly created Active Transportation Program focuses on making California a national leader in active transportation[4] and one Caltrans district is studying freeway capping as an innovative way to better connect people to destinations via parks, paths, and transit constructed atop existing freeways.[5]

In addition to reducing VMT, there are many efforts underway to reduce emissions via other mechanisms. These include more stringent emissions and fuel standards for cars, trucks, and buses; state regulations for zero emission vehicle (ZEV) adoption; and California's Sustainable Freight Transport Initiative. Other state efforts that will reduce emissions, and therefore complement this document, include the AB 32 Scoping Plan and the State Implementation Plan, and the Mobile Source Strategy.

More and more, planners are designing land use developments to make alternatives to automobile travel more attractive. These changes are important because of their long-term significance, as changes in the built environment mean changes in land use patterns that will last for decades. Land use development patterns in some California jurisdictions already contribute to reductions in the use and ownership of cars because of land use planning strategies and active transportation investments. However, change is slow, and many existing and planned developments—including important infill and compact development projects—place sensitive individuals in close proximity to high-volume roadways. In these instances, there is a need for developers, local governments, and other entities to consider pollution reduction strategies to ensure that residents of both new and existing developments breathe air that is as clean as possible.

Need for this Technical Advisory

The primary public health concern regarding roadways near existing and future developments is the possibility that at-risk populations/communities—like children, pregnant women, the elderly, and those with serious health problems affected by air pollution—will be exposed to traffic emissions. In California, there are several instances of schools and other sensitive locations such as daycare facilities located near major roadways, particularly in non-white and economically disadvantaged neighborhoods [6, 7]. Studies show that these populations can experience serious health impacts, including worsening of asthma and cardiovascular disease and adverse birth outcomes because of exposure to traffic-related air pollution. Additionally, studies show that poor and minority communities are more likely to live near busy roadways, and therefore may be more at-risk for the health effects related to exposure to traffic emissions [8, 9].

Scientific evidence indicates that implementing the strategies contained in this document would decrease exposure to air pollution in a variety of locations and contexts, so these strategies are applicable in a broad range of developments, not just those located near high-volume roadways. ARB's motivation for emphasizing these strategies in near-roadway environments is a reflection of the potentially serious health impacts that at-risk populations/communities may experience when they spend significant time in such environments, absent appropriate design measures.

3 "Ciclovias," Open Streets, and Sunday Streets are events whereby roadways are closed to automobiles but open to cyclists and pedestrians. Many cities around the world have implemented these events, including several cities in California: Los Angeles (*http://www.ciclavia.org/*), San Francisco (*http://sundaystreetssf.com/*), San Jose (http://*www.vivacallesj.org/*). Albany, Long Beach, Oakland, Redding, and San Mateo. Visit the California Bicycle Coalition's Web site for more information: *http://www.calbike.org/open_streets*.

4 *http://www.dot.ca.gov/hq/LocalPrograms/atp/index.html*

5 *http://www.dot.ca.gov/dist11/departments/planning/planningpages/capstudy.htm*

In addition, these strategies are likely to yield the greatest public health benefit when applied in near high-volume roadway contexts.

Planners, developers, and others can implement these strategies where existing sensitive uses are already located near high-volume roadways. The strategies are also relevant for new developments. When planners and other decision makers consider these strategies during the planning phase, they may be less expensive to implement than if they are added via retrofits after construction.

How to use this Technical Advisory

ARB envisions that this document will be used by planners and other stakeholders to identify combinations of strategies that can be implemented to reduce exposure at specific developments or to recommend the consideration of these strategies in policy or planning documents. For example, local governments may refer to it or use portions of it in their general plans. The contents may also be helpful in the development or updating of environmental justice policies in general plans, as required by Senate Bill (SB) 1000. Readers interested in learning more about the requirements of SB 1000 should consult OPR's General Plan Guidelines.

It is important to note that this Technical Advisory is not intended as guidance for any specific project, nor does it create any presumption regarding the feasibility of mitigation measures for purposes of compliance with the California Environmental Quality Act (CEQA). Instead, it is meant as guidance for planners weighing options for reducing exposure to traffic emissions.

Strategies to reduce exposure, weighed alongside overarching considerations

The table that follows this executive summary describes the research findings supporting each recommended strategy, the appropriate land use context, and other considerations. These additional items were revealed either through the research or through consultation with experts and stakeholders. This table can be used for quick reference, but readers should also refer to *Section II* for an expanded discussion of these strategies, including details about co-benefits and potential drawbacks.

In addition to the considerations outlined in Section II, readers should be mindful of the following important overarching considerations that were identified by ARB staff and other experts who were consulted during the development of this document:

Changes in land use patterns and the built environment persist for decades

Land use patterns, once established, remain fixed for decades. Increasing density through infill development helps to transform low-density neighborhoods to ones that can support alternative modes. When developing new plans and projects, planners should carefully consider the ongoing influence of those plans and projects on the creation of accessible and livable neighborhoods.

Holistic and comprehensive planning practices

Stakeholders involved in public health, air quality, and community planning efforts must weigh a variety of factors and issues when making policy decisions. At-risk populations/communities' exposure to traffic is just one of many considerations, but it is an important piece that planners and others should weigh alongside other local goals and priorities. Thus, ARB recommends that exposure to traffic emissions and strategies to reduce exposure be considered holistically, within planning processes at the scale of a neighborhood or community plan or ordinance, general plan, sub-regional or regional plan, depending on the geographic impact and regulatory context of the issue. Additionally, ARB recommends that planners consider leveraging holistic and combined practices, policies, and strategies to achieve local goals. Real-world evidence from the Atlanta 1996 Summer Olympic Games showed that a suite of coordinated strategies reduced ozone pollution and childhood asthma events significantly (*see textbox on page 16 for details*).

Site-specific considerations

Site-specific factors may play a significant role in whether or not an exposure reduction strategy will be effective without resulting in negative, unintended consequences. In some cases, it may be possible for planners and other stakeholders to use site-specific information to estimate the reduction in pollution concentration associated with a specific strategy or combination of strategies. When exposure reduction strategies—such as those presented in this document—are incorporated into large-scale policy documents like jurisdiction-wide general plans, a menu of strategies and language about the usefulness of site-specific analysis to assist in choosing the right strategies for specific projects may be appropriate, since not all strategies are necessary or appropriate in all cases.

Changing vehicle fleets and impacts on air quality

California's vehicle fleets and freight system are becoming cleaner and this trend will continue into the future, given existing and forthcoming policies and transformations underway in the automobile market (see more information in *Section I. Introduction*). This fact should be carefully considered in local decision-making, particularly when long-term, durable strategies are being considered, such as urban design changes or standards. It is worth noting, however, that while transitioning to ZEVs eliminates tailpipe emissions, it does not eliminate all traffic emissions. Non-tailpipe particulate matter emissions from road dust, brake dust, and tire wear are likely to continue to impact public health, particularly for sensitive individuals. Furthermore, ZEVs do not eliminate upstream emissions from non-renewable energy sources or sources linked to their manufacture and production [10].

On-roadway exposure to traffic emissions

The more time people spend on roadways, the greater their exposure to emissions that are harmful to their health [11]. This fact should also be considered as planners weigh strategies for reducing near-roadway pollution exposure, since it is crucial that they avoid making land use decisions that would result in longer commutes. In other words, planners should not push new development farther from urban centers because this could induce longer vehicle trips and thus increased on-roadway exposure. Additionally, it should be noted that, in some cases, exposure reduction strategies may increase on-road pollution concentrations. If in-vehicle filtration is inadequate or if drivers travel with the windows down, this could translate into increased exposure for people driving in cars.

Translating research into practice

Putting research into practice can be challenging since research studies often seek to address a narrowly defined question and control for factors that are commonly observed in the real world. The way that research is conducted may not be reflective of real world conditions, so users of this Technical Advisory should consider how the research applies to the specific context being considered. Also, even when data is collected in the real world, the data may be several years old by the time that researchers are able to digest, analyze, and summarize findings and conclusions. Thus, users of this document may need to consider how changes in the local context may have affected the variables that researchers considered in their analyses.

Executive Summary conclusion

The identification of strategies described herein is intended to provide stakeholders involved in public health, air quality, and land use planning efforts (including city and county planners, planning commissioners, developers, planning consultants, and other local government staff and decision makers) with options for reducing exposure to traffic pollution in near-roadway environments, both for existing and new developments. We envision that this document will be used as a resource to:

1. Identify strategies that can be employed on a site-specific basis to reduce exposure to traffic emissions at existing and future developments and;
2. Help shape local policies aimed at reducing exposure to traffic emissions and therefore associated public health impacts.

As California grows, we have the collective opportunity to shape the future of the built environment to be both protective of public health and supportive of environmental goals. ARB hopes that the content of this Technical Advisory will assist the efforts of planners and other practitioners and decision makers to promote healthy, safe, equitable, and sustainable communities. Furthermore, ARB will continue to investigate options to mitigate air pollution exposure in many contexts and related to different sources of air pollution in addition to high-volume roadways.

Table 1: Summary of strategies to reduce air pollution exposure near high-volume roadways

Strategy	Description of research findings	Appropriate context and other considerations
Strategies that reduce traffic emissions		See *Section II*, page 20.
Speed reduction mechanisms, including roundabouts	Vehicle speed reduction mechanisms change the design and operating speed of the road by altering the physical characteristics of the road. These features can reduce stop-and-go driving and hard accelerations and thereby reduce emissions rates. Some of these features, like the roundabout intersection, can be used as an alternative to stop-controlled and signalized intersections. Studies show that roundabouts can reduce localized pollutant concentrations compared to intersections with stop and signal control by 20 percent or more (depending on context and site-specific conditions).	Transportation planners and engineers should carefully consider the potential direct and indirect effects of implementing speed reduction mechanisms to determine if they will reduce vehicle emissions and other impacts to the environment as well as to traveler safety and delay. When guidance is needed to estimate emissions and air quality-related effects, planners and engineers may consult with MPOs or traffic modeling experts.

Strategy	Description of research findings	Appropriate context and other considerations
Traffic signal management	Traffic signal management systems can reduce stop-and-go driving and vehicle idling, resulting in reduced localized pollutant concentrations of up to 50 percent compared to corridors that do not implement these systems. Studies show that site-specific conditions dictate the magnitude of reductions.	Many different types of signal management are available, and planners should identify what is best for air quality, vulnerable road user safety, and transit and active mode throughput and comfort.
Speed limit reductions on high-speed roadways (>55 mph)	Research studies have identified an optimal average speed range of ~35-55 mph within which per-mile traffic emissions and fuel consumption are minimized. Generally, speed limit reductions on high-speed roadways can reduce tailpipe emission rates up to 30 percent, depending on the change in speed, the pollutant measured or modeled, and the roadway characteristics.	Speed limit reductions are appropriate on roadways where speed limit and design speeds exceed 55 mph.
Strategies that increase dispersion of traffic emissions		See *Section II*, page 26.
Design that promotes air flow and pollutant dispersion along street corridors	The physical layout of urban streetscapes influences air flow and pollution movement. Research studies show that street corridors characterized by buildings with varying shapes and heights, building articulations (street frontage design elements like edges and corners that help break up building mass), and spaces that encourage air flow (e.g., parks) benefit from better pollutant dispersion and air quality. For example, buildings of varying heights can result in significant increases in turbulence (e.g., up to doubling), and adding bike lanes and sidewalks not only reduces car traffic, but also creates space for more dispersion (up to a 45 percent reduction in particulate concentrations).	Wider sidewalks, bicycle lanes, dedicated transit lanes, and other features that benefit alternative modes of transportation can also create space for better air flow and pollutant dispersion along with increasing active transportation and mode shift. This strategy should be considered in the context of the overall need to increase development density.

Strategy	Description of research findings	Appropriate context and other considerations
Solid barriers, such as sound walls	Measurement and modeling studies consistently find that solid barriers reduce near-road downwind concentrations by increasing vertical **dispersion** of pollutants emitted by vehicles. The magnitude of the reduction and its spatial extent depend on the height of the barrier, the width of the road, and micrometeorology. Studies have consistently found that pollution concentrations downwind of the barrier range from a 10 percent to 50 percent reduction compared to concentrations measured on or directly adjacent to high-volume roadways.	Solid barriers should only be considered for installation along freeways, because they have the negative effect of dividing neighborhoods and obscuring sightlines.
Vegetation for pollutant dispersion	Studies indicate that vegetation has the potential to alter pollutant transport and **dispersion**. In some studies, specific locations and conditions translated to air quality benefits (e.g., pollution concentration reductions of up to 20 percent on the leeward side of the tree line). It should be noted that most studies were conducted on the East Coast and in Europe where vegetation types and densities differ from what is found in California.	Online tools are available to assist with the selection of appropriate vegetation considering allergen impacts, watering needs, and other factors. Maximum benefits have been shown to occur when vegetation is combined with solid barriers.
Strategies that remove pollution from the air		See Section II, page 36.
Indoor high efficiency filtration	Studies show that particle filtration systems and devices, specifically high-efficiency filtration with mechanical ventilation or portable high efficiency air cleaners, can be highly effective for reducing indoor pollution concentrations. High efficiency filters in ventilation systems can remove from 50-99 percent of particles in the air. However, research shows that filtration technologies for gaseous pollutants (VOCs) are variable in their effectiveness; some remove certain VOCs well, but not others.	Planners should be aware of current state and local building codes and their respective air filtration requirements, including requirements for amending code standards. Regular operation and maintenance is necessary for highest filter and ventilation efficiency, and is required by regulation in commercial buildings.

Introduction

State programs to improve air quality and reduce exposure to traffic emissions

California has a long and successful history of reducing air pollution to protect public health. Gasoline sold in California contains less pollution-forming compounds than most gasoline sold elsewhere in the nation[6], and the low carbon fuel standard is continuing to reduce the carbon content of fuels[7]. California now has more than 100,000 plug-in electric vehicles on its roads, and today's new cars pollute 99 percent less than their predecessors did thirty years ago. ARB's Advanced Clean Cars program will continue to drive reductions in emissions from light-duty vehicles[8]. Emissions from trucks and buses are declining[9], and ambient diesel particulate matter (PM) concentrations in California dropped 68 percent between 1990 and 2012 [12]. These emissions reductions have resulted in significant public health benefits, including the reduction of cancer risk associated with diesel PM.

Reducing traffic emissions

The primary mission of ARB is to protect public health through the improvement of air quality. ARB has many policies and programs to improve near-roadway air quality and to protect public health. These policies and programs primarily rely on technologies or strategies that reduce traffic emissions at the source, which is more effective than attempting to clean up the air after emissions have already been released into the environment. ARB policies and programs focus on traffic emissions because regulation of emissions from stationary sources occurs at local and regional air pollution control authorities known as Air Pollution Control Districts (APCD) or Air Quality Management Districts (AQMD). The following describes State programs that are important for reducing traffic emissions.

The sustainable communities program at ARB focuses on ways to reduce traffic emissions by reducing vehicle miles traveled (VMT). VMT can be reduced through a variety of strategies. Research shows that people tend to drive less when trip origins and destinations can be easily accessed via walking, biking, and transit. Dense, mixed use development is a common way that communities can achieve improved accessibility and mobility without relying on cars.

ARB is responsible for the implementation of the Sustainable Communities and Climate Protection Act of 2008, or SB 375[10]. In accordance with the law, ARB sets regional targets for GHG emissions reductions from passenger vehicle use. In 2010, ARB established targets for 2020 and 2035 for each of the state's metropolitan planning organizations (MPO). To comply with the law, MPOs prepare a "sustainable communities strategy" (SCS) to be included in their regional transportation plans (RTP). The SCS contains land use, housing, and transportation strategies that, if implemented, would allow the region to meet its GHG emission reduction targets. Once adopted by the MPO, the RTP/SCS guides the transportation policies and investments for the region. ARB must review the adopted SCS to confirm and accept the MPO's determination that the SCS, if implemented, would meet the regional GHG targets. As of the writing of this Technical

6 http://www.arb.ca.gov/fuels/gasoline/gasoline.htm
7 http://www.arb.ca.gov/fuels/lcfs/lcfs.htm
8 http://www.arb.ca.gov/msprog/consumer_info/advanced_clean_cars/consumer_acc.ht
9 http://www.arb.ca.gov/msprog/onrdiesel/onrdiesel.htm
10 http://www.leginfo.ca.gov/pub/07-08/bill/sen/sb_0351-0400/sb_375_bill_20080930_chaptered.pdf

Advisory, all MPOs in California have completed their first SCS/RTP, and most have at least begun the process of completing their second. ARB's Sustainable Communities Web page provides links to SCSs along with ARB staff's technical evaluation. These documents are a useful place for planners to gather information about what is happening at a regional level to reduce VMT and thus air pollution from cars generally.[11]

ARB partners closely with many other state agencies to promote sustainable communities and reductions in VMT and to provide MPOs and local governments with resources that can be used in the development of SCSs and in the implementation of land use and transportation policies at the local level. Partners include Caltrans, the California State Transportation Agency (CalSTA), the Governor's Office of Planning and Research (OPR), the California Department of Housing and Community Development (HCD), and the Strategic Growth Council (SGC). These partners are actively engaged in various programs to reduce VMT. OPR is actively working on promoting VMT reduction by changing the metric used to assess transportation impacts under CEQA, per SB 743[12]. Caltrans is also encouraging shifts from passenger car use toward alternative modes of transportation. The Strategic Management Plan: 2015-2020 contains a statewide VMT reduction target of 15 percent by 2020 relative to 2010 levels and targets to triple biking and double walking and transit by 2020, compared to the 2010-2012 California Household Travel Survey Baseline.[13] Additionally, Caltrans's Active Transportation Program facilitates active transportation programs and infrastructure throughout the state. Caltrans's District 11 (San Diego and Imperial Counties) is also studying freeway capping as a way to use land atop freeways to better connect communities and make walking and biking viable and attractive, and has engaged the local community to consider a future cap over State Route 94.[14]

ARB is responsible for developing statewide programs and strategies to reduce the emission of smog-forming pollutants and toxics by mobile sources. These include both on- and off-road sources such as passenger cars, motorcycles, trucks, buses, heavy-duty construction equipment, recreational vehicles, marine vessels, lawn and garden equipment, and small utility engines.

Looking to the future, ARB's Mobile Source Strategy[15] contains a suite of measures that are being considered to simultaneously meet air quality standards, achieve GHG emission reduction targets, reduce petroleum consumption, and decrease health risk from transportation emissions over the next 15 years. California's Sustainable Freight Action Plan[16] is part of the broader mobile source strategy for on-road heavy-duty vehicles, and includes efforts to reduce nitrogen oxide (NO_x) emissions at the state and federal levels and to encourage freight electrification. Figures 1 and 2 below illustrate both past emission reduction trends and projected future reductions as a result of elements of the Mobile Source Strategy (and based on EMFAC2014[17]).

11 *https://www.arb.ca.gov/cc/sb375/sb375.htm*
12 *https://www.opr.ca.gov/s_sb743.php*
13 *http://www.dot.ca.gov/perf/library/pdf/Caltrans_Strategic_Mgmt_Plan_033015.pdf*
14 *http://www.dot.ca.gov/dist11/departments/planning/planningpages/capstudy.htm*
15 *http://www.arb.ca.gov/planning/sip/2016sip/2016mobsrc_dd.pdf*
16 *http://www.arb.ca.gov/gmp/sfti/sfti.htm*
17 ARB's EMFAC2014 model assesses emissions from on-road vehicles including cars, trucks, and buses in California, and represents ARB's current understanding of motor vehicle travel activities and their associated emission levels.

Figure 1: Statewide annual NO_x emissions (tons/day) between 2000 and 2030 based on EMFAC2014.

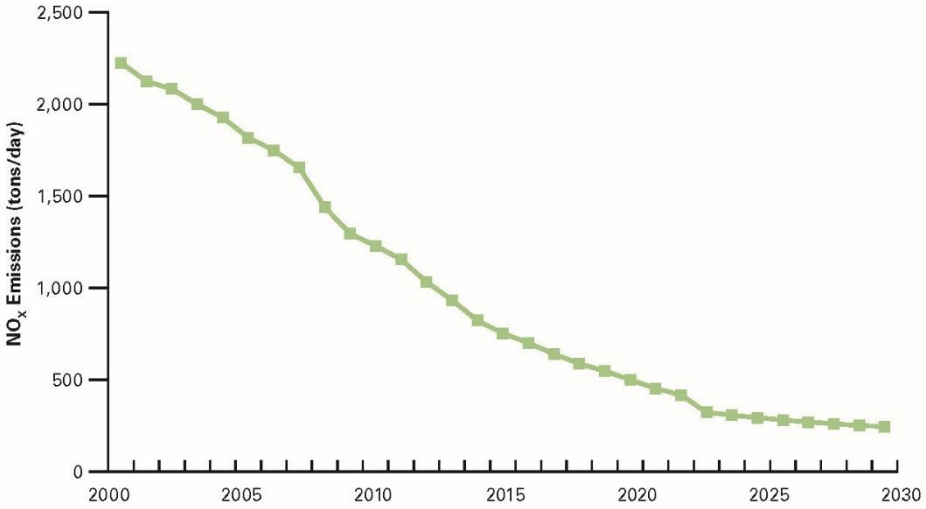
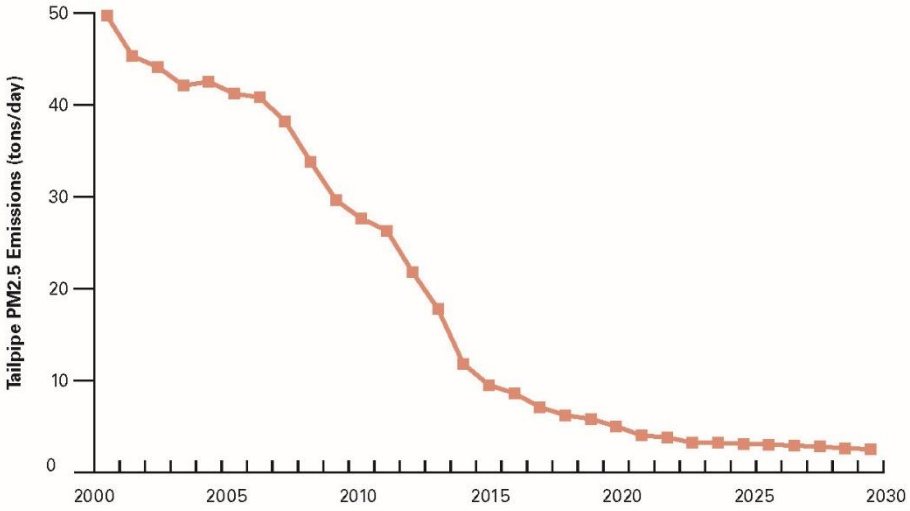


Figure 2: Statewide annual PM2.5[18] tailpipe emissions (tons/day) between 2000 and 2030 based on EMFAC2014.



18 PM2.5 is particulate matter with a diameter of 2.5 micrometers or less.

Reducing exposure to traffic emissions

ARB sponsors research and develops programs and regulations to improve Californians' health by identifying and reducing exposure to air pollutants in both indoor and outdoor environments. Research, sponsored by ARB and others, has revealed a variety of strategies that can be used to reduce exposure when traffic emissions cannot be avoided. These strategies are of great interest to ARB, but it is beyond the authority of ARB to regulate or require that they be implemented. Instead, ARB has historically provided guidance—based on scientific studies and peer-reviewed literature—to agencies with land use authority. In this capacity, ARB has provided guidance on the following, related to reducing the exposure of at-risk populations/communities to traffic emissions.

The 2005 Land Use Handbook recommends that health protective distances (500 feet at minimum, if there is no site-specific information available) be implemented to separate sensitive uses from freeways, urban roads with 100,000 vehicles/day, or rural roads with 50,000 vehicles/day.[19] This recommendation is based on research showing that pollutant concentrations decline significantly as you move farther away from pollution sources, including freeways and other busy traffic corridors [13-15] and epidemiological studies that indicate that spending time in proximity to traffic emissions sources may lead to adverse health effects beyond those associated with regional air pollution in urban areas [16-21].

Much research has taken place since the publication of the Land Use Handbook, and while vehicle emissions rates have declined because of increasingly stringent emissions standards for cars and trucks, recent studies continue to show high near-roadway concentrations and serious health impacts linked to traffic emissions [22-24]. Studies also show that these pollutant concentration gradients can change with traffic patterns, meteorology, and time of day [25, 26, 27-30]. Pollution concentrations near high-volume roadways decline with distance more sharply during the daytime than during the night and the very early morning (i.e., 1-2 hours before sunrise), largely as a result of diurnal meteorological patterns [25, 26, 27, 31]. These research findings—explained in more detail in the text box "*Time-of-day and air pollution concentrations*" (page 20)—highlight the possibility that near-roadway pollution exposure had been previously underestimated and that people living as much as 1,000 feet from freeways were being adversely impacted by poor air quality at night and in the early morning. However, additional research demonstrates that there are alternative strategies that can protect public health while not dictating development patterns.

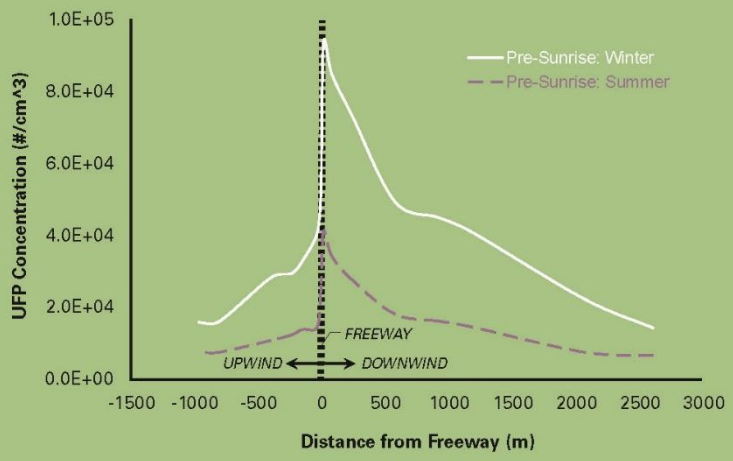
19 *http://www.arb.ca.gov/ch/landuse.htm*

Time-of-day and air pollution concentrations

In a study measuring near-roadway ultrafine particulate matter (UFP) size distributions and concentrations along the Interstate 405 freeway, Zhu et al. [25] found that UFP concentrations decreased with downwind distance from the freeway at night, but at a slower rate than is typically observed during the day.

This finding sparked additional studies to characterize night-time and pre-sunrise pollution concentrations. These studies were motivated by concerns that near-roadway pollution exposure had been previously underestimated and that many people living more than 300 meters (984 feet) from freeways were being adversely impacted by poor air quality at night and in the early morning. Like Zhu et al., these studies found both seasonal and diurnal differences in the rate of decline for pollution concentrations with increasing distance from pollution sources. Winer et al. [32] found that, before sunrise, UFP concentrations did not return to background levels until 2,600 meters (8,530 feet) from the freeway. Later in the morning and afternoon, pollutant concentrations exhibited the typical daytime downwind decrease to background levels within 300 meters (984 feet) downwind of the freeway.

Figure 3: UFP concentrations and gradients along the pre-sunrise route by season. Positive distances are downwind and negative distances are upwind from the I-10 freeway. Image: Winer et al.



Choi et al. [26] observed significant extensions of freeway plumes (~2 kilometers or 1.2 miles) in the stable pre-sunrise periods, much longer than typical daytime plumes measuring ~150-300 meters (~493-984 feet). Also, the researchers calculated a pre-sunrise dilution rate coefficient that is about 10 times lower than dilution coefficient measured during the daytime.

Technical Advisory: Strategies to Reduce Air Pollution Exposure Near High-Volume Roadways 13

These recent studies highlight the importance of protecting at-risk populations/communities from traffic emissions and indicate that exposure reduction strategies may be needed to protect people that live and spend time in environments that are more than 500 feet from high-volume roadways. This does not mean that nothing should be developed within this distance. In fact, as previously discussed, a compact development pattern is a key strategy in reducing GHG emissions and improving public health through physical activity and it has many other benefits. Instead, planners and developers may want to consider siting non-sensitive uses and developments that will be primarily used and occupied during the daytime—such as commercial uses and offices. In addition to optimizing land use when near-roadway pollution concentrations drop off more sharply with distance, commercial and office buildings are often equipped with indoor filtration systems that can remove particulates from the air inhaled by building occupants, and these buildings are more likely to have permanently closed or sealed windows. This means that, when these buildings are sited close to roads, people that spend time in them are less likely to breathe harmful pollutants and experience negative health impacts. Plus, people typically spend less time at work than at home, meaning that the duration of exposure at work is shorter. These approaches, along with strategies to reduce traffic emissions, disperse pollution and clean indoor air—all discussed in this Technical Advisory—will reduce exposure.

Strategies to reduce air pollution exposure near high-volume roadways

In spite of past successes and ongoing efforts to improve near roadway air quality in California, exposure to traffic pollution is still a concern because pollution concentrations and exposure levels near high-volume roadways continue to indicate that there is a lingering public health concern. In addition, the Office of Environmental Health Hazard Assessment (OEHHA) recently revised its methodology for risk assessment in order to estimate more accurately the health impacts of exposure. This reanalysis has resulted in a revision of cancer risks from exposure to toxic air contaminants, including those emitted by transportation-related sources, to significantly higher levels.[20] ARB forecasting models also indicate that air quality issues will persist even with changes in vehicle technologies and increasingly stringent emissions and fuel regulations. Finally, ARB does not currently regulate non-tailpipe emissions—like tire- and brake-wear—and noise. Scientific literature links these to health effects. Therefore, despite existing efforts they are likely to continue to impact near-roadway public health.

For these reasons, ARB recommends that strategies to reduce emissions, increase dispersion, and remove pollution from the air be implemented to reduce health risks. Many such strategies have been studied and published in peer-reviewed scientific literature. Results can vary based on the specifics of the studies performed, but comprehensive literature reviews conducted by ARB have identified several strategies that consistently and effectively improve air quality and reduce exposure to traffic-related air pollution, particularly where people spend time near high-volume roadways. The specific criteria that ARB used in its evaluation of potential exposure reduction strategies includes the following.

1. Consistent findings from multiple studies support the strategy as a means for reducing pollution concentrations, or emissions rates, or improving air flow to disperse pollutants.
2. Evidence of significantly effective exposure reduction is documented in the scientific literature.
3. Diversity in the study methods supports consistent findings (such that strategy efficacy does not exclusively rely on one method of investigation).

If literature reviews revealed that all criteria were met, ARB staff included the strategy in this document. In Section II, readers will find a comprehensive discussion of each strategy, including scientific findings and "appropriate context and other considerations."

20 *https://oehha.ca.gov/air/crnr/notice-adoption-air-toxics-hot-spots-program-guidance-manual-preparation-health-risk-0*

Important overarching considerations in selecting strategies

In addition to the strategy-specific considerations outlined in Section II, readers should be mindful of important overarching considerations that were identified by ARB staff and others consulted in the process of compiling these strategies. All of these should be considered regardless of the types of exposure reduction strategies being considered by planners and other users of this document.

Changes in land use patterns and the built environment are changes that last

The durability of the built environment means that land use patterns, once established, remain fixed for decades. This can both help and hinder compact and infill development and the promotion of alternative transportation. In cities like New York, Boston, and Philadelphia, which developed prior to the widespread use of personal cars, established land use patterns have facilitated density and the viability of transit, biking, and walking. Conversely, where a majority of development occurred when personal cars were prevalent, low-density development and separated land uses necessitate driving to access key destinations [3].

Increasing density through infill development helps to transform low-density neighborhoods to ones that can support alternative modes. When developing new plans and projects, planners should carefully consider the ongoing influence of those plans and projects on public health, sustainability, and community goals to support accessible and livable neighborhoods. Some of the exposure reduction strategies listed in this document will have long-term effects on the built environment. In the case where durable changes will be made to the urban fabric, planners should consider how long-run variables might influence their selection from the exposure recommendations strategies recommended by ARB.

Holistic and comprehensive planning practices

Stakeholders involved in public health, air quality, and community planning efforts must weigh a variety of factors and issues when making policy decisions. Vulnerable populations' exposure to traffic is just one of many considerations, but it is an important piece that should be weighed alongside other local goals and priorities. For this reason, it is recommended that exposure to traffic emissions and strategies to reduce exposure be considered within planning processes at the scale of a neighborhood or community plan or ordinance, general plan, and sub-regional or regional plan, depending on the geographic impact and regulatory context of the issue. In this way, planners and other local officials can proactively consider near-roadway factors in their broader, holistic planning processes.

Another important part of holistic planning is considering how combinations of practices, policies, and strategies can be leveraged to achieve local goals. Few scientific studies examine the combined effect of strategies to reduce air pollution exposure, but there is real-world evidence that a suite of strategies yields better results than those implemented in isolation. For example, when multiple strategies were employed to reduce downtown traffic congestion in Atlanta during the 1996 Summer Olympic Games, ozone pollution and childhood asthma events decreased significantly (*see textbox on the next page for more details*).

Additionally, there is evidence that increasing density and urbanization should be implemented in combination with efforts to expand transit, walking, and biking in order to ensure that mobility needs are met without necessitating the use of a vehicle [33-39].

Site-specific considerations

Site-specific factors may play a significant role in whether or not an exposure reduction strategy will be effective without resulting in negative, unintended consequences. Specific factors that are important to consider include topographical, meteorological, and time-of-day factors (e.g., roadway versus development height, wind direction, and pollutant concentration). For example, both traffic management and high efficiency filtration for indoor air may be particularly important

Case study of the 1996 Summer Olympic Games in Atlanta: The impact of changes in transportation and commuting behaviors on air quality

The 1996 Summer Olympic Games in Atlanta, Georgia provided a unique, real-world opportunity to study the traffic, air quality, and public health outcomes of a holistic, integrated alternative transportation strategy. This strategy was developed in preparation for the Games by the City of Atlanta to mitigate anticipated traffic congestion and to enable travel between Olympic events for the more than 1 million visitors. Moreover, Atlanta hoped that the strategy would avoid additional summertime ground-level ozone-related air quality violations. The strategy included a suite of travel-demand management measures, including the following: (1) a 24-hour public transportation system, (2) the addition of 1,000 buses for park-and-ride services, (3) use of alternative work hours and telecommuting by local businesses, (4) the closure of the downtown sector to private cars, (5) alterations in downtown delivery schedules, and (6) public notifications of potential traffic and air quality problems.

Researchers studied the effect of this alternative transportation strategy by comparing the 17 days of the Olympic Games (July 19 – August 4, 1996) to a baseline period consisting of 4 weeks before and 4 weeks after the Games. They looked at citywide acute care visits and hospitalizations for asthma and non-asthma events, concentrations of major air pollutants, meteorological variables, and traffic counts. Results showed decreased traffic density, especially during the critical morning period. This was associated with a prolonged reduction in ozone pollution and significantly lower rates of childhood asthma events [40].

to employ in development along a high-volume roadway where there will be a cumulative pollution burden. Local context is also important; some strategies herein work better in urban environments than in suburban or rural contexts. Drawbacks associated with some strategies may make them unacceptable for a specific site. For example, while stop signs may mean increased emission rates at some intersections, planners may determine that they are more appropriate than implementing a roundabout at that particular location, for a variety of reasons. Also, local planners may wish to eliminate from consideration any strategy that, in the local context, would increase VMT and therefore overall emissions. If such factors are considered as part of a detailed planning process, such as the development of a specific plan, a project-specific or parcel-specific analysis may be avoided.

When strategies are incorporated into large-scale policy documents, such as jurisdiction-wide general plans that direct planning processes for new developments, a menu of strategies and language about the usefulness of site-specific analysis to assist in choosing the right strategies for specific projects may be appropriate, since not all strategies are necessary or appropriate in all cases.

Changing vehicle fleets and impacts on air quality

California's vehicle fleets and freight system are becoming cleaner, and this trend will continue into the future, given existing and forthcoming policies and transformations underway in the automobile market. ARB programs, like those previously noted in the section "State programs to improve air quality and reduce exposure to traffic emissions" (*page 9*), are helping to usher in this transition. This fact should be considered in local decision-making, particularly when long-term, durable strategies are being considered, such as urban design changes or standards.

However, while transitioning to ZEVs eliminates tailpipe emissions, it does not eliminate all traffic emissions. Non-tailpipe particulate matter emissions—like road dust, tire wear, and brake wear—currently account for more than 90 percent of PM10 and 85 percent of PM2.5 emissions from traffic. Both epidemiological and toxicological studies show an association between these pollutants and cardiovascular and pulmonary effects [41]. In a review of published literature examining how the transition to EVs may effect PM10 and PM2.5 emissions, researchers confirmed a positive relationship between vehicle weights and non-exhaust PM emission factors, and also found that ZEVs are, on average 24 percent heavier than equivalent internal combustion engine vehicles (ICEVs) [42]. This makes PM10 emissions from ZEVs roughly equivalent to PM10 emissions from modern ICEVs. PM2.5 emissions from ZEVs are about 1-3 percent less than PM2.5 emissions from conventional cars. This study concludes that, absent efforts to reduce vehicle weights and otherwise mitigate PM emissions, PM10 and PM2.5 levels could remain steady with the EV transition.

Furthermore, ZEVs do not eliminate upstream emissions from non-renewable energy sources or sources linked to their manufacture and production [10]. Using a life cycle approach, some studies have found a modest increase in emissions associated with ZEV production compared to the production of ICEVs [43, 44]. Other studies emphasize the importance of the energy sources used to produce the electricity for ZEVs. They demonstrate that, in some cases, carbon-intense grid mixes can actually translate to greater per-mile CO_2 equivalent emissions from ZEVs relative to conventional cars [44-46].

On-roadway exposure to traffic emissions

Exposure to vehicle emissions also occurs when people use the roadways, whether or not they live or work near them, and past studies show that on-road pollution concentrations can far exceed ambient concentrations. On-road ultrafine particulate matter (UFP) concentrations, for example, typically range from 10,000 to 500,000 particles/cm^3, which is 1-2 orders of magnitude greater than typical ambient levels [15]. These high on-road concentrations mean that people may experience a large proportion of their total daily UFP exposure while driving, depending on where and how long they drive. Based on data from Los Angeles, Fruin et al. [47] found that 36 percent of total daily exposure to ultrafine particulate matter (UFP) resulted from drive time even though only 6 percent of the day (~90 minutes) is spent driving on these roadways by the average Californian. These exposures can be reduced three ways: (1) by reducing on-road concentrations and (2) by reducing time spent driving on roadways, and (3) via in-vehicle air filtration. Reducing time spent driving is an important point for planners to consider, since it is crucial that they avoid making land use decisions that would result in longer commutes. In other words, planners should avoid new development farther from key destinations because this could induce longer vehicle trips and thus increased on-roadway exposure.

Users of this document should also be aware that it is possible that some of the exposure reduction strategies herein—specifically solid barriers and vegetation—could have the effect of increasing on-road pollution concentrations, but study results are mixed [48, 49]. Some field studies that have found increased on-road concentrations attribute this to the possibility that barriers block air flow across the roadway that would, in the absence of a barrier, carry pollution off the roadway. When meteorological conditions and windspeed and direction create the conditions for the entrapment of on-road pollution, some modeling studies also demonstrate this phenomenon. Hagler et al. found that on-road pollution concentrations may increase as barriers

grow taller, too [50]. On the other hand, there is also research that contradicts these results. In field studies in Phoenix, AZ, Bauldauf et al. found that concentrations on the highway upwind of the barrier were similar to those measured in the absence of the barrier [51]. These studies suggest that it is very important for planners and others to consider local meteorology when deciding if and how to design certain exposure reduction strategies, which is consistent with the abovementioned overarching consideration regarding the use of site-specific information when it is available and when issues like elevated on-road pollution concentrations are a relevant concern.

While on-road pollution concentrations are concerning, it is also worth noting that many new passenger vehicles are equipped with on-board air filtration that helps to remove particles from the air breathed by the people traveling in the cabin of the car. Xu et al. found that typical commercially available filters exhibit a range of particle removal efficiencies (up to 60 percent), and some thicker filters are even more effective [52]. A study by Zhu et al. found that maximum in-cabin protection from UFPs (approximately an 85 percent reduction in UFP concentration) could be achieved when the in-cabin fan and recirculation settings were on [15]. There are many variables that influence filter efficacy, however, including age, maintenance, and driver behavior when it comes to operating their vehicles. When old filters are not replaced or when windows are open while traveling on roadways, for example, exposure concentrations may be very high [15].

Translating research into practice

Putting research into practice can be challenging since research studies often seek to address narrowly defined questions and control for factors that are commonly observed in the real world. For this reason, research findings may not always be entirely reflective of real world conditions, so users of this Technical Advisory should consider how the research applies to the specific context being considered.

Additionally, even when research is based on data collected in the real-world, the data may be several years old by the time that researchers are able to digest, analyze, and summarize findings and conclusions. For this reason, it may be necessary for planners and the users of this document to consider how changes in the local context may have affected the variables that researchers considered in their analyses. For example, improvements in vehicle technology and controls for diesel emissions from trucks may mean that concentrations of some pollutants are lower today than they were when the data were collected. However, ARB cautions against making assumptions about how health outcomes may be affected by these changes, since health effects are related to a suite of variables, not just emission rates and pollution concentrations.

Ongoing research and other resources

New studies are currently underway and results are constantly emerging from the literature. Appendix A, "Strategies not meeting ARB's criteria at this time" (*page 42*), includes exposure reduction strategies that did not meet all three ARB's following criteria required for inclusion: (1) consistent findings from multiple studies, (2) evidence of significantly effective exposure reduction, and (3) diversity in the study methods used.

In the years to come, these strategies may emerge as promising exposure reduction strategies as a result of additional investigation or updated techniques for more successful implementation.

ARB collaborated with many partner agencies and organizations to produce this Technical Advisory, and in the process, learned of many additional resources that stakeholders will find useful, including the following:

- The United States Environmental Protection Agency (U.S. EPA) sponsors research related to near-roadway air pollution exposure, and as such, recently published a report outlining strategies for reducing exposure at schools. Many of the strategies found in the U.S. EPA document, titled "Best Practices for Reducing Near-Road Air Pollution Exposure at Schools" complement strategies found in this Technical Advisory. To access the U.S. EPA report, visit: *https://www.epa.gov/schools/best-practices-reducing-near-road-air-pollution-exposure-schools.*
- The Bay Area Air Quality Management District (BAAQMD) provides tools, guidance, and information to promote "healthy infill development" from an air quality perspective. The guidance is also intended to encourage Bay Area local governments to consider and address local air quality issues in the planning and development stages. In 2016, BAAQMD published "Planning Healthy Places," which provides recommended best practices for reducing emissions from and exposure to local air pollution sources. BAAQMD's guidebook is accompanied by an interactive web-based mapping tool that illustrates where best practices are recommended and where "further study" is recommended to assess the local concentrations of TACs and fine PM, and therefore the health risks from air pollution" (pg. 12). To access BAAQMD's document and interactive map, visit: *http://www.baaqmd.gov/plans-and-climate/planning-healthy-places.*

ARB encourages users of this Technical Advisory to consult with local air quality experts as they weigh the options presented in this document. Air districts, like BAAQMD may also have useful localized information to aid in the decision-making process. Finally, given the evolving nature of the science, ARB will continue to update documents and websites with the most current information, which can be found at: *https://www.arb.ca.gov/ch/landuse.htm*.

Detailed Description of Strategies to Reduce Air Pollution Exposure Near High-Volume Roadways

This section details strategies to reduce air pollution exposure near high-volume roadways identified by ARB staff from academic literature and ARB-funded research. These strategies are organized into three categories:

1. Strategies that reduce traffic emissions,
2. Strategies that increase dispersion of traffic pollution, and
3. Strategies that remove pollution from the air .

Each strategy presented below includes a description of relevant research findings as well as a summary of the "appropriate context & other considerations" that planners and policy makers should be take into account as they make decisions about which exposure reduction strategies they might include in policy-level documents or on a case-by-case basis. The "other considerations" portion for each strategy also includes a discussion of potential co-benefits and drawbacks.

Strategies that reduce traffic emissions

1: Speed reduction mechanisms, including roundabouts

FINDING: Vehicle speed reduction mechanisms change the design and operating speed of the road by altering the physical characteristics of the road. These features can reduce stop-and-go driving and hard accelerations and thereby reduce emissions rates. Some of these features, like the roundabout intersection, can be used as an alternative to stop-controlled and signalized intersections. Studies show that roundabouts can reduce localized pollutant concentrations compared to intersections with stop and signal control by 20 percent or more (depending on context and site-specific conditions).

APPROPRIATE CONTEXT & OTHER CONSIDERATIONS: Transportation planners and engineers should carefully consider the potential direct and indirect effects of implementing speed reduction mechanisms to determine if they will reduce vehicle emissions and other impacts to the environment as well as to traveler safety and delay. When guidance is needed to estimate emissions and air quality-related effects, planners and engineers may consult with MPOs or traffic modeling experts.

Street, highway, and freeway ramp intersections have been found to be pollution hot spots. This is mainly due to frequent deceleration and acceleration and the increased frequency and duration of idling at intersections. As a result, intersection alternatives that reduce the frequency of stops, acceleration, and idling can generally benefit air quality at and around intersections.

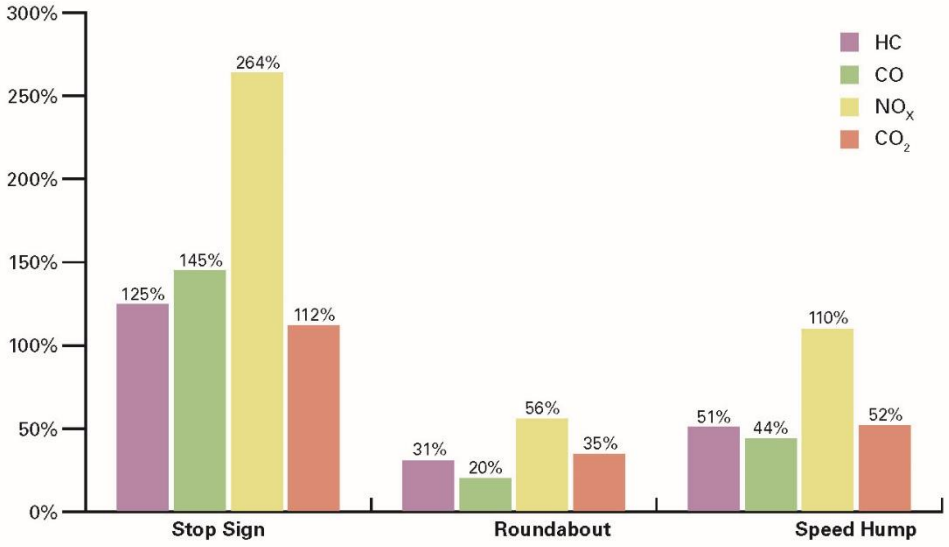
Speed reductions mechanisms, such as roundabouts, can be implemented to smooth traffic flow. Roundabouts can be used in lieu of stop signs or signal controls in order to decrease hard accelerations and decelerations and encourage driving speeds that fall within the optimal range for minimizing emissions rates and fuel consumption. A roundabout is an example of an

intersection-specific speed reduction mechanism that can be implemented to reduce pollution concentrations, and produce other transportation system benefits.

Roundabouts

Several studies have found that roundabouts generate substantially less air pollution from vehicles than stop-controlled intersections. Ahn and Rakha [53] found that roundabouts reduce emissions of hydrocarbons (HC), carbon monoxide (CO), nitrogen oxide (NO_x), and carbon dioxide (CO_2) by 75, 86, 79, and 69 percent respectively, compared to stop-controlled intersections. Figure 4 shows how emissions levels changed compared to a no-control scenario and illustrates how roundabouts and speed humps—another speed reduction measure—compare to a two-way stop controlled intersection (with stop signs on the minor leg approaches). These data were produced using a mathematical model that estimates emission rates using second-by-second speed and acceleration measurements collected by researchers at a specific intersection located in Arlington, VA.

Figure 4: Relative increases in emissions for various intersection treatments (compared to no treatment) as measured at an experimental site in Arlington, VA. Image derived from: Ahn and Rakha 2009.



Höglund [54] found when a traffic signal intersection was changed to a roundabout, the HC emission per vehicle per kilometer travelled decreased by 36 percent. Várhelyi [55] used the "car-following" method and showed that replacing a signalized junction with a roundabout decreased CO emissions from vehicles by 29 percent, NO_x emissions by 21 percent, and fuel consumption by 28 percent. Mandavilli et al. [56] found a statistically significant decrease in the emissions from vehicles when a modern roundabout replaced a stop-controlled intersection for six sites with different traffic volumes. In particular, the reductions were 21-42 percent for CO, 16-59 percent for CO_2, 20-48 percent for NO_x and 17-65 percent for HC.

While the research literature shows mostly positive performance results for roundabouts from the emissions and air pollution perspective, some studies illuminate their limitations. Ahn et al. [57] find that, at the intersection of a high-speed road with a low-speed road, an isolated

roundabout does not necessarily reduce vehicle fuel consumption and emissions compared with other forms of intersection control (stop sign and traffic signal control). In fact, the case study found that the roundabout in this context results in a significant increase in vehicle fuel consumption and emission levels compared with a two-way stop. The researchers attribute this finding to the fact that, as demand increases, traffic at the roundabout experiences a substantial increase in geometric delay (the increase in travel time as vehicles must navigate the roundabout more slowly) in comparison with the use of signal control.

Appropriate context & other considerations

It is important that speed reduction mechanisms and roundabouts be evaluated with site-specific conditions and context in mind in order to ensure that these road design elements achieve sought-after emissions reductions and other benefits. Many resources are available to assist with the selection, planning, and design of speed reduction mechanisms and roundabouts, including (but not limited to) the following:

- FHWA Roundabout Website: *http://safety.fhwa.dot.gov/intersection/roundabouts/*
- Roundabouts: An Informational Guide, Second Edition (NCHRP Report 672):
- *http://onlinepubs.trb.org/onlinepubs/nchrp/nchrp_rpt_672.pdf*
- National Association of City Transportation Officials Urban Street Design Guide: *http://nacto.org/publication/urban-street-design-guide/design-controls/design-speed/*
- AASHTO's Strategic Highway Safety Plan: *http://safety.transportation.org/htmlguides/speeding/section01.htm*
- FHWA Roundabout Outreach and Education Toolbox: *http://safety.fhwa.dot.gov/intersection/roundabouts/roundabouttoolbox/*

Depending on site-specific conditions, speed reduction mechanisms can result in improved safety; specifically, fewer fatal crashes and less serious injuries when crashes occur. The FHWA Office of Safety identified roundabouts as a Proven Safety Countermeasure because of their ability to substantially reduce the types of crashes that result in injury or loss of life. Roundabouts reduce vehicle speed and the number of conflict points at the intersection, which provides safety benefits for vehicles, pedestrians, and bicycles. Single lane roundabouts produce the lowest vehicle speeds and fewest number of conflict points compared to multi-lane roundabouts and traditional signal and stop-controlled intersections. The FHWA document, "Roundabouts: An Information Guide,"[21] states, "While overall [and especially severe] crash frequencies have been reduced, the crash reductions are most pronounced for motor vehicles, less pronounced for pedestrians, and equivocal for bicyclists, depending on the study and bicycle design treatments" [58-60].

While roundabouts are not expected to reduce vehicle emissions at all intersections (refer to above mentioned case study by Ahn et al.), [57] roundabouts have been proven to be effective at freeway interchange ramp terminals. FHWA guidance indicates that roundabouts can help create a transition area that moves traffic from a high-speed to a lower-speed environment.

Regarding design and engineering requirements for roundabouts, Caltrans and FHWA provide guidance to help local planners and engineers, including the following:

- The California Manual of Uniform Traffic Control Devices (MUTCD) provides standard guidance on roundabouts as an alternative to traffic signal control; see Part 4, Chapter 4C, Section 4C.01 Studies and Factors for Justifying Traffic Control Signals.[22]
- The Caltrans Intersection Control Evaluation (ICE) Policy Directive (TOPD13-02) and website provide direction and guidance on the evaluation of highway project proposals that create new, and expand or modify existing, intersections and interchanges. Caltrans established ICE to ensure the objective consideration, evaluation, and comparison

21 *https://www.fhwa.dot.gov/publications/research/safety/00067/index.cfm*
22 *http://www.dot.ca.gov/trafficops/camutcd/*

of roundabouts with traditional and other innovative intersection solutions.[23]

In all cases, roundabouts should be designed to satisfy the engineering principles outlined in the FHWA Informational Guide on Roundabouts, published as NCHRP Report 672.[24] This will generally produce the range of vehicle speeds that are capable of reducing vehicle emissions and the potential for crashes (as described above). Local and other agencies responsible for the operation of streets and highways are advised to employ qualified traffic analysts and engineers to evaluate, design and oversee their first roundabouts. Roundabout implementation in some communities may require consultation with local agencies that may be affected by these intersections, including (but not limited to) operators of transit, waste disposal, delivery, and emergency response vehicles. Planners should also consult with their local air quality management district to see if it provides additional recommendations for this type of strategy.

It is advisable to establish an education campaign for communities that are planning to construct roundabout intersections for the first time to accelerate understanding and acceptance of roundabouts in communities that do not yet have a modern roundabout intersection. This can inform travelers and others who will be affected by a roundabout of other advantages and co-benefits attributed to roundabouts (e.g., roundabouts can improve aesthetics and reduce operating & maintenance costs compared to signalized intersections).

2: Traffic signal management

FINDING: Traffic signal management systems can reduce stop-and-go driving and vehicle idling, resulting in reduced localized pollutant concentrations of up to 50 percent compared to corridors that do not implement these systems. Studies show that site-specific conditions dictate the magnitude of reductions.

APPROPRIATE CONTEXT & OTHER CONSIDERATIONS: Many different types of signal management are available, and planners should identify what is best for air quality, vulnerable road user safety, and transit and active mode throughput and comfort.

Traffic lights are widely used at intersections to reduce traffic speed, avoid traffic accidents and crashes, and improve safety for road users. However traffic lights can also increase idling, deceleration, and acceleration of vehicles, and therefore increase air pollutant emissions from vehicles. Coelho et al. [61] found the presence of traffic signals can increase CO, NO, and HC emissions from vehicles by about 15 percent, 10 percent, and 40 percent, respectively. Different traffic signal schemes may have different impacts on vehicle emissions [62]. Signal strategies that prioritize enforcement of the speed limit may result in more stops for all traffic, and therefore lead to higher emissions from vehicles. Signal strategies that are more tolerant on speed enforcement may achieve lower emissions.

Traffic signal coordination has been found to be a potentially effective strategy to reduce vehicle emissions by several modeling studies. Rakha et al. [63] found a well-timed green wave (all vehicles only need to stop at the first traffic signal along a road section) can reduce the emissions of HC, CO, and NO_x from vehicles by 50 percent, compared with extreme cases of all vehicles having to stop at all signals. De Coensel et al. [64] simulated vehicle emissions for an urban arterial road with a speed limit of 50 kph, and five consecutive traffic signals spaced at a distance of 200 m from each other. This study found that the introduction of a green wave could reduce the emissions of CO_2, NO_x, and PM10 by 10-40 percent. The largest reduction of vehicle emissions may be achieved when traffic intensities are close to road capacity and the green split (the ratio between the amount of green light time and the traffic light cycle time) is high. The introduction

23 http://www.dot.ca.gov/trafficops/ice.html
24 http://onlinepubs.trb.org/onlinepubs/nchrp/nchrp_rpt_672.pdf

of a green wave also reduced noise levels near traffic signals; however, noise levels between intersections increased. A study in China showed that, by increasing the green split of the major direction by 5 percent, the emissions of CO, HC, and NO_x of different vehicle categories decreased in the range of 2.6-14.6 percent [65].

Positive environmental impacts of traffic signal coordination have also been confirmed in measurement studies. Unal et al. [66] performed on-board air pollutant emission measurements along two signalized arterial roads in North Carolina and found that, depending on the type of vehicles and the level of congestion, the implementation of traffic signal coordination reduced the HC, NO, and CO emissions per unit of distance by 10-20 percent. Similarly, Zhang et al. [67] measured the NO_x, HC, and CO emissions from a single vehicle driven on two roads that were similar except one had coordinated traffic signals. The results showed that the emissions of HC and CO per kilometer travelled decreased 50 percent and 30 percent, respectively, along the road with coordinated signals, but the emission of NO_x per kilometer travelled was 10 percent higher.

Appropriate context & other considerations

It is important that planners consider site-specific factors and consult with guidance material and traffic experts before deciding to implement traffic signal management strategies. The following resources (and others) are available to assist with the selection, planning, and design of traffic signal management systems:

- FHWA Traffic Signal Timing Manual: *http://ops.fhwa.dot.gov/publications/fhwahop08024/fhwa_hop_08_024.pdf*
- Signal Timing Manual: Second Edition (NCHRP Report 812): *http://onlinepubs.trb.org/onlinepubs/nchrp/nchrp_rpt_812.pdf*

When implemented with site-specific context and other goals in mind, traffic signal management can improve safety and enable efficient movement of transit vehicles and bicycles. Regarding safety, several studies have found that coordinated signals can reduce the frequency and severity of automobile crashes. A field evaluation in Scottsdale, Arizona found that coordinated traffic signals resulted in a crash risk reduction of 6.7 percent [68] and studies from Europe found that network coordinated signals were associated with a 20 percent reduction in injury accidents at intersections [69]. Based on data from 1,345 crashes at three arterial intersections in Indiana, Li and Tarko [70] used a mixed logit model to find that crashes and severe crashes are less likely at intersections with signal coordination. Finally, a study in Phoenix, Arizona assessed five years of crash data (1993-1997) and found that crash rates at coordinated traffic signals were less than those for uncoordinated traffic signals by 14 to 43 percent.

Coordinated signals can also be designed to more efficiently move transit vehicles and other modes. With the technological infrastructure in place, coordinated traffic signals can be programmed to work in concert with transit vehicles. Recent advances in intelligent transportation system technology have made it possible for transit vehicles to communicate with signal timing infrastructure, so coordinated signals could be dynamically adjusted to allow more efficient movement of transit vehicles which not only makes them more attractive to transit riders but also reduces diesel particulate emissions from these heavy-duty vehicles. Coordinated signals can also be timed to accommodate cyclists and to give them a "green wave" along with motorists.

It is important for planners and others to consider potential effects of traffic signal management strategies when deciding if and where this exposure reduction strategy may make sense. For example, this strategy loses effectiveness when implemented where traffic volumes on cross-streets are comparable with those on the managed section. This will result in increased idling on these perpendicular sections and thus accumulating traffic emissions.

Additionally, it is possible that coordinated signals will increase vehicle throughput and VMT on the road section where it is implemented, since this strategy increases the "effective" capacity of the roadway section. Some models have shown that increased throughput is VMT shifted from

elsewhere while others attribute increased VMT to new trips generated by the increased effective capacity. Dowling [71] analyzed the net effects of a 0.5 mile long arterial signal coordination project and found that, regionally, VMT is actually reduced by -0.01 percent and emissions by 0.02-0.04 percent as a result of the project. More studies are needed to understand the broad and long-term impacts of traffic signal synchronizations, and local traffic engineers may have information that will make it possible for planners to implement this without offsetting air quality gains with increased vehicle use.

Finally, pedestrian crossings are an important consideration for traffic signal management projects. The FHWA Traffic Signal Timing Manual indicates that the time needed to serve vehicle volume is usually commensurate with a reasonable amount of wait-time for pedestrian calls, but planners should evaluate this on a site-specific basis to ensure that traffic signal coordination and the resultant timings for pedestrian crossings do not curb overall pedestrian activity.

Planners should also consult with their local air quality management district to see if it provides additional recommendations for this type of strategy.

3: Speed limit reductions on high-speed roadways (>55 mph)

FINDING: Research studies have identified an optimal average speed range of ~35-55 mph within which per-mile traffic emissions and fuel consumption are minimized. Generally, speed limit reductions on high-speed roadways can reduce tailpipe emission rates up to 30 percent, depending on the change in speed, the pollutant measured or modeled, and the roadway characteristics.

APPROPRIATE CONTEXT & OTHER CONSIDERATIONS: Speed limit reductions are appropriate on roadways where speed limit and design speeds exceed 55 mph.

Studies show that high speeds encountered on highways require high power output from vehicles, and this is associated with increased per-vehicle tailpipe emissions rates. Several studies have evaluated the role that speed limits play in vehicle speeds and air quality. Keller et al. [72] conducted a modeling simulation to investigate the emission impact of lowering the maximum speed limit on Swiss motorways from 120 to 80 kph (75 to 50 mph). The models predicted current total NO_X release from road traffic would decrease around 4 percent, peak ozone levels may decrease by less than 1 percent, and no significant change in emissions of VOCs. Similarly, Gonçalves et al. [73] simulated the effects on vehicle emissions of the 80 kph (50 mph) speed restriction planned for the Barcelona Metropolitan area, and found the reductions on NO_2, NO_2, and PM10 levels on the affected roads reached up to 5.7 percent, 5.3 percent, and 3.0 percent on 24-h average concentration, respectively. Field measurements also confirmed the reductions of traffic-related air pollutant levels with lower speed limits. A Netherlands study monitored the changes of traffic related air pollutant levels in the direct vicinity of a highway after lowering the maximum speed limit from 100 to 80 kph (62 to 50 mph) [74]. This study found the adjusted traffic contribution to air pollutant concentrations in the vicinity of the intervention site significantly decreased by 27 percent, 11 percent, and 21 percent, for PM10, PM2.5, and black smoke, respectively.

Additionally, studies indicate that higher vehicle speeds are also associated with increased non-tailpipe emissions, including higher rates of tire wear and associated PM emissions and greater resuspension of road dust [75, 76]. Related to tire wear, researchers have measured increased PM emissions with increasing vehicle speed and have hypothesized that, as tire temperature increases with faster speeds, tires break down more readily [77]. Studies also show that more road dust tends to be re-suspended into the air when vehicles travel faster [76]; Kuhns et al. found that road dust emissions increase exponentially with increasing vehicle speeds [78].

Appropriate context & other considerations

Planners should consider the direct and indirect effects—including benefits and drawbacks—involved in reducing posted speed limits on high-speed roadways to less than 55 mph. Planners should also consult with their local air quality management district to see if it provides additional recommendations for this type of strategy.

Higher vehicle speeds are associated with increased risk of severe crashes and injury or death when crashes occur [79, 80]. Thus, reducing speed limits to 55 mph or less on freeways could result in safety benefits for roadway users. This assumes, however, that drivers respond to speed limit reductions. In actuality, changing the speed limit does not necessarily translate to a change in vehicle speed, as the majority of drivers drive at speeds at which they feel comfortable. This means that speed limit reductions may need to be implemented in conjunction with additional enforcement in order to ensure that drivers adhere to new speed limits. Enforcement can be implemented via police, radar, camera, or aircraft, but this comes with associated costs.

Research also indicates that the ratio of in-cabin to on-roadway pollution concentration ratios—or I/O ratios—increase with increasing vehicle speed because faster driving speed creates a larger pressure differential between the in-cabin and outside air. This causes more air exchange into the cabin from outside, and therefore exposes the people traveling in the cabin to higher pollution concentrations [81]. Xu et al. measured in-cabin I/O ratios for UFP and found that the largest UFP penetration factor and the largest I/O ratios were measured at the fasted driving speeds [52]. Thus, reducing in-cabin exposure to traffic related pollution may be a co-benefit of reducing speed limits for near-roadway exposure reduction purposes.

Strategies that increase dispersion of traffic pollution

To date, several studies and literature reviews have evaluated how urban design in the built environment influences air pollutant levels in streetscapes [82-92]. While the majority of these are modeling studies conducted to understand air flow and pollutant dispersion in urban street canyons, they also show that urban design characteristics—including building geometry, architectural design, street canyon dimensions, and building siting—are important parameters that influence pollutant dispersion, concentration, and exposure [82, 86]. Also, a select few have identified urban design guidelines to reduce pollutant exposure [91, 93-95].

4: Design that promotes air flow and pollutant dispersion along street corridors

FINDING: The physical layout of urban streetscapes influences air flow and pollution movement. Research studies show that street corridors characterized by buildings with varying shapes and heights, building articulations (street frontage design elements like edges and corners that help break up building mass), and spaces that encourage air flow (e.g., parks) benefit from better pollutant dispersion and air quality. For example, buildings of varying heights can result in significant increases in turbulence (e.g., up to doubling), and adding bike lanes and sidewalks not only reduces car traffic, but also creates space for more dispersion (up to a 45 percent reduction in particulate concentrations).

APPROPRIATE CONTEXT & OTHER CONSIDERATIONS: Wider sidewalks, bicycle lanes, dedicated transit lanes, and other features that benefit alternative modes of transportation can also create space for better air flow and pollutant dispersion along with increasing active transportation and mode shift. This strategy should be considered in the context of the overall need to increase development density.

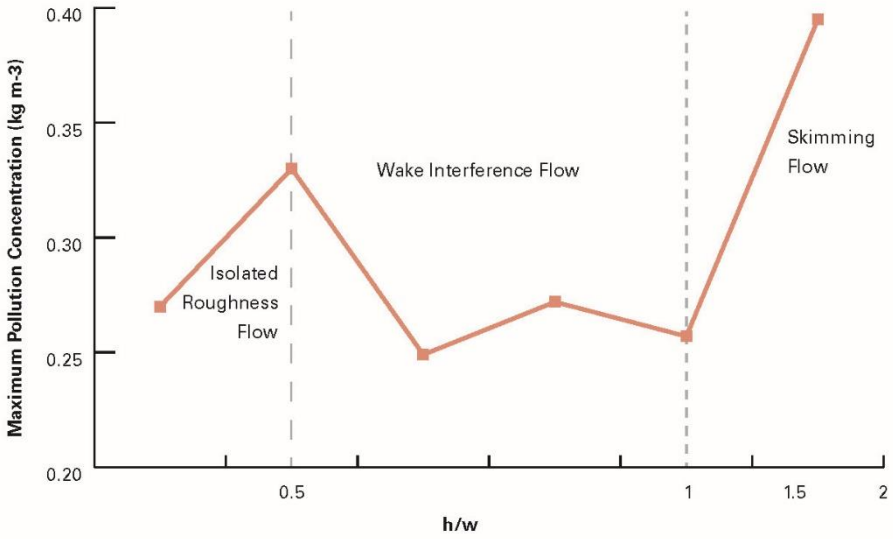
Research shows that the physical layout of urban streetscapes influences how air flows and pollutants move, and thus, planners can use this to their advantage to design buildings and streets to facilitate pollution dispersion [83, 84, 96, 97]. Key variables that planners can consider include the size, shape, and location of building and streets. This section outlines findings from modeling studies (e.g., wind tunnel simulations, computational fluid dynamics modeling, etc.) and field and measurement studies that shed light on the influence of these variables.

Many studies focus on evaluating pollutant behavior in "urban street canyons" characterized by narrow streetscapes continuously lined with buildings because they often experience "hot spots" of gaseous and particulate pollutants due to high levels of vehicular traffic and reduced ventilation flow created by the street canyon configurations themselves [98, 99]. In California, there are very few cities with traditional urban street canyons, and as such, concerns about pollution hot spots that have been raised in other cities—like Hong Kong and Manhattan—may not be relevant for current California cities. Nevertheless, the studies discussed herein can inform design choices that reduce pollutant exposures by maintaining or increasing ventilation and air flow as California's cities continue to grow and develop.

Developing uniform characterizations of pollutant dispersion and concentration in urban street canyons is challenging because differences in canyon geometry, traffic intensity and fleet mix, and local meteorological conditions translate to an almost infinite set of combinations and air quality outcomes [82, 89, 100]. While arriving at rigid guidelines for altering urban design to reduce air pollution is extremely difficult given this complexity, researchers have endeavored to identify various critical configurations to avoid when concerned about pollution concentrations [84, 100, 101]. These recommendations align with findings from studies that model the flow of pollutants through urban areas.

Numerous studies have investigated the close link between air vortex circulations that develop within the canyons and pollutant dispersion. Modeled and measured research confirms that when roof-level wind flows perpendicular to the street, a vortex circulation develops, resulting in much higher pollution levels on the downwind side of the street canyon [82, 87, 100, 102-108]. These circulation vortices are also influenced by street canyon geometry, and one variable used to measure this geometry is called the "aspect ratio" [89]. In canyon flow studies, the aspect ratio—the ratio of the building height to the width between buildings—is generally accepted as the key factor determining wind flow characteristics [83, 85, 93, 109]. Research shows that aspect ratios that describe canyons that are wider relative to their height promote better pollutant dispersion because they provide more space for ventilation flow to reach the street level [84, 100, 110-113]. This is not to say that tall buildings necessarily promote blockage, however. Using dispersion modeling validated against measurements from wind tunnels, Chan et al. [100] found that—with a fixed reference speed and fixed building height—as the street width is increased, pollutant concentrations decrease on both the upwind and downwind sides of the street. As long as the canyon aspect ratio creates a turbulence pattern that falls between stagnation flow and leeward blockage, ventilation will be promoted [84]. Figure 5 below demonstrates this concept by showing how pollution concentrations change with varying height-to-width ratios (h/w).

Figure 5: There are three air flow regimes in urban areas that are denoted in the figure: isolated roughness flow (generally more ventilation), wake interference flow (some ventilation), and skimming flow (little to no ventilation). The figure demonstrates that street canyons with higher height-to-width ratios tend to have higher pollutant concentration. To avoid this, ARB suggests that street canyons have space for better ventilation and/or implement strategies to reduce emissions produced. Image: Chan et al. 2001.



Studies also show that open space can increase ventilation over the city fabric [91, 114, 115]. Kaur et al. [114] found that particulate concentrations are two times higher at intersections surrounded by buildings compared to intersections adjacent to open space. Hess et al. [115] examined pollutant concentrations inside and outside seven bus stop locations in Buffalo, New York and found that the presence of undeveloped areas without vehicle access on both sides of the bus shelter or without a building on one side provide statistically significant reductions compared to a bus stop site with buildings on both sides of the street.

In addition to canyon geometry, building variables—including height, width, and roof shape—also influence air flow and pollutant dispersion. Some studies find that building uniformity (e.g., height and breadth) decreases air flow [83, 84, 89], and others find that gaps between adjacent buildings facilitate air flow and ventilation [116-118]. Roof shape and height can also influence air flow [30, 106, 119, 120]. Xie et al. used both 2D and 3D modeling to simulate the effects of different roof shapes and building geometries on vehicle emissions dispersion [106]. They found that different roof shapes lead to different circulation vortices and thereby influence air quality in the urban canyon. Huang found similar results when investigating the impact of wedge-shaped roofs on pollutant dispersion [30].

Boarnet et al. studied the effect of both canyon geometry and building characteristics on pollutant concentrations in five cities in Southern California [111]. The researchers measured PM2.5 concentrations near arterials in five cities that exhibit different development patterns, ranging from low-density auto-oriented development to dense urban areas with mid- and high-rise buildings. A regression analysis of the measurements indicated that—after accounting for meteorology, time of day, and location—higher concentrations were associated with lower wind speeds, higher temperatures, higher adjacent passenger vehicle traffic, higher ambient

concentrations, and street canyons with buildings over five stories.

While there is a large body of research that explores the interaction between building and street design and air flow, only a few studies quantify the pollution reduction. Chan et al. applied the urban form guidelines they developed through their modeling efforts to a hypothetical situation and modeled the effect of these building configuration modifications in a small district in Hong Kong [83]. These modifications included (1) altering the relative building heights—including by adding height to some buildings—to create differential heights and (2) altering the building breadth ratio. The modeled pollution levels dropped by 40 percent and 30 percent, respectively.

Acero et al. used dispersion models to calcuate NO_2 concentrations associated with three different urban design features—a park with trees, an open space with obstacles, and a building—in the medium-sized town of Durango, Spain [121]. The study found that removing the park with trees to leave an open space reduced NO_2 concentrations on the eastern part of the street by about 6.1 percent. On the other hand, the presence of a 16 meter (52 foot) building instead of trees created a recirculation vortex. This dispersed local traffic pollutants to the western side of the street, close to the new building, with the wind direction influencing the spatial variation of pollutants. This study illustrates the importance of local wind direction and orientation to the dispersion of polluants.

Schulte et al. [113] developed and evaluated a semi-empirical dispersion model to estimate surface concentrations of NO and NO_2. This was accomplished using empirically collected data from street canyons in Hanover, Germany to evaluate dispersion models and identify the variables that best describe the observed data. The researchers concluded that the ratio of effective building height to street width governs the dispersion of vehicle emissions. The researchers also presented three possible methods for mitigating street-level pedestrian exposure to vehicle emissions: (1) limiting vehicle traffic within streets with large aspect ratios when there is high pedestrian traffic, (2) limiting the street aspect ratio based on expected pedestrian exposure, and (3) in new developments, or where such design can be implemented, separate pedestrian and heavy vehicle traffic into different streets.

Appropriate context & other considerations

The research literature demonstrates that design that promotes air flow and pollutant dispersion along street corridors can take many forms. Implementing complete streets design concepts—which are characterized by wider sidewalks, bike routes or paths, and transit lanes or infrastructure—is an option that both facilitates air flow and encourages active transportation and alternative modes. Complete streets designs also have the potential to reduce VMT and therefore emissions along a corridor, particularly when vehicle lanes are converted to provide the infrastructure for alternative modes.

A recent ARB study that compared existing complete streets and "incomplete streets (streets that did not exhibit the characteristics of complete streets) found that the former may be positively associated with reductions in UFP, lower vehicle traffic volume, and more pedestrians and cyclists [122]. The research concluded, however, that these outcomes are not always a given with complete streets; context and design play an important role in influencing the direction and magnitude of the benefits. The researchers recommend prioritizing construction of complete streets in downtowns, business areas, and locations that create a contiguous network of bike, pedestrian, and transit infrastructure.

Other valuable sources of information on how to maximize the desired benefits of complete streets implementation are available from the National Association of City Transportation Officials (NACTO). Several NACTO publications provide guidance on how to design urban streets, transit streets, and urban bikeways, and include case study examples.[25] Planners should also consult with their local air quality management district to see if it provides additional recommendations for this type of strategy.

25 *http://nacto.org/*

Increasing active transportation may lead to additional health benefits that are associated with increased physical activity [123]. Also, complete streets can improve the street aesthetic, increase property values, and promote business visibility.

The literature also shows that siting or preserving parks can also improve air quality along street corridors, but care should be taken when deciding what park facilities will be installed and where these facilities should be located. For example, playgrounds or recreation fields should be located away from heavily-trafficked routes to protect children and others from concentrated emissions.

Lastly, this strategy should be considered in the context of the overarching goals to increase development density and infill. Planners should consider how this strategy can be used without spurring more dispersed development, which is associated with more vehicle travel and thus more emissions, which would undercut the environmental and health benefits. In some cases, it may be necessary to implement this strategy in specific areas in concert with other measures that will ensure that broader goals are still supported.

5: Solid barriers, such as sound walls

FINDING: Measurement and modeling studies consistently find that solid barriers reduce near-road downwind concentrations by increasing vertical dispersion of pollutants emitted by vehicles. The magnitude of the reduction and its spatial extent depend on the height of the barrier, the width of the road, and micrometeorology. As reference, studies have consistently found a concentration deficit downwind of the barrier, ranging from a 10 percent to 50 percent reduction compared to concentrations measured on or directly adjacent to high-volume roadways.

APPROPRIATE CONTEXT & OTHER CONSIDERATIONS: Solid barriers should only be considered for installation along freeways because they have the negative effect of dividing neighborhoods and obscuring sightlines.

Field measurement studies generally show that solid barriers, such as sound walls, can effectively and significantly reduce near-road pollution concentrations for a variety of traffic air pollutants [48, 51, 124-127]. Baldauf et al. measured concentrations of NO_x, PM, and air toxics behind a 1 km long barrier along Interstate I-440 in Raleigh, NC using a mobile platform and fixed sampling instruments. The study revealed that CO and PM number concentrations generally decreased between 15-50 percent behind the barrier [48]. Ning et al. also measured lower pollution concentration reductions where barriers were present along I-710 and I-5 in Southern California, compared to where they were not present [125]. Finally, a more recent field study in Phoenix, AZ—which measured NO_2, CO, UFP, and black carbon (BC) using both a mobile platform and fixed sites—found that pollutant concentrations behind the roadside barriers were significantly lower relative to those measured in the absence of barriers. The reductions ranged from 50 percent within 50 meters (~164 feet) from the barrier to about 30 percent as far as 300 meters (984 feet) from the barrier [51].

Modeling and wind tunnel studies, like the field studies mentioned above, also consistently find that barriers result in reduced concentrations beyond the barrier [50, 127-129]. Heist et al. conducted a wind tunnel experiment that modeled 12 configurations with and without barriers and found that all with-barrier configurations reduced the downwind ground-level concentrations compared to no-barrier configurations, though the magnitude of the reduction varied depending on the specific conditions [129]. Hagler et al. created a model to mimic the wind tunnel experiments conducted by Heist et al. and used it to observe the effect of changing variables—like the barrier height and wind direction—to test how near-roadway concentrations of pollutants might change with these different variables. The model found decreased concentrations downwind of the barrier and estimated that higher barriers would result in greater downwind reductions [50].

The South Coast Air Quality Management District recently funded a study to investigate the effect of roadside barriers on dispersion from roadways [49, 130]. Using semi-empirical modeling approaches, the study found that barrier height, freeway width, and atmospheric turbulence were key factors determining pollutant dispersion. Results from Schulte et al. are consistent with the studies above that look specifically at varying barrier heights and atmospheric stability [130].

Appropriate context & other considerations

Research shows that solid barriers can be effective at reducing near-roadway pollution concentrations, but many other considerations should be taken into account before deciding to implement these as a means to reduce near-roadway pollution exposure. Local planners should consider consulting with highway experts at FHWA or Caltrans and referencing some of the many resources that are available to assist with the selection, planning, and design of solid barriers, including (but not limited to) the following:

- FHWA Highway Noise Barrier Design Handbook: *http://www.fhwa.dot.gov/environment/noise/noise_barriers/design_construction/design/index.cfm*
- FHWA Guide to Visual Quality in Noise Barrier Design *http://www.fhwa.dot.gov/environment/noise/noise_barriers/design_construction/visql/index.cfm*
- FHWA Brochure, "Keeping the Noise Down: Highway Traffic Noise Barriers" *http://www.fhwa.dot.gov/environment/noise/noise_barriers/design_construction/keepdown.pdf*
- Caltrans Highway Design Manual, Chapter 1100 Highway Traffic Noise Abatement *http://www.dot.ca.gov/hq/oppd/hdm/pdf/english/chp1100.pdf*
- Caltrans Project Development Procedures Manual, Chapter 30 Highway Traffic Noise Abatement: *http://www.dot.ca.gov/hq/oppd/pdpm/chap_pdf/chapt30.pdf*

Solid barriers are only appropriate for installation along freeways. When implemented in non-freeway settings, solid barriers can increase vehicle miles traveled, disrupt community connectivity, and counteract planners' efforts to encourage walking, biking, and complete streets designs.

Research shows that there are design features of solid barriers that should be avoided in order to maximize their effectiveness in reducing pollutant concentrations near high-volume roadways. For example, gaps and edges are places where pollutants can concentrate and creep around barriers, so gaps should be avoided and edges should occur where sensitive uses will not be exposed to elevated pollution levels [50].

Some studies indicate that barriers may result in increased on-road pollution concentrations, as was discussed previously under "*Important overarching considerations in selecting strategies*" that users of this Technical Advisory should take into account. This is not observed in all cases, but it is worth considering whether or not the site-specific conditions will result in very high on-road concentrations and additional exposure reduction strategies that could be implemented in concert to reduce them. Possibilities include other strategies that would reduce roadway volumes and thereby bring down the emissions rates of the roadway segment where a barrier may be implemented.

Before implementing solid barriers, planners should inform nearby residents and the public to ensure that the community is involved in the proposal and planning of the barrier before it is implemented. FHWA finds that people's reactions to noise barriers can be mixed. In the past, residents that live near roadways reported that solid barriers make conversations and sleeping easier in their homes and that, as a result of the barrier, they are more likely to open windows and spend time outdoors. Others have complained that solid barriers restrict views, contribute to a sense of confinement, reduce circulation, and can create an eyesore if the barrier is not maintained or designed with aesthetics in mind. Additionally, if solid barriers disrupt existing

network connectivity, they could also result in an increase in vehicle miles traveled [131]. Planners should also consult with their local air quality management district to see if it provides additional recommendations for this type of strategy.

In addition to mitigating pollution exposure, solid barriers benefit near-roadway populations by reducing noise from roadways or freeways. Several studies have shown an association between roadway noise to a variety of physical and psychological health outcomes. Because noise can cause stress in humans, it may be linked to a variety of stress-related diseases, including hypertension, anxiety, and heart disease [132]. The negative health outcomes of stress are particularly serious if noise causes disruption in sleep cycles [133]. One survey of residents near a sound wall found that most felt that sleeping conditions were improved after the barrier was built [134]. Solid barriers and sound walls can reduce the loudness of traffic noise by as much as 50 percent [135].

6: Vegetation for pollutant dispersion

FINDING: Studies indicate that vegetation has the potential to alter pollutant transport and dispersion. In some studies, specific locations and conditions translated to air quality benefits (e.g., pollution concentrations of up to 20 percent on the leeward side of the tree line). It should be noted that most studies were conducted on the East Coast and in Europe where vegetation types and densities differ from what is found in California.

APPROPRIATE CONTEXT & OTHER CONSIDERATIONS: Online tools are available to assist with the selection of appropriate vegetation considering allergen impacts, watering needs, and other factors. Maximum benefits have been shown to occur when vegetation is combined with solid barriers.

Vegetation, including plants and trees, has been studied as a means of improving air quality by assisting in the dispersion of near-roadway pollution. Jeanjean et al. [136] modeled the effectiveness of trees at dispersing road traffic emissions and found that they can reduce ambient pollutant concentrations by increasing turbulence. Other studies have included the effect of urban parks and green belts. Experimental studies measured reductions of PM (and gases) attributable to urban parks and forests by measuring within, near and away from urban parks, finding reduced levels of PM and other pollutants (NO_2, SO_2) within and near park areas [137, 138]. Similarly, strategies such as creating green belts have been used as an environmental management strategy and appear to be successful in reducing air pollution [139, 140].

An emerging area of study examines the potential air quality impact of vegetation as a barrier and vegetation combined with solid barriers. Brantley et al. found that black carbon on the leeward side of the tree line was reduced up to 22 percent compared to the BC levels measured on the traffic adjacent side of the tree line, indicating that trees may provide some air quality improvement [141]. Baldauf et al. conducted a field study at a site in Raleigh, North Carolina that provided an opportunity to evaluate near-road air quality with no barriers, with a noise barrier only, and with a noise barrier and vegetation adjacent to the road. The study results suggested that the presence of mature trees (~10 m tall) in addition to the barrier lowered PM number concentrations beyond what was observed in the barrier-only scenario. Researchers attributed this additional reduction to increased turbulence and mixing created by the presence of the trees [48]. However, a subsequent study by Hagler et al. showed mixed results for vegetative barriers. UFP concentrations were sometimes higher and sometimes lower at the two vegetative barrier sites, which were characterized by relatively thin tree stands, one evergreen, and one deciduous (all sites were in central North Carolina). The researchers posit that study and site-specific conditions may have influenced these results, including the relative sparseness of the tree stands that acted as vegetative barriers [124].

Modeling studies also support the air quality improvement potential of vegetative barriers [128, 142, 143]. Fuller et al. [143] modeled a vegetation screen separating a freeway in Davis, California from a nearby elementary school. The modeling showed that—with the tree configurations studied—74 percent of PM impacted a tree surface. This means that the particles did not merely pass by the tree, but rather impacted and may have deposited on the tree itself. The modeling study also found that installing multiple rows of trees maximized the potential for impaction. The most recent modeling study, by Tong et al., found that the greatest reduction in downwind particle concentration was associated with a vegetation-solid barrier combination, whereby trees are planted next to a solid barrier [144]. However, the modeling for this configuration also showed significant increases in on-road particle concentrations.

A recent study has also investigated the effect of tree stands on indoor PM levels. While being indoors provides some protection from pollution exposure, Maher et al. [145] found that trees planted outside the home can provide substantial reductions in PM inside the home (>50 percent reduction).

It is worth noting that these measurement studies take advantage of existing tree stands or vegetative barriers with various densities, plant species, leaf shapes, and other variables, and it is difficult to isolate the variables that most strongly contribute to potential air quality improvement. In addition, these studies have been mostly conducted in the U.K. or on the east coast of the U.S., and the greatest effectiveness has been observed with extremely dense vegetative stands that provide a solid barrier (with no gaps, from ground-level to top of the canopy) between roadways and people that live or spend time in near roadway environments.

A recent ARB-funded study examined vegetation in combination with solid barriers in California. At the time of the writing of this Technical Advisory, the final report on the study was not yet available, but upon finalization, it will be published at the associated ARB Research webpage.[26] Measurements from the study show that the combination of vegetation (trees) and soundwalls is associated with a reduction in BC, UFP, PM2.5, and NO_X concentrations, when ideal or perpendicular wind conditions are present. The concentration reductions vary from 4.8 percent to 28 percent, depending on the location and wind conditions. The study looked at many wind conditions outside of the simple perpendicular wind pattern and found that the soundwall/tree combination barrier may have little or no effect in very high wind cases and in parallel wind cases. A useful table summarizing conditions and measured values will appear in the final report. Additionally, the research project included the development of a model to estimate the reduction in pollution concentrations for combined soundwall and vegetation barriers. This model will also be made publicly available when this project is finalized later in 2017.

Appropriate context & other considerations

While much research is still underway to assess the effectiveness of vegetative barriers and solid barriers plus vegetation as a means for reducing near-roadway pollution concentrations, the U.S. EPA has synthesized research to date into a recent publication, "Recommendations for Constructing Roadside Vegetation Barriers to Improve Near-Road Air Quality."[27] The document summarizes research findings on the best practices for building roadside vegetative barriers to improve air quality, and includes examples of effective and ineffective vegetative barrier designs and also discussions of vegetation characteristics and how these may affect exposure reduction potential. Specifically, the document emphasizes that higher and thicker vegetation results in the greatest downwind pollution reduction. Research has shown that pollutants can meander around edges and through gaps, so vegetation should be densely planted and well-maintained to prevent gaps created by dead or dying trees. Figure 6, from U.S. EPA's publication provides examples of (a) effective barriers that have full coverage from ground to top of canopy and (b) ineffective vegetation barriers that may result in increased pollutant concentrations because of gaps and edge effects.

26 *https://www.arb.ca.gov/research/single-project.php?row_id=65195*
27 *https://www.epa.gov/air-research/recommendations-constructing-roadside-vegetation-barriers-improve-near-road-air-quality*.

Figure 6: Examples of effective and ineffective vegetative barriers. Image: U.S. EPA 2016.



This document also highlights a variety of non-air quality related considerations that should be weighed when considering planting trees or vegetation to mitigate pollution near high-volumes roadways. One important consideration is what to install and where to install it order to minimize potential negative impacts, including allergen production, water need, cost, and safety hazards. The overarching best management practice for urban forestry is to plant a diversity of species in accordance with the 30/20/10 rule: no more than 30 percent of trees should be species within the

same family, no more than 20 percent should be from the same genus, and no more than 10 percent should be the same species. Diversity not only reduces concentrations of allergens, but also protects against pests, invasive species, climate change, and severe weather.

In February 2017, the Sacramento Metropolitan Air Quality Management District released a draft document, "Landscaping Guidance for Improving Air Quality near Roadways."[28] The document translates findings and recommendations from the above mentioned U.S. EPA document so that they can be applied in the unique conditions and circumstances found in the Sacramento region.

For tree installations, CAL FIRE and the USDA Forest Service have funded the Urban Forest Ecosystems Institute website, which includes a tree selection software tool called Selectree.[29] This online tool allows users to search for low allergen and drought resistant trees and to select for other characteristics that best fit the context of where they will be planted. To avoid over- or under-watering trees, "Save Our Water and Our Trees" guidance can be consulted.[30] Planners should also consult with their local air quality management district to see if it provides additional recommendations for this type of strategy.

As stated in the research summary above, wind conditions—including wind speed and direction—influence the effect of adding vegetation to a solid barrier. The local meteorological conditions displayed in a wind rose can help planners decide how much of an air quality benefit can be realized from the addition of trees to a soundwall. Some communities prefer to plant low growing vegetation near soundwalls or near freeways out of concerns for pedestrian safety, to reduce shelter for vermin, and to discourage illegal camping.

A potential co-benefit is the possibility that this action may help to mitigate the urban heat island effect.[31] If trees or vegetation replace or are installed over non-reflective, heat-absorbing surfaces, they can reflect light that may have otherwise been converted into heat. This reduction in heat can have important air quality and energy use benefits, since it may translate to reductions in the use of electricity for air conditioning. Additionally, trees and vegetation can encourage outdoor activity, walking and other non-vehicle modes, and improve the street aesthetic.

While trees and vegetation can increase pollutant dispersion and thereby improve air quality, some studies show that they can increase street-level pollutant levels under certain circumstances. The effectiveness of trees in mitigating pollution in urban street canyons depends on three major factors: (1) ventilation, (2) tree planting density/size of canopy, and (3) street width to building height ratio. In street canyons, roadside vegetation may lead to increased pollutant levels in the street canyon at the street level, as the presence of trees can reduce ventilation, effectively trapping pollutants in the canyon; this aerodynamic effect has been shown to be much stronger than the pollutant removal from trees [146]. Increasing tree planting density reduces the effect of ventilation and can result in increased pollutant concentrations under the tree canopy [117, 147-149]. Larger tree crowns were associated with increasing concentrations [150]. However, increased ventilation can mitigate these effects [117, 149]. In addition to ventilation, the ratio of building height to street width (h/w) also is an important variable in describing the effect of trees in an urban canyon. Large h/w ratios reduce the trapping effect of trees by increasing ventilation in the local area [147, 149]. Finally, some tree species may contribute to the worsening of air quality by producing VOCs that can lead to ozone formation [151]. These species should be avoided, and online tools and expert consultations are helpful resources for planners as they choose tree species for installation.

28 *http://www.airquality.org/Residents/CEQA-Land-Use-Planning/Roadway-Protocol*
29 *http://ufei.calpoly.edu/index.lasso*
30 *http://saveourwater.com/what-you-can-do/tips/landscaping/save-our-water-and-our-trees/*
31 Urban air temperature is elevated compared to rural areas because of the prevalence of roofs and pavements that absorb heat and radiate it back into the ambient environment.

Strategies that remove pollution from the air

7: Indoor high efficiency filtration

FINDING: Studies show that particle filtration systems and devices, specifically high-efficiency filtration with mechanical ventilation or portable high efficiency air cleaners, can be highly effective for reducing indoor pollution concentrations. High efficiency filters in ventilation systems, for example, can remove 50-99 percent of particles in the air. However, research shows that filtration technologies for gaseous pollutants (VOCs) are variable in their effectiveness; some remove certain VOCs well, but not others.

APPROPRIATE CONTEXT & OTHER CONSIDERATIONS: Planners should be aware of current state and local building codes and their respective air filtration requirements, including requirements for amending code standards. Regular operation and maintenance is necessary for highest filter and ventilation efficiency, and is required by regulation in commercial buildings.

Reducing the entry of air pollutants into indoor environments from nearby roadways is critical for mitigating adverse health impacts. Research shows that both high efficiency filtration in central ventilation systems and portable air cleaners can effectively remove particles in most circumstances. Depending on particle size and other factors, central ventilation systems with high efficiency filtration remove about 50-99 percent and portable air cleaners remove about 30-90 percent of the particles in the air. Unlike particle filtration, filtration technologies for gaseous pollutants can be useful in some circumstances but generally are not as effective as particle filters.

Filter efficiency is rated using several scales, the most common of which is the minimum efficiency reporting value (MERV) rating system. A table illustrating the features and characteristics of MERV rated filters can be found in Appendix B. Flat, one-inch fiberglass filters are the most commonly used filters in residential heating and air systems. They remove only a portion of the largest particles in the airstream that passes through the filter and are typically rated no higher than MERV 4. MERV 5 to MERV 8 filters are medium efficiency filters that remove some additional types of particles such as mold spores and cat and dog dander, but they still do not remove the finer particles produced on roadways. MERV 9 to MERV 12 filters begin to remove particles in the smaller fraction of PM2.5. Higher efficiency MERV 13 to MERV 16 filters remove a portion of the ultrafine and submicron particles emitted from vehicles. True HEPA (high efficiency particulate arrestance) filters—equivalent to MERV 17 to MERV 20—remove 99.97 percent to 99.999 percent of particles less than 0.3 microns (μm). HEPA filters are available for use in residential applications, but they are not yet in widespread use in residences.

High efficiency filtration with mechanical ventilation

Mechanical ventilation integrated with in-duct filters removes some air pollutants when outdoor air passes through the filters and through deposition in the ducts. The amount of air pollutants removed depends on the air flow passing through the filters and the filtration efficiency of the filters. The performance of high efficiency filtration with mechanical ventilation has been evaluated by both field measurements and modeling simulations for residences, schools, and commercial buildings.

In residences, field studies of high efficiency filtration with mechanical ventilation have found that these systems can reduce air pollutants of outdoor origin by 50-98 percent [152-154]. In a seven-home study in northern California, Bhangar et al. [152] found that when filtration was active (systems turned on) at the two homes with active filtration in a mechanical system, the portion of indoor particles from outdoors was lower by 54 percent and 74 percent respectively, than when they were turned off (no filtration). In the most recent ARB-funded study in a test

home, Singer et al. [154] measured indoor reductions of incoming outdoor PM2.5 particles up to 97-98 percent with MERV 16 filtration on a supply ventilation system and one central ventilation system configuration. MacIntosh et al. [155] measured particle removal rates of various in-duct filters that varied in thickness and found that, compared to a 1-inch filter, using a 5-inch MERV 8 filter increased the PM2.5 removal rates by 4.6 times. Stephens et al. [156] used four different methods to estimate the particle removal efficiencies of filters in the heating, ventilation, and air conditioning (HVAC) system of a test house, and found that all methods showed significantly higher removal efficiencies for MERV 11 filters than MERV 7 or lower filters across the size range (0.3-10 µm) measured, by about 20-50 percent. Modeling simulations show similar results. Brown et al. [157] found that, compared to a MERV 1 fiberglass filter, a MERV 12 or higher filter can effectively remove 63-76 percent more PM2.5 of outdoor origin. Using the same model as Brown et al., MacIntosh et al. [158] found an indoor/outdoor ratio of 0.1 for PM2.5 (a reduction of 90 percent) for homes with a high efficiency electrostatic air cleaner in the HVAC systems. This was significantly lower than the ratio of 0.35 (65 percent reduction) found in homes with a one-inch media filter and 0.57 (43 percent reduction) for homes with natural ventilation.

Although the MERV rating system does not specify removal efficiencies for particles smaller than 0.3 µm in diameter, a few studies have evaluated the performance of high efficiency filtration on UFPs. In a recent study of various filtration levels and types of mechanical ventilation in a test home, Singer et al. found good removal of UFP, including up to 99 percent removal of incoming UFP from the outdoors with a MERV 16 filter on either a supply ventilation system or a central system [154]. The researchers also measured air flow resistance for the highest MERV filters tested, and found that it was not an issue; a deep pleat MERV16 filter reduced airflow by just 2.7 percent and a 1-inch MERV13 filter reduced airflow by 4.9 percent. Stephens and Siegel [159] found that achieving substantial removal of UFPs in real residential environments (>50 percent removal efficiency) requires higher efficiency filters (e.g., MERV 13 or higher) than those typically used in homes. A field study in a radio station surrounded by busy roads in Australia showed that adding a MERV 7-8 equivalent pre-filter and a MERV 14-15 equivalent filter to the HVAC system increased overall removal efficiency for UFPs by 48 percent [160]. In a modeling study, Azimi et al. [161] used about 200 outdoor particle size distributions and the single-pass filter removal efficiencies obtained from the literature to estimate the removal efficiencies for UFPs of outdoor origin. This study found that, assuming an HVAC system operates with 100 percent outdoor air, the UFP removal efficiencies for MERV 16 or higher filters were over 98 percent, compared to 12 percent for MERV 7 or lower filters.

Similar findings on high efficiency filtration with mechanical ventilation were also reported in schools and other commercial buildings. In a study of a single school in Utah, indoor submicron particle counts were reduced to just one-eighth of the outdoor levels in a building with a mechanical system using a MERV 8 filter, indicating substantial protection of air filtration in the HVAC system against exposure to outdoor submicron particles [162]. In a pilot study in three southern California schools, a combination of MERV 16 filters used as a replacement for the normal panel filter in the ventilation system and in a separate filtration unit reduced indoor levels of outdoor-generated black carbon, UFPs and PM2.5 by 87-96 percent [163]. Use of the MERV 16 panel filter alone in the HVAC system achieved average particle reductions of nearly 90 percent. Wu et al. [164] found that in small and medium commercial buildings, indoor/outdoor ratios of black carbon were lower for those with MERV 6-8 filters in the HVAC systems, compared to the building with MERV 4 or lower filters, although the difference was not statistically significant. Zaatari et al. [165] estimated that the removal efficiencies of PM2.5 for the rooftop HVAC units in commercial buildings increased by 2.9-3.8 times after upgrading filters from MERV 8 to MERV 13-14.

High efficiency portable air cleaning devices

For homes and schools without forced air HVAC systems, portable or stand-alone air cleaning devices can be used to provide filtration. When portable air cleaners use high efficiency or HEPA filters and are appropriately sized for the space to be treated, they can typically achieve 30-60 percent removal of particles and sometimes up to 90 percent removal [166-169]. In the pilot study conducted in three southern California schools (discussed above), a large stand-alone air cleaner with MERV 16 filters reduced black carbon, UFP and PM2.5 by 90 percent or more, and PM2.5 mass by 75 percent, when the HVAC system was not running [163]. However, portable air cleaning devices are generally not as capable as in-duct air cleaners and those associated with mechanical ventilation systems for cleaning large areas. The review by Sublett [170] indicated that portable air cleaners with HEPA filters can lower particle levels indoors, but their effectiveness is limited to a single room and not the entire dwelling. The results from the field study by MacIntosh et al. [155] showed that five portable HEPA air cleaners operating at the same time were needed to achieve the same PM2.5 removal rate of an in-duct MERV 8 filter in a test house.

Appropriate context & other considerations

There are several California state building codes that relate to indoor air filtration in residences and commercial buildings, including offices. For workplaces, State regulation (California Labor Code, Title 8, Section 5142) requires that mechanical ventilation systems be operated as designed to provide the required amounts of outdoor air exchange during occupied periods. This includes properly servicing and maintaining filtration equipment. For residences, California building codes [2016 California Energy Code, Section 150.0 (m)(12)(B)] require mechanical ventilation in new construction; however, the current building code only requires a minimum filtration efficiency of MERV 6, which is rated lower than what is likely needed to adequately protect residents' health when homes are located near roadways. Local jurisdictions and planners should consider opportunities to revise local codes to include recommendations that filtration with a higher efficiency rating be installed when new housing is planned near roadways. Installation at the time of construction involves minimal incremental costs (equal to a two-inch or larger filter slot vs. the typical one-inch slot) and costs less than retrofitting existing buildings. Airflow resistance issues can be avoided by using deeper pleat filters, and there are high efficiency filters on the market that do not produce airflow resistance issues. This is true for retrofitting existing buildings as well, although costs may be higher depending on the nature and extent of the retrofit. The 2016 California Energy Code [Section 150.0 (m)(12)(C)] also requires mechanical systems, including heating and air conditioning systems, to be designed to accommodate the system's air filter media rated pressure drop for the system design airflow rate. Planners should also consult with their local air quality management district to see if it provides additional recommendations for this type of strategy.

Stand-alone air cleaners are less relevant for new homes which are now required to include mechanical ventilation, but good quality high-efficiency portable models can be useful in reducing indoor exposure to pollutants in existing homes that do not have mechanical ventilation. Also, they can be useful in homes that use bathroom exhaust type mechanical ventilation systems, which by their design cannot incorporate filtration of the incoming air because the supply air enters through leakage points throughout the building.

In general, particles are typically of greatest concern and pose the highest health risk, so HEPA filtration is likely to provide the highest degree of public health protection in near-roadway buildings. However, when VOC levels are of concern for a specific site, planners should consider additional options and consult with filtration experts. As described in more detail in Appendix A, adsorption using activated charcoal, sometimes with a catalyst such as potassium permanganate, is most commonly used, and while its effectiveness varies, it generally reduces VOCs, including VOCs commonly emitted from vehicles such as benzene and xylenes. Other methods may effectively reduce gaseous pollutants, but they also present the possibility of producing harmful byproducts. These technologies should be used with caution and in consultation with indoor air quality and filtration experts. Those seeking information on air cleaning devices can also consult

the ARB document, "Air Cleaning Devices for the Home: Frequently Asked Questions."[32] The document discusses situations where an air cleaning device can help improve indoor air quality describes central system filtration and portable air cleaning technologies and the benefits of each.

Indoor high efficiency filtration is linked to a number of co-benefits. First, filtration can help reduce the dust and soot that collects in building interiors, making it easier to maintain a clean and hygienic environment. Additionally, some studies have shown improved employee health and reduced absences with reduced exposure to pollution. Indoor filtration is among a very small number of exposure reduction strategies that can be implemented in existing buildings.

32 *https://www.arb.ca.gov/research/indoor/acdsumm.pdf*

III. Conclusions

The implementation of SB 375 and other long-range land use and transportation planning efforts are important for California to meet its greenhouse gas emission reduction goals, to reduce pollution, to protect natural and working lands, and to promote equity and environmental justice. Many of these efforts focus on increasing development density as a means to reduce the frequency and length of automobile trips. In addition, greater density facilitates alternative modes of transportation, including transit, biking, and walking.

In some parts of the state, efforts to increase development density may result in infill development located near high-traffic roadways. The people that spend time in and around buildings located on these infill parcels will likely experience heightened exposures to traffic emissions, even as the vehicle fleet gets cleaner over time. Decades of research show an association between exposure to traffic emissions and serious health impacts, including cardiovascular and respiratory impacts. For new development, setbacks and buffers separating roadways from housing, offices, and other uses have been the primary defense against traffic emissions exposure and its public health impacts. This is largely because the distance-decay gradients for traffic-related pollutants is well studied and understood, and setbacks and buffers are effective ways to protect against the public health impacts of traffic pollution. However, given the significant population already living near high-volume roadways, and with the growing need to develop infill parcels to meet other state goals, ARB has funded and examined research that assesses other ways to reduce pollution exposure in near-roadway developments.

As this document shows, there are a variety of scientifically supported strategies to reduce near-roadway pollution exposure. Not only are these strategies well-studied and consistently effective, but they also fall into diverse categories. Urban design characteristics, roadside features, street design and traffic management strategies, and pollutant removal technologies outlined in this document give local planners and decision-makers options and thus the opportunity to find a strategy that best fits the local context.

As emphasized throughout this document, however, it is important that planners and decision-makers consider a variety of variables and tradeoffs when deciding which exposure reduction strategies make the most sense. Important points for consideration include (but are not limited to) the following:

- Site specific factors and conditions;
- Potential co-benefits, drawbacks, and direct and indirect effects;
- Interaction of the exposure reduction strategy with other local, regional, and state goals and policies;
- Community well-being and concerns, including safety and equity;
- Long-term effects of implementing strategies;
- Importance of implementing strategies in concert to enhance their effectiveness; and
- Other policies may need to be implemented concurrently to counter any potential drawbacks of the near-roadway strategy.

Many resources are available to assist local governments and other stakeholders to help them determine which exposure reduction strategies are appropriate for their community, including documents and guidance mentioned throughout this report. Various public and non-

governmental agencies may also be able to provide expert assistance, including ARB, Caltrans, the Office of Planning and Research, CA Department of Housing and Community Development, CAL FIRE, CA Department of Public Health, FHWA, U.S. EPA, MPOs, regional air districts, and local community groups.

Finally, many studies exploring this topic are currently underway and more will be published in the years to come. ARB will continue to review and analyze this research on a periodic basis. Updates to this document will be posted to ARB's website at: *https://www.arb.ca.gov/ch/landuse.htm*.

Appendix A: Strategies not meeting ARB's criteria at this time

This appendix contains a summary of findings for other potential exposure reduction strategies that ARB evaluated in its review of scientific, peer-reviewed literature. The following are not included in the main section of this document because they did not meet all of the following criteria at the time of the 2016 literature review.

1. Consistent findings from multiple studies support the strategy as a means for reducing pollution concentrations or emissions rates or for improving air flow to disperse pollutants.
2. Significant evidence of effective emissions reductions is documented in the scientific literature.
3. Diversity in the study methods supports consistent findings (such that strategies do not exclusively rely on one method of investigation).

The table that precedes each strategy indicates the criteria that were (þ) and were not (o) met.

Strategies that reduce traffic emissions

Onboard traffic signal system

☐	Criterion 1	Consistent findings from multiple studies support the strategy as a means for reducing pollution concentrations, etc.
☑	Criterion 2	Significant evidence of effective emissions reductions is documented in the scientific literature.
☐	Criterion 3	Diversity in the study methods supports consistent findings (such that strategies do not exclusively rely on one method).

To reduce the stop-and-go activities at intersections, in-vehicle signal systems that help drivers anticipate signals and speed limit have been introduced. One in-vehicle advanced driving alert system (ADAS) which provides real time information on traffic signal status to help drivers avoid hard braking at intersections was investigated for its potential to change drivers' behavior and reduce vehicle emissions [171]. A modeling simulation shows that ADAS can help reduce vehicle fuel consumption and CO_2 emissions both by 26-40 percent in a single vehicle in the tested hypothetical conditions. Another in-vehicle signal system which had been studied for its effect on traffic emissions is Intelligent Speed Adaptation (ISA) system [172]. ISA consists of a GPS navigation system that locates a vehicle on a digital map with speed limits for each street, and a device that can control fuel supply. It provides speed limit warnings and can cap the maximum driving speed automatically to comply with speed limits. This study found that with an ISA on board, there was a significant reduction in averge speed, but no statistically significant change in NO_x and PM emissions, and even a small increase in volatile organic compound (VOC) emissions.

Road pricing

☐	Criterion 1	Consistent findings from multiple studies support the strategy as a means for reducing pollution concentrations, etc.
☑	Criterion 2	Significant evidence of effective emissions reductions is documented in the scientific literature.
☑	Criterion 3	Diversity in the study methods supports consistent findings (such that strategies do not exclusively rely on one method).

For a few decades, road pricing has been considered to be an effective way to manage traffic demand and generate revenue. In 1975, Singapore implemented the world's first congestion pricing scheme and since then, pricing schemes have been adopted in many cities worldwide. Road pricing programs, including the London Congestion Charging Scheme (CCS) and the Stockholm Congestion Tax Scheme, have been studied for their roles in reducing vehicular emissions.

Implemented in February 2003, the London Congestion Charging Scheme (CCS) assesses a single charge for vehicles entering a central London zone between 07:00–18:30 on weekdays, with several vehicle types exempt from the charge. Since the program's inception, vehicle kilometers travelled within the zone reduced by 15 percent and the average speed increased by 20 percent. Based on the measurements from a single roadside monitor within the CCS Zone, roadside levels of NO_x and NO dropped by 5 percent and 9.5 percent, respectively, but concentrations of NO_2 and PM10 increased by 2.1 percent and 5.6 percent, respectively [173]. Interestingly, similar changes were observed during the same hours during weekends when the scheme was not operating. This may be due to the exceptional meteorological conditions of 2003, when concentrations of PM10, NO_2 and O_3 were higher than those in 2002, perhaps causing the impacts of the implementation of the CCS zone to be concealed. In an attempt to understand the role meteorology might have played in the observations, a modeling simulation was conducted and found that total NO_x and PM10 emissions in the CCS zone were reduced by 12.0 percent and 11.9 percent, respectively [174]. Furthermore, Tonne et al. [175] conducted more extensive air pollution concentration modeling combining exposure-response relationships from the literature to predict the life expectancy impact of the CCS. This study estimated that 183 years of life per 100,000 people would be gained within the CCS zone.

The Stockholm Congestion Tax Scheme was employed between January 3 and July 31, 2006. Vehicles travelling into and out of the affected area were charged for every passage during weekdays. Based on measured and modelled changes in road traffic, this scheme resulted in a 15 percent reduction in total road use within the affected area. Total traffic emissions of NO_x and PM10 in this area fell by 8.5 and 13 percent, respectively [176]. It was estimated that with a permanent congestion tax system, the annual average NO_x concentrations would drop up to 12 percent and PM10 concentrations would drop up to 7 percent along the most densely trafficked streets.

Low emission zones

☐	Criterion 1	Consistent findings from multiple studies support the strategy as a means for reducing pollution concentrations, etc.
☐	Criterion 2	Significant evidence of effective emissions reductions is documented in the scientific literature.
☑	Criterion 3	Diversity in the study methods supports consistent findings (such that strategies do not exclusively rely on one method).

Low Emission Zones (LEZ) vary in terms of their parameters, but usually involve limiting vehicles into part or all of an urban area. Generally, there are three types of LEZs. An air quality based LEZ triggers action when air quality in the LEZ exceeds or is predicted to exceed a certain threshold. A technology based LEZ restricts certain vehicle types (i.e., vehicles that do not meet certain emission standards) from entering the designated zone. A transport-based LEZ usually aims to restrict, prioritize, and optimize traffic flow in order to reduce emissions.

A London-based study used empirical prediction models to evaluate the impacts of different LEZ scenarios on annual mean NO_2 concentrations in central London [177]. By reducing all road traffic in central London by 10 percent or 20 percent, the concentrations of NO_2 were decreased by 1.4-3.4 percent or 2.9-7.1 percent, respectively. Removing all pre-Euro I cars and light-goods vehicles reduced NO_2 level in London by 1.8-5.2 percent. Further removing all pre-Euro III heavy-goods vehicles and buses reduced NO_2 by 3.6-11.1 percent. A similar regulation implemented in Amsterdam excluded Euro 0, I and II heavy-duty vehicles from entering Amsterdam's Low Emission Zone (LEZA). Data from two monitoring sites within the LEZA showed that the traffic-contributed concentrations decreased by 4.9 percent for NO_2, 5.9 percent for NO_x, 5.8 percent for PM10, 7.7 percent for absorbance, and 12.9 percent for elemental carbon (EC) [178]. Boogaard et al. [179] investigated air pollution at street level before and after implementation of LEZ in the inner-city of five Dutch cities. The Dutch LEZ restricts old heavy-duty vehicles entering the LEZ, including all Euro-0, I, II trucks and Euro-III trucks if older than 8 years or not retrofitted with particle filters. The results showed that the traffic-related pollutants monitored, including 'soot', NO_x, and elemental composition (Cr, Cu, Fe), did not decrease significantly. Only PM2.5 reductions, which fell 30 percent, were large compared to the observed reductions at the corresponding suburban control location (22 percent). While overall, the Dutch study did not find reductions in soot, NO_x, and NO_2, in one urban street where traffic intensity was reduced 50 percent, they were found to be reduced by 41, 36, and 25 percent, respectively, compared to reductions at the suburban control location (22, 14, and 7 percent, respectively). Acero et al. [180] studied the emission reductions related to a minor extension of a pre-existing LEZ. This LEZ is around 0.1 kilometer^2 with 60 percent of the area occupied by buildings. Only resident and commercial vehicles can operate within this LEZ during certain hours. The modeling simulation showed that if the LEZ is extended to include a 170 meter street during weekend, there will be a reduction of 6.4 percent for PM10 and 6.6 percent for NO_2 within the LEZ. But the impact outside the LEZ was negligible.

An extreme case of LEZ is called a pedestrianization scheme, which forbids any vehicles entering a small region, usually a commercial or residential area. Chiquetto [181] analyzed the influence of a pedestrianization scheme in Chester, UK on total vehicle exhaust emissions, local levels of air pollution concentration, and noise from traffic. The results showed that the pedestrianization scheme reduced air pollution in the pedestrian area 70-80 percent. However, the subsequent re-routing of traffic increased average air pollutant concentrations in the city as a whole by 6 percent.

Road surface designs

☐	Criterion 1	Consistent findings from multiple studies support the strategy as a means for reducing pollution concentrations, etc.
☑	Criterion 2	Significant evidence of effective emissions reductions is documented in the scientific literature.
☐	Criterion 3	Diversity in the study methods supports consistent findings (such that strategies do not exclusively rely on one method).

Special road surface designs, including speed humps and bumps, pavement treatments, chicanes, and raised crosswalks and speed tables have been used for decades to reduce driving speed and improve pedestrian safety. Most drivers will slow down when driving over these structures, which results in a series of accelerations and decelerations, and are anticipated to have adverse impact on vehicle emissions. A few studies have investigated the impacts of some road surface designs on emissions from vehicles driving on roadways. A case study in Gothenburg, Sweden used a simulation model to investigate the environmental impacts of speed humps for different traffic intensities and driving speed limits and found that speed humps increased fuel consumption estimates by 3-19 percent. Accordingly, the introduction of speed bumps increased the emissions from a singular vehicle by 7-62 percent for HC, 0.4-32 percent for CO, and 5-26 percent for NO_x [182]. Similarly, Ahn and Rakha [53] simulated vehicle emissions using vehicle driving data and energy and emission modeling, and found the installation of speed humps and bumps increased fuel consumption by 53 percent, and the emissions of HC, CO, NO_x, and CO_2 by 51, 44, 110, and 52 percent, respectively.

Strategies that increase dispersion of traffic pollution

Taller buildings/pollution dispersion along vertical gradients

☐	Criterion 1	Consistent findings from multiple studies support the strategy as a means for reducing pollution concentrations, etc.
☑	Criterion 2	Significant evidence of effective emissions reductions is documented in the scientific literature.
☑	Criterion 3	Diversity in the study methods supports consistent findings (such that strategies do not exclusively rely on one method).

A handful of studies have examined how pollution concentrations change along a vertical gradient with increasing distance from ground-level. These studies help to shed light on exposure levels that may be experienced by people that spend prolonged periods of time above ground-level along street corridors (e.g., in offices, homes, etc.).

Morawska et al. [183] examined both horizontal and vertical pollutant concentration gradients near busy roadways in Brisbane, Australia (not an urban canyon site). The researchers found that fine and ultrafine particle concentrations outside buildings with 9 to 26 stories were not significant and can be highly variable, depending on other local sources and local meteorological conditions. Also, they found no correlation between particle concentration and height for buildings 15 meters or more from the freeway. For buildings in the immediate proximity of the roadway, pollutant concentrations throughout the building envelope were very high, comparable to those in the immediate vicinity of the road, indicating that undiluted concentrations drawn directly from the freeway encircled the buildings.

In contrast, several studies from urban areas in Asia show statistically significant reductions in pollutant concentrations with increasing distance from ground-level [184-186]. However, for some

pollutants (e.g. polycyclic aromatic hydrocarbons, PAHs, and PM2.5), the attenuation rate slows above a certain threshold, indicating that concentrations drop off more sharply closer to pollution sources. In a study conducted in Macao, China, Wu et al. [184] found that the mass concentrations of PM10, PM2.5, and PM1 decreased by 40, 38, and 20 percent respectively at 79 meters (~26 floors) above ground level, and maximum mass concentrations were measured at 2 meters above the ground. Li et al. [185] studied changes in PM2.5 and PAH concentrations along a vertical gradient at a residential building adjacent to a busy roadway in Guangzhou, China. The study found that both pollutants decreased significantly at heights above ground level at an urban study site. At 24 meters (~8 stories), PM2.5 concentrations had decreased by 36 percent from the maximum, but the rate of decrease slowed at a height of 36 meters (~12 stories). PAH concentrations showed a similar vertical tapering off; at a height of 33 meters (~11 stories), PAH concentrations had fallen to 51 percent of the maximum. Tao et al. [186] confirmed these prior results via measurements collected along a meteorological tower in Beijing during the winter.

Recent studies in the U.S. agree with the directionality of these Asian studies but differ in the magnitude of the pollutant concentration reductions observed. Wu et al. [187] studied particle number concentration and particulate matter mass concentration by hoisting instruments up the vertical face of an 11-story (35 meter) building in Boston's Chinatown. The researchers found that particle number concentration decreased by 7.7 percent and PM2.5 concentration decreased 3.6 percent with increasing height from 0 to 35 meters. Another study in New York found that outdoor black carbon and polycyclic aromatic hydrocarbons were significantly reduced for floors 6 through 32 during the non-heating season only [188]. Researchers also measured the highest median concentrations for outdoor pollutants at floors 3 to 5, but this trend was not statistically significant and the elevated pollutants were believed to come from nearby rooftop exhausts.

Finally, in a modeling study, Zhou and Levy [189] found that—in a street canyon with a height of 60 meters and a width of 30 meters—approximately 30 percent of the ground-level concentrations of PM10, PM2.5, CO, and NO remains at the top of the street canyon. For NO_2, 50 percent of the ground-level concentration remains at the top of the street canyon. Overall, the sharpest decline in pollutant concentration occurred within 15 meters (~50 feet) of the ground.

While the research literature shows that transportation related pollutants may decline with increasing distance from the roadway along a vertical gradient, there are many other factors at play, including local meteorological conditions, seasonal differences, and other local pollution sources. Studies that observed higher concentrations several floors up attributed these to other pollution sources, like exhaust vents on adjacent buildings. Thus, while multi-story housing may reduce exposure in some situations, further research is needed to determine conditions under which tall buildings might provide a reliable approach to reduce exposure near busy roadways.

Air intake location

☑	Criterion 1	Consistent findings from multiple studies support the strategy as a means for reducing pollution concentrations, etc.
☐	Criterion 2	Significant evidence of effective emissions reductions is documented in the scientific literature.
☑	Criterion 3	Diversity in the study methods supports consistent findings (such that strategies do not exclusively rely on one method).

Although locating air intakes for mechanical ventilation systems on the opposite side of the building from the nearby outdoor source and prevailing wind direction seems logical, there is little scientific evidence that this practice results in significant indoor air quality improvement, and the limited research indicates that many site-specific factors influence effectiveness. Specifically, the reduction of pollutant entry depends on the distance of the intake from the outdoor source, the consistency of the prevailing wind direction, and any local geographical or

structural objects that might produce wind turbulence or eddies near the building and the air intake. It is likely that moving the air intake would be somewhat beneficial if the outdoor source is very near the intake and the intake is moved fairly far away. Otherwise, because particles tend to disperse quickly and particle plumes "flow" around buildings, elevated particle concentrations around the building will be fairly consistent. Also, according to the abovementioned Australian study, researchers found consistently high submicron particle concentrations enveloping a building located within 15 meters of the roadway [183]. Thus, while there may be some benefit to moving the intake in certain circumstances, that benefit likely will be very small, and is not reliable or quantifiable at this time.

Roadway elevation

☐	Criterion 1	Consistent findings from multiple studies support the strategy as a means for reducing pollution concentrations, etc.
☐	Criterion 2	Significant evidence of effective emissions reductions is documented in the scientific literature.
☑	Criterion 3	Diversity in the study methods supports consistent findings (such that strategies do not exclusively rely on one method).

Elevation of the road surface plays an important role in the transport and dispersion of traffic-emitted air pollutants in the near-road environment [190]. A wind tunnel study indicates that at-grade roadways experience the least amount of pollutant mixing if no other structures exist near the road, while depressed or elevated roadways result in higher pollutant mixing and dispersion, and therefore lower near-road concentrations of air pollutants [129]. Field measurements have also evaluated the impact of road grade on local air pollution, finding depressed configurations are associated with lower pollutant levels for downwind near-road environments. For instance, size-resolved PM samples collected upwind and downwind of five urban freeways in Los Angeles, CA with different road configurations (i.e., at-grade, sloped depressed section, and elevated fill section) indicated that depressed sections resulted in lower downwind concentration [191]. Similarly, a study in Santa Monica, CA investigated particulate dispersion from highways located along depressed sections, and found lower near-road pollutant concentrations compared with theoretical dispersion model predictions for at-grade roadways [192]. By monitoring PM2.5, NO_x, elemental carbon, and particle number concentration, one study in Antwerp, Belgium found that taking into account confounding parameters (i.e., time of day, day of the week, distance to the road and wind speed), the contribution of traffic to air pollutant concentrations in the near-roadway environment is significantly higher for a ground level motorway than a motorway flyover [193]. Similarly, a study by Nikolaou et al. [194] found that elevated freeways had slightly lower levels of near-road pollution while depressed freeways were similar to at-grade roads.

Sidewalk and bicycle lane placement

☐	Criterion 1	Consistent findings from multiple studies support the strategy as a means for reducing pollution concentrations, etc.
☑	Criterion 2	Significant evidence of effective emissions reductions is documented in the scientific literature.
☑	Criterion 3	Diversity in the study methods supports consistent findings (such that strategies do not exclusively rely on one method).

The separation of a pedestrian or cyclist from the roadway may be an effective mitigation measure for walkers and bikers, but not necessarily for people that dwell in buildings near-roadways.

Studies have shown that route choice (walking or biking on less trafficked roads) or location of a walkway or bike lane with respect to a busy roadway (at or below grade, roadside boundary wall or parked cars separating street from foot path) can significantly reduce exposure to air pollution [126, 195-198]. McNabola et al. [126] found that PM2.5 levels on a boardwalk 1-3 meters from the road were almost three times lower than PM2.5 levels on a sidewalk immediately adjacent to the road. Kendrick et al. [196] conducted a similar study in Seattle with bicycle lanes adjacent to the roadway or a few meters away, separated by parked cars. They found up to 40 percent reduction in UFP concentrations when the bicycle lane was further away from the road.

Proper route choice and time of commute can also reduce exposure. In Copenhagen, Hertel et al. [195] not only found that low trafficked routes were beneficial in terms of air pollutant exposure, travel during non-rush hour commutes also reduced exposures by 5-20 percent. In Australia, a study showed UFP concentrations that are two times higher on average on routes with high traffic [197]. Such studies suggest alternate routes and commute times may reduce exposure to traffic-related pollutants. Hatzopoulou et al. [198] developed a web-based planning tool to reduce such exposures for cyclists in Montreal and found that decreased exposure could be achieved with only a small increase in overall route length.

Truck rerouting

☐	Criterion 1	Consistent findings from multiple studies support the strategy as a means for reducing pollution concentrations, etc.
☑	Criterion 2	Significant evidence of effective emissions reductions is documented in the scientific literature.
☑	Criterion 3	Diversity in the study methods supports consistent findings (such that strategies do not exclusively rely on one method).

Field measurements before and after local traffic rerouting interventions were in place agree that these interventions improve local air quality [199, 200]. After a by-pass was operational in North Wales, PM concentrations decreased between 23-29 percent in nearby residential streets as heavy-duty traffic decreased almost in half [200]. Similarly, opening of a tunnel in Australia led to a redistribution of NO_2 concentrations with the greatest decrease occurring along the bypassed main road [199]. Modeling studies have confirmed that rerouting traffic decreases localized air pollution [201, 202]. For example, rerouting trucks weighing over 5 tons away from residential streets in San Diego, CA is estimated to have decreased diesel particulate matter by 99 percent near residences and schools [201]. Truck restrictions in the Philippines were also shown to have decreased CO, NO_x, and PM in the zone closest to the restrictions [202]. Despite local improvements in air quality, regional emissions increased because trucks were required to drive longer distances [199-202]. Because air pollutant concentrations decline with distance as one moves away from heavily trafficked roads [17], the improvements from these local interventions are expected to be limited to about 500 feet from the intervention site. Therefore, these local traffic interventions could have a significant impact in areas with a high density of residences, schools, or hospitals nearby. However, results from a health questionnaire indicate that health improvements of residents were fairly modest after trucks were rerouted off the local streets through a by-pass [200].

A microscopic modeling study of freeway traffic emissions determined that hydrocarbon, CO, and NO_x emissions from heavy-duty vehicles during road-work congestion were highest followed by rush-hour congestion compared with periods of free-flowing traffic [203]. External parameters that impact CO_2 truck emissions include travel speed, road gradient, whether congestion is present, temperature, wind, and road surface [204].

Strategies that remove pollution from the air

Removal of gaseous pollutants by filtration

☐	Criterion 1	Consistent findings from multiple studies support the strategy as a means for reducing pollution concentrations, etc.
☐	Criterion 2	Significant evidence of effective emissions reductions is documented in the scientific literature.
☑	Criterion 3	Diversity in the study methods supports consistent findings (such that strategies do not exclusively rely on one method).

As pointed out in the review by Zhang et al. [205], mechanical filters can efficiently remove particles, but are not as effective for gaseous pollutants. Many technologies have been developed to address indoor air quality issues related to gaseous pollutants. One of the most common methods is adsorption whereby the pollutant is transferred from a gaseous phase to a solid phase, usually via activated carbon. Because a wide range of gaseous pollutants with different attractive forces to different sorbents are present indoors, and testing conditions such as temperature and relative humidity differed, the removal efficiencies of adsorption reported in the literature vary greatly. In the study by Batterman et al. [206], a portable air cleaner with an activated carbon pre-filter and a HEPA filter removed 30-70 percent of particles in cigarette smokers' houses, but did not change the concentration of volatile organic chemicals (VOCs). Chen et al. [207] tested the initial performance of 15 air cleaners with a mixture of 16 representative VOCs in a chamber study, and found that sorption filtration removed some but not all VOCs (light and very volatile gases such as aldehydes and dichloromethane were not well removed). However, devices that included sorption media such as activated alumina impregnated with potassium permanganate showed better VOC removal efficiencies. Using a modeling analysis, Sidheswaran et al. [208] estimated that the combination of using activated carbon fiber filters for air cleaning in HVAC systems and a 50 percent reduction in ventilation could decrease indoor concentrations of VOCs by 60-80 percent and reduce formaldehyde concentrations by 12-40 percent. In the southern California schools study discussed above, the stand-alone unit used in one of the schools included charcoal sorbent for removal of gaseous pollutants; it removed 52 percent of the benzene indoors and 15 percent of total VOCs when operated with the HVAC turned off [163]. In addition to activated carbon, various adsorbents for VOC removal had been studied, but their removal efficiencies under real world conditions were not conclusive [209-212].

Other available technologies for gaseous pollutant removal include photocatalytic oxidation (PCO), ozone-oxidation, non-thermal plasma, and other technologies. PCO systems combine ultraviolet rays with a catalyst, usually a titanium oxide-coated filter. This interaction produces highly reactive electrons that in turn combine with and break down VOCs and other pollutants in the air. Hodgson et al. [213] found that, when challenged with complex VOC mixtures, ultraviolet PCO systems achieved 20-80 percent VOC conversion efficiencies. However, due to incomplete mineralization of common VOCs, this device also produced formaldehyde, acetaldehyde, acetone, formic acid and acetic acid as by-products. The formation of secondary air pollutants was also reported in a recent ARB-funded study [214]. Ozone oxidation is generally not recommended as a means for removing gaseous pollutants in indoor environments because the oxidation process can produce other air pollutants like formaldehyde and UFPs, which also have serious adverse health impacts [215-217]. To protect Californians from adverse health effects related to ozone-emitting air cleaning devices, ARB adopted a regulation in September 2007 to limit the ozone emissions from indoor air cleaning devices to no more than 50 ppb.[33] Non-thermal plasma has been found to effectively remove VOCs in some laboratory studies. Quoc An et al. [218] reported that the toluene removal efficiencies were in the 55-60 percent range with non-thermal plasma only, and increased to 96 percent when combined with a catalyst. But removal efficiencies of

33 *https://www.arb.ca.gov/regs/regs-17.htm*

this technology were much lower under real world conditions, and like PCO, the process can also produce harmful byproducts, including aldehydes and ketones. The ARB-funded study discussed above [219] also tested a plasma generator. While the device removed 29 percent of VOCs from the chamber, small amounts of ozone and formaldehyde were emitted.

Overall, the literature shows highly variable removal efficiencies for gaseous pollutants, ranging from 0 to 80 percent. Some technologies have been found to generate harmful by-products during the removal process. Specifically, they either re-emit VOCs that have been removed over time, or emit potentially harmful reaction products from the process during which VOCs are removed. Thus, these VOC removal technologies are not always reliable, and caution should be taken when using these technologies for indoor environments.

Removal of air pollution via vegetation

☑	Criterion 1	Consistent findings from multiple studies support the strategy as a means for reducing pollution concentrations, etc.
☐	Criterion 2	Significant evidence of effective emissions reductions is documented in the scientific literature.
☑	Criterion 3	Diversity in the study methods supports consistent findings (such that strategies do not exclusively rely on one method).

The ability of plants to remove pollutants from the atmosphere depends on absorption and deposition onto vegetative material. The scientific literature contains both modeling and measurement studies that characterize this removal process. An early study indicated that vegetation could effectively absorb gaseous air pollutants including NO_2 and ozone [220]. Later studies have investigated the ability of trees to act as an effective particle sink. A review of the literature [221] and measurement studies [222] found that coniferous species had the greatest potential to capture particles compared to their deciduous counterparts, although the deposition of PM on surfaces by particle size varies with different plant species [223]. For UFPs, the capture efficiency of vegetation tends to decrease with increasing particle size, increasing wind speed, and decreasing packing density, which in wind tunnel studies is the volume fraction of the wind tunnel occupied by the branches [224].

Many studies have modeled the application and effectiveness of vegetation in urban areas to remove pollution by deposition [225-228]. These studies have shown that trees and other vegetation have the ability to remove pollutants from the atmosphere in urban contexts. Separate from such processes; however, some trees can also emit volatile organic compounds (VOCs) that can lead to the formation of ozone [151]. As such, some tree species may be more advantageous than others, in terms of air quality. In the United Kingdom one study suggests an index to rank trees in order of their potential to improve air quality using an atmospheric chemistry model [229]. In this study, researchers used species-specific VOCs emission rates, pollutant deposition rates, and tree cover data to develop an urban tree air quality score. Conifers and silver birch were found to have the highest potential to improve air quality while several deciduous tree species such as oak and poplar had the greatest potential to worsen air quality when planted in large numbers. These results are consistent with other studies discussed previously.

The application of trees and vegetation to remove air pollutants have been studied from a city-wide [230, 231] to microscale (e.g., street canyon) level [232, 233]. Although trees and vegetation have the potential to remove large quantities of air pollutants from ambient air, the process of pollutant removal through dry deposition alone can only improve air quality by a small fraction (<5 percent), particularly in urban areas [225-228, 231, 234, 235]. However, Pugh et al. [236] found that, in the street canyon microenvironment, pollutant removal through green walls and roofs reduced levels of NO_2 and PM by 40-60 percent, respectively. Another study by Baik et al. [232] used computational fluid dynamics (CFD) modeling to illustrate how greening cools surrounding

air to strengthen air flow in a street canyon, thereby reducing pollutant concentrations. These two studies suggest vegetation in the form of green walls and roofs is an effective mitigation measure for reducing exposure to traffic-related pollutants in urban street canyons. However, it is important to note that pollutant removal effectiveness increases as dispersion decreases, so these two mitigation goals may be at odds with one another (e.g., green walls and roofs may be less effective if mitigation to improve pollutant dispersion has been successfully implemented).

Appendix B: Characteristics of MERV-Rated Filters

MERV rating	Removal rate according to average particle size			Typical controlled contaminant or material sources (ASHRAE 52.2)	Typical building applications
	0.3-1.0	1.0-3.0	3.0-10.0		
1-4	—	—	< 20%	> 10 µm textile fibers, dust mites dust, pollen	Window AC units, common residential, minimal filtration
5	—	—	20-35%	3.0-10.0 µm cement dust, mold spores, dusting aids	Industrial workplace, better residential, commercial
8	—	—	> 70%		
9	—	< 50%	> 85%	1.0-3.0 µm legionella, some auto emissions, humidifier dust	Hospital laboratories, better commercial, superior residential
12	—	> 80%	> 90%		
13	< 75%	> 90%	> 90%	0.3 to 1.0 µm bacteria, droplet nuclei (sneeze), most tobacco smoke, insecticide dust	Superior commercial, smoking lounge, hospital care, general surgery
16	> 95%	> 95%	> 95%		
17**	> 99.97%			<0.3 µm (HEPA/ULPA filters)**, viruses, carbon dust, fine combustion smoke	Clean rooms, carcinogenic & radioactive materials, orthopedic surgery
18**	> 99.99%				
19, 20**	> 99.999%				

* Adapted from EPA 2009; originally from ANSI/ASHRAE Standard 52.2-2007.
** Not part of the official ASHRAE Standard 52.2 test, but added by ASHRAE for comparison purposes.

Acronyms

ARB	Air Resources Board
APCD	Air Pollution Control District
AQMD	Air Quality Management District
BAAQMD	Bay Area Air Quality Management District
BC	black carbon
CCS	Congestion Charging Scheme
CFD	computational fluid dynamics
CO	carbon monoxide
CO_2	carbon dioxide
DPM	diesel particulate matter
EC	elemental carbon
FHWA	Federal Highway Administration
GHG	greenhouse gas
HC	hydrocarbon
HDV	heavy-duty vehicle
HEPA	high-efficiency particulate arrestance
HVAC	heating, ventilation, and air conditioning
ICE	Intersection Control Evaluation
ICEV	internal combustion engine vehicle
I/O	ratio of in-cabin to on-roadway pollution concentrations
kph	kilometers per hour
LDV	light-duty vehicle
LEZ	low emission zone
MERV	minimum efficiency reporting value
mph	miles per hour
MPO	metropolitan planning organization
MUTCD	California Manual of Uniform Traffic Control Devices
NCHRP	National Cooperative Highway Research Program
NO_X	mono-nitrogen oxides (NO and NO_2)
OEHHA	Office of Environmental Health Hazard Assessment
PAH	polycyclic aromatic hydrocarbon
PCO	photocatalytic oxidation
PHEV	plug-in electric hybrid vehicle

PM10	particulate matter with an aerodynamic diameter of 10 micrometers or less
PM2.5	particulate matter with an aerodynamic diameter of 2.5 micrometers or less
ppb	parts per billion
ppm	parts per million
RTP	regional transportation plan
SB 375	Senate Bill 375
SCS	Sustainable Communities Strategy
TAC	toxic air contaminants
UFP	ultrafine particulate matter with an aerodynamic diameter of 0.1 micrometers or less
U.S. EPA	United States Environmental Protection Agency
VMT	vehicle miles traveled
VOC	volatile organic compound
ZEV	zero emission vehicle

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Response to Comment 1 in 20240111, Environmental Council Of Sacramento (ECOS)

This introductory comment provides the qualifications of the letter author and does not discuss the adequacy of the EIR/EA. No changes to the Draft EIR/EA are necessary.

Response to Comment 2 in 20240111, Environmental Council Of Sacramento (ECOS)

The commenter proposes consideration of additional alternatives to mitigate environmental impacts including tolling all vehicle lanes with tolling revenue to be used for funding public transit, or higher density housing near transit, tolling vehicles on two lanes in each direction, and toll single occupant vehicles on two lanes each direction. Please refer to Master Response B for responses related to project alternatives considered.

Response to Comment 3 in 20240111, Environmental Council Of Sacramento (ECOS)

The commenter states that the DEIR does not adequately evaluate induced travel, arguing the long-term increases in year 2049 for alternatives 2 and 3 will be much higher than the estimates of 4.2% and 4.3% respectively. The commenter also states the increases of induced VMT and GHG should be fully mitigated and funded, and that the data does not support its conclusions of no or less-than-significant impacts.

Please refer to Master Response A for responses related to induced travel and VMT calculation methodologies. Please also refer to Master Response I for responses related to air quality and GHG analyses.

Response to Comment 4 in 20240111, Environmental Council Of Sacramento (ECOS)

The commenter notes Sacramento and Yolo counties are in non-attainment areas for PM2.5 and ozone pollution standards, but the Draft EIR/EA finds no impact for air pollution for the No Build alternative, even though Appendix J shows PM10 and PM2.5 increases is subsequent year(s). The commenter also notes the Draft EIR/EA does not show ozone data.

The Draft EIR/EA discussed air quality impacts for the No Build Alternative in Section 2.2.6.3 (*Environmental Consequences*). The No Build Alternative analysis is based on existing conditions of the project area. Without construction of the project, vehicles would continue to travel within the project area and contribute to an increase in emissions. However, the projected increase of emissions is calculated to be approximately 1% increase per year (total projected increase by up to 26.9 percent by year 2049). This increase is not considered a substantial increase in emissions and is determined to be no impact in relation to the existing conditions.

The project is included in the SACOG Metropolitan Transportation Plan/Sustainable Communities Strategy (MTP/SCS), which incorporates air quality standards, including ozone attainment goals, into project planning.

Operational emissions associated with the roadways in the project area were estimated using specific traffic data and conditions provided by the Caltrans District 3 traffic forecasting and the CT-EMFAC2021 emission model. Operational PM10 and PM2.5 emissions are specifically presented in Tables 2.2-10 and 2.2-11. Emissions results for additional pollutants, including

ROG and NOx, are included in Appendix G of the Air Quality Technical Report. See also Response to Comments in 20240112, Sacramento Metropolitan Air Quality Management District for a summary of operational emissions modeling and an analysis of emissions trends among the modeled conditions (i.e., Opening 2029, MTIP 2040, and Design 2049).

Response to Comment 5 in 20240111, Environmental Council Of Sacramento (ECOS)

The commenter states and provides authority for the deleterious effects of exposure to PM2.5.and US EPA's proposal to revise the PM2.5 standard from 12 to 9-10 micrograms per meter^3. Further, the commenter notes CARB has recommended sitting and new building developments 500 feet or more from freeways and questions the less than significant findings for air quality impacts.

Please refer to Master Response A for information related to induced travel and Master Response I for air quality impact analysis.

Some part of PM2.5 is associated with Mobile Source Air Toxic (MSAT). In FHWA's view, information is incomplete or unavailable to credibly predict the project-specific health impacts due to changes in MSAT emissions associated with a proposed set of highway alternatives. The outcome of such an assessment, adverse or not, would be influenced more by the uncertainty introduced into the process through assumption and speculation rather than any genuine insight into the actual health impacts directly attributable to MSAT exposure associated with a proposed action.

The EPA is responsible for protecting the public health and welfare from any known or anticipated effect of an air pollutant. They are the lead authority for administering the Clean Air Act and its amendments and have specific statutory obligations with respect to hazardous air pollutants and MSAT. The EPA is in the continual process of assessing human health effects, exposures, and risks posed by air pollutants. They maintain the Integrated Risk Information System (IRIS), which is "a compilation of electronic reports on specific substances found in the environment and their potential to cause human health effects" (EPA, https://www.epa.gov/iris/). Each report contains assessments of non-cancerous and cancerous effects for individual compounds and quantitative estimates of risk levels from lifetime oral and inhalation exposures with uncertainty spanning perhaps an order of magnitude.

Other organizations are also active in the research and analyses of the human health effects of MSAT, including the Health Effects Institute (HEI). A number of HEI studies are summarized in Appendix D of FHWA's Updated Interim Guidance on Mobile Source Air Toxic Analysis in NEPA Documents. Among the adverse health effects linked to MSAT compounds at high exposures are: cancer in humans in occupational settings; cancer in animals; and irritation to the respiratory tract, including the exacerbation of asthma. Less obvious is the adverse human health effects of MSAT compounds at current environmental concentrations (HEI Special Report 16, https://www.healtheffects.org/publication/mobile-source-air-toxics-critical-review-literature-exposure-and-health-effects) or in the future as vehicle emissions substantially decrease. The methodologies for forecasting health impacts include emissions modeling; dispersion modeling; exposure modeling; and then final determination of health impacts – each step in the process building on the model predictions obtained in the previous step. All are encumbered by technical

shortcomings or uncertain science that prevents a more complete differentiation of the MSAT health impacts among a set of project alternatives. These difficulties are magnified for lifetime (i.e., 70 year) assessments, particularly because unsupportable assumptions would have to be made regarding changes in travel patterns and vehicle technology (which affects emissions rates) over that time frame, since such information is unavailable.

It is particularly difficult to reliably forecast 70-year lifetime MSAT concentrations and exposure near roadways; to determine the portion of time that people are actually exposed at a specific location; and to establish the extent attributable to a proposed action, especially given that some of the information needed is unavailable.

There are considerable uncertainties associated with the existing estimates of toxicity of the various MSAT, because of factors such as low-dose extrapolation and translation of occupational exposure data to the general population, a concern expressed by HEI (Special Report 16, https://www.healtheffects.org/publication/mobile-source-air-toxics-critical-review-literature-exposure-and-health-effects). As a result, there is no national consensus on air dose-response values assumed to protect the public health and welfare for MSAT compounds, and in particular for diesel PM. The EPA states that with respect to diesel engine exhaust, “[t]he absence of adequate data to develop a sufficiently confident dose-response relationship from the epidemiologic studies has prevented the estimation of inhalation carcinogenic risk.” (EPA IRIS database, Diesel Engine Exhaust, Section II.C. https://iris.epa.gov/static/pdfs/0642_summary.pdf).

There is also the lack of a national consensus on an acceptable level of risk. The current context is the process used by the EPA as provided by the Clean Air Act to determine whether more stringent controls are required in order to provide an ample margin of safety to protect public health or to prevent an adverse environmental effect for industrial sources subject to the maximum achievable control technology standards, such as benzene emissions from refineries. The decision framework is a two-step process. The first step requires EPA to determine an “acceptable” level of risk due to emissions from a source, which is generally no greater than approximately 100 in a million. Additional factors are considered in the second step, the goal of which is to maximize the number of people with risks less than 1 in a million due to emissions from a source. The results of this statutory two-step process do not guarantee that cancer risks from exposure to air toxics are less than 1 in a million; in some cases, the residual risk determination could result in maximum individual cancer risks that are as high as approximately 100 in a million. In a June 2008 decision, the U.S. Court of Appeals for the District of Columbia Circuit upheld EPA’s approach to addressing risk in its two-step decision framework. Information is incomplete or unavailable to establish that even the largest of highway projects would result in levels of risk greater than deemed acceptable (https://www.cadc.uscourts.gov/internet/opinions.nsf/284E23FFE079CD59852578000050C9DA/$file/07-1053-1120274.pdf).

Because of the limitations in the methodologies for forecasting health impacts described, any predicted difference in health impacts between alternatives is likely to be much smaller than the uncertainties associated with predicting the impacts. Consequently, the results of such assessments would not be useful to decision makers, who would need to weigh this information

against project benefits, such as reducing traffic congestion, accident rates, and fatalities plus improved access for emergency response, that are better suited for quantitative analysis.

Response to Comment 6 in 20240111, Environmental Council Of Sacramento (ECOS)

The commenter notes GHG increases for the various project alternatives in year 2029, states that this is inconsistent with State climate policy, and recommends including induced travel.

Generally, HOV and HOT lanes with build alternative emissions are lower than No Build emissions due to a reduction in congestion (i.e., higher travel speeds throughout the modeled region) and an estimated future reduction in truck traffic percentages. Therefore, this project would decrease GHG emissions by design year 2049 and improve mobility and provide traffic relief.

No single project is expected to achieve the same percent reduction as the goals stated in various policies. Caltrans' criteria, for determining significance of GHG emissions is whether or not the project *contributes* to overall state reduction goals. A project that results in less GHG emissions compared to existing conditions can be considered to have a less than significant impact. While emissions may be estimated to increase initially at opening year 2029, the operational emissions are estimated to not be substantial by design year 2049. The project does not conflict with any applicable plan, policy, or regulation adopted for the purpose of reducing the emissions of GHGs.

Please refer to Master Response A for induced travel and Master Response I for response related to air quality and GHG analysis methods.

20240111, Evergreen Action

Evergreen Action

January 11, 2024

Re: Climate Leadership Means Not Widening Freeways –
Rethink the Yolo 80 Corridor "Improvements" Project – CEQA Comments

Dear Secretary Omishakin, Secretary Garcia, Director Tavares, and Director Taylor:

Climate leaders don't widen highways. It is time to lead and immediately work together to reset Caltrans's plan to waste $350 million to expand I-80 into Sacramento, contrary to the state's climate plans, the science, and good fiscal practice. As a former state agency leader myself, I know it can be hard to change course. But real leaders – as I know you all are – need to chart a new direction, now. Evergreen Action is among many national groups working to help state transportation departments move forward towards climate leadership; that journey starts when bad projects like this one stop. 1

As you know, in my prior role at the California Air Resources Board (CARB), I was the Deputy Executive Officer over transportation; my team led development of the state's zero emission vehicle rules, and of key policy documents establishing that even if we electrify all new vehicles, we must accelerate efforts to reduce vehicle miles traveled (VMT) to meet public health and climate goals. Writing now in my new capacity, but informed by my past experience, I am dismayed that Caltrans has so wholly departed from the transportation policy climate science demands.

This project specifically – proposing to symbolically abandon climate leadership by widening the highway leading straight to the heart of the capital city of California – will generate over 130 million more VMT even under Caltrans's flawed analysis – even as the state Scoping Plan, our governing climate action document, calls for a 30% *decrease* in VMT statewide by 2045.

The project is not just terrible climate and transportation policy; it is futile. Road widening does not reduce congestion because it induces demand for more highway travel – as Caltrans has acknowledged. It is money far better spent on transit, housing, and other real solutions to the climate crisis and to improving transportation systems. Caltrans's own Climate Action Plan for Transportation Infrastructure (CAPTI) is clear that road widening is a failed path; so is CARB's authoritative report on state VMT growth, which emphasizes that we must shift away from projects of this type, and quickly. 2

No wonder that CARB has filed comments with Caltrans pointing to fundamental errors of analysis in the project Environmental Impact Report (EIR) – including its glaring inconsistency with the state's climate commitments. A broad coalition of expert NGOs and transportation professionals have also decried this proposal and similar Caltrans actions. Their letters detail myriad flaws in the technical reports underlying this project. To highlight just a few:

- The project starts out wrong from the start by defining the pressing public need as congestion reduction, which is a euphemistic way of saying "encouraging car travel" – even though the science and the law have long been clear that our goal is *not* enhancing car dependency, but providing transportation choices that reduce VMT and meet climate and health goals. Having asked the wrong question, Caltrans has proposed the wrong project. 3

- The project's analyses are fundamentally flawed by quantitative and analytic errors that systematically, and likely intentionally, understate the impact of the project. For instance, the EIR lowballs increases in VMT by downplaying or ignoring sprawl development that the project will develop. It also inflates the VMT of "no-build" alternatives to make the project's own VMT increases look relatively smaller by implausibly claiming that without the project drivers will take a detour more than double the length of the project area, rather than adjusting when they commute (as of course most will). 4

- The project's alternatives are systematically biased towards road building, as almost all of the alternatives analyzed would expand highway capacity, and none would toll the entire causeway, even though tolling would clearly reduce congestion *and* VMT, while providing funds for transit and active transportation alternatives. Nor do the alternatives serious explore more fundamental changes such as large increases in transit service combined with road removal or repurposing to transit, instead consigning such better possibilities to an underfunded "mitigation" appendix. Thus, the sorts of projects that should have been primarily considered are given short shrift, while a dinosaur highway project is prioritized. This sort of thumb on the scale impermissibly biases the analyses (see, for instance, *ONDA v. BLM*, 625 F. 3d 1092 (9th CIr. 2008), holding that an environmental analysis that only considered alternatives that allowed various levels of offroad driving, but no reductions in driving, was impermissibly biased). 5

- Caltrans dismisses mitigation options for the VMT impacts it acknowledges; ultimately it proposes to spend only 14-15% of the project cost on VMT mitigation, a figure it does not justify. In essence, Caltrans is, contrary to CEQA, both improperly narrowly defining its primary project, dismissing feasible alternatives, and also failing to mitigate the impacts of the unwise project it is promoting. 6

- The result is a project which is fundamentally inconsistent with the Scoping Plan, the CAPTI, and state climate and transportation policy. Indeed, even in Caltrans's rosy analysis, it projects only marginal decreases in greenhouse gas emissions from the project by mid-century (see Table 3.4-2). The lane-widening alternatives that Caltrans clearly favors would cut GHG from status quo by only around 2-10% by mid-century in its own optimistic analysis. This essentially status quo climate result simply cannot be squared state's mandate to cut GHGs by 85% by 2045 and achieve full carbon-neutrality. 7

To sum up: Caltrans is acting in opposition to climate science, state policy and the law. It is attempting to prop up a legacy highway widening project – which, notably, 8

will not even achieve its own improper goal of "reducing congestion" – with a series of shoddy analyses. The result? A proposal to spend something like $350 million in widening a road, whose harms will swamp out any benefits secured by the pocket change going to mitigation. At a time when the climate crisis requires bold action and real change, Caltrans is proposing to pour public money into entrenching an already unsustainable status quo. This is worse than inaction: it is negligent.

The right path is obvious: Stop. Think what $350 million could do if not flushed away - what, for instance, a regional future would look like where transit, cycling, and walking infrastructure and transit-efficient housing received that cash infusion. That would be a result worthy of the capital city of California. That would be climate leadership.

But it is clear that Caltrans will not change course without leadership from CalSTA and CalEPA, and outside legislative oversight. Indeed, Caltrans appears to have improperly demoted and functionally dismissed its most senior and leading voice for climate action over her objections to this project. And this project is representative of more problems throughout the system, and in CTC's project queue; as a recent report recently demonstrated, less than 20% of state transportation spending is going to reduce VMT. In a time of budget shortfalls, it is unconscionable that this misprioritization continues and the vast bulk of our budget still goes to projects inconsistent with our climate goals.

I fear that inertia and a lack of political fortitude will, instead carry the agencies along their current course. The outcome of stasis is obvious. The public will be ill-served. It will not see the transportation system changes needed not just to address the climate crisis, but to make life better in communities affected by this project and those like it, and which could so badly use better investments. But the agencies will also suffer. Already, the reputational harm Caltrans has suffered by firing internal critics and pressing on is national news. The situation won't improve when advocates doubtless litigate this project, and likely win. After years of delay, procedural churn, and public cost, no one will be any further ahead, traffic will still be bad, transit will still be underfunded, and the climate crisis will continue. We simply can no longer afford this sort of time-wasting.

8 cont.

But change is still possible. Caltrans could still announce, next month, that it has reviewed public comments and decided that this project should not move forward. CalSTA could still bring together advocates and regional leaders to imagine a better future. CTC could still announce that it is revisiting funding for this project, and those like it, in its pipeline via a systematic audit – and that it will no longer fund highway expansions as it pivots to a future of right-sizing the highway system, removing undue capacity, as other alternatives are finally properly supported. CalEPA could insist that CARB's Scoping Plan be followed in projects with real stakes, like this one. And advocates across the country could be encouraged by California, at last, leading the way in this context, as it has in so many others.

I believe it is also time for the Legislature to forcefully renew its oversight efforts to support that better future, too – which is why I am copying the Chairs of the Senate and Assembly Transportation Committees and the Joint Legislative Committee on Climate Change. Statutory changes to the mandates of CalSTA, CTC, and Caltrans to

require alignment with climate goals are needed now, along with direct oversight into this project and the project pipeline as a whole. As agency leaders, I hope you will loudly call for oversight and the legal changes needed to help your agencies better serve the state.

I would be very happy to discuss these matters, and look forward to your response. There really is time to pick a better path, and you are the leaders who have the opportunity to do so.

Sincerely,

Craig Holt Segall, VP, Evergreen Action; Former Deputy Executive Officer, CARB

8 cont.

Response to Comment 1 in 20240111, Evergreen Action

This introductory comment provides the qualifications of the letter author and does not discuss the adequacy of the EIR/EA. No changes to the Draft EIR/EA are necessary.

Response to Comment 2 in 20240111, Evergreen Action

This comment discusses the inadequacy of the EIR/EA in broad terms. Caltrans deems the Draft EIR/EA to contain adequate analyses and mitigation for the project's various Build Alternatives impacts and that the document complies with CEQA and NEPA. No changes to the Draft EIR/EA are necessary.

Response to Comment 3 in 20240111, Evergreen Action

The project has a multi-faceted purpose and need (see below) of which easing congestion is just one part. While the commenter interprets the purpose as encouraging car travel, other parts of the purpose, including improving modality and person throughput, are major factors in alternative selection for the project.

1. Ease congestion and improve overall person throughput

2. Improve freeway operation on the mainline, ramps, and at system interchanges

3. Support reliable transport of goods and services throughout the region

4. Improve modality and travel time reliability

5. Provide expedited traveler information and monitoring systems

Response to Comment 4 in 20240111, Evergreen Action

Please refer to Master Responses A and D for responses related to induced travel, VMT calculation methodologies, and modeling methodologies.

Response to Comment 5 in 20240111, Evergreen Action

Please refer to Master Response B for responses related to project alternatives considered. Additionally, alternatives that did not add capacity were analyzed and are part of the project alternatives evaluated. Specifically, Build Alternative 7 would convert the inside general-purpose lane to HOV. All alternatives, except for the No Build Alternative, would increase multimodal access to the existing corridor. The commenter also suggested alternatives that include increased transit and road removal. While these alternatives have been analyzed (see the description of Build Alternatives 6 and 7 in EIR/EA Chapter 1), road removal alternatives would not meet the project's purpose and need. For additional information related to tolling and congestion, please refer to response to comment 3 in 20240110, California Air Resources Board.

Response to Comment 6 in 20240111, Evergreen Action

Please refer to Master Response A for responses related to VMT mitigation.

Response to Comment 7 in 20240111, Evergreen Action

The project does not conflict with any applicable plan, policy, or regulation adopted for the purpose of reducing the emissions of GHGs. Please refer to Response to Comment 15 in 20240108 Sierra Club Yolano Group, Response to Comment 6 in 20240111, Environmental Council of Sacramento, and Response to Comment 12 in 20240111, Center for Biological Diversity for additional discussion.

Response to Comment 8 in 20240111, Evergreen Action

This closing comment summarizes the commenter's views on the project, in general, and on several state agencies and the Legislature. This comment does not discuss the adequacy of the EIR/EA. No changes to the Draft EIR/EA are necessary.

20240112, Davis Community Action Network

From: Judy Ennis
To: Yolo80Corridor@DOT
Cc: info@daviscan.org
Subject: RE: Comment Letter on the Draft Environmental Impact Report (DEIR) for the Yolo 80 Managed Lanes Project
Date: Friday, January 12, 2024 4:36:30 PM

EXTERNAL EMAIL. Links/attachments may not be safe.

January 12th, 2024

Masum Patwary
Environmental Scientist
Caltrans District 3
703 B Street, Marysville, CA 95901
Yolo80Corridor@dot.ca.gov

RE: **Comment Letter on the Draft Environmental Impact Report (DEIR) for the Yolo 80 Managed Lanes Project**

Dear Mr. Patwary,

The Davis Community Action Network supports the letter sent to Caltrans by the City of Davis and we urge you to address the issues raised by the city. We join other members of the Davis and Yolo County community to request Caltrans provide a revised DEIR that responds to the comments, concerns, and questions about this project. 1

As a housing and climate advocacy organization, we are moved to action on this issue due to the overwhelming evidence that this proposal will do a great deal more harm to our climate without any sustained upside. The stated purpose of the proposed project is to ease congestion and improve overall person throughput, improve freeway operation on the mainline, ramps, and at system interchanges, support reliable transport of goods and services throughout the region, and improve modality and travel time reliability. Yet, the proposed solutions are not supported by decades of research. By Caltrans' own reporting, the additional lanes will become just as congested in the near future, resulting in increased greenhouse gas emissions. This document makes it very clear that the negative environmental impact of the I-80 expansion is so large, it would effectively undo any of the emission reductions that the City of Davis has achieved over the past 15-20 years and will 2

make our current climate goals unreachable. The state aims to slash gas emissions by 94% and cut GHG emissions by 85% by 2045. As a state body, it's hard to understand how Caltrans could propose a plan that is entirely incompatible with the state's climate goals. 2 cont.

We ask that Caltrans prepare and circulate a revised DEIR responding to the following points:

- For the build alternatives, the percentage of VMT mitigated is too low. The revised EIR must substantially increase the percentage of VMT mitigated. 3
- Build Alternative 6 should be analyzed more deeply and include projected VMT impacts of expanding transit service supply. 4
- For all build alternatives, please analyze the environmental impacts of providing tolling authority to the Sacramento Area Council of Governments (SACOG) on the existing six lanes in the revised EIR. 5
- Please drop all "b" Alternatives—1b, 2b, 3b, 4b, 5b, 6b, 7b—from consideration; they do not meet CEQA's standard of "environmentally superior alternatives." 6

Based on the expertise presented in the public comment period, it is our view that CalTrans did not meet its obligation under CEQA to fully analyze all mitigation options and has not communicated detailed responses to inform the public. Instead of continuing to invest in a car-centric, emissions-heavy transportation system, CalTrans can join the future-focused leadership represented by the rest of the state and help us build the public transit transportation system for our future. 7

Thank you for your consideration.

Davis Community Action Network

Response to Comment 1 in 20240112, Davis Community Action Network

Thank you for your comments on the Draft EIR/EA. Please refer to the responses to the City of Davis comment letter (20240112, City of Davis).

Response to Comment 2 in 20240112, Davis Community Action Network

The commenter stated the solutions for the stated purpose of the project are not supported by research, would undo emission reduction in the City of Davis, and make climate goals unreachable. Many of the project alternatives evaluated in the EIR/EA aim to promote carpooling and use of public transportation with the construction of a managed lane. The managed lane would offer free or discounted travel to transit and high-occupant vehicles while single-occupant vehicles and trucks would be prohibited from using the lane or have to pay a toll. The managed lane would have improved travel times from the general-purpose lanes. However, the Draft EIR/EA shows that the addition of a managed lane would reduce congestion (i.e., travel times) in both the managed lane and general-purpose lanes, in contrast to what this comment claims.

Additionally, any alternative that induces VMT would require environmental mitigation. For more information on induced VMT and the VMT mitigation plan, please refer to Master Response A.

The project does not conflict with any applicable plan, policy, or regulation adopted for the purpose of reducing the emissions of GHGs. Please refer to Response to Comment 15 in 20240108 Sierra Club Yolano Group, Response to Comment 6 in 20240111, Environmental Council Of Sacramento, and Response to Comment 12 in 20240111, Center for Biological Diversity for addition discussion.

No changes to the Draft EIR/EA are necessary.

Response to Comment 3 in 20240112, Davis Community Action Network

The commenter requested the Draft EIR/EA be recirculated to consider increasing the VMT mitigation. Please refer Master Response A for more information on induced VMT. No changes to the Draft EIR/EA are necessary.

Response to Comment 4 in 20240112, Davis Community Action Network

The commenter requested the Draft EIR/EA be recirculated to analyze more deeply alternative 6, and the projected VMT impacts of expanding transit service supply. Build Alternative 6 is analyzed with the same methodologies and standards that applied to other project alternatives. No changes to the Draft EIR/EA are necessary.

Response to Comment 5 in 20240112, Davis Community Action Network

The commenter requested further analysis on environmental impacts of tolling the existing six lanes. For more information on tolling all lanes, please refer to Master Response B. The tolling operator of the corridor will be Capital Area Regional Tolling Authority (CARTA), a joint powers

authority that includes members from SACOG. However, appointment of a tolling authority is not a part of the environmental process.

No changes to the Draft EIR/EA are necessary.

Response to Comment 6 in 20240112, Davis Community Action Network

The commenter requested dropping all the alternatives proposing a Managed Lane Connector ramp. Build Alternatives 2B through 7B propose to construct Managed Lane Connector ramps the I-80/ US 50 interchange which would improve traffic flow and ease merging in the area. The Managed Lane Connector ramp would allow motorists in the managed lane traveling along I-80 to stay in the inside lane and reduce the number lane changes required at the interchange.

No changes to the Draft EIR/EA are necessary.

Response to Comment 7 in 20240112, Davis Community Action Network

The Draft EIR/EA contains adequate analyses and mitigation for the Project's build alternatives and their impacts and that the document complies with CEQA and NEPA. For more information on VMT mitigation, please refer to Master Response A. No changes to the Draft EIR/EA are necessary.

20240112, Graduate Student Association of UC Davis

To whom it may concern,

I am writing on behalf of the Graduate Student Association of UC Davis as well as a Davis resident. The EIR shared by CalTrans does not fully capture the impact of air, noise, and light pollution of the I-80 Widening. It does not give due consideration to alternatives. This project does not fall in line with the climate goals and environmental justice that the State itself aims for. It is detrimental to the local environment and community. We strongly urge CalTrans to re-draft this EIR, with due consideration to alternatives 7a and 7b–repurpose existing lanes without the addition of a new lane. 1

Currently, the widening seeks to decrease "congestion" mainly caused by people not locally traveling from Sacramento to Davis and vice versa. Rather, it is caused by individuals who are choosing to use I-80 for recreation and as a means to live somewhere affordable with a longer commute. It's an unfortunate situation and feels as if Davis is being forced to agree to this, since other stretches of the highway have already been expanded before and after our section.

We strongly urge CalTrans to only consider alternatives 7a and 7b, to repurpose existing lanes without the addition of a new lane. The State of California is looking to reduce Vehicle Miles Traveled in line with its climate goals. However, at the recent I-80 Teach-In held by the Cool Davis group, Dr. Susan Handy of UC Davis explained that a 1% increase in the I-80 capacity is equal to 1% increase in vehicle miles of travel.[1] Therefore, increasing the number of lanes accessible to drivers would only defer the problem of congestion into the future. The proposal states that this project will lead to a 12.6 million decrease in Vehicle Miles Traveled. This only takes into account the decrease in trips 1 car will take, not the increase in cars due to increased road accessibility. 2

We also ask for a more transparent reasoning as to why this project will be invested in before alternative 1 and current plans for increasing regional public transportation are not being given more attention. Simply increasing the highway lanes is not accessible to people who may be low-income or unable to have a car, for any reason.[2] What this proposal also fails to acknowledge is that many households defined as low-income or in environmental justice communities rely on personal vehicles for transportation because of the lack of reliable public transportation. Before expanding, there also needs to be a push to maintain and improve what is already in place by implementing better transportation alternatives. 3

[1] LiveCooldavis. (2023, December). "A Freeway I-80 Teach-In with Dr. Susan Handy and Caltrans I-80 Corridor Master Plan." https://youtu.be/Hz-niK150U4?si=b-kBoBROfQSsSxdW

[2] Caltrans. (2023, December). *Yolo 80 Corridor Improvements Project 03-3H900 Administrative Draft Environmental Impact Report / Environmental Assessment.* https://dot.ca.gov/-/media/dot-media/district-3/documents/i80yoloproject/2_environment_508-a11y.pdf., p. 2-81.

CalTrans must focus on and support the development and implementation of accessible and affordable public transportation first. The future projects outlined in the Proposed Project Table 1.3-3 would improve accessibility between Davis and Sacramento without the need for cars. Those plans outline clear details on how to improve biking, train, and other means of transportation. It also includes building of Transportation Demand Management systems to encourage carpooling and the use of public transportation, without the need to expand the highway. These alternatives should be the first priority–provide reliable transportation that anyone can access, before assuming increasing driving availability is the best alternative. As part of this project, Segment 2 for each alternative states there will be new Park-and-Ride Facilities. What is the purpose of this if the project itself is devoted to increasing the number of cars able to pass on the highway? 4 5

The project EIR fails to acknowledge the full impact of alternatives 2-6 on the environment in a non-human centric view. I-80 in Davis passes next to the Riparian Reserve and Arboretum, both habitats for local animal and plant populations. We ask that CalTrans release a better report on how these environments will be impacted by highway expansion. With increased travel, there will be increased headlights and road lights, emissions, and traffic noise. What is the impact of these changes from a non-human perspective? How will this affect local animal populations, such as the bats roosting under the highway overpass? The EIR fails to comment on the actual ecological damage an *increased* capacity would have. 6

This EIR specifically states that noise levels due to traffic would increase and exceed the Noise Abatement Criteria under CEQA.[3] The proposal argues that the increase in noise will not be noticeable to nearby residents, but at the level of increase, this is doubtful. While the proposal states it to be a "modest increase in noise", it will be above the CEQA requirement, meaning it is not a low noise level. It is also very important to note that this expansion will be directly near areas of Davis already listed as affordable housing and environmental justice communities. These individuals will be impacted by the rising noise levels, increased emissions, and decreased air quality. 7 8

We also ask that CalTrans provide data on how the changes in traffic resulting from the highway expansion will impact the city of Davis. Currently, many cars will exit I-80 onto Covell Blvd or Mace Blvd, which Davis has no plans to expand due to its overall goal of decreasing reliance on cars. With the many exits into Davis as well, there will be an increase in cars driving through Davis in order to enter or exit the highway. How will this impact traffic within the city? How will this increase emissions and air quality within Davis? These questions and issues should be addressed and presented to the City Council and general members of the city. 9 10

[3] Caltrans. (2023, December). Yolo 80 Corridor Improvements Project 03-3H900 Administrative Draft Environmental Impact Report / Environmental Assessment. https://dot.ca.gov/-/media/dot-media/district-3/documents/i80yoloproject/3_ceqaevaluation_508-a11y.pdf., p. 3-14.

Thank you for your consideration. I look forward to the answers to these questions. 10 cont.

Sincerely,
Victoria Salemme
GSA Legislative Director
Davis City Liaison

Response to Comment 1 in 20240112, Graduate Student Association of UC Davis

The Draft EIR/EA was prepared to the standards set by CEQA. For more information on the project alternatives not considered, please refer to Master Response B. Alternatives 7a and 7b were evaluated with the same methodologies and standards as the other project alternatives. No changes to the Draft EIR/EA are necessary.

Response to Comment 2 in 20240112, Graduate Student Association of UC Davis

The commenter urged Caltrans to only consider Alternatives 7a and 7b. Alternatives 7a and 7b were evaluated with the same methodologies and standards as the other project alternatives. No changes to the Draft EIR/EA are necessary.

Response to Comment 3 in 20240112, Graduate Student Association of UC Davis

The commenter questioned why regional public transportation was not given more attention, and that increasing highway lanes is not accessible to people who may be low-income, or not own a car. The Draft EIR/EA considers alternatives that would construct a transit-only lane (Build Alternatives 6A and 6B). Moreover, many alternatives improve conditions for transit as well, since transit vehicles would have free-access to the managed lane under all alternatives that include a managed lane. Furthermore, Mitigation Measure TRANS-1 to reduce VMT impacts includes contributions to programs that would expand existing transit services in collaboration with our regional transit partners. These measures are listed in EIR/EA Table 2.1-27, and have been updated in the Final EIR/EA as coordination with transit partners has continued.

The Build alternatives of the project also include improvements to the pedestrian/bicycle facility adjacent to the Yolo Causeway that include construction of a pedestrian path/bicycle lane extension along the westbound I-80 off-ramp to Chiles Road (from the west end of the Yolo Causeway bridge to County Road 32A/Chiles Road), repaving the western approach to the Yolo Causeway (west) bridge and eastern approach to the Yolo Causeway (east) bridge, and installation of lighting.

Additionally, many of the project alternatives include construction of a managed lane that would offer free or discounted travel to transit and high-occupant vehicles. Therefore, the benefits of the managed lane would apply to public transportation and carpoolers.

These amenities of the Build alternatives aim to improve modality of the corridor, meaning increase the variety of transportation modes available to travel on the corridor.

The commenter states this project fails to acknowledge many people in environmental justice communities rely on their personal vehicle due to lack of access to reliable transportation. In the Draft EIR/EA the “Community Impacts” in Table S-1 displays comparison for each build alternative and their impacts on environmental justice communities. For more on equity considerations in regards to toll lanes please see Master Response E.

Response to Comment 4 in 20240112, Graduate Student Association of UC Davis

The commenter stated there should be more focus on developing accessible and affordable public transportation. EIR/EA Table 1.3-3 lists other transportation projects in the area in varying stages of the project planning and construction process. These are not alternatives evaluated in this document. The current project may expand on the benefits of the projects listed in Table 1.3-3 by increasing accessibility between Davis and West Sacramento. The benefits would apply not just to single-occupant vehicles but also public transportation, pedestrians, cyclists, and high-occupant vehicles. No changes to the Draft EIR/EA are necessary.

Response to Comment 5 in 20240112, Graduate Student Association of UC Davis

The commenter questioned the purpose of the new Park-and-Ride Facilities in Segment 2. The build alternatives of the project include construction of a 200-space Mobility Hub near the I-80/West Capitol Avenue interchange. Park & Ride facilities exist near this location but are frequently full. The Mobility Hub for the proposed project would be a bus stop and bus transfer station that includes a pedestrian drop-off area, electric vehicle charging stations for buses and passenger vehicles, bus stop shelters, bike lockers, lighting and trees/landscaping. The Mobility Hub could also facilitate carpooling. As indicated in Section 1.2.1, Purpose, the purpose of the project is to each congestion and increase person throughput, not to increase the number of cars. Buses and carpools help to achieve that goal. No changes to the Draft EIR/EA are necessary.

Response to Comment 6 in 20240112, Graduate Student Association of UC Davis

The commenter stated Alternatives 2–6 failed to acknowledge the full impact to local animals, their habitat, and plant populations. The Draft EIR/EA contains adequate analyses and mitigation for the project's Build Alternatives and their impacts and the document complies with CEQA and NEPA, including determining potential impacts to sensitive natural resources, including wildlife connectivity, special-status species, and sensitive habitats. No changes to the Draft EIR/EA are necessary.

Response to Comment 7 in 20240112, Graduate Student Association of UC Davis

The commenter questioned the increased noise levels from traffic increases. For traffic Noise, the Noise Abatement Criteria (NAC) is a NEPA requirement under 23 CFR 772. The traffic noise levels would increase by up to 2 dBA over Existing conditions under the year 2049 No Build conditions. When compared to Existing conditions, changes in traffic noise levels under year 2049 Alt 2b and Alt 3a Build conditions would range from 0 to +2 dBA, which is barely perceivable by the human ear. Although noise levels are predicted to approach or exceed the NEPA Noise Abatement Criteria (NAC) at some receptors, none of the noise level increases that would result from the project are considered substantial because: (1) the increases would be well below the Caltrans 12 dBA threshold; (2) or are located behind existing noise barriers which range in height from 8 to 16 feet or were evaluated for noise barriers. Noise abatement was considered as document in Section 2.2.8.4 of the Draft EIR/EA.

Response to Comment 8 in 20240112, Graduate Student Association of UC Davis

The commenter stated environmental justice communities in Davis will be impacted by rising noise levels, increased emissions, and decreased air quality. The Draft EIR/EA Environmental Justice analysis (Section 2.1.7) identifies the low-income areas referenced by the commenter and discusses the effects of noise, air quality, and visual impacts on community character in this environmental justice community. Please refer to Draft EIR/EA Section 2.1.7.3 for more information. No changes to the Draft EIR/EA are necessary.

Response to Comment 9 in 20240112, Graduate Student Association of UC Davis

The commenter asked for data on how highway expansion and changes in traffic will impact the City of Davis. The project aims to reduce cut-through traffic within the City of Davis by providing a more reliable, direct route between Davis and West Sacramento. Encouraging drivers of regional trips to remain on the freeway will leave surface streets available to those making local trips in the modes available to them. Drivers using off-ramps in Davis will be using them to access land uses in Davis, instead of accessing local roads to avoid congestion on I-80.

Response to Comment 10 in 20240112, Graduate Student Association of UC Davis

The commenter asked how the increased emissions will affect the air quality on Davis. The Draft EIR/EA discussed air quality impacts from project construction and operation in Section 2.2.6.3 (Environmental Consequences). The City of Davis was included in the evaluation of air quality impacts as the city is located within Yolo County. Yolo County is included in SACOG jurisdiction. The project is included in the SACOG Metropolitan Transportation Plan/Sustainable Communities Strategy (MTP/SCS), which incorporates air quality standards, including ozone attainment goals, into project planning. Please refer to Master Responses A and I for responses to modeling used for air quality impact analysis methods.

20240112, Natural Resources Defense Council

NRDC

January 12, 2024

Via email to:
Masum A Patwary, Environmental Scientist C
California Department of Transportation, District 3
703 B Street, Marysville, CA 95901
Yolo80Corridor@dot.ca.gov

Re: Comments on the Draft Environmental Impact Report for Yolo 80 Corridor Improvements Project

Dear Masum Patwary:

On behalf of the Natural Resources Defense Council (NRDC), we submit these comments on the Draft Environmental Impact Report (DEIR) for the Yolo 80 Corridor Improvements Project (Project).

For decades, the California Department of Transportation (Caltrans) has built out a massive network of roads and highways that crisscross our landscapes and communities. These projects have come at significant cost to the families displaced by highway projects, communities that breathe the nation's dirtiest air, and ecosystems harmed by vehicle pollution and habitat destruction. 1

Most recently, Caltrans has proposed widening the I-80 corridor between Kidwell Road in Solano County and West El Camino Avenue in Sacramento County. The proposal has raised myriad concerns, including allegations by a senior Caltrans official that the agency illegally "piecemealed" the Project's environmental review by splitting it into two parts. *See, e.g.*, Debra Kahn, *Caltrans official says she was demoted for objecting to highway expansion*, Politico, Oct. 3, 2023 [attached as Ex. A].

To add to the Project's issues, the Project's DEIR has glaring deficiencies that obscure its significant environmental impacts. Caltrans must address the flaws in the DEIR to ensure that the public and decision-makers can sufficiently consider the Project. Our letter details these deficiencies as follows: 1) Caltrans improperly piecemealed the Project; 2) the DEIR's alternatives analysis is flawed; 3) the DEIR does not fully disclose or adequately consider the Project's significant impacts on the environment; and 4) even when it recognizes the Project's significant impacts, the DEIR fails to adequately mitigate these impacts as required by CEQA. 2

NATURAL RESOURCES DEFENSE COUNCIL
111 SUTTER STREET | SAN FRANCISCO, CA | 94104 | T 415.875.6100 | F 415.875.6161 | NRDC.ORG

1. Caltrans improperly piecemealed the Project

In the fall of 2023, Jeanie Ward-Waller, Caltrans's deputy director of planning and modal programs, was demoted after filing a whistleblower complaint claiming that Caltrans had piecemealed this Project. *See* Ex. A. Before this DEIR, under the guise of "pavement rehabilitation," Caltrans approved preparatory road-widening construction under a CEQA exemption. This road-widening will help accommodate the new lanes the Project proposes. *See* Ex. A.

Under CEQA, a "project" is "the whole of an action" that may result in a change to the environment. Cal. Code Regs., tit. 14, § 15378. "There is no dispute that CEQA forbids 'piecemeal' review of the significant environmental impacts of a project." *Berkeley Keep Jets Over the Bay Committee v. Board of Port Com'rs*, 91 Cal. App. 4th 1344, 1358 (Cal. Ct. App. 2001), *as modified on denial of reh'g* (Sept. 26, 2001). Rather, "CEQA mandates that environmental considerations do not become submerged by chopping a large project into many little ones, each with a potential impact on the environment, which cumulatively may have disastrous consequences." *Burbank–Glendale–Pasadena Airport Authority v. Hensler*, 233 Cal. App. 3d 577, 592 (Cal. Ct. App. 1991). 3

Here, Caltrans may not split the Project into smaller pieces to hide its environmental consequences. This earlier construction should have been properly reviewed under CEQA at the time of its approval, as part of this Project. And although evaluation of the prior construction in this DEIR does not cure those prior CEQA violations, Caltrans must nonetheless fully consider any cumulative impacts of the prior construction in this DEIR. The DEIR's passing reference to the prior construction (DEIR 2-355) fails in this regard.

2. Caltrans' consideration of alternatives is misleading and incomplete

A. The DEIR's analysis of whether the Build Alternatives fulfill the Project's purpose is faulty

The DEIR lists the Project's purpose as follows: 4

1. Ease congestion and improve overall person throughput
2. Improve freeway operation on the mainline, ramps, and at system interchanges

3. Support reliable transport of goods and services throughout the region
4. Improve modality and travel time reliability
5. Provide expedited traveler information and monitoring systems

DEIR 1-5. Due to the DEIR's modeling errors, it is impossible to evaluate whether any of the alternatives will achieve this purpose.

In the DEIR, Caltrans essentially considered thirteen alternatives: one No Build Alternative and six pairs of Build Alternatives. Each Build Alternative includes a variation where an I-80 managed lane direct connector is added and one where it is not. The No Build Alternative leaves the Project area as it is and was used as the baseline for comparison to the other alternatives. Build Alternatives 2a, 2b, 3a, 3b, 4a, 4b, 5a, and 5b (Added Lane Alternatives) all add one lane in each direction to I-80 and U.S. 50. They differ only in what kind of lane is added (i.e., high-occupancy vehicle lane, high-occupancy toll lane, express lane). Build Alternatives 6a and 6b add a transit-only lane in each direction. Build Alternatives 7a and 7b do not build lanes and instead convert one of the current lanes to a high-occupancy vehicle lane. 4 cont.

Caltrans states that the No Build Alternative would result in "severe traffic congestion and impaired mobility," DEIR 1-22, and therefore would not meet the Project's purpose. Meanwhile, Caltrans assumes that the Build Alternatives will meet the Project's purpose. *See* DEIR 1-7 to 1-8. These conclusions are based on faulty traffic modeling, as addressed in detail in Section 3.A, *infra*. In short, the erroneous modeling overstates the congestion in the No Build Alternative and therefore makes the Build Alternatives look much better in comparison.

Because of this faulty modeling, the DEIR does not provide enough accurate information to ascertain whether the Build Alternatives would fulfill the Project's purpose. Due to the No Build Alternative's overinflated traffic estimates, the public and decision-makers cannot accurately determine whether the Build Alternatives ease congestion, support transport reliability, or fulfill any of the Project's other goals.

B. Caltrans omitted alternatives that better achieve the Project's purpose with fewer environmental impacts 5

There are several reasonable alternatives that would achieve the above purpose with fewer environmental impacts and better implementation of

relevant state and regional plans and targets. Caltrans omitted these alternatives from the DEIR. As a result, the DEIR does not paint an adequate picture of the range of options available to decision-makers.

First, Caltrans should have considered more alternatives that do not add any vehicle miles travelled (VMT). Pursuant to the California Climate Crisis Act (AB 1279), the state adopted the 2022 Scoping Plan for Achieving Carbon Neutrality, which includes VMT reduction of 25% per capita by 2035 and 30% by 2045. California Air Resources Board, *2022 Scoping Plan for Achieving Carbon Neutrality* 72 (2022) [attached as Ex. B]. Caltrans could better comply with these targets and achieve the Project's purpose by considering alternatives that have an established track record of reducing VMT. These alternatives could have included significantly improved rail service along the Capitol Corridor featuring faster, more frequent, and electrified rail service to meet the needs of travelers moving between cities and regions along the I-80 corridor. Another alternative would have entailed improved local public transit and active transportation infrastructure and service in the region's communities to replace more local-serving trips that use I-80. A final alternative focused on VMT reduction would have entailed investing in a robust regional travel demand management strategy that encourages use of transit, ridesharing, walking, biking, and telework options for communities along I-80, and other applicable strategies from Table 1 of the Caltrans VMT Mitigation Playbook. Caltrans, *SB 743 Program Mitigation Playbook* 7–8 (2022) [attached as Ex. C].

The DEIR also omits an alternative with more than one tolled lane in each direction. Having multiple tolled lanes in each direction would allow for greater congestion relief than just having one tolled lane, bring in more toll revenue to fund VMT-reducing strategies, and contribute to meeting statutory carbon-reduction goals like those in the Scoping Plan. The omission of this alternative is especially damning because it was expressly included in the 2020 Metropolitan Transportation Plan/Sustainable Communities Strategy (MTP/SCS) prepared by the Sacramento Area Council of Governments (SACOG) pursuant to SB 375. When it approved the SACOG MTP/SCS, the California Air Resources Board (CARB) assumed that this project would have multiple tolled lanes in each direction. California Air Resources Board, *Evaluation of the Sacramento Area Council of Governments' SB 375 2020 Sustainable Communities Strategy* 26 (2020) [attached as Ex. D]. Without more than one tolled lane in each direction, the Project will lead to higher greenhouse gas (GHG) emissions than the MTP/SCS allows for.

5 cont.

Finally, the DEIR omits an all-lane tolling alternative. This option would allow Caltrans to manage lanes with pricing, achieving permanent congestion reduction without adding VMT-inducing capacity. This alternative could also generate revenue to permanently fund VMT-reducing programs and alternatives to driving along the corridor, including enhanced rail capital and service improvements, local, regional, and long-distance bus service, and improved active transportation corridors, trails, and networks. *See, e.g.*, U.S. Dep't of Transp., Fed. Highway Admin., *Congestion Pricing*, https://ops.fhwa.dot.gov/congestionpricing/cp_benefits.htm [attached as Ex. E]. Such an all-lane tolling program could be designed with a procedural and outcomes focus on improving transportation equity. *See, e.g.*, TransForm, *Pricing Roads, Advancing Equity* (2019) [attached as Ex. F].

5 cont.

3. Caltrans did not fully disclose and adequately analyze the Project's impacts

The DEIR fails to fully disclose and adequately consider several of the Project's impacts. As a result, the public and the relevant decision-makers will be unable to accurately ascertain the Project's effects on the environment.

A. The DEIR's flawed modeling leads to erroneous conclusions about traffic impacts, greenhouse gas emissions, air quality, and energy impacts

There are several errors in the DEIR's modeling and assessment of the Project's expected impacts on travel patterns. These failures lead to the erroneous conclusion that the Project would not lead to significant traffic impacts. The traffic-related errors have knock-on effects on the DEIR's analysis of greenhouse gas emissions (GHG), air quality, and energy. These issues are also addressed in the expert report prepared for NRDC by Norm Marshall, President of Smart Mobility, Inc. [hereafter, "Marshall Report"] [attached as Ex. G.].

6

The first of the traffic-related errors was Caltrans's choice to use SACSIM, a static trip assignment model. This type of model assumes that drivers' departure time will remain static in the face of congestion, leading to unrealistic predictions about the No Build Alternative. *See, e.g.*, Fehr & Peers, *I-80/US-50 Managed Lanes Transportation Analysis Report* 76 (2023). For example, SACSIM cannot account for the fact that drivers will naturally shift their departure times to avoid congested peak periods. Therefore, it predicts that in order to avoid the congestion, drivers will take an unrealistically long

detour, increasing the predicted VMT of the No Build Alternative. This leads Caltrans to the flawed conclusion that the Build Alternatives will reduce VMT because drivers will take a more direct route. This contributes to the DEIR's conclusion that widening the roadway will lead to lower VMT, contradicting the established literature which shows that widening congested roadways increases VMT. *See, e.g.*, Jamey M. B. Volker and Susan L. Handy, *The Induced Travel Calculator and Its Applications* 5 (Feb. 2021) [attached as Ex. H].

Rather than using a static trip assignment model, Caltrans should have used a dynamic trip assignment model. A dynamic trip assignment model hews closer to reality by assuming that when faced with extreme congestion, instead of taking long detours, drivers will simply adjust their departure time to avoid traffic. Such a model would correctly estimate lower VMT for the No Build Alternative, and therefore comparatively higher VMT for the Build Alternatives. By relying on an inappropriate model that produces implausible results, Caltrans has not informed the public and the relevant decision-makers about the project's environmental impacts.

Another issue with Caltrans' traffic analysis is that SACSIM cannot account for induced travel. The DEIR acknowledges this by using the National Center for Sustainable Transportation (NCST) Induced Travel Calculator for the induced VMT analysis. *See, e.g.*, DEIR 2-117, 3-41. However, instead of using the NCST figures for the traffic analysis, Caltrans stuck with SACSIM, despite admitting that it cannot properly account for induced travel. This leads to further underestimation of traffic impacts. *See* Marshall Report, Ex. G, at 4.

Caltrans's third traffic-related error is the improper use of the Build Alternatives' land use and traffic growth effects as the baseline for all traffic analyses, including for the No Build Alternative. Highway expansion often leads to increases in car-centric development in the area, which in turn leads to more VMT. Because of this, Caltrans's Transportation Analysis Framework requires that traffic models be sensitive to land use changes in response to network changes. Caltrans, *Transportation Analysis Framework* 21 (1st ed., 2020) [attached as Ex. I]. However, the DEIR's traffic analysis uses the same land use inputs across all the alternatives, including the No Build Alternative. Fehr & Peers at 26 ("Caltrans district staff directed that the model land uses be maintained without changes from the MTP/SCS versions for all alternatives, including the no build alternative."); *see also* Marshall Report, Ex. G, at 7. This means that the traffic estimates for the No Build Alternative will be inflated by the land use and traffic growth inputs of

6 cont.

6

the Build Alternatives. As a result, the comparative traffic caused by the Build Alternatives is further underestimated. These flaws in the traffic modeling allow Caltrans to understate the Project's effects on VMT.

The shortcomings in the traffic analysis detailed above cause errors in the DEIR's connected analysis of GHG emissions, criteria pollutant emissions, and energy consumption. As detailed above, the DEIR's flawed traffic modeling undercounts the Project's impacts on VMT and overestimate the congestion in the No Build scenario. The DEIR's analysis of GHG emissions, air pollution, and energy consumption relies on these measurements, meaning that the DEIR also undercounts how much GHG emissions, air pollution, and energy consumption will result from the Project. *See* Marshall Report, Ex. G, at 9–10. As a result, the DEIR reaches the erroneous conclusion that the Build Alternatives will lead to reduced GHG emissions, air pollutant emissions, and energy consumption, contradicting the literature establishing that widening roadways will cause more VMT, and therefore greater GHG emissions, air pollution impacts (more exhaust from combustion; more brake and tire wear; more suspended road particles), and more energy consumption (more vehicle fuel consumed). 6 cont.

Furthermore, the DEIR's claims that the Build Alternatives will lead to decreased GHG emissions, air pollutant emissions, and energy consumption in the future are reliant on newer vehicles' efficiency improvements and future fuel economy standards. These changes would occur with or without the Project. By including them in the DEIR, Caltrans obfuscates the true measure of the Project's impact: a comparison of the GHG emissions, air pollution, and energy consumption with and without the Project. Thus, the inclusion of this irrelevant information can only serve to confuse the public and decision-makers into thinking that the Project's impacts will be less severe than the reality.

Therefore, Caltrans has failed to fully disclose and accurately analyze GHG emissions, air pollution, and energy impacts. This analysis should be redone and grounded in realistic estimates of the VMT caused by the project without reference to extraneous variables.

B. Even as to the induced VMT that Caltrans admits is significant, Caltrans still vastly underestimates the impact 7

The only impact that Caltrans admits would be significant is the Project's induced VMT. According to the DEIR, the VMT caused by the Build Alternatives would top out at 133 million annual auto VMT. DEIR 3-41.

However, as shown in the Marshall Report, when properly used, the NCST Induced Travel Calculator (the same calculator used by the DEIR to estimate induced VMT), actually produces a much larger figure. The Marshall Report shows that Caltrans underestimated induced VMT by up to 44.4%. Marshall Report, Ex. G, at 3–4. Such a large discrepancy means that even though the DEIR admits that the VMT induced by the Build Alternatives will be significant, the public and decision-makers are not getting an accurate picture of just how significant the induced VMT will be. Caltrans should explain how it reached its figure in this analysis and why it differs from the result in the Marshall Report.

7 cont.

C. The DEIR fails to adequately measure the growth induced by the Project

The DEIR admits that the Build Alternatives will "change development patterns surrounding the project area." DEIR 2-53. Given that the I-80 corridor connects the Sacramento area to the Bay Area and that Sacramento is typically more affordable than the Bay Area, it stands to reason that increasing the number of vehicle lanes through the corridor will encourage Bay Area commuters to move further east, leading to more development in the areas surrounding the Project. *Id.* Despite admitting all of this, Caltrans concludes that there would be "no adverse effects associated with growth" because other factors like "other impediments to growth. . . , market conditions, and local land use policies are a greater influence on land use change than roadway capacity." *Id.*

8

The DEIR is meant to measure the Project's impacts, including on development; it is entirely irrelevant whether other factors may influence growth more than the Project. The operative question is how much the Project will influence growth and development. The DEIR should be redone to squarely address this matter.

D. The DEIR fails to adequately analyze the Project's marginal impacts on species and habitats

Several times throughout the DEIR, Caltrans simply describes current conditions, then baldly asserts that the Project will not have significant impacts. These conclusions do not even try to measure the Project's added impacts on certain species and habitats that will be harmed by the construction of the Project.

9

For example, the DEIR acknowledges that the western yellow-billed cuckoo, a threatened species, and the least Bell's vireo, an endangered species, could use the project area as migratory stopover habitat. Still, to conclude that "there will be no impact on western yellow-billed cuckoo or least Bell's vireo," the DEIR simply states that area is already subject to "frequent anthropogenic disturbances" and that "the activities proposed in the staging areas would be similar to those already occurring in the area." DEIR 3-14. The DEIR makes no effort to define the marginal impacts added by the Project or to analyze their effects on these species.

The DEIR similarly brushes off the Project's impacts on native resident or migratory fish or wildlife species, established native resident or migratory wildlife corridors, and native wildlife nursery sites because "[t]he project is located in areas with high levels of anthropogenic disturbances within and near the Caltrans right-of-way." DEIR 3-16. Again, such bare assertions do not provide any information on the Project's impacts.

9 cont.

4. The DEIR fails to adequately mitigate induced VMT, even though there are feasible mitigation measures

If an EIR concludes that a project will have a significant impact, CEQA requires the lead agency to adopt feasible mitigation measures or alternatives that reduce that impact to a level of insignificance. Cal. Pub. Res. Code §§ 21081, 21002. If the agency believes that there are no feasible mitigation measures or alternatives that reduce the project's impacts to less than significant, it must explain why and adopt a statement of overriding considerations before approving the project. Cal. Pub. Res. Code § 21081(b), 21002; Cal. Code Regs., tit. 14, §§ 15043, 15093.

Even though its faulty modeling underestimates the annual VMT induced by the Project, the DEIR still predicts that the Added Lane Alternatives will result in at least 128 million additional annual auto VMT. DEIR 3-41. However, the DEIR proposes to mitigate only 57.1 million annual auto VMT, less than half of the Project's added VMT. This is contrary to Caltrans' own guidance, which states that "[t]he level of induced travel projected generally represents the level of VMT to be mitigated." Caltrans, *Transportation Analysis under CEQA* 22 (1st ed., 2020) [attached as Ex. J].

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The Project's sizable unmitigated induced VMT remains a significant impact. If further mitigation measures are not feasible, then Caltrans must explain why and support its conclusion with substantial evidence. And if Caltrans tries to argue that the remaining induced VMT is not significant, "[a]n

agency's choice of a significance threshold [must be] founded on substantial evidence." *Mission Bay All. v. Off. of Cmty. Inv. & Infrastructure*, 6 Cal. App. 5th 160, 206 (Cal. Ct. App. 2016). Here, Caltrans makes no attempt to do either. The closest that the DEIR gets to an explanation is buried in an appendix, wherein Caltrans states that the mitigation budget is "14-15% of [the Project's] $350 million [budget]." Caltrans, *Yolo 80 Managed Lanes Project Draft VMT Mitigation Plan* 8 (Oct. 20, 2023). Caltrans implies this as justification for choosing its limited mitigation measures. However, there is no explanation why a project with a budget this massive has such a paltry mitigation fund or why Caltrans cannot contribute more to mitigation. Due to these oversights, the Project's mitigation measures cannot pass muster.

Furthermore, several of the proposed mitigation measures cannot credibly achieve the amount claimed. The Marshall Report finds that the measures related to transit pass subsidies and commuter incentives are duplicative and lead to double-counting of VMT reductions. The Marshall Report also finds that several mitigation measures assume rates of utilization and VMT impact that are unrealistically high, leading to overstated VMT reduction benefits. Marshall Report, Ex. G, at 11–19.

There are also several feasible measures that could further mitigate induced VMT, as required by CEQA. For example, as addressed above, Caltrans could consider an alternative with more than one tolled lane in each direction. *See* Sec. 2.B, *supra*. Without such measures, the DEIR fails to comply with CEQA requirements.

10 cont.

5. Delays in providing requested technical studies

The CEQA Guidelines requires that technical information in appendices "shall be readily available for public examination and shall be submitted to all clearinghouses which assist in public review." Cal. Code Regs., tit. 14, § 15147. NRDC attempted to obtain copies of the technical studies by emailing yolo80corridor@dot.ca.gov and the District 3 Chief Public Information Officer on November 16 and November 27 to request copies of the technical studies listed in Appendix H, but did not receive a response. After a third request directed to Caltrans and California State Transportation Agency leadership, we finally received the technical studies on December 13, 2023, with further information provided on January 11, 2024. While the deadline for comments was extended until January 12, Caltrans ultimately provided NRDC with less than the minimum time

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required to review and comment on the DEIR and its technical information. *See* Cal. Code Regs., tit. 14, § 15105. 11 cont.

6. Conclusion

The DEIR has numerous shortcomings. It left out alternatives that it should have studied while sandbagging the No Build Alternative with unrealistic assumptions. It also failed to adequately disclose, analyze, and mitigate the Project's impacts. These fatal flaws must be corrected—and the DEIR recirculated for public comment—before the Project may lawfully be approved. 12

Sincerely,

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Exhibit A

POLITICO

CALIFORNIA

Caltrans official says she was demoted for objecting to highway expansion

Jeanie Ward-Waller was removed last month from her position overseeing California's transportation planning.



Jeanie Ward-Waller filed whistleblower complaint about Sacramento-area road construction projects allegedly circumventing environmental rules. | Rich Pedroncelli/AP Photo

By **DEBRA KAHN**
10/03/2023 06:06 PM EDT

A top California transportation official who was reassigned last month told POLITICO she was demoted for objecting to highway expansions that will increase driving.

Jeanie Ward-Waller, Caltrans' deputy director of planning and modal programs, was taken off the job in September. Her reassignment came three weeks after she said she notified agency officials that she would file a whistleblower complaint about Sacramento-area road construction projects allegedly circumventing environmental rules.

AD

Caltrans' chief deputy director, Michael Keever, notified Ward-Waller on Sept. 14 that she would be terminated from her role Oct. 4 and placed on administrative leave until then. In a letter seen by POLITICO, he offered her the option of returning to her previous role at the agency or one administrative level above that.

Ward-Waller's attorney, Christian Schreiber, said she was still weighing her next steps. "We plan to press her employment-related claims and her whistleblower retaliation claims and litigation, if that's what's necessary," he said in an interview.

Caltrans officials declined to comment on specific claims. "Caltrans will cooperate with any independent investigation into these claims," agency spokesperson Edward Barrera said in a statement. "In addition, Caltrans does not comment on personnel matters."

Ward-Waller had served in the position since January 2020 and was an appointee of former Caltrans Director Toks Omishakin, whom Gov. Gavin Newsom (D) promoted last year to Secretary of Transportation. She started at Caltrans in 2017 as sustainability program manager and before that was the policy director for the California Bicycle Coalition.

As deputy director of planning, she oversaw Caltrans' long-range planning and research and helped set the agency's policy direction. The agency has authority over all state highways and oversees all state and federal transportation spending, including on rail, bike lanes and pedestrian routes as well as roads.

Ward-Waller said in an interview — her first since her termination — that she had objected to two construction projects on Highway 80 because, she said, Caltrans' state and federal permits improperly understated their environmental impacts.

"My job at Caltrans headquarters was really to help move us in a direction where we're not widening highways so much anymore," she said. "We care about climate, we care about equity, so we're trying to move towards more multimodal options and do less widening. My involvement in projects like this is from that kind of a perspective, of trying to challenge the districts to think differently about how they're approaching projects like this."

The projects are both located on the Yolo Causeway, an elevated highway between Davis and Sacramento that crosses the Yolo Bypass, a floodplain that serves as wildlife habitat. The first project began construction in August and the second is expected to begin construction by October 2024.

Ward-Waller alleged that Caltrans improperly described the first project as "pavement rehabilitation" when it will actually widen the road to accommodate new lanes. Because of that, she said, it's illegally using state funds that are intended only for road maintenance, not widening.

She also said the projects should have been considered as one and that by "piecemealing" them into two, Caltrans was able to streamline permitting for

the first project, avoiding a full evaluation of alternatives under the California Environmental Quality Act and the National Environmental Policy Act.

Ward-Waller said she had been raising concerns about the project since July. She said she elevated the concerns in a text message to Keever on Aug. 16 and detailed them in a meeting with him on Aug. 17 before going on vacation for two weeks.

"That was the time I basically said, 'We need to call an external audit here,'" she said.

After being demoted Sept. 14, Ward-Waller said, she submitted a formal whistleblower complaint to Caltrans on Sept. 16.

She also identified in the complaint two other projects underway in the Sacramento region that she said are improperly using maintenance funding while actually widening the roads and said the Caltrans district that oversees the region is known for trying to use road-maintenance funding to widen highways. "This was somewhat their way of doing business," she said.

Caltrans declined further comment.

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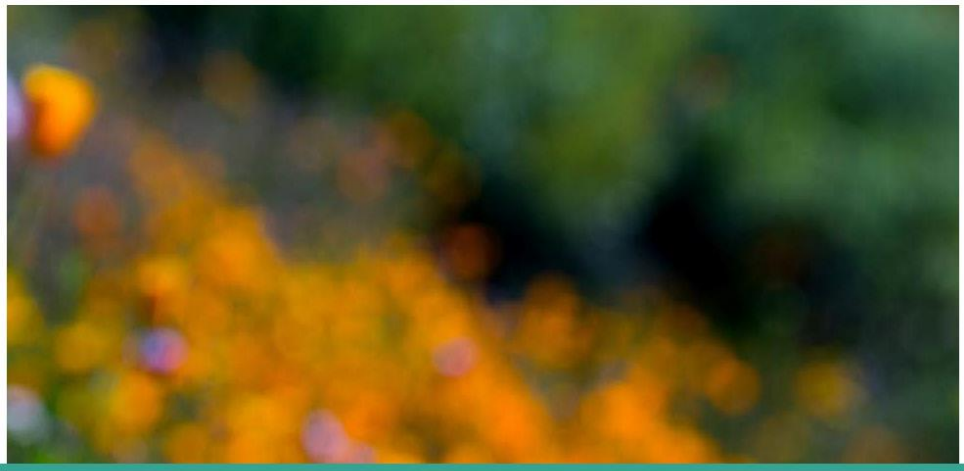
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Exhibit B

CALIFORNIA
AIR RESOURCES BOARD

December 2022



2022 Scoping Plan for Achieving Carbon Neutrality



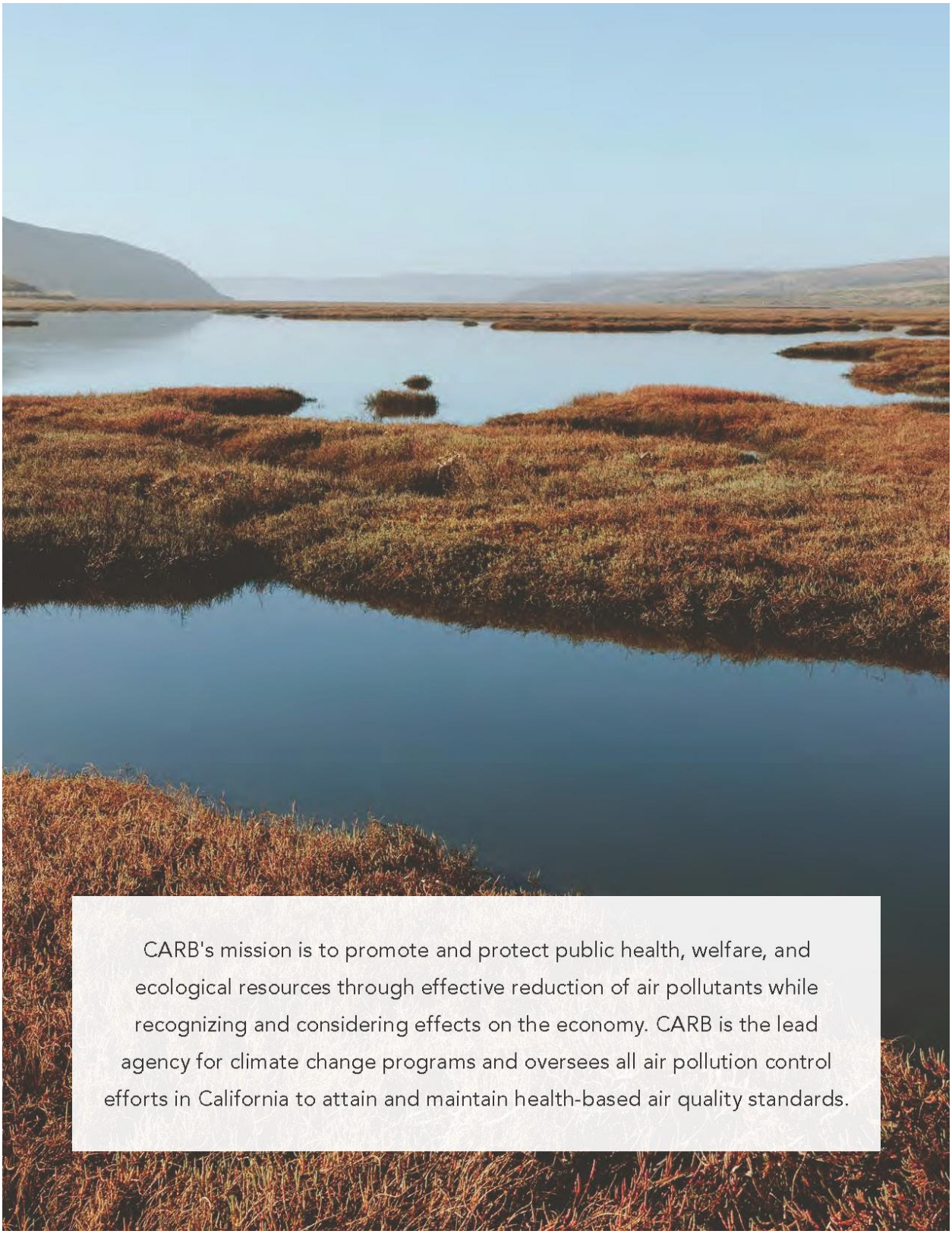

CARB's mission is to promote and protect public health, welfare, and ecological resources through effective reduction of air pollutants while recognizing and considering effects on the economy. CARB is the lead agency for climate change programs and oversees all air pollution control efforts in California to attain and maintain health-based air quality standards.

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Abbreviations

°F	Fahrenheit
°C	Celsius
AB	Assembly Bill
AQMD	Air Quality Management District
AR5	IPCC Fifth Assessment Report
BECCS	bioenergy with carbon capture and storage
CAISO	California Independent System Operator
CalEPA	California Environmental Protection Agency
CalGEM	California Geologic Energy Management Division
CalSTA	California State Transportation Agency
CAP	climate action plan
CARB	California Air Resources Board
CCR	California Code of Regulations
CCS	carbon capture and sequestration
CCUS	carbon capture, utilization, and storage
CDFA	California Department of Food and Agriculture
CDPH	California Department of Public Health
CDR	carbon dioxide removal
CE	common era
CEC	California Energy Commission
CEQA	California Environmental Quality Act
CES	CalEnviroScreen
CH_4	methane
CMAQ	Community Multiscale Air Quality
CNRA	California Natural Resources Agency
CO_2	carbon dioxide
COPD	chronic obstructive pulmonary disease

CORE	Clean Off-Road Equipment
CPUC	California Public Utilities Commission
CVM	Climate Vulnerability Metric
DAC	direct air capture
DPR	Department of Pesticide Regulation
Draft EA	Draft Environmental Analysis for this Scoping Plan
EA	Environmental Analysis
ED	emergency department
EIA	U.S. Energy Information Administration
EJ	environmental justice
EJ Advisory Committee	Environmental Justice Advisory Committee
EO	executive order
EV	electric vehicle
F-gas	fluorinated gas
FCEV	fuel cell electric vehicle
GCF	Governors' Climate and Forests Task Force
GDP	gross domestic product
GHG	greenhouse gas
GSP	gross state product
GW	gigawatt
GWh	gigawatt-hour
GWP	global warming potential
HDV	heavy-duty vehicle
HD ZEV	heavy-duty zero-emission vehicle
HFC	hydrofluorocarbon
IBank	Infrastructure and Economic Development Bank
ICE	internal combustion engine
IPCC	Intergovernmental Panel on Climate Change

IPT	incidence-per-ton
IWG	Interagency Working Group
LCFS	low-carbon fuel standard
LDV	light-duty vehicle
MDV	medium-duty vehicle
MMT	million metric tons
$MMTCO_2e$	million metric tons of carbon dioxide equivalent
MOU	memorandum of understanding
MRR	Mandatory Reporting of GHG Emissions
$MTCO_2e$	metric tons of carbon dioxide equivalent
MW	megawatt
N_2O	nitrous oxide
NEMS	National Energy Systems Model
NF_3	nitrogen trifluoride
NOAA	National Oceanic and Atmospheric Administration
NOx	nitrogen oxides
NRDC	National Resources Defense Council
NWL	Natural and Working Lands
OEHHA	Office of Environmental Health Hazard Assessment
OGV	Ocean-Going Vessel
OPR	Governor's Office of Planning and Research
OTC	once-through cooled
PFC	perfluorocarbon
PHMSA	Pipelines and Hazardous Materials Safety Administration
PM	particulate matter
$PM_{2.5}$	fine particulate matter
PPP	public-private partnership
RFS	renewable fuel standard

ROG	reactive organic gases
RPS	Renewables Portfolio Standard
SB	Senate Bill
SC-CH_4	social cost of methane
SC-CO_2	social cost of carbon
SC-GHG	social cost of greenhouse gases
SC-N_2O	social cost of nitrous oxide
SF_6	sulfur hexafluoride
SGIP	Self-Generation Incentive Program
SLCP	short-lived climate pollutant
TSD	Technical Support Document
UC	University of California
UCLA	University of California, Los Angeles
UNFCCC	United Nations Framework Convention on Climate Change
U.S. EPA	United States Environmental Protection Agency
VMT	vehicle miles traveled
WUI	wildland-urban interface
ZEV	zero-emission vehicle

Executive Summary

This Scoping Plan lays out the sector-by-sector roadmap for California, the world's fifth[1] largest economy, to achieve carbon neutrality by 2045 or earlier, outlining a technologically feasible, cost-effective, and equity-focused path to achieve the state's climate target. This is a challenging but necessary goal to minimize the impacts of climate change. There have been three previous Scoping Plans. Previous plans have focused on specific greenhouse gas (GHG) reduction targets for our industrial, energy, and transportation sectors—first to meet 1990 levels by 2020, then to meet the more aggressive target of 40 percent below 1990 levels by 2030. This plan, addressing recent legislation and direction from Governor Newsom, extends and expands upon these earlier plans with a target of reducing anthropogenic emissions to 85 percent below 1990 levels by 2045. This plan also takes the unprecedented step of adding carbon neutrality as a science-based guide and touchstone for California's climate work. The plan outlines how carbon neutrality can be achieved by taking bold steps to reduce GHGs to meet the anthropogenic emissions target and by expanding actions to capture and store carbon through the state's natural and working lands and using a variety of mechanical approaches.



What this means for California is an ambitious and aggressive approach to decarbonize every sector of the economy, setting us on course for a more equitable and sustainable future in the face of humanity's greatest existential threat, and ensuring that those who benefit from this transformation include communities hardest hit by climate impacts and the ongoing pollution from the use of fossil fuels. The combustion of fossil fuels has polluted our air—particularly in low-income communities and communities of color—for far too long and is the root cause of climate change. This Scoping Plan helps us chart the path to a future where race and class are no longer predictors of disproportionate burdens from harmful air pollution and climate impacts.

The major element of this unprecedented transformation is the aggressive reduction of fossil fuels wherever they are currently used in California, building on and accelerating carbon reduction programs that have been in place for a decade and a half. That means rapidly moving to zero-emission transportation; electrifying the cars, buses, trains, and trucks that now constitute California's single largest source of planet-warming pollution. It also means phasing out the use of fossil gas used for heating our homes and buildings. It means clamping down on chemicals and refrigerants that are thousands of times more powerful at trapping heat than carbon dioxide (CO_2). It means providing our communities with sustainable options for walking, biking, and public transit to reduce reliance on cars and their associated expenses. It means continuing to build out the solar arrays, wind turbine capacity, and other resources that provide clean, renewable energy to displace fossil-fuel fired electrical generation. It also means scaling up new options such as renewable hydrogen for hard-to-electrify end uses and biomethane where needed. Successfully achieving the outcomes called for in this Scoping Plan would reduce demand for liquid petroleum by 94 percent

1 In October 2022, California was poised to become the world's fourth largest economy.

and total fossil fuel by 86 percent in 2045 relative to 2022.[2] Despite these world-leading efforts, some amount of residual emissions will remain from hard-to-abate industries such as cement, internal combustion vehicles still on the road, and other sources of GHGs, including high global warming chemicals used as refrigerants.

The plan addresses these remaining emissions by re-envisioning our natural and working lands—forests, shrublands/chaparral, croplands, wetlands, and other lands—to ensure they play as robust a role as possible in incorporating and storing more carbon in the trees, plants, soil, and wetlands that cover 90 percent of the state's 105 million acres while also thriving as a healthy ecosystem. Modeling indicates that natural and working lands will not, on their own, provide enough sequestration and storage to address the residual emissions. For that reason, it is necessary to research, develop, and deploy additional methods of capturing CO_2 that include pulling it from the smokestacks of facilities, or drawing it out of the atmosphere itself and then safely and permanently utilizing and storing it, as called for in recent legislation. Carbon removal also will be necessary to achieve net negative emissions to address historical GHGs already in the atmosphere.

This is a plan that aims to shatter the carbon status quo and take action to achieve a vision of California with a cleaner, more sustainable environment and thriving economy for our children. This ambitious plan will serve as a model for other partners around the world as they consider how to make their transition. As we have so often in the past, California can continue to serve as a leader in innovation that has produced not only the fifth largest economy on the planet, but ultimately one of the most energy-efficient economies, with a track record of demonstrating the ability to decouple economic growth from carbon pollution. This plan also builds upon current and previous environmental justice efforts to integrate environmental justice directly into the plan, to ensure that all communities can reap the benefits of this transformational plan. Specifically, this plan identifies a path to keep California on track to meet its SB 32 GHG reduction target of at least 40 percent below 1990 emissions by 2030.

2 See *CARB's energy demand reductions.*



- Identifies a technologically feasible, cost-effective path to achieve carbon neutrality by 2045 and a reduction in anthropogenic emissions by 85 percent below 1990 levels.
- Focuses on strategies for reducing California's dependency on petroleum to provide consumers with clean energy options that address climate change, improve air quality, and support economic growth and clean sector jobs.
- Integrates equity and protecting California's most impacted communities as driving principles throughout the document.
- Incorporates the contribution of natural and working lands (NWL) to the state's GHG emissions, as well as their role in achieving carbon neutrality.
- Relies on the most up-to-date science, including the need to deploy all viable tools to address the existential threat that climate change presents, including carbon capture and sequestration, as well as direct air capture.
- Evaluates the substantial health and economic benefits of taking action.
- Identifies key implementation actions to ensure success.

The path forward is informed by robust science. The recent Sixth Assessment Report (AR6) of the Intergovernmental Panel on Climate Change (IPCC) summarizes the latest scientific consensus on climate change. It finds that atmospheric concentrations of CO_2 have increased by 50 percent since the industrial revolution and continue to increase at a rate of two parts per million each year.[3] By the 2030s, and no later than 2040, the world will exceed 1.5°C warming unless there is drastic action. While every tenth of a degree matters—every incremental increase in warming brings additional negative impacts—climate-related risks to human health, livelihoods, and biodiversity are projected to increase further under 2°C warming, compared to 1.5°C.[4] For example, at 1.5°C of global warming, we would experience increasing heat waves, longer warm seasons, and shorter cold seasons, but at 2°C of global warming, heat extremes would more often reach critical tolerance thresholds for human health and agriculture.[5] We are already seeing unprecedented climate change impacts, such as continued sea level rise, that are "irreversible" for centuries to millennia, and we are dangerously close to hitting 1.5°C in the near term.[6] To avoid climate catastrophe and remain below 1.5°C with limited or no overshoot of that threshold, global net anthropogenic CO_2 emissions need to reach net zero by 2050.

3 *IPCC. 2021. Climate Change 2021: The Physical Science Basis. Contribution of Working Group I to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change. [Masson-Delmotte, V., P. Zhai, A. Pirani, S. L. Connors, C. Péan, S. Berger, N. Caud, Y. Chen, L. Goldfarb, M. I. Gomis, M. Huang, K. Leitzell, E. Lonnoy, J. B. R. Matthews, T. K. Maycock, T. Waterfield, O. Yelekçi, R. Yu, and B. Zhou (eds.)]. Cambridge University Press. In Press.*

4 *IPCC. 2018. Global Warming of 1.5°C. World Meteorological Organization. Geneva, Switzerland. 32 pp.*

5 *IPCC. 2021. Climate change widespread, rapid, and intensifying – IPCC. August.*

6 *United Nations. 2021. IPCC report: 'Code red' for human driven global heating, warns UN chief. August 9.*

It has been 16 years since the Global Warming Solutions Act of 2006 was passed and signed into law. In 2017, the second update to the Assembly Bill (AB) 32 Climate Change Scoping Plan[7] (2017 Scoping Plan) laid out a cost-effective and technologically feasible path to achieve the 2030 GHG reduction target. At the time, many characterized the plan and the AB 32 target as unachievable, citing that it would lead to massive business and job loss, and excessive costs. Those predictions proved to be incorrect as California achieved its AB 32 target years ahead of schedule, all the while growing our economy, with the state distinguishing itself as a hub for green technology investment. This Scoping Plan draws on a decade and a half of proven successes and additional new approaches to provide a balanced and aggressive course of effective actions to achieve carbon neutrality in 2045, if not before, in addition to the 2030 goal.

California's economy is projected to grow vigorously in the coming years and decades. In 2045, under a Reference Scenario, the gross state product would be $5.1 trillion, nearly $2 trillion more than in 2021, and allow growth that would add hundreds of thousands of jobs. Under the Scoping Plan scenario, impacts to economic and job growth would be negligible in both 2035 and 2045, while delivering $199 billion of benefits in the form of reduced hospitalizations, asthma cases, and lost work and school days due to the cleaner air supported by this plan. This should come as no surprise given the tremendous growth of California's economy since the Great Recession of 2007–2009, even as the state has taken drastic measures to lower emissions. As noted, the savings associated with ambitious climate action are extensive, both in terms of avoided climate impacts and health costs. As described in Chapter 1, the health costs of climate and air pollution in the U.S. are well over $800 billion today and will continue to grow in the coming years[8] without robust action. Similarly, the costs of delayed or insufficient climate action could cost the U.S. upwards of $14.5 trillion over the next 50 years.[9] We can either take action now or pay the cost of inaction, both now and later.



Grows CA's economy to $5.1 trillion by 2045



New jobs ⬆ 4 million



Health costs ⬇ $200 billion

We cannot take on this unprecedented challenge alone. Collaboration with the federal government, other U.S. states, and other jurisdictions around the world will continue to be fundamental for California to succeed in achieving its climate targets, especially as the pace of our efforts increases in the coming years. We believe this collaboration and coordination also creates a race to the top, encouraging and enabling other jurisdictions to achieve climate and air quality goals as well, and often providing lessons for national action.

One example of fruitful collaboration is California's longstanding vehicle emissions standards programs, which have repeatedly been freely adopted by other states, consistent with the federal Clean Air Act. California's programs frequently pioneer more rigorous standards or new technologies—such as the now-standard catalytic converter and the rules that led directly to the nation-leading numbers of zero-emission vehicles on our roads today. From initial standards for cars

7 *CARB. 2017. California's 2017 Climate Change Scoping Plan.*
8 *Alwis, D. D., and V. S. Limaye. No date. The Costs of Inaction: The Economic Burden of Fossil Fuels and Climate Change on Health in the United States. NRDC, The Medical Society Consortium on Climate and Health, and WHPCA.*
9 *Deloitte. 2022. The Turning Point: A New Economic Climate in the United States.*

and trucks decades ago to the world-leading Advanced Clean Trucks program currently helping to electrify heavy-duty vehicles, this partnership continues to offer regulatory options and spread innovative technologies. A major example of future work is the Advanced Clean Cars II program, which lays out California's legally binding path to achieving 100 percent zero emission vehicle (ZEV) sales in 2035.[10] The California Air Resources Board (CARB) continues to work closely with many other states that also see zero-emission vehicles as critical to their climate and public health goals and expects many states to choose to adopt this regulation as well. This partnership with other states also creates market certainty for automakers, which in turn helps to ensure that California consumers have access to a variety of ZEVs at multiple price points.

The Scoping Plan Process

Four scenarios were extensively modeled to develop this Scoping Plan, with the objective of informing the most viable path to remain on track to achieve our 2030 GHG reduction target: a reduction in anthropogenic emissions by 85% below 1990 levels and carbon neutrality by 2045. All four have their merits and are informed by stakeholder input. The scenario ultimately chosen as the basis of this Scoping Plan is the alternative that most closely aligns with existing statute and Executive Orders. It was selected because it best achieves the balance of cost-effectiveness, health benefits, and technological feasibility.

For the first time, this Scoping Plan includes modeling and quantification of GHG emissions and carbon sequestration in natural and working lands (NWL). To date, the focus has been only on reducing the emissions of GHGs from our transportation, energy, and industrial sectors. The state's 2020 and 2030 GHG reductions targets only include these sources, as they are the primary drivers of climate change and disproportionate harmful air pollution in our vulnerable communities. This Scoping Plan, through the lens of carbon neutrality, expands the scope to more meaningfully consider how our NWL contribute to our long-term climate goals. For the first time, new and cutting-edge modeling tools allow us to estimate the quantitative ability of our forests and other landscapes to remove and store carbon under different scenarios. These cutting-edge tools were developed through a stakeholder process and in coordination with other agencies for the purpose of this update and will continue to be refined over time and made available to others seeking to do similar work.

10 *Executive Department. State of California. Executive Order N-79-20.*



As recent data and Scoping Plan modeling shows, our NWL also can act as a source of emissions, principally in the form of wildfires. California's forests are experiencing a deadly combination of drought and heat combined with a century of misguided fire suppression management. Scoping Plan modeling shows that, at this time and until our forests reach a balance through appropriate treatments, California's NWL will act as a net source of emissions, not a sink. As such, the Scoping Plan includes policy direction and actions intended to quickly move the sector toward being a net sink and a more natural state, where wildfires will continue to be an important part of the healthy forest cycle but not at the intensity and frequency observed in recent years.

Development of this Scoping Plan also includes careful consideration of, and coordination with, other state agencies, consistent with Governor Gavin Newsom's whole-of-government approach to tackling climate change. State agency plans and regulations, including the SB 100 Joint Agency Report,[11] State Implementation Plan, Climate Action Plan for Transportation Infrastructure,[12] AB 74 Studies on Vehicle Emissions and Fuel Demand and Supply,[13,14,15] Short-Lived Climate Pollutant Strategy (SLCP Strategy),[16] CARB's Achieving Carbon Neutrality Report,[17] Climate Smart Lands Strategy,[18] Natural Working Land Implementation Plan,[19] and the California Climate Insurance Report: Protecting Communities, Preserving Nature, and Building Resiliency,[20] among others, provided critical inputs and data points for this plan. This Scoping Plan is the product of work by multiple agencies across the Administration, including dozens of public workshops and years of rigorous analysis and economic modeling by California's leading institutions. This cooperation on planning lays the foundation for even closer coordination among and between state agencies to put the plan into effect.

The plan is also the product of tireless efforts of, and recommendations from, the AB 32 Environmental Justice Advisory Committee (EJ Advisory Committee). The EJ Advisory Committee, created by statute, plays a critical role to inform the development of each Scoping Plan and helps to ensure environmental justice is integrated throughout the plan. CARB reconvened the EJ Advisory Committee in early 2021 to advise on the development of this Scoping Plan. In their advisory role, the EJ Advisory Committee has worked together to provide inputs to CARB to inform the development of scenarios and the associated modeling. And in April 2022, the EJ Advisory Committee provided draft preliminary recommendations in advance of the Draft 2022 Scoping Plan to help ensure the draft plan meaningfully addresses environmental justice. The CARB Board and EJ Advisory Committee held a joint board hearing on September 1, 2022, where the EJ Advisory Committee presented their final recommendations on the Scoping Plan. Over five dozen of the recommendations are reflected in the Scoping Plan. Going forward, as this plan is ultimately acted on by the Board, ongoing input from the EJ Advisory Committee will be essential to address environmental justice and achieve the ambitious vision outlined in the plan throughout its implementation in the coming years.

11 *California Public Utilities Commission (CPUC), California Energy Commission (CEC), and CARB. 2021. SB 100 Joint Agency Report.*
12 *California State Transportation Agency (CalSTA). 2021. Climate Action Plan for Transportation Infrastructure.*
13 *California Environmental Protection Agency (CalEPA). 2021. Carbon Neutrality Studies.*
14 *Brown, A. L., et. al. 2021. Driving California's Transportation Emissions to Zero. University of California Institute of Transportation Studies.*
15 *Deschenes, O. 2021. Enhancing equity while eliminating emissions in California's supply of transportation fuels. University of California Santa Barbara.*
16 *CARB. Short-Lived Climate Pollutants.*
17 *Energy and Environmental Economics, Inc. 2020. Achieving Carbon Neutrality in California: PATHWAYS Scenarios Developed for the California Air Resources Board. October.*
18 *California Natural Resources Agency (CNRA). 2021. Draft Climate Smart Lands Strategy.*
19 *CARB. 2019. Draft California 2030 Natural and Working Lands Climate Change Implementation Plan.*
20 *California Department of Insurance. 2021. Protecting Communities, Preserving Nature, and Building Resiliency.*



Importantly, per legislative direction, the Scoping Plan development includes modeling and analyses of emissions, economics, air quality, health, jobs, and public health. This work is important to inform the discussion around trade-offs and how to balance the various legislative direction in identifying a path to achieve the state's climate goals. The technical work serves as a backdrop to what this means to Californian's daily lives—to how they will work, play, and live as we act to eliminate fossil fuel combustion and achieve the many public health and environmental benefits that will result from that action.

Ensuring Equity and Affordability

The state has a long history of public health and environmental protection. However racist and discriminatory practices such as redlining have resulted in low-income communities and communities of color being disproportionately exposed to health hazards and pollution burdens.[21] These communities are often located adjacent to major roadways and large stationary sources that not only emit GHGs, but also harmful localized air pollution. The plan delivers on the promise to transform the way we move, live, and work by nearly eliminating our dependence on fossil fuels. It includes effective actions to move with all possible speed to clean energy, zero-emission cars and trucks, energy-efficient homes, sustainable agriculture, and resilient NWL. And it prioritizes working with the communities most impacted to ensure that these strategies address their needs.

An important part of our equity consideration is ensuring the transition to a zero-emission economy is affordable and accessible, and that it uplifts disadvantaged, low-income communities and communities of color. Some aspects of the transition will have associated costs (e.g., escalating efforts to retrofit existing homes and businesses to support electric appliances and vehicles and increased costs of insurance). The state must ensure that these costs do not disproportionately burden consumers. In addition, the state has an important role to play in providing financial incentives, especially to low-income consumers, to allow for uptake of clean technologies. The Department of Community Services and Development's Low Income Weatherization Program is a prime example of this approach, enabling low-income Californians to be part of the zero-emission transition, all while lowering energy bills. The program provides low-income households with solar

21 *CalEPA. 2021. Pollution and Prejudice: Redlining and Environmental Injustice in California. August 16.*

photovoltaic systems and energy efficiency upgrades at no cost to residents, helping cushion the impact of climate change on vulnerable communities.

With this Scoping Plan, the state also adds another tool to help identify and close climate change impact gaps that will emerge over time. As California invests in climate mitigation and adaptation, it is essential to understand the relative impact of climate change across the state's diverse communities. We know not all communities are equally resilient in the face of climate impacts due to persisting health and opportunity gaps. We also know that a global metric such as the Social Cost of Carbon cannot adequately capture the incremental additional impact faced by overly burdened communities. The Climate Vulnerability Metric (CVM) is specifically focused on quantifying the community-level impacts of a warming climate on human welfare.

Energy and Technology Transitions

To support the transformation needed, we must build the clean energy production and distribution infrastructure for a carbon-neutral future. The solution will have to include transitioning existing energy production and transmission infrastructure to produce zero-carbon electricity and hydrogen, and utilizing biogas resulting from wildfire management or landfill and dairy operations, among other substitutes. In almost all sectors, electrification will play an important role. That means that the grid will need to grow at unprecedented rates and ensure reliability, affordability, and resiliency through the next two decades and beyond. It also means we need to keep all options on the table, as it will take time to fully grow the electricity grid to be the backbone for a decarbonized economy. We also know that electrification is not possible in all situations. As such, this plan systematically evaluates and identifies feasible clean energy and technology options that will bring both near-term air quality benefits and deliver on longer-term climate goals.



This transition will not happen overnight. It will take time and planning to ensure a smooth transition of existing energy infrastructure and deployment of new clean technology. And while this Scoping Plan has the longest planning horizon of any Scoping Plan to date, this 25-year horizon is still relatively short in terms of transforming California's economy. We must avoid making choices that will lead to stranded assets and incorporate new technologies that emerge over time. Importantly, given the pace at which we must transition away from fossil fuels, we absolutely must identify and address market and implementation barriers to be successful. The scale of transition includes adding four times the solar and wind capacity by 2045 and about 1,700 times the amount of current hydrogen supply.

As we transition our energy systems, we must also rapidly deploy the clean technologies that rely on a decarbonized grid. As called for in Executive Order N-79-20, all new passenger vehicles sold in California will be zero-emission by 2035, and all other fleets will have transitioned to zero-emission as fully possible by 2045. This means the percentage of fossil fuel combustion vehicles will continue to rapidly decrease, becoming a fading vision of the past. Successful implementation of this Executive

Order (EO) and other zero-emission priorities will have to be attractive to consumers. As an example, electric and hydrogen transportation refueling must be readily accessible, and active transportation and clean transit options must be cheaper and more convenient than driving.

Cost-Effective Solutions Available Today

Ultimately, to achieve our climate goals, urgent efforts are needed to slash GHG emissions. Fortunately, cost-effective solutions are available to do so in many cases. In short, this plan relies on existing technologies—it does not require major technological breakthroughs that are highly uncertain.

For example, targeted action to reduce methane emissions can be achieved at low or negative cost, and with significant near-term climate and public health benefits. In many cases, renewable energy and energy storage are cheaper than polluting alternatives, and are already firmly part of our business-as-usual approach; modeling related to the most recent integrated resource planning process at the California Public Utilities Commission (CPUC) has shown that scenarios associated with the best emissions outcomes had the lowest average rates. As another example, research from Energy Innovation shows that the U.S. can achieve 100 percent zero-carbon power by 2035 without increasing customer costs.[22]

The same is either already true, or soon to be true, for zero-emission vehicles as well. Myriad studies show cost parity for light-duty and heavy-duty ZEVs being achieved by mid-decade or shortly thereafter. A carbon neutrality study conducted by the University of California (UC) Institute of Transportation Studies and funded by the California Environmental Protection Agency (CalEPA) shows that achieving carbon neutrality in the transportation sector will save Californians $167 billion through 2045.[23] Similar research from the Goldman School of Public Policy at UC Berkeley finds that achieving 100 percent light-duty ZEV sales nationwide would save consumers $2.7 trillion through 2050; equivalent to $1,000 per household, per year, for 30 years.[24]

22 *Phadke, A. et al. 2020. "Illustrative Pathways to 100 Percent Zero Carbon Power by 2035 Without Increasing Customer Costs, Energy Innovation." September.*
23 *Brown, A. L., et al. 2021. Driving California's Transportation Emissions.*
24 *Goldman School of Public Policy. 2021. 2035: The Report: Transportation. UC Berkeley. April.*





Many of these outcomes are a direct result of California's vision and policy development to advance clean energy and climate solutions, including through the Renewables Portfolio Standard, Advanced Clean Cars II regulations, SLCP Reduction Strategy, and others. While the world collectively has not yet fully deployed clean energy and climate solutions at the scale needed to adequately address climate change, California has made tremendous progress—even since the last Scoping Plan update in 2017. Continued ambition, leadership, and climate policy development from California will help the state achieve the scale of emissions reductions needed from technologies and strategies that are already cost-effective or close to it today, and will move additional technologies and strategies to that point in the near future. Achieving those outcomes and reducing costs for the entire array of climate solutions needed to achieve carbon neutrality and then maintain net-negative emissions will prove the true measure of California's success. This will enable California to not just meet our own climate targets, but to ultimately develop the replicable solutions that can scale globally to address global warming.

Continue with a Portfolio Approach

Over the past decade and a half, the state has undertaken a successful three-pronged approach to reducing GHGs: incentives, regulations, and carbon pricing. The 2017 Scoping Plan leveraged existing programs such as the Renewables Portfolio Standard, Advanced Clean Cars, Low Carbon Fuel Standard, Short-lived Climate Pollutant Strategy, mobile source measures to achieve federal air quality targets, and a Cap-and-Trade Program, among others, to lay out a technologically feasible and cost-effective path to achieve the 2030 GHG reduction target. When looking toward the 2045 climate goals and the deeper GHG reductions needed across the AB 32 GHG Inventory sectors, all of the existing programs must be evaluated and, as necessary, strengthened to support the rapid production and deployment of clean technology and energy, as well as the increased pace and scale of actions on our natural and working lands.

The challenge before us requires us to keep all tools on the table. Given the climate mitigation co-benefits, critical actions to deliver near-term air quality benefits, such as those included in the State Implementation Plan to achieve the federal air quality standards, are incorporated into this Scoping Plan, as are new legislative mandates to decarbonize the electricity and cement sectors. And, if additional gaps are identified, new programs and policies must be developed and implemented to

ensure all sectors are on track to reduce emissions. Opportunities to leverage these programs to address ongoing air quality disparities must also be considered, along with targeted environmental justice policies such as the AB 617 Community Air Protection Program and the investments made possible through the California Climate Investments Program.

Conclusion

California has never undertaken such a comprehensive, far-reaching, and transformative approach to fighting climate change as that called for in this plan. Once implemented, it will place every aspect of how we live, work, play, and travel in California on a more sustainable footing, with a focus on directly benefitting those communities already most burdened by pollution. This comprehensive approach reflects how climate change is already changing life in California. We have all experienced the impacts of devastating wildfires, extreme heat, and drought. Despite much progress, California still has some of the worst air pollution in the nation, especially in the San Joaquin Valley and the Los Angeles Basin, which is driven by the continued use of fossil fuel-powered trucks and cars.

This Scoping Plan provides a solution; a way forward and a vision of a California where we can and will address those impacts. This plan is fundamentally based on hope. It is a hope grounded in experience and science that we can fundamentally improve the California we leave to future generations. The plan is built on the legacy of effective actions and on the conviction that we can effectively marshal the combined capabilities of California—from state, regional, tribal, and local governments to industry to our research institutions, and most importantly, to the nearly 40 million Californians who will benefit from the actions laid out in the plan. It addresses the challenge of our generation by laying out a pathway and guideposts for action across three decades. But the Scoping Plan is only that: a plan. The hard work—and hopeful work—is putting its recommendations into action. And there is no time to waste.

Post-adoption of the Scoping Plan

As with previous Scoping Plans, CARB Board approval is the beginning of the next phase of climate action. Specifically, approval of this plan catalyzes a number of efforts, including the development of new regulations as well as amendments to strengthen regulations and programs already in place, not just at CARB but across state agencies. The unprecedented rate of transition will also require the identification and removal of market and implementation barriers to the production and deployment of clean technology and energy. All of these actions and more will be needed if we are to achieve our climate goals.

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Chapter 1: Introduction

"The debate is over around climate change. Just come to the state of California. Observe it with your own eyes."

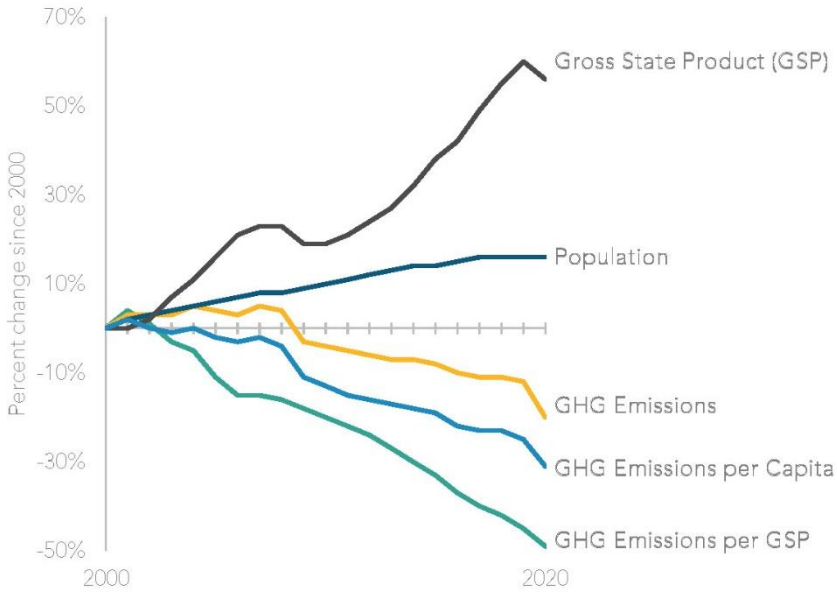
- California Governor Gavin Newsom in September 2020 after surveying the devastation caused by catastrophic wildfires

The impacts of climate change are no longer a distant threat on the horizon—they are right here, right now, with a growing intensity that is adversely affecting our communities and our environment, here in California and across the globe. The science that, decades ago, predicted the impacts we are currently experiencing is even stronger today and unambiguously tells us what we must do to limit irreversible damage: we must act with renewed commitment and focus to do more and do it sooner. That science is indisputable. Unless we increase ambition, we will be faced with more fire, more drought, more temperature extremes, and deadly, choking air pollution. The future of our state—our communities, economy, and ecosystems—is inextricably tied to the way we respond in this decade and the partnerships we forge along the way.

The impacts of climate change fall most heavily on frontline communities that bear the brunt of extreme heat, drought, wildfires, and other effects. Low-income communities and communities of color are also disproportionately impacted by fossil fuel combustion-related air pollution and related health problems. The continued phaseout of fossil fuel combustion will advance both climate and air quality goals and will deliver the greatest health benefits to the most impacted communities.

As it has responded to this climate crisis, California has established itself as a global leader in science-based, public health-focused climate change mitigation and air quality control. The California Legislature has worked with both Republican and Democratic governors to advance action on public health and environmental protections—and California has made progress on addressing climate change during periods of both Republican and Democratic federal administrations. Since the passage of Assembly Bill 32 (AB 32) (Núñez and Pavley, Chapter 488, Statutes of 2006), California has developed bold, creative, and durable policy solutions to protect our environment and public health, all while growing our economy. In fact, California met the target established in AB 32—a return of greenhouse gas (GHG) emissions to 1990 levels by 2020—years ahead of schedule, even as the state established itself as the one of the largest economies in the world. As Figure 1-1 below shows, California's emissions and economic growth have continued to decouple, and California is now the fifth largest economy in the world.

Figure 1-1: California total and per capita GHG emissions[25]



Recognizing both California's early successes in achieving GHG emissions reductions while growing the economy, as well as the worsening impacts of climate change, our governors and legislators have continued to enact ambitious goals. California's unwavering commitment to address climate change is based on indisputable science and data. This commitment is also informed by our collective efforts to address environmental justice and advance racial equity, such that race will no longer be a predictor for disproportionate environmental burdens faced by low-income communities and communities of color. As the Office of Environmental Health Hazard Assessment's

[25] Due to the global pandemic, 2020 is an outlier year and should not be considered indicative of a trend; emissions are likely to increase as economies recover from the impacts of the pandemic.

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(OEHHA's) recent analysis of race/ethnicity and air pollution vulnerability and CalEnviroScreen 4.0 scores demonstrate, much work remains to be done.[26]

Many of California's environmental policies have served as models for similar policies in other U.S. states, and at national and international levels. Moving forward, California will continue its pursuit of collaborations and advocacy for action to address climate change at all levels of government. While California is responsible for just one percent of global GHG emissions, and we must do our part, we also play an important role in exporting both political will and technical solutions to address the climate crisis globally.

Today, we have a chance to re-envision California's future and set the state on a path to be carbon neutral no later than 2045 while advancing equity, addressing environmental justice, and continuing to grow our economy. This Scoping Plan provides a roadmap outlining key policies we can implement to achieve our climate goals while improving the health and welfare of Californians and addressing disparities in health outcomes to create a more equitable future. It will enable us to turn the corner in our efforts to protect and preserve our critical natural and public resources, all while providing unparalleled opportunities for clean, pollution-free economic growth.

Severity of Climate Change Impacts

With the increasing severity and frequency of drought, wildfire, extreme heat, and other impacts, Californians just have to look out their windows to know that climate change is real and rapidly getting worse. The impacts we thought we would see in the decades to come are happening now. We must act decisively to both reduce our GHG emissions and build resilience to these impacts for ourselves, future generations, and our iconic landscapes.

Wildfires

Of the twenty largest wildfires ever recorded in California, nine occurred in 2020 and 2021. The worst wildfire season in California's recorded history was in 2018, with over 24,226 structures damaged or destroyed and over 100 lives lost. The largest wildfire season ever recorded in state history was in 2020, where more than 4.3 million acres burned, albeit at different intensity and with varying ecological impacts, and over 112 million metric tons of

[26] OEHHA and CalEPA. 2021. Analysis of Race/Ethnicity and CalEnviroScreen 4.0 Scores. https://oehha.ca.gov/media/downloads/calenviroscreen/document/calenviroscreen40raceanalysisf2021.pdf.

carbon dioxide (CO_2) emitted into the atmosphere.[27] The economic damage of these fires was estimated to be over $10 billion in property damage and over $2 billion in fire suppression costs.[28] The Camp Fire, which destroyed much of Paradise, California, was the world's costliest natural disaster in 2018, with overall damages of $16.5 billion.[29] It was also the deadliest fire in California history, with 85 civilian fatalities. Wildfires have always been part of California's natural ecology and will continue to be. However, changes to the state's climate and precipitation expands the footprint of wildfire threat, severity, and intensity, with one quarter of California—more than 25 million acres—now classified as being under very high or extreme fire threat.[30]

The impacts of wildfire smoke have been linked to respiratory infections, cardiac arrests, low birth weight, mental health conditions, and exacerbated asthma and chronic obstructive pulmonary disease.[31] In 2020, with all of California covered by wildfire smoke for over 45 days—and 36 counties for at least 90 days—maximum fine particulate ($PM_{2.5}$) levels persisted in the "hazardous" range of the Air Quality Index for weeks in several areas of the state.[32,33]

Catastrophic wildfire damages extend beyond human health and the economy. The Castle Fire in 2020 and the KNP Complex and Windy Fires in 2021 led to the loss of an unprecedented number of giant sequoias: an estimated 13 to 19 percent of the giant

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[27] CARB. 2020. Public Comment Draft Greenhouse Gas Emissions of Contemporary Wildfire, Prescribed Fire, and Forest Management Activities. https://ww3.arb.ca.gov/cc/inventory/pubs/ca_ghg_wildfire_forestmanagement.pdf.

[28] News18. 2021. San Francisco Bay Area Receives its First Wildfire Warning of 2021, After California Concludes its Driest Year. https://www.news18.com/news/buzz/san-francisco-bay-area-receives-its-first-wildfire-warning-of-2021-after-california-concludes-its-driest-year-3722897.html.

[29] Munich RE. 2019. Extreme Storms, Wildfires and Droughts Cause Heavy Nat Cat Losses In 2018. https://www.munichre.com/en/company/media-relations/media-information-and-corporate-news/media-information/2019/2019-01-08-extreme-storms-wildfires-and-droughts-cause-heavy-nat-cat-losses-in-2018.html#-1808457171.

[30] CARB. No date. Wildfires. https://ww2.arb.ca.gov/our-work/programs/wildfires/about.

[31] Reid, C. E., M. Brauer, F. H. Johnston, M. Jerrett, J. R. Balmes, and C. T. Elliott. 2016. "Critical Review of Health Impacts of Wildfire Smoke Exposure." *Environmental Health Perspectives* http://dx.doi.org/10.1289/ehp.1409277.

[32] Vargo J. A. 2020 (updated in 2021 using the NOAA Hazard Mapping System). "Time Series of Potential US Wildland Fire Smoke Exposures." *Frontiers in Public Health* https://doi.org/10.3389/fpubh.2020.00126.

[33] CalFire. 2020 *Fire Siege Report*. https://www.fire.ca.gov/media/hsviuuv3/cal-fire-2020-fire-siege.pdf.

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sequoia population in the Sierra Nevada. An iconic species, giant sequoias are the largest trees on earth, with exceptional longevity outside of climate extremes.[34,35]

It is clear that we must take drastic measures to prepare for future wildfires, which is why California invested $2.7 billion in wildfire resilience from fiscal years 2020 to 2023. The exponential increase in funding launched more than 552 wildfire resilience projects in less than a year, and CAL FIRE met its 2025 goal of treating 100,000 acres a full three years ahead of schedule. Since Fiscal Year 2019–20, treatment work has significantly increased, and CAL FIRE has averaged 100,000 acres treated each fiscal year.

Although we are making progress, we have a lot more work to do in order to achieve our goal of treating one million acres annually by 2025. The Governor's Wildfire and Forest Resilience Strategy details 99 actions needed to address the key drivers of catastrophic wildfires, ramp up the pace and scale of forest management, and make threatened communities more resilient to catastrophic fires. It is also important to note that natural wildfire cycles are a part of a sustainable forest ecosystem and will continue to play a role in a healthy forests' future. We should not expect wildfires to cease, but we must manage our lands to address catastrophic wildfires that result from buildup of carbon stocks due to our interventions to suppress wildfires and from climate change resulting from fossil fuel combustion.

Drought

Drought is a recurring feature of the California climate that has been intensified by increasingly warmer average temperatures. Anthropogenic climate trends have exacerbated drought conditions; human-caused climate change accounts for 19 percent of drought severity and 42 percent of the soil moisture deficit in this region since 2000. The governor declared a drought state of emergency in October 2021, and as of September 2022, 94 percent of California was in severe drought, and 99.8 percent[36] of the state was in at least moderate drought. The first three months of 2022 were the driest January, February, and March on record in California.[37] The harsh drought conditions affecting California are part of a larger megadrought—a drought lasting more than two

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[34] Shive, K., C. Brigham, T. Caprio, and P. Hardwick. 2021. 2021 Fire Season Impacts to Giant Sequoias. The Nature Conservancy and National Park Service. https://www.nps.gov/articles/000/2021-fire-season-impacts-to-giant-sequoias.htm.

[35] Shive, K. L., A. Wuenschel, L. J. Hardlund, S. Morris, M. D. Meyer, and S. M. Hood. 2022. "Ancient Trees and Modern Wildfires: Declining Resilience to Wildfire in the Highly Fire-adapted Giant Sequoia." *Forest Ecology and Management* 511, 120110. https://doi.org/10.1016/j.foreco.2022.120110.

[36] Drought.gov. California. National Oceanic and Atmospheric Administration (NOAA) and the National Integrated Drought Information System. https://www.drought.gov/states/california.

[37] Drought.ca.gov. September 26, 2022. California Drought Update. https://drought.ca.gov/media/2022/09/Weekly-CA-Drought-Update-09262022-FINAL.pdf.

decades—that has been ongoing in the Southwestern region of North America since 2000. The past 22 years have been the region's driest period since at least 800 CE.[38]

While large urban water districts with diversified sources of water supply have maintained water deliveries to customers through the drought, hundreds of individual well owners and some small water systems have suffered disruption. The state is providing funding for water system consolidation and modernization projects in small communities, emergency repairs and replacements for dry wells, and bottled and hauled water deliveries. A 2021 law requires small suppliers to create drought contingency plans. During the drought of the last three years the state has delivered emergency drinking water assistance to nearly 10,000 households and 150 water systems.

California agriculture is responsible for more than half of all U.S. domestic fruit and vegetable production, and in 2021 drought resulted in the fallowing of nearly 400,000 acres of fields.[39] Direct crop revenue losses were approximately $962 million, and total economic impacts were more than $1.7 billion, with over 14,000 full- and part-time job losses.[40] During the 2011–2017 drought, California's agricultural industry suffered at least $5 billion in losses.[41] The 2022–23 budget includes $100 million to support agricultural water conservation practices, provide on-farm technical assistance, and provide direct relief to small farm operators.

Though native California species are adapted to drought, human engineering has altered most streams and wetlands in the state, making drought increasingly stressful to fish and wildlife. The state has conducted hundreds of fish and amphibian rescues in this drought to move creatures from diminished habitat, upgraded hatcheries, and boosted hatchery production, and has hauled millions of young hatchery salmon to San Francisco Bay to avoid adverse river conditions. State biologists monitor dozens of streams statewide and have negotiated voluntary agreements with landowners and water users to improve stream flows and temperatures.

California has started to implement major policies to build resilience to combat drought—such as the Sustainable Groundwater Management Act of 2014, the governor's Water Resilience Portfolio (2020), the governor's Water and Supply Strategy (August 2022), and

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[38] Williams, A. P., B. I. Cook, and J. E. Smerdon. 2022. "Rapid Intensification of The Emerging Southwestern North American Megadrought in 2020–2021." *Nature Climate Change* https://doi.org/10.1038/s41558-022-01290-z.

[39] Medellín-Azuara, J. 2022. *Economic Impacts of the 2021 Drought on California Agriculture*. University of California Merced. https://wsm.ucmerced.edu/wp-content/uploads/2022/02/2021-Drought-Impact-Assessment_20210224.pdf.

[40] Medellín-Azuara. *Economic Impacts of the 2021 Drought*.

[41] National Resources Defense Council (NRDC). 2019. Climate Change and Health in California. Issue Brief. https://www.nrdc.org/sites/default/files/climate-change-health-impacts-california-ib.pdf.

new standards for indoor, outdoor, and industrial water use. However, it is crucial that we take further actions to minimize the impacts of drought in the years to come.

Extreme Heat

California's hottest summer on record was 2021.[42] Death Valley recorded the world's highest reliably measured temperature (130°F) in July 2021, breaking its own record (129°F) from summer 2020.[43] Meanwhile, Fresno also broke one of its own records, with 64 days over 100°F in 2021.[44] This is part of a trend: the daily maximum average temperature, an indicator of extreme temperature shifts, is expected to rise 4.4°F–5.8°F by 2050 and 5.6°F–8.8°F by 2100.[45] Heat waves that result in public health impacts are also projected to worsen throughout the state. By 2050, these heat-related health events are projected to last two weeks longer in the Central Valley and occur four to ten times more often in the Northern Sierra region.[46]

Heat ranks among the deadliest of all climate hazards in California, and heat waves in cities are projected to cause two to three times more heat-related deaths by mid-century.[47] Climate vulnerable communities[48] will experience the worst of these effects, as heat risk is associated and correlated with physical, social, political, and economic factors. Aging populations, infants and children, pregnant people, and people with chronic illness are especially sensitive to heat exposure.[49,50] Combining these characteristics and existing health inequities with additional factors such as poverty, linguistic isolation,

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[42] NOAA. 2022. Climate at a Glance. https://www.ncdc.noaa.gov/cag/statewide/time-series/4/tavg/3/8/1895-2021?base_prd=true&firstbaseyear=1901&lastbaseyear=2000.
[43] Masters, J. 2021. Death Valley, California, breaks the all-time world heat record for the second year in a row. Yale Climate Connections. https://yaleclimateconnections.org/2021/07/death-valley-california-breaks-the-all-time-world-heat-record-for-the-second-year-in-a-row/.
[44] NOAA. Climate Data Online Search. Accessed on 16 March 2022. https://www.ncdc.noaa.gov/cdo-web/search.
[45] Governor's Office of Planning and Research (OPR), CEC, and CNRA. 2018. *California's Fourth Climate Change Assessment*. Page 23. https://www.energy.ca.gov/sites/default/files/2019-11/Statewide_Reports-SUM-CCCA4-2018-013_Statewide_Summary_Report_ADA.pdf.
[46] OPR, CEC, and CNRA. *California's Fourth Climate Change Assessment - Statewide Summary Report.* https://www.energy.ca.gov/sites/default/files/2019-11/Statewide_Reports-SUM-CCCA4-2018-013_Statewide_Summary_Report_ADA.pdf.
[47] Ostro, B., S. Rauch, and S. Green. 2011. "Quantifying the health impacts of future changes in temperature in California." National Library of Medicine. https://pubmed.ncbi.nlm.nih.gov/21975126/.
[48] CARB. Priority Populations. California Climate Investments. https://www.caclimateinvestments.ca.gov/priority-populations.
[49] Basu, R. 2009. "High Ambient Temperature and Mortality: A Review of Epidemiologic Studies from 2001 to 2008." National Library of Medicine. https://pubmed.ncbi.nlm.nih.gov/19758453/.
[50] Basu, R., and B. Malig. 2011. "High Ambient Temperature and Mortality in California: Exploring the Roles of Age, Disease, and Mortality Displacement." National Library of Medicine. https://pubmed.ncbi.nlm.nih.gov/21981982/.

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housing insecurity, and the legacy of racist redlining practices, can put individuals at a disproportionately high risk of heat-related illness and death.[51,52] Rising temperatures will also speed up smog-forming chemical reactions, leading to worse asthma, reduced lung function, cardiac arrest, and cognitive decline. African American, American Indian/Alaskan Native, and Puerto Rican Californians are particularly sensitive to smog, as they are between 28.6 and 132.5 percent more likely to be diagnosed with asthma than white Californians.[53]

In addition to the dangers to public health, California's September 2022 heat wave is particularly illustrative of how more frequent extreme heat strains the state's infrastructure we depend on to adapt to a changing climate. For example, as all-time high temperature records were broken in Sacramento, San Jose, Santa Rosa and Fairfield, electricity demand for air conditioning threatened to overwhelm the state power supply.[54]

California has taken major steps to protect communities from the impacts of extreme heat. Our recent budgets invest $800 million to cool our schools and neighborhoods, including projects to reduce urban overheating. The Extreme Heat Action Plan, released in April 2022, outlines the all-of-government approach California is taking to reduce urgent risks and build long-term resilience to the impacts of extreme heat. In September 2022, Governor Newsom signed multiple bills addressing extreme heat, including AB 2238 (Rivas, Chapter 264, Statutes of 2022), which will create the nation's first extreme heat advance warning and ranking system to better prepare communities ahead of heat waves. The Administration is committed to addressing extreme heat, but we still have a lot of work to do.

Wildfires, drought, and extreme heat are some of the most pronounced climate impacts California is experiencing, but they are not the only ones. Sea level rise, rising ocean temperatures, ocean acidification, and inland flooding are also already having devastating impacts on our communities, ecosystems, and economy, and will continue to do so in the years and decades to come. The decisions and actions that we take today will determine how strongly we will feel the impacts of climate change in the future.

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[51] Hoffman, J. S., V. Shandas, and N. Pendleton. 2020. "The Effects of Historical Housing Policies on Resident Exposure to Intra-Urban Heat: A Study of 108 US Urban Areas." MDPI. https://www.mdpi.com/2225-1154/8/1/12/htm.

[52] U.S. Climate Resilience Toolkit. No date. Heat and Social Inequity in the United States. https://toolkit.climate.gov/tool/heat-and-social-inequity-united-states.

[53] NRDC. 2019. Climate Change and Health. Issue Brief. https://www.nrdc.org/sites/default/files/climate-change-health-impacts-california-ib.pdf.

[54] Samenow, Jason. 2022. No September on record in the West has seen a heat wave like this. *The Washington Post*. September 9. https://www.washingtonpost.com/climate-environment/2022/09/08/western-heatwave-records-california-climate/.

Imperative To Act

Consequences of Further Warming

The Intergovernmental Panel on Climate Change (IPCC) Sixth Assessment Report (AR6) found that it will not be possible to keep global warming within the threshold of 1.5°C to avoid the most severe impacts of climate change unless we make immediate and large-scale reductions in GHG emissions. It finds that atmospheric concentrations of CO_2 have increased by 50 percent since the industrial revolution, and that they continue to increase at a rate of two parts per million each year.[55] Without immediate action, the world will exceed 1.5°C (or 2.7°F) warming by the 2030s, and no later than 2040.

While every tenth of a degree matters—every incremental increase in warming brings additional negative impacts—climate-related risks to human health, livelihoods, and biodiversity are projected to increase further under 2°C (or 3.6°F) warming, compared to 1.5°C.[56] To remain below 1.5°C with limited or no overshoot of that threshold, global net anthropogenic CO_2 emissions need to be cut by about half by 2030 and reach net-zero by 2050.

If we fail to make rapid changes, we may not be able to limit global warming to 2°C,[57] and the consequences of inaction would be catastrophic. Our planet is already 1.2°C warmer than pre-industrial times due to human-induced warming, and many impacts we are already experiencing, such as sea level rise, are "irreversible" for centuries to millennia.[58] Californians with the fewest resources, who are disproportionately low-income communities and communities of color, are the most vulnerable to the impacts of climate change. While the human costs associated with health impacts can never be fully monetized, a recent report finds that the health costs of climate and air pollution in the U.S. are well over $800 billion today and will continue to grow in the coming years.[59]

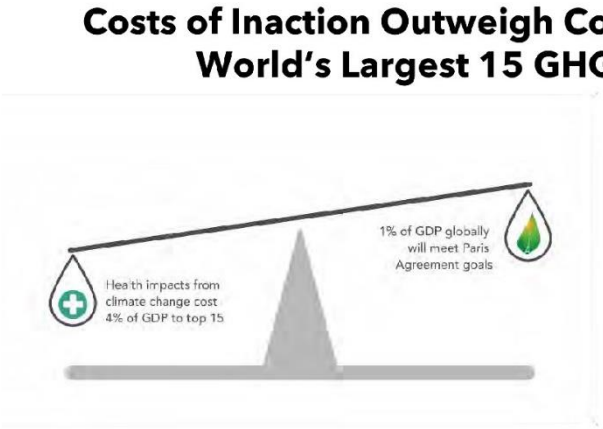
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[55] IPCC. 2021. *Climate Change 2021: The Physical Science Basis*. https://www.ipcc.ch/report/ar6/wg1/.
[56] IPCC. 2018. *Special Report: Global Warming of 1.5°C*. World Meteorological Organization. https://www.ipcc.ch/sr15/.
[57] IPCC. 2021. Summary for Policymakers. In: *Climate Change 2021: The Physical Science Basis*. Contribution of Working Group I to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change [Masson-Delmotte, V., P. Zhai, A. Pirani, S. L. Connors, C. Péan, S. Berger, N. Caud, Y. Chen, L. Goldfarb, M. I. Gomis, M. Huang, K. Leitzell, E. Lonnoy, J. B. R. Matthews, T. K. Maycock, T. Waterfield, O. Yelekçi, R. Yu, and B. Zhou (eds.)]. In Press. https://www.ipcc.ch/report/ar6/wg1/downloads/report/IPCC_AR6_WGI_SPM_final.pdf.
[58] United Nations. 2021. IPCC report: 'Code red.' https://news.un.org/en/story/2021/08/1097362#:~:text=%27Code%20red%20for%20humanity%27&text=We%20are%20at%20imminent%20risk,%2C%20to%20keep%201.5%20alive.%22.
[59] Alwis, D. D., and V. S. Limaye. No date. *The Costs of Inaction*. https://www.nrdc.org/sites/default/files/costs-inaction-burden-health-report.pdf.

Any delays in action or insufficient action are a threat to public health and the environment. The impacts to our economy would be devastating as well. While not specific to California, a 2022 report from Deloitte Economics Institute finds that failing to take sufficient action to reduce emissions could result in economic losses to the U.S. of more than $14.5 trillion over the next 50 years.[60] On a hopeful note, however, the report finds that if the country invests now and in the coming years in a net-zero economy, $3 trillion could be added to the economy over the next 50 years. The U.S. annual gross domestic product (GDP) would be 2.5 percent higher in 2070 in this fast-action scenario than in the delayed action scenario. The lessons for California from these analyses are clear: invest now or pay the price later. As shown in Figure 1-2, inaction can lead to negative consequences for individuals, communities, the economy, and society as a whole. As discussed later, Governor Newsom and the Legislature have accepted this imperative and made significant investments in climate action. This Scoping Plan combined with the historic investments and policy direction from the governor and Legislature, will result in unprecedented action to address the climate crisis.

[60] Deloitte. 2022. *The Turning Point*. https://www2.deloitte.com/content/dam/Deloitte/us/Documents/about-deloitte/us-the-turning-point-a-new-economic-climate-in-the-united-states-january-2022.pdf?id=us:2el:3dp:wsjspon:awa:WSJSBJ:2021:WSJFY22.

Figure 1-2: The real costs of inaction[61]



Exposure to air pollution causes 7 million deaths worldwide every year and costs an estimated US$5.11 trillion in welfare losses globally. In the 15 countries that emit the most greenhouse gas emissions, the health impacts of air pollution are estimated to cost more than 4% of their GDP. Fossil fuel combustion contributes to both air pollution and climate change. Actions to meet the Paris goals would cost about 1% of global GDP.

Scoping Plan Overview

Previous Scoping Plans

The Scoping Plan is a strategy the California Air Resources Board (CARB) develops and updates at least one every five years, as required by AB 32. It lays out the transformations needed across our society and economy to reduce emissions and reach our climate targets. This Scoping Plan is the third update to the original plan that was adopted in 2008. The initial Scoping Plan laid out a path to achieve the AB 32 2020 limit of returning to 1990 levels of GHG emissions, a reduction of approximately 15 percent below business as usual.[62] The 2008 Scoping Plan included a mix of incentives, regulations, and carbon pricing, laying out the portfolio approach to addressing climate change and clearly making the case for using multiple tools to meet California's GHG targets. The 2013 Scoping Plan assessed progress toward achieving the 2020 limit and made the case for addressing

[61] Katowice, P. 2018. *Health benefits far outweigh the costs of meeting climate change goals.* WHO. https://www.who.int/news/item/05-12-2018-health-benefits-far-outweigh-the-costs-of-meeting-climate-change-goals.

[62] CARB. 2008. *Climate Change Scoping Plan.* https://ww2.arb.ca.gov/sites/default/files/classic/cc/scopingplan/document/adopted_scoping_plan.pdf.

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short-lived climate pollutants (SLCPs).[63] The most recent update, the 2017 Scoping Plan,[64] also assessed the progress toward achieving the 2020 limit and provided a technologically feasible and cost-effective path to achieving the Senate Bill 32 (SB 32, Pavley, Chapter 249, Statutes of 2016) target of reducing GHGs by at least 40 percent below 1990 levels by 2030.

Overview of this Scoping Plan

It is paramount that we continue to build on California's success by taking effective actions and doubling down on implementation of the strategies outlined here. As such, this Scoping Plan builds on and integrates efforts already underway to reduce the state's GHG, criteria pollutant, and toxic air contaminant emissions by identifying the clean technologies and fuels that should be phased in as the state transitions away from combustion of fossil fuels. By selecting and pursuing a sustainable and clean economic path, the state will continue to successfully execute existing programs, work to eliminate air pollution inequities, demonstrate the coupling of economic growth and environmental progress, and enhance new opportunities for engagement within the state to address and prepare for climate change.

The 2022 Scoping Plan for Achieving Carbon Neutrality (Scoping Plan) is the most comprehensive and far-reaching Scoping Plan developed to date. It identifies a technologically feasible and cost-effective path to achieve carbon neutrality by 2045 while also assessing the progress California is making toward reducing its GHG emissions by at least 40 percent below 1990 levels by 2030, as called for in SB 32 and laid out in the 2017 Scoping Plan.[65] The 2030 target is an interim but important stepping stone along the critical path to the broader goal of deep decarbonization by 2045. Modeling for this Scoping Plan shows that this decade must be one of transformation on a scale never seen before to set us up for success in 2045.

The relatively longer path assessed in this Scoping Plan incorporates, coordinates, and leverages many existing and ongoing efforts to reduce GHGs and air pollution, while identifying new clean technologies and energy. Given the focus on carbon neutrality, this Scoping Plan also includes discussion for the first time of the Natural and Working Lands (NWL) sectors as both sources of emissions and carbon sinks. Chapter 2 of this document

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[63] CARB. 2014. *First Update to the Climate Change Scoping Plan.* https://ww2.arb.ca.gov/sites/default/files/classic/cc/scopingplan/2013_update/first_update_climate_change_scoping_plan.pdf.
[64] CARB. 2017. *California's 2017 Climate Change Scoping Plan.* https://ww2.arb.ca.gov/sites/default/files/classic/cc/scopingplan/scoping_plan_2017.pdf.
[65] CARB. 2017. *California's 2017 Climate Change Scoping Plan.* https://ww2.arb.ca.gov/sites/default/files/classic/cc/scopingplan/scoping_plan_2017.pdf.

includes a description of a suite of specific actions to drastically reduce GHGs across all sectors. Chapter 3 provides the air quality and economic evaluations of the actions. Chapter 4 provides a broader description of the many actions needed across all sectors to achieve carbon neutrality. Chapter 5 provides an overview of the next steps and partnerships needed to implement this Scoping Plan. Guided by legislative direction, the actions identified in this Scoping Plan reduce overall GHG emissions in California and deliver policy signals that will continue to drive investment and certainty in a low carbon economy. This Scoping Plan builds upon the successful framework established by the Initial Scoping Plan and subsequent updates while identifying new, technologically feasible, and cost-effective strategies.

Principles That Inform Our Approach to Addressing the Climate Challenge

California has decades of experience addressing the climate challenge. Through this experience, and based on extensive engagement with stakeholders through our regulatory and program development processes, we have developed a set of principles to inform our approach.

Unprecedented Investments in a Sustainable Future

The scale of transformation needed over this decade to avoid the worst impacts of climate change and meet our ambitious climate goals is extraordinary. This is why Governor Newsom and the Legislature invested over $15 billion in climate action through the 2021–2022 California Comeback Plan, and why the 2022–2023 budget marks the beginning of the California Climate Commitment—the governor's multi-year plan to invest $54 billion in climate action. The enacted budgets (Figure 1-3) and the California Climate Commitment represent investments of a historic scale and will advance precisely the type of all-of-government approaches necessary to create the whole-of-society changes described in this Scoping Plan that will enable us to avert the worst impacts of climate change.

Figure 1-3: Comprehensive California climate change investments



The *California Climate Commitment* includes the following game-changing elements:

- $10 billion for zero-emission vehicles (ZEVs), including $1.5 billion for electric school buses to protect students' health and $3 billion to build an accessible charging network. ZEV investments will particularly focus on programs such as heavy-duty vehicle and port electrification that will reduce emissions and protect public health in low-income communities.
- $2.1 billion for clean energy investments, such as long duration storage, offshore wind, green hydrogen,[66] and industrial decarbonization.
- $13.8 billion for programs that reduce emissions from the transportation sector, such as improving public transportation while also funding walking, biking, and adaptation projects.
- Over $720 million for California's higher education institutions and research that will support the next generation of climate innovations.

[66] For the purposes of this Scoping Plan, "renewable hydrogen" and "green hydrogen" are interchangeable and are not limited to only electrolytic hydrogen produced from renewables.

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- Nearly $1 billion to build sustainable, affordable housing and over $1 billion to help low-income Californians realize energy cost savings through building decarbonization.
- Nearly $9 billion for wildfire risk reduction, drought mitigation, extreme heat resilience, and nature-based solutions.

These investments are incredibly important in the context of this Scoping Plan in that they accompany and help support implementation of the many policies and regulations that will continue to be necessary to achieve our 2030 and carbon neutrality targets. In addition, these incentive programs jump-start emission reduction strategies for priority sectors, sources, and technologies, leveraging private-sector investment and building sustainable, growing markets for clean and efficient technologies. Many of California's incentive programs work in concert with federal and other state programs to drive emission reductions. As an example, as California pushes to move to 100% sales of new zero emission-vehicles, including plug-in hybrid vehicles, the Newsom Administration continues to invest heavily in incentive programs that allow families, communities, and businesses to choose zero-emission vehicles. This is done while simultaneously working with the federal government, other states, and jurisdictions around the world to align policies, regulations, and incentives, creating market certainty for the automakers that serve our markets.

Centering Equity

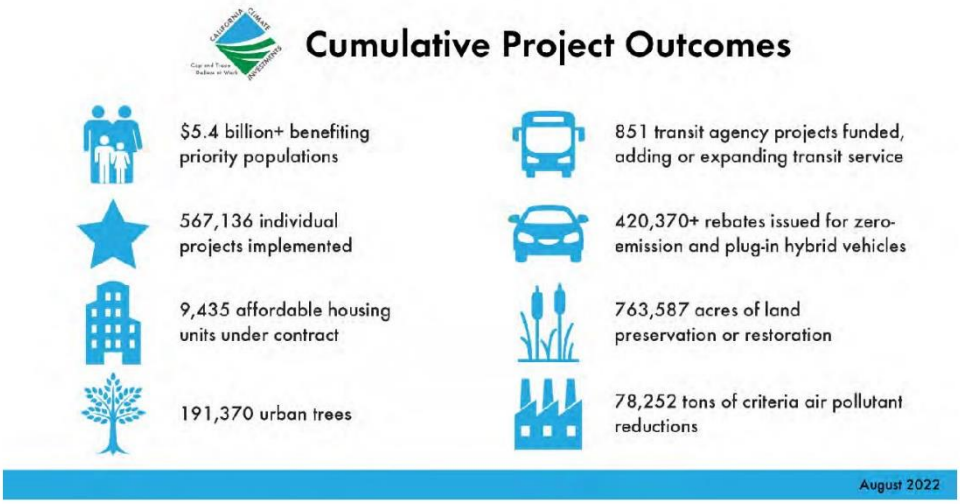
Prioritizing equity is just as important as the magnitude of the climate investments California is making. Addressing climate change and advancing our equity and economic opportunity goals cannot be decoupled. In line with the governor's Executive Order[67] to take additional actions to embed equity analysis and considerations, this plan works to center equity by addressing disparities for historically underserved and marginalized communities. California strives to ensure that our climate and air research, regulations, investments, and plans include provisions that specifically address and advance equity. This includes reducing and eliminating air pollution disparities, removing barriers that can prevent frontline communities from accessing benefits, lowering costs for low-income Californians, and promoting high-quality jobs. CARB's incentive programs regularly surpass their mandated equity targets, and CARB has incorporated equity-focused provisions in our research, planning, and regulatory efforts. For instance, statute requires that a minimum of 35 percent of California Climate Investments benefit low-income households along with disadvantaged and low-income communities (referred to as ***priority***

[67] Executive Department. State of California. 2022. Executive Order N-16-22. GSS_9320_2-20220912152941 (ca.gov).

populations). However, 48 percent—over $5.4 billion—of implemented California Climate Investments project funding is benefiting priority populations, greatly exceeding the statutory minimums (see Figure 1-4). Senate Bill 535 (De León, Chapter 830, Statutes of 2012) and AB 1550 (Gomez, Chapter 369, Statutes of 2016) direct state and local agencies to make significant investments using auction proceeds to assist California's most vulnerable communities. Under these laws, a minimum of 25 percent of the total investments are required to be located within and provide benefits to disadvantaged communities, and at least 10 percent of the total investments must benefit low-income communities and households. Moving forward, the state will continue to devote a greater share of incentive funding to priority populations, with the light-duty vehicle incentive program as just one example. We can simultaneously confront the climate crisis and build a more resilient, just, and equitable future for all communities.

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Figure 1-4: California climate investments cumulative outcomes[68,69]



Role of the Environmental Justice Advisory Committee

To inform the development of the Scoping Plan, AB 32 calls for the convening of an Environmental Justice Advisory Committee (EJ Advisory Committee) to advise CARB in developing the Scoping Plan, and any other pertinent matter in implementing AB 32. It requires that the Committee be comprised of representatives from communities with the most significant exposure to air pollution, including communities with minority populations and/or low-income populations. On January 25, 2007, CARB appointed the first

[68] CARB. 2022. California Climate Investments program implements $10.5 billion in greenhouse gas-reducing programs, expected to reduce 76 million metric tons of emissions. April 11. https://ww2.arb.ca.gov/news/california-climate-investments-program-implements-105-billion-greenhouse-gas-reducing-projects.

[69] SB 535 and AB 1550 require investments located in and benefiting low-income communities and households, which are termed *priority populations*. *Disadvantaged communities* are currently defined by CalEPA as the top 25 percent of communities experiencing disproportionate amounts of pollution, environmental degradation, and socioeconomic and public health conditions according to the Office of Environmental Health Hazard Assessment's CalEnviroScreen tool, plus certain additional communities including federally recognized Tribal Lands. Low-income communities and households are defined by statute as those with incomes either at or below 80 percent of the statewide median or below a threshold designated as low-income by the Department of Housing and Community Development.

Environmental Justice Advisory Committee to advise it on the Initial Scoping Plan and other climate change programs.

For this Scoping Plan, CARB reconvened the EJ Advisory Committee in May 2021. The committee is currently comprised of 14 environmental justice and disadvantaged community representatives, including the EJ Advisory Committee's first tribal representative, who was appointed in February 2022. In October 2021, the EJ Advisory Committee formally created eight workgroups. These workgroups are a space for EJ Advisory Committee members to better understand specific sectors of the Scoping Plan and to assist the EJ Advisory Committee in the development of recommendations on this Scoping Plan. In December 2021, the EJ Advisory Committee provided scenario input responses to help shape the modeling for this Scoping Plan. In February 2022, San Joaquin Valley EJ Advisory Committee members hosted their first community workshop, with over 100 attendees. In March 2022, the CARB Board held a joint public meeting with the EJ Advisory Committee to discuss their draft preliminary recommendations for this Scoping Plan. In June 2022, over 165 attendees participated in a statewide community workshop held by EJ Advisory Committee members. The full schedule of EJ Advisory Committee Meetings and meeting materials are available on CARB's website.[70] This Scoping Plan includes references where EJ Advisory Committee Final Recommendations[71] are included in the document. The final recommendations were discussed at a joint CARB and EJ Advisory Committee Hearing on September 1, 2022.

The integration of environmental justice is critical to ensure that certain communities are not left behind. The AB 32 EJ Advisory Committee provided recommendations on September 30 in advance of the final Scoping Plan. There are footnotes to indicate where there is alignment between the AB 32 EJ Advisory Committee's recommendations and this Scoping Plan. While the language in the text may not fully incorporate the specific EJ Advisory Committee's recommendation, the footnotes do acknowledge the places in the text where there is general alignment with the spirit of the EJ Advisory Committee's recommendation.

Partnering with Tribes

[70] CARB. Environmental Justice Advisory Committee Meetings and Events. https://ww2.arb.ca.gov/environmental-justice-advisory-committee-meetings-and-events.
[71] Environmental Justice Advisory Committee. September 30, 2022. 2022 Scoping Plan Recommendations. https://ww2.arb.ca.gov/sites/default/files/barcu/board/books/2022/090122/finalejacrecs.pdf.

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There are 109 federally recognized tribes and over 60 non-federally recognized tribes in California.[72] In 2011, Governor Brown issued Executive Order B-10-11, recognizing and reaffirming the inherent right of tribes to exercise sovereign authority over their members and territory and directing state agencies to engage in government-to-government consultation with tribe and to work to develop partnerships and consensus.[73] In 2019, Governor Newsom issued Executive Order N-15-19, which acknowledges and apologizes on behalf of the state for the historical "violence, exploitation, dispossession and the attempted destruction of tribal communities."[74] Establishing partnerships with tribal leaders to incorporate their priorities, traditional expertise, and knowledge will be important to achieving California's climate goals. The Scoping Plan includes actions that tribal partners can voluntarily implement for sources under their jurisdiction (e.g., transitioning to zero emission fleets, installing infrastructure and control technologies, conducting climate smart land management). The Scoping Plan also uplifts the importance of having our tribal partners help guide actions that may impact tribal cultural resources and of benefitting from tribal input.

We also need alignment between state and local partners and tribes on actions related to land-use decisions. This means respecting and reinforcing tribal sovereignty and self-determination. As tribes do not always draw clear lines between the "natural" and "cultural" resources of a place, taking a holistic perspective will result in positive impacts in ability to address the complex issues of land management and regulatory undertakings.

Tribes have an intimate and historical knowledge of places and should be engaged early on to inform planning and future management related to activities that may impact tribal resources and areas including potential funding opportunities, technical assistance, and capacity building, where appropriate. Additionally, tribes should be involved in the identification of their own significant resources and areas of use. As decisions are made related to Scoping Plan undertakings, agencies should recognize and appropriately consider cultural resources and management from the beginning, not as an afterthought; and consider how the project could impact tribes.

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[72] These numbers are subject to change depending on determinations made by the Bureau of Indian Affairs (BIA) and the Native American Heritage Commission (NAHC). Please consult the most current Federal Register for a list of federally recognized tribes and the NAHC for a list of non-federally recognized tribes in California. As of the date of the Scoping Plan, the current list for federally recognized tribes is located at 87 Fed. Reg. 4636 (Jan. 28, 2022).

[73] Executive Order B-10-11. *https://www.ca.gov/archive/gov39/2011/09/19/news17223/index.html#:~:text=EXECUTIVE%20ORDER%20B-10-11%20Published%3A%20Sep%2019%2C%202011%20WHEREAS,and%20affirmed%20in%20state%20and%20federal%20law%3B%20and*.

[74] Executive Order N-15-19. *https://tribalaffairs.ca.gov/wp-content/uploads/sites/10/2020/02/Executive-Order-N-15-19.pdf*.

Finally, to the extent allowed by law, traditional ecological knowledge and culturally sensitive information should be protected, as this is information that may not be common knowledge and may not be known outside the tribe, as each tribe is unique and influenced by its local environment and cultural practices. Protection of this information will help foster productive relationships with tribes and should be included as part of the process. CARB and other agencies should continue to foster relationships with tribal partners.

Maximizing Air Quality and Health Benefits

The state has over 50 years of experience successfully cleaning the air in California by addressing criteria pollutants and toxic air contaminants from mobile and stationary sources. CARB has been a leader in measuring, evaluating, and reducing sources of air pollution that impact public health. Its air pollution programs have been adapted for national programs and emulated in other countries. Significant progress has been made in reducing diesel particulate matter (PM), which is a designated toxic air contaminant, and many other hazardous air pollutants. CARB partners with local air districts to address stationary source emissions and adopts and implements state-level regulations to address sources of criteria and toxic air pollution, including mobile sources. CARB also collaborates with federal agencies to address air pollution from sources primarily under federal jurisdiction. In many instances, actions to reduce fossil fuel combustion and achieve federal air quality standards also help to reduce GHG emissions.

However, air pollution disparities still exist, and more must be done to ensure the most vulnerable populations have safe air to breathe. California must continue to evaluate opportunities to harmonize our climate and air quality programs through innovative policymaking and by building on existing programs like the Low Carbon Fuel Standard (LCFS) and Community Air Protection Program. The LCFS includes a provision that allows electric utilities to opt-in and generate residential electric vehicle (EV) charging credits, where some of the revenues are invested back into rebate programs that address air quality and climate pollution.[75] The Community Air Protection Program[76] is the first of its kind in the country and brings together diverse stakeholders, including CARB, local air districts, and residents of environmental justice communities to increase local air monitoring and develop community-led plans to improve air quality in the communities most impacted by air pollution.

This Scoping Plan identifies actions that will deliver near-term air quality benefits to communities with the highest exposures and provide long-term GHG benefits. Many of the actions in this Scoping Plan are key elements of the 2022 State Strategy for the State

[75] CARB. LCFS Utility Rebate Programs. https://ww2.arb.ca.gov/resources/documents/lcfs-utility-rebate-programs.
[76] CARB. Community Air Protection Program. https://ww2.arb.ca.gov/capp.

Implementation Plan to meet federal air quality standards,[77] which has a primary focus of reducing harmful air pollution and achieving federal air quality targets. California's approach of leveraging air quality and GHG policies together has yielded results. A 2022 report by the Office of Environmental Health and Hazard Assessment (OEHHA)[78] that evaluated GHG and harmful air pollution emissions from the heavy-duty vehicle (HDV) and large stationary source sectors found declines in emissions in both sectors, with the greatest declines in disadvantaged communities. Both sectors are subject to state GHG and air quality policies, in addition to federal and local rules on harmful air pollution. Because of historically racist and discriminatory practices such as redlining, both types of sources are disproportionately located adjacent to vulnerable communities, which are predominantly communities of color.[79] The key findings from the OEHHA report are as follows:

- Both HDVs and facilities subject to the Cap-and-Trade Program have reduced emissions of co-pollutants, with HDVs showing a clearer downward trend when compared to stationary sources. These emission reductions have major health benefits, including a reduction in premature pollution-related deaths.
- The greatest beneficiaries of reduced emissions from both HDVs and facilities subject to the Cap-and-Trade Program have been in communities of color and in disadvantaged communities in California, as identified by CalEnviroScreen (CES). This has reduced the emission gap between disadvantaged and non-disadvantaged communities, but a wide gap still remains.
- The transition to zero-emission HDVs will expedite further emissions reductions.
- While the progress observed is encouraging, inequities persist, and federal, state, and local climate and air quality programs must do more to reduce emissions of GHGs and co-pollutants to reduce the burden of emissions on disadvantaged communities and communities of color.

It will take all tools at all levels of government, with robust enforcement, to ensure that vulnerable communities continue to see improvements in air quality until no disparities exist in air pollution across the state.

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[77] CARB. 2022 State Strategy for the State Implementation Plan. https://ww2.arb.ca.gov/resources/documents/2022-state-strategy-state-implementation-plan-2022-state-sip-strategy.
[78] OEHHA. 2022. *Impacts of Greenhouse Gas Emission Limits within Disadvantaged Communities: Progress Toward Reducing Inequities*. https://oehha.ca.gov/environmental-justice/report/ab32-benefits.
[79] CalEPA. 2021. Pollution and Prejudice. https://storymaps.arcgis.com/stories/f167b251809c43778a2f9f040f43d2f5.

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Economic Resilience

The state's efforts to tackle the climate crisis will create economic and workforce development opportunities in the clean energy economy in communities across the state. Transitioning existing skills and expanding workforce training opportunities in climate-related fields are critical for reducing harmful emissions and supporting workers in transitioning to new, high-quality jobs. The Administration's recent budgets acknowledge the challenges facing workers in industries most affected by the state's response to climate change—especially those in the fossil fuel industry. It will invest $1 billion in regional partnerships and economic diversification to create new jobs and support a local tax base and workforce transition and development once opportunities are identified. It also will invest in safety nets to protect, and support impacted communities as part of the transition to a carbon neutral economy. Specifically, the Community Economic Resilience Fund Program[80] (CERF) supports communities and regional groups in producing regional roadmaps for economic recovery and transition that prioritize the creation of accessible, high-quality jobs in sustainable industries. The budget investments create the opportunity to future-proof and increase economic resilience in the face of more frequent climate impacts and shifting economic conditions. For these investments and implementation of the Scoping Plan to be successful in supporting the transition to a carbon neutral economy, workers and affected communities must be included in ongoing dialogue to ensure a high-road transition for regional economies.

That state also recognizes it can play a more direct role in supporting a sustainable work force through its incentive programs. In 2021, Assembly Bill 680 (AB 680) (Burke, Chapter 746, Statutes of 2021) was signed into law, requiring CARB to work with the California Labor and Workforce Development Agency to update the Funding Guidelines to include new workforce standards. CARB's Funding Guidelines currently include requirements for administering agencies to, wherever possible, foster job creation within California, provide employment opportunities or job training tied to employment, and target these opportunities to priority populations. The Funding Guidelines also recommend administering agencies prioritize investments in projects that directly support jobs or a job training and placement program, and that they report the estimated employment benefits and employment outcomes for projects that meet specified criteria. These new requirements apply to agencies administering certain California Climate Investments

[80] Office of Planning and Research. Community Economic Resilience Fund. https://opr.ca.gov/economic-development/cerf/.

programs that receive continuous appropriations from the Greenhouse Gas Reduction Fund and fall into the following six categories of standards:

- fair and responsible employer standards,
- inclusive procurement policies,
- prevailing wage for construction work,
- community workforce agreements for construction projects over one million dollars,
- preference for projects with educational institutions or training programs, and
- creation of high-quality jobs. CARB will be updating the Funding Guidelines through a public process over the next year to operationalize these new requirements.

Partnering Across Government

The Scoping Plan is an actionable plan to identify and align programs and policies to achieve California's climate targets. To realize the outcomes and deliver results in any Scoping Plan, action is critical. For this Scoping Plan, there are also actions that rely on our federal partners to take on sources primarily under their jurisdiction (such as aviation, and federally owned/managed lands) while they also continue to develop national programs for GHG reductions. The federal government is already taking major steps to advance these types of programs. The Inflation Reduction Act of 2022[81] includes $369 billion for domestic energy production and manufacturing and is expected to lead to U.S. GHG emission reductions of roughly 40 percent by 2030. Direct incentives will include those for clean vehicles and ENERGY STAR appliances, as well as improving transportation and clean energy in underserved communities.

We also need our local partners to align on actions related to land-use decisions that support sustainable, resilient, low-carbon communities and permitting for clean energy production facilities and infrastructure; diversion of organics from landfills; and other climate-related projects. State agencies also should use the Scoping Plan to review and update their own programs and policies to support the actions identified in this Scoping Plan. Importantly, the Scoping Plan also can serve as a resource as the Legislature considers new legislative direction and funding to support the state's path to carbon neutrality and continue action to address near-term air pollution disparities.

Partnering with the Private Sector

Government cannot achieve our climate targets alone. The scale of investment needed requires both private-sector investment and partnerships with philanthropies. Public

[81] Pub.L. No. 117-169 (August 16, 2022).

sector dollars, accompanied by strong and steady policy signals, must be a catalyst for deeper and broader investments by the private sector in both reducing emissions and building the resilience of our communities. Governor Newsom is committed to working collaboratively with businesses, including small businesses, to deploy the technologies, capital, and ingenuity that are hallmarks of the private sector.

California structures our climate policies and regulations to create market signals and certainty that spur private sector investment. For example, the Governor's Executive Order on Zero-Emission Vehicles[82] set 2035 as the target year for 100 percent zero-emission vehicle sales, creating a time horizon that allows automakers to scale up zero-emission fleets and sending a clear signal to the companies and utilities that would deploy charging infrastructure. The Executive Order has been followed by development and adoption of the Advanced Clean Cars II regulation. CARB convened auto manufacturers, environmental justice groups, labor organizations, and many other stakeholders to provide input into development of the regulation in a robust and transparent manner; again, with the aim of providing certainty for producers and consumers.

California also pursues public-private partnerships (PPP) as a mechanism to advance our collective climate goals. We know these vehicles can be effective at increasing the impact of public sector dollars and helpful in moving markets in a direction aligned with state policy. A new PPP the Administration is advancing is the Climate Catalyst Revolving Loan Fund, housed at the state's Infrastructure and Economic Development Bank (IBank). The fund offers a range of financial instruments—including flexible credit and credit support—to help bridge financing gaps currently preventing advanced climate solutions from scaling in the marketplace. The Catalyst Fund's initial areas of investment include forest biomass management and utilization (unlocking innovation to reduce wildfire threats), climate-smart agriculture, and clean energy transmission. The fund leverages public sector investments by mobilizing private finance for shovel-ready projects that are stuck in the deployment phase. As such, IBank is ideally positioned as the state's all-purpose "Green Bank," with increasing connection to federal financing programs such as US DOE's Loan Programs Office and the United States Environmental Protection Agency's (U.S. EPA) Greenhouse Gas Reduction Fund.

The Catalyst Fund builds from existing IBank financing programs that are themselves increasingly focused on the climate imperative. The IBank's Infrastructure State Revolving Fund provides supportive capital to climate-aligned projects promoted by local governments and certain nonprofit entities, and will be refining its criteria and market outreach strategies to increase its level of service. IBank's bonds program has supported

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[82] Executive Department. State of California. Executive Order N-79-20. *https://www.gov.ca.gov/wp-content/uploads/2020/09/9.23.20-EO-N-79-20-Climate.pdf*.

multiple large environmental projects, including more than $2 billion in "green bonds," and is poised to help expand access to the state's deep and liquid bond capital market. Within IBank's Small Business Finance Center, the new Climate Tech Loan Guarantee program encourages commercial banks to back climate-focused small businesses, leveraging federal capital to insure a portion of the private bank's loan. And through IBank's Expanding Venture Capital Access Fund program, the state is promoting greater diversity in the venture capital community, including climate equity and climate justice.

All of these financing programs exist to leverage private capital in support of the state's climate goals, and to partner with state policy agencies driving the transition. IBank will also continue to collaborate closely with the State Treasurer's Office in its provision of capital support to climate solutions, ensuring that funding flows to programs best positioned to deliver success. This partnership of public and private capital, responsive to and in communication with the climate policy community, will ensure that California gets the maximum possible benefit from its allocation of scarce resources.

Supporting Innovation

Reaching our ambitious, deep decarbonization goals will require continued technological innovation. Investment in research, development, and deployment of clean technologies has never been more critical. Sending clear and sustained market and policy signals will encourage large and small companies alike to pursue innovation that can be scaled up and deployed here and beyond our borders. The full suite of AB 32 policies[83] has touched nearly every sector of California's economy and spurred technology innovation in the state, including the growth of technology developers, manufacturers, processors, and assemblers in many areas. Specifically, AB 32 policies and programs support both the supply side and the demand side to build new markets in California. On the supply side, AB 32 policies support businesses to demonstrate and refine technologies, and to help establish critical supply chains. On the demand side, AB 32 policies and programs provide outreach, education, and incentives—as well as disincentives—to motivate everyone from consumers to institutional purchasers to utility planners to adopt new, climate smart technologies. Innovations resulting directly from the state's climate policies include the following:

- In the past 10 years, a growing market for heavy-duty zero-emission vehicles (HD ZEVs) was established in California, and this market now represents the largest single share of North American supply and demand for HD ZEVs. Vehicle

[83] CARB. Climate Change Programs. *https://ww2.arb.ca.gov/our-work/topics/climate-change*.

and component manufacturers are making long-term investments to develop and produce HD ZEVs within California.

- Total consumption of renewable diesel in the California LCFS market has skyrocketed from approximately 1.8 million gallons in 2011 to nearly 589 million gallons in 2020. The LCFS is a key driver of market development for renewable diesel and its coproducts. While the federal renewable fuel standard (RFS) and blenders tax credit also benefit producers, an analysis of their respective contributions to market development, and interviews with industry representatives and independent experts, point to LCFS as a more important factor in market development, at least in recent years.
- In the past five years, a market for small-scale energy storage in California was created where none previously existed. As of 2020, 185 megawatts (MW) of small-scale energy storage projects have been interconnected to the grid. The significant increase in deployment in the last five years is a result of the Self-Generation Incentive Program (SGIP), which significantly reduces the upfront costs to purchase and install small-scale energy storage devices, and of growing customer interest in disaster resiliency in the face of increasing risk from wildfire and related utility outages. These systems have already provided disaster resiliency benefits for residential and non-residential customers.

We have seen how quickly market barriers can be overcome in response to strong policy signals, as occurred in the solar panel and electric vehicle battery space. Government-stated priorities have a significant role in guiding private and public research, development, and deployment. This Scoping Plan unequivocally puts the marker down on the need for innovation to continue in non-combustion technologies, clean energy, CO_2 removal options, and alternatives for SLCPs. The five-year update to the Scoping Plan allows for a periodic evaluation of new tools to add to the state's toolkit.

Engagement with Partners to Develop, Coordinate, and Export Policies

California works closely with other states, tribal governments, the federal government, and international jurisdictions to identify the most effective strategies and methods to reduce GHGs, manage GHG control programs, and facilitate the development of integrated and cost-effective regional, national, and international GHG reduction programs. For example, the state's Cap-and-Trade Program has been linked with Québec's since 2014, and CARB staff regularly engage with jurisdictions throughout the world on the design features of our Cap-and-Trade Program through memoranda of understanding (MOUs) and venues such as the International Climate Action

Partnership.[84] Low carbon fuel mandates similar to California's LCFS have been adopted by the U.S. EPA and by other jurisdictions, including Oregon, Washington, British Columbia, the European Union, and the United Kingdom. Many other jurisdictions from Japan to New Zealand, Australia, and the European Commission also continue to seek information and technical experience on our LCFS. California has and will continue to share information and encourage ambitious emissions reductions with interested jurisdictions, with a focus on China, India, Mexico, Canada, and the European Union. California's early action to reduce super-pollutants such as methane and other SLCPs was reaffirmed by the 2021 Global Methane Pledge signed by the U.S. and over 100 other countries at the 26th Conference of the Parties to the United Nations Framework Convention on Climate Change (UNFCCC).[85]

In addition, under the Clean Air Act, the federal government is authorized to allow California to set more stringent vehicle emissions regulations than federal standards. California's goals and regulations to transition to 100 percent sales of new zero-emission passenger vehicles by 2035 (including plug-in hybrid vehicles), to drayage trucks by 2035, and other trucks and buses where feasible by 2045 are being emulated by partner states across the U.S. and in jurisdictions around the world. CARB's Advanced Clean Cars II regulation, [86] which codifies these targets, was approved in August 2022, and already at least four other states have announced their plans to adopt this regulation. Earlier in June 2020 CARB adopted the Advanced Clean Truck regulation, which requires truck manufacturers to meet increasing sale targets of zero-emission trucks in California through 2035. Since adoption, at least five other states—20 percent of the U.S. truck market—have adopted this regulation. These kinds of coordinated policies help signal to vehicle manufacturers a widespread and growing demand for zero-emissions technology, which in turn helps scale production and lower costs for consumers.

With the Mexican Secretariat for Environment and Natural Resources (SEMARNAT), California has engaged in a technical exchange on clean vehicle policies and helped to establish Mexico's Emissions Trading System (being piloted in 2022). A 2019 MOU signed between California and Environment and Climate Change Canada enables in-depth collaboration on policies and programs to decarbonize vehicles, engines, and fuels. This partnership has led to tangible emissions reductions, from aligning vehicle emissions targets and policies to collaborating on emissions testing and research critical to enforcing

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[84] International Carbon Action Partnership (ICAP). Homepage. https://icapcarbonaction.com/en?msclkid=dac30cb7b4f511ec94ccd0f1ae323e98.
[85] Global Methane Pledge. Homepage. https://www.globalmethanepledge.org/.
[86] Cal. Code Regs., tit. 13, §§ 1900,1961.2, 1961.3, 1962.2, 1962.3, 1962.4, 1962.5, 1962.6, 1962.7, 1962.8, 1965, 1968.2, 1969, 1976, 1978, 2037, 2038, 2112, 2139, 2140, 2147, and 2903; and Test Procedures located here: https://ww2.arb.ca.gov/rulemaking/2022/advanced-clean-cars-ii.

emissions limits for vehicle manufactures. At the national level, China has looked to California for cutting-edge requirements for car diagnostics and policies that promote zero-emissions vehicles. At a local level, Beijing has adopted California's vehicle emissions standards and several other progressive environmental regulations. California will continue and renew such efforts across China, including through a 2022 MOU signed with China's Ministry of Ecology and Environment.

Between 2021 and 2023, California also will serve as president of the Transport Decarbonisation Alliance, a global network of countries, regions, cities, and companies that come together to share experiences and technical expertise, and to increase the ambition and accelerate the deployment of targeted transportation decarbonization policies across freight, electric vehicle infrastructure, and active mobility. Throughout its presidency, California will focus its leadership on decarbonizing the cross-jurisdiction network of medium- and heavy-duty vehicles, both to ensure cleaner air in freight-adjacent communities and to stem the effects of climate change.

Over the years, California has also asserted the importance of and supported the ongoing efforts of state and local clean air and climate leadership. Through our participation in the Pacific Coast Collaborative alongside British Columbia, Washington, and Oregon,[87] the Under2 Coalition,[88] the U.S. Climate Alliance,[89] the International ZEV Alliance,[90] the Transportation Decarbonisation Alliance, and many more organizations, California has and will continue to build climate partnerships with state and local governments.

California also recognized the need to address the substantial emissions caused by the deforestation and degradation of tropical and other forests, and continues its work alongside other subnational governments as part of the Governors' Climate and Forests Task Force (GCF).[91] Founded in 2008, there are currently 39 GCF members, including states and provinces in Brazil, Colombia, Ecuador, Indonesia, Ivory Coast, Mexico, Nigeria, Peru, Spain, and the United States—all of whom are considering or operating programs to reduce emissions from deforestation, land-use, and rural development, and to benefit local and indigenous communities. CARB's California Tropical Forest Standard provides a rigorous methodology to assess jurisdiction-scale programs that reduce deforestation and to incentivize responsible action and investment.[92] The standard

[87] Pacific Coast Collaborative. Homepage. https://pacificcoastcollaborative.org/.
[88] Under2 Coalition. Homepage. https://www.theclimategroup.org/under2-coalition.
[89] United States Climate Alliance (USCA). Homepage. https://www.usclimatealliance.org/.
[90] ZEV Alliance. Homepage. Accelerating the Adoption of Zero-Emission Vehicles. https://zevalliance.org/.
[91] Governors' Climate and Forests Task Force. University of Colorado Boulder: Colorado Law. https://www.gcftf.org/.
[92] CARB. California Tropical Forest Standard. https://ww2.arb.ca.gov/our-work/programs/california-tropical-forest-standard.

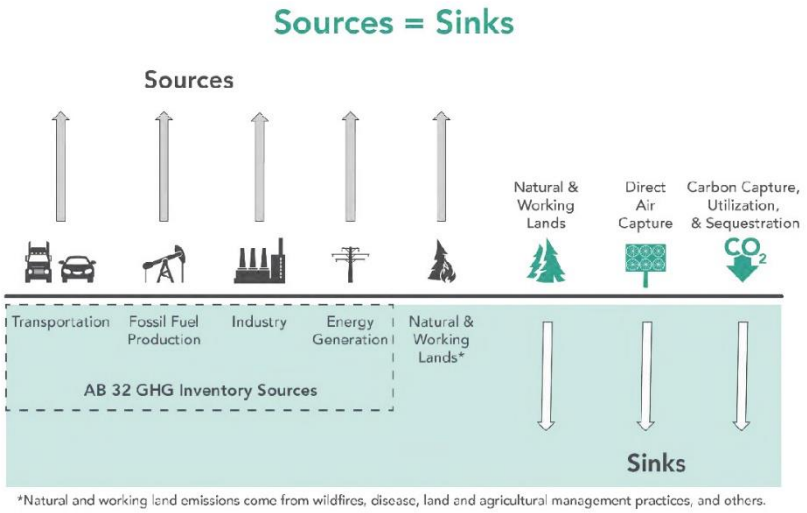
provides a strong signal to value the preservation of tropical forests over continued destructive activities such as oil exploration and extraction and ensures rigorous social and environmental safeguards for indigenous peoples and local communities.

Working Toward Carbon Neutrality

To date, California and many other regions have focused on reducing GHG emissions from the industrial, energy, and transportation sectors. As defined in statute, the state's 2020 and 2030 targets include all in-state sources of GHG emissions—and those emissions associated with imported power that is consumed in the state. By moving to a framework of carbon neutrality, the scope for accounting is expanded to include all sources and sinks. As such, carbon neutrality is achieved when the GHG fluxes are at equilibrium—when sources equal sinks. Figure 1-5 depicts the sources included in the AB 32 GHG Inventory and the new sources and sinks added in this Scoping Plan under the framework of carbon neutrality. Natural and working lands are able to sequester carbon and therefore play an increasingly important role in this framework. However, modeling for this plan shows that carbon sequestration in our natural and working lands alone will be insufficient to achieve carbon neutrality no later than 2045. Therefore, this plan also considers the role of carbon capture and sequestration, as well as biological and mechanical carbon sequestration processes that are included in the IPCC Sixth Assessment Report,[93] as necessary tools for climate change mitigation.

[93] IPCC. 2021. *Climate Change 2021: The Physical Science Basis*. https://www.ipcc.ch/report/ar6/wg1/.

Figure 1-5: Carbon neutrality: Balancing the net flux of GHG emissions from all sources and sinks



Supporting Healthy and Resilient Lands

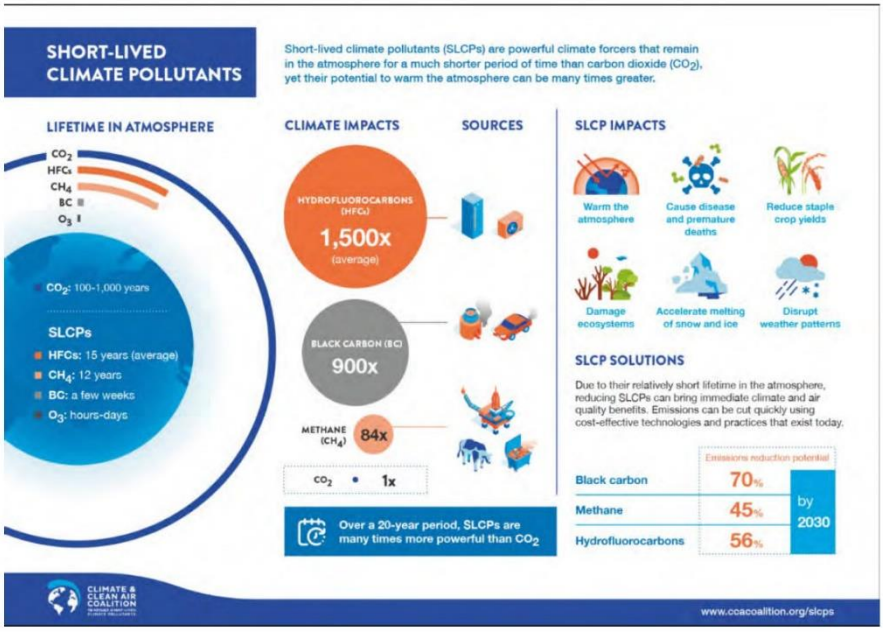
Our natural and working lands are an important piece in California's fight to achieve carbon neutrality and build resilience to the impacts of climate change. Healthy land can sequester and store atmospheric carbon dioxide in forests, grasslands, soils, and wetlands. Healthy lands can also reduce emissions of powerful short-lived climate pollutants, limit the release of future GHG emissions, protect people and nature from the impacts of climate change, and build our resilience to future climate risks. Unhealthy lands have the opposite effect—they release more GHGs than they store and are more vulnerable to future climate change impacts. Through climate smart land management that focuses on supporting healthy living systems, we can support our carbon neutrality goals, reduce emissions, advance sequestration, and support healthy and more climate-resilient lands.

Maintaining the Focus on Methane and Short-Lived Climate Pollutants

Given the urgency of climate change, the often-disproportional impacts already being felt by underserved populations across California and the world, and the need to rapidly decarbonize and avoid climate tipping points as identified in the most recent IPCC assessment, efforts to reduce short-lived climate pollutants are especially important. SLCPs include methane (CH_4), black carbon (soot), and fluorinated gases (F-gases,

including hydrofluorocarbons, or HFCs), and they are among the most harmful pollutants to both human health and the global climate. SLCPs are more potent than CO_2 in terms of their impact on climate change (and subsequently, global warming) and have a much shorter lifetime in the atmosphere than CO_2 does. That means they have an outsized impact on climate change in the near term—they are responsible for up to 45 percent of current climate forcing. It also means that targeted efforts to reduce short-lived climate pollutant emissions can provide outsized climate and health benefits, within weeks to about a decade (see Figure 1-6).

Figure 1-6: Short-lived climate pollutant impacts[94]



California has been a leader in addressing SLCP emissions. As part of the 2014 Scoping Plan,[95] CARB committed to developing a dedicated strategy to reduce SLCP emissions.

[94] Climate and Clean Air Coalition. Short-Lived Climate Pollutants (SLCPs). https://www.ccacoalition.org/en/content/short-lived-climate-pollutants-slcps.
[95] CARB. 2014. *First Update*. https://ww2.arb.ca.gov/sites/default/files/classic/cc/scopingplan/2013_update/first_update_climate_change_scoping_plan.pdf.

The resulting SLCP Reduction Strategy,[96] adopted by CARB in 2017, implements targets codified in SB 1383 (Lara, Chapter 395, Statutes of 2016) to reduce methane and HFC emissions by 40 percent by 2030 and anthropogenic black carbon emissions by 50 percent. California worked with several other states through the U.S. Climate Alliance to establish a similar goal to reduce SLCP emissions in line with the requirements of the Paris Agreement,[97] identifying the potential to reduce SCLPs by 40 to 50 percent by 2030 across the U.S. Climate Alliance.[98]

Process for Developing the Scoping Plan

This Scoping Plan was developed in coordination with the Governor's Office and state agencies, in accordance with direction from the Chair and Members of CARB, through engagement with the Legislature, with advice from the EJ Advisory Committee, in consultation with tribes, and with open and transparent opportunities for stakeholders and the public to engage in workshops and other meetings. Appendix A (Public Process) includes details of the public workshops, and Chapter 5 includes details of the EJ Advisory Committee's role in the Scoping Plan update process.

Guidance from the Administration and Legislature

This Scoping Plan reflects existing and recent direction in the Governor's Executive Orders and Statutes. Table 1-1 provides a summary of major climate legislation and executive orders issued since the adoption of the 2017 Scoping Plan.

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[96] CARB. 2017. *Short-Lived Climate Pollutant Reduction Strategy*. https://ww2.arb.ca.gov/sites/default/files/2020-07/final_SLCP_strategy.pdf.
[97] UNFCCC. 2015. Paris Agreement. https://unfccc.int/sites/default/files/english_paris_agreement.pdf.
[98] USCA. 2018. *From SLCP Challenge to Action: A Roadmap for Reducing Short-Lived Climate Pollutants to Meet the Goals of the Paris Agreement*. http://www.usclimatealliance.org/slcp-challenge-to-action.

Table 1-1: Major climate legislation and executive orders enacted since the 2017 Scoping Plan

Bill/Executive Order	Summary
Assembly Bill 1279 (AB 1279) (Muratsuchi, Chapter 337, Statutes of 2022) *The California Climate Crisis Act*	AB 1279 establishes the policy of the state to achieve carbon neutrality as soon as possible, but no later than 2045; to maintain net negative GHG emissions thereafter; and to ensure that by 2045 statewide anthropogenic GHG emissions are reduced at least 85 percent below 1990 levels. The bill requires CARB to ensure that Scoping Plan updates identify and recommend measures to achieve carbon neutrality, and to identify and implement policies and strategies that enable CO_2 removal solutions and carbon capture, utilization, and storage (CCUS) technologies. This bill is reflected directly in this Scoping Plan.
Senate Bill 905 (SB 905) (Caballero, Chapter 359, Statutes of 2022) *Carbon Capture, Removal, Utilization, and Storage Program*	SB 905 requires CARB to create the Carbon Capture, Removal, Utilization, and Storage Program to evaluate, demonstrate, and regulate CCUS and carbon dioxide removal (CDR) projects and technology. The bill requires CARB, on or before January 1, 2025, to adopt regulations creating a unified state permitting application for approval of CCUS and CDR projects. The bill also requires the Secretary of the Natural Resources Agency to publish a framework for governing agreements for two or more tracts of land overlying the same geologic storage reservoir for the purposes of a carbon sequestration project. The Scoping Plan modeling reflects both CCUS and CDR contributions to achieve carbon neutrality.
Senate Bill 846 (SB 846) (Dodd, Chapter 239, Statutes of 2022) *Diablo Canyon Powerplant: Extension of Operations*	SB 846 extends the Diablo Canyon Power Plant's sunset date by up to five additional years for each of its two units and seeks to make the nuclear power plant eligible for federal loans. The bill requires that the California Public Utilities Commission (CPUC) not include and disallow a load-serving entity from including in their adopted resource plan, the energy, capacity, or any attribute from the Diablo Canyon power plant. The Scoping Plan explains the emissions impact of this legislation.
Senate Bill 1020 (SB 1020) (Laird,	SB 1020 adds interim renewable energy and zero carbon energy retail sales of electricity targets to California end-use customers set at 90 percent in 2035 and 95 percent in 2040.

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Chapter 361, Statutes of 2022) *Clean Energy, Jobs, and Affordability Act of 2022*	It accelerates the timeline required to have 100 percent renewable energy and zero carbon energy procured to serve state agencies from the original target year of 2045 to 2035. This bill requires each state agency to individually achieve the 100 percent goal by 2035 with specified requirements. This bill requires the CPUC, California Energy Commission (CEC), and CARB, on or before December 1, 2023, and annually thereafter, to issue a joint reliability progress report that reviews system and local reliability. The bill also modifies the requirement for CARB to hold a portion of its Scoping Plan workshops in regions of the state with the most significant exposure to air pollutants by further specifying that this includes communities with minority populations or low-income communities in areas designated as being in extreme federal non-attainment. The Scoping Plan describes the implications of this legislation on emissions.
Senate Bill 1137 (SB 1137) (Gonzales, Chapter 365, Statutes of 2022) *Oil & Gas Operations: Location Restrictions: Notice of Intention: Health protection zone: Sensitive receptors*	SB 1137 prohibits the development of new oil and gas wells or infrastructure in health protection zones, as defined, except for purposes of public health and safety or other limited exceptions. The bill requires operators of existing oil and gas wells or infrastructure within health protection zones to undertake specified monitoring, public notice, and nuisance requirements. The bill requires CARB to consult and concur with the California Geologic Energy Management Division (CalGEM) on leak detection and repair plans for these facilities, adopt regulations as necessary to implement emission detection system standards, and collaborate with CalGEM on public access to emissions detection data.
Senate Bill 1075 (SB 1075) (Skinner, Chapter 363, Statutes of 2022) *Hydrogen: Green Hydrogen: Emissions of Greenhouse Gases*	SB 1075 requires CARB, by June 1, 2024, to prepare an evaluation that includes: policy recommendations regarding the use of hydrogen, and specifically the use of green hydrogen, in California; a description of strategies supporting hydrogen infrastructure, including identifying policies that promote the reduction of GHGs and short-lived climate pollutants; a description of other forms of hydrogen to achieve emission reductions; an analysis of curtailed electricity; an estimate of GHG and emission reductions that could be achieved through deployment of green hydrogen through a variety of scenarios; an analysis of the potential for opportunities to integrate hydrogen production and applications with drinking water supply treatment needs; policy recommendations for regulatory and permitting processes

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	associated with transmitting and distributing hydrogen from production sites to end uses; an analysis of the life-cycle GHG emissions from various forms of hydrogen production; and an analysis of air pollution and other environmental impacts from hydrogen distribution and end uses. This bill would inform the production of hydrogen at the scale called for in this Scoping Plan.
Assembly Bill 1757 (AB 1757) (Garcia, Chapter 341, Statutes of 2022) *California Global Warming Solutions Act of 2006: Climate Goal: Natural and Working Lands*	AB 1757 requires the California Natural Resources Agency (CNRA), in collaboration with CARB, other state agencies, and an expert advisory committee, to determine a range of targets for natural carbon sequestration, and for nature-based climate solutions, that reduce GHG emissions in 2030, 2038, and 2045 by January 1, 2024. These targets must support state goals to achieve carbon neutrality and foster climate adaptation and resilience. This bill also requires CARB to develop standard methods for state agencies to consistently track GHG emissions and reductions, carbon sequestration, and additional benefits from natural and working lands over time. These methods will account for GHG emissions reductions of CO_2, methane, and nitrous oxide related to natural and working lands and the potential impacts of climate change on the ability to reduce GHG emissions and sequester carbon from natural and working lands, where feasible. This Scoping Plan describes the next steps and implications of this legislation for the natural and working lands sector.
Senate Bill 1206 (SB 1206) (Skinner, Chapter 884, Statutes of 2022) *Hydrofluorocarbon gases: sale or distribution*	SB 1206 mandates a stepped sales prohibition on newly produced high- global warming potential (GWP) HFCs to transition California's economy toward recycled and reclaimed HFCs for servicing existing HFC-based equipment. Additionally, SB 1206 also requires CARB to develop regulations to increase the adoption of very low-, i.e., GWP < 10, and no-GWP technologies in sectors that currently rely on higher-GWP HFCs.
Senate Bill 27 (SB 27) (Skinner, Chapter 237, Statutes of 2021)	SB 27 requires CNRA, in coordination with other state agencies, to establish the Natural and Working Lands Climate Smart Strategy by July 1, 2023. This bill also requires CARB to establish specified CO_2 removal targets for 2030 and beyond as part of its Scoping Plan. Under SB 27, CNRA is to establish and maintain a registry to identify projects in the state

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Carbon Sequestration: State Goals: Natural and Working Lands: Registry of Projects	that drive climate action on natural and working lands and are seeking funding. CNRA also must track carbon removal and GHG emission reduction benefits derived from projects funded through the registry. This bill is reflected directly in this Scoping Plan as CO_2 removal targets for 2030 and 2045 in support of carbon neutrality.
Senate Bill 596 (SB 596) (Becker, Chapter 246, Statutes of 2021) *Greenhouse Gases: Cement Sector: Net-zero Emissions Strategy*	SB 596 requires CARB, by July 1, 2023, to develop a comprehensive strategy for the state's cement sector to achieve net-zero-emissions of GHGs associated with cement used within the state as soon as possible, but no later than December 31, 2045. The bill establishes an interim target of 40 percent below the 2019 average GHG intensity of cement by December 31, 2035. Under SB 596, CARB must: • Define a metric for GHG intensity and establish a baseline from which to measure GHG intensity reductions. • Evaluate the feasibility of the 2035 interim target (40 percent reduction in GHG intensity) by July 1, 2028. • Coordinate and consult with other state agencies. • Prioritize actions that leverage state and federal incentives. • Evaluate measures to support market demand and financial incentives to encourage the production and use of cement with low GHG intensity. The Scoping Plan modeling is designed to achieve these outcomes.
Executive Order N-82-20	Governor Newsom signed Executive Order N-82-20 in October 2020 to combat the climate and biodiversity crises by setting a statewide goal to conserve at least 30 percent of California's land and coastal waters by 2030. The Executive Order also instructed the CNRA, in consultation with other state agencies, to develop a Natural and Working Lands Climate Smart Strategy that serves as a framework to advance the state's carbon neutrality goal and build climate resilience. In addition to setting a statewide conservation goal, the Executive Order directed CARB to update the target for natural and working lands in support of carbon neutrality as part of this Scoping Plan, and to take into consideration the NWL Climate Smart Strategy.

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	Executive Order N-82-20 also calls on the CNRA, in consultation with other state agencies, to establish the California Biodiversity Collaborative (Collaborative). The Collaborative shall be made up of governmental partners, California Native American tribes, experts, business and community leaders, and other stakeholders from across the state. State agencies will consult the Collaborative on efforts to: • Establish a baseline assessment of California's biodiversity that builds upon existing data and can be updated over time. • Analyze and project the impact of climate change and other stressors in California's biodiversity. • Inventory current biodiversity efforts across all sectors and highlight opportunities for additional action to preserve and enhance biodiversity. CNRA also is tasked with advancing efforts to conserve biodiversity through various actions, such as streamlining the state's process to approve and facilitate projects related to environmental restoration and land management. The California Department of Food and Agriculture (CDFA) is directed to advance efforts to conserve biodiversity through measures such as reinvigorating populations of pollinator insects, which restore biodiversity and improve agricultural production. The Natural and Working Lands Climate Smart Strategy informs this Scoping Plan.
Executive Order N-79-20	Governor Newsom signed Executive Order N-79-20 in September 2020 to establish targets for the transportation sector to support the state in its goal to achieve carbon neutrality by 2045. The targets established in this Executive Order are: • 100 percent of in-state sales of new passenger cars and trucks will be zero-emission by 2035. • 100 percent of medium- and heavy-duty vehicles will be zero-emission by 2045 for all operations where feasible, and by 2035 for drayage trucks. • 100 percent of off-road vehicles and equipment will be zero-emission by 2035 where feasible. The Executive Order also tasked CARB to develop and propose regulations that require increasing volumes of zero-electric passenger vehicles, medium- and heavy-duty

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	vehicles, drayage trucks, and off-road vehicles toward their corresponding targets of 100 percent zero-emission by 2035 or 2045, as listed above. The Scoping Plan modeling reflects achieving these targets.
Executive Order N-19-19	Governor Newsom signed Executive Order N-19-19 in September 2019 to direct state government to redouble its efforts to reduce GHG emissions and mitigate the impacts of climate change while building a sustainable, inclusive economy. This Executive Order instructs the Department of Finance to create a Climate Investment Framework that: • Includes a proactive strategy for the state's pension funds that reflects the increased risks to the economy and physical environment due to climate change. • Provides a timeline and criteria to shift investments to companies and industry sectors with greater growth potential based on their focus of reducing carbon emissions and adapting to the impacts of climate change. • Aligns with the fiduciary responsibilities of the California Public Employees' Retirement System, California State Teachers' Retirement System, and the University of California Retirement Program. Executive Order N-19-19 directs the State Transportation Agency to leverage more than $5 billion in annual state transportation spending to help reverse the trend of increased fuel consumption and reduce GHG emissions associated with the transportation sector. It also calls on the Department of General Services to leverage its management and ownership of the state's 19 million square feet in managed buildings, 51,000 vehicles, and other physical assets and goods to minimize state government's carbon footprint. Finally, it tasks CARB with accelerating progress toward California's goal of five million ZEV sales by 2030 by: • Developing new criteria for clean vehicle incentive programs to encourage manufacturers to produce clean, affordable cars. • Proposing new strategies to increase demand in the primary and secondary markets for ZEVs. • Considering strengthening existing regulations or adopting new ones to achieve the necessary GHG reductions from within the transportation sector.

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	The Scoping Plan modeling reflects efforts to accelerate ZEV deployment.
Senate Bill 576 (SB 576) (Umberg, Chapter 374, Statutes of 2019) *Coastal Resources: Climate Ready Program and Coastal Climate Change Adaptation, Infrastructure and Readiness Program*	Sea level rise, combined with storm-driven waves, poses a direct risk to the state's coastal resources, including public and private real property and infrastructure. Rising marine waters threaten sensitive coastal areas, habitats, the survival of threatened and endangered species, beaches, other recreation areas, and urban waterfronts. SB 576 mandates that the Ocean Protection Council develop and implement a coastal climate adaptation, infrastructure, and readiness program to improve the climate change resiliency of California's coastal communities, infrastructure, and habitat. This bill also instructs the State Coastal Conservancy to administer the Climate Ready Program, which addresses the impacts and potential impacts of climate change on resources within the conservancy's jurisdiction.
Assembly Bill 65 (AB 65) (Petrie-Norris, Chapter 347, Statutes of 2019) *Coastal Protection: Climate Adaption: Project Prioritization: Natural Infrastructure: Local General Plans*	This bill requires the State Coastal Conservancy, when it allocates any funding appropriated pursuant to the California Drought, Water, Parks, Climate, Coastal Protection, and Outdoor Access For All Act of 2018, to prioritize projects that use natural infrastructure in coastal communities to help adapt to climate change. The bill requires the conservancy to provide information to the Office of Planning and Research on any projects funded pursuant to the above provision to be considered for inclusion into the clearinghouse for climate adaption information. The bill authorizes the conservancy to provide technical assistance to coastal communities to better assist them with their projects that use natural infrastructure.
Executive Order B-55-18	Governor Brown signed Executive Order B-55-18 in September 2018 to establish a statewide goal to achieve carbon neutrality as soon as possible, and no later than 2045, and to achieve and maintain net negative emissions thereafter. Policies and programs undertaken to achieve this goal shall: • Seek to improve air quality and support the health and economic resiliency of urban and rural communities, particularly low-income and disadvantaged communities. • Be implemented in a manner that supports climate adaptation and biodiversity, including protection of the state's water supply, water quality, and native plants and animals.

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	This Executive Order also calls for CARB to: • Develop a framework for implementation and accounting that tracks progress toward this goal. • Ensure future Scoping Plans identify and recommend measures to achieve the carbon neutrality goal. This Scoping Plan is designed to achieve carbon neutrality no later than 2045 and the modeling includes technology and fuel transitions to achieve that outcome.
Senate Bill 100 (SB 100) (De León, Chapter 312, Statutes of 2018) *California Renewables Portfolio Standard Program: emissions of greenhouse gases*	SB 100 mandates that the CPUC, CEC, and CARB plan for 100 percent of total retail sales of electricity in California to come from eligible renewable energy resources and zero-carbon resources by December 31, 2045. This bill also updates the state's Renewables Portfolio Standard (RPS) to include the following interim targets: • 44% of retail sales procured from eligible renewable sources by December 31, 2024. • 52% of retail sales procured from eligible renewable sources by December 31, 2027. • 60% of retail sales procured from eligible renewable sources by December 31, 2030. Under SB 100, the CPUC, CEC, and CARB shall use programs under existing laws to achieve 100 percent clean electricity. The statute requires these agencies to issue a joint policy report on SB 100 every four years. The first of these reports was issued in 2021. This Scoping Plan reflects the SB 100 Core Scenario resource mix with a few minor updates.
Assembly Bill 2127 (AB 2127) (Ting, Chapter 365, Statutes of 2018) *Electric Vehicle Charging Infrastructure: Assessment*	This bill requires the CEC, working with CARB and the CPUC, to prepare and biennially update a statewide assessment of the electric vehicle charging infrastructure needed to support the levels of electric vehicle adoption required for the state to meet its goals of putting at least 5 million zero-emission vehicles on California roads by 2030 and of reducing emissions of GHGs to 40% below 1990 levels by 2030. The bill requires the CEC to regularly seek data and input from stakeholders relating to electric vehicle charging infrastructure. This bill supports the deployment of ZEVs as modeled in this Scoping Plan.

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Senate Bill 30 (SB 30) (Lara, Chapter 614, Statutes of 2018) *Insurance: Climate Change*	This bill requires the Insurance Commissioner to convene a working group to identify, assess, and recommend risk transfer market mechanisms that, among other things, promote investment in natural infrastructure to reduce the risks of climate change related to catastrophic events, create incentives for investment in natural infrastructure to reduce risks to communities, and provide mitigation incentives for private investment in natural lands to lessen exposure and reduce climate risks to public safety, property, utilities, and infrastructure. The bill requires the policies recommended to address specified questions.
Assembly Bill 2061 (AB 2061) (Frazier, Chapter 580, Statutes of 2018) *Near-zero-emission and Zero-emission Vehicles*	Existing state and federal law sets specified limits on the total gross weight imposed on the highway by a vehicle with any group of two or more consecutive axles. Under existing federal law, the maximum gross vehicle weight of that vehicle may not exceed 82,000 pounds. AB 2061 authorizes a near-zero-emission vehicle or a zero-emission vehicle to exceed the weight limits on the power unit by up to 2,000 pounds. This bill supports the deployment of cleaner trucks as modeled in this Scoping Plan.

Consideration of Relevant State Plans and Regulations

Development of this Scoping Plan also included careful consideration of, and coordination with, other state agency plans and regulations, including the SB 100 Joint Agency Report,[99] the 2022 State Strategy for the State Implementation Plan,[100] Climate Action Plan for Transportation Infrastructure,[101] AB 74 Studies on Vehicle Emissions and Fuel Demand and Supply,[102,103,104] Short-Lived Climate Pollutant Strategy (SLCP Strategy),[105]

[99] CPUC, CEC, and CARB. 2021. *SB 100 Joint Agency Report*. https://www.energy.ca.gov/sb100.
[100] CARB. January 31, 2022. Draft 2022 State Strategy for the State Implementation Plan. https://ww2.arb.ca.gov/sites/default/files/2022-01/Draft_2022_State_SIP_Strategy.pdf.
[101] CalSTA. 2021. *Climate Action Plan*. https://calsta.ca.gov/subject-areas/climate-action-plan.
[102] CalEPA. 2021. Carbon Neutrality Studies. https://calepa.ca.gov/climate/carbon-neutrality-studies/.
[103] Brown, A. L., et. al. 2021. *Driving California's Transportation Emissions*. https://escholarship.org/uc/item/3np3p2t0.
[104] Deschenes, O. 2021. *Enhancing equity*. https://zenodo.org/record/4707966#.YKPiaKhKi73.
[105] CARB. Short-Lived Climate Pollutants. https://ww2.arb.ca.gov/our-work/programs/slcp.

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CARB's Achieving Carbon Neutrality Report,[106] Climate Smart Strategy,[107] and draft Natural and Working Lands Implementation Plan,[108] among others.

Input from Partners and Stakeholders

CARB also collaborated with other state agencies, held consultations with tribes, and solicited comments and feedback from affected stakeholders, including labor organizations and the public. The process to update the Scoping Plan began with kickoff workshops in early June 2021,[109] followed by over a dozen public workshops, including engagement with tribes,[110] and featured a series of EJ Advisory Committee and environmental justice community meetings.[111] The June 2021 workshop and several others were a joint agency effort, as there are many agencies with direct authority or jurisdiction over different sectors of the economy. Consultation with agencies also included bi-weekly, monthly, and weekly meetings.

During the summer of 2022 CARB held three community listening sessions, hosted by the CARB Chair and Board, in communities around the state, along with one virtual community listening session and one tribal listening session specifically for tribes. Many tribes provided written feedback, which was incorporated into this Scoping Plan. In addition, CARB respects tribal sovereignty and also engaged in a consultation campaign with tribes, which resulted in government-to-government consultations, and this Scoping Plan is reflective of this process.[112]

Emissions Data That Inform the Scoping Plan

Greenhouse Gas Emissions

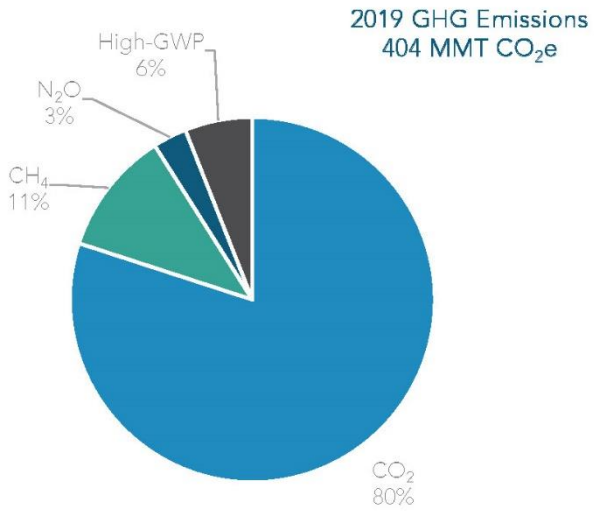
AB 32 includes which GHGs are to be regulated, reduced, and included in the state's targets and goals. That list includes seven GHGs: carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), sulfur hexafluoride (SF_6), hydrofluorocarbons (HFCs),

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[106] Energy and Environmental Economics, Inc. 2020. *Achieving Carbon Neutrality*. https://ww2.arb.ca.gov/sites/default/files/2020-10/e3_cn_final_report_oct2020_0.pdf.
[107] CNRA. 2022. Natural and Working Lands Climate Smart Strategy. https://resources.ca.gov/Initiatives/Expanding-Nature-Based-Solutions.
[108] CARB. 2019. *Draft California 2030 Natural and Working Lands Climate Change Implementation Plan.* https://ww2.arb.ca.gov/resources/documents/nwl-implementation-draft.
[109] Appendix A (Public Process).
[110] CARB. Scoping Plan Meetings & Workshops. https://ww2.arb.ca.gov/our-work/programs/ab-32-climate-change-scoping-plan/scoping-plan-meetings-workshops.
[111] CARB. Environmental Justice Advisory Committee Meetings and Events. https://ww2.arb.ca.gov/environmental-justice-advisory-committee-meetings-and-events.
[112] CARB. 2018. Tribal Consultation Policy. October. https://www.arb.ca.gov/regact/nonreg/2018/california_air_resources_board_tribal_consultation_policy.pdf.

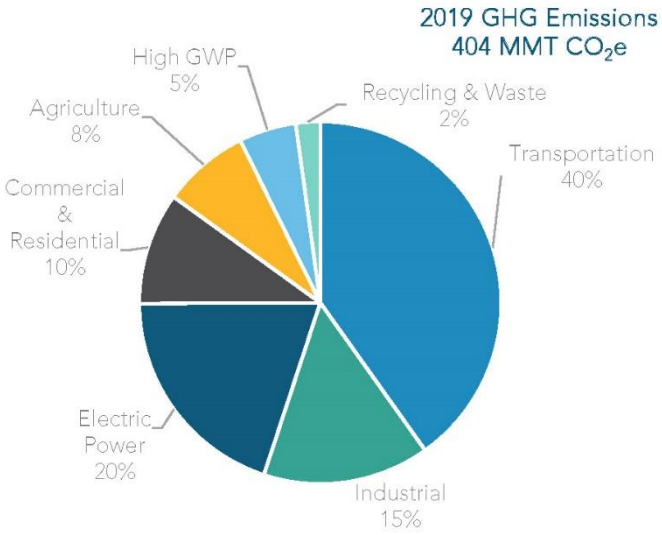
perfluorocarbons (PFCs), and nitrogen trifluoride (NF_3). Carbon dioxide is the primary GHG emitted in California, accounting for 83 percent of the total GHG emissions in 2019, as shown in Figure 1-7 below. Figure 1-8 illustrates that transportation (primarily on-road travel) is the single largest source of CO_2 emissions in the state. Upstream transportation emissions from the refinery and oil and gas sectors are categorized as CO_2 emissions from industrial sources and constitute about 50 percent of the industrial source emissions. When including these emissions, the transportation sector accounts for approximately half of statewide GHG emissions. Other significant sources of CO_2 include electricity production, industrial sources like refineries and cement plants, and residential sources like fossil gas. Figures 1-7 and 1-8 show state GHG emission contributions by GHG and sector based on the 2020 Greenhouse Gas Emission Inventory; GHG emissions for 2019 are shown because 2020 was an outlier due to the global pandemic. Emissions in Figure 1-8 are depicted by Scoping Plan sector, which includes separate categories for high-global warming potential (GWP) and recycling/waste emissions that are otherwise typically included within other economic sectors.

Figure 1-7: 2019 State GHG emission contributions by GHG[113]



[113] CARB. 2022. *California Greenhouse Gas Emissions for 2000 to 2020: Trends of Emissions and Other Indicators.* https://ww2.arb.ca.gov/sites/default/files/classic/cc/inventory/2000-2020_ghg_inventory_trends.pdf.

Figure 1-8: 2019 State GHG emission contributions by Scoping Plan sector[114]



The scope of the AB 32 GHG Inventory encompasses emission sources within the state's borders, as well as imported electricity consumed in the state. This construct for the inventory is consistent with IPCC practices to allow for comparison of statewide GHG emissions with those at the national level and with other international GHG inventories. Statewide GHG emissions calculations use many data sources, including data from other state and federal agencies. However, a significant source of data comes from reports submitted to CARB through the Regulation for the Mandatory Reporting of GHG Emissions (MRR). The MRR requires facilities and entities with more than 10,000 metric tons of carbon dioxide equivalent ($MTCO_2e$) of combustion and process emissions, all facilities belonging to certain industries, and all electric power entities to submit an annual GHG emissions data report directly to CARB. Furthermore, this regulation requires that reports from entities that emit more than 25,000 $MTCO_2e$ be verified by a CARB-

[114] The High GWP sector includes high global warming potential gas emissions from releases of ozone depleting substance (ODS) substitutes, SF_6 emissions from the electricity transmission and distribution system, and gases that are emitted in the semiconductor manufacturing process. ODS substitutes, which are primarily HFCs, are used in refrigeration and air conditioning equipment, solvent cleaning, foam production, fire retardants, and aerosols.

accredited third-party verification body. More information on MRR emissions reports can be found at CARB's Mandatory Greenhouse Gas Emissions Reporting website.[115]

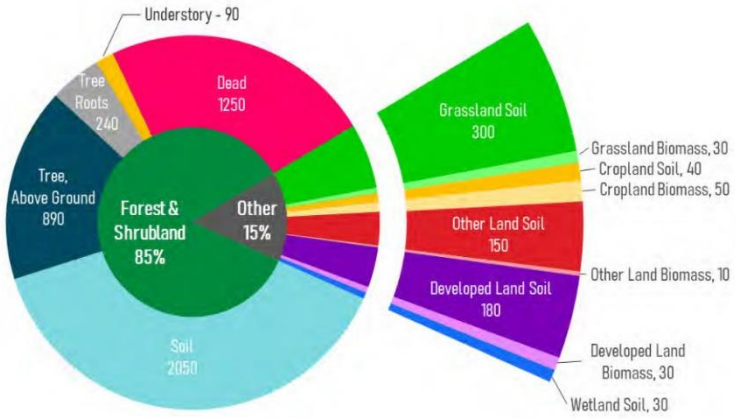
All data sources used to develop the GHG Emission Inventory are listed in CARB's inventory supporting documentation.[116]

Natural and Working Lands

For natural and working lands, the 2018 ecosystem carbon inventory (NWL Inventory)[117] shows there are approximately 5,340 million metric tons (MMT) of carbon in the carbon pools[118] (reservoirs of carbon that have the ability to both take in and release carbon) that CARB has quantified (see Figure 1-9). For purposes of comparison, 5,340 MMT of ecosystem carbon stock is equivalent to 19,600 MMT of atmospheric CO_2. Forests and shrublands contain the majority of California's carbon stock because they cover the majority of California's landscape and have the highest carbon density of any land cover type. All other land categories combined comprise over 35 percent of California's total acreage, but only 15 percent of carbon stocks. Roughly half of the 5,340 MMT of carbon resides in soils and half in plant biomass.

[115] CARB. Mandatory Greenhouse Gas Emissions Reporting. https://ww2.arb.ca.gov/our-work/programs/mandatory-greenhouse-gas-emissions-reporting.
[116] CARB. Current California GHG Emission Inventory Data. www.arb.ca.gov/cc/inventory/data/data.htm.
[117] CARB. 2018. *An Inventory of Ecosystem Carbon in California's Natural and Working Lands*. https://ww3.arb.ca.gov/cc/inventory/pubs/nwl_inventory.pdf.
[118] "Carbon pools" are Above-Ground Live Biomass (boles, stems, and foliage in shrubs, trees, grasses, and herbaceous vegetation), Below-Ground Live Biomass (roots in shrubs, trees, grasses, and herbaceous vegetation), Dead Organic Matter (standing or downed dead wood and litter), Harvested Wood Products (all wood and bark material that leaves harvest sites regardless of whether it is eventually incorporated into merchandisable products), and Soil Organic Matter (organic carbon in the top 30 centimeters of soil).

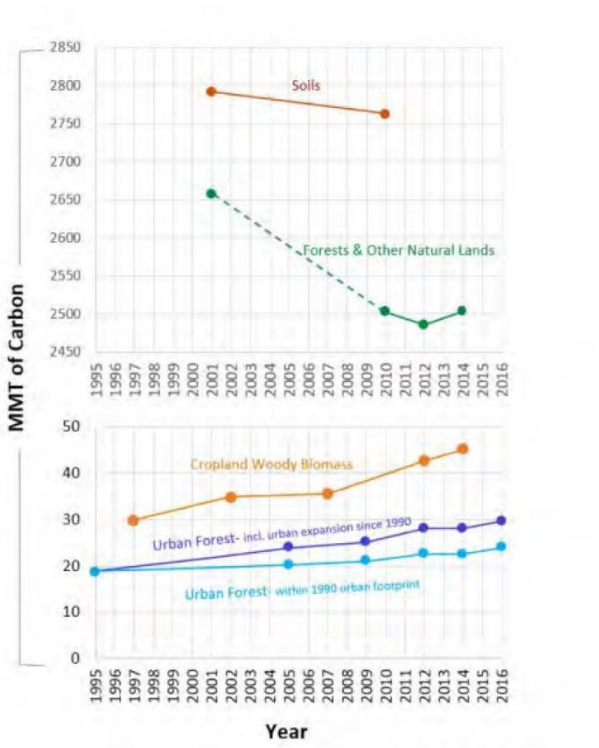
Figure 1-9: Carbon stocks in natural and working lands (MMT carbon)



In addition to providing an estimate of the ecosystem carbon that exists on California's landscape, the NWL Inventory also shows how those carbon stocks are changing (see Figure 1-10). The inventory attributes stock change to human activity, such as land use change, or to disturbances, such as wildfire. CARB's inventory shows these lands were a source of GHG emissions from 2001 to 2011, releasing more carbon than they stored, and then they returned to be a slight carbon sink from 2012 to 2014. These trends highlight the interannual and interdecadal variability of lands and their ability to be both a source and a sink of carbon.

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Figure 1-10: Changes in carbon stock by landscape type



For natural and working lands, California's inventory is also based on IPCC methods for tracking ecosystem carbon over time, providing for comparability with other national and subnational inventories and carbon accounting. As such, the NWL Inventory is an important tool for tracking both carbon stock changes in California over time and the impacts that interventions such as those identified in this Scoping Plan, actions identified in the Climate Smart Land Strategy, and others have on NWL carbon stocks.

All data sources used to develop the NWL Inventory are listed in the technical support documentation at CARB's California Natural & Working Lands Inventory website.[119]

[119] CARB. California Natural & Working Lands Inventory. https://ww2.arb.ca.gov/nwl-inventory.

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Black Carbon

In addition, CARB has developed a statewide emission inventory for black carbon in support of the SLCP Strategy. The inventory is reported in two categories: non-forestry (anthropogenic) sources and forestry sources.[120] The black carbon inventory is calculated using existing $PM_{2.5}$ emission inventories combined with speciation profiles that define the fraction of $PM_{2.5}$ that is black carbon. The black carbon inventory helps support implementation of the SLCP Strategy, but it is not part of California's GHG Inventory that tracks progress toward the state's climate targets under AB 32 or SB 32. The state's major anthropogenic sources of black carbon include off-road transportation, on-road transportation, residential wood burning, fuel combustion, and industrial processes. CARB estimated 2017 black carbon emissions to be approximately 8 $MTCO_2e$.[121] The majority of anthropogenic sources come from transportation—specifically, heavy-duty vehicles. The share of black carbon emissions from transportation is dropping rapidly and is expected to continue to do so between now and 2030 as a result of California's air quality programs. The remaining black carbon emissions will come largely from woodstoves/fireplaces, off-road applications, and industrial/commercial combustion. The forestry category includes non-agricultural prescribed burning and wildfire emissions.

Tracking Life-Cycle and Out-of-State Emissions

In recent years there has been increased interest in the embedded carbon in products, also known as *life-cycle emissions.* A life-cycle accounting framework refers to all of the GHG emissions generated from the sourcing, production, and transportation of products to an endpoint. In doing such assessments for a product, emissions may be associated with sourced materials and production activity outside a jurisdiction's borders. While life-cycle emissions can provide a more comprehensive picture of the emissions associated with the goods we consume and ongoing demand, life-cycle inventories are inconsistent with IPCC standards, as they would result in double counting of emissions across jurisdictions. Other countries and regions do produce their own inventory reports consistent with IPCC methods and are taking action to reduce emissions within their jurisdictions. In addition, jurisdictions often lack legal authority to regulate sources outside of their borders. Finally, it is difficult to obtain accurate data for sources and production activities outside of a region's border that would impact the accuracy of such an inventory. For these reasons, the inventory used in the Scoping Plan does not use a life-cycle

[120] SB 1383. https://leginfo.legislature.ca.gov/faces/billTextClient.xhtml?bill_id=201520160SB1383.
[121] This is a preliminary estimate developed for this Scoping Plan. Official Black Carbon emissions estimates are provided in the SLCP inventory here: https://ww2.arb.ca.gov/ghg-slcp-inventory.

approach and remains consistent with international accounting standards and consistent with how other countries and regions track emissions within their jurisdictions.

However, GHG mitigation action may cross geographic borders as part of subnational and international collaboration, or as a natural result of implementation of regional policies. In addition to the state's existing GHG inventory, CARB will develop an accounting framework that reflects the benefits of our policies accruing outside of the state. This accounting framework will be important to better understand the true impact of the state's policies on what is emitted into the atmosphere. For example, the LCFS incentivizes GHG reductions along the entire supply chain for the production and delivery of transportation fuel imported for use in the state. However, our inventory only captures the change in emissions from the tailpipe of when that fuel is used in California and does not capture any GHG reductions that occur in the production process if the fuel is produced out of state.

Natural and working lands forestry actions are another example, where California's policies are inspiring forest management actions in other states that result in increased permanent carbon sequestration. California's NWL inventory does not capture the increased carbon stocks resulting from forestry projects happening outside of California, and the CO_2 removals resulting from these projects are not applied in either CARB's NWL inventory or CARB's AB 32 GHG Emissions Inventory. For GHG reductions outside of the state to be attributed to our programs, those reductions must be real, quantifiable, verifiable, and permanent.

It also will be important to avoid any double counting (including claims to those reductions by other jurisdictions) and to transparently indicate whether any extra-jurisdictional emissions reductions might be included in another region's inventory. CARB is collaborating with other jurisdictions to ensure GHG accounting rules are consistent with international best practices, as robust accounting rules instill confidence in the reductions claimed and maintain support for joint action across jurisdictions. The policy goals of consistency and transparency are critical as we work together with other jurisdictions on our parallel paths to achieve our GHG targets with real benefits to the atmosphere.

Tracking Progress

Historically, the AB 32 GHG Inventory has been the primary metric to track progress toward achieving climate targets.[122] However, we must now deploy clean technology at unprecedented rates. The emissions modeling underpinning this Scoping Plan and

[122] Starting with the 2022 Edition of the AB 32 GHG inventory, the inventory development now relies more directly on the annually reported and third-party verified emissions from the Regulation for the Mandatory Reporting of Greenhouse Gas Emissions.

targets for clean technology in statute can serve as leading indicators across the economy on how our actions compare to the pace of action needed to be on track to achieve carbon neutrality. The California Climate Dashboard[123] was launched in 2022 and provides high-level metrics for clean energy production and technology deployment. Statistics such as the deployment of zero emission vehicles and clean electricity generation are just some of the examples of metrics across the economy that can be tracked, in addition to GHG emissions, to understand if the state is on track to meet its climate goals. A key indicator to track will be building of new energy infrastructure and deployment of clean technology as evaluated in the uncertainty analysis in Chapter 2. CARB will coordinate with state agencies to establish and make public similar metrics across all economic sectors to help provide transparency on the state's progress in deploying clean technology at the pace and scale needed to achieve carbon neutrality no later than 2045.

[123] CalEPA. California Climate Dashboard. https://calepa.ca.gov/climate-dashboard/.

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Chapter 2: The Scoping Plan Scenario

This chapter describes the Scoping Plan Scenario, which for the first time includes sources in both the AB 32 GHG Inventory and Natural and Working Lands (NWL). It begins with a short description of the alternatives evaluated. Four scenarios for the AB 32 GHG Inventory and NWL were considered separately and helped to inform the Scoping Plan Scenario. Each of the alternatives were considered in terms of the important criteria and priorities that the state's comprehensive climate action must deliver, including the need for GHG reductions that are not only technologically feasible and cost-effective, but also can deliver health and economic benefits for the state. All the scenarios were set against what is called the *Reference Scenario*—that is, what the GHG emissions would look like if we did nothing at all beyond the existing policies that are required and already in place to achieve the 2030 target of at least 40 percent below 1990 levels, or those expected with no new actions in the NWL sector. For this Scoping Plan, two sets of modeling tools were used to evaluate the AB 32 GHG Inventory and NWL sectors because no single model can assess both AB 32 sectors and NWL together. As a result, two different sets of scenarios were developed for each sector type. While this chapter breaks out discussion separately for the two sector types, the Scoping Plan Scenario reflects the combined actions across both sectors by choosing an alternative from each sector type. The modeling provides point estimates; however, that does not imply precision. As discussed in the uncertainty section, several types of uncertainties are associated with any outcomes projected by the modeling results. There will be ranges of estimates associated with each point that are not shown in the graphs or results.

Scenarios for the AB 32 GHG Inventory Sectors

The Reference Scenario for the AB 32 GHG Inventory sectors shows continuing but modest GHG reductions beyond 2030 that level off toward mid-century. The comprehensive analysis of all four alternatives indicates that the Scoping Plan Scenario is the best choice to achieve California's climate and clean air goals while balancing the legislative direction on prioritizing direct emissions reductions, reducing anthropogenic emissions by at least 85 percent by 2045, being technologically feasible, and being cost-effective. It also protects public health, provides a solid foundation for continued economic growth, and drastically reduces the state's dependence on fossil fuel combustion and does not disproportionately impact disadvantaged communities. Each of the alternative scenarios was the product of a process of development informed by public input, the

governor,[124] CARB, legislative direction, and input by the EJ Advisory Committee.[125,126] Future updates to the Scoping Plan may consider new clean technologies and fuels beyond those included in this Scoping Plan.

The four scenarios evaluated shared many similarities. They each embodied the following characteristics:

- Drastic reduction in fossil fuel dependence, with some remaining in-state demand for fossil fuels for aviation, marine, and locomotion applications, and for fossil gas for buildings and industry
- Ambitious deployment of efficient non-combustion technologies such as zero emission vehicles and heat pumps
- Rapid growth in the production and distribution of clean energy such as zero carbon electricity and hydrogen
- Progressive phasedown of fossil fuel production and distribution activities as part of the transition to clean energy
- Remaining emissions of fugitive SLCPs such as refrigerants and fugitive methane
- Strong consumer adoption of clean technology and fuel options
- Removal of remaining CO_2 emissions to achieve carbon neutrality
- Some reliance on carbon capture and sequestration (CCS)

While the four scenarios had a lot in common, they also had some differences:

- Year in which carbon neutrality is achieved (2035 or 2045)
- Rate of deployment of clean technology and production and distribution of zero carbon energy
- Remaining amount of demand for fossil energy in the year carbon neutrality is achieved
- Constraints on technology and fuels deployed in certain sectors
- Consumer adoption rates of clean technologies and fuels
- Degree of reliance on CO_2 removal
- Degree of reliance on CCS

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[124] Newsom, Gavin. July 22, 2022. Letter from Governor Newsom to CARB Chair Liane Randolph. Retrieved from https://www.gov.ca.gov/wp-content/uploads/2022/07/07.22.2022-Governors-Letter-to-CARB.pdf.

[125] EJ Advisory Committee. December 2, 2021. EJ Advisory Committee Responses for the CARB Scenario Inputs. https://ww2.arb.ca.gov/sites/default/files/2021-12/EJAC%20Final%20Responses%20to%20CARB%20Scenario%20Inputs_12_2_21.pdf.

[126] CARB. January 25, 2022. Update on PATHWAYS Scenario Modeling Assumptions. https://ww2.arb.ca.gov/sites/default/files/2022-01/Scenario%20Slides%20for%20Jan25%20EJAC%20Mtg_01242022.pdf.

The summary below provides an overview of the alternatives designed and considered for the energy and industrial sectors in this update. Full details of each scenario considered can be found in the *Draft 2022 Scoping Plan Update*

> **Scoping Plan Scenario (modeling scenario Alternative 3 from the Draft):** carbon neutrality by 2045, deploy a broad portfolio of existing and emerging fossil fuel alternatives and clean technologies, and align with statutes, Executive Orders, Board direction, and direction from the governor
>
> **Alternative 1:** carbon neutrality by 2035, nearly complete phaseout of all combustion, limited reliance on carbon capture and sequestration and engineered carbon removal, and restricted applications for biomass-derived fuels
>
> **Alternative 2:** carbon neutrality by 2035 and aggressive deployment of a full suite of technology and energy options, including engineered carbon removal
>
> **Alternative 4:** carbon neutrality by 2045, deployment of a broad portfolio of existing and emerging fossil fuel alternatives, slower deployment and adoption rates than the Scoping Plan Scenario, and a higher reliance on CO_2 removal

Other considerations for the AB 32 GHG Inventory sectors include the following:

- To what extent does an alternative meet the statewide targets and any sector targets, and also deliver clean air benefits (especially in the near term) to address ongoing healthy air disparities, prioritize reductions for mobile and large stationary sources, and emphasize continued investment in disadvantaged communities?
- Does an alternative support California in building on efforts to collaborate with other jurisdictions and include exportable policies based on robust science?
- Does an alternative provide for compliance options and a cost-effective approach to reduce GHG emissions?
- Does the alternative present a realistic and ambitious path forward consistent with statute and science, and support economic opportunities, particularly in anticipated growth sectors?

Scenarios for Natural and Working Lands

For the natural and working lands sector, the Reference Scenario shows that NWL will continue to emit GHGs and lose carbon stocks into the future as the combined effects of past unhealthy management practices and climate change impact our lands. Relative to the Reference Scenario, the four NWL scenarios represent different scales of land management on seven landscapes (forests, shrublands/chaparral, grasslands, croplands, developed lands, wetlands, and sparsely vegetated lands) to support carbon neutrality.

The analysis of the four NWL scenarios shows that the Scoping Plan Scenario is the preferred choice because it prioritizes sustainable land management to sequester carbon over the long term, GHG and air pollution reductions, ecosystem health and resilience, and implementation and technological feasibility and cost-effectiveness. The Scoping Plan Scenario reduces catastrophic wildfire risk to the state; increases the health and resilience of California's forests, shrublands, and grasslands; increases soil health; and protects, restores, and enhances California's natural and working lands for future generations. The Scoping Plan Scenario takes into consideration the priority landscapes and nature-based strategies identified in California's Climate Smart Strategy[127] and reflects the state's priorities to manage lands in ways that support the multiple benefits they provide. The Scoping Plan Scenario, as well as each of the alternative NWL scenarios, were informed by input from other agencies, the public, and the EJ Advisory Committee. Additional landscapes and land management activities will be added and evaluated in future Scoping Plan updates and in response to AB 1757.

Each of the NWL scenarios have several similarities, including the following:

- Prioritizing NWL management actions on forests, shrublands, grasslands, croplands, developed lands, wetlands, and sparsely vegetated lands. These actions can reduce GHG emissions from these lands, protect ecosystems against future climate change, protect communities, and enhance the ecosystem benefits they provide to nature and society.
- Exploring the potential impacts of different levels of NWL management actions that are designed to achieve the objective associated with each scenario.
- Analyzing the carbon impacts of land management actions, climate change, wildfire, and water use on California's diverse natural and working lands through 2045.

There are also differences across the four NWL scenarios. These include:

- The level of NWL management actions taken on each landscape, such as varying the acres of healthy soils practices for croplands.
- The types of NWL management actions taken on each landscape, such as prescribed burning or thinning for forests, grasslands, and shrublands.

[127] CNRA. 2022. Natural and Working Lands Climate Smart Strategy. https://resources.ca.gov/-/media/CNRA-Website/Files/Initiatives/Expanding-Nature-Based-Solutions/CNRA-Report-2022---Final_Accessible_Compressed.pdf.

The summary below provides an overview of the alternatives designed and considered for the NWL sectors in this Scoping Plan. Full details of each scenario considered can be found in the *Draft 2022 Scoping Plan Update*.

Scoping Plan Scenario (NWL Alternative 3 from the Draft): land management activities that prioritize restoration and enhancement of ecosystem functions to improve resilience to climate change impacts, including more stable carbon stocks

NWL Alternative 1: land management activities that prioritize short term carbon stocks in our forests and through increased climate smart agricultural practices on croplands

NWL Alternative 2: land management activities representative of California's current commitments and plans

NWL Alternative 4: land management activities that prioritize reducing catastrophic wildfires in forests, shrublands, and grasslands

Evaluation of Scoping Plan Alternatives

CARB staff solicited feedback from topical experts, affected stakeholders, and the EJ Advisory Committee, including a tribal representative, at public meetings to assemble input assumptions for four carbon neutrality scenarios to model using PATHWAYS. Revisions to the Draft Scoping Plan were informed by direction in statute, the Governor's Executive Orders, public comments, and the recommendations of the EJ Advisory Committee. The three alternative scenarios were designed to explore the potential speed, magnitude, and impacts of transitioning California's energy demand away from fossil fuels. The modeling assumptions listed below identify the primary fossil fuel alternative that is commercially available and technically feasible for widespread use by 2045 for each sector. CARB assumes that any energy demand that remains after the alternative technology or fuel is applied—such as on-road internal combustion engines, industrial processes, and gas use in existing buildings that have not yet decarbonized—will continue to be met by fossil fuels, resulting in residual GHG emissions.

NWL Scoping Plan Alternatives

For the NWL sectors, staff significantly expanded the scale of the scientific analysis for NWL from previous Scoping Plan efforts. CARB staff utilized modeling tools for this expanded analysis to assess both the carbon and other ecological, public health, and economic outcomes of management actions on forests, shrublands, grasslands, croplands, developed lands, wetlands, and sparsely vegetated lands. CARB staff aligned the scenarios with both the landscape types and actions identified in other efforts called for in Governor Newsom's Executive Order N-82-20 (e.g., California's Climate Smart Strategy and Pathways to 30x30). As part of this Scoping Plan, CARB staff modeled as many of the management actions identified in the Natural and Working Lands Climate

Smart Strategy as were feasible. The management actions that were included in the model were selected because of the State of California's previous work to quantify these actions' impacts. It was not feasible to model every land management strategy for NWL, and so it is possible that larger volumes of sequestration (e.g., in soils or in oceans) could result from additional non-modeled activities. California's Natural and Working Lands Climate Smart Strategy includes a more comprehensive listing of priority nature-based solutions and management actions. It is important to note that the absence of a particular management action or its climate benefit in the modeling is not an indication of its importance or potential contributions toward meeting the target or toward supporting the carbon neutrality target for California.

Forests: Management strategies were modeled for forests: biological/chemical/herbaceous treatments (e.g., herbicide application), clearcut, various timber harvests (e.g., variable retention, seed tree / shelterwood, selection harvesting), mastication, other mechanical treatments (e.g., piling of dead material, understory thinning), prescribed burning, and thinning. Avoided land conversion to another land use was also included in the modeling. Wildfire was modeled and is responsive to management strategies and climate conditions.

Shrublands and chaparral: Management strategies were modeled for shrublands and chaparral: biological/chemical/herbaceous treatments, prescribed burning, mechanical treatment (e.g., mastication, crushing, mowing, piling), and avoided conversion from shrubland to another land use. Wildfire was modeled and is responsive to management strategies and climate conditions.

Grasslands: Management strategies were modeled for grasslands: biological/chemical/herbaceous treatments, prescribed burning, and avoided land conversion from grasslands to another land use. Wildfire was modeled and is responsive to management strategies and climate conditions.

Croplands: Management strategies were modeled for row crops: cover cropping, no till, reduced till, compost amendment, transition to organic[128] farming, avoided conversion of annual crop agricultural land through easements, establishing riparian forest buffers, alley cropping, establishing windbreaks/shelterbelts, establishing tree and shrubs in croplands, and establishing hedgerows. For perennial crops, windbreaks/shelterbelts, hedgerows, conversion from annual crops to perennial crops, and avoided conversion to other land uses were modeled.

[128] Note: N_2O reductions from decreases in synthetic fertilizer application in organic farming were not modeled.

Developed lands: Management strategies were modeled for developed lands: Increasing tree canopy cover through planting trees and improved management of existing trees, and removing vegetation surrounding structures in accordance with the CAL FIRE Defensible Space PRC 4291.

Wetlands: Management strategies were modeled for wetlands: Restoring wetlands through submerging cultivated land in the Sacramento-San Joaquin Delta and avoided land conversion in the Sacramento-San Joaquin Delta.

Sparsely vegetated lands: Management strategies were modeled for sparsely vegetated lands: Avoided conversion of sparsely vegetated lands to another land use.

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Scoping Plan Scenario

The Scoping Plan Scenario achieves GHG emission reductions that exceed the levels expected based on existing policies represented in the Reference Scenario, keeping California on track to achieve the SB 32 GHG reduction target for 2030 and become carbon neutral no later than 2045. Actions that reduce GHG emissions and transition AB 32 GHG Inventory sources away from fossil fuel combustion affect each economic sector. Actions that lead to improved carbon stocks affect each landscape.

AB 32 GHG Inventory Sectors

The AB 32 GHG Inventory Sector Reference scenario is the forecasted statewide GHG emissions through mid-century, with existing policies and programs but without any further action to reduce GHGs beyond those needed to achieve the 2030 limit. The Reference Scenario was developed based on other projections of business-as-usual conditions. Sources of data and policies included are:

- California Energy Demand Forecast[129]
- The two transportation carbon neutrality studies required by AB 74[130]
- The Mobile Source Strategy[131]
- SB 100 60 percent Renewables Portfolio Standard
- A Low Carbon Fuel Standard carbon intensity reduction target of 20 percent

Policies that are under study or design, such the Advanced Clean Fleets regulation, are not included. The Reference Scenario reflects current trends and expected performance of policies identified in the 2017 Scoping Plan—some of which are performing better (such as the RPS and LCFS) and others that may not meet expectations (such as vehicle miles traveled [VMT] reductions and methane capture). Figure 2-1 provides the modeling results for a Reference Scenario for the AB 32 GHG Inventory sectors compared to the Scoping Plan Scenario.

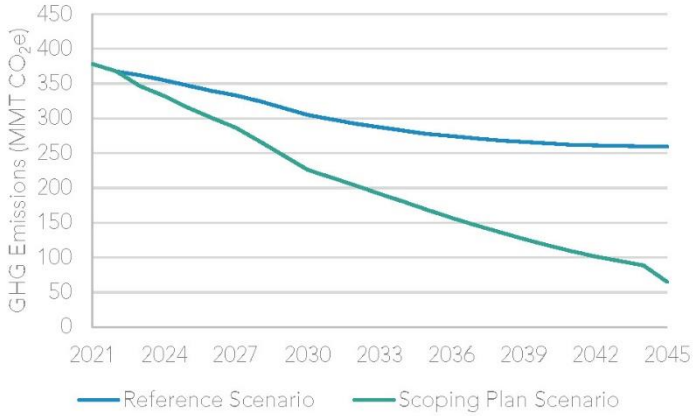
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[129] California Energy Commission (CEC). 2020. *2019 Integrated Energy Policy Report*. https://www.energy.ca.gov/data-reports/reports/integrated-energy-policy-report/2019-integrated-energy-policy-report.

[130] Brown et al. 2021. *Driving California's Transportation Emissions*. https://escholarship.org/uc/item/3np3p2t0 and Deschenes et al. 2021. *Enhancing equity*. https://zenodo.org/record/4707966#.YI72RNrMKUn.

[131] CARB. 2021. 2020 *Mobile Source Strategy*. https://ww2.arb.ca.gov/sites/default/files/2021-12/2020_Mobile_Source_Strategy.pdf.

Figure 2-1: Reference and Scoping Plan Scenario GHG emissions[132]



The Scoping Plan Scenario is summarized in Table 2-1. The table shows the types of technologies and energy needed to drastically reduce GHG emissions from the AB 32 Inventory sectors. It also includes references to relevant statutes and Executive Orders, although it is not comprehensive of all existing new authorities for directing or supporting the actions described. Each action is expected to both reduce GHGs and help improve air quality, primarily by transitioning away from combustion of fossil fuels. The Scoping Plan Scenario achieves the AB 1279 target of 85 percent below 1990 levels by 2045 and identifies a need to accelerate the 2030 target to 48 percent below 1990 levels.

[132] The drop in emissions in 2045 reflects both the need to achieve an 85% reduction below 1990 levels in anthropogenic emissions per AB 1279 and Governor Newsom's request for a 100 MMT CO2e carbon removal and capture target in 2045. This was modeled by extending CCS to electric sector emissions.

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Table 2-1: Actions for the Scoping Plan Scenario: AB 32 GHG Inventory sectors

Sector	Action	Statutes, Executive Orders, Other Direction, Outcome
GHG Emissions Reductions Relative to the SB 32 Target[133]	40% below 1990 levels by 2030	SB 32: Reduce statewide GHG emissions. AB 197: direct emissions reductions for sources covered by the AB 32 Inventory
Smart Growth / Vehicle Miles Traveled (VMT)	VMT per capita reduced 25% below 2019 levels by 2030, and 30% below 2019 levels by 2045	SB 375: Reduce demand for fossil transportation fuels and GHGs, and improve air quality. In response to Board direction and EJ Advisory Committee recommendations
Light-duty Vehicle (LDV) Zero Emission Vehicles (ZEVs)	100% of LDV sales are ZEV by 2035	EO N-79-20: Reduce demand for fossil transportation fuels and GHGs, and improve air quality. AB 197: direct emissions reductions for sources covered by the AB 32 Inventory 2035 target aligns with the EJ Advisory Committee recommendation.

[133] While the SB 32 GHG emissions reduction target is not an Action that is analyzed independently, it is included in this table for reference.

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Sector	Action	Statutes, Executive Orders, Other Direction, Outcome
Truck ZEVs	100% of medium-duty (MDV)/HDV sales are ZEV by 2040 (AB 74 University of California Institute of Transportation Studies [ITS] report)	EO N-79-20: Reduce demand for fossil transportation fuels and GHGs, and improve air quality. AB 197: direct emissions reductions for sources covered by the AB 32 Inventory
Aviation	20% of aviation fuel demand is met by electricity (batteries) or hydrogen (fuel cells) in 2045. Sustainable aviation fuel meets most or the rest of the aviation fuel demand that has not already transitioned to hydrogen or batteries.	Reduce demand for petroleum aviation fuel and reduce GHGs. AB 197: direct emissions reductions for sources covered by the AB 32 Inventory In response to Governor Newsom's July 2022 letter to CARB Chair Liane Randolph
Ocean-going Vessels (OGV)	2020 OGV At-Berth regulation fully implemented, with most OGVs utilizing shore power by 2027. 25% of OGVs utilize hydrogen fuel cell electric technology by 2045.	Reduce demand for petroleum fuels and GHGs, and improve air quality. AB 197: direct emissions reductions for sources covered by the AB 32 Inventory
Port Operations	100% of cargo handling equipment is zero-emission by 2037. 100% of drayage trucks are zero emission by 2035.	Executive Order N-79-20: Reduce demand for petroleum fuels and GHGs, and improve air quality. AB 197: direct emissions reductions for sources covered by the AB 32 Inventory

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Sector	Action	Statutes, Executive Orders, Other Direction, Outcome
Freight and Passenger Rail	100% of passenger and other locomotive sales are ZEV by 2030. 100% of line haul locomotive sales are ZEV by 2035. Line haul and passenger rail rely primarily on hydrogen fuel cell technology, and others primarily utilize electricity.	Reduce demand for petroleum fuels and GHGs, and improve air quality. AB 197: direct emissions reductions for sources covered by the AB 32 Inventory
Oil and Gas Extraction	Reduce oil and gas extraction operations in line with petroleum demand by 2045.	Reduce GHGs and improve air quality. AB 197: direct emissions reductions for sources covered by the AB 32 Inventory
Petroleum Refining	CCS on majority of operations by 2030, beginning in 2028 Production reduced in line with petroleum demand.	Reduce GHGs and improve air quality. AB 197: direct emissions reductions for sources covered by the AB 32 Inventory

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Sector	Action	Statutes, Executive Orders, Other Direction, Outcome
Electricity Generation	Sector GHG target of 38 million metric tons of carbon dioxide equivalent ($MMTCO_2e$) in 2030 and 30 $MMTCO_2e$ in 2035 Retail sales load coverage[134] 20 gigawatts (GW) of offshore wind by 2045 Meet increased demand for electrification without new fossil gas-fired resources.	SB 350 and SB 100: Reduce GHGs and improve air quality. AB 197: direct emissions reductions for sources covered by the AB 32 Inventory In response to Governor Newsom's July 2022 letter, Board direction, and EJ Advisory Committee recommendation
New Residential and Commercial Buildings	All electric appliances beginning 2026 (residential) and 2029 (commercial), contributing to 6 million heat pumps installed statewide by 2030	Reduce demand for fossil gas and GHGs, and improve ambient and indoor air quality. AB 197: direct emissions reductions for sources covered by the AB 32 Inventory In response to Governor Newsom's July 2022 letter

[134] SB 100 speaks only to retail sales and state agency procurement of electricity. The *2021 SB 100 Joint Agency Report* reflects the agency authors' understanding that other loads—wholesale or non-retail sales and losses from storage and transmission and distribution lines—are not subject to the law.

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Sector	Action	Statutes, Executive Orders, Other Direction, Outcome
Existing Residential Buildings	80% of appliance sales are electric by 2030 and 100% of appliance sales are electric by 2035. Appliances are replaced at end of life such that by 2030 there are 3 million all-electric and electric-ready homes—and by 2035, 7 million homes—as well as contributing to 6 million heat pumps installed statewide by 2030.	Reduce demand for fossil gas and GHGs, and improve ambient and indoor air quality. AB 197: direct emissions reductions for sources covered by the AB 32 Inventory In response to Governor Newsom's July 2022 letter
Existing Commercial Buildings	80% of appliance sales are electric by 2030, and 100% of appliance sales are electric by 2045. Appliances are replaced at end of life, contributing to 6 million heat pumps installed statewide by 2030.	Reduce demand for fossil gas and GHGs, and improve ambient and indoor air quality. AB 197: direct emissions reductions for sources covered by the AB 32 Inventory In response to Governor Newsom's July 2022 letter
Food Products	7.5% of energy demand electrified directly and/or indirectly by 2030; 75% by 2045	Reduce demand for fossil gas and GHGs, and improve air quality. AB 197: direct emissions reductions for sources covered by the AB 32 Inventory

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Sector	Action	Statutes, Executive Orders, Other Direction, Outcome
Construction Equipment	25% of energy demand electrified by 2030 and 75% electrified by 2045	Reduce demand for fossil energy and GHGs, and improve air quality. AB 197: direct emissions reductions for sources covered by the AB 32 Inventory
Chemicals and Allied Products; Pulp and Paper	Electrify 0% of boilers by 2030 and 100% of boilers by 2045. Hydrogen for 25% of process heat by 2035 and 100% by 2045 Electrify 100% of other energy demand by 2045.	Reduce demand for fossil energy and GHGs, and improve air quality. AB 197: direct emissions reductions for sources covered by the AB 32 Inventory
Stone, Clay, Glass, and Cement	CCS on 40% of operations by 2035 and on all facilities by 2045 Process emissions reduced through alternative materials and CCS	SB 596: Reduce demand for fossil energy, process emissions, and GHGs, and improve air quality. AB 197: direct emissions reductions for sources covered by the AB 32 Inventory
Other Industrial Manufacturing	0% energy demand electrified by 2030 and 50% by 2045	Reduce demand for fossil energy and GHGs, and improve air quality. AB 197: direct emissions reductions for sources covered by the AB 32 Inventory

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Sector	Action	Statutes, Executive Orders, Other Direction, Outcome
Combined Heat and Power	Facilities retire by 2040.	Reduce demand for fossil energy and GHGs, and improve air quality. AB 197: direct emissions reductions for sources covered by the AB 32 Inventory
Agriculture Energy Use	25% energy demand electrified by 2030 and 75% by 2045	Reduce demand for fossil energy and GHGs, and improve air quality. AB 197: direct emissions reductions
Low Carbon Fuels for Transportation	Biomass supply is used to produce conventional and advanced biofuels, as well as hydrogen.	Reduce demand for petroleum fuel and GHGs, and improve air quality. AB 197: direct emissions reductions for sources covered by the AB 32 Inventory
Low Carbon Fuels for Buildings and Industry	In 2030s biomethane[135] blended in pipeline Renewable hydrogen blended in fossil gas pipeline at 7% energy (~20% by volume), ramping up between 2030 and 2040 In 2030s, dedicated hydrogen pipelines constructed to serve certain industrial clusters	Reduce demand for fossil energy and GHGs, and improve air quality. AB 197: direct emissions reductions for sources covered by the AB 32 Inventory

[135] *Biomethane* is also known as renewable natural gas (RNG).

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Sector	Action	Statutes, Executive Orders, Other Direction, Outcome
Non-combustion Methane Emissions	Increase landfill and dairy digester methane capture. Some alternative manure management deployed for smaller dairies Moderate adoption of enteric strategies by 2030 Divert 75% of organic waste from landfills by 2025. Oil and gas fugitive methane emissions reduced 50% by 2030 and further reductions as infrastructure components retire in line with reduced fossil gas demand	SB 1383: Reduce short-lived climate pollutants.
High GWP Potential Emissions	Low GWP refrigerants introduced as building electrification increases, mitigating HFC emissions	SB 1383: Reduce short-lived climate pollutants.

Natural and Working Lands

The Reference Scenario for NWL represents the amount of land management that occurred between 2001 and 2014, and projects the outcomes from maintaining the 2001–2014 levels of land management until 2045. The management and land use practices that occur within the Reference Scenario were derived from empirical data used by staff. For forests, shrublands/chaparral, and grasslands, the Reference Scenario constitutes approximately 250,000 acres of annual statewide treatments. For croplands, the Reference Scenario represents no healthy soil practices because during this period the healthy soil program did not yet exist. For land use change within all land types that consider land use change, historical rates of land conversion from 2001–2014 also were taken from empirical data and modeled into the future for the Reference Scenario.

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Table 2-2 summarizes the Scoping Plan Scenario. The table also includes references to relevant statutes and Executive Orders where available.

Table 2-2: Actions for the Scoping Plan Scenario: NWL sectors

Sector	Action	Statutes, Executive Orders, Outcome
Natural and Working Lands	Conserve 30% of the state's NWL and coastal waters by 2030. Implement near- and long-term actions to accelerate natural removal of carbon and build climate resilience in our forests, wetlands, urban greenspaces, agricultural soils, and land conservation activities in ways that serve all communities—and in particular low-income, disadvantaged, and vulnerable communities.	EO N-82-20 and SB 27: CARB to include an NWL target in the Scoping Plan. AB 1757: Establish targets for carbon sequestration and nature-based climate solutions. SB 1386: NWL are an important strategy in meeting GHG reduction goals.

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Sector	Action	Statutes, Executive Orders, Outcome
Forests and Shrublands	At least 2.3 million acres[136] treated statewide annually in forests, shrublands/chaparral, and grasslands, comprised of regionally specific management strategies that include prescribed fire, thinning, harvesting, and other management actions. No land conversion of forests, shrublands/chaparral, or grasslands.	Restore health and resilience to overstocked forests and prevent carbon losses from severe wildfire, disease, and pests. Improve air quality and reduce health costs related to wildfire emissions. Improve water quantity and quality and improve rural economies. Provide forest biomass for resource utilization. EO B-52-18: CARB to increase the opportunity for using prescribed fire. AB 1504 (Skinner, Chapter 534, Statutes of 2010): CARB to recognize the role forests play in carbon sequestration and climate mitigation.

[136] The 2.3 million acre target is what the Scoping Plan modeling shows would be needed to realize the carbon stock target called for in this Scoping Plan by 2045.

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Sector	Action	Statutes, Executive Orders, Outcome
Grasslands	At least 2.3 million acres[137] treated includes increased management of grasslands interspersed in forests to reduce fuels surrounding communities using management strategies appropriate for grasslands. No land conversion of forests, shrublands/chaparral, or grasslands.	Help to achieve climate targets, improve air quality, and reduce health costs.
Croplands	Implement climate smart practices for annual and perennial crops on ~80,000 acres annually. Land easements/ conservation on annual crops at ~5,500 acres annually. Increase organic agriculture to 20% of all cultivated acres by 2045 (~65,000 acres annually).	Reduce short-lived climate pollutants. Increase soil water holding capacity. Increase organic farming and reduce pesticide use. SB 859: Recognizes the ability of healthy soils practices to reduce GHG emissions from agricultural lands. Target increased in response to Governor Newsom's direction to prioritize sustainable land management.

[137] The 2.3 million acre target is what the Scoping Plan modeling shows would be needed to realize the carbon stock target called for in this Scoping Plan by 2045.

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Sector	Action	Statutes, Executive Orders, Outcome
Developed Lands	Increase urban forestry investment by 200% above current levels and utilize tree watering that is 30% less sensitive to drought. Establish defensible space that accounts for property boundaries.	Increase urban tree canopy and shade cover. Reduce heat island effects and support water infrastructure. Reduce fire risk via defensible space. AB 2251 (Calderon, Chapter 186, Statutes of 2022): Increase urban tree canopy 10% by 2035. Target increased in response to AB 2251 and Governor Newsom's direction on CO_2 removal targets in his July 2022 letter.
Wetlands	Restore 60,000 acres of Delta wetlands.	Increase carbon sequestration and reduce short-lived climate pollutants. Helps to reverse land subsidence while improving flood protection and providing critical habitat.
Sparsely Vegetated Lands	Land conversion at 50% of the Reference Scenario land conversion rate.	Reduce the rate of land conversion to more GHG-intensive land uses.

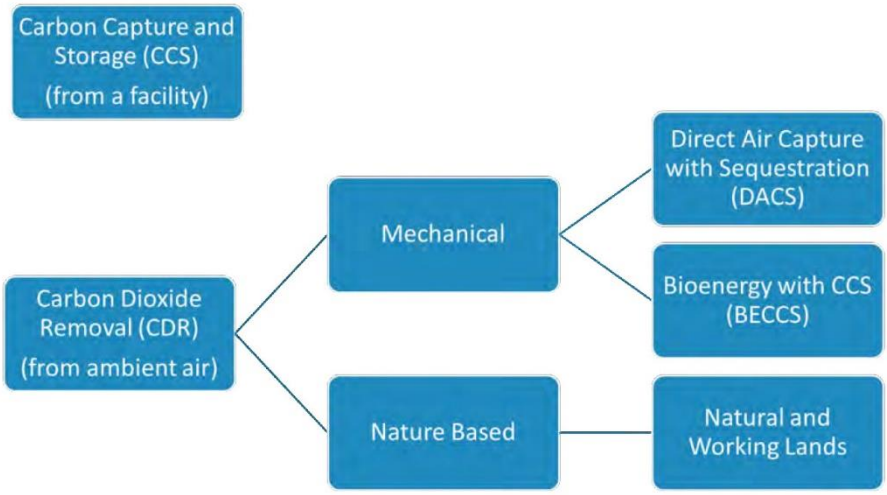
Strategies for Carbon Removal and Sequestration

To achieve carbon neutrality, any remaining emissions must be compensated for using carbon removal and sequestration tools. The following discussion presents more detail

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on the options available to capture and sequester carbon. Carbon removal and sequestration will be an essential tool to achieve carbon neutrality, and the modeling clearly shows there is no path to carbon neutrality without carbon removal and sequestration. Governor Newsom also recognized the importance of CO_2 removal strategies and directed CARB to establish CO_2 removal and carbon capture targets of 20 $MMTCO_2$ and 100 $MMTCO_2$ by 2030 and 2045, respectively, as well as signing 2022 legislation on carbon removal and sequestration, including: AB 1279, SB 905, SB 1137, and AB 1757. Carbon removal and sequestration can take different forms. Figure 2-2 illustrates the types of carbon removal and sequestration included in this Scoping Plan. There are numerous other carbon removal options undergoing research, development, and pilot deployment. As these options mature and new approaches emerge, they can be considered in future Scoping Plan updates.

Figure 2-2: Forms of carbon removal and sequestration considered in this Scoping Plan



The Role of Carbon Capture and Sequestration

Carbon capture and sequestration (CCS) will be a necessary tool to reduce GHG emissions and mitigate climate change while minimizing leakage and minimizing emissions where no technological alternatives may exist. CCS is a process by which large amounts of CO_2 are captured, compressed, transported, and sequestered. CCS projects are paired with a source of emissions, as the CCS project captures CO_2 as it leaves a facility's smokestack. CCS projects are often paired with large GHG-emitting facilities such as energy, manufacturing, or fuel production facilities. The sequestration component

of CCS includes CO_2 injection into geologic formations (such as depleted oil and gas reservoirs and saline formations), as well as use in industrial materials (e.g., concrete). CCS is distinct from biological sequestration, which is typically accomplished through NWL management and conservation practices that enhance the storage of carbon or reduce CO_2 emissions with nature-based approaches. CCS is also distinct from mechanical CO_2 removal technologies, where CO_2 is removed directly from the atmosphere using mechanical and/or chemical processes.

CARB adopted a CCS Protocol in 2018 as part of amendments to the Low Carbon Fuel Standard.[138] At this time, no CCS projects have been implemented or have generated any credits under that protocol. However, CCS projects have been implemented elsewhere since the 1970s, largely on coal-fired power plants, with over two dozen projects operational around the world. Over 100 are at the stages of advanced or early development and are expanding beyond coal-fired plants to fossil gas, fuel production, and electricity generation facilities.[139] CCS projects are in development for addressing emissions from fuel, gas, energy production, and chemical production. As of November 2019, more than half of global large-scale CCS facilities (representing approximately 22 $MMTCO_2$/yr in capacity[140]) were in the U.S., mostly as a result of sustained governmental support for these technologies.[141] This support includes the federal 45Q tax credit for CCS[142,143] and research and deployment grants from federal agencies.[144,145] California's deep sedimentary rock formations in the Central Valley represent world-class

[138] CARB. 2022. Carbon Capture & Sequestration. https://ww2.arb.ca.gov/our-work/programs/carbon-capture-sequestration.
[139] Global CCS Institute. 2021. *Global Status of CCS 2021*. https://www.globalccsinstitute.com/wp-content/uploads/2021/11/Global-Status-of-CCS-2021-Global-CCS-Institute-1121.pdf.
[140] IHS Markit. August 2021. Carbon Removal Potential: An Overview. https://ww2.arb.ca.gov/sites/default/files/2021-08/ihsmarkit_presentation_sp_engineeredcarbonremoval_august2021.pdf.
[141] Beck, Lee. 2019. *Carbon capture and storage in the USA: The role of US innovation leadership in climate-technology commercialization*. https://academic.oup.com/ce/article/4/1/2/5686277.
[142] Congressional Research Service. 2021. Carbon Storage Requirements in the 45Q Tax Credit. IF11639. https://crsreports.congress.gov/product/pdf/IF/IF11639.
[143] The Inflation Reduction Act of August 2022 expands and enhances the 45 Q tax credit for CCS. Pub.L. No. 117-169 (August 16, 2022).
[144] U.S. Department of Energy. 2020. U.S. Department of Energy Announces $131 Million for CCUS Technologies. https://www.energy.gov/articles/us-department-energy-announces-131-million-ccus-technologies.
[145] U.S. Department of Energy. 2021. Funding Opportunity Announcement 2515, Carbon Capture R&D for Natural Gas and Industrial Point Sources, and Front-End Engineering Design Studies for Carbon Capture Systems at Industrial Facilities and Natural Gas Plants. https://www.energy.gov/fecm/articles/funding-opportunity-announcement-2515-carbon-capture-rd-natural-gas-and-industrial.

CO_2 storage sites that would meet the highest standards, with storage capacities of at least 17 billion tons of CO_2.[146,147]

In this Scoping Plan, CCS is included to address emissions from limited sectors, including electricity generation, cement production facilities, and refineries, to ensure anthropogenic emissions are reduced by at least 85 percent below 1990 levels in 2045, as directed in AB 1279. While the modeling outputs show CCS not being applied to the electricity sector until 2045, CCS could be implemented earlier on the electricity sector with a similar ramp up over time as that for refineries and cement plants. An earlier application of CCS in the electricity sector would yield additional reductions in years prior to 2045. In addition, CCS can support hydrogen production until such time as there is sufficient renewable power for electrolysis and an abundant water source.

Cement plants have emissions associated with combustion and process-related activities. Combustion emissions account for approximately 40 percent of the total emissions at cement plants. The remaining emissions are related to process-related activities. Due to the high heat content needed to produce cement, there is currently no technically feasible alternative to combustion. SB 596 calls for a 40 percent reduction in GHG intensity in cement emissions from 2019 levels by 2035, and then net zero emissions by 2045. To meet in-state demand, the state relies on cement both produced in state and imported. There are seven cement plants operating in California.[148] To minimize emissions leakage and address emissions from cement plants, the Scoping Plan Scenario includes CCS for cement plants. Additional reductions will need to be pursued and considered as part of implementation of SB 596, which calls for CARB to develop a comprehensive strategy by July 1, 2023, for the state's cement sector to achieve net-zero emissions of GHGs associated with cement used within the state as soon as possible, but no later than December 31, 2045. This effort began in the summer of 2022 and included sector specific workshops.

Even with implementation of EO N-79-20, and despite all of the ambitious efforts in the Scoping Plan Scenario, there will remain some demand for petroleum fuels for legacy vehicles on road applications, and in aviation, rail, and marine applications. Petroleum refineries will need to implement technology to decarbonize their operations and reduce their emissions. This Scoping Plan also assumes CCS at petroleum refineries as one of those potential strategies. Currently, there are seventeen petroleum refineries operating

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[146] For comparison purposes, California's emitted 418.2 million metric tons of CO_2e in 2019.
[147] Lawrence Livermore National Laboratory. 2020. *Getting to Neutral: Options for Negative Carbon Emissions in California.* Revision 1. https://www-gs.llnl.gov/content/assets/docs/energy/Getting_to_Neutral.pdf.
[148] CARB. Mandatory GHG Reporting – Reported Emissions. https://ww2.arb.ca.gov/mrr-data

in the state.[149] On the supply side, the modeling assumes all in-state demand is met through some very limited refining activities in California. Figure 2-3 shows the emissions from the refining sector with and without CCS. If CCS is not deployed, the emissions would be directly emitted into the atmosphere, and CO_2 removal by NWL or direct air capture would need to increase to compensate for the sector's emissions.

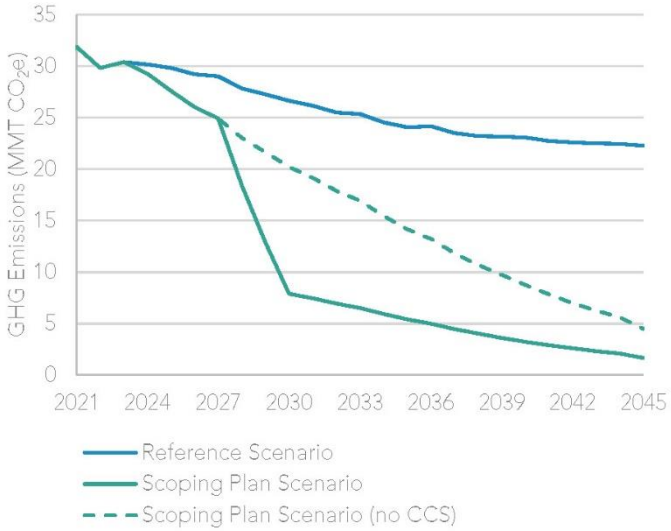
Refineries can have a variety of point sources that emit CO_2—such as steam methane reformers for producing hydrogen, combined heat and power units, and catalytic crackers—that are best suited for CCS. Each configuration of a refinery can be unique to its footprint, onsite operations, and the types of crude oils processed. There are newer technologies with smaller footprints[150] that can be deployed in modular configurations to capture CO_2 in space-constrained and multiple-point-source facilities such as refineries. CCS can provide a path to reducing GHG emissions from these facilities to meet petroleum demand while avoiding leakage and until such time as some refineries can be transitioned to produce clean energy to support the transition away from fossil fuels.

While the Scoping Plan modeled deployment of CCS on refineries and identifies significant emissions reductions that can be achieved, the refineries in California are large and complex. The actual deployment of CCS at these facilities as modeled in the Scoping Plan is uncertain. It will be important to closely monitor the evolution of CCS deployment in the refinery sector and, in the next Scoping Plan update, to evaluate the progress toward use in this sector to determine whether the projected reductions will be achieved.

[149] CARB. Mandatory GHG Reporting. https://ww2.arb.ca.gov/mrr-data.
[150] Carbon Clean. Modular Carbon Capture Systems for Industry. https://www.carbonclean.com/modular-systems?hsLang=en.

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Figure 2-3: Petroleum refining emissions with and without carbon capture and sequestration



This Scoping Plan also calls for accelerating the transition from combustion of fossil fuels to hydrogen. Hydrogen can be produced through electrolysis with renewable electricity or through steam methane reformation of biomethane. There is a high degree of uncertainty around the availability of solar to support both electrification of existing sectors and the production of hydrogen through electrolysis. Producing hydrogen required under the Scoping Plan Scenario with electrolysis would require about 10 gigawatts (GW)[151] of additional solar capacity. If steam methane reformation is paired with CCS, the hydrogen produced could potentially be low carbon. Additionally, the biomethane used to generate hydrogen could be sourced from gasification of forest or agricultural waste resulting from forest management and other NWL management practices, which could also lead to net negative carbon outcomes. Steam methane reformation paired with CCS can thus ensure a rapid transition to hydrogen and increase hydrogen availability until such time as

[151] The Draft Scoping Plan included an estimate for solar capacity (40 GW) to support only electrolysis to produce all hydrogen in the Proposed Scenario. The Scoping Plan now includes steam methane reformation of biomethane and biomass gasification with CCS to produce hydrogen, along with electrolysis from off-grid solar. See Appendix H (AB 32 GHG Inventory Sector Modeling) for additional details.

electrolysis with renewables can meet the ongoing need, assuming there is also sufficient water supply. Additional background and next steps for CCS can be found in Chapter 4.

The EJ Advisory Committee has raised multiple concerns related to the inclusion of CCS and mechanical CDR in the Scoping Plan. Concerns range from potential negative health and air quality impacts in communities from operation of facilities utilizing CCS that continue to emit other emissions, to safety concerns related to potential leaks, to the viability of the current technology. Additionally, the EJ Advisory Committee has policy concerns about the strategy and wants to ensure that engineered carbon removal is not used as a substitute for strategies to achieve emissions reductions onsite and that it does not result in delays in phasing out fossil fuel use. Given these and other concerns and the importance of building public awareness, CARB recognizes the need for a multi-stakeholder process including other state, federal, and local agencies; tribes; independent experts; and community residents to further understand and address community concerns related to CCS. CARB hosted a CCS Symposium with U.S. EPA Region 9 and the Stanford Doerr School of Sustainability to discuss some of these critical issues with community members and other participants. As CARB begins the process of implementing SB 905 in 2023, that will provide an opportunity for further engagement.

In the context of CCS deployment, the Council of Environmental Quality (CEQ) also highlighted the need to further assess and quantify potential impacts on local criteria air pollutants and other emissions resulting from carbon capture retrofits at industrial facilities in response to concerns regarding potential cumulative emissions from single and/or multiple sources.[152] An October 2020 Stanford report[153] discussed how the potential post-combustion capture for CO_2 could also reduce emissions of criteria air pollutant emissions from certain facilities. Exploring these potential outcomes will be important to ensure deployment of CCS does not exacerbate air pollution impacts in communities and maximizes any air pollution benefits. The need for these types of evaluations is also included in SB 905.

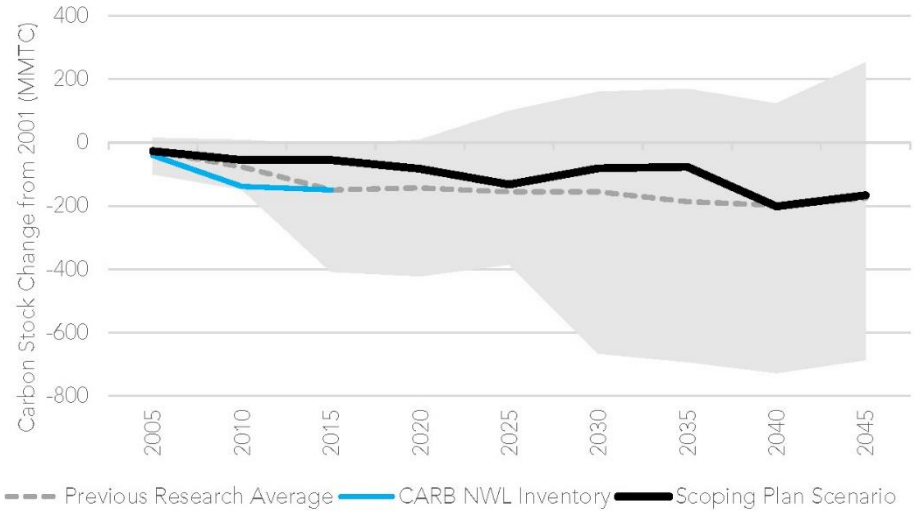
The Role of Natural and Working Lands Emissions and Sequestration

California's NWL assessments highlight the importance of increasing the pace and scale of NWL actions to ensure that our ecosystems are better equipped to withstand future climate change so they continue to provide the benefits that nature and society depend

[152] Carbon Capture, Utilization, and Sequestration Guidance. 87 Fed. Reg. 8808 (Feb. 16, 2022), 2022-03205.pdf (govinfo.gov).
[153] Stanford Center for Carbon Storage. 2020. *An Action Plan for Carbon Capture and Storage in California: Opportunities, Challenges, and Solutions*. October. https://sccs.stanford.edu/ccs-in-ca/full-report-form?msclkid=6f9177f6c57811ecbebc473e75203b21.

upon for survival. As climate change increases the likelihood of extreme wildfires, drought, heat, and other impacts, carbon stocks in California's NWL will face increased risks and impacts. We know from previous climate change and Scoping Plan work[154] that lands can be a net source of GHG emissions or a net sink, and that the magnitude of carbon stock changes and GHG emissions and sequestration from NWL are dependent on the effects of climate change and land management. The expanded modeling conducted for this Scoping Plan shows that NWL are projected to be a net source of emissions through 2045 and indicates a probable decrease of carbon stocks into the future. This projection is further corroborated by previous, independent research that has reached the same conclusion, showing a range of varying levels of carbon stock loss. Figure 2-4 shows the modeling results of the Scoping Plan Scenario overlaid with the NWL inventory and findings from independent research.

Figure 2-4: Comparison of the Scoping Plan Scenario (NWL) with existing research



The modeling indicates that immediate and aggressive climate action can reduce the environmental impacts that would occur in the absence of this action. The results of the modeling demonstrate that regular NWL management over the next two decades can

[154] CARB. 2019. January 2019. *Draft California 2030 Natural and Working Lands Climate Change Implementation Plan.* https://ww2.arb.ca.gov/sites/default/files/2020-10/draft-nwl-ip-040419.pdf.

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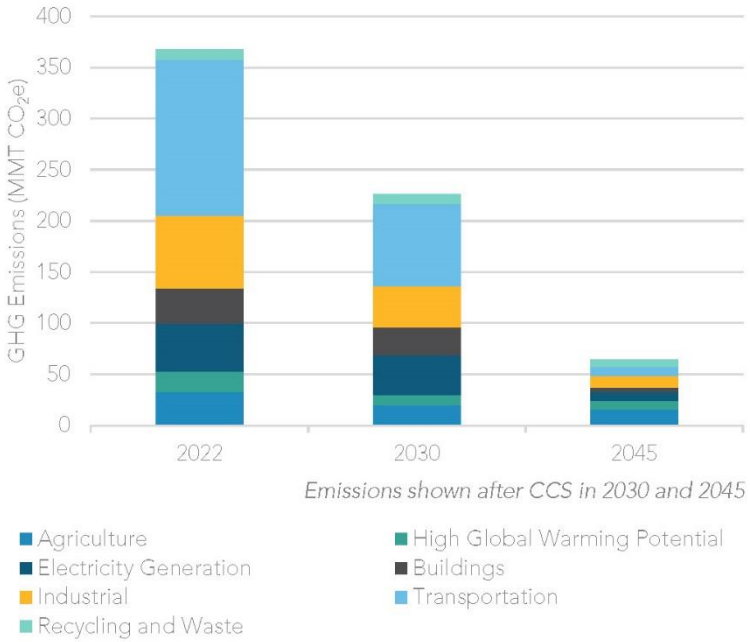
increase carbon stocks from the Reference Scenario trajectory, reduce GHG emissions from lands, and improve ecosystem and public health. This effort is the most comprehensive scientific effort taken by any government to include NWL within its overall climate strategy. Even so, we know that uncertainty exists about future climate and economic forces and the impacts they may have on our ecosystems, so it is important that the state take decisive and aggressive action to improve and diversify ecosystem structures and management.

The effects of climate change, including increased drought, wildfire, and extreme heat, play a significant role in determining the future of California's carbon stocks. And while management actions will help to reduce the impact that climate change will have on California, it is clear from the analysis that NWL sinks and sources are highly variable from year to year, and short time frames do not adequately demonstrate the impact that climate and management are having on ecosystems. For the purposes of climate planning, therefore, it is best to focus on carbon stock changes over longer periods rather than focusing on sequestration or emissions on shorter time frames. The Scoping Plan Scenario is estimated to result in additional NWL emissions of 7 million metric tons of carbon dioxide equivalent ($MMTCO_2e$) annually from 2025–2045. The Reference Scenario is estimated to result in annual emissions of 9 $MMTCO_2e$ over the same time period, and so the Scoping Plan Scenario slows the rate of emissions and provides an approximate 2 $MMTCO_2e$ in additional annual sequestration relative to the Reference Scenario. Because NWL are projected to be a net emissions source, the annual NWL emissions of approximately 7 $MMTCO_2e$ from the Scoping Plan Scenario will need to be compensated by additional CO_2 removal approaches to ensure California can achieve carbon neutrality by 2045.

The Role for Carbon Dioxide Removal (Direct Air Capture)

Even if anthropogenic emissions are reduced to at least 85 percent below 1990 levels by 2045 as called for by AB 1279, there will still be residual emissions in the AB 32 GHG Inventory sectors in 2045 that must be addressed in order to achieve the California's carbon neutrality target. Figure 2-5 includes the emissions by sector for the AB 32 GHG Inventory Sectors in 2022, 2030, and 2045 for the Scoping Plan Scenario.

Figure 2-5: Residual emissions in 2022, 2030, and 2045 for the Scoping Plan Scenario[155]



To achieve carbon neutrality, mechanical CDR will therefore need to be deployed. Because NWL management is not estimated to be a significant carbon removal path in the near term, additional CDR options will be needed. ***Mechanical CDR*** refers to a range of technologies that capture and concentrate ambient CO_2. Direct air capture (DAC) is one available option that is under development today and could be widely deployed. Note that, unlike CCS, DAC technologies are not designed to be attached to a specific source or smokestack. These technologies include chemical scrubbing processes that capture CO_2 through absorption or adsorption separation processes. Another carbon removal

[155] The High GWP sector includes high global warming potential gas emissions from releases of ozone depleting substance (ODS) substitutes, SF_6 emissions from the electricity transmission and distribution system, and gases that are emitted in the semiconductor manufacturing process. ODS substitutes, which are primarily hydrofluorocarbons (HFCs), are used in refrigeration and air conditioning equipment, solvent cleaning, foam production, fire retardants, and aerosols.

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option that involves rapid mineralization of CO_2 at the Earth's surface is called ***mineral carbonation***.[156] As is the case with CCS, mechanical CDR technologies will need governmental or other incentive support to overcome technology and market barriers. In the United States, the U.S. Department of Energy announced financing specifically for DAC in March 2020[157] and March 2021.[158] Additionally, almost $9 billion in CCS support was included in the $ 1 trillion Infrastructure Investment and Jobs Act of 2021.[159] This includes funding to establish four DAC hubs. The Inflation Reduction Act of 2022[160] increases the value of the 45Q tax credit to USD 85 per metric ton of CO_2 captured and stored in geologic formations from some industrial applications and USD 180 per metric ton for DAC with storage in geologic formations. In 2021, there were approximately 19 DAC facilities globally.[161]

Ultimately, the role for mechanical CDR will depend on the success of reducing emissions directly at the source in the AB 32 GHG Inventory sectors and the ability of the NWL to sequester carbon. However, mechanical CDR also provides an opportunity to not just achieve carbon neutrality, but also remove legacy GHG emissions from the atmosphere. As such, increased deployment of DAC can help achieve net negative emissions. This would further help avoid the most damaging impacts of climate change. While the federal incentives for DAC provide some support for this technology, the only California program that recognizes this technology is the LCFS program. Permitting must also happen across different levels of government and across multiple state agencies. Energy availability must also be addressed if DAC is to be implemented in remote areas. Additional information and next steps on DAC can be found in Chapter 4.

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[156] The National Academies Press. 2018. Direct Air Capture and Mineral Carbonation Approaches for Carbon Dioxide Removal and Reliable Sequestration: Proceedings of a Workshop–in Brief. https://nap.nationalacademies.org/catalog/25132/direct-air-capture-and-mineral-carbonation-approaches-for-carbon-dioxide-removal-and-reliable-sequestration#:~:text=National%20Academies%20of%20Sciences%2C%20Engineering%2C%20and%20Medicine%3B%20Division,concentrate%20carbon%20dioxide%20%28CO%202%29%20from%20ambient%20air.

[157] U.S. Department of Energy. 2020. Department of Energy to Provide $22 Million for Research on Capturing Carbon Dioxide from Air. https://www.energy.gov/articles/department-energy-provide-22-million-research-capturing-carbon-dioxide-air.

[158] U.S. Department of Energy. 2021. DOE Invests $24 Million to Advance Transformational Air Pollution Capture. https://www.energy.gov/articles/doe-invests-24-million-advance-transformational-air-pollution-capture.

[159] Pub.L. No. 117-58 (November 15, 2021). https://www.congress.gov/bill/117th-congress/house-bill/3684/text.

[160] Pub.L. No. 117-169 (August 16, 2022). https://www.congress.gov/bill/117th-congress/house-bill/5376/text.

[161] International Energy Agency (IEA). 2022. Direct Air Capture – Analysis. https://www.iea.org/reports/direct-air-capture.

Carbon Dioxide Removal and Capture Targets for 2030 and 2045

Recognizing the importance of CO_2 removal, Governor Newsom and the Legislature identified the need for targets to send policy and regulatory signals to pilot, deploy, and scale action for those efforts. Governor Newsom requested that CARB set a CO_2 removal and capture target of 20 MMT for 2030 and 100 MMT for 2045, first prioritizing sequestration in NWL. And while this Scoping Plan prioritizes and recommends significant increased climate-smart action on all NWL to support carbon neutrality and healthy and resilient lands, the modeling indicates that, across all NWL, lands will be a net source of emissions when accounting for both carbon sequestration and GHG (CO_2, CH_4, and N_2O) emissions from lands.

Some landscapes, however, are projected to have a net increase in carbon stocks under the Scoping Plan Scenario between 2025 and 2045 relative to the reference case, indicating that NWL actions can help California achieve Governor Newsom's CO_2 removal targets. Carbon stocks in urban forests and grasslands are projected to increase relative to historical levels from implementation of the 2022 Scoping Plan. To support the governor's CO_2 removal targets, CARB estimates that lands would contribute an average of 1.5 MMT of CO_2 removals each year between 2025 and 2045. Any carbon sequestration contributions from lands need to reflect both long-term storage and an overall net increase in carbon stocks over time to ensure these NWL actions are contributing toward California's achievement and maintenance of carbon neutrality over time.

CARB will work to update and revise these estimates as part of implementation of AB 1757, which was signed by the governor in September 2022 and requires that CARB and the California Natural Resources Agency (CNRA) work with an expert advisory committee to determine an ambitious range of carbon sequestration targets by January 1, 2024, for the years 2030, 2038, and 2045.

For the AB 32 GHG Inventory sectors, the Scoping Plan Scenario modeling indicates that the scenario would meet or exceed the 2030 SB 32 target through GHG reduction policies without the need for CDR. CDR will, however, be necessary to increase ambition for an accelerated 2030 target and in increasing amounts over the following decades to achieve carbon neutrality by 2045.[162] Given the likelihood of NWL to be a net source of emissions, and the need for CDR to compensate for residual emissions to achieve carbon neutrality

[162] The modeled scenarios assume that residual emissions will be compensated using DAC technologies by including the direct cost in terms of dollars per ton CO_2 removed. The energy source for DAC is not modeled, but renewable electricity and/or hydrogen produced from electrolysis are zero carbon options consistent with the carbon neutrality targets in this Scoping Plan.

by 2045, California will need increasing deployment of mechanical CDR over the coming decades. In the immediate future, scaling nature-based CDR approaches also can help to provide some CO_2 removal quickly while mechanical CDR is scaled up between now and 2045. Table 2-3 provides estimates of CO_2 removal and capture needed in 2030[163] and 2045.

[163] As identified in Chapter 1, SB 27 (Skinner, Chapter 237, Statues of 2021) directed CARB to "establish carbon dioxide removal targets for 2030 and beyond" as part of this Scoping Plan. CARB is establishing these targets to satisfy both the requirements of SB 27 and the directive from Governor Newsom to establish CO_2 removal targets for 2030 and 2045.

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Table 2-3: GHG emissions and removals needed to achieve carbon neutrality and meet the 20 $MMTCO_2$ removal and capture target in 2030 and the 100 $MMTCO_2$ removal and capture target in 2045.[164]

	2030 ($MMTCO_2e$)	2045 ($MMTCO_2e$)
GHG Emissions	233	72
AB 32 GHG Inventory Sector Emissions	226	65
Net NWL GHG Emissions Across All Landscapes (annual average from 2025–2045)	7	7
Carbon Capture and Sequestration (CCS): Avoided GHG Emissions from Industry and Electric Sectors	(13)	(25)
Carbon Dioxide Removal (CDR) including natural and working lands carbon sequestration,[165] Direct Air Capture, and Bioenergy with CCS (BECCS).	(7)	(75)
Net Emissions (GHG Emissions + CDR)	226	(3)

In 2030, the CO_2 removal and capture target is 20 MMT, but because the SB 32 target only encompasses the AB 32 GHG Inventory sectors, only CCS that reduces GHG emissions on AB 32 sources count toward achieving more ambitious GHG emission reductions in 2030. In 2045, the CO_2 removal and capture must compensate for any residual emissions from the AB 32 Inventory sectors and NWL emissions to support achieving carbon neutrality while also totaling at least 100 MMT. It is important to note that NWL, particularly forests, need a natural wildfire cycle to remain healthy. While the modeling projected wildfires, and implementing the Scoping Plan will result in a reduction in future wildfire emissions, getting to zero wildfires in the sector is not the goal, nor the

[164] Modeled estimates from the Scoping Plan Scenario indicate the relative quantity of emissions and removals to achieve carbon neutrality and meet carbon removal and capture targets. These estimates are not intended to imply precision, as the required policies are yet to be implemented and all models have some uncertainty in their forecasts.

[165] For the purposes of quantifying how to achieve the governor's 20 MMT and 100 MMT CO_2 removal and capture target, CARB included 1.5 $MMTCO_2e$ sequestration from NWL, which is the sequestration from urban forests. This is included as CO_2 removal because it is this sequestration that CARB can consider as having some permanence. Permanence is necessary for incorporating NWL into carbon neutrality. The net NWL emissions of 7 $MMTCO_2e$, identified in the second row of Table 2-3, includes *all* emissions and sinks from all NWL landscapes, which is inclusive of the 1.5 $MMTCO_2e$ sequestration. CARB will develop an accounting framework to accommodate NWL carbon stocks.

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right approach to a sustainable forestry sector. In contrast in 2045, the reductions from programs and policies are estimated to reduce emissions by 169 $MMTCO_2e$ from business as usual.

The 2030 target for engineered CDR also provides a near term milestone for California and can serve as an important marker for progress in deploying CDR to support California's carbon neutrality goal. Preliminary estimates indicate that, globally, capacity from already announced projects will range from about 2 million metric tons per year ($MMTCO_2/y$) to 8 $MMTCO_2/y$ from bioenergy paired with CCS, and from about 2,000 metric tons per year ($MTCO_2/y$) to 1 $MMTCO_2/y$ from DACs by 2027,[166] which indicates that California's 2030 target is an ambitious, but achievable, goal.

Scenario Uncertainty

Greenhouse Gas Emissions Modeling

Several types of uncertainty are important to understand in both forecasting future emissions and estimating the benefits of emission reduction actions. In developing this Scoping Plan we forecasted a reference scenario and estimated the GHG emissions outcome of the AB 32 GHG Inventory sectors using the PATHWAYS[167] model. Inherent in the reference scenario modeling is the expectation that many of the existing programs will continue in their current form, and that the expected drivers for GHG emissions, such as energy demand, population growth, and economic growth, will match our current projections.

However, there is also the expectation that each of the policies included and implemented to achieve the 2030 target in the 2017 Scoping Plan will deliver their exact outcomes. It is unlikely the future will precisely match our projections, and this will lead to uncertainty in the forecast. For example, we never could have foreseen and forecasted economic and emissions impacts related to the extended disruptions from the COVID-19 pandemic. Thus, the single "reference" or "forecast" line should be understood to represent one possible future in a range of possible predictions. For this Scoping Plan, PATHWAYS utilized inputs that reflect technically feasible levels of deployment or adoption of low- or zero-carbon fuels and technologies. Each of the input assumptions provided to PATHWAYS has some uncertainty, which also contributes to uncertainty in the resulting reference scenario.

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[166] IHS Markit. August 2021. Carbon Removal Potential. https://ww2.arb.ca.gov/sites/default/files/2021-08/ihsmarkit_presentation_sp_engineeredcarbonremoval_august2021.pdf.
[167] See Appendix H (AB 32 GHG Inventory Sector Modeling).

Similarly, for the NWL modeling, CARB used a mix of individual modeling tools[168] to estimate the carbon and other ecological, public health, and economic outcomes. The Reference scenario assumes that the level of land management actions that occurred between 2001 and 2014 for forests, shrublands, grasslands, croplands, developed lands, wetlands, and sparsely vegetated lands continues into the future. Alternative scenarios assessed the effect of increasing levels of management actions from the reference scenario beginning in 2025. There is a great deal of uncertainty about exactly how lands are currently managed, and a larger uncertainty about how they may be managed in the future. For NWL, it is unlikely that the future will precisely match the carbon stock outcomes CARB has projected, particularly given the uncertainties around current and future land management and the effects climate change will have on our lands. For any modeling exercise these uncertainties exist; however, this modeling effort brings together the best available science, data, and models to quantify the impact our actions may have on the landscape under an unknown future.

Implementation

As this Scoping Plan is designed to chart a path to achieving carbon neutrality, additional work will be required to fully design and implement any policies and actions identified in this plan. During the subsequent development of policies, the Legislature, CARB, and other state agencies will learn more about the technologies and their costs, as well as how each industry works, as a more comprehensive evaluation is conducted in coordination with stakeholders, including community engagement. Significant areas of uncertainty include permitting wait times[169] and local ordinances that might limit or slow the build-out of utility scale renewables.[170,171] In another example, times to reach commercial operations for solar projects after securing an interconnection agreement also have increased in recent years, to 3.5 to 5.5 years.[172]

The level of natural and working lands climate action identified in this Scoping Plan is ambitious. Achieving the level of action needed to result in the quantified carbon,

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[168] See Appendix I (Natural and Working Lands Technical Support Document).
[169] CEC. 2021. *SB 100 Joint Agency Report*. https://www.energy.ca.gov/sb100#anchor_report.
[170] Roth, Sammy. 2019. "California's San Bernardino County slams the brakes on big solar projects." *Los Angeles Times*. https://www.latimes.com/business/la-fi-san-bernardino-solar-renewable-energy-20190228-story.html?fbclid=IwAR2gHGg3bahHme6SFErLsnyFi9UPlfBHIhvnOh3dU3OM7kUTMcEgYfN3pQA.
[171] Chediak, Mark. 2021. "California NIMBYs Threaten Biden's Clean Energy Goals." *BNN Bloomberg*. https://www.bnnbloomberg.ca/california-nimbys-threaten-biden-s-clean-energy-goals-1.1634351?msclkid=668c9ae9c11311ec92e34035ea157ad4.
[172] Rand, Joseph, et al. 2022. Queued Up: Characteristics of Power Plants Seeking Transmission Interconnection as of the End of 2021. Power Point Presentation. Lawrence Berkeley National Laboratory. https://emp.lbl.gov/sites/default/files/queued_up_2021_04-13-2022.pdf.

emissions, health, and economic outcomes within this Scoping Plan requires coordination, investment, and partnerships across all levels of government and sectors of the economy. It is possible that not all of the actions at the identified level will begin in 2025. This uncertainty will result in diminished levels of beneficial outcomes quantified in the Scoping Plan Scenario. The levels of NWL action identified in this Scoping Plan represent CARB's assessment of the pace and scale of action needed to achieve the carbon stock targets and CO_2 removal targets identified in this Scoping Plan.

The Scoping Plan Scenario identifies that 2.3 million acres of forests, shrubland, and grassland management annually would achieve substantial levels of fire emissions reductions and the concomitant health and economics benefits. Currently, 1 million acres of forest treatment annually is the joint federal and state government goal (500,000 acres each). This target of one million acres annually by 2025 is for the purposes of increasing forest health and wildfire resilience in the near term, whereas the 2.3 million acre target is what the Scoping Plan modeling shows would be needed to realize the carbon stock target called for in this Scoping Plan by 2045. By identifying 2.3 million acres of climate action annually in forests, shrublands, and grasslands, this Scoping Plan emphasizes the importance of that 1 million acre annual goal as a milestone on the way to even more action and improved fire and air quality outcomes. The modeling indicates that substantial improvements to statewide fire emissions will occur at levels of action greater than 1 million acres per year. If these levels of action do not occur starting in 2025, the Scoping Plan has quantified climate benefits that will still occur, but to a lesser extent. In terms of fire emissions, compared to the Reference Scenario, 2.3 million acres of forest, shrubland and grassland management will result in a 10% reduction in wildfire emissions. At 1 million acres per year, this decreases to a 2.5% reduction. If 1 million acres per year is also not accomplished, then the emissions and health benefits are even lower.

Climate action in other NWL sectors also generates many co-benefits. Climate action identified in this Scoping Plan is aimed at not only fighting climate change but also improving air quality and public health. The climate action identified in the agricultural sector, for example, should result in decreased pesticide and synthetic fertilizer use. This decrease of synthetic chemical use in agriculture across California also should result in improved public health, especially for communities that work and live in and around agricultural lands. However, as with the forestry sector, the benefits of climate action in agricultural lands and in any other land are dependent on how much implementation takes place. Ramping up increased healthy soils practices and increasing organic agriculture in California will require continued and sustained implementation by private industry and public agencies. For example, achieving the carbon stock outcomes for the annual crops called for in this Scoping Plan would require deployment and maintenance of healthy soils practices on 80,000 additional acres of croplands in California every year between 2025 and 2045. For context, CDFA's Healthy Soils Program, which is an incentive program

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supporting healthy soils practices, took almost four years of sustained funding to achieve approximately 50,000 acres total under healthy soils practices.[173]

Given the uncertainty around the modeling assumptions, and performance uncertainty as specific policies are fully designed and implemented, estimates associated with the Scoping Plan Scenario are certain to be different than what is ultimately implemented. One way to mitigate for this is to develop policies that can adapt and increase certainty in GHG emissions reductions. Periodic reviews of progress toward achieving the 2030 target and longer term deeper decarbonization, as well as performance of specific policies, also provide opportunities for the state to consider any changes to ensure we remain on course to achieve the 2030 target and carbon neutrality. The need for this periodic review process was anticipated in AB 32, as it calls for updates to the Scoping Plan at least once every five years. For this Scoping Plan, the metrics provided on the rate of deployment of clean fuels and technologies, along with the annual AB 32 GHG Inventory, provide additional information that can be used to assess progress on sectors and aggregate emissions. This is also true of CARB's NWL carbon inventory. An uncertainty analysis for achieving an accelerated 2030 target is provided toward the end of this chapter.

Targeted Evaluations for the Scoping Plan: Oil and Gas Extraction and Refining

To achieve California's air quality and climate goals, we must end our dependence on petroleum. This will not happen overnight. There are about 28 million combustion engine heavy- and light-duty trucks and passenger vehicles in California, and these are almost always replaced at their end of life. The ZEV Executive Order (EO N-79-20) calls for 100 percent new ZEV car sales beginning in 2035 and a 100 percent ZEV medium- and heavy-duty fleet sales by 2045 where feasible. The result is an ongoing, albeit shrinking, pool of vehicles that will continue to require petroleum fuels. To avoid leakage, as called for in AB 32, and to meet that remaining demand for petroleum fuel, a complete phaseout of oil and gas extraction and refining is not possible by 2045. This Scoping Plan assumes a phasedown in both oil and gas extraction as well as petroleum refining in line with the reduction in demand for in-state on-road petroleum fuel demand. Since the transportation sector is the largest source of GHG emissions and harmful local air pollution, we must continue to research and invest in efforts to deploy zero emissions technologies and clean fuels, and to reduce VMT. An assessment of ongoing progress and efforts to reduce

[173] California Department of Food and Agriculture. 2021. *Incentives Program 2017–2020 Summary by the Numbers*. https://www.cdfa.ca.gov/oefi/healthysoils/docs/HSP_Incentives_program_level_data_funded_projects.pdf.

demand for petroleum fuels and of opportunities to phase down oil and gas extraction and refining will be included in the next Scoping Plan update.

In addition to supplying in-state demand, California is a net exporter of gasoline, diesel, and jet fuel. California pipelines supply the Nevada and Arizona regions[174] with approximately 87 million barrels gasoline equivalent of refined products annually.[175] California pipelines deliver approximately 85% of Nevada's and 40% of Arizona's refined product. Most finished fuels flowing from California to Nevada and Arizona are currently produced by California refineries. To manage the phasedown of oil and gas extraction and petroleum refining in California, exports of finished fuels must be considered and factored into that process, in addition to the declining in-state demand. The authorities and considerations related to supply and demand of petroleum fuels span federal, state, and local agencies. If supply of fossil fuels is to decline along with demand, a multi-agency discussion is needed to systematically evaluate and plan for the transition to ensure that it is equitable.

This inter-agency work should also consider related topics, such as the following:

- Direct and indirect job and economic impacts
- Demand for other liquid fuel types such as renewable fuels, and expected volumes
- Legal considerations
- Public health benefits
- Demand and supply strategies for petroleum fuels, including how to avoid short term supply constraints that may impact low-income consumers

Some of these topics were also discussed as part of two studies[176] supported by the California Environmental Protection Agency, which can serve as a starting point for a working group to analyze these questions and develop policy recommendations.

Oil and Gas Extraction

On April 23, 2021,[177] Governor Newsom directed CARB to evaluate the phaseout of oil and gas extraction no later than 2045 as part of this Scoping Plan. As noted above, this Scoping Plan still has some California demand for finished fossil fuels (gasoline, diesel,

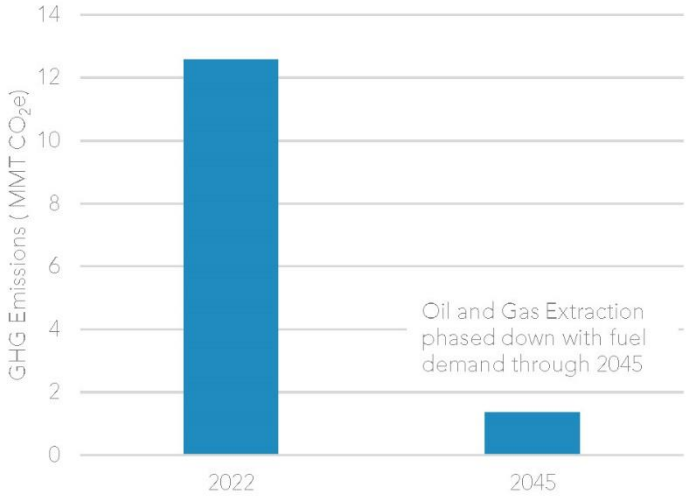
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[174] CEC. August 2021. A Primer on California's Pipeline Infrastructure. *Petroleum Watch*. https://www.energy.ca.gov/sites/default/files/2021-08/August_Petroleum_Watch_ADA.pdf.
[175] CEC. March 2020. *Petroleum Watch*. https://www.energy.ca.gov/sites/default/files/2020-03/March_2020_Petroleum_Watch.pdf.
[176] CalEPA. 2021. Carbon Neutrality Studies: https://calepa.ca.gov/climate/carbon-neutrality-studies/.
[177] Governor Newsom. April 23, 2021. Governor Newsom Takes Action to Phase Out Oil Extraction in California. Press Release. https://www.gov.ca.gov/2021/04/23/governor-newsom-takes-action-to-phase-out-oil-extraction-in-california/.

and jet fuel) in 2045. This demand is primarily for transportation, including for sectors that are directly regulated by the state and some that are subject to federal jurisdiction, such as interstate locomotives, marine, and aviation. As discussed more fully below, while significant GHG reductions from oil and gas extraction could be achieved as demand for fossil fuels is reduced due to strategies in this Scoping Plan, it is not feasible to phase out oil and gas production fully by 2045 given this remaining demand.

In the Scoping Plan Scenario, with successful deployment of zero carbon fuels and non-combustion technology to phase down petroleum demand, GHG emissions from oil and gas extraction could be reduced by approximately 89 percent in 2045 from 2022 levels if extraction decreases in line with in-state finished fuel demand. If in-state extraction were to be phased out fully, the future petroleum demand by in-state refineries would be met through increased crude imports to the state relative to the Scoping Plan Scenario. AB 32 defines leakage as, "a reduction in emissions in greenhouse gases within the state that is offset by an increase in emissions of greenhouse gases outside the state." AB 32 also requires any actions undertaken to reduce GHGs to "minimize leakage." Increases in imported crude could result in increased activity outside California to extract and transport crude into California. Therefore, our analysis indicates that a full phaseout of in-state extraction could result in GHG emissions leakage and in-state impacts to crude oil imported into the state. Figure 2-6 compares the 2022 emissions from this sector with the modeled results when the sector is phased down with in-state petroleum demand.

Figure 2-6: Oil and gas extraction sector GHG emissions in 2022 and 2045 when activity is phased down with in-state fuel demand



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According to California Energy Commission (CEC) data used in Figure 2-7, the total oil extracted in California peaked at 402 million barrels in 1986. Since then, California crude oil production has decreased by an average of 6 million barrels per year, to about 200 million barrels in 2020. This steadily decreasing production of crude in California is expected to continue as the state's oil fields deplete.

Figure 2-7: California in-state crude oil production[178]



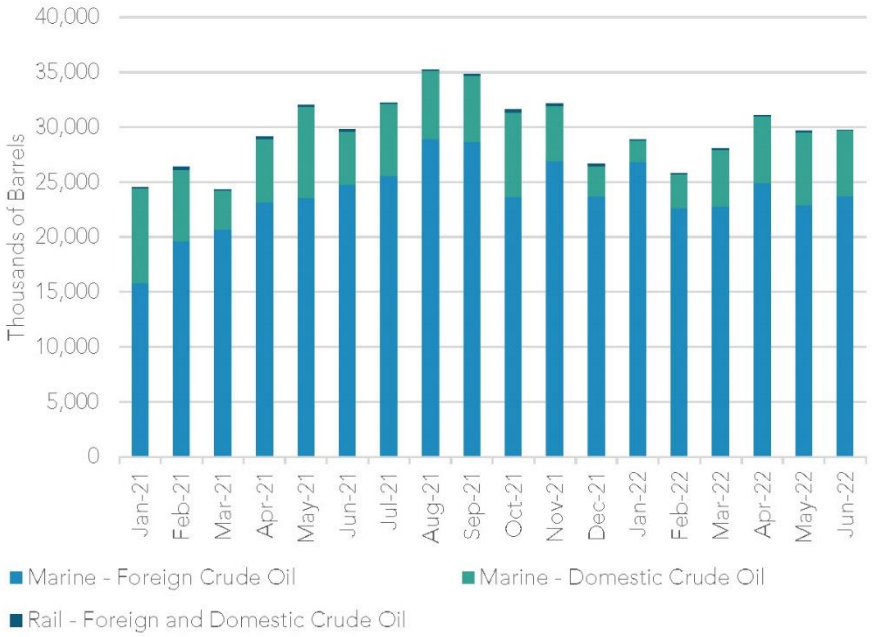
A UC Santa Barbara report estimated that, under business-as-usual conditions, California oil field production would decrease to 97 million barrels in 2045.[179] The business-as-usual model assumed no additional regulations limiting oil extraction in California.

Any crude oil demand by California refineries not met by California crude oil will be met by marine imports of Alaskan and foreign crude.[180] As shown in Figure 2-8, approximately 99 percent of crude imports into California are delivered by marine transportation. The

[178] CEC. No date. Oil Supply Sources to California Refineries. Accessed April 21, 2022. https://www.energy.ca.gov/data-reports/energy-almanac/californias-petroleum-market/oil-supply-sources-california-refineries.
[179] University of California, Santa Barbara. 2021. Enhancing Equity While Eliminating Emissions in California's Supply of Transportation Fuels.
[180] CEC. 2020. *Petroleum Watch: How Petroleum Products Move*. March. https://www.energy.ca.gov/sites/default/files/2020-03/March_2020_Petroleum_Watch.pdf, and CEC. 2020. *Petroleum Watch: What Types of Crude Oil Do California Refineries Process?* February. https://www.energy.ca.gov/sites/default/files/2020-02/2020-02_Petroleum_Watch_ADA_0.pdf.

remaining imports occur by rail.[181] There are no pipelines that bring crude oil into California from out of state.[182]

Figure 2-8: Crude oil imports by transportation type[183]



Crude oil delivered by marine tankers is delivered to onshore storage tanks and subsequently to refineries via pipeline. Most crude oil produced in California is delivered to California refineries by pipeline. Using historical trends, any increases in imported crude above historic levels would result in increased deliveries through the marine ports. This increased activity could require more infrastructure to store and move larger volumes of crude to the refineries in state.

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[181] CEC. June 2021. Crude Oil Imports by Transportation Type. Accessed March 16, 2022. https://www.energy.ca.gov/data-reports/energy-almanac/californias-petroleum-market/crude-oil-imports-source.
[182] CEC. 2020. *Petroleum Watch: How Petroleum Products Move*. March. https://www.energy.ca.gov/sites/default/files/2020-03/March_2020_Petroleum_Watch.pdf.
[183] CEC. June 2021. Crude Oil Imports. https://www.energy.ca.gov/data-reports/energy-almanac/californias-petroleum-market/crude-oil-imports-source.

California refineries import a variety of crude oils to meet refinery needs. California petroleum refineries are generally designed to process relatively heavy crude relative to other U.S. refineries. In 2018, crude inputs to California refineries had an average American Petroleum Institute (API) gravity of 26.18 and an average sulfur content of 1.64 percent. Processing significantly lighter or heavier crude blends would require significant changes to a refinery.[184] Most crude imported from Alaska and the Middle East is relatively light (API gravity > 30) compared to California crude (API gravity < 20).[185] If California crude production is insufficient to meet the demand at California refineries, then California refineries will need access to a similarly heavy source of crude so that the average API gravity of crude remains within their established operating window. South American crude oil imports into California are the heaviest relative to other regions, and therefore they may be the most likely to replace decreased California crude oil supply.[186]

In summary, the modeling indicates that demand for petroleum will persist due to legacy fleets that will not be replaced until end of life. The modeling also shows what the GHG emissions reductions would be if oil and gas extraction activities were phased down in line with the reduction of in-state petroleum demand. Trend data shows that oil and gas extraction already has been on the decline and will continue to decline. It is possible to anticipate the likely regions and types of crude that would be imported to meet in-state petroleum demand if in-state extraction was fully phased out by 2045. Importantly, activity at the ports would increase, and new infrastructure would be needed to store and deliver crude to in-state refineries. And while GHG emissions from this sector would go to zero in our AB 32 GHG Inventory with a full phaseout, emissions related to the production and transport of crude to California might increase elsewhere, resulting in emissions leakage.

As the state continues to reduce demand for petroleum, efforts to protect public health for communities located near oil and gas extraction sites must also continue. In October 2021, Governor Newsom directed action to prevent new oil drilling near communities and

[184] CEC. 2020. *Petroleum Watch: What Types of Crude?* February. https://www.energy.ca.gov/sites/default/files/2020-02/2020-02_Petroleum_Watch_ADA_0.pdf.
[185] CEC. 2020. *Petroleum Watch: What Types of Crude?* February. https://www.energy.ca.gov/sites/default/files/2020-02/2020-02_Petroleum_Watch_ADA_0.pdf.
[186] CEC. 2020. *Petroleum Watch: What Types of Crude?* February. https://www.energy.ca.gov/sites/default/files/2020-02/2020-02_Petroleum_Watch_ADA_0.pdf.

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expand health protections.[187, 188] In 2022, the Legislature passed, and the governor signed, SB 1137 to protect communities from existing and any new oil and gas extraction activities through 3,200 foot setbacks.

Petroleum Refining

In the Scoping Plan Scenario CARB modeled a phasedown of refining activity in line with petroleum demand. Meeting petroleum demand means sufficient availability of finished fuel (gasoline, diesel, and jet fuel). Crude is processed at in-state refineries to produce finished fuel. In response to stakeholder requests,[189] this evaluation focuses on the Scoping Plan Scenario, but with an evaluation of a complete phasedown of refinery operations in state.

The Scoping Plan Scenario results in California petroleum refining emissions of 4.5 MMTCO$_2$e in 2045; a reduction of approximately 85 percent relative to 2022 levels, which is in line with the decline in in-state finished fuel demand.[190] Emissions from refining can be reduced further through the application of CCS technology, as shown in Figure 2-9. If in-state refining is phased down to zero and the demand for the finished fuels produced by that refining persists, imported finished fuels may be needed to meet the remaining in-state demand.[191] The current data shows unmet demand for liquid petroleum transportation fuels would most likely be met by marine imports. A CEC report notes, "The only way for California to receive large amounts of crude and refined products is by marine."[192]

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[187] Office of Governor Gavin Newsom. 2021. California Moves to Prevent New Oil Drilling Near Communities, Expand Health Protections. https://www.gov.ca.gov/2021/10/21/california-moves-to-prevent-new-oil-drilling-near-communities-expand-health-protections-2/?msclkid=6c0da86bc58e11ecb81cf596d4d8a735.

[188] California Department of Conservation Geologic Energy Management Division. October 2021. Draft Rule for Protection of Communities and Workers from Health and Safety Impacts from Oil and Gas Production Operations. https://www.conservation.ca.gov/calgem/Pages/Public-Health.aspx?msclkid=45660232cf2511ecb1c56119097e3b0c.

[189] California Environmental Justice Alliance. October 22, 2021. Comment on 2022 Scoping Plan Update - Scenario Inputs Technical Workshop. https://www.arb.ca.gov/lists/com-attach/68-sp22-inputs-ws-WzhdPll5AjACW1Qx.pdf.

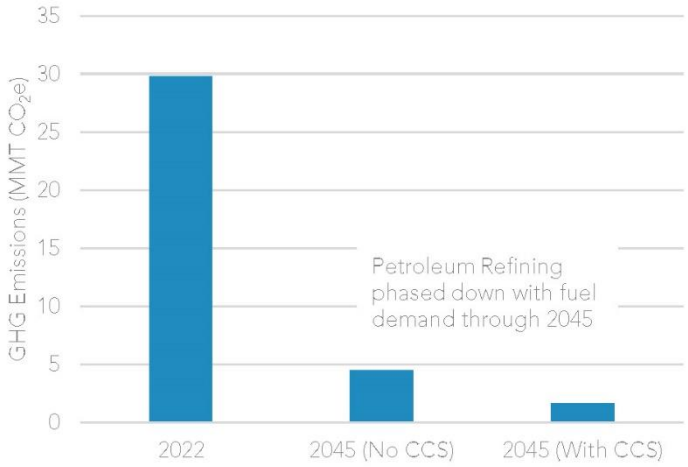
[190] This reduction in demand does not assume any need for ongoing operations to support exports to neighboring states.

[191] If demand assumes an ongoing need to support exports to neighboring states, the residual demand would require a five-fold increase in finished fuel imports.

[192] CEC. 2020. *Petroleum Watch: How Petroleum Products Move*. March. https://www.energy.ca.gov/sites/default/files/2020-03/March_2020_Petroleum_Watch.pdf.

There are currently no pipelines capable of bringing refined products to the state, and rail imports of refined products have historically made up less than 1 percent of all imports.[193] Significant increases in marine imports would likely require significant reconfiguring, retrofitting, or replacement of crude pipelines and storage tanks at current marine terminals, and possible reconfiguring of existing finished fuel infrastructure to account for changes in volumes and locations of supply points.

Figure 2-9: Petroleum refining sector GHG emissions in 2022 and 2045 (with and without CCS) when activity is phased down with fuel demand



If California's finished fuel demand is not met by continued refining activity in California, the state would need to import finished fuels to meet the ongoing demand. This would likely result in a two- to five-fold increase in the number of finished fuel ship deliveries to marine terminals. Marine tankers delivering refined products are often much smaller than crude oil tankers, so changes in fuel use and emissions cannot be easily estimated from the change in both the type and the number of ship deliveries.[194]

[193] CEC. 2020. *Petroleum Watch: How Petroleum Products Move*. March. https://www.energy.ca.gov/sites/default/files/2020-03/March_2020_Petroleum_Watch.pdf.
[194] Personal communication with CEC staff, March 2022; U.S EIA. 2017. *World Oil Transit Chokepoints*. 3. https://www.eia.gov/beta/international/regions-topics.php?RegionTopicID=WOTC.

If refining ceased in California, the rail and marine deliveries currently needed to support both refining processes and the export of waste products, such as petroleum coke, would cease.

In summary, the modeling indicates that demand for petroleum will persist through 2045. The modeling also shows what the GHG emissions reductions would be if refining activities were phased down in line with the reduction in in-state petroleum demand. CCS can further reduce emissions for this sector. Importantly, activity at the ports would increase, and new infrastructure would be needed to store and deliver finished fuel across the state, if in-state refining were fully phased down by 2045. And while GHG emissions from this sector would go to zero in our AB 32 GHG Inventory with a full phaseout, emissions related to the refining and transport of finished fuel to California might increase elsewhere, resulting in emissions leakage.

Progress Toward Achieving the Accelerated 2030 Target

The 2017 Scoping Plan laid out a path to achieving the SB 32 target of at least a 40 percent reduction of GHG emissions below 1990 levels by 2030 that focused on reducing emissions in the state and was technologically feasible and cost-effective, reflecting statutory direction. Many of the programs to achieve the 2030 target increased in stringency beginning January 1, 2021. However, the 2030 target must be increased to help achieve the deeper reductions needed to meet the state's statutory carbon neutrality target specified in AB 1279 and Executive Order B-55-18.

Starting in 2020 and extending into 2022, the COVID-19 pandemic impacts reverberated across the globe in a multitude of ways, including the devastating loss of millions of lives. The pandemic also had a significant impact on GHG emissions by virtue of its impact on global economies and lifestyle changes for Californians, with extended work and school disruptions. Thus, assessing our progress toward meeting our SB 32 target is confounded by the unprecedented nature of the pandemic. Nevertheless, an assessment of progress toward the 2030 target is critical, in particular the accelerated 2030 target called for in this Scoping Plan, since achieving the accelerated 2030 target would make the state well positioned to achieve its carbon neutrality goals and bring critical near-term air quality benefits to address historical and ongoing disparities in access to healthy air. Because there is only one year of data available for this decade, the analysis takes a prospective look using projected emissions over the remainder of this decade.

Estimating GHG emissions in 2030 requires projecting the effect of policies or measures that are currently deployed and undergoing implementation. Table 2-4 shows three distinct estimates of GHG emissions in 2030 that were created at different times and used different modeling approaches.

Table 2-4: Estimates of 2030 GHG emissions

Scenario Description	2030 GHG Emissions ($MMTCO_2e$)
2017 Scoping Plan: the projected outcome from implementing policies identified in the 2017 Scoping Plan that was approved by the CARB Board in December 2017.	320
Reference Scenario: the assessment of current trends and expected performance of policies identified in the 2017 Scoping Plan, as of February 2022, using the PATHWAYS model (E3).	305
Reference Scenario (Rhodium): the analysis of projected emissions from 2021 to 2030 from state and federal policies implemented as of July 2022, including the estimated impact of the Inflation Reduction Act and Advanced Clean Cars II using RHG-NEMS and other Rhodium Taking Stock 2022 methods (https://rhg.com/wp-content/uploads/2022/07/Taking-Stock-2022_US-Emissions-Outlook.pdf).	324

These three estimates of 2030 GHG emissions differ, which is expected. The estimates reflect different outcomes of the current and future impact of policies and measures. They also vary due to fundamental differences in the way these models work. For example, PATHWAYS is an economy-wide, scenario-based GHG accounting tool that tracks energy demands and supplies in line with scenario assumptions and is benchmarked to historical values. RHG-NEMS optimizes both the supply and demand sides of the energy system while factoring in consumer constraints and dynamic economic and energy systemwide feedback. Importantly, while these point estimates give the appearance of certainty and accuracy, there is significant uncertainty in future emissions projections that is documented thoroughly in each of the three emissions scenarios described above. No model can predict the future given unforeseen factors such as notable economic swings and implementation delays for programs. However, the range of emissions estimates provides a useful indication of possible outcomes from successful implementation of policies and measures.

An important source of uncertainty is the impact of delayed implementation of policy measures and market actions. The successful rate of deployment of clean technology and fuels—including consumer adoption patterns, economic recovery from the pandemic, and the permitting and build-out of necessary new assets and reuse of existing assets to produce and deliver clean energy—is essential to reach GHG emission reduction targets. Any delays will only increase GHG emissions in 2030.

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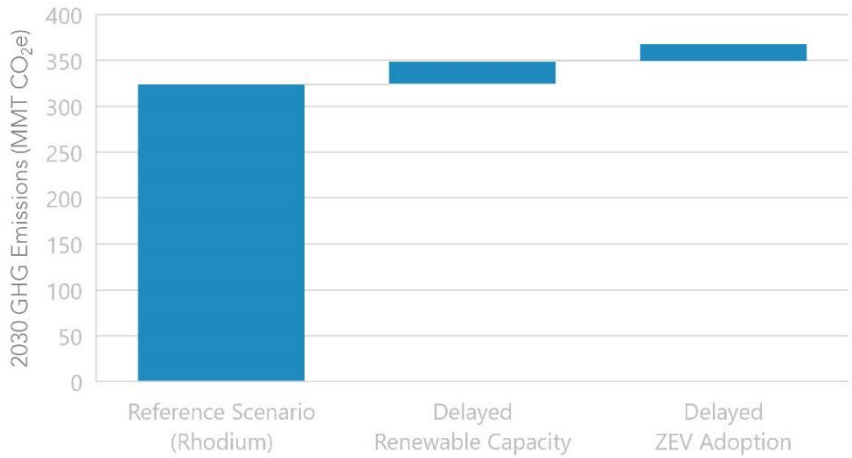
It is important to note that incentives, carbon pricing, and regulations all can result in similar types of responses including, but not limited to:

- Build-out of clean energy and infrastructure
- Deployment of clean technology
- Reduced demand for fossil energy
- Efficiency improvements

As such, the uncertainty analysis discussion focuses on implementation (technology and infrastructure deployment), and not any specific programs or policies. It is successful implementation that must ultimately happen for emissions reductions to be realized.

The uncertainty analysis described in Appendix J (Uncertainty Analysis) quantifies the impact of delayed permitting and building of renewable generation and transmission in the power sector and delayed adoption of ZEVs across all vehicle fleets in the transportation sector. The Reference Scenario (Rhodium) estimates emissions in 2030 to be 324 MMTCO2e. A five-year delay in renewable capacity would increase emissions by 8 percent in 2030 (25 MMTCO2e) relative to the Reference Scenario. If similar delays in clean energy production and deployment occur in other sectors, a larger increase in emissions relative to the reference scenario would be expected, jeopardizing the state's ability to achieve the 2030 target. Similarly, a delay in consumer adoption of zero emission vehicles (LDV, MDV, HDV) would increase emissions by 6 percent in 2030 (19 MMTCO2e) relative to the Reference Scenario. Delays in transitioning to electric equipment and appliances in homes and businesses would also lead to increased emissions in 2030. Figure 2-10 illustrates the impact on projected emissions in 2030 associated with delayed renewable capacity and delayed transportation vehicle electrification.

Figure 2-10: Impact of delayed implementation on 2030 GHG emissions[195]



Appendix J (Uncertainty Analysis) includes additional details on the assumptions and model used for the uncertainty analysis and the risks to achieve the emissions reductions from 2022 to 2030 that are anticipated in the Scoping Plan Reference Scenario. While the analysis focuses on renewable capacity and transportation, the analysis identifies a common set of themes that can impact emissions reductions across economic sectors, including permitting, technology availability, and consumer adoption. The impact of delayed emissions reductions will vary by sector and by the specific policy at risk of delay.

We give these quantitative examples of the impact implementation delays can have on GHG reductions, but almost every economic sector will have the need for permitting to enable at least a 40 percent reduction below 1990 levels. If we consider the increased ambition of the Scoping Plan Scenario, which identifies an accelerated 2030 target, the same types of uncertainty manifest themselves in successful implementation of the Scoping Plan Scenario, with the added need for CCS and CDR and a need to grow other energy sectors such as hydrogen.

[195] The implementation delay scenarios were modeled separately and do not necessarily reflect the combined impact of delayed renewable capacity and transportation vehicle electrification.

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Cap-and-Trade Program Update

Since the adoption of the first Scoping Plan in 2008, carbon pricing in the form of a Cap-and-Trade Program has been part of the portfolio to achieve the state's GHG reduction targets, and it will remain critical as we work toward carbon neutrality. This section provides an update on the program and its role in achieving the 2030 target.

The Cap-and-Trade Program first came into effect in 2012, under AB 32, and included declining allowance caps through 2020. In 2017, AB 398[196] was passed by a supermajority in the Legislature and included prescriptive direction on the design of the program from 2021 through 2030. The AB 398 Cap-and-Trade Program came into effect on January 1, 2021, and it included the following changes:

- Doubling of stringency with an annual cap decline of 4 percent per year from 2021–2030
- AB 398 price ceiling
- AB 398 redesigned allowance price containment reserve with two tiers
- AB 398 100 percent leakage assistance factor for industry
- AB 398 lower offset limits: Usage limit cut from 8 percent to 4 percent, and half of offsets must provide direct benefits to California

The reduction in the role of offsets in the program was in recognition of ongoing concerns raised by environmental justice advocates regarding the ability of companies to use offsets for compliance instead of investing in actions on site to reduce GHG emissions that could also potentially reduce criteria or toxic emissions.[197,198] Note that data show the relationship between facility emissions of GHGs and co-pollutants is highly variable by sector and pollutant.[199] Changes to the allowance price containment reserve and the addition of the price ceiling were included to ensure protections against price spikes in the program, while the changes to the leakage assistance factors were to ensure the maximum protection against leakage in the program. The original design of the program included an auction floor price that increases by 5 percent plus inflation each year, and

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[196] Assembly Bill 398 (Garcia, Chapter 135, Stats. of 2017). California Global Warming Solutions Act of 2006: market-based compliance mechanisms: fire prevention fees: sales and use tax manufacturing exemption. https://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=201720180AB398.

[197] OEHHA. 2022. *Impacts of Greenhouse Gas Emission Limits Within Disadvantaged Communities*. https://oehha.ca.gov/media/downloads/environmental-justice/impactsofghgpoliciesreport020322.pdf.

[198] The OEHHA report also found that companies that use the most offsets often own the facilities that contribute to local $PM_{2.5}$ exposure. However, there was no causal relationship found to indicate that implementation of the Cap-and-Trade Program was contributing to increases in local air pollution. Also see: CARB. FAQ Cap-and-Trade Program. https://ww2.arb.ca.gov/resources/documents/faq-cap-and-trade-program.

[199] OEHHA. 2022. *Impacts of Greenhouse Gas Emission Limits Within Disadvantaged Communities*. https://oehha.ca.gov/media/downloads/environmental-justice/impactsofghgpoliciesreport020322.pdf.

that escalation factor is retained in the post-2020 program and is also applied to the allowance price containment reserve and price ceiling. These features, combined with the self-ratcheting mechanism for unsold allowances at auctions,[200] help to ensure the program is able to handle periods of high and low demand for allowances while continuing to ensure a steadily increasing price signal for regulated entities to invest in GHG reduction technologies.

As a result of achieving the 2020 target several years earlier than mandated by law, there are unused allowances in circulation. CARB estimated the amount to be approximately 310 million allowances after the conclusion of the third compliance period (2018–2020).[201] AB 398 had also called for a similar analysis, which was completed in 2018.[202] This bank represents approximately 5 percent of the total number of vintage 2013–2030 allowances issued within the joint market. This bank of allowances can only remain banked if year-over-year the covered emissions are declining by 14 MMT. If the annual decline in actual emissions is less than 14 MMT, regulated entities will need to use the banked allowances to cover their compliance obligations. It is likely that the existing bank of 310 million allowances will be needed over the early part of this decade and will be exhausted by the end of the decade. During the same period, prices for allowances will continue to increase at least 5 percent plus inflation year-over-year, sending a steadily increasing price signal to spur investment in onsite reductions for covered entities.

With the passage of AB 1279, the state has a statutory target to achieve carbon neutrality no later than 2045. This Scoping Plan demonstrates that planning on a longer time frame for the new carbon neutrality target means we must accelerate our near-term ambition for 2030 in order to be on track to achieve our longer-term target. CARB will use the modeling for this Scoping Plan to assess what changes may be warranted to the Cap-and-Trade or other programs to ensure we are on track to achieve an accelerated 2030 target. Since the original adoption of the Cap-and-Trade regulation, the program has been amended eight times through a robust public process. Moreover, then-California Environmental Protection Agency Secretary Jared Blumenfeld testified at a Senate hearing in 2022 that CARB will report back to the Legislature by the end of 2023 on the status of the allowance supply with any suggestions on legislative changes to ensure the number of allowances

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[200] The self-ratcheting mechanism temporarily removes unsold allowances from the market until either sufficient demand manifests for two consecutive auctions and they are incrementally reintroduced at future auctions, or they are permanently removed from general circulation if demand remains low.
[201] CARB. 2022. BR 18-51 Cap-and-Trade Allowance Report. Attachment A. https://ww2.arb.ca.gov/sites/default/files/cap-and-trade/Allowance%20Report_Reso18_51.pdf.
[202] CARB. 2018. Staff Report: Initial Statement of Reasons: Proposed Amendments to the Cap on Greenhouse Gas Emissions and Market-Based Compliance Mechanisms Regulation. September 4. https://www.arb.ca.gov/regact/2018/capandtrade18/ct18398.pdf?_ga=2.134288305.1735610122.1664813952-1100516233.1657841496.

is appropriate to help the state achieve its 2030 target of at least 40% below 1990 levels. As part of that status update, CARB will also provide information on any potential program changes that may be needed to allowance supply to help achieve an accelerated target for 2030 identified in this Scoping Plan as necessary to achieve carbon neutrality no later than 2045. Engaging in this process in 2023 will allow for the consideration of this Scoping Plan, inclusion of additional data points for the second year of operation of the AB 398-designed program (which only came into force in January 2021), and an opportunity to hold public workshops.

It is also worth noting that the COVID-19 pandemic had significant impacts on economic activity in California and elsewhere.[203] Emissions were significantly lower in 2020 due to the impacts of the global pandemic. There is an expectation that emissions will increase as the economy recovers and behaviors continue to shift from the impacts of the ongoing pandemic. As a result, 2020 should be regarded as an outlier in the emissions trends. This scenario of increasing emissions is similar to what happened in the first compliance period for Cap-and-Trade, where the state economy was recovering from the Great Recession and does not correlate to a problem with the structure of this program or other programs that cover emissions related to the manufacturing or transportation sectors. In any assessment of this and other programs, it is essential to consider external factors such as economic activity and availability of zero carbon energy such as hydropower, among others.

To better understand the role of the Cap-and-Trade Program in achieving the 2030 target, Table 2-5 compares the 2030 GHG emissions estimates from the three reference scenarios described in Table 2-4. The 2017 Scoping Plan projection is from the PATHWAYS model for the Scoping Plan Scenario approved by the Board in late 2017. It excludes the contribution of the Cap-and-Trade Program, without any consideration of uncertainty factors (i.e., a characterization of the uncertainty that a given GHG reduction measure included in the 2017 Scoping Plan will actually achieve the GHG reductions it is projected to deliver). The Reference Scenario represents what GHG emissions would look like if we did nothing beyond the existing policies that are required and already in place to achieve the 2030 target; this scenario is based on the recent PATHWAYS modeling, excluding the contribution of the Cap-and-Trade Program, and without any consideration of uncertainty factors. It indicates that GHG emissions will be lower over this decade than originally projected when the 2017 Scoping Plan was approved. The

[203] CARB. November 4, 2021. Mandatory Greenhouse Gas Reporting - 2020 Emissions Year Frequently Asked Questions. https://www.arb.ca.gov/cc/reporting/ghg-rep/reported-data/2020mrrfaqs.pdf?_ga=2.264251343.1760432228.1650736660-1644197524.1577749754.

Reference Scenario (Rhodium) which also does not include uncertainty bounds, is the modeling used for the uncertainty analysis above.

Importantly, PATHWAYS is not able to explicitly model a carbon pricing policy, and therefore the Cap-and-Trade Program is not represented in the 2017 Scoping Plan or the Reference Scenario. Carbon pricing is included in RHG-NEMS, which reflects state and federal policies included in the U.S. Energy Information Administration (EIA) Annual Energy Outlook 2022 and the National Energy Systems Model (NEMS), which is the basis for RHG-NEMS.[204]

As detailed in EIA's documentation, California's Cap-and-Trade Program is represented through increased energy prices, which flow across economic sectors.[205] However, many of the emissions covered by the California Cap-and-Trade Program are not energy- and fuel-related emissions. Given that, the energy systems model RHG-NEMS was used to model the impact of California Cap-and-Trade on the energy system. However, RHG-NEMS does not explicitly model the entire program, which includes non-energy related emissions from the industrial, agricultural, waste, and transportation sectors.

[204] U.S. EIA. 2022. *Summary of Legislation and Regulations Included in the Annual Energy Outlook 2022.* March. https://www.eia.gov/outlooks/aeo/assumptions/pdf/summary.pdf.
[205] U.S. EIA. 2022. Electricity Market Module. https://www.eia.gov/outlooks/aeo/assumptions/pdf/electricity.pdf.

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Table 2-5: Comparison of 2017 Scoping Plan and two Reference Scenarios

	2030 GHG Emissions ($MMTCO_2e$) (2017 Scoping Plan)	2030 GHG Emissions ($MMTCO_2e$) (Reference Scenario)	2030 GHG Emissions ($MMTCO_2e$) (Reference Scenario-Rhodium)
Reference Scenarios	320	305	324
Gap to Accelerated 2030 Target under the Scoping Plan Scenario (226)[206]	94	79	98

Under the Scoping Plan Scenario, in 2030 California emissions are anticipated to be 48% below 1990 levels. This represents an acceleration of the current SB 32 target of a 40% reduction below 1990 levels. Table 2-5 includes the gap between the different reference scenarios and the accelerated 2030 target achieved under the Scoping Plan Scenario. It also shows that depending on the modeling, there are a range of potential emissions levels in 2030 prior to accounting for the full impact of the Cap-and-Trade Program on emissions. That range is from 305 to 324 $MMTCO_2e$ in 2030. That represents a 19 $MMTCO_2e$ spread, or about 8.4 percent of the accelerated 2030 target of 226 $MMTCO_2e$. Importantly, none of these scenarios includes all of the actions identified in the Scoping Plan Scenario for this Scoping Plan; many of those actions, such as SB 596, CCS, and a more stringent LCFS program, will only begin to happen in this decade, and their contributions toward meeting the accelerated 2030 target are therefore not included in the reference scenarios. The actual emissions for the remainder of this decade will therefore likely be lower than in each of the scenarios in Table 2-5 once policies and regulations are in place to support an accelerated 2030 target. However, the degree of this difference between actual and projected emissions will differ across the modeled reference scenarios.

[206] Table 3 from the 2017 Scoping Plan included a range of 34 to 79 $MMTCO_2e$ for reductions needed from the Cap-and-Trade Program to achieve a 2030 target of 40 percent below 1990 levels.

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Regardless of the uncertainty and differences in the models, it is clear additional GHG reductions must happen over this decade to achieve an accelerated 2030 target. This will require an evaluation of all major programs to assess the need to increase their stringency between now and 2030. As the actual reductions from non-Cap-and-Trade Program measures increase, California will be less reliant on the Cap-and-Trade Program to "fill the gap" to meet an accelerated 2030 reduction target. For example, CARB is developing a proposal to increase the stringency of the LCFS program for 2030, the recently adopted Advanced Clean Cars II regulation is more stringent than modeled for the 2030 40 percent target in the 2017 Scoping Plan, and SB 596 requires specific reductions in the cement sector over this decade and beyond. However, we also know we are not on track to achieve the VMT reduction called for in the 2017 Scoping Plan and will need to double down to achieve the even more ambitious target called for in the Scoping Plan Scenario. Also, we will need additional actions over the coming years to reduce short-lived climate pollutants to meet the emission reductions called for in SB 1383.

Collectively, any additional legislation or prescriptive policies for sectors, delays in successful implementation of non-Cap-and-Trade programs and policies, increases in incentive program funding, and delays in economic recovery from the pandemic will continue to affect the role the Cap-and-Trade Program will need to play over this decade to meet the state's GHG reduction obligations. In summary, the Cap-and-Trade Program must continue to be able to scale across a range of possibilities. With passage of AB 1279 and the need to accelerate the 2030 target, CARB will initiate a public process to utilize the modeling results from this Scoping Plan, specifically the Scoping Plan Scenario, to evaluate and potentially propose changes to the design of the Program, including the annual caps. This process will ensure that the Program supports an increased ambition for 2030 while retaining the ability to scale as other factors, such as changing economic conditions and implementation of non Cap-and-Trade programs, impact the actual emissions at the sources covered by the Program. Any changes to the Program must continue to support a well-designed system that continues to send a steadily increasing price signal, minimizes for leakage, reduces emissions in the covered sectors toward the state's targets, is cost-effective and technologically feasible, and avoids energy rate spikes. Importantly, the Program should support air quality benefits, especially in overly burdened communities, and not exacerbate existing air quality disparities.

Chapter 3: Economic and Health Evaluations

This chapter provides two approaches for quantifying the economic and health outcomes of the Scoping Plan Scenario. One approach is to consider the combined impact of all measures[207] in a scenario. The other approach is required by AB 197, where each measure within a scenario is evaluated independently. In addition to these two evaluation approaches, this chapter also includes a discussion of the Public Health implications for the Scoping Plan Scenario, an overview of the Climate Vulnerability Metric, and the Environmental Analysis conducted in accord with the California Environmental Quality Act (CEQA).

It is important to note that all of the analyses in this chapter use a variety of data sources, but because the modeling is economy-wide at the state level, none of them produce community specific detail outputs. The AB 32 GHG Inventory Sector analysis relies on PATHWAYS data at the state level that is proportionally applied across all regions of the state to translate changes in state level fuel combustion to local level changes. The NWL analysis similarly utilizes a variety of data sources and a suite of models that produce data that are scaled up to the statewide level. All of the models, except the Wildland Urban Interface (WUI) defensible space model, which is conducted at the county level, create aspatial projections that are not applicable at the community level.

Economic Analysis

As part of the process to develop this Scoping Plan, alternative scenarios that transition energy needs away from fossil fuels and achieve carbon neutrality no later than 2045 were developed. Alternative scenarios that assess the impact of different land management strategies on carbon stocks in NWL were also developed. These alternatives are described in Appendix C (AB 197 Measure Analysis). The following sections describe the Scoping Plan Scenario in terms of direct cost, the economy, employment, and health outcomes.[208]

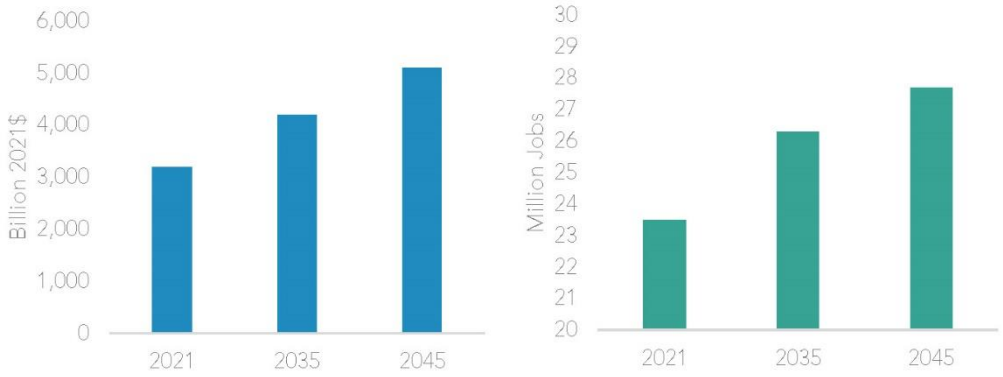
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[207] AB 197 calls for the evaluation of "measures." This Scoping Plan treats each action and its variants on stringency as measures for the purposes of this chapter. Appendix C (AB 197 Measure Analysis) lists the measures and corresponding modeling assumptions for each alternative and the Scoping Plan Scenario. The modeling assumptions for the Scoping Plan Scenario are summarized in Table 2-1.

[208] For the Draft 2022 Scoping Plan Update, achieving carbon neutrality in 2035 and 2045 was evaluated. The AB 32 GHG Inventory sector direct cost, the economy, employment, and health outcomes were assessed in those years. Similarly, the Scoping Plan Scenario assessments that are presented in this chapter were made for years 2035 and 2045.

The California economy is growing, and it is projected to continue to grow about 2 percent each year, from $3.2 trillion in 2021 to $5.1 trillion in 2045, as shown in Figure 3-1. Similarly, employment in California is anticipated to grow 0.7 percent per year, from 23.5 million jobs in 2021 to 27.7 million jobs in 2045. It is in this context, termed the *Reference Scenario*, that CARB evaluates the Scoping Plan Scenario in terms of its impact on economic growth and employment. The projections shown in Figure 3-1 were produced by CARB to evaluate the incremental impact of regulations.

Figure 3-1: Projected California gross state product (left) and employment growth (right) from 2021 to 2035 and 2045



Source: California Air Resources Board

Transitioning away from fossil fuels to alternatives and increasing action on NWL will affect employment opportunities, household spending, businesses, and other economic aspects of our lives. Sectors expected to see growth include renewable electricity and hydrogen production, while other sectors may shrink. The deployment of clean technology may require higher upfront costs for things like heat pumps and induction stoves, but those could be offset by energy efficiency savings. Employment and economic development in NWL-related industries and sectors are expected to increase as land management actions increase, especially for the Forestry sector (in which a significant increase is called for under the Scoping Plan Scenario). The net impact of these actions on employment and jobs is presented in this chapter.

Estimated Direct Costs

One key metric is the direct cost, or net investment, reflecting any savings that result from actions. Similar approaches were used to estimate direct costs for the AB 32 GHG Inventory sectors and for the NWL, as described in this section.

AB 32 GHG Inventory Sectors

Transitioning away from fossil fuels requires investment in new equipment and infrastructure throughout the economy. It involves developing the capacity to produce fuels and electricity from renewable sources rather than producing fossil energy. This transition also takes time. One approach is to eliminate combustion of fossil fuels by replacing all equipment in a specified year. Another approach is to establish a future point at which all sales of new equipment rely on alternative energy sources and allow the transition to occur over time as equipment is replaced upon its end of life.

To evaluate the investment required through 2045, the PATHWAYS model was used to represent equipment stock and its turnover to non-fossil fuel alternatives over time. The annualized, incremental cost of infrastructure in excess of the annualized cost of the Reference Scenario[209] was computed for each year from 2022 through 2045. These costs were computed by first taking the absolute cost in each year—which includes both new equipment investment and also expenditures on energy, operations, and maintenance in each year—and then levelizing the costs (in the same way car or house payments are annualized or spread out over time) to arrive at an annualized cost. Fuel savings, and resulting cost savings, associated with changing energy demand—from gasoline to electricity for vehicles, for example—are included as a result of this methodology. Carbon dioxide removal includes DAC technology powered primarily by off-grid solar, BECCS to produce hydrogen or other fuels, and NWL sequestration, as discussed in Chapter 2.[210]

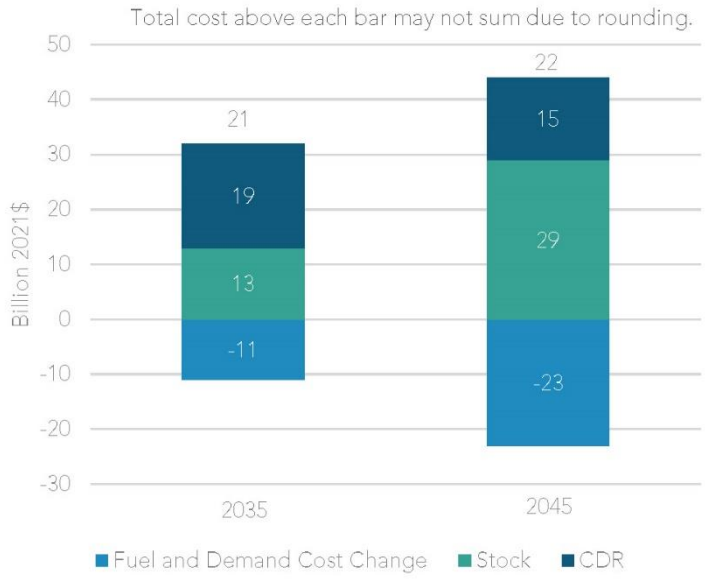
Figure 3-2 shows the stock investment cost, fuel/efficiency savings, and CDR cost. The Scoping Plan Scenario allows end-of-life transition of equipment. The cost of investing in new equipment is partially offset by savings associated with efficiency gains and reduced demand for fuels like gasoline. This is particularly relevant in the transportation sector, which leads to the majority of savings in 2045 in the Scoping Plan Scenario, which models near complete electrification of transport relying only on end-of-life replacement of vehicles. Appendix H (AB 32 GHG Inventory Sector Modeling) includes additional detail on direct costs in each sector and how costs change over time.

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[209] The Reference Scenario described in Chapter 2 and in Appendix H (AB 32 GHG Inventory Sector Modeling) was the basis for the direct cost comparison.

[210] The energy source for DAC is not modeled, but renewable electricity and/or hydrogen produced from electrolysis are zero-carbon options consistent with the carbon neutrality targets in this Scoping Plan. The economic analysis associated the investment in DAC with the solar industry for consistency with the carbon neutrality targets.

Figure 3-2: Cost and savings relative to the growing California economy for the Scoping Plan Scenario in 2035 and 2045 (AB 32 GHG Inventory sectors)



Natural and Working Lands

For NWL, the direct costs of each management strategy were estimated using available academic literature, monitoring and reporting data, survey data, and cost data from existing subsidy programs on the per acre cost of implementing the management strategy. These cost data, in combination with the acreage of each management strategy under the scenarios, provided estimates of the overall direct cost to either the government or the private sector. The direct costs are independent of the policy lever used to implement the action and do not include many important benefits and externalities of the actions. They are assumed to be constant for each scenario and into the future. Avoided or secondary costs, such as those from reductions in wildfire suppression expenses, are not included. Appendix I (NWL Technical Support Document) includes additional direct cost details.

Table 3-1 includes the direct cost estimates for the Scoping Plan Scenario compared to the Reference Scenario.[211] Direct costs for the NWL sector are expected to be significant due to the ambitious level of action for each land type.

Table 3-1: Cost and savings relative to a growing California economy for the Scoping Plan Scenario (NWL)

Measure	Scoping Plan Scenario: Average Direct Annual Cost, 2025–2045 (millions $/year)
Forests / Shrublands / Grasslands	1,780
Annual Croplands	284
Perennial Croplands	4
Urban Forest	4,230
Wildland Urban Interface (WUI)	114
Wetlands	28
Sparsely Vegetated Lands	4
Totals	6,460
Note: Table values may not add to total due to rounding.	

CARB estimates that all jurisdictions, including private landowners, currently spend approximately $4 billion dollars annually on planting, maintenance, sidewalk repair, tree removal, and other expenses related to urban forests, and that reaching the theoretical maximum tree cover would require increasing that spending by a factor of 20. The cost of the Scoping Plan Scenario is predominantly a mix of urban forests and forests, shrubland, and grasslands spending.

[211] The Reference Scenario described in Chapter 2 and in Appendix I (NWL Technical Support Document) was the basis for the direct cost comparison.

Economy and Employment

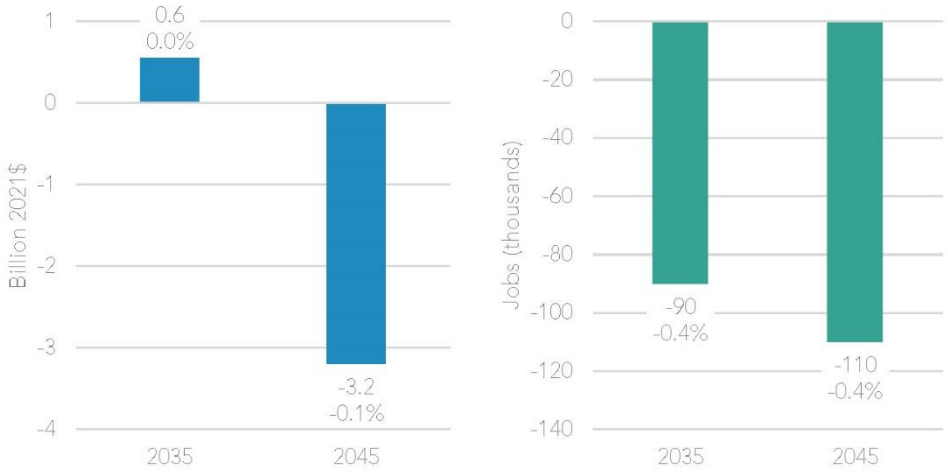
Two different models were used to estimate the overall impact that investing in a transition away from fossil fuels and in our NWL may have on the growing California economy. The transition away from fossil fuels was evaluated using the IMPLAN economic analysis model. The NWL investments were evaluated using the REMI PI+ economic model. These models provide similar outputs relative to the same economic and employment forecasts used to develop a Reference Scenario for use in each model.

AB 32 GHG Inventory Sectors

To estimate the overall impact that investing in a transition away from fossil fuels may have on the California economy, CARB used the IMPLAN model. Additional detail regarding the model, assumptions, and methodology are included in Appendix H (AB 32 GHG Inventory Sector Modeling). The IMPLAN model is a multisector representation of private industries in the U.S. economy that maps economic relationships across industries, households, and governments. This model translates direct costs and savings associated with transitioning away from fossil fuels with indirect effects such as wages, purchases of goods and services, business tax impacts, and supply chain effects. In addition, the induced effects of household purchases, local and import purchases, wages paid, and household tax impacts are estimated. This comprehensive assessment of the interactions between capital investment in fossil fuel alternatives and household purchases provides an indication of the response of the California economy to the Scoping Plan Scenario.

The Scoping Plan Scenario results in a small impact on the Gross State Product (GSP) and employment relative to the Reference Scenario, as shown in Figure 3-3. Economic growth is largely unaffected by the Scoping Plan Scenario in 2035 and slowed by 0.1 percent in 2045. Employment growth is also slowed a small amount, 0.4 percent in 2035 and in 2045, and employment still grows. Assuming annual growth rates of 0.7 percent means there would be more than 193,000 additional jobs in 2045.

Figure 3-3: Gross state product (left) and employment (right) relative to a growing California economy for the Scoping Plan Scenario in 2035 and 2045 (AB 32 GHG Inventory sectors)



California households will see increased costs from the purchase of new capital stock and savings from reduced spending on fuel, as shown in Figure 3-2. Households also will face increased costs associated with CDR, costs associated with energy efficiency measures, and commercial stock purchases—all of which are assumed to be passed directly to consumers. The impact to California households, however, is not limited to these direct costs, as changes in relative prices, employment, and wages can affect household well-being. Personal income, which captures the direct, indirect, and induced impacts, is a metric commonly used to evaluate the impact of policies on households.

Personal income in California is projected to grow from $2.7 trillion in 2021 to $3.6 trillion in 2035 and $4.4 trillion in 2045. Household projections are based on California Department of Finance population projections, which estimate the state's population to grow an average of 0.3 percent each year from 2021 to 2045.[212] California households are projected to increase from 13.3 million in 2020 to 14.6 million in 2035 and 15.0 million in 2045.

[212] California Department of Finance. Population Projections (Baseline 2019). https://dof.ca.gov/forecasting/demographics/projections/.

While the transition away from combustion of fossil fuels will improve air quality for all Californians (and even, more so in overly burdened communities), the economic impacts of the Scoping Plan Scenario are unlikely to be equal among Californians. Table 3-2 presents the change in income by household income group relative to the Reference Scenario in 2035 and 2045. While in 2035 there is a net decrease in personal income of $600 million, total income for households that make less than $100,000 per year is estimated to decline by $4.1 billion dollars, and the total income for households that make more than $100,000 per year will increase by $3.5 billion under the Scoping Plan Scenario. In 2045, although there is no net change in personal income across all California households, results vary by income level. Total income for households that make less than $100,000 per year are estimated to decline by $5.3 billion dollars, while the total income for households that make more than $100,000 per year will increase by $5.3 billion under the Scoping Plan Scenario.

Table 3-2: Income Impacts by California household income group in 2035 and 2045 for the Scoping Plan Scenario (AB 32 GHG Inventory Sectors)

Household Income Group ($2021)	Percentage of 2021 California Households[213]	Change in Income (Billion $2021)	
		2035	2045
Less than $50,000	30	-2.9	-3.9
$50,000 to $100,000	27	-1.2	-1.4
$100,000 to $200,000	28	2.5	4.0
More than $200,000	15	1.0	1.3
Total	100	-0.6	0.0

[213] U.S. Census Bureau. 2021. Household Income. California. https://data.census.gov/cedsci/table?q=california%20income.

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In addition to income level, there is likely to be an impact to California personal income that varies based on race/ethnicity.[214] Table 3-3 shows the percentage of households within each income group based on eight race/ethnicity categories identified in the American Community Survey 2021. As shown in Table 3-2, households in lower income groups are anticipated to see negative impacts, while households in higher income groups are anticipated to see positive impacts from the Scoping Plan Scenario in both 2035 and 2045. Because more than 60% of households in the race/ethnicity categories of Hispanic, Black alone, Native Hawaiian (HI) or Pacific Islander, American Indian or Alaskan Native, Other, and Two or More make less than $100,000 per year, these populations generally are likely to experience reduced income. White and Asian households will generally experience both increased and decreased income because these households are distributed more evenly across all four income groups.

The state recognizes the need to ensure that accessibility to clean technology and energy do not further exacerbate health and opportunity gaps for low-income households and communities of color. The Climate Change Investments program exceeds the statutory minimums to invest in projects to benefit disadvantaged communities.[215] Utilities implement programs for reduced energy bills for qualifying low-income customers.[216] There are also resources for waste and water bills that leverage federal funds.[217] CARB also coordinated with the CPUC to ensure that the Climate Credit[218] funded from the sale of Cap-and-Trade allowances provided to utilities on behalf of ratepayers is credited equally to households and not based on how much energy is used. These are just a few examples of how the state is designing and implementing programs to avoid increasing existing disparities. The state must continue to find ways to relieve economic burdens on low-income households.

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[214] The number of households in each bracket and the race/ethnicity categories are from American Community Survey 2021 results. Population changes through 2035 and 2045 are not forecast. U.S. Census Bureau. 2021. Household Income. California. https://data.census.gov/cedsci/table?q=california%20income.
[215] CARB. Priority Populations — California Climate Investments. https://www.caclimateinvestments.ca.gov/priority-populations.
[216] CPUC. CARE/FERA Program. https://www.cpuc.ca.gov/lowincomerates/.
[217] California Department of Community Services and Development. Low Income Household Water Assistance Program. https://www.csd.ca.gov/lihwap.
[218] CPUC. California Climate Credit - FAQ. https://www.cpuc.ca.gov/industries-and-topics/natural-gas/greenhouse-gas-cap-and-trade-program/california-climate-credit/california-climate-credit---faq.

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Table 3-3: Percentage of households in each race/ethnicity category by household income group

Household Income Group ($2021)	Households in Income Group (%)							
	White Not Hispanic	Hispanic	Black Alone	Asian Alone	Native HI or Pacific Islander	American Indian or Alaskan Native	Other	Two or More
Less than $50,000	26	35	45	25	30	35	37	32
$50,000 to $100,000	25	32	27	21	31	33	33	30
$100,000 to $200,000	29	25	21	30	30	26	24	27
More than $200,000	19	7	7	24	9	7	5	11

Natural and Working Lands

The macroeconomic impact of the NWL scenario was evaluated separately in the REMI PI+ model. For the Scoping Plan Scenario, the macroeconomic impact was modeled by assuming that economic activity in the relevant industries grows in proportion to the proposed implementation spending in that industry. All funds for implementing the actions were assumed to be sourced from within the state. For urban forests, the funds were modeled as being sourced from a combination of state government and private property owners in proportion to the current estimated private/public spending ratio. For all other actions, funds were assumed to be sourced from the state government. In each modeled scenario, government spending and income to property owners were reduced relative to the Reference Scenario in proportion to the annual costs of implementation. None of the proposed spending was modeled as being sourced from increased taxes. Additional details on the methodology for evaluating macroeconomic impacts are in Appendix I (NWL Technical Support Document).

While the macroeconomic model does count the increased economic activity in the affected industries as part of GSP, it does not quantify many of the important economic, health, and environmental benefits that would occur if these actions were implemented. While these benefits—like the reduced use of pesticides, value of urban trees, and increased recreational opportunities—would be very significant, they are outside the scope of the macroeconomic model.

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The macroeconomic model also makes projections about the total level of employment in the state. The model forecasts that the Scoping Plan Scenario, which greatly increases the level of NWL management actions, channels economic activity toward related industries and would lead to a slight increase in total employment. (Table 3-4). While the model does aim to accurately represent many labor market dynamics, including adjustments of wages and migration rates, it does not account for many costs that might be associated with dramatically scaling up employment in a particular industry, such as the cost of job training.

Table 3-4: Gross state product and employment relative to a growing California economy for the Scoping Plan Scenario in 2035 / 2045 (NWL)

	Scoping Plan Scenario (%)
Gross State Product	0.00 / 0.01
Employment	0.12 / 0.10
Personal Income	-0.04 / -0.04
Personal Income per Capita	-0.04 / -0.14

Health Analysis

Air quality is affected by pollutant emissions from various processes associated with energy systems, including the combustion of fossil fuels, as well as the combustion of vegetation biomass from NWL during wildfires. Pollutants that are important contributors to degraded air quality in California include nitrogen oxides (NO_x), particulate matter (PM), reactive organic gases (ROG), and others. Further, in the atmosphere these pollutants are transported away from the locations of the emissions by wind and other phenomena, and undergo chemical reactions that result in the formation of new pollutants such as ground-level ozone and fine particulate matter ($PM_{2.5}$). Both primary (emitted) and secondary (formed) pollutants are important from a public health standpoint and contribute to the incidence of air pollution-related mortality and disease within California populations. Measures focused on GHGs do not incorporate specific targets to reduce emissions of $PM_{2.5}$ or air toxics like benzene. These co-pollutants, which are emitted from many of the same pollution sources as GHGs, affect local air quality and pose known risks to public health, such as the risk of asthma and cardiovascular disease. Generally, for stationary sources, certain harmful pollutants are regulated via local rules and regulations that are reflected in permits for stationary sources and are enforced by local air districts, with CARB also regulating air toxics contaminants from stationary sources with the air districts.

AB 32 GHG Inventory Sectors

To assess health impacts for the AB 32 GHG Inventory sectors, an integrated modeling approach was used to quantify and value the air pollution-related public health benefits of the Scoping Plan Scenario relative to the Reference Scenario. Additional details about the models, assumptions, and methodology are included in Appendix H (AB 32 GHG Inventory Sector Modeling). Using output from the PATHWAYS model, projections of pollutant emissions to 2045 were developed for stationary, area, and mobile source emissions using a detailed base year CARB pollutant emissions inventory. Further, the emissions are processed, including for where and when they occur in California, using the Sparse Matrix Operator Kernels Emissions (SMOKE) model. For example, on-road vehicle emissions were allocated along existing roadways, and refining emissions were assigned to the locations of existing refineries. It should be noted that the emissions projections represent statewide average reductions associated with high-level assumptions about alternative fuels and technologies. For example, emissions occurring from refineries to produce liquid fuels are reduced in line with petroleum demand. This reduction is applied equally to all refineries in the Scoping Plan Scenario and does not specify individual facility responses to changing demand. Similarly, the Scoping Plan Scenario does not specify which refineries transition to biofuel production or where new electricity generation facilities are built.

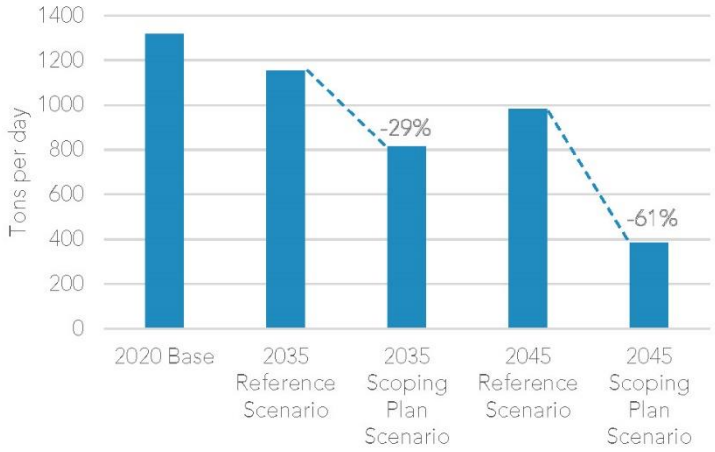
Next, emission changes were translated into impacts on atmospheric pollution levels, including ground-level ozone and $PM_{2.5}$, via an advanced photochemical air quality model called the Community Multiscale Air Quality (CMAQ) model, which accounts for atmospheric chemistry and transport. A comprehensive assessment of how pollutant concentrations are impacted throughout the year was achieved by simulating all months in 2035 and 2045 for the Scoping Plan Scenario.[219] Health benefits were estimated using the U.S. EPA's environmental Benefits Mapping and Analysis Program (BenMAP) model to translate pollutant changes into avoided incidence of mortality, hospital admissions, emergency room visits, and other outcomes as a result of reduced exposure to ozone and $PM_{2.5}$. These outcomes are associated with an economic value in order to aggregate health impacts.

The Scoping Plan Scenario shows a substantial reduction in pollutant emissions relative to the Reference Scenario, including NO_x, $PM_{2.5}$, and ROG. Reductions in NO_x are shown in Figure 3-4. Even under a business-as-usual trajectory, emissions are reduced from present levels by 26 percent in 2045 in the Reference Scenario, demonstrating the impact of current regulations and trends in energy sectors. The Scoping Plan Scenario further reduces NO_x

[219] This annual approach differs from the episodic modeling approach applied to the Proposed Scenario and Alternatives in the Draft 2022 Scoping Plan Update. Appendix H (AB 32 GHG Inventory Sector Modeling) describes both approaches.

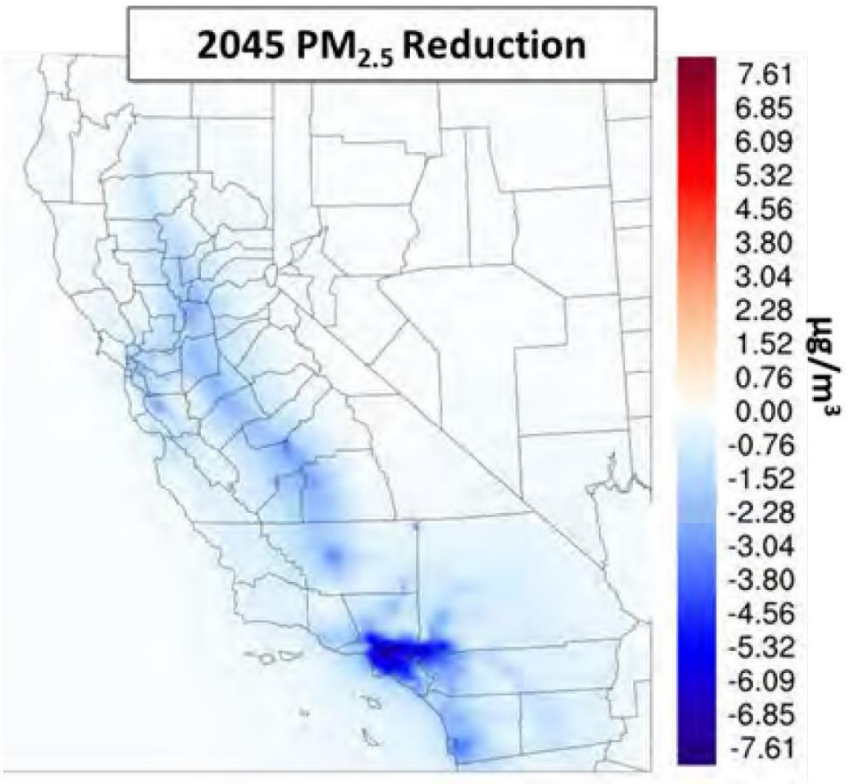
emissions from the Reference Scenario by 29% in 2035 and 61% in 2045. Emission reductions occur throughout the state with particular prominence in urban areas, including the South Coast Air Basin, due to the large presence and activity of emission sources. Appendix H (AB 32 GHG Inventory Sector Modeling) contains additional information about the pollutant emissions modeling and results.

Figure 3-4: Illustration of NOx emission reductions from current levels for the Reference Scenario and the Scoping Plan Scenario (AB 32 GHG Inventory sectors)



The emission reductions achieve important improvements in air quality throughout California, including reductions in the levels of ozone and $PM_{2.5}$. Reductions in annual $PM_{2.5}$ levels are shown in Figure 3-5. The greatest reductions are evident in Southern California, the San Joaquin Valley, the San Francisco Bay area, and the Greater Sacramento area due to the large presence and activity of emission sources, meteorology, topography, and others. To highlight the extent of the air quality improvements: reductions reach nearly 8 micrograms per cubic meter ($\mu g/m^3$) in 2045 and lead to 76% fewer exceedances of the health-based National Ambient Air Quality $PM_{2.5}$ standard of 12 $\mu g/m^3$. Similarly, ozone improvements reach 19 parts per billion (ppb) and yield 62% fewer exceedance events. Furthermore, the locations of improvements carry important implications for human health as these areas support large urban populations and generally experience the most degraded ozone and $PM_{2.5}$ pollution. Appendix H (AB 32 GHG Inventory Sector Modeling) provides details regarding the atmospheric modeling and results, including differences in ozone and $PM_{2.5}$.

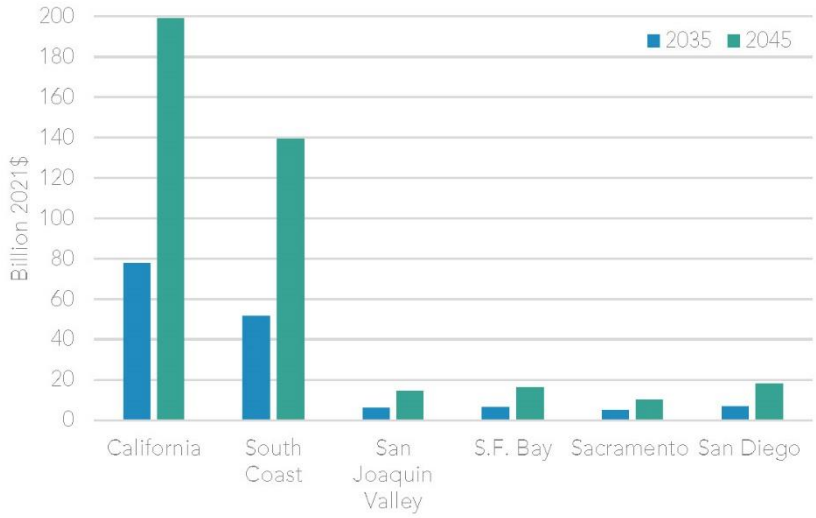
Figure 3-5: Difference in annual average $PM_{2.5}$ ($\mu g/m^3$) in the Scoping Plan scenario relative to the Reference scenario in 2045 (AB 32 GHG Inventory sectors)



Notable health benefits representing the economic value of the avoided incidence of health effects are associated with the Scoping Plan Scenario. In total, the benefits reach $78 billion in 2035 and $199 billion in 2045, as shown in Figure 3-6. Populations in Southern California benefit the most due to preexisting air quality challenges, significant emission sources and activity, and the presence of a large, dense urban population. Additional details regarding the health impact assessment are provided in Appendix H (AB 32 GHG Inventory Sector Modeling).

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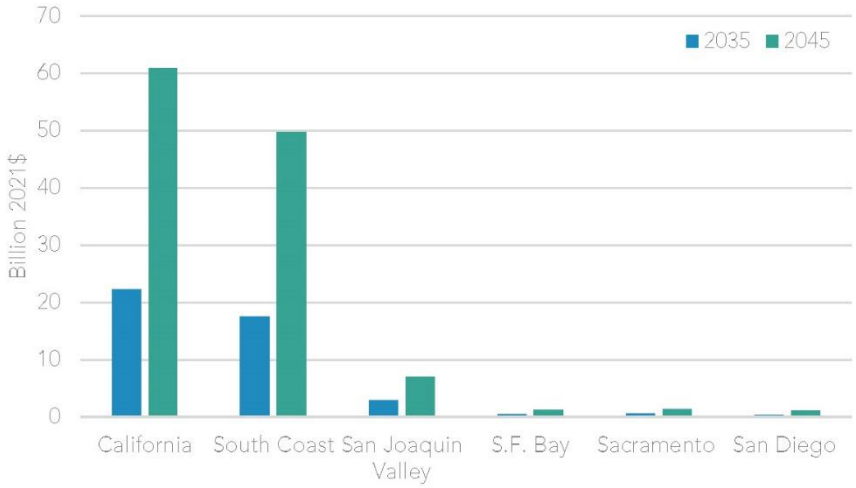
Figure 3-6: Total health benefits estimated from air quality improvements in the Scoping Plan Scenario (AB 32 GHG Inventory sectors)



Furthermore, these benefits accrue within socially and economically disadvantaged communities identified by CalEnviroScreen, where they are most needed. Total health benefits within census tracts identified as disadvantaged communities using CalEnviroScreen 4.0 reach $22 billion in 2035 and $61 billion in 2045, as shown in Figure 3-7. Similarly to the statewide health benefits, the largest share of benefits occurs within disadvantaged communities in Southern California. Additional information on the health benefits within disadvantaged communities can be found in Appendix H (AB 32 GHG Inventory Sector Modeling).

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Figure 3-7: Disadvantaged community health benefits relative to the Reference Scenario for the Scoping Plan Scenario (AB 32 GHG Inventory sectors)

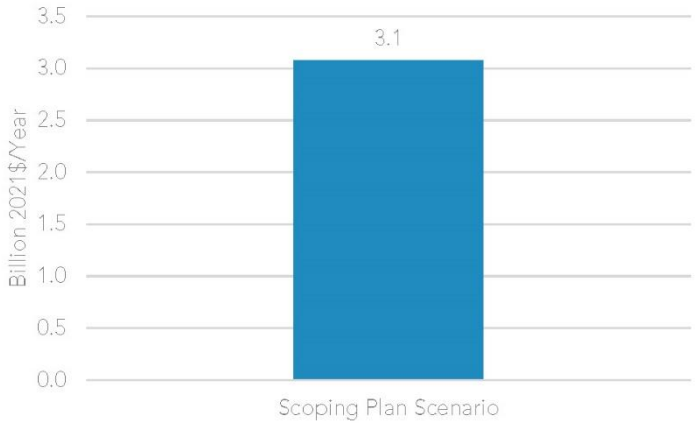


Natural and Working Lands

For NWL, health benefits were evaluated based on projected $PM_{2.5}$ wildfire emissions on forests, shrublands, and grasslands, discussed in the AB 197 Measure Analysis section of the chapter that follows.[220] The health endpoints for the Scoping Plan Scenario and in Appendix I (NWL Technical Support Document) for the alternative scenarios were the basis for the estimated health benefits shown in Figure 3-8. Health benefits were derived from the preliminary University of California, Los Angeles (UCLA) study that estimated annual health impacts and associated costs from California's wildfires from 2008–2018. Additional details are included in Appendix I (NWL Technical Support Document). These costs were applied to the health endpoints discussed in the AB 197 Measure Analysis section of the chapter.

[220] AB 32 EJ Advisory Committee. 2022 Scoping Plan Recommendations, N11, N14. finalejacrecs.pdf (arb.ca.gov).

Figure 3-8: Total average annual health benefits relative to the Reference Scenario for the Scoping Plan Scenario (NWL)



As health impacts analyzed here are driven by wildfire emissions, the health benefits for the Scoping Plan Scenario are directly related to the amount of forest, shrubland, and grassland management action. These management actions reduce vegetation fuels and, as a result, wildfire activity. The Scoping Plan Scenario increases the amount of these management actions, reducing wildfire emissions and avoiding incidence of emission-related health effects. The health benefits, or economic value of the avoided incidence of health effects, correspondingly increase with an increasing management implementation rate. Additional details are included in Appendix I (NWL Technical Support Document).

Estimated health benefits do not include the direct impact of wildfires on injuries, deaths, or mental health, nor the indirect costs of lost ecosystem benefits to wildfire. Additional direct health costs may result from wildfire that would likely increase the health benefits from increased forest, shrubland, and grassland management to reduce wildfire activity. Nonetheless, the conservative health benefits under the Scoping Plan Scenario are estimated to be $3.1 billion per year relative to the Reference Scenario for all NWL actions identified in the Scoping Plan Scenario.

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AB 197 Measure Analysis

This section provides estimates for information associated with GHG emissions reduction measures evaluated in this Scoping Plan.[221] These estimates, which were developed as part of the process for meeting the requirements of AB 197 (E. Garcia, Chapter 250, Statutes of 2016), provide information on the relative impacts of the evaluated measures when compared to each other. To support the design of a suite of policies that result in GHG reductions, air quality co-benefits, and cost-effective measures, it is important to understand if a measure will increase or reduce criteria pollutants or toxic air contaminant emissions, or if increasing stringency at additional costs yields few additional GHG reductions. To this end, AB 197 requires the following for each potential emissions reduction measure evaluated in any Scoping Plan update:

- The range of projected GHG emissions reductions that result from the measure;
- The range of projected criteria pollutant emission reductions that result from the measure; and
- The cost-effectiveness, including avoided social costs, of the measure.

The following sections describe the evaluation of measures for the AB 32 GHG Inventory sectors and NWL. For the purposes of this Scoping Plan, the identified emissions reduction measures for the analysis required by AB 197 are actions grouped by sectors where several policies and programs are expected to overlap. This approach reflects the most granular feasible analysis given the modeling tools available,[222] the overlap and interaction effects among policies and incentive programs, the longer planning horizon used for this Scoping Plan compared to previous efforts, and the scale of transition needed to achieve carbon neutrality. To implement this Scoping Plan, dozens of individual regulations, policies, and incentive programs are anticipated that work together to drive down emissions across all economic sectors and support actions. Every specific policy or incentive program that could contribute to the deployment of clean technology and energy called for in this plan may overlap in ways that make it infeasible to tease out those policies and programs' individual effects with any reasonable degree of certainty. For example, in the transportation sector, deploying ZEVs and reducing driving demand may be achieved through a combination of the implementation of new or existing regulations, fuels programs, incentive programs, and VMT reduction initiatives that can each contribute to reductions in emissions for the sector. It is not feasible to isolate each sub action from each other at this time in terms of the share of contribution to total reductions. The estimated emission

[221] AB 197 calls for the evaluation of "emission reduction measures." This Scoping Plan treats each action and its variants on stringency as emission reduction measures for the purposes of this chapter. Appendix C (AB 197 Measure Analysis) lists the measures and corresponding modeling assumptions for each alternative.
[222] See Appendix H (AB 32 GHG Inventory Sector Modeling and Appendix I (NWL Technical Support Document).

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reductions, health endpoints, and costs by measure for the Scoping Plan Scenario are presented in this chapter, and the corresponding estimates for the Proposed Scenario and Alternatives 1, 2, and 4 are included in Appendix C (AB 197 Measure Analysis).

Because many of the measures and underlying assumptions interact with each other, isolating the GHG emission reductions, corresponding changes to fuel combustion, and associated cost of an individual measure is analytically challenging. Each measure is evaluated by examining the change in fuel combustion, cost, and emissions associated with just that measure using the PATHWAYS model. The difference between the Scoping Plan Scenario and the Reference Scenario is estimated for each measure. Starting from the Scoping Plan Scenario, the modeling assumptions for an individual measure are reverted to the Reference Scenario values, resulting in GHG reductions, changes to fuel combustion, and costs (or savings). This approach does not reflect interactions between sectors in PATHWAYS that influence the results for each complete alternative, presented earlier. As such, the values associated with each measure should not be added to obtain an overall scenario estimate.

To arrive at the 2045 target for NWL, CARB modeled the ecological impact that climate smart land-based management strategies (suites of on-the-ground actions, or *treatments*, that are used across the landscape to manipulate an ecosystem) will have on ecosystem carbon; and whenever possible, additional co-benefits from those actions. The Scoping Plan Scenario incorporates a set of land management actions at varying scales of implementation for each land type to achieve the GHG emission reductions. Each land type, and its associated management actions, was considered a measure for this analysis. For modeling individual landscapes and management actions, CARB used a suite of models. The complexity of these models varies by land type, depending on the existing science, data, and availability of existing models to use. Appendix I (NWL Technical Support Document) provides detailed modeling assumptions for each NWL type. The estimated emission reductions, health endpoints, and costs by measure under the Scoping Plan Scenario for each NWL type are presented in this chapter, and the corresponding estimates for the Proposed Scenario and NWL Alternatives 1, 2, and 4 are included in Appendix C (AB 197 Measure Analysis).

Estimated Emissions Reductions

Both GHG emissions reductions and emissions of criteria air pollutants were evaluated for the AB 32 GHG Inventory sectors and for NWL. The methods and results are described in this section.

AB 32 GHG Inventory Sectors

In the absence of having direct modeling results for criteria pollutant estimates from PATHWAYS, CARB estimated criteria pollutant emissions impacts by using changes in fuel combustion in units of exajoules from PATHWAYS and emission factors in units of tons per exajoule to estimate the change in emissions in tons per year. Emission factors from a variety

of sources for each sector were utilized, including but not limited to CARB's mobile source emissions models,[223] U.S. EPA's AP 42 Emissions Factors,[224] and the South Coast Air Quality Management District's (AQMD's) District Rules.[225] These emission factors were applied to fuel burn change by fuel type, sector, equipment type, and process, where applicable. Statewide annual average emissions were estimated for three criteria pollutants: NO_x, $PM_{2.5}$, and ROG.

Table 3-5 provides the estimated GHG and criteria pollutant emission reductions for the measures in the Scoping Plan Scenario in 2035 and 2045. The other alternatives are presented in Appendix C (AB 197 Measure Analysis). Based on the estimates below, these measures are expected to provide air quality benefits. The estimates provided in this chapter and Appendix C (AB 197 Measure Analysis) are appropriate for comparing across alternatives considered for the development of this Scoping Plan, but they are not precise estimates.

[223] CARB. MSEI - Modeling Tools. https://ww2.arb.ca.gov/our-work/programs/mobile-source-emissions-inventory/msei-modeling-tools.
[224] U.S EPA. AP-42: Compilation of Air Emissions Factors. https://www.epa.gov/air-emissions-factors-and-quantification/ap-42-compilation-air-emissions-factors.
[225] South Coast AQMD. South Coast AQMD Rule Book. https://www.aqmd.gov/home/rules-compliance/rules/scaqmd-rule-book.

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Table 3-5: Estimated GHG and criteria pollutant emission reductions relative to the Reference Scenario for the Scoping Plan Scenario in 2035/2045 (AB 32 GHG Inventory sectors)

Measure	GHG Reductions ($MMTCO_2$)	NOx Reductions (Short Tons/Year)	$PM_{2.5}$ Reductions (Short Tons/ Year)	ROG Reductions (Short Tons/Year)
Deploy ZEVs and reduce driving demand	-46 / -84	-51,620 / -122,806	-2,008 / -6,506	-18,967 / -30,410
Coordinate supply of liquid fossil fuels with declining California fuel demand	-25 / -30	-1,601 / -2,707	-978 / -1,705	-747 / -1,323
Generate clean electricity	-8 / -31	-92 / -1,555	-177 / -1,382	-41 / -425
Measure	**GHG Reductions ($MMTCO_2$)**	**NOx Reductions (Short Tons/Year)**	**$PM_{2.5}$ Reductions (Short Tons/ Year)**	**ROG Reductions (Short Tons/Year)**
Decarbonize industrial energy supply	-9 / -22	-21,172 / -34,876	-1,188 / -2,527	-3,710 / -6,298
Decarbonize buildings	-14 / -35	-8,105 / -94,455	-826 / -6,877	-1,093 / -8,109
Reduce non-combustion emissions[a]	-0.41 / -0.52 ($MMTCH_4$)	N/A	N/A	N/A
Compensate for remaining emissions	-25 / -64	N/A	N/A	N/A

[a] Methane emissions reductions are reported for this measure.

The measures related to reducing non-combustion emissions and compensating for the remaining emissions do not include changes to fuel combustion, and therefore are not

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associated with changes to air pollutants. Biomethane combustion is captured in measures that reduce combustion of fossil gas, such as decarbonizing industrial energy supply and buildings.

Natural and Working Lands

NWL ecosystems naturally vary between being a source and a sink for carbon over time. The NWL ecosystem carbon stock changes projected through mid-century by the suite of models were used to estimate net emissions or emissions reductions relative to the Reference Scenario. These changes in carbon stocks were affected by projected climate change, the implementation of management actions under the various scenarios, land conversion, and (for forests, shrublands, grasslands) wildfire. Each NWL type was evaluated, and an overview of all NWL is presented in Table 3-6. More detailed results for each NWL type can be found in Appendix C (AB 197 Measure Analysis).

Table 3-6: Estimated average annual GHG and criteria pollutant emission reductions relative to the Reference Scenario for the Scoping Plan Scenario from 2025–2045 (NWL)

Measure	GHG Reductions ($MMTCO_2e$/year)	$PM_{2.5}$ Reductions (MT/Year)
Forests/Shrublands/Grasslands	-0.12	-17,500
Annual Croplands	-0.25	N/A
Perennial Croplands	-0.01	N/A
Urban Forest	-1.29	N/A
Wildland Urban Interface (WUI)	0.75	N/A
Wetlands	-0.43	N/A
Sparsely Vegetated Lands	<-0.01	N/A

Fine particulate wildfire emissions were evaluated for forests, shrublands, and grasslands only. Wildfire emissions decreased under the Scoping Plan Scenario compared to the Reference Scenario. The Scoping Plan Scenario's higher level of management actions that reduce tree or shrub densities, protect large trees, reintroduce fire to the landscape, and diversify species and structures result in greater reductions in wildfire emissions.

Estimated Health Endpoints

Climate change mitigation will result in both environmental and health benefits. This section provides information about the potential health benefits of the Scoping Plan Scenario. Health benefits are primarily the result of reduced $PM_{2.5}$ pollution, both from stationary and mobile sources, as well as wildfire in forests, shrublands, and chaparral.

AB 32 GHG Inventory Sectors

CARB used the criteria pollutant emissions in Table 3-5 to understand potential health impacts. Similar to the air quality estimates, this information should be used to understand the relative health benefits of the various measures and should not be taken as absolute estimates of health outcomes. CARB used the incidence-per-ton (IPT) methodology to quantify the health benefits of emission reductions. The IPT methodology is based on a methodology developed by the U.S.

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EPA.[226,227,228,229] Under the IPT methodology, changes in emissions are approximately proportional to the resulting changes in health outcomes. IPT factors are derived by calculating the number of health outcomes associated with exposure to $PM_{2.5}$ for a baseline scenario using measured ambient concentrations and dividing that number by the emissions of $PM_{2.5}$ or a precursor. To estimate the reduction in health outcomes, the emission reductions are multiplied by the IPT factor. For future years, the number of outcomes is adjusted to account for population growth. IPT factors were computed for the two types of $PM_{2.5}$: primary $PM_{2.5}$ and secondary $PM_{2.5}$ of ammonium nitrate aerosol formed from precursors.

For this AB 197 analysis, CARB calculated the health benefits associated with the five key measures that are represented by changes to fuel combustion. The health benefits associated with emission reductions for the Scoping Plan Scenario were estimated for each air basin and then aggregated for the entire state of California. CARB assumed that the statewide emission reductions distribution among the air basins is proportional to the baseline emissions in that air basin.

Calculated health endpoints include premature mortality, cardiovascular emergency department (ED) visits, acute myocardial infarction, respiratory ED visits, lung cancer incidence, asthma onset, asthma symptoms, work loss days, hospitalizations due to cardiopulmonary illnesses, hospitalizations due to respiratory illnesses, hospital admissions for Alzheimer's disease, and hospital admissions for Parkinson's disease.[230,231,232] These health endpoints were calculated using the IPT method for estimated emission reductions. Table 3-7 compares the health benefits of emission reductions associated with each measure for the Scoping Plan Scenario in the year

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[226] CARB. CARB's Methodology for Estimating the Health Effects of Air Pollution. Retrieved February 9, 2021. https://ww2.arb.ca.gov/resources/documents/carbs-methodology-estimating-health-effects-air-pollution.

[227] Fann, N., C. M. Fulcher, and B. J. Hubbell. 2019. "The influence of location, source, and emission type in estimates of the human health benefits of reducing a ton of air pollution." *Air Quality, Atmosphere & Health* 2:169–176. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2770129/.

[228] Fann, N., K. R. Baker, and C. M. Fulcher. 2012. "Characterizing the $PM_{2.5}$-related health benefits of emission reductions for 17 industrial, area and mobile emission sectors across the U.S." *Environ Int*. 49:141–51. November 15. https://www.sciencedirect.com/science/article/pii/S0160412012001985.

[229] Fann, N., K. Baker, E. Chan, A. Eyth, A. Macpherson, E. Miller, and J. Snyder. 2018. "Assessing Human Health $PM_{2.5}$ and Ozone Impacts from U.S. Oil and Natural Gas Sector Emissions in 2025." *Environ. Sci. Technol.* 52 (15), 8095–8103. https://pubs.acs.org/doi/abs/10.1021/acs.est.8b02050.

[230] CARB. CARB's Methodology. https://ww2.arb.ca.gov/resources/documents/carbs-methodology-estimating-health-effects-air-pollution.

[231] CARB. 2022. Updated Health Endpoints in CARB's Health Benefits Methodology. Evaluating New Health Endpoints for Use in CARB's Health Analyses.

[232] Cardio-pulmonary mortality, hospitalizations due to cardiopulmonary illnesses, and hospital admissions due to respiratory illnesses endpoints utilize studies documented in CARB's methodology document. For future assessments, CARB will use more recent studies to estimate cardiovascular hospital admissions and respiratory hospital admissions, as documented in CARB's updated health endpoints memo.

specified (2035 or 2045). The other alternatives are presented in Appendix C (AB 197 Measure Analysis).

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Table 3-7: Estimated avoided incidence of mortality, cardiovascular and respiratory disease onset, work loss days and hospital admissions relative to the Reference Scenario for the Scoping Plan Scenario (AB 32 GHG Inventory sectors)

Measure	Mortality	Cardiovascular ED Visits	Acute Myocardial Infarction	Respiratory ED Visits	Lung Cancer Incidence	Asthma Onset	Asthma Symptoms	Work Loss Days	Hospital Admissions, Cardiovascular	Hospital Admissions, Respiratory	Hospital Admissions, Alzheimer's Disease	Hospital Admissions, Parkinson's Disease
Deploy ZEVs and reduce driving demand in 2035	635	170	70	400	45	1,475	128,930	92,510	95	115	245	40
Deploy ZEVs and reduce driving demand in 2045	1,820	475	200	1,115	135	3,995	343,095	255,800	295	350	745	125
Coordinate supply of liquid fossil fuels with declining CA fuel demand in 2035	115	30	15	70	10	275	23,530	16,880	20	20	50	10

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Measure	Mortality	Cardiovascular ED Visits	Acute Myocardial Infarction	Respiratory ED Visits	Lung Cancer Incidence	Asthma Onset	Asthma Symptoms	Work Loss Days	Hospital Admissions, Cardiovascular	Hospital Admissions, Respiratory	Hospital Admissions, Alzheimer's Disease	Hospital Admissions, Parkinson's Disease
Coordinate supply of liquid fossil fuels with declining CA fuel demand in 2045	215	55	25	130	15	490	40,860	30,445	35	40	95	15
Generate clean electricity in 2035	20	5	0	10	0	45	3,930	2,820	5	5	10	0
Generate clean electricity in 2045	170	45	20	105	15	385	32,065	23,890	25	30	75	10
Decarbonize industrial energy supply in 2035	300	80	35	190	20	695	60,660	43,520	45	55	115	20
Decarbonize industrial energy supply in 2045	595	155	65	365	45	1,310	111,925	83,435	95	115	245	40

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Measure	Mortality	Cardiovascular ED Visits	Acute Myocardial Infarction	Respiratory ED Visits	Lung Cancer Incidence	Asthma Onset	Asthma Symptoms	Work Loss Days	Hospital Admissions, Cardiovascular	Hospital Admissions, Respiratory	Hospital Admissions, Alzheimer's Disease	Hospital Admissions, Parkinson's Disease
Decarbonize buildings in 2035	155	40	15	95	10	360	31,130	22,335	25	30	60	10
Decarbonize buildings in 2045	1,610	420	175	985	120	3,550	303,830	226,500	260	310	665	115
Note: All values are rounded to the nearest 0 or 5.												

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The measures related to reducing non-combustion emissions and compensating for remaining emissions do not include changes to fuel combustion and therefore are not associated with changes to air pollutants or health endpoints. Biomethane combustion is captured in measures that reduce combustion of fossil gas, such as decarbonizing industrial energy supply and buildings.

Although the estimated health outcomes presented are based on a well-established methodology, they are subject to uncertainty. For instance, future population estimates are subject to increasing uncertainty as they are projected further into the future, and baseline incidence rates can experience year-to-year variation. Also, the relationship between changes in pollutant concentrations and changes in pollutant or precursor emissions is assumed to be approximately proportional.

In addition, emissions are reported at an air basin level and do not capture local variations. These estimates also do not account for impacts from global climate change, such as temperature rise, and are only based on the scenarios in this Scoping Plan.

The fuel changes for each AB 197 measure are estimated based on the impact of each measure compared to the Reference Scenario for the years 2035 and 2045. Therefore, aggregating the effect of each measure would overestimate the impacts of the Scoping Plan Scenario because the implementation of each measure would affect the level of benefits of the other measures. This measure-by-measure analysis uses a different methodology for calculating health endpoints than does the health analysis for the complete Scoping Plan Scenario provided earlier.

Natural and Working Lands

Implementation of NWL management strategies to mitigate and adapt to climate change will result in both environmental and health benefits. This section provides information about the potential health benefits of measures evaluated for the Scoping Plan Scenario. For this analysis, health benefit estimates were focused on increases or decreases to $PM_{2.5}$ resulting from wildfire emissions on forests, shrublands, and grasslands.[233] Other health benefits resulting from NWL management actions in the Scoping Plan Scenario are not quantified here but are important for all Californians. This includes, but is not limited to, reductions in exposure to synthetic pesticides when switching to organic agricultural systems, improvements in shade availability and mental health with increasing urban forest cover, improved mental health from opportunities for recreation in resilient and healthy environments, and protection from floods and rising sea levels.

[233] AB 32 EJ Advisory Committee. 2022 Scoping Plan Recommendations, N11, N14. finalejacrecs.pdf (arb.ca.gov).

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These examples are by no means exhaustive, as our natural and working lands provide immense health benefits to everyone.

For this analysis, CARB used the $PM_{2.5}$ emissions in Table 3-6 to understand potential health impacts. This information should be used to understand the relative health endpoints of the various measures and should not be taken as absolute estimates of health outcomes of this Scoping Plan statewide or within a specific community. The IPT methodology was used to calculate health endpoints, similar to the AB 32 GHG Inventory Sector analysis. CARB calculated the annual health endpoints associated with the wildfire emissions changes resulting from the implementation of management strategies on forests, shrublands, and grasslands under each alternative. The annual health endpoints associated with emission reductions for the Scoping Plan Scenario were estimated for the entire state. Calculated health endpoints include emissions-caused mortality, hospital admittance, and emergency room visits from asthma; hospital admittance from chronic obstructive pulmonary disease; and emergency room visits from respiratory and cardiovascular outcomes. Table 3-8 compares the average annual health endpoints of wildfire emission reductions associated with the Scoping Plan Scenario over the period 2025–2045. The other alternatives are presented in Appendix C (AB 197 Measure Analysis).

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Table 3-8: Estimated average annual avoided incidence of hospital admissions, emergency room visits, and mortality relative to the Reference Scenario for the Scoping Plan Scenario resulting from forest, shrubland, and grassland wildfire emissions (NWL)

Health Endpoints from Forest, Shrubland, and Grassland Wildfire Emissions	Average Annual Avoided Incidence
Hospital admissions from asthma	22
Hospital admissions from chronic obstructive pulmonary disease without asthma	19
Hospital admissions from all respiratory outcomes	63
Emergency room visits from asthma	155
Emergency room visits from all respiratory outcomes	419
Emergency room visits from all cardiovascular outcomes	156
All causes of mortality	394

Estimated Social Cost

Social costs are generally defined as the cost of an action on people, the environment, or society and are widely used to understand the impact of regulatory actions. One tool, the social cost of greenhouse gases (SC-GHG), is an estimate of the present value of the costs associated with the emission of GHGs in future years. It combines climate science and economics to help understand the benefits of reducing GHG emissions. The estimates of the social cost of carbon (SC-CO_2) and social cost of methane (SC-CH_4), two types of SC-GHGs presented here, estimate the value of the net harm to society associated with adding GHGs to the atmosphere in a given year; they do not represent the cost of actions taken to reduce GHG emissions (known as the *cost of abatement*) nor the cost of GHG emissions reductions. In principle, the SC-GHG includes the value of climate change impacts, including but not limited to, changes in net agricultural productivity, human health effects, property damage from increased flood risk and other natural disasters, disruption of energy systems, risk of conflict, environmental migration, and the value of ecosystem services. It reflects the societal value of reducing emissions

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of the gas in question by one metric ton.[234] Many of these damages from GHG emissions today will affect economic outcomes throughout the next several centuries.

In 2008, federal agencies began incorporating SC-CO_2 estimates into the analysis of their regulatory actions. U.S. EPA has used various models and discount rates to determine the value of future impacts. Generally, these models begin with assumptions to predict economic activity over time, along with projected GHG emissions. The modeled emissions are input into a model of the global climate system, which then translates into estimates of surface temperature, sea level rise, and other impacts. These outputs are used to estimate economic damages per ton of GHG emitted in a given year in the future. Since the models are calculating the present value of future damages, a discount rate is applied. For example, the SC-CO_2 for the year 2045 represents the value of climate change damages from a release of CO_2 in 2045 discounted back to today. The present value is significantly affected by the discount rate used; a higher discount rate results in a lower present value. For example, in 2021 dollars the SC-CO_2 in 2045 is $31 using a 5 percent discount rate, $88 using a 3 percent discount rate, and $122 using a 2.5 percent discount rate. Additional detail is included in Appendix C (AB 197 Measure Analysis).

The 2017 Scoping Plan utilized SC-CO_2 and SC-CH_4 Obama Administration-era values developed by the Council of Economic Advisors and the Office of Management and Budget-convened Interagency Working Group on the Social Cost of Greenhouse Gases (IWG)[235] to consider the social costs of actions to reduce GHG emissions. The Biden Administration reinstated these values in February 2021,[236] after they had been rescinded and significantly revised by the Trump Administration. The reinstatement was considered an interim step, and the Biden Administration also reconvened the IWG to continue its work to evaluate and incorporate the latest climate science and economic research and

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[234] U.S. Government. Interagency Working Group on Social Cost of Greenhouse Gases. February 2021. Technical Support Document: Social Cost of Carbon, Methane, and Nitrous Oxide – Interim Estimates under Executive Order 13990. https://www.whitehouse.gov/wp-content/uploads/2021/02/TechnicalSupportDocument_SocialCostofCarbonMethaneNitrousOxide.pdf

[235] Originally titled the "Interagency Working Group on the Social Cost of Carbon," the IWG was renamed in 2016. 82 Fed. Reg. 16093, 16095-96 (Mar. 28, 2017). https://www.govinfo.gov/content/pkg/FR-2017-03-31/pdf/2017-06576.pdf.

[236] Protecting Public Health and the Environment and Restoring Science to Tackle the Climate Crisis, Executive Order 13990 (Jan. 20, 2021), 86 Fed. Reg. 7037 (Jan. 25, 2021). https://www.energy.gov/sites/default/files/2021/02/f83/eo-13990-protecting-public-health-environment-restoring.pdf. IWG, Technical Support Document: Social Cost of Carbon, Methane, and Nitrous Oxide Interim Estimates Under Executive Order 13990 (February 2021), https://www.whitehouse.gov/wp-content/uploads/2021/02/TechnicalSupportDocument_SocialCostofCarbonMethaneNitrousOxide.pdf See also, The White House. 2021. A Return to Science: Evidence-Based Estimates of the Benefits of Reducing Climate Pollution. https://www.whitehouse.gov/ceq/written-materials/2021/02/26/a-return-to-science-evidence-based-estimates-of-the-benefits-of-reducing-climate-pollution/.

respond to the National Academies' recommendations from 2017 as it develops a more complete revision of the estimates.

It is important to note that the models used to produce SC-GHG estimates do not include all of the important physical, ecological, and economic impacts of climate change recognized in the climate literature. There are additional costs to society, including the costs associated with changes in co-pollutants and costs that cannot be included due to modeling and data limitations. The IWG has stated that the range of the interim SC-GHG estimates likely underestimates societal damages from GHG emissions.[237] The revised estimates were originally slated to be released in early 2022 but were stalled.[238] CARB staff is applying the interim values presented in the IWG February 2021 Technical Support Document (TSD), which reflect the best available science in the estimation of the socioeconomic impacts of GHGs.[239] This Scoping Plan utilizes the TSD standardized range of discount rates, from 2.5 to 5 percent, to represent varying valuation of future damages.

AB 32 GHG Inventory Sectors

Table 3-9 presents the estimated social cost, in terms of avoided economic damages, for each measure of the Scoping Plan Scenario. For each measure, Table 3-9 includes the range of the SC-CO_2 and SC-CH_4 that results from the GHG emissions reductions in 2035 and 2045 at 2.5 and 5 percent discount rates. Additional background on the SC-GHG and methodology for calculating the SC-CO_2 and SC-CH_4 estimates in this Scoping Plan, as well as estimates for the alternatives, are provided in Appendix C (AB 197 Measure Analysis).

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[237] Interagency Working Group on Social Cost of Greenhouse Gases. 2021. Technical Support Document. https://www.whitehouse.gov/wp-content/uploads/2021/02/TechnicalSupportDocument_SocialCostofCarbonMethaneNitrousOxide.pdf

[238] See *Louisiana v. Biden* (W.D. La. 2022) 585 F.Supp.3d 840, stayed pending review (5th Cir. Mar. 16, 2022) 2022 WL 866282. A federal district court ruling issued in early February 2022 had granted a preliminary injunction blocking the Biden Administration from using the interim IWG SC-GHG estimates. However, a federal appeals court overturned the lower court's preliminary injunction in March 2022, which allows the Biden Administration to continue using the policy as legal proceedings continue. CARB will continue to monitor the litigation. However, the federal action does not prohibit CARB from using social cost of carbon and CARB will use the best available science regardless of politics. A separate federal appeals court upheld the Biden administration's use of the IWG SC-GHG estimates in October 2022. *Missouri v. Biden* (8th Cir. 2022) ____ F.4th ____.

[239] Interagency Working Group on Social Cost of Greenhouse Gases. 2021. Technical Support Document. https://www.whitehouse.gov/wp-content/uploads/2021/02/TechnicalSupportDocument_SocialCostofCarbonMethaneNitrousOxide.pdf

Table 3-9: Estimated social cost (avoided economic damages) of measures considered in the Scoping Plan Scenario (AB 32 GHG Inventory sectors)

Measure	Social Cost of Carbon in 2035, 5%–2.5% Discount Rate Billion USD (2021 dollars)	Social Cost of Carbon in 2045, 5%–2.5% Discount Rate Billion USD (2021 dollars)
Deploy ZEVs and reduce driving demand	1.12–4.87	2.64–10.23
Coordinate supply of liquid fossil fuels with declining California fuel demand	0.61–2.63	0.95–3.67
Generate clean electricity	0.20-0.88	0.97–3.75
Decarbonize industrial energy supply	0.23–1.01	0.69–2.67
Decarbonize buildings	0.35–1.52	1.11–4.32
Reduce non-combustion emissions	0.51–1.29 ($SC\text{-}CH_4$)	0.86–2.01 ($SC\text{-}CH_4$)
Compensate for remaining emissions	0.61–2.66	2.03–7.84
Scoping Plan Scenario $SC\text{-}CO_2$	2.4–10.4	5.6–21.9
Scoping Plan Scenario $SC\text{-}CH_4$	0.51–1.3	0.86–2.0
Scoping Plan Scenario (Total)[a]	2.9–11.7	6.5–23.9

[a] CARB staff could not precisely separate some CO_2 and CH_4 from other GHGs from PATHWAYS outputs, but the contribution is believed to be small for purposes of calculating the social cost of carbon. The approach used to estimate GHG emissions reductions for individual measures in PATHWAYS does not reflect cross-sector interactions. Therefore, the GHG values for each measure do not sum to the overall scenario total. The total GHG emissions reduction used in this calculation is 97 $MMTCO_2e$ in 2035 and 180 $MMTCO_2e$ in 2045.

Natural and Working Lands

The $SC\text{-}CO_2$ estimates for the NWL measures shown in Table 3-10, in terms of avoided economic damages, reflect 2021 IWG interim values, updated for inflation, similar to the AB 32 GHG Inventory Sector analysis. This analysis utilizes the 2.5 percent and 5 percent

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discount rate and the average annual emissions reductions from each NWL type from 2025–2045. Estimates for all alternatives are included in Appendix C (AB 197 Measure Analysis).

Table 3-10: Estimated social cost (avoided economic damages) of measures considered in the Scoping Plan Scenario (NWL)

Measure	Social Cost of Carbon in 2035, 5%–2.5% Discount Rate Billion USD (2021 dollars)	Social Cost of Carbon in 2045, 5%–2.5% Discount Rate Billion USD (2021 dollars)
Forests/Shrublands/Grasslands	0.003–0.012	0.004–0.014
Annual Croplands	0.006–0.027	0.008–0.031
Perennial Croplands	<0.001–0.001	0.000–0.001
Urban Forest	0.032–0.138	0.041–0.157
Wildland Urban Interface (WUI)	(0.018) – (0.080)[a]	(0.023) – (0.090)
Wetlands	0.011–0.046	0.014–0.053
Sparsely Vegetated Lands	<0.001	<0.001

[a] Parentheses indicate an increase in estimated social cost, i.e., an increase in economic damages. This is only the case for WUI measures where emissions are increased, shown in Table 3-6. The estimated social cost does not account for the decrease in wildfire risk or decrease in wildfire damages resulting from the WUI measures.

Social Costs of GHGs in Relation to Cost-Effectiveness

AB 32 includes a requirement that rules and regulations "achieve the maximum technologically feasible and cost-effective" greenhouse gas emissions reductions.[240] Under AB 32, ***cost-effectiveness*** means the relative cost per metric ton of various GHG reduction strategies,[241] which is the traditional cost metric associated with emission control. In contrast, the SC-CO_2, SC-CH_4, and social cost of nitrous oxide (SC-N_2O), because they are estimates of the cost to society of additional GHG emissions, can be used to estimate of the economic benefits of reducing emissions, but do not take into account the cost of the actions that must be taken to achieve those GHG emissions reductions.

There may be technologies or policies that do not appear to be cost-effective when compared to the SC-CO_2, SC-CH_4, and SC-N_2O associated with GHG reductions. However, these technologies or policies may result in other benefits that are not reflected in the IWG social costs. Examples include the evaluation of social diversification of the portfolio of transportation fuels (a goal outlined in the Low Carbon Fuel Standard) and reductions in criteria pollutant emissions from power plants (as in the Renewables Portfolio Standard). Additionally, costs for new technology may be higher early on in a technology's development cycle and may drop over time as use of the technology is scaled up.

Estimated Cost per Metric Ton

AB 197 requires an estimation of the cost-effectiveness of the measures evaluated for this Scoping Plan. The cost (or savings)[242] per metric ton of CO_2e reduced for each measure is one metric for comparing the performance of the measures. Additional factors beyond the cost per metric ton that could be considered include continuity with existing laws and policies, implementation feasibility, contribution to fuel diversity and technology transformation goals, and health and other benefits to California. These considerations are not reflected in the cost per metric ton estimates presented below. It is important to understand the relative cost-effectiveness of individual measures as presented in this section. However, the economic analysis presented earlier in this chapter, in Appendix H

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[240] AB 32 Air pollution: greenhouse gases: California Global Warming Solutions Act of 2006. (AB 32, Nuñez, Chapter 488, Statutes of 2006). https://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=200520060AB32.

[241] Health & Saf. Code § 38505(d).

[242] Similarly, to the direct costs reported earlier, the cost per metric ton of a measure reflects the stock costs and any fuel or efficiency savings associated with a measure divided by the GHG emission reduction achieved by the measure. Costs are reported as positive values, and savings are reported as negative values.

(AB 32 GHG Inventory Sector Modeling), and in Appendix I (NWL Technical Support Document) provides a more comprehensive analysis of how the Scoping Plan Scenario and alternative scenarios affect the state's economy and jobs.

AB 32 GHG Inventory Sectors

The cost per metric ton for the AB 32 GHG Inventory sectors was computed for each measure independently relative to the Reference Scenario using the sensitivity calculations based on PATHWAYS and RESOLVE outputs. The difference in the annualized cost between the Scoping Plan Scenario and the Reference Scenario was computed for each measure in 2035 and in 2045. The incremental cost was divided by the incremental GHG emissions impact to calculate the cost per metric ton in each year. To capture the fuel and GHG impacts of investments made from 2022 through 2035, or from 2022 through 2045, CARB computed an average annual cost per metric ton. The incremental cost in each year was averaged over the period. This value is divided by the corresponding annual, incremental GHG impact averaged over the same period.

The cost metric includes the annualized incremental cost of energy infrastructure, such as zero-emission vehicles, electric appliances, and required revenue to support all electric assets. A residual value for equipment such as vehicles or appliances that are retired early is included. The annual fuel cost or avoided fuel cost that results from efficiency improvements or changes to demand for fuels associated with transitioning to alternative fuels is included. Not included in this cost metric are costs that represent transfers within the state, such as incentive payments for early retirement of equipment.

It is important to note that this cost per metric ton does not represent an expected market price value for carbon mitigation associated with these measures. In addition, the values do not capture fuel savings or GHG reductions associated with the full economic lifetime of measures that have been implemented by the target date of 2035 or 2045 but whose impacts extend beyond the target date.

Table 3-11 includes the cost per metric ton and annual average cost per metric ton estimates for the Scoping Plan Scenario. The other alternatives are presented in Appendix C (AB 197 Measure Analysis). Measures that are relatively less costly in 2035 or 2045 are also less costly over the extended period. As noted earlier, incremental costs of new vehicles are generally offset by gains in efficiency and avoided fuel consumption resulting in negative cost per metric ton.

Table 3-11: Estimated cost per metric ton of reduced CO_2e relative to the Reference Scenario for measures considered in the Scoping Plan Scenario (AB 32 GHG Inventory sectors)

Measure	Annual Cost, 2035 ($/ton)	Average Annual Cost, 2022–2035 ($/ton)	Annual Cost, 2045 ($/ton)	Average Annual Cost, 2022–2045 ($/ton)
Deploy ZEVs and reduce driving demand	-171	-99	-103	-122
Coordinate supply of liquid fossil fuels with declining CA fuel demand	60	109	-50	39
Generate clean electricity[a]	101	156	145	161
Decarbonize industrial energy supply	290	217	257	274
Decarbonize buildings	235	230	112	213
Reduce non-combustion emissions	93	94	106	99
Compensate for remaining emissions	745	823	236	485

[a] Note: The denominator of this calculation (2045) does not include GHG reductions occurring outside of California resulting from SB 100. If these reductions were included, this number would be lower.

Natural and Working Lands

The cost per metric ton for NWL measures were computed for the Scoping Plan Scenario relative to the Reference Scenario using the projected carbon stock/sequestration data from the NWL modeling and the direct cost estimates for each management action, described earlier. Direct costs represent the cost of implementing a certain management action. The projected emissions reductions take into account the loss of carbon that results from the management action, such as fuels reduction treatments in forests, as well as climate change effects on growth. The direct cost for each NWL measure was divided by the average annual emission reductions presented in Table 3-6 to produce the cost

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per metric ton. The increasing effect of climate change on diminished future growth reduces the ability of the land to sequester or store carbon, driving up the cost per ton.

It is important to note that this cost per metric ton does not represent an expected market price value for carbon mitigation associated with these measures. In addition, emissions benefits of NWL management actions often take longer time periods to accrue, and these values only capture GHG reductions up to 2045.

Table 3-12 includes the average cost per metric ton estimates for the average annual CO_2e reductions from 2025 through 2045 for the Scoping Plan Scenario. The other alternatives are presented in Appendix C (AB 197 Measure Analysis).

Table 3-12: Estimated average cost per metric ton of reduced CO_2e relative to the Reference Scenario for measures considered in the Scoping Plan Scenario (NWL)

Measure	Average Cost per Reduced Ton CO_2e ($/Ton)
Forests/Shrublands/Grasslands	15,500
Annual Croplands	1,100
Perennial Croplands	412
Urban Forest	3,270
Wildland Urban Interface (WUI)	N/A
Wetlands	64
Sparsely Vegetated Lands	451,000

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Climate Vulnerability Metric

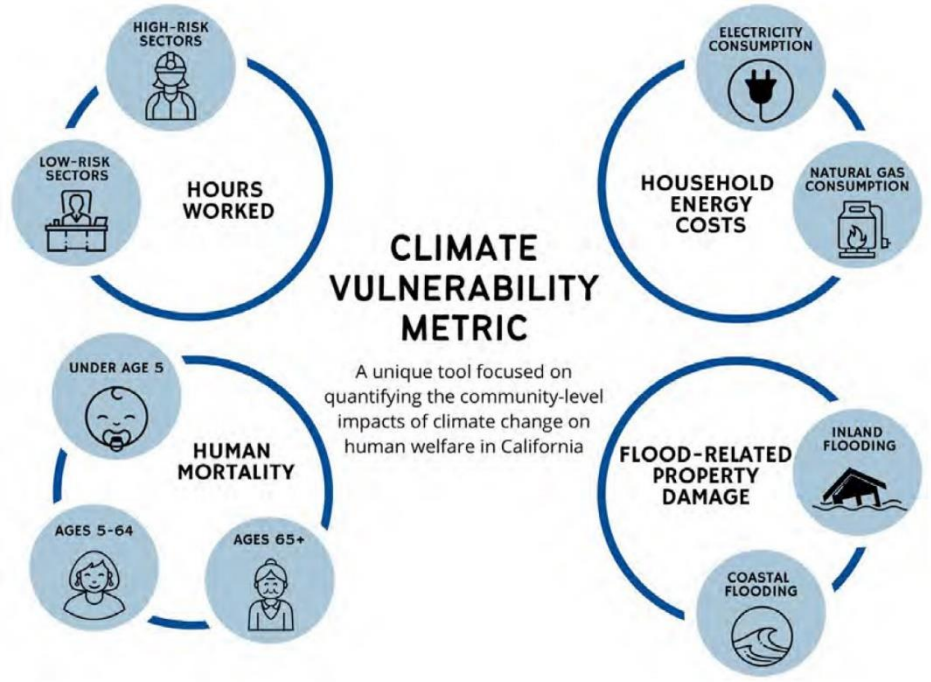
As California invests in climate mitigation and adaptation, it is essential to understand that the relative impact of climate change will vary across the state's communities. Due to persisting health and opportunity gaps, not all communities are equally resilient in the face of climate impacts. A global metric such as the Social Cost of Carbon cannot adequately capture the incremental additional economic impact faced by overly burdened communities. The Climate Vulnerability Metric (CVM) is specifically focused on quantifying the community-level impacts of a warming climate on human welfare and the additional costs. Additional details and results are included in Appendix K (Climate Vulnerability Metric).

The CVM aggregates the impacts of climate change that can be quantified at the census tract level using robust and currently available research. The CVM includes the projected impacts of climate change on human welfare across four categories (hours worked, household energy costs, human mortality, and flood-related property damage) through midcentury. The CVM identifies nine components of the four climate impacts as shown in Figure 3-9 and aggregates the data to generate a total CVM result for each census tract. To ensure that the CVM represents the diversity of California communities, it is reported as the aggregate monetized impact of climate change as a percentage of census tract-specific incomes.[243] For example, a CVM value of 3 implies that by 2050, a census tract is projected to experience human welfare impacts of climate change that amount to 3% of annual income in that tract.

[243] Per capita income in 2019 for census tracts across California ranges from $633 to $176,388, with a median of $32,181 ($2019). Source: American Community Survey.

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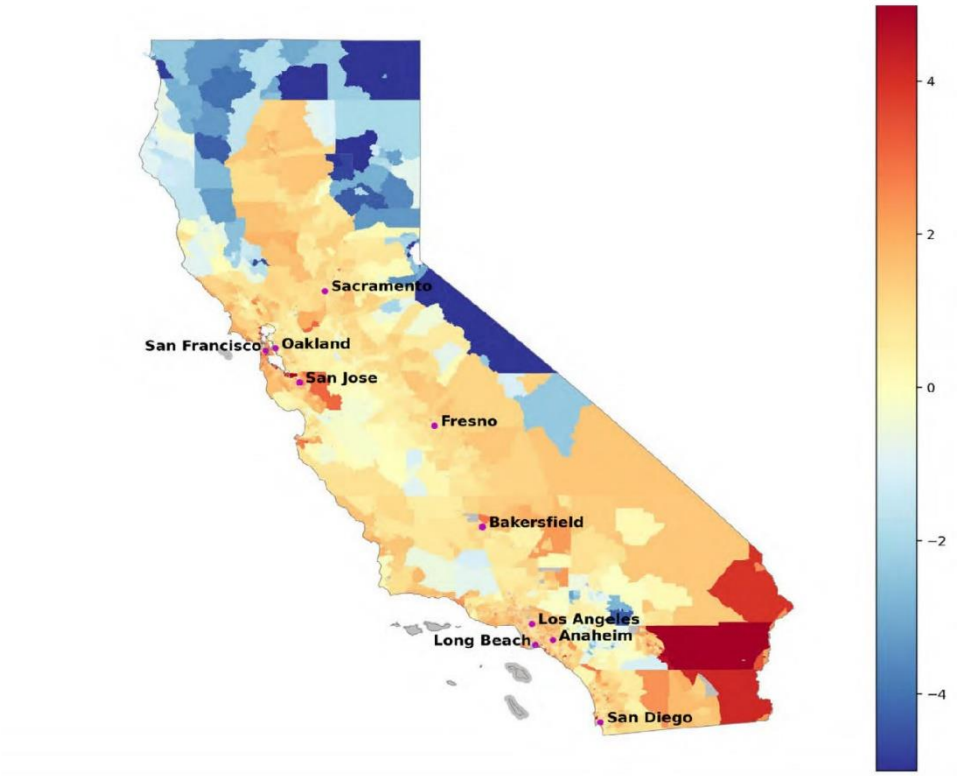
Figure 3-9: Categories of climate change impacts on human welfare included in the Climate Vulnerability Metric.



The CVM shows that climate change will have highly unequal impacts across California. While some southeastern regions of California are estimated to suffer damages that exceed 5% of annual income, other high-elevation northeastern regions of California are estimated to see benefits of up to 10%. Some low-lying urban areas, such as the San Francisco Bay Area, are estimated to be particularly vulnerable, while much of the Central Valley is estimated to suffer at least moderate economic damages relative to the rest of the state. It is important to note that the CVM does not set a threshold for vulnerability. Instead, it shows relative impacts across census tracts. The CVM is limited to the impacts that can currently be quantified at the census tract level.

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Figure 3-10: Combined impacts of climate change in 2050 under a moderate emissions scenario; damages as share of 2019 tract income (%)



The map shows combined impacts of climate change in 2050 under a moderate emissions scenario (RCP 4.5), reported as a share of 2019 census tract income. For example, a CVM value of 3 implies that by 2050, a census tract is projected to experience human welfare impacts of climate change that amount to 3% of annual income. Impacts are combined across the categories shown in Figure 3-9. The higher the CVM for a given census tract, the more damaging the projected impacts of climate change on human welfare. Census tracts with high CVMs are represented by positive percentages in orange and red. A lower CVM is associated with lower projected impacts of climate change, shown in yellow, while a negative CVM value represents a projected beneficial impact of climate change (e.g., through reductions in deaths caused by extremely cold winter weather). Negative CVMs are represented by negative percentages in blue.

By providing information about how climate vulnerability varies across California (Figure 3-10), the CVM results can be used to direct resources to enhance resiliency in the state's

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most vulnerable communities based on the specific impacts, such as heat or flooding, they are experiencing. The CVM may be used in combination with existing screening tools, such as CalEnviroScreen 4.0, to identify communities that face environmental and health hazards that contribute to disproportionate economic impacts in addition to climate vulnerability. The CVM can become an essential source of information to implement this Scoping Plan and build a more resilient, just, and equitable future for all communities.

Public Health

Health Analysis Overview

This section focuses on a broader evaluation of public health and climate change. Science demonstrates that taking action to address climate change presents one of the most significant opportunities to improve public health outcomes.[244] Transitioning to clean energy and technology and improving land and ecosystem management will lead to a much healthier future. Many actions to reduce GHG emissions also have health co-benefits that can improve the health and well-being of populations across the state, as well as address climate change. This section and the accompanying Appendix G (Public Health) provide a qualitative analysis of health benefits to accompany the quantitative health analysis included in this chapter, in Appendix C (AB 197 Measure Analysis), and in Appendix H (AB 32 GHG Inventory Sector Modeling). Together the qualitative and quantitative analyses of benefits are demonstrating the many ways that climate action and health improvements go hand in hand.

Climate change can lead to a wide range of direct health impacts such as increased heat-related illnesses (i.e., heat exhaustion and heat stroke), and injuries and deaths from extreme weather events or disasters (e.g., severe storms, flooding, wildfires). Indirect impacts include:

- more air pollution-related exacerbations of cardiovascular and respiratory diseases (e.g., due to increased smog, wildfire smoke)
- increased vector-borne and fungal diseases due to changes in the distribution and geographic range of disease-carrying species (e.g., mosquitoes, ticks, fungi in dust)
- negative nutritional consequences related to decreases in agricultural food yields
- stress and mental trauma due to extreme weather-related catastrophes
- anxiety, depression, and other mental health impacts associated with gradual changes in the climate (e.g., prolonged drought or temperature shifts affecting jobs and industries) that result in unemployment and income loss

[244] Watts, N., W. N. Adger, P. Agnolucci, et al. 2015. "Health and climate change: Policy responses to protect public health." *Lancet* 386, 1861–1914.

- residential displacement and home loss (e.g., sea level rise impacting coastal communities)

Wildfires and wildfire smoke are one area where we have already seen and expect to see even further drastic impacts on the health of Californians. According to CalFire, since 1932 the top eight largest wildfires in California have occurred in the past five years (2017–2022), with 151 deaths due directly to fires during that period.[245] Researchers estimate that wildfire smoke during fall 2020 may have led to as many as 3,000 excess deaths, with at least 95% of Californians suffering unhealthy levels of particle pollution due to wildfires in 2020.[246] Continued climate change is projected to further increase smoke exposure from wildfires through the end of the century.[247] Wildfires also create a high-risk environment for outdoor workers, including agricultural workers. While the direct medical and physical health impacts are often most noticeable, the psychological impacts can develop and persist well after the event. Estimates indicate that 20%–65% of survivors of extreme weather events have mental health issues following the event.[248]

Extreme heat, drought, and associated worsened air quality impacts are among the most serious climate-related exposures affecting the health of Californians. Numerous studies find a wide range of adverse health effects accompanying extreme heat, including heat stroke and adverse birth outcomes, and find that extreme heat can harm most body systems. Climate change exacerbates air pollution problems that cause difficulty breathing and can lead to serious illness and death in many parts of California. Increasing temperatures cause increases in ozone and other pollution concentrations, including for California's most polluted regions, and heighten health risks for the vulnerable and marginalized populations living in these areas.[249] In 2020, there were 157 ozone polluted days across Los Angeles, Orange, Riverside, and San Bernardino Counties—the most days since 1997. In addition, particulate matter exposure is a heightened problem during

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[245] California Department of Forestry and Fire Protection (CAL FIRE). "Stats and Events." *Cal Fire Department of Forestry and Fire Protection*, https://www.fire.ca.gov/stats-events/.
[246] G-FEED. 2020. Indirect mortality from recent wildfires in CA. http://www.g-feed.com/2020/09/indirect-mortality-from-recent.html.
[247] M. D. Hurteau, A. L. Westerling, C. Wiedinmyer, and B. P. Bryant. 2014. "Projected effects of climate and development on California wildfire emissions through 2100." *Environ. Sci. Technol.* 48, 2298–2304.
[248] American Public Health Association. 2019. Addressing the Impacts of Climate Change on Mental Health and Well-Being. Policy No: 20196. https://www.apha.org/policies-and-advocacy/public-health-policy-statements/policy-database/2020/01/13/addressing-the-impacts-of-climate-change-on-mental-health-and-well-being.
[249] American Lung Association. State of the Air 2021. https://www.lung.org/research/sota.

droughts, which are expected to increase over this century.[250,251] Worse air quality leads to illnesses, emergency room visits, and hospitalizations for chronic health conditions, including chronic obstructive pulmonary disease (COPD), asthma, chronic bronchitis, and other respiratory and cardiovascular conditions, as well as increased risk for respiratory infections, which all result in greater health costs to the state.[252,253,254] These and other climate-related health impacts are discussed in more detail in Appendix G (Public Health).

Health Analysis Components

This Scoping Plan health analysis focuses on the contrast between a California that is still dependent on a fossil fuel-based economy and a California that is transitioned to a carbon-neutral, clean energy future. This qualitative analysis evaluates and demonstrates the broad range of benefits of a dramatic reduction in fossil fuels by 2045 combined with healthier ecosystem management, comparing health outcomes for a "no-action" scenario (Reference) to a "take-action" decarbonization scenario. As this is a qualitative analysis, it looks more broadly at the public health benefits of a drastic reduction in fossil fuel combustion. While this analysis provides scientific evidence for Scoping Plan benefits based on achieving carbon neutrality by 2045, it does not analyze a specific scenario.

The key areas of focus for the analysis are: heat impacts, children's health and development, economic security, food security, mobility and physical activity, urban greening, wildfires and smoke impacts, and housing affordability. For each area of focus, the analysis covers the scientific evidence and compares expected health effects between the Reference and decarbonization scenarios. This analysis looks at the major health outcomes, provides directional effects for each health outcome, and where possible provides information on the strength and scale of health impacts. Some areas include quantitative information where tools are available to measure health outcomes. While the analysis is focused on health outcomes statewide, it also includes discussion

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[250] Cvijanovic, I., B. D. Santer, C. Bonfils, et al. 2017. "Future Loss of Arctic Sea-ice Cover Could Drive a Substantial Decrease in California's Rainfall." 8 *Nat. Commun.* 1947. https://doi.org/10.1038/s41467-017-01907-4.

[251] Williams, A. P., R. Seager, J. T. Abatzoglou, B. I. Cook, J. E. Smerdon, and E. R. Cook. 2015. "Contribution of anthropogenic warming to California drought during 2012–2014." *Geophysical Research Letters* 42(16), 6819–6828.

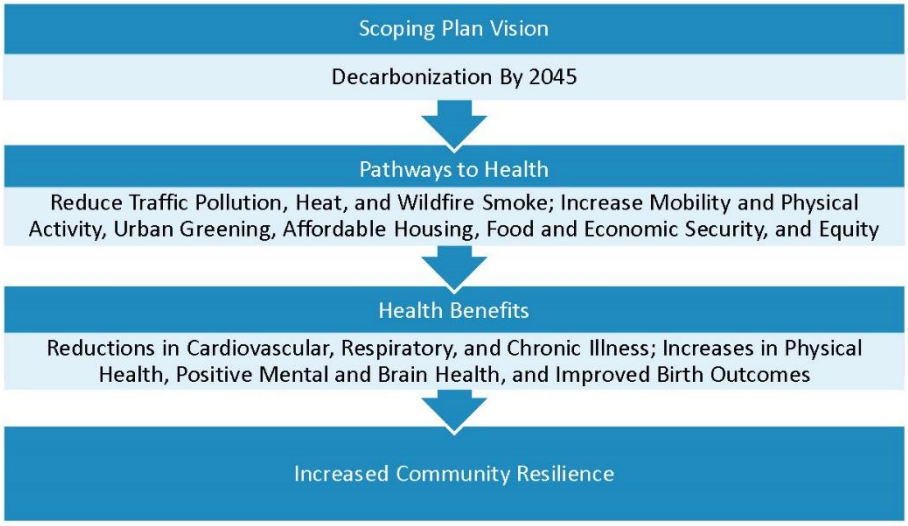
[252] Romley, J. A., A. Hackbarth, and D. P. Goldman. 2010. Cost and Health Consequences of Air Pollution in California. Santa Monica, California. RAND Corp. https://www.rand.org/pubs/research_briefs/RB9501.html.

[253] Wang, M., C. P. Aaron, J. Madrigano, E. A. Hoffman, E. Angelini, J. Yang, A. Laine, et al. 2019. "Association between long-term exposure to ambient air pollution and change in quantitatively assessed emphysema and lung function." *JAMA* 322(6), 546–556.

[254] Inserro, A. 2018."Air Pollution Linked to Lung Infections, Especially in Young Children." *Am. J. Managed Care* (May 6). https://www.ajmc.com/view/air-pollution-linked-to-lung-infections-especially-in-young-children.

of benefits to community health and climate resilience, as well as potential inequities experienced at a community level. Figure 3-11 shows the co-benefit areas covered in this Scoping Plan and the path to health improvements and increased community resilience.

Figure 3-11: Scoping Plan outcome and the path to health improvements



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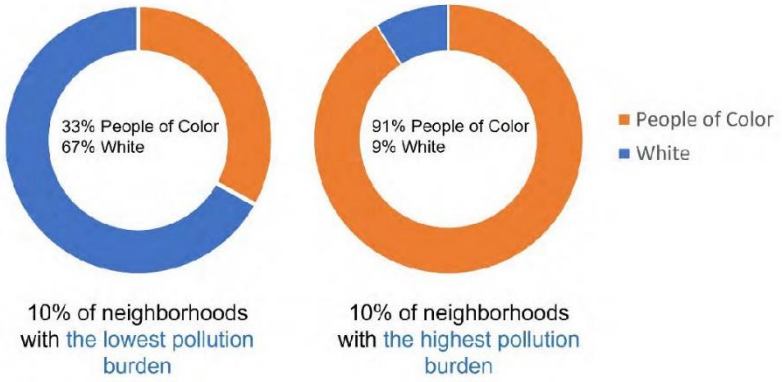
Social and Environmental Determinants of Health Inequities

Communities across the state do not experience exposure to pollution sources and the resulting effects equally. Low-income communities and communities of color (including Black, Latino and Indigenous communities) consistently experience significantly higher rates of pollution and adverse health conditions than others due to factors including historic marginalization rooted in systemic racism. As shown in Figure 3-12, the most impacted neighborhoods according to CalEnviroScreen (CES) are home to very high percentages of people of color while the least impacted neighborhoods are predominantly white. Recent findings show that Black Californians have 19% higher $PM_{2.5}$ exposure from vehicle emissions than the state average, and the census tracts with the highest $PM_{2.5}$ pollution burden from vehicle emissions have a high proportion of people of color.[255] Air pollutant emissions from mobile sources have disproportionate impacts on low-income communities and communities of color due to their proximity.[256] Diesel-fueled vehicles traveling on California's freeways and major roads expose nearby residents to pollution that is linked to lung cancer, hospitalizations and emergency department visits for chronic heart and lung disease, and premature death.[257,258] A combination of historical and social inequities are evident in communities of color disproportionately living close to freeways and other major sources of vehicle pollution. Environmental exposures and contaminants are one component of a broader set of social, economic, and environmental factors that can amplify health conditions, and the combination of all these factors can compound the health effects of individual exposures. This broader set of community factors can be referred to as "cumulative impacts." In addition, specific populations are more sensitive to pollution and face greater susceptibility. This includes young children, older adults, and individuals with existing health conditions.

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[255] Reichmuth, D. 2019. *Inequitable exposure to air pollution from vehicles in California.* https://www.ucsusa.org/resources/inequitable-exposure-air-pollution-vehicles-california-2019.
[256] CARB. 2017. *California's 2017 climate change scoping plan.* https://www.arb.ca.gov/cc/scopingplan/scoping_plan_2017.pdf.
[257] CARB. 2020. Overview: Diesel exhaust & health. https://ww2.arb.ca.gov/resources/overview-diesel-exhaust-and-health.
[258] Kagawa, J. 2002. "Health effects of diesel exhaust emissions—a mixture of air pollutants of worldwide concern." *Toxicology* 181–182:349–353.

Figure 3-12: Least and most impacted neighborhoods from CalEnviroScreen[259]



Social Determinants of Health Inequities

The physical and mental health of individuals and communities is shaped, to a great extent, by the social, economic, and environmental circumstances in which people live, work, play, and learn. According to the World Health Organization, these same circumstances—or social determinants of health—are "mostly responsible for health inequities: the unfair and avoidable differences in health status seen within and between countries." In fact, a strong body of research demonstrates that more than 50 percent of long-term health outcomes are the result of social determinants affecting an individual.[260] Race/ethnicity and socioeconomic status, for example, have been found to amplify impacts from long- and short-term environmental exposures for several health outcomes,

[259] The figure represents the top and bottom decile scoring of CalEnviroScreen census tracts for pollution burden. This chart is modified from Figure 2. Race in the Least and Most Impacted Census Tracts of CalEnviroScreen 4.0 in the Office of Environmental Health Hazard Assessment, California Environmental Protection Agency. Analysis of Race/Ethnicity and CalEnviroScreen 4.0 Scores. 2021. https://oehha.ca.gov/media/downloads/calenviroscreen/document/calenviroscreen40raceanalysisf2021.pdf.

[260] California Department of Public Health (CDPH). 2015. *The Portrait of Promise: The California Statewide Plan to Promote Health and Mental Health Equity*. A Report to the Legislature and the People of California by the Office of Health Equity. Sacramento, California. California Department of Public Health, Office of Health Equity.

such as mortality and birth outcomes.[261,262,263,264] Social factors combine in low-income communities and communities of color to create levels of toxic chronic stress and limit opportunities for healthy food and healthy lifestyles. Social factors also can cause health disparities through psychosocial pathways such as discrimination and social exclusion.[265] While the importance of social determinants is well known, measuring the specific and cumulative impacts of social determinants is challenging.

There are several important tools to evaluate and map cumulative impacts and factors contributing to the results of historical practices such as redlining, and these tools have been used for air quality and climate planning, community protection, and investments. CalEnviroScreen is a tool that maps cumulative pollution burdens and vulnerabilities on a statewide basis and ranks census tracts based on environmental, exposure, population, and socioeconomic indicators. An analysis using CES shows a direct, persistent relationship between exposure to environmental burdens and socioeconomic and health vulnerabilities affecting communities of color and historical redlining practices. OEHHA has evaluated health impacts of certain climate change policies on disadvantaged communities and communities of color utilizing CES rankings.[266] The Healthy Places Index (HPI) maps indicators that affect life expectancy on a statewide basis. In the future, these and other tools can be helpful to prioritizing investments and informing implementation efforts for GHG emission reductions policies.

Environmental Determinants of Health Inequities

Communities with large percentages of Black and other socially vulnerable and marginalized groups are disproportionately located near pollution sources, such as traffic

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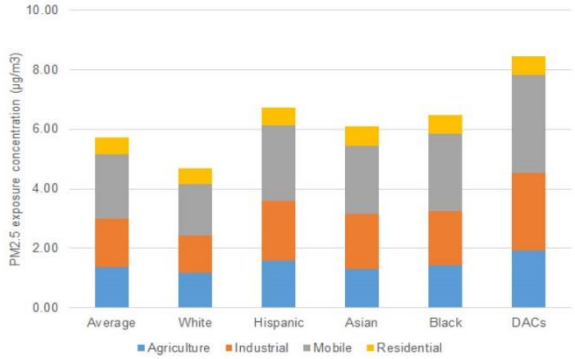
[261] O'Neill, M. S., M. Jerrett, I. Kawachi, J. I. Levy, A. J. Cohen, N. Gouveia, et al. 2003. "Health, wealth, and air pollution: Advancing theory and methods." *Environ Health Perspect.* 111 (16): 1861–70.
[262] Ponce, N. A., K. J. Hoggatt, M. Wilhelm, and B. Ritz. 2005. "Preterm birth: The interaction of traffic-related air pollution with economic hardship in Los Angeles neighborhoods." *Am J Epidemiol.* 162 (2): 140–8.
[263] Morello-Frosch, R., B. Jesdale, J. Sadd, and M. Pastor. 2010. "Ambient air pollution exposure and full-term birth weight in California." *Environ Health.* 9: 44.
[264] Finkelstein, M. M., M. Jerrett, P. DeLuca, N. Finkelstein, D. K. Verma, K. Chapman, et al. 2003. "Relation between income, air pollution, and mortality: A cohort study." *CMAJ.* 169 (5): 397–402.
[265] Clougherty, J., and L. Kubzansky. 2009. "A framework for examining social stress and susceptibility in air pollution and respiratory health." *Environ Health Perspect.* 117 (9): 1351–8.
[266] OEHHA. 2022. *Impacts of Greenhouse Gas Emission Limits Within Disadvantaged Communities.* https://oehha.ca.gov/media/downloads/environmental-justice//impactsofghgpoliciesreport020322.pdf.

and freight facilities, industrial facilities, and hazardous waste sites.[267,268,269,270] Research shows large disparities in exposure to pollution between white and non-white populations in California, and between low-income and communities of color (Figure 3-13). The research also shows Black and Latino populations experience significantly greater air pollution impacts than white populations in California.[271] Additionally, Native Americans are disproportionately impacted by air pollution with high rates of exposure to industrial, diesel, and residential pollution sources and higher rates of diseases linked to air pollution.[272, 273]

[267] Mohai. P., P. M. Lanz, J. Morenoff, J. S. House, and R. P. Mero. 2009. "Racial and socioeconomic disparities in residential proximity to polluting industrial facilities: Evidence from the Americans' Changing Lives Study." *Am J Public Health.* 99 (Suppl 3): S649–56.
[268] Mohai, P., and R. Saha. 2007. "Racial inequality in the distribution of hazardous waste: A national-level reassessment." *Soc Probl.* 54 (3): 343–70.
[269] Morello-Frosch, R., M. Pastor, C. Porras, and J. Sadd. 2002. "Environmental justice and regional inequality in southern California: Implications for future research." *Environ Health Perspect.* 110 (Suppl 2): 149–54.
[270] Gunier, R. B., A. Hertz, J. von Behren, and P. Reynolds. 2003. "Traffic density in California: Socioeconomic and ethnic differences among potentially exposed children. *J Expo Anal Environ Epidemiol.* 13 (3): 240–6.
[271] Apte, J. S., S. E. Chambliss, C. W. Tessum, and J. D. Marshall. 2019. *A Method to Prioritize Sources for Reducing High $PM_{2.5}$ Exposures in Environmental Justice Communities in California.* CARB Research Contract Number 17RD006.
[272] Indigenous People and Air Pollution in the United States. A Report from the National Tribal Air Association and Moms Clean Air Force. 2021. https://7vv611.a2cdn1.secureserver.net/wp-content/uploads/2021/04/indigenousairpollution_041421.pdf
[273] National Tribal Air Association. 2022. Status of Tribal Air Report. Pg. 66. https://7vv611.a2cdn1.secureserver.net/wp-content/uploads/2022/10/2022-NTAA-Status-of-Tribal-Air-Report.pdf.

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Figure 3-13: Top sources of $PM_{2.5}$ and their contribution to $PM_{2.5}$ exposures by race and in disadvantaged communities



These disparities in exposure to pollution sources generate health inequities. Communities located near major roadways are at increased risk of asthma attacks and other respiratory and cardiac effects. Studies consistently show that mobile source pollution exposure near major roadways or freight sources contributes to and exacerbates asthma, impairs lung function, and increases cardiovascular mortality.[274] The exposure to mixtures of gaseous and particulate pollutants in mobile sources (including PM, NO_x, and benzene) is associated with higher rates of heart attacks, strokes, lung cancer, autism, and dementia.[275]

Environmental hazards found in communities also can include exposures to toxic substances and emissions, as well as occupational exposures. Due to historical inequities, under-resourced communities and communities of color are often located close to sources of toxic pollution, including chrome platers; metal recycling facilities; oil and gas operations; agricultural burning; railyards; facilities transporting, managing, or disposing of hazardous waste; and areas impacted by pesticides, among others. Some populations may be at increased risk of exposure to pollutants, both at work and home.

Children are more susceptible to environmental pollutants for many reasons, including the ongoing development of their nervous, immune, digestive, and other bodily systems. Moreover, children eat more food, drink more fluids, and breathe more air relative to their

[274] U.S. Environmental Protection Agency website. How Mobile Source Pollution Effects Your Health. https://www.epa.gov/mobile-source-pollution/how-mobile-source-pollution-affects-your-health.
[275] USC Environmental Health Centers. 2018. Living Near Busy Roads or Traffic Pollution. https://envhealthcenters.usc.edu/wp-content/uploads/2016/10/living-near-bus_19696172.pdf.

body weight, as compared to adults.[276] Exposure to high levels of air pollutants, including indoor air pollutants, increases the risk of respiratory infections, heart disease, and asthma.[277] Children living in low-income communities near industrial operations, rail yards, and heavily trafficked freeways and streets in urban areas are at especially high risk of chronic respiratory conditions. Black children are four times more likely to be hospitalized for asthma compared with white children, and urban Black and Latino children are two to six times more likely to die from asthma than white children.[278] Native American children also experience more impacts from asthma and Native American children, along with Black children, have the highest prevalence of asthma.[279]

For older adults, increased vulnerability is linked to respiratory, cardiovascular, and immune systems weakened by aging.[280] Preexisting health conditions interact with environmental pollutants to enhance risks of adverse health outcomes.[281,282] The recent COVID-19 pandemic has highlighted the heightened vulnerability of older adults as well as communities of color to respiratory disease, as hospital admissions and mortality data linked to COVID-19 cases for these groups have been higher than other groups. Research has also underscored the important link between COVID-19 mortality and morbidity and air pollution, demonstrating significantly higher mortality and morbidity for COVID-19 in areas of elevated $PM_{2.5}$ pollution.

Climate Vulnerabilities

Climate change is expected to exacerbate the existing disparities of health conditions and worsen climate vulnerability, which is the degree to which natural systems and people or

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[276] Blaisdell, R. J. Air Toxics Hot Spots Program Risk Assessment Guidelines. 2012. Technical Support Document for Exposure Assessment and Stochastic Analysis. Oakland, California: California Environmental Protection Agency, Office of Environmental Health Hazard Assessment. August.
[277] Woodruff, T. J., D. A. Axelrad, A. D. Kyle, O. Nweke, and G. G. Miller. 2003. *America's Children and the Environment: Measures of Contaminants, Body Burdens, and Illness*. 2nd ed. Washington, D.C.: United States Environmental Protection Agency. February.
[278] California Department of Public Health. Asthma Inequities in California Children. 2021. https://www.cdph.ca.gov/Programs/CCDPHP/DEODC/EHIB/CPE/CDPH%20Document%20Library/CA_Asthma_Inequities_Children_2021-Infographic.pdf.
[279] Meng, Y., S. H. Babey, T. A. Hastert, and E. Brown. 2007. California's Racial and Ethnic Minorities More Adversely Affected by Asthma. UCLA: Center for Health Policy Research. Retrieved from https://escholarship.org/uc/item/4k45v3xt.
[280] Sandström, T., A. J. Frew, M. Svartengren, and G. Viegi. 2003. "The need for a focus on air pollution research in the elderly." *Eur Respir J Suppl.* 40: 92s–5s.
[281] Zanobetti, A., and J. Schwartz. 2001. "Are diabetics more susceptible to the health effects of airborne particles?" *Am J Respir Crit Care Med.* 164 (5): 831–3. https://www.atsjournals.org/doi/pdf/10.1164/ajrccm.164.5.2012039.
[282] Zanobetti, A., J. Schwartz, and D. Gold. 2000. "Are there sensitive subgroups for the effects of airborne particles?" *Environ Health Perspect.* 108 (9): 841–5.

communities are at risk of experiencing the negative impacts of climate change.[283] A report from the California Climate Change Center warned that the impacts of climate change will likely create especially heavy burdens on low-income and other vulnerable populations: "*Without proactive policies to address these equity concerns, climate change will likely reinforce and amplify current as well as future socioeconomic disparities, leaving low-income, minority, and politically marginalized groups with fewer economic opportunities and more environmental and health burdens.*"[284]

In the U.S. Environmental Protection Agency's "Climate Change and Social Vulnerability in the United States: A Focus on Six Impacts,"[285] investigators analyzed risks of six primary climate change impacts disproportionately affecting communities across income, educational attainment, race/ethnicity, and age groups. Four socially vulnerable populations—low income, communities of color, no high school diploma, and age 65 and older—were identified as having a higher likelihood of experiencing the greatest impacts of a changing climate (according to the projected 2°C of global warming or 50 centimeters of global sea level rise). Disproportionate impacts were projected for climate events, including air quality, extreme temperature, coastal flooding, and other impacts, leading to increased risk of health and other adverse outcomes. The study projected significant health impacts for low-income communities, certain racial and ethnic subgroups, and those with lower educational attainment.

Several climate vulnerability tools have been developed or are under development to better understand and map areas at higher risk of climate impacts. The Climate Change and Health Vulnerability Indicators (CCHVIs) for California helps state and local health officials prepare for and reduce adverse health impacts due to a changing climate.[286] For example, Los Angeles County shows higher than state average climate vulnerability overall, particularly for those who are linguistically isolated (more than twice the state average).

In summary, there are many environmental, social, individual, and economic factors affecting health and equity in California and contributing to worsening health outcomes from climate change impacts. This section and Appendix G (Public Health) reference a substantial and growing body of research documenting the different social and

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[283] OPR. 2018. Defining Vulnerable Communities in the Context of Climate Adaptation. https://opr.ca.gov/docs/20180723-Vulnerable_Communities.pdf.

[284] Shonkoff, S., R. Morello-Frosch, M. Pastor, and J. Sadd. 2011. "The climate gap: environmental health and equity implications of climate change and mitigation policies in California—A review of the literature." *Climatic Change* 109 (Suppl 1): S485–S503.

[285] U.S. EPA. 2021. Climate Change and Social Vulnerability in the United States: A Focus on Six Impacts. U.S. Environmental Protection Agency. EPA 430-R-21-003.

[286] CDPH. 2022. Climate Change and Health Vulnerability Indicators for California. California Department of Public Health. https://www.cdph.ca.gov/Programs/OHE/Pages/CC-Health-Vulnerability-Indicators.aspx.

environmental factors affecting health outcomes and the many groups that are vulnerable to increased effects or that experience health inequities in California (see Table 3-13).

Table 3-13: Examples of vulnerable groups due to socioeconomic, environmental, developmental, and climate change factors

Examples of Vulnerable Groups Due to Socioeconomic, Environmental, Developmental, and Climate Change Factors		
Older People	People with Existing Chronic Illness	People Impacted Due to Working Conditions
Tribal Groups	Infants and Children	Low-Income People
People with Disabilities	People Experiencing Homelessness	Pregnant People
Communities of Color	Marginalized People	Immigrants/Refugees
People with Less Educational Options	Linguistically Isolated Households	People Impacted Due to Poor Housing Conditions

Summary of the Qualitative Health Analysis

CARB has developed a detailed health analysis that covers eight social and environmental co-benefit areas that impact public health (listed below). These co-benefit areas were selected due to ongoing research in these areas as well as discussion in a public workshop on climate change and health impacts held in summer 2018. For each social and environmental area, the analysis includes:

- a discussion of health impacts and disparities,
- key health metrics or epidemiological research on this topic,
- a discussion of how these areas would be affected by "no-action" (i.e., Reference) scenario compared to a "take-action" (i.e., Scoping Plan) scenario
- a discussion of where there are actions to consider for further success, and
- the types of mitigation actions that can help reduce or eliminate disparities and promote greater health equity and resilience.

All co-benefit areas are interconnected, and pursuing benefits in all areas has the potential to multiply positive results and further support building community resilience. *Community resilience* is the ability of a community to reduce harm and maintain an acceptable quality of life in the face of climate-induced stresses, which vary depending on that community's circumstances and location. Below is a brief description of the areas evaluated for public health co-benefits. The specific health outcomes impacted by each

area, as well as the directional health benefits, are included in the Summary of Health Benefits section of the chapter and covered in more detail in Appendix G (Public Health).

Heat Impacts

Globally, increased GHG concentrations in the atmosphere are causing a continuing increase of the planet's average temperature. California temperatures have risen since records began in 1895, and the rate of increase is accelerating. Recent heat waves have broken heat records and caused serious illness across the state, and these events are becoming more frequent. Heat waves have a particularly high impact in Southern California, where they have become more intense and longer lasting. In the past two years, Los Angeles recorded 121°F, and the Coachella Valley had its hottest year ever, with temperatures reaching 123°F. Heat island effects in urbanized areas can elevate heat effects and disproportionately affect low-income communities and communities of color. Heat events exacerbate respiratory and cardiac illness and cause emergency room visits to soar. Strategies that reduce the impacts of heat exposure promote improved health outcomes.

Wildfires and Smoke

California's NWL cover more than 90 percent of California and include rangeland, forests, woodlands, grasslands, and urban green space. They provide biodiversity and ecosystem benefits, including their ability to sequester carbon from the atmosphere. Protecting and managing California's forests and other natural lands and maintaining their ecosystem health are key practices for maximizing GHG benefits and minimizing negative climate change impacts. Vegetation plays an important role in storing carbon; however, it can also release CO_2 back into the atmosphere when it dies or is burned by fires. California's wildfires are getting worse with increased fire risks, higher frequency of occurrence, larger burn areas, more costly damage, and a longer fire season due to climate change. Strategies that promote healthy ecosystem management of natural and working lands and increased urban greening promote improved health outcomes. Healthy ecosystems provide many health and environmental benefits and can maximize carbon sequestration.

Children's Health and Development

There are a wide range of interconnected environmental, social, biological, and community factors associated with climate change that are adversely affecting children's health. This section focuses on air pollution and near-roadway or traffic pollution as environmental impacts that have a profound effect on children's health. Children's bodies and lungs are still developing, and they take in more air per body weight than adults do. Many low-income communities and communities of color in California experience disproportionately high levels of air pollution, as well as high levels of traffic and freight that impact children. This excess exposure harms children's development and

predisposes them to increased risk of illness throughout their lives. Strategies that reduce air pollution and traffic emissions promote improved health outcomes for children.

Economic Security

Climate change is expected to result in serious adverse socioeconomic effects across many sectors. Economic factors, such as income inequality (among geographic regions), poverty, wealth, debt, unemployment rate, and job security are among the strongest determinants of health. Along the entire income spectrum, higher income is associated with increased life expectancy and improved health outcomes in the United States. Additionally, economic insecurity and negative health impacts are more pronounced in low-income communities and communities of color. Economic strategies, such as the promotion of clean energy and other green jobs and investments in low-income communities and communities of color, and promoting a transition to high road jobs in economic sectors tied to the current fossil fuel economy, can promote improved health outcomes.[287]

Food Security

The food system is under pressure from numerous factors, and climate change is a key concern. Climate change can affect food production and agricultural yield, impact culturally significant plants and animals for Native American tribes, and exacerbate factors that limit food availability, such as supply chain disruption. Food security is defined as stable access to affordable, sufficient food for an active, healthy life. Many Californians routinely experience food insecurity, and while that impacts Californians of all races and groups, low-income communities and communities of color and children are disproportionately affected by food insecurity. Many Native Americans depend on resources from the land, such as animals and plants for consumption and cultural practices. Strategies that promote sustainable agriculture, access to healthy foods, and reduced organic food waste promote improved health outcomes.

Mobility and Physical Activity

Physical activity is one of the most important factors for a healthy lifestyle, and lack of activity increases the risk of chronic illness and premature death. Research shows that regular physical activity improves health in people of all ages by improving heart and lung

[287] According to the California Labor and Workforce Development Agency's High Road Training Partnership program, high road jobs are considered "Quality jobs [that] provide family-sustaining wages, health benefits, a pension, worker advancement opportunities, and collective worker input and are stable, predictable, safe and free of discrimination." https://cwdb.ca.gov/wp-content/uploads/sites/43/2020/08/OneSheet_Job-Quality_ACCESSIBLE.pdf.

function, muscle fitness, mental health and brain function, and sleep quality. A sedentary lifestyle contributes to chronic illnesses, including obesity, heart disease, and Type 2 diabetes among other chronic illnesses. Promoting community design that supports sustainable patterns of land use and transportation enables active transportation choices like walking, biking, and public transit over driving, and can significantly increase physical activity, leading to many valuable health benefits.

Affordable Housing

Housing is an important social determinant of health. The stability of housing, housing quality, conditions inside and outside the home, the cost of housing, and the environmental and social characteristics of the places people live all affect health (including energy efficiency and insulation, cooler building material, tree canopy, home size). Housing affordability is a key factor, and this section highlights how housing affordability supports not only improved health but also more sustainable land use and transportation patterns. A lack of affordable housing is increasing commute distances for low-income renters and creating health burdens. Strategies that support sustainable transportation and housing patterns, together with increased housing affordability, promote improved health outcomes.

Urban Greening

Urban Greening is well recognized as an important amenity, but the inherent health benefits are not always well understood. Under-resourced and vulnerable areas consistently show a lack of urban greening and higher percentages of concrete, asphalt, and impervious surfaces. Under-resourced communities have a greater proportion of concrete and heat-trapping surfaces and a lower amount of tree cover in the neighborhoods in which they live. Areas with reduced urban greening have the potential to create areas of higher temperatures as heat is reflected from pavements and buildings. By contrast, increasing urban greening can provide air pollution buffers and promote physical activity. Strategies that preserve and create urban parks, green space, natural infrastructure, and sustainable agricultural practices support improved physical and mental health outcomes.

No Action Scenario (Reference)

In a no-action scenario, California would remain dependent on fossil fuels and other GHG emitting technologies. Fossil-fuel powered mobile sources including cars, trucks, trains, tractors, and a myriad of other on-road and off-road vehicles and equipment are the largest source of criteria pollutants and toxic air contaminants that directly affect

community health and contribute the largest portion of GHG emissions.[288] Other key GHG emission sources include buildings, natural and working lands, and power production and industry. The no-action scenario reflects a continued reliance on fossil fuels in mobile and stationary sectors, including buildings. The continued production and use of fossil fuels; ongoing dependence on gasoline and diesel cars, trucks, buses, and equipment; continued releases of short-lived climate pollutants; and decreased emphasis on forest and ecosystem health will impact communities by reducing climate resilience and health benefits. Green space will likely remain at the same levels or degrade, and urban heat islands will likely increase. With continued growth of vehicle miles traveled, physical activity and the accompanying health benefits will not increase.

Exposure to wildfire smoke will increase, and air quality is expected to worsen as rising temperatures will increase levels of harmful air pollution. Jobs and economic security will be affected by the continuing potential for price spikes in fossil fuels, impacts to the economy from climate change, and fewer job opportunities in green technologies such as solar and electric vehicles. Food security in California will decrease due to the effects of accelerating climate impacts to agriculture; and without increased recovery of organic waste, including food products, food security will continue to decline under a no action scenario. All these impacts can be linked to worse health outcomes. Adverse health impacts are often most felt by Black, Latino, Native American, and other people of color and in low-income communities. These groups are affected more intensely by the physical stress of environmental pollution, social inequities, and the psychological stress of extreme weather events and food and economic insecurity.

Take Action Scenario

In the Take Action scenario, California will drastically reduce reliance on fossil fuels for motor vehicles, freight, buildings, electricity, or other sectors. This scenario is not a specific scenario within this Scoping Plan but examines the broad outcomes of actions to achieve carbon neutrality in 2045. Implementation of this Scoping Plan would achieve a transition to ZEVs, with 100% sales of light-duty ZEVs by 2035 and 100% sales of zero emission trucks by 2040, along with 30% VMT reductions below 2019 levels by 2045. State and local action that supports sustainable land use and transportation patterns and enables more transit and active transportation will lead to substantial health benefits from physical activity, including reduced illness and deaths.

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[288] CARB. 2022. *California Greenhouse Gas Emissions for 2000 to 2020.* https://ww2.arb.ca.gov/sites/default/files/classic/cc/inventory/2000-2020_ghg_inventory_trends.pdf.

The economic benefits of improved health through active transportation can be modeled using the Healthy Mobility Options Tool (HMOT).[289] In order to demonstrate the important health and economic benefits of VMT reduction, CARB and CDPH used the HMOT to analyze an illustrative trip reduction scenario for 2050 from the California Transportation Plan (CTP). The CTP has a goal of increasing active modes of travel and transit from the current level of 13 percent to a level of 23 percent of all travel trips. While the CTP goal of 23 percent for active modes of travel is not a VMT reduction target, the scenario increases active transportation through a mix of changes in land use planning for increased transportation options, including increases in biking, walking, and transit use, and it helps to show the health benefits of increased active transportation. By achieving the CTP 2050 goals, nearly 8,000 deaths would be avoided in 2050 alone (see Figure 3-14), along with significant reductions in chronic diseases. Achieving this would rank among the top public health accomplishments (see Appendix G [Public Health] for additional modeling results and detailed discussion).

The dramatic reduction in fossil fuel combustion, combined with reductions in VMT and freight and traffic emissions projected in this Scoping Plan will significantly reduce air pollution and its associated health impacts on a statewide basis and in communities near freight sources. Coordinated action strategies will emphasize natural and working lands management changes, including healthy forests, increased vegetative cover, and increased organic farming. Wildfire smoke exposure will reduce significantly with healthy ecosystem management strategies. Since many communities in California are disproportionately impacted by high levels of traffic pollution, the reduction in petroleum fueled vehicles will reduce the additional impacts of living or going to school near historically highly polluting sources. Indoor air quality is also likely to improve through a shift to non-fossil fuel appliances. Concerted state and local action to support sustainable land use and transportation patterns can enable more active transportation with health benefits from physical activity.

[289] ITHIM California. 2020. Transportation Planning for Health, Equity, and Climate Change. https://skylab.cdph.ca.gov/HealthyMobilityOptionTool-ITHIM/.

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Figure 3-14: Quantified health benefits of active transportation from increased physical activity



*Calculated by the Healthy Mobility Options Tool, active transportation (including walking, rolling, cycling, and taking public transit) from the California Transportation Plan 2050 compared to business as usual for 2050.

Overall community resilience is expected to increase as physical activity and green space increases—potentially decreasing urban heat islands. Efforts to support VMT reduction will include coordination across state agencies on affordable housing measures. Reduced fossil fuel dependence will reduce economic pressure from wildfires, droughts, and price spikes in fossil fuels, especially as more jurisdictions implement plans with similar actions. Investment in sustainable agriculture, healthy forests, urban greening, and clean energy technologies will add sustainable jobs and further promote economic security. More sustainable agriculture and food recovery efforts will add to food security. All these impacts can be linked to wide ranging health benefits, including positive respiratory and cardiovascular effects, healthier birth and brain outcomes, improved mental health indicators, improved life expectancy, reductions in chronic illness and cancers, improved children's health and development, reduced depression, and other benefits. The magnitude of the possible co-benefits is extremely large, especially in areas that are currently the most affected.

Summary of Health Benefits

Below, Tables 3-14 and 3-15 show overall summaries of the directional benefits by co-benefit area estimated for this Scoping Plan. The supporting epidemiological studies used for qualitative or quantitative analysis of each co-benefit area are included in Appendix G (Public Health). Another section of Chapter 3, together with Appendix C (AB 197 Measure Analysis) and Appendix H (AB 32 GHG Inventory Sector Modeling), also includes the quantitative analysis of air pollution related health impacts, including recently added health endpoints for CARB's ongoing analysis.

Table 3-14: Scoping Plan directional benefits for health co-benefit areas (heat, affordable housing, food security, economic security, and urban greening)

Health Co-benefit Areas*					
Quantitative vs. Qualitative	Reduced Heat Impacts	Increased Affordable Housing	Increased Food Security	Increased Economic Security	Increased Urban Greening
Research was used for Qualitative Analysis	↓ Mortality ↓ Emergency Room Visits for cardiovascular and respiratory causes and intestinal infections ↓Hospitalization for cardiovascular, respiratory causes ↓ Preterm Birth ↓ Mental Illness	↓ Infectious Disease ↓ Chronic Illness ↓ Asthma ↓ Injuries ↓ Mental Illness ↑ Children's Performance in Schools ↑ Children's Health ↓ Children's Behavioral Problems	↓ Mental Illness ↓ Iron Deficiency ↓ Chronic Diseases ↑ Life Expectancy ↓ Children's Mental Illness ↓ Children's Cognitive Problems ↓ Children's Behavioral Health Problems ↓ Children's Iron Deficiency ↓ Children's Oral Health Problems	↑ Life Expectancy ↑ Health Status ↑ Mental Health	↓ Mortality ↓ Asthma Prevalence ↓ Depression ↓ Adverse Birth Outcomes including low birth weight and small for gestational age ↑ Life Expectancy

*See Appendix G (Public Health) for a table with references to research for each health outcome listed.

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Table 3-15: Scoping Plan directional benefits for health co-benefit areas (traffic pollution, wildfire, and active transportation)

Health Co-benefit Areas*			
Quantitative vs. Qualitative	Reduced Traffic Pollution	Reduced Wildfire Smoke	Increased Active Transportation
Research was used for Quantitative Analysis	↓ Children's Respiratory Outcomes, Hospital Admissions ↓ Children's Respiratory Outcomes, Emergency Room Visits ↓ Children's Asthma Onset ↓ Children's Asthma Symptoms	↓ All-Cause Mortality ↓ Asthma, Hospital Admissions ↓ COPD, Hospital Admissions ↓ All Respiratory Outcomes, Hospital Admissions ↓ Asthma, Emergency Room Visits ↓ All Respiratory Outcomes, Emergency Room Visits ↓ All Cardiac Outcomes, Emergency Room Visits	↓ Cardiovascular Diseases ↓ Colon Cancer ↓ Breast Cancer ↓ Diabetes ↓ Dementia ↓ Lung Cancer ↓ Respiratory Disease ↓ Depression ↑ Traffic Accidents
Research was used for Qualitative Analysis	↑ Children's Lung Function Growth ↓ Children's Bronchitic Symptoms ↓ Children's Impaired Cognitive Development ↓ Children's Adverse Birth Outcomes, including low birth weight and preterm birth		

*See Appendix G (Public Health) for a table with references to research for each health outcome listed.

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In summary, the qualitative health analysis of the No-Action versus Take-Action scenarios for this Scoping Plan shows an overwhelming benefit for the state by taking action to move forward to carbon neutrality while continuing efforts to increase health equity and resilience in individual communities. Taking action can improve physical and mental health for adults and children, reduce a range of chronic illnesses, and promote improvements in life expectancy. Development and implementation of actions to achieve the outcomes called for in this Scoping Plan should consider how to engage affected communities in implementation, address the existing health and opportunity gaps, and pursue equitable implementation statewide and locally. This Scoping Plan deployment of clean technology and fuels, together with improved land management, will reduce GHGs and air pollution and create more resilient communities that are better able to prepare for and recover from extreme climate events.

Environmental Analysis

In May 2022, CARB, as the lead agency for the Scoping Plan, released for public review the Draft Environmental Analysis (Draft EA) for this Scoping Plan; it assessed the potential environmental impacts of implementing the Scoping Plan. CARB circulated the Draft EA for public review and comment for a period of 45 days that began on May 10, 2022, and ended on June 24, 2022. CARB held a public hearing on June 23, 2022 to provide the opportunity for public comment. During the review period, written and oral comments were received on the Draft EA. CARB reviewed the comments to identify environmental topics and began preparation of responses to those comments.

After the end of the Draft EA public review period, CARB identified potential revisions to certain aspects of this Scoping Plan that merit revisions to the project description. This new information results from, among other things, revisions to the project description regarding energy sector goals (including offshore wind), revised carbon removal targets, and additional strategies for natural and working lands. CARB released a Recirculated Draft EA for a written public comment period that started September 9, 2022, and ended on October 24, 2022. See Chapter 2 of the Recirculated Draft EA[290] for further information regarding the changes. The Recirculated Draft EA assesses the potential for significant adverse and beneficial environmental impacts associated with all proposed actions in this Scoping Plan, and provides a programmatic environmental analysis of the reasonably foreseeable compliance responses that could result from implementation of the Scoping

[290] CARB. 2022. Recirculated Draft EA. https://ww2.arb.ca.gov/sites/default/files/2022-09/2022-draft-sp-appendix-b-draft-ea-recirc.pdf.

Plan.[291] The Recirculated Draft EA concluded implementation of this Scoping Plan could result in the following:

- Beneficial impacts to: air quality (long-term operational-related) and GHG emissions (short-term construction-related and long-term operational-related)
- Less than significant impacts to: energy demand, mineral resources, population and housing, public services, recreation (short-term construction-related), and wildfire (short-term construction-related)
- Potentially significant and unavoidable adverse impacts to: aesthetics, agriculture and forest resources, air quality (construction-related and operational odors), biological resources, cultural resources, geology and soils, hazards and hazardous materials, hydrology and water quality, land use and planning, noise, recreation (long-term operational-related), transportation and traffic, tribal cultural resources, utilities and service systems, and wildfire (long-term operational-related

Before the public meeting at which the Board will consider this Scoping Plan Update, CARB will publish the Final EA as Appendix B (Final Environmental Analysis) to this Scoping Plan, along with written responses to timely submitted comments raising significant environmental issues received on the Draft EA and the Recirculated Draft EA, which will be presented to the Board for consideration.

[291] The Recirculated Draft EA is available at https://ww2.arb.ca.gov/our-work/programs/ab-32-climate-change-scoping-plan/2022-scoping-plan-documents.

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Chapter 4: Key Sectors

Chapter 4 provides an overview of the major energy sources and technology in use today, and of alternative clean technology and fuels to support decarbonization based on the latest information available. Every sector of the economy will need to begin to transition in this decade to meet our GHG reduction goals and achieve carbon neutrality no later than 2045. AB 32 requires climate change mitigation policies to be considered in the context of the sector's contribution to the state's total GHG emissions. The transportation, electricity (in-state and imported), and industrial sectors are the largest contributors of GHGs in the state and present the largest opportunities for GHG reductions. Actions to reduce fossil fuel combustion in these sectors also can provide critical air pollution reductions in low-income communities and communities of color, which are often located adjacent to these sources. A carbon neutrality framework also elevates the role of CO_2 removal through natural and working lands and mechanical capture and storage. Actions that support energy efficiency, reduced VMT, alternative fuels, and renewable power also can provide benefits by reducing both criteria and toxic air pollutants.

What sets this plan apart from previous Scoping Plans is the focus on the accelerated rate of deployment of clean technology and energy within every sector. As a result, specific actions, including accelerated rates of deployment of clean technology and fuels identified within this Scoping Plan, will need to be translated into both new and amended regulations, policies, and incentive programs. State agencies will need to evaluate current authority to align existing policies or develop new ones to achieve outcomes called for in this Scoping Plan. Legislative support may be needed in some cases to ensure authority and funding is sufficient to ensure this Scoping Plan is translatable to action on the ground. Most regulations, or change to existing regulations, ultimately considered by the Board or other state agencies for adoption will be subject to administrative procedure requirements. Accordingly, they must rely on specific subsequent supporting analysis and extensive public processes and consultations with interested tribes to develop and identify appropriate proposals for effective implementation. For example, any proposal to strengthen the LCFS regulations through amendments increasing the stringency of the carbon intensity (CI) targets would be considered on the basis of a public process, including workshops, and focused environmental, economic, and public health analyses.

Policies that ensure economy-wide investment or program decisions that incorporate consideration of GHG emissions are particularly important. As we pursue GHG reduction targets, we must acknowledge the manner in which built and natural environments are connected, how changes in one may impact the other, and how policy choices in one sector can and do impact other sectors. For example, fostering more compact, transportation-efficient development in infill areas and increasing transportation choices with the goal of reducing VMT not only reduces demand for transportation fuel but also requires less energy for buildings and helps to conserve natural and working lands that

sequester carbon. Therefore, the multiple and often interwoven actions that reduce VMT both reduce emissions from the transportation sector and support reductions needed in other sectors.

Legislation, such as SB 350[292] (De León and Leno, Chapter 457, Statutes of 2015), has recognized the need for CARB, the CEC, and the CPUC to work together to ensure the state's energy and climate goals are integrated in procurement decisions by load serving entities as part of Integrated Resource Plans. Moving forward, it is especially critical that similar approaches are adopted to break down silos across state agencies to ensure policies and programs are aligned with multiple state priorities outlined in this plan. Finally, supportive legislative direction, such as SB 905 that requires CARB to create the Carbon Capture, Removal, Utilization, and Storage Program, may also benefit emerging areas of policy to provide express agency authority and roles for these nascent efforts, including streamlining of permitting, while ensuring that protections for communities are in place.

Unlike previous Scoping Plans that separated out individual economic sectors, this Scoping Plan approaches decarbonization from two perspectives: (1) managing a phasedown of existing energy sources and technology and (2) ramping up, developing, and deploying alternative clean energy sources and technology over time. This approach supports a more comprehensive consideration of our energy infrastructure, the ability to repurpose existing assets, and the need to build new assets. It also provides multiple metrics beyond just the annual AB 32 GHG Inventory to better enable tracking progress. For example, it clearly demonstrates the production and distribution rates of specific types of clean energy, such as adding 4.3 GW of utility solar and 2.5 GW of storage year-over-year between now and 2035 to be on track to achieve carbon neutrality no later than 2045, and does the same for technology deployment, such as 11 million ZEVs in 2035.

The sections below include key actions to support success in the necessary transition away from fossil combustion, which is an overriding goal of this plan. The wide array of complementary and supporting actions being contemplated or to be undertaken across state government are detailed here. The broad view of actions described in this chapter thus provides context for the specific deployment of clean technology and fuels identified in the Scoping Plan Scenario described in Chapter 2. Actions identified in this Scoping Plan are based on currently known options and the latest science. As part of future Scoping Plan updates, additional clean technology and fuels may be identified and added to the mix of needed tools to continue to reduce the state's GHG emissions, support air quality co-benefits, and remove carbon from the atmosphere.

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[292] California Air Resources Board. SB 350 Electricity Sector Greenhouse Gas Planning Targets. https://ww2.arb.ca.gov/our-work/programs/sb350.

Transportation Sustainability

The transportation sector has long relied on liquid petroleum fuels as the primary energy source for internal combustion engine (ICE) vehicles, including cars, trucks, locomotives, marine equipment, and aircraft. Combustion of fossil fuels in vehicles emits significant amounts of GHGs, criteria pollutants, and toxic air contaminants. In 2019,[293] the transportation sector accounted for approximately 50 percent of statewide GHG emissions[294] and thus was by far the single largest source of carbon pollution in the state. In addition, the transportation sector accounted for over 80 percent of statewide NOx emissions and 30% of fine particulate matter emissions, including toxic diesel particulate matter.[295]

Communities adjacent to congested roadways, including ports and distribution centers, are exposed to the highest concentration of toxic pollutants from vehicles and equipment consuming fossil fuels, leading to a number of demonstrated health impacts such as respiratory illnesses, higher likelihood of cancer development, and premature death. In addition, communities located near oil extraction operations or crude oil refineries often experience higher exposure to poor air quality. While CARB's programs, along with local action, have made substantial progress over the past few decades, it is clear that California must transition away from fossil fuels to zero-emission technologies with all possible speed and pursue policies that result in less driving, in order to meet our GHG and air quality targets.

The transportation sector can be divided into three general categories: Technology, Fuels, and Vehicle Miles Traveled.

- *Technology* refers to the vehicles themselves, as well as the associated refueling infrastructure for those vehicles.
- *Fuels* refers to the energy source used to power vehicles and the facilities that produce them.
- Vehicle travel is measured as *vehicle miles traveled* (VMT), and is a product of development patterns and available transportation options.

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[293] In 2020 the state experienced shelter-in-place orders in response to the COVID-19 pandemic. The orders, and the effects of the pandemic, led to a significant year-over-year decline in transportation emissions in 2020. This means 2019 is likely a more representative year for overall transportation emissions and 2020 a likely outlier in the historical transportation emissions trend data.
[294] CARB. 2022. *California Greenhouse Gas Emissions for 2000 to 2020.* https://ww2.arb.ca.gov/sites/default/files/classic/cc/inventory/2000-2020_ghg_inventory_trends.pdf. This includes upstream oil extraction and refining emissions.
[295] CARB. California Greenhouse Gas Emission Inventory Program. https://ww2.arb.ca.gov/our-work/programs/ghg-inventory-program.

Sector Transition

Technology

Vehicles must transition to zero emission technology to decarbonize the transportation sector. Executive Order N-79-20[296] reflects the urgency of transitioning to zero emission vehicles (ZEVs) by establishing target dates for reaching 100 percent ZEV sales or fleet transitions to ZEV technology. The primary ZEV technologies available today are battery-electric and hydrogen fuel cell electric vehicles (FCEVs), both of which emit zero tailpipe GHGs, criteria pollutants, and toxic air contaminants, as they do not burn fuel. These vehicles are rapidly growing in performance, affordability, and popularity.[297] Plug-in hybrid electric vehicles also offer a limited but increasing range of zero emission operation and will play a role in the transition to ZEVs.

Light-duty passenger vehicles consume the majority of gasoline in the state—12.9 billion gallons in 2019[298]—and are well-suited for transitioning to ZEVs. EO N-79-20 calls for 100 percent ZEV sales of new light-duty vehicles by 2035, and this target is reflected in this Scoping Plan.[299] The Advanced Clean Cars II regulation fulfills the goal in the Executive Order and serves as the primary mechanism to help deploy ZEVs. A number of existing incentive programs also support this transition, including the Clean Cars 4 All Program.[300] Heavy-duty trucks are the largest source of diesel particulate matter, a toxic air contaminant that is directly linked to a number of adverse health impacts, and EO N-79-20 also sets targets for transitioning the medium- and heavy-duty fleet to zero emissions: by 2035 for drayage trucks and by 2045 for buses and heavy-duty long-haul trucks where feasible. Replacing heavy-duty vehicles with ZEV technology will significantly reduce GHG emissions and diesel PM emissions in low-income communities and communities of color adjacent to ports, distribution centers, and highways. The existing Advanced Clean Trucks regulation, paired with the proposed Advanced Clean Fleets regulation, are designed to transition a significant amount of the

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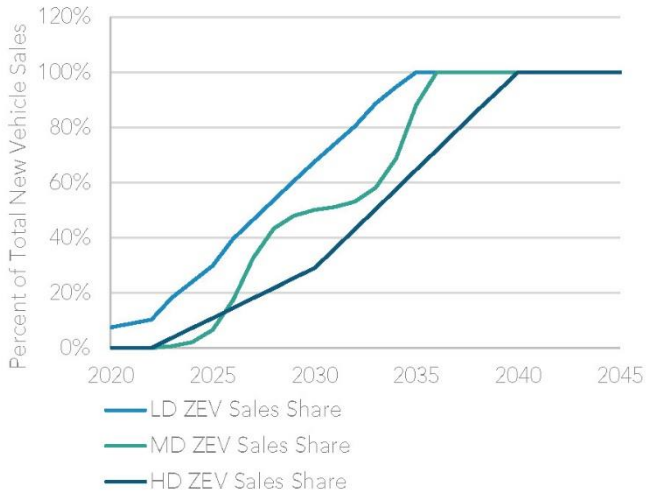
[296] Executive Department. State of California. Executive Order N-79-20. https://www.gov.ca.gov/wp-content/uploads/2020/09/9.23.20-EO-N-79-20-Climate.pdf.
[297] CARB. 2021. Public Workshop for Advanced Clean Cars II. May 6. https://ww2.arb.ca.gov/sites/default/files/2021-05/acc2_workshop_slides_may062021_ac.pdf.
[298] CARB. 2022. *Fuel Activity for California's Greenhouse Gas Inventory by Sector and Activity*. https://ww2.arb.ca.gov/sites/default/files/classic/cc/inventory/fuel_activity_inventory_by_sector_all_00-20.xlsx.
[299] AB 32 EJ Advisory Committee. 2022 Scoping Plan Recommendations, F1A, with reference to the date at which all new vehicle sales are ZEVs. finalejacrecs.pdf (arb.ca.gov).
[300] CARB. Clean Cars 4 All. https://ww2.arb.ca.gov/our-work/programs/clean-cars-4-all. The Clean Vehicle Rebate Project (CVRP) also supports the transition to ZEVs. https://cleanvehiclerebate.org/en.

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California truck fleet to ZEV technology. As with the LDV sector, a number of incentive programs support this transition, such as the Hybrid and Zero-Emission Truck and Bus Voucher Incentive Project (HVIP).[301]

Figure 4-1 below illustrates the pace of transition in vehicle technology needed to drastically reduce GHG emissions from vehicles. All vehicle classes reach 100 percent ZEV sales before 2045, with some achieving this well before. The ZEV technology across the vehicle classes is assumed to be primarily battery electric and hydrogen fuel cell (reflecting the primary ZEV technologies available today).[302]

Figure 4-1: Transition of on-road vehicle sales to ZEV technology in the Scoping Plan Scenario



Today, off-road vehicles also rely heavily on ICE technology. Executive Order N-79-20 sets an off-road equipment target of transitioning the entire fleet to ZEV technology by 2035, where feasible. There is a great need for both investment and innovation in the off-road space in order to develop and commercialize zero emission equipment types that meet or exceed the performance of existing equipment. A number of funding sources currently support this transition, including programs such as FARMER, Carl Moyer, and

[301] California HVIP. Hybrid and Zero-Emission Truck and Bus Voucher Incentive Project. https://californiahvip.org/?msclkid=efaf65f2c26f11eca6bdd08ecc323864.
[302] The light-duty fleet includes more than 11 million battery electric and hydrogen fuel cell vehicles in 2035 and over 23 million battery electric and hydrogen fuel cell vehicles in 2045.

the Community Air Protection Incentives—as well as Low Carbon Transportation Incentives, including the Clean Off-Road Equipment (CORE) program. In addition, the 2021–22 California budget provided record-high allocations for funding ZEVs, including off-road equipment, and the 2022–23 budget is similarly ambitious.[303] Several regulations focused on transitioning to zero emission off-road equipment have recently been adopted or are in the works, and apply to locomotives,[304] forklifts, ocean-going vessels at berth,[305] commercial harbor craft,[306] small off-road engines,[307] and more.

Intrastate aviation relies on ICE technology today, but battery-electric and hydrogen fuel cell aviation applications are in development, along with sustainable aviation fuel. The Scoping Plan Scenario includes a transition of 20% of aviation fuel demand to ZEV technologies by 2045 and sustainable aviation fuel for the rest.

Refueling infrastructure is a crucial component of transforming transportation technology. Electric vehicle chargers and hydrogen refueling stations must become easily accessible for all drivers to support a wholesale transition to ZEV technology. Deployment of ZEV refueling infrastructure is currently supported by a number of existing local and state public funding mechanisms, the new National Electric Vehicle Infrastructure (NEVI) federal funding mechanism, California's electric utilities, the Electrify America initiative that was established in response the Volkswagen ZEV commitment, and by numerous companies, such as EVgo, ChargePoint, Tesla, Ford, FirstElement Fuel, Chevron, Shell, and Iwatani, who are investing substantial private resources into developing these networks. Private investment in reliable, affordable and ubiquitous refueling infrastructure must drive the transition as the business case for ZEVs continues to strengthen.

Strategies for Achieving Success

- Achieve 100 percent ZEV sales of light-duty vehicles by 2035[308] and medium-heavy-duty vehicles by 2040.
- Achieve a 20% zero emission target for the aviation sector.

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[303] AB 32 EJ Advisory Committee. 2022 Scoping Plan Recommendations, F1C. CARB and the Administration are committed to increasing focus on transportation equity investment as was reflected in the governor's 2022–23 budget. finalejacrecs.pdf (arb.ca.gov).
[304] CARB. Reducing Rail Emissions in California. https://ww2.arb.ca.gov/our-work/programs/reducing-rail-emissions-california.
[305] CARB. Ocean-Going Vessels At Berth Regulation. https://ww2.arb.ca.gov/our-work/programs/ocean-going-vessels-berth-regulation.
[306] CARB. CARB passes amendments to commercial harbor craft regulation. https://ww2.arb.ca.gov/news/carb-passes-amendments-commercial-harbor-craft-regulation.
[307] CARB. Small Off-Road Engines (SORE). https://ww2.arb.ca.gov/our-work/programs/small-off-road-engines-sore.
[308] AB 32 EJ Advisory Committee. 2022 Scoping Plan Recommendations, F1A. finalejacrecs.pdf (arb.ca.gov).

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- Develop a rapid and robust network of ZEV refueling infrastructure to support the needed transition to ZEVs.
- Ensure that the transition to ZEV technology is affordable for low-income households and communities of color, and meets the needs of communities and small businesses.[309]
- Prioritize incentive funding for heavy-duty ZEV technology deployment in regions of the state with the highest concentrations of harmful criteria and toxic air contaminant emissions.[310]
- Promote private investment in the transition to ZEV technology, undergirded by regulatory certainty such as infrastructure credits in the Low Carbon Fuel Standard for hydrogen and electricity[311] and hydrogen station grants from the CEC's Clean Transportation Program[312] pursuant to Executive Order B-48-18.[313]
- Evaluate and continue to offer incentives similar to those through FARMER,[314] Carl Moyer,[315] the Clean Fuel Reward Program,[316] the Community Air Protection Program,[317] and Low Carbon Transportation,[318] including CORE.[319] Where feasible, prioritize and increase funding for clean transportation equity programs.[320]
- Continue and accelerate funding support for zero emission vehicles and refueling infrastructure through 2030 to ensure the rapid transformation of the transportation sector.

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[309] AB 32 EJ Advisory Committee. 2022 Scoping Plan Recommendations, NF6, in the context of communities. finalejacrecs.pdf (arb.ca.gov).
[310] AB 32 EJ Advisory Committee. 2022 Scoping Plan Recommendations, NF7. finalejacrecs.pdf (arb.ca.gov).
[311] CARB. LCFS ZEV Infrastructure Crediting. https://ww2.arb.ca.gov/resources/documents/lcfs-zev-infrastructure-crediting.
[312] CEC. Clean Transportation Program. https://www.energy.ca.gov/programs-and-topics/programs/clean-transportation-program.
[313] EO B-48-18 calls for 200 hydrogen refueling stations by 2025. https://www.library.ca.gov/wp-content/uploads/GovernmentPublications/executive-order-proclamation/39-B-48-18.pdf.
[314] CARB. FARMER program. https://ww2.arb.ca.gov/our-work/programs/farmer-program.
[315] CARB. Carl Moyer program. https://ww2.arb.ca.gov/our-work/programs/carl-moyer-memorial-air-quality-standards-attainment-program.
[316] California Clean Fuel Reward Program. https://cleanfuelreward.com/.
[317] CARB. Community Air Protection Program. https://ww2.arb.ca.gov/capp.
[318] CARB. Low Carbon Transportation Investments and Air Quality Improvement Program. https://ww2.arb.ca.gov/our-work/programs/low-carbon-transportation-investments-and-air-quality-improvement-program.
[319] Clean Off-Road Equipment (CORE) Voucher Incentive Program. https://californiacore.org/.
[320] AB 32 EJ Advisory Committee. 2022 Scoping Plan Recommendations, F1C. finalejacrecs.pdf (arb.ca.gov).

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- Evaluate and align with this Scoping Plan relevant CARB policies such as Advanced Clean Cars II,[321] Innovative Clean Transit,[322] Zero Emission Airport Shuttle,[323] California Phase 2 GHG Standards,[324] Advanced Clean Trucks, Advanced Clean Fleets, Zero Emission Forklifts,[325] In-use Locomotives,[326] the Off-Road Zero-Emission Targeted Manufacturer rule, Clean Off-Road Fleet Recognition Program, In-use Off-Road Diesel-Fueled Fleets Regulation,[327] Commercial Harbor Craft,[328] Off-Road Zero-Emission Targeted Manufacturer rule, Clean Off-Road Fleet Recognition Program, Amendments to the In-use Off-Road Diesel-Fueled Fleets Regulation,[329] carbon pricing through the Cap-and-Trade Program,[330] and the Low Carbon Fuel Standard.[331]
- Identify and address permitting and market barriers to successful rapid ZEV technology deployment while protecting public health and the environment.

Fuels

Transitioning away from conventional ICE vehicles is part of the solution, but we must ensure that an adequate supply of zero-carbon alternative fuel and distribution is available to power these vehicles. Electricity and hydrogen are currently the primary fuels for ZEVs,

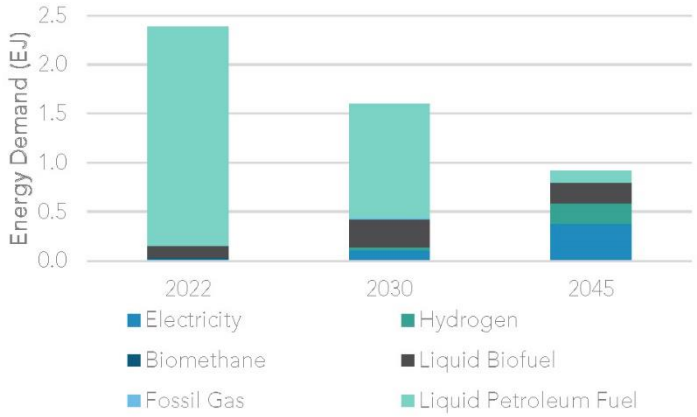
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[321] CARB. Advanced Clean Cars Program. https://ww2.arb.ca.gov/our-work/programs/advanced-clean-cars-program. Cal. Code Regs., tit. 13, §§ 1900, 1961.2, 1961.3, 1961.4, 1962.2, 1962.3, 1962.4, 1962.5, 1962.6, 1962.7, 1962.8, 1965, 1968.2, 1969, 1976, 1978, 2037, 2038, 2112, 2139, 2140, 2147, 2317, 2903.
[322] CARB. Innovative Clean Transit. https://ww2.arb.ca.gov/our-work/programs/innovative-clean-transit. Cal. Code Regs., tit. 13, §§ 2023—2023.11.
[323] CARB. Zero-Emission Airport Shuttle. https://ww2.arb.ca.gov/our-work/programs/zero-emission-airport-shuttle. Cal. Code Regs., tit. 17, §§ 95690.1—95690.8.
[324] CARB. California Phase 2 Greenhouse Gas Standards. https://ww2.arb.ca.gov/our-work/programs/greenhouse-gas-standards-medium-and-heavy-duty-engines-and-vehicles/phase2. Cal. Code Regs., tit. 13, §§ 1956.8 and 2036; and Cal. Code Regs., tit. 17, §§ 95301, 95302, 95303, and 95663.
[325] CARB. Zero-Emission Forklifts. https://ww2.arb.ca.gov/our-work/programs/zero-emission-forklifts. Cal. Code Regs., tit. 17, §§ 95690.1—95690.8.
[326] CARB. Reducing Rail Emissions. https://ww2.arb.ca.gov/our-work/programs/reducing-rail-emissions-california. Proposed Cal. Code Regs., tit. 13, §§ 2478—2478.16.
[327] CARB. In-use Off-Road Diesel-Fueled Fleets Regulation. https://ww2.arb.ca.gov/our-work/programs/use-road-diesel-fueled-fleets-regulation. Cal. Code Regs., tit. 13, §§ 2449, 2449.1, 2449.2.
[328] CARB. Commercial Harbor Craft. https://ww2.arb.ca.gov/our-work/programs/commercial-harbor-craft. Cal. Code Regs., tit. 13, § 2299.5.
[329] CARB. In-use Off-Road Diesel-Fueled Fleets Regulation. https://ww2.arb.ca.gov/our-work/programs/use-road-diesel-fueled-fleets-regulation.
[330] CARB. Cap-and-Trade Program. https://ww2.arb.ca.gov/our-work/programs/cap-and-trade-program. Cal. Code Regs., tit. 17, §§ 95801 et seq.
[331] CARB. Low Carbon Fuel Standard. https://ww2.arb.ca.gov/our-work/programs/low-carbon-fuel-standard. Cal. Code Regs., tit. 17, §§ 95480 et seq.

and both fuels must be produced using low-carbon technology and feedstocks to minimize upstream emissions.

The transition to complete ZEV technology will not happen overnight. Conventional ICE vehicles from legacy fleets will remain on the road for some time, even after all new vehicle sales have transitioned to ZEV technology. In addition, some equipment types are only now in the initial stages of development of ZEV technology for propulsion, such as commercial aircraft or ocean-going vessels. In addition to building the production and distribution infrastructure for zero-carbon fuels, the state must continue to support low-carbon liquid fuels during this period of transition and for much harder sectors for ZEV technology such as aviation, locomotives, and marine applications. Biomethane currently displaces fossil fuels in transportation and will largely be needed for hard-to-decarbonize sectors but will likely continue to play a targeted role in some fleets while the transportation sector transitions to ZEVs. Figure 4-2 provides the detail on fuels used in 2020 and the fuel mix under the Scoping Plan Scenario for 2035 and 2045.

Figure 4-2: Transportation fuel mix in 2022, 2030, and 2045 in the Scoping Plan Scenario[332]



Private investment in alternative fuels will play a key role in diversifying the transportation fuel supply away from fossil fuels. The Low Carbon Fuel Standard is the primary mechanism for transforming California's transportation fuel pool with low-carbon

[332] See https://ww2.arb.ca.gov/sites/default/files/2022-11/2022-sp-PATHWAYS-data-E3.xlsx for transportation fuels by year.

alternatives and has fostered a growing alternative fuel market. Partially as a result of the powerful market signals from the LCFS, fuels like renewable diesel, sustainable aviation fuel, biomethane, and electricity have all gained significant market shares and continue to displace gasoline and diesel in both on- and off-road vehicles. In addition, Executive Order N-79-20 calls on state agencies to support the transition of existing fuel production facilities away from fossil fuels and directs that this transition also protect and support workers, public health, safety, and the environment. In line with this direction, existing refineries could be repurposed to produce sustainable aviation fuel, renewable diesel, and hydrogen. This trend has already begun, and continuing to develop fuel production capacity in-state to support the energy transition while making the most efficient use of existing assets is critical to avoiding emissions leakage. If fuel demand persists after fuel production facilities have ceased operations, fuel demand will have to be met through imports.

As we transition or build new energy production facilities and infrastructure, it will be important to ensure low-income communities, tribes, and communities of color do not experience increases in existing air pollution disparities and continue to experience a reduction in the air pollution disparities that exist today. California must use the best available science to ensure that raw materials used to produce transportation fuels do not incentivize feedstocks with little to no GHG reductions from a life cycle perspective. A dramatic increase in alternative fuel production must not come at the expense of global deforestation, unsustainable land conversion, or adverse food supply impacts, to name a few examples. CARB will continue to monitor scientific findings on these topics to ensure that California policies, such as the LCFS, send the appropriate market signals and do not result in unintended consequences.[333]

Strategies for Achieving Success

- Accelerate the reduction and replacement of fossil fuel production and consumption in California.[334]
- Incentivize private investment in new zero-carbon fuel production in California.
- Incentivize the transition of existing fuel production and distribution assets to support deployment of low- and zero-carbon fuels while protecting public health and the environment.
- Invest in the infrastructure to support reliable refueling for transportation such as electricity and hydrogen refueling.

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[333] AB 32 EJ Advisory Committee. 2022 Scoping Plan Recommendations, F1E. finalejacrecs.pdf (arb.ca.gov).
[334] AB 32 EJ Advisory Committee. 2022 Scoping Plan Recommendations, F3. finalejacrecs.pdf (arb.ca.gov).

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- Evaluate and propose, as needed, changes to strengthen the Cap-and-Trade Program.
- Initiate a public process focused on options to increase the stringency and scope of the LCFS:
    - Evaluate and propose accelerated carbon intensity targets pre-2030 for LCFS.
    - Evaluate and propose further declines in LCFS post-2030 carbon intensity targets to align with this 2022 Scoping Plan.
    - Consider integrating opt-in sectors into the program.
    - Provide capacity credits for hydrogen and electricity for heavy-duty fueling.
- Monitor for and ensure that raw materials used to produce low-carbon fuels or technologies do not result in unintended consequences.[335]

Vehicle Miles Traveled

Transforming the transportation sector goes beyond phasing out combustion technology and producing cleaner fuels. Managing total demand for transportation energy by reducing the miles people need to drive on a daily basis is also critical as the state aims for a sustainable transportation sector in a carbon neutral economy. Though GHG emissions are declining due to cleaner vehicles and fuels, rising VMT can offset the effective benefits of adopted regulations.

Even under full implementation of Executive Order N-79-20 and CARB's Advanced Clean Cars II Regulations, with 100 percent ZEV sales in the light-duty vehicle sector by 2035, a significant portion of passenger vehicles will still rely on ICE technology, as demonstrated in Figure 4-2 above. Accordingly, VMT reductions will play an indispensable role in reducing overall transportation energy demand and achieving the state's climate, air quality, and equity goals. After a significant pandemic-induced reduction in VMT during 2020, passenger VMT has steadily climbed back up and is now closing in on pre-pandemic levels.[336] Driving alone with no passengers remains the primary mode of travel in California, amounting to 75 percent of the mode share for daily commute trips. Conversely, the transit industry, which was significantly impacted during

[335] AB 32 EJ Advisory Committee. 2022 Scoping Plan Recommendations, F1E. finalejacrecs.pdf (arb.ca.gov).
[336] U.S. Department of Transportation. 2021. December 2021 Traffic Volume Trends. Figure 3 - Seasonally Adjusted Vehicle Miles Traveled by Month. https://www.fhwa.dot.gov/policyinformation/travel_monitoring/21dectvt/figure3.cfm.

the lockdown months, and has struggled to recover; ridership only averages two-thirds of pre-pandemic levels,[337] [338] and service levels also lag behind.

Sustained VMT reductions have been difficult to achieve for much of the past decade, in large part due to entrenched transportation, land use, and housing policies and practices. Specifically, historic decision-making favoring single-occupancy vehicle travel has shaped development patterns and transportation policy, generating further growth in driving (and making transit, biking and walking less viable alternatives). These policies have also reinforced long-standing racial and economic injustices that leave people with little choice but to spend significant time and money commuting long distances, placing a disproportionate burden on low-income Californians, who pay the highest proportion of their wages on housing and transportation. While CARB has included VMT reduction targets and strategies in the Scoping Plan and appendices, these targets are not regulatory requirements, but would inform future planning processes. CARB is not setting regulatory limits on VMT in the 2022 Scoping Plan; the authority to reduce VMT largely lies with state, regional, and local transportation, land use, and housing agencies, along with the Legislature and its budgeting choices.

Appendix E (Sustainable and Equitable Communities) elaborates on reasons for reducing VMT and identifies a series of policies that, if implemented by various responsible authorities, could help to achieve the recommended VMT reduction trajectory included in this Scoping Plan (and related mode share increases for transit and active transportation). These policies aim to advance four strategic objectives:

1. Align current and future funding for transportation infrastructure with the state's climate goals, preventing new state-funded projects from inducing significant VMT growth and supporting an ambitious expansion of transit service and other multimodal alternatives.
2. Move funding for transportation beyond the gasoline and diesel taxes and implement fuel-agnostic pricing strategies that accomplish more productive uses of the roadway network and generate revenues to further improve transit and other multimodal alternatives.
3. Deploy autonomous vehicles, ride-hailing services, and other new mobility options toward high passenger-occupancy and low VMT-impact service models that complement transit and ensure equitable access for priority populations.
4. Encourage future housing production and multi-use development in infill locations and other areas in ways that make future trip origins and destinations

[337] U.S. Government Accountability Office. January 25, 2022. During COVID-19, Road Fatalities Increased and Transit Ridership Dipped. https://www.gao.gov/blog/during-covid-19-road-fatalities-increased-and-transit-ridership-dipped.
[338] American Public Transportation Association. APTA - Ridership Trends. https://transitapp.com/APTA.

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closer together and create more viable environments for transit, walking, and biking.

The pace of change to reduce VMT must be accelerated. Certainly, structural reform will be challenging, but California has demonstrated time and again that it possesses the collective leadership and commitment to break away from ideas that no longer represent Californians' values and their aspirations for the many generations to come.

Strategies for Achieving Success

- Achieve a per capita VMT reduction of at least 25 percent below 2019 levels by 2030 and 30 percent below 2019 levels by 2045. [339]
- Reimagine new roadway projects that decrease VMT in a way that meets community needs and reduces the need to drive.
- Invest in making public transit a viable alternative to driving by increasing affordability, reliability, coverage, service frequency, and consumer experience.[340]
- Implement equitable roadway pricing strategies based on local context and need, reallocating revenues to improve transit, bicycling, and other sustainable transportation choices.[341]
- Expand and complete planned networks of high-quality active transportation infrastructure.[342]
- Channel the deployment of autonomous vehicles, ride-hailing services, and other new mobility options toward high passenger-occupancy and low VMT-impact service models that complement transit and ensure equitable access for priority populations.
- Streamline access to public transportation through programs such as the California Integrated Travel Project.
- Ensure alignment of land use, housing, transportation, and conservation planning in adopted regional plans, such as regional transportation plans (RTP)/ sustainable communities strategies (SCS), regional housing needs assessments (RHNA), and local plans (e.g., general plans, zoning, and local transportation plans), and develop tools to support implementation of these plans.

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[339] AB 32 EJ Advisory Committee. 2022 Scoping Plan Recommendations, F1D. finalejacrecs.pdf (arb.ca.gov).
[340] AB 32 EJ Advisory Committee. 2022 Scoping Plan Recommendations, F1D. finalejacrecs.pdf (arb.ca.gov).
[341] AB 32 EJ Advisory Committee. 2022 Scoping Plan Recommendations, F1D. finalejacrecs.pdf (arb.ca.gov).
[342] AB 32 EJ Advisory Committee. 2022 Scoping Plan Recommendations, F1F. finalejacrecs.pdf (arb.ca.gov).

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- Accelerate infill development and housing production at all affordability levels in transportation-efficient places, with a focus on housing for lower-income residents.

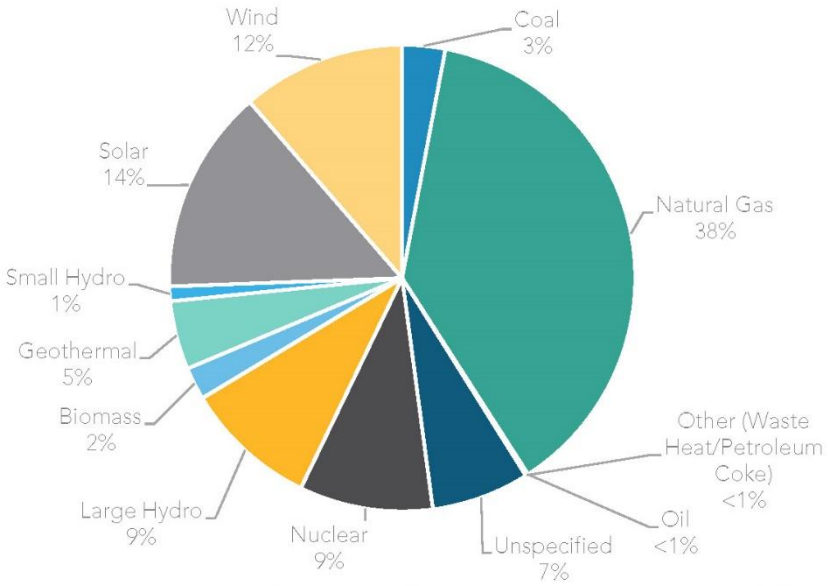
Clean Electricity Grid

Much of the state's success to date in reducing GHGs is due to decarbonization of the electricity sector as a result of the RPS, SB 100 implementation, and the Cap-and-Trade Program. Moving forward, a clean, affordable, and reliable electricity grid will serve as a backbone to support deep decarbonization across California's economy. Under this Scoping Plan, the role of electricity in powering the economy will grow in almost every sector.

In 2021, 70 percent of California electricity demand was served by in-state power plants totaling about 82 GW, with the rest coming from out-of-state imports.[343] Additionally, approximately 8 GW of customer solar photovoltaic capacity has been installed to date to help with in-state demand.[344] Figure 4-3 shows the breakdown of in-state and imported sources of electricity.

[343] CEC. 2021. Electric Generation Capacity and Energy. Data available at: https://www.energy.ca.gov/data-reports/energy-almanac/california-electricity-data/electric-generation-capacity-and-energy and CEC. 2021. Total System Electric Generation. Data available at: https://www.energy.ca.gov/data-reports/energy-almanac/california-electricity-data/2021-total-system-electric-generation. Capacity values are nameplate capacity from sources 1 MW and larger.
[344] CEC. 2021. *SB 100 Joint Agency Report Summary: Achieving 100% Clean Electricity in California, An Initial Assessment*. 10. https://www.energy.ca.gov/publications/2021/2021-sb-100-joint-agency-report-achieving-100-percent-clean-electricity.

Figure 4-3: 2021 total system electric generation (based on GWh)[345]



Note: Imports contributing to total system generation are comprised of 58% zero-carbon energy and 42% non-renewable and unspecified energy. Percentages do not add to exactly 100 due to rounding.

In 2021, about 48 percent of electricity generation serving California came from non-renewable and unspecified[346] resources, while 52 percent came from renewable and zero-carbon resources. The state's Strategic Reliability Reserve, established in AB 205 to provide additional reliability insurance during extreme events, may make three of the fossil gas-fired OTC plants planned for retirement available to support the grid on a limited basis after 2023. The state also adopted legislation to facilitate extension of the Diablo Canyon Nuclear Power Plant for five years beyond its 2025 planned closure.[347] At the

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[345] *Total system generation* is the sum of all utility-scale, in-state generation, plus net electricity imports. CEC. 2021 Total System Electricity Generation. https://www.energy.ca.gov/data-reports/energy-almanac/california-electricity-data/2021-total-system-electric-generation.

[346] *Unspecified power* refers to electricity that is not traceable to a specific generating facility, such as electricity traded through open market transactions. It typically consists of a mix of resources and may include renewables.

[347] In accordance with SB 846 (Dodd, Chapter 239, Statutes of 2022).

same time, the state continues to rapidly expand deployment of clean energy generation and storage resources and plan for increased electrification.[348] This is critical to reducing GHG emissions and addressing the long-term impacts of climate change.

Climate change is causing unprecedented stress on California's energy system—driving high demand and constraining supply. Heat, drought, and wildfires can both reduce electricity supply from reductions in hydropower generation and impacts on generation and transmission performance, and increase demand, especially in the evening hours when solar generation is declining.

California has experienced three straight years of energy reliability challenges, including a multi-day extreme heat event across the western United States with temperatures up to 20 degrees above normal in California, resulting in rotating outages in August 2020. In 2021, heat waves in June prompted a Grid Warning and the onset of emergency conditions, and the Bootleg Fire caused the loss of one transmission line, reducing import capability by 3,000 megawatts into the California Independent System Operator (CAISO) balancing authority area. And from August 31–September 9, 2022, a 10-day extreme heat event resulted in an unprecedented, sustained period of high peak loads in the CAISO system, averaging 47,000 MW and maxing at an all-time record of over 52,000 MW on September 6. The Western region also hit its record peak load on September 6, at 167.5 GW.

Reliable electricity service was maintained throughout the 10-day September 2022 heat wave in spite of the record breaking load levels. Factors that contributed to this outcome include the installation of over 3,500 MW of lithium-ion battery storage since summer 2020, enhanced coordination and communication within and outside of California, engagement with customer groups and other stakeholders, state actions to reduce load during critical times, and the additional capacity provided through the Strategic Reliability Reserve and other new state programs authorized in the 2022 Budget to provide load reduction and support the grid in extreme events. CEC, CPUC, CAISO, and the California Department of Water Resources will continue to build out strategies to enhance reliability in light of the increasing and compounding impacts of climate change on the electricity system.

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[348] In June 2021, the CPUC adopted D.21-06-035 directing procurement of 11,500 MW of new capacity between 2023 and 2026 to ensure systemwide electric reliability as Diablo Canyon and several OTC facilities retire. It requires that, out of the 11,500 MW, 2,500 MW must be from zero-emission resources. Additionally, 2,000 MW must be long lead-time resources, with at least 1,000 MW of long-duration storage and 1,000 MW of firm capacity with zero on-site emissions or that qualifies under the RPS eligibility requirements.

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While the electricity sector is using less fossil fuel due to increasing amounts of renewables,[349] existing fossil gas generation will continue to play a critical role in grid reliability until other clean, dispatchable alternatives can be deployed at scale. The integration of greater amounts of variable renewable generation resources[350] is changing power system planning and operations, and system operators need resources with flexible attributes to balance shifting supply and demand.

High levels of solar generation can lead to instances of oversupply during the middle of the day, when the sun is brightest.[351] In the evening hours, as the sun is setting, solar generation declines to zero and customers with solar generation shift back to the electric grid. In hot weather, customer demand remains high well into the summer evening period to power air conditioning, which can lead to reliability challenges.[352]

Figure 4-4 shows the energy sources used throughout one summer day in July. Renewable energy is consistent during the middle of the day, but it cannot meet all of the evening demand in the gray area. As illustrated in the figure, fossil gas generation is currently a resource that is typically ramped up to meet this evening demand as solar production begins to drop and electrical loads increase To help address this challenge, resource installations that pair solar with batteries, as well as a greater amount of battery build-out, are coming online currently and over the next five years. Nevertheless, the state's electricity grid is expected to be stressed further in the coming years by heat waves, drought, wildfires, and the growing intermittent power supply from renewables. California must accelerate deployment of diverse clean energy resources to maintain reliability and affordability in the face of climate change.

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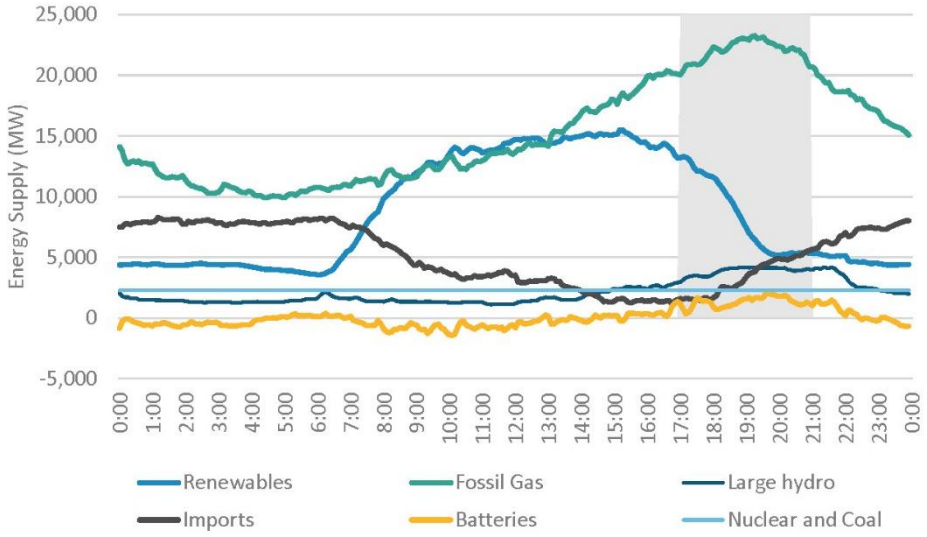
[349] CARB. 2022. *California Greenhouse Gas Emissions for 2000 to 2020.* https://ww2.arb.ca.gov/sites/default/files/classic/cc/inventory/2000-2020_ghg_inventory_trends.pdf.

[350] A *variable renewable generation resource* is a renewable source of electricity that is non-dispatchable due to its fluctuating nature and only produces electricity when weather conditions are right, such as when the sun is shining or the wind is blowing. Renewable resources that can be controlled and are dispatchable include geothermal, biomass, and dam-based hydroelectric power.

[351] *Brightness* is used colloquially here; solar energy depends on insolation (e.g., sun-hours), which is the measurement of cumulative solar energy that reaches an area over a period of time.

[352] CAISO, CPUC, and CEC. 2021. *Final Root Cause Analysis: Mid-August 2020 Extreme Heat Wave.* http://www.caiso.com/Documents/Final-Root-Cause-Analysis-Mid-August-2020-Extreme-Heat-Wave.pdf.

Figure 4-4: Electricity supply trend by resource for a California summer day, July 2022



Sector Transition

Decarbonizing the electricity sector is a crucial pillar of this Scoping Plan. It depends on both using energy more efficiently and replacing fossil-fueled generation with renewable and zero carbon resources, including solar, wind, energy storage,[353] geothermal, biomass, and hydroelectric power. The RPS Program[354] and the Cap-and-Trade Program continue to incentivize dispatch of renewables over fossil generation to serve state demand. SB 100 increased RPS stringency to require 60 percent renewables by 2030 and for California to provide 100 percent of its retail sales[355] of electricity from renewable and zero-carbon resources by 2045. Furthermore, SB 1020 has added interim targets to

[353] AB 32 EJ Advisory Committee. 2022 Scoping Plan Recommendations, NF1, NF2. finalejacrecs.pdf (arb.ca.gov).
[354] The CEC estimates that 36 percent of California's 2019 retail electricity sales was served by RPS-eligible renewable resources (see CPUC. 2021. CPUC Perspectives on Electric Sector Decarbonization. https://ww2.arb.ca.gov/sites/default/files/2021-11/CPUC-sp22-electricity-ws-11-02-21.pdf).
[355] SB 100 speaks only to retail sales and state agency procurement of electricity. The *2021 SB 100 Joint Agency Report* interprets this to mean that other loads—wholesale or non-retail sales and losses from storage and transmission and distribution lines—are not subject to the law.

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SB 100's policy framework to require renewable and zero-carbon resources to supply 90 percent of all retail electricity sales by 2035 and 95 percent of all electricity retail sales by 2040; the governor has asked the CEC to establish a planning goal of at least 20 GW of offshore wind by 2045; and the governor directed that state agencies plan for an energy transition that avoids the need for new fossil gas capacity to meet California's long-term energy goals.[356] In addition to grid-level resources, state efforts have supported rapid growth of the distributed solar industry through key actions like the California Solar Initiative (SB 1, Murray, Chapter 132, Statues of 2006).[357] Steps to commercialize microgrids powered by clean resources[358] are also being examined as part of SB 1339 (Stern, Chapter 566, Statutes of 2018).[359]

California also continues to advance its appliance and building energy efficiency standards to reduce growth in electricity consumption and meet the SB 350 goal to double statewide energy efficiency savings in electricity and fossil gas end uses[360] by 2030. In 2018, the CEC adopted a building energy efficiency code requiring most new homes to have solar photovoltaic systems[361] (or be powered by a solar array nearby) starting January 1, 2020. In 2019, California reached the milestone of 1 million solar rooftop installations.

Increased transportation and building electrification and continued policy commitment to behind-the-meter solar and storage will continue to drive growth of microgrids and other distributed energy resources (DER).[362] The CPUC's High-DER proceeding is examining how to prepare the electric grid for a high DER future by determining how to integrate

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[356] Newsom, Gavin. July 22, 2022. Letter from Governor Newsom to CARB Chair Liane Randolph. https://www.gov.ca.gov/wp-content/uploads/2022/07/07.22.2022-Governors-Letter-to-CARB.pdf.
[357] More information on the program, which closed in 2016, can be found on the CPUC website, including annual program assessment reports, at: https://www.cpuc.ca.gov/industries-and-topics/electrical-energy/demand-side-management/california-solar-initiative.
[358] AB 32 EJ Advisory Committee. 2022 Scoping Plan Recommendations, In part (NF2, NF13). finalejacrecs.pdf (arb.ca.gov).
[359] CPUC. Resiliency and Microgrids. https://www.cpuc.ca.gov/industries-and-topics/electrical-energy/infrastructure/resiliency-and-microgrids.
[360] AB 32 EJ Advisory Committee. 2022 Scoping Plan Recommendations, NF1, ES1. finalejacrecs.pdf (arb.ca.gov).
[361] AB 32 EJ Advisory Committee. 2022 Scoping Plan Recommendations, NF2. finalejacrecs.pdf (arb.ca.gov).
[362] Distributed energy resources include rooftop solar and other distributed renewable generation resources, energy storage, electric vehicles, time variant and dynamic electric rates, flexible load management, demand response, and energy efficiency technologies.

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millions of DERs within the distribution grid to maximize societal and ratepayer benefits from DERs while ensuring grid reliability and affordable rates.[363]

SB 350 also aims to connect long-term planning for electricity needs with the state's climate targets. This is primarily accomplished through CARB's establishment of 2030 GHG emissions targets for the electricity sector in general and for each electricity provider, which inform the CPUC and publicly owned utilities' integrated resource planning. A GHG planning target range of 30 to 53 MMTCO_2e—informed by the 2017 Scoping Plan—was originally developed and adopted by CARB in 2018. In its 2021 IRP planning cycle, the CPUC adopted a 38 MMT GHG target for the electricity sector in 2030, which drops to 35 MMT in 2032.[364]

The Scoping Plan Scenario incorporates SB 350's energy efficiency doubling goal, aligns with the CPUC's IRP 2030 GHG target and latest GHG emissions benchmarks through 2035,[365] the governor's 20 GW offshore wind and no new gas generation[366] goals, and SB 100's 2030 RPS and 2045 zero-carbon retail sales targets to reduce dependence on fossil fuels in the electricity sector by transitioning substantial energy demand to renewable and zero-carbon resources.[367] As described in Chapter 2, CCS is applied in limited sectors, including on 16.7 MMT of CO_2 from existing fossil gas electricity generation in 2045, to ensure the state achieves the 85 percent reduction in anthropogenic emissions required by AB 1279. Continued transition to renewable and

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[363] The High-DER proceeding is one of four "anchor" proceedings in the CPUC's DER Action Plan 2.0 and is within the Action Plan's infrastructure track. Information on the High-DER proceeding is available at: https://www.cpuc.ca.gov/industries-and-topics/electrical-energy/infrastructure/distribution-planning. The Action Plan can be accessed at: https://www.cpuc.ca.gov/about-cpuc/divisions/energy-division/der-action-plan.

[364] The February 10, 2022, Decision 22-02-004 by the CPUC adopts the 2021 Preferred System Plan, completing the 2019–21 IRP cycle. https://docs.cpuc.ca.gov/PublishedDocs/Published/G000/M451/K412/451412947.PDF. The Decision requires load serving entities to submit plans in the next IRP cycle detailing how they will meet their proportionate share of a 30 MMT electric sector target, as well as a 38 MMT GHG target.

[365] June 15, 2022, Administrative Law Judge's Ruling for 2022 integrated resource plan filings specifies the need for GHG targets to plan for in 2035 to continue progress toward the 2045 goal. The ruling proposes a straight-line projection from the GHG planning target for 2030. Corresponding to the adopted Preferred System Plan in D.22-02-004, 38 MMT in 2030 leads to a target of 30 MMT in 2035. https://docs.cpuc.ca.gov/PublishedDocs/Efile/G000/M485/K625/485625915.PDF.

[366] The governor's July 22, 2022, letter specifies no new gas generation but does not place any constraints on existing gas resources. Therefore, for purposes of RESOLVE electricity sector modeling, existing gas capacity is an available resource that is able to be reduced over time based on announced retirements or if selected for retirement by the model.

[367] CARB. 2021. PATHWAYS Scenario Modeling: 2022 Scoping Plan Update – Attachment B: Generation Technologies to be included in Modeling. https://ww2.arb.ca.gov/sites/default/files/2021-12/Revised_2022SP_ScenarioAssumptions_15Dec.pdf.

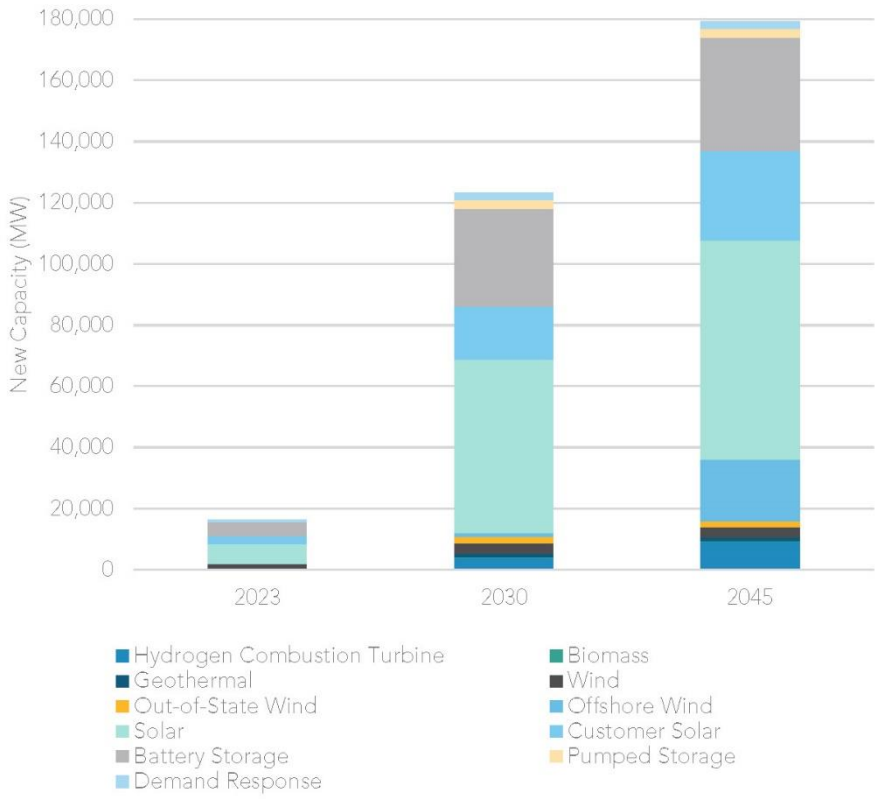
zero-carbon electricity resources will enable electricity to become a zero-carbon substitute for fossil fuels across the economy.

Figure 4-5 shows the modeled resource capacity to meet the SB 100 retail sales target.[368] Energy efficiency moderates some of the need for additional electricity generation. However, that is quickly surpassed by growing electricity demand of 26 percent by 2030 and 76 percent by 2045 compared to today (2022) from increased population and electrification of other sectors, as shown in Figure 4-6. The estimated resource build needed to meet this level of demand amounts to approximately 72 GW of utility solar[369] and 37 GW of battery storage by 2045. Annual build rates (over the 2022–2035 period) for the Scoping Plan Scenario will need to increase by about 60 percent and over 700 percent for utility solar and battery storage, respectively, compared to historic maximum rates.[370] To reach the 2045 target, the state will need to quadruple its current level of wind and solar capacity. This does not include capacity associated with hydrogen production nor mechanical CDR, which was modeled off-grid; assuming hydrogen production via electrolysis, this would roughly be equivalent to an additional 10 GW[371] of solar generation needed in 2045, and an additional 64 GW of solar generation for direct air capture in 2045. The scale of solar and battery build rates needed could be reduced through the commercialization of new zero-carbon technologies.

[368] SB 846 requires that load-serving entities exclude energy, capacity, or any attribute from the Diablo Canyon power plant in their resource plans. The Scoping Plan Scenario excludes energy, capacity, or any attribute from the Diablo Canyon power plant after the prior planned retirement date of 2025.
[369] The amount of additional customer solar included in the Scoping Plan Scenario is 29,208 MW by 2045.
[370] E3. 2022. CARB Scoping Plan: AB32 Source Emissions Final Modeling Results. PowerPoint. https://ww2.arb.ca.gov/sites/default/files/2022-11/SP22-MODELING-RESULTS-E3-PPT.pdf. Build rates are from EIA data historical builds in the 2011–2021 time frame.
[371] The estimate does not include hydrogen production assumed to be produced with bioenergy with carbon capture and storage (BECCS) and steam methane reforming (SMR).

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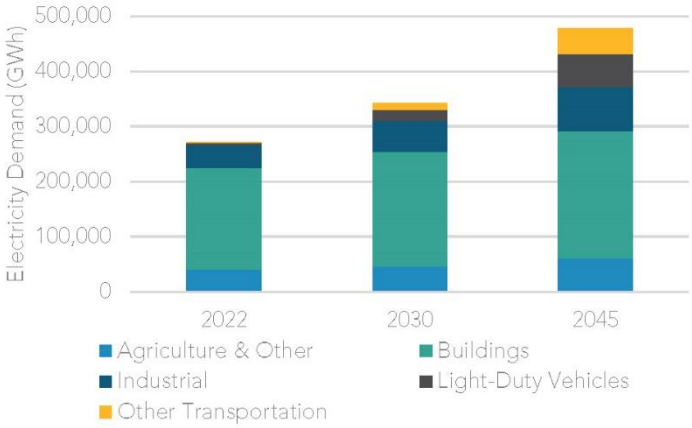
Figure 4-5: Projected new electricity resources needed by 2045 in the Scoping Plan Scenario[372]



[372] See https://ww2.arb.ca.gov/sites/default/files/2022-11/2022-sp-PATHWAYS-data-E3.xlsx for the capacity build-out by resource type.

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Figure 4-6: Electric loads in 2022, 2030 and 2045 for the Scoping Plan Scenario[373]



This transformation will drive investments in a large fleet of generation and storage resources but will also require significant transmission to accommodate these new capacity additions. Transmission needs include high-voltage lines to access out-of-state resources and major in-state generation pockets. In consideration of typical 8- to 10-year lead times for many projects, the CAISO published its first 20-Year Transmission Outlook to inform transmission planning focused on meeting the needs identified through the 2021 SB 100 Joint Agency Report process. The outlook calls for significant transmission development to access offshore wind and out-of-state wind and reinforce the existing CAISO footprint at an estimated cost of $30.5 billion.[374]

Presently, fossil gas power plants provide about 75 percent of the flexible capacity for grid reliability as more renewable power enters the system. Moving forward, other resources such as storage and demand-side management are essential to maintain reliability with high concentrations of renewables. Hydrogen produced from renewable resources and renewable feedstocks can serve a dual role as a low-carbon fuel for existing combustion turbines or fuel cells, and as energy storage for later use. Reliability

[373] *Other Transportation* includes all non-light-duty vehicles and reflects electrification of modes like passenger and freight rail, aviation, and ocean-going vessels.
[374] CAISO. 2022. *20 Year Transmission Outlook*. http://www.caiso.com/InitiativeDocuments/20-YearTransmissionOutlook-May2022.pdf.

also can be supported through increased coordination and markets in the interconnected western power grid; this is already helping to better integrate renewables.[375]

Strategies for Achieving Success

- Use long-term planning processes (Integrated Energy Policy Report, IRP, CAISO Transmission Planning Process, AB 32 Climate Change Scoping Plan) to support grid reliability and expansion of renewable and zero-carbon resource and infrastructure deployment.
- Complete systemwide and local reliability assessments across CAISO and other balancing authority areas, using realistic assumptions for land use, build rates, statewide and distribution system level constraints, and energy needs. Such assessments should be completed before state agencies update their electricity sector GHG targets.
- Prioritize actions to mitigate impacts to electricity reliability and affordability and provide sufficient flexibility in the state's decarbonization roadmap for adjustments as may be needed.
- Facilitate long lead-time resource development through the IRP and the SB 100 interagency process and through technology development and demonstration funding[376] that includes resources such as long-duration energy storage and hydrogen production.
- Continue coordination between energy agencies and energy proceedings to maximize opportunities for demand response.
- Continue to explore the benefits of regional markets to enhance decarbonization, reliability, and affordability.
- Address resource build-out challenges, including permitting, interconnection, and transmission network upgrades.
- Explore new financing mechanisms and rate designs to address affordability.[377]
- Per SB 350, double statewide energy efficiency savings in electricity and fossil gas end uses by 2030, through a combination of energy efficiency and fuel substitution actions.[378]
- Per SB 100 and SB 1020, achieve 90 percent, 95 percent, and 100 percent

[375] CEC. 2021. *2021 SB 100 Joint Agency Report – Achieving 100 Percent Clean Electricity in California: An Initial Assessment*. Publication Number: CEC-200-2021-001.
[376] AB 32 EJ Advisory Committee. 2022 Scoping Plan Recommendations, ES2. The committee recommendation speaks specifically to offshore wind production. finalejacrecs.pdf (arb.ca.gov).
[377] AB 32 EJ Advisory Committee. 2022 Scoping Plan Recommendations, NF30. finalejacrecs.pdf (arb.ca.gov).
[378] AB 32 EJ Advisory Committee. 2022 Scoping Plan Recommendations, NF1, NF2. finalejacrecs.pdf (arb.ca.gov).

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renewable and zero-carbon retail sales by 2035, 2040, and 2045, respectively.

- Evaluate and propose, as needed, changes to strengthen the Cap-and-Trade Program.
- Target programs and incentives to support and improve access to renewable and zero-carbon energy projects (e.g., rooftop solar, community owned or controlled solar or wind, battery storage, and microgrids) for communities most at need, including frontline, low-income, rural, and indigenous communities.[379]
- Prioritize public investments in zero-carbon energy projects to first benefit the most overly burdened communities affected by pollution, climate impacts, and poverty.[380]

Sustainable Manufacturing and Buildings

Fossil gas is the primary gaseous fossil fuel used to produce heat at industrial facilities, as well as in residential and commercial buildings. In buildings, space and water heating, cooking, and clothes drying all rely on gaseous fuels today. Industrial processes that require heat for conventional boilers and other processes also rely on gaseous fuels. Refineries rely on fossil gas and other gaseous fossil fuels, like liquefied petroleum gas and refinery fuel gas, and fossil gas is also used to generate electricity, as discussed earlier.

Gaseous fossil fuel use can be displaced by four primary alternatives: zero-carbon electricity, solar thermal heat, hydrogen, and biogas/biomethane. Displacing gaseous fossil fuel use can yield indoor air quality benefits, protect public health and property from unexpected fossil gas leaks, and reduce short-lived climate pollutants, which are many times more potent in affecting climate change than CO_2. The Scoping Plan Scenario reduces dependence on fossil gas in the industrial and building sectors by transitioning substantial energy demand to alternative fuels. Reducing fossil gas combustion also will help toward achieving our air quality and equity goals by reducing pollution in neighboring areas and communities. In addition, reduced dependence on gasoline and diesel in the transportation sector diminishes the need for gaseous fossil fuels to support oil and gas production and petroleum refining operations as those are phased down relative to the demand.

[379] AB 32 EJ Advisory Committee. 2022 Scoping Plan Recommendations, NF2, NF9, NF11, NF12, NF13. finalejacrecs.pdf (arb.ca.gov).
[380] AB 32 EJ Advisory Committee. 2022 Scoping Plan Recommendations, NF14. finalejacrecs.pdf (arb.ca.gov).

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Sector Transition

Industry

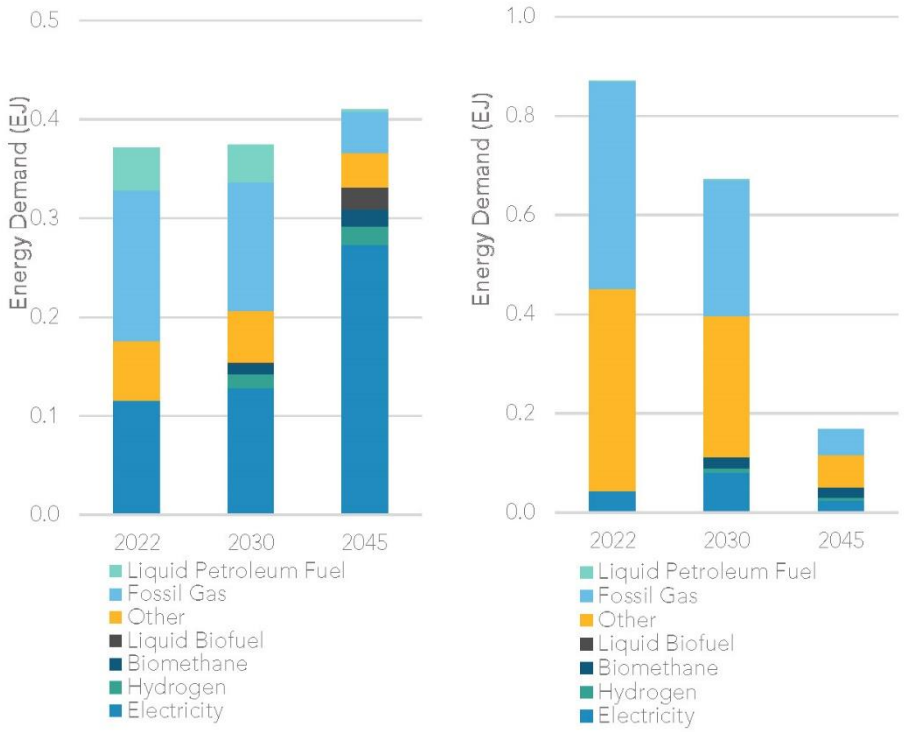
California's industrial sector contributes significantly to the state's economy, with a total output from manufacturing in 2019 of $324 billion (10.4 percent of the state total)[381] and employment of 1,222,000 manufacturing jobs (7.6 percent of the total state workforce).[382] California industry includes a diverse range of facilities, including cement plants, refineries, glass manufacturers, oil and gas producers, paper manufacturers, mining operations, metal processors, and food processors. Combustion of fossil gas, other gaseous fossil fuels, and solid fossil fuels provide energy to meet three broad industry needs: electricity, steam, and process heat. Non-combustion emissions result from fugitive emissions and from the chemical transformations inherent to some manufacturing processes. About 20 percent of the GHG emissions from the industrial sector are non-combustion emissions.

Decarbonizing industrial facilities depends upon displacing fossil fuel use with a mix of electrification, solar thermal heat, biomethane, low- or zero-carbon hydrogen, and other low-carbon fuels to provide energy for heat and reduce combustion emissions. Emissions also can be reduced by implementing energy efficiency measures and using substitute raw materials that can reduce energy demand and some process emissions. Some remaining combustion emissions and some non-combustion CO_2 emissions can be captured and sequestered. The strategy employed will depend on the industrial subsector and the specific processes utilized in production. The left side of Figure 4-7 illustrates the fuels used to meet industrial manufacturing energy demand in 2020. Industrial manufacturing energy demand needs to transition to the fuel mix shown for 2035 and 2045. The right side of Figure 4-7 illustrates the fuel mix needed to meet the energy demand of oil and gas extraction and petroleum refining operations for the same years. Energy demand in this portion of the industrial sector declines along with decreased demand for gasoline and diesel in the transportation sector. In both figures there is a continuing demand for fossil gas due to lack of non-combustion technologically feasible or cost-effective alternatives for certain industrial sectors. Policies that support decarbonization strategies like electrification, use of renewable energy, and transition to alternative fuels are needed.

[381] National Association of Manufacturers (NAM). 2021 California Manufacturing Facts. https://www.nam.org/state-manufacturing-data/2021-california-manufacturing-facts/.
[382] NAM. 2021 California Manufacturing Facts. https://www.nam.org/state-manufacturing-data/2021-california-manufacturing-facts/.

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Figure 4-7: Final energy demand in industrial manufacturing (left) and in oil and gas extraction and petroleum refining (right) in 2022, 2030, and 2045 in the Scoping Plan Scenario[383]



Electrification and solar thermal heat are best-suited to industrial processes that have relatively low heat requirements, such as food processors, paper mills, and industries that use low-pressure steam in their processes. Approaches could include replacing fossil gas boilers with electric boilers, process heaters with industrial electric heat pumps, steel forging furnaces with induction heaters, and implementing other sector-specific process electrification. Under current rate structures for industrial electricity and fossil gas in

[383] *Other* fuel in the industrial manufacturing sector is primarily coke and coal for cement production. *Other* fuel in the petroleum refining sector is primarily fossil gas associated with refining petroleum products.

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California, most projects to electrify a fossil gas-powered industrial process will face operating cost barriers and potential reliability concerns. Microgrids powered by renewable resources and with battery storage are emerging as a key enabler of electrification and decarbonization at industrial facilities.

There are fewer commercially available and economically viable electrification options to replace industrial processes that require higher-temperature heat. For these processes, onsite combustion may continue to be needed, and decarbonization will require fuel substitution to hydrogen,[384] biomethane, or other low-carbon fuels. Fuel substitution and continued combustion will require monitoring and mitigation of any potential air quality impacts, especially in low-income and communities of color which already face disproportionate air pollution burdens. Industries in California with high heat needs include steel forging, glass manufacturing, and industries with calcination processes, such as manufacturing lime and cement.

Onsite emissions from cement manufacturing derive from two main sources: (1) fuel combustion to heat the kiln to a very high temperature and (2) process CO_2 emissions from the chemical transformation of limestone. Over 60 percent of emissions from the sector are process emissions unrelated to fuel use, and most emissions related to fuel use are from coal and petroleum coke combustion. Process emissions from cement manufacturing are significant and will continue even if the sector were to operate using only zero-carbon fuels; thus carbon capture and use/sequestration will be a likely component of any strategy to fully decarbonize cement manufacturing. There are additional opportunities to reduce GHG emissions from cement manufacturing via the combination of fuel-switching to low-carbon fuels (e.g., biomethane, municipal solid waste, biochar), increased blending of non-clinker materials, and efficiency improvements. High technological and economic barriers exist to electrifying kiln process heat at cement plants, as clinker production requires temperatures in excess of 1,500°C. There are potential decarbonization opportunities throughout the value chain of cement use, including in cement manufacturing, concrete mixing, and construction practices.[385] SB 596 (Becker, Chapter 246, Statutes of 2021), which was signed by Governor Newsom in September 2021, requires CARB to develop a comprehensive strategy for cement use in California to achieve a GHG intensity 40 percent below 2019 levels by 2035, and net-zero emissions by 2045.

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[384] Griffiths, Steve, Benjamin K. Sovacool, Jinsoo Kim, Morgan Bazilian, and Joao M. Uratani. 2021. "Industrial decarbonization via hydrogen: A critical and systematic review of developments, socio-technical systems and policy options." *Energy Research & Social Science* 80. 102208, ISSN 2214-6296. https://doi.org/10.1016/j.erss.2021.102208.

[385] California Nevada Cement Association. Achieving Carbon Neutrality in the California Cement Industry. https://cncement.org/attaining-carbon-neutrality.

Oil and gas extraction and refining make up over half of California's industrial GHG emissions. Reduced demand for transportation fossil fuels corresponds to reduced supply of fossil gas and other gaseous fossil fuels for refineries to produce these fuels. Some refining operations will continue to operate to produce fossil fuel for the remaining transportation energy demands, along with renewable diesel and sustainable aviation fuel, as discussed in the Transportation Sustainability section of this chapter.

Across industrial subsectors and processes, California facilities also could realize significant reductions in GHG emissions and energy-related costs by implementing advanced energy efficiency projects and tools.[386] While enhanced operation and maintenance practices are typical at industrial facilities, additional strategic energy management practices offer greater efficiency gains by focusing on setting goals, tracking progress, and reporting results.

Strategies for Achieving Success

- Maximize air quality benefits using the best available control technologies for stationary sources in communities most in need, including frontline, low-income, disadvantaged, rural, and tribal communities.[387]
- Prioritize alternative fuel transitions first in communities most in need, including frontline, low-income, disadvantaged, rural, and tribal communities.[388]
- Invest in research and development and pilot projects to identify options to reduce materials and process emissions along with energy emissions in California's industrial manufacturing facilities, leveraging programs like the CEC's Electric Program Investment Charge (EPIC).[389]
- Evaluate and propose, as needed, changes to strengthen the Cap-and-Trade Program.
- Support electrification with changes to industrial rate structures.
- Develop infrastructure for CCS and hydrogen production to reduce GHG emissions where cost-effective and technologically feasible non-combustion alternatives are not available.
- Implement SB 905.

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[386] Therkelsen, Peter, Aimee McKane, Ridah Sabouini, and Tracy Evans. 2013. *Assessing the Costs and Benefits of the Superior Energy Performance Program*. U.S Department of Energy. https://www.osti.gov/servlets/purl/1165470.
[387] AB 32 EJ Advisory Committee. 2022 Scoping Plan Recommendations, JT14. finalejacrecs.pdf (arb.ca.gov).
[388] AB 32 EJ Advisory Committee. 2022 Scoping Plan Recommendations, JT15. finalejacrecs.pdf (arb.ca.gov).
[389] AB 32 EJ Advisory Committee. 2022 Scoping Plan Recommendations, M20. finalejacrecs.pdf (arb.ca.gov).

- Establish markets for low-carbon products and recycled materials using Buy Clean California Act and other mechanisms relying on robust data
- Develop a net-zero cement strategy to meet SB 596 targets for the GHG intensity of cement use in California.
- Continue to leverage energy-efficiency programs, including the U.S. DOE's ENERGY STAR program,[390] U.S. DOE's Superior Energy Performance program,[391] and ISO 50001.[392]
- Evaluate and continue to offer incentives to install energy efficiency and renewable energy technologies through programs such as CPUC decisions as part of rulemaking R.19-09-009[393] and the CEC's Food Production Investment Program (FPIP) and EPIC programs.[394]
- Leverage low-carbon hydrogen programs, including the Bipartisan Infrastructure Law, for regional hydrogen hubs, hydrogen electrolysis, and hydrogen manufacturing and recycling.
- Evaluate the role of hydrogen in meeting GHG emission reductions, including policy recommendations regarding the use of hydrogen in California as required by SB 1075.
- Address cost barriers to promote low-carbon fuels for hard-to-electrify industrial applications.

Buildings

Buildings have cross-sector interactions that influence our public health and well-being and affect land use and transportation patterns, energy use, water use, and indoor and outdoor environments.[395] There are about 14 million existing homes and over 7.5 billion square feet of existing commercial buildings[396] in California. Fossil gas supplies about half of the energy consumed by end uses in these buildings. In addition to GHG emissions, fossil gas usage in buildings also produces CO_2, NOx, $PM_{2.5}$, and

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[390] ENERGY STAR. ENERGY STAR Guidelines for Energy Management. https://www.energystar.gov/buildings/tools-and-resources/energy-star-guidelines-energy-management.
[391] Energy.gov. Superior Energy Performance 50001. https://www.energy.gov/eere/amo/superior-energy-performance.
[392] ISO. ISO 50001 Energy Management. https://www.iso.org/iso-50001-energy-management.html.
[393] CPUC. January 14, 2021. CPUC Adopts Strategies to Help Facilitate Commercialization of Microgrids Statewide. https://docs.cpuc.ca.gov/PublishedDocs/Published/G000/M360/K370/360370887.PDF.
[394] Bailey, Stephanie, David Erne, and Michael Gravely. 2021. *Final 2020 Integrated Energy Policy Report Update, Volume II: The Role of Microgrids in California's Clean and Resilient Energy Future, Lessons Learned From the California Energy Commission's Research.* California Energy Commission. Publication Number: CEC-100-2020-001-V2-CMF.
[395] See Appendix F (Building Decarbonization).
[396] CEC. 2021. California Building Decarbonization Assessment. https://efiling.energy.ca.gov/GetDocument.aspx?tn=239311&DocumentContentId=72767.

formaldehyde.[397] Each year, about 120,000 new homes[398] and more than 100 million-square feet[399] of commercial buildings are newly constructed across California. These new buildings will represent between a third to half of the total building stock by mid-century.

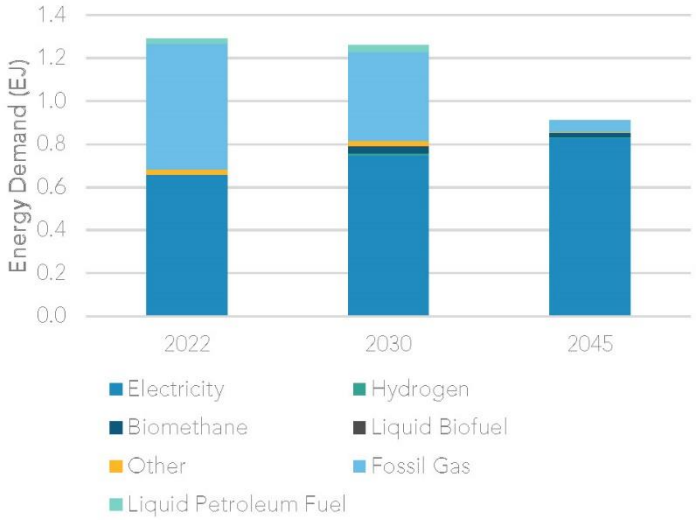
Achieving carbon neutrality must include transitioning away from fossil gas in residential and commercial buildings, and will rely primarily on advancing energy efficiency while replacing gas appliances with non-combustion alternatives. This transition must include the goal of trimming back the existing gas infrastructure so pockets of gas-fueled residential and commercial buildings do not require ongoing maintenance of the entire limb for gas delivery. Blending low-carbon fuels such as hydrogen and biomethane into the pipeline further displaces fossil gas. Pipeline safety and reliability must be evaluated to accommodate low-carbon fuels. Figure 4-8 illustrates the energy Californians use in buildings at present compared with the Scoping Plan Scenario, which introduces alternatives to fossil gas. In that scenario almost 90 percent of energy demand is electrified by 2045, and the remaining energy demand is met with combustion of hydrogen, biomethane, and fossil gas.

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[397] Zhu, Yifang, et al. 2020. *Effects of Residential Gas Appliances on Indoor and Outdoor Air Quality and Public Health in California*. UCLA Fielding School of Public Health Department of Environmental Health Sciences.
[398] Construction Industry Research Board. 2018. Annual Building Permit Summary. http://www.cirbreport.org.
[399] Delforge, Pierre. August 11, 2021. California Forging Ahead on Zero Emission Buildings. Blog. NRDC. https://www.nrdc.org/experts/pierre-delforge/california-forging-ahead-zero-emission-buildings.

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Figure 4-8: Final energy demand in buildings in 2022, 2030, and 2045 in the Scoping Plan Scenario[400]

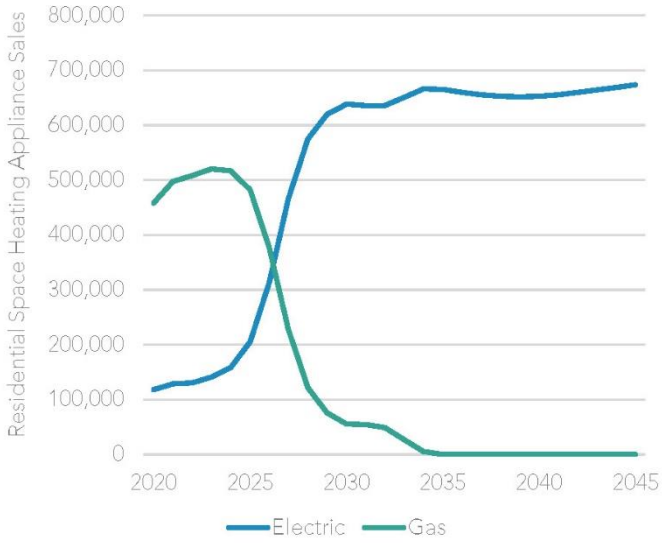


This transition is achieved when all new buildings constructed include non-combustion appliances, and appliances in existing buildings are replaced at the end of their useful life with non-combustion alternatives. Currently, electric alternatives, combined with the decarbonizing of California's grid, are the most effective alternatives, and the Scoping Plan Scenario modeled these alternatives. The Scoping Plan Scenario assumes three million all-electric and electric-ready homes by 2030 and seven million by 2035. Figure 4-9 illustrates the pace at which electric space heating appliance sales increase and gas space heating appliance sales decrease in residences in the Scoping Plan Scenario, such that by 2035 100 percent of residential home appliance sales are electric. By 2030 over six million electric heat pumps are installed statewide. The residential electric space heating appliance sales increases rapidly in the near term as new all-electric buildings are constructed and as existing buildings are renovated to utilize electric appliances. A similar transition is envisioned for other home appliances. Commercial buildings also will undergo a transition away from gas appliances to electric appliances, achieving 80 percent sales of all-electric appliances by 2035 and 100 percent by 2045. Appendix F (Building Decarbonization) describes a holistic policy approach to rapidly grow the

[400] *Other* fuel in the buildings sector is primarily liquid petroleum gas and waste heat.

number of zero emission appliances and buildings, to surmount the market barriers, and to prioritize an equitable transition for vulnerable communities.

Figure 4-9: Residential space heating appliance sales in the Scoping Plan Scenario



Strategies for Achieving Success

- Prioritize California's most vulnerable residents with the majority of funds in the new $922 million Equitable Building Decarbonization program, created through the 2022–2023 state budget. This would include residents in frontline, low-income, disadvantaged, rural, and tribal communities. This program is dedicated to a statewide direct-install building retrofit program for low-income households to replace fossil fuel appliances with electric appliances, energy-efficient lighting, and building insulation and sealing while also coordinating reductions in gas infrastructure in specific geographic areas.
- Achieve three million all-electric and electric-ready homes by 2030 and seven million by 2035 with six million heat pumps installed statewide by 2030.
- Expand incentive programs to support the holistic retrofit of existing buildings, especially for vulnerable communities.
- Ensure that incentive programs prioritize energy affordability and tenant protections, promote affordable and low-income household retrofits that improve habitability and reduce expenses, protect and empower small landlords and homeowners, address overlooked consumer groups, and pair decarbonization

with other critically needed renovation efforts to ensure that buildings support human health and are climate- and weather-resistant.[401]

- End fossil gas infrastructure expansion for newly constructed buildings.[402]
- Evaluate and propose, as needed, changes to strengthen the Cap-and-Trade Program.
- Strengthen California's building standards to support zero-emission new construction.
- Develop building performance standards for existing buildings.
- Adopt a zero-emission standard for new space and water heaters sold in California beginning in 2030, as specified in the 2022 State Strategy for the State Implementation Plan.
- Expand use of low-GWP refrigerants within buildings.
- Support electrification with changes to utility rate structures and by promoting load management programs.
- Increase funding for incentive programs and expand financing assistance programs focused on existing buildings and appliance replacements.
- Expand consumer education efforts to raise awareness and stimulate the adoption of decarbonized buildings and appliances, especially in vulnerable communities.
- Implement biomethane procurement targets for investor-owned utilities as specified in SB 1440 (Hueso, Chapter 739, Statutes of 2018) to reduce GHG emissions in remaining pipeline gas and reduce methane emissions from organic waste.

[401] AB 32 EJ Advisory Committee. 2022 Scoping Plan Recommendations, NF23, NF24, NF25, NF26, NF28. finalejacrecs.pdf (arb.ca.gov).
[402] AB 32 EJ Advisory Committee. 2022 Scoping Plan Recommendations, NF22. finalejacrecs.pdf (arb.ca.gov).

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Carbon Dioxide Removal and Capture

Climate Change 2022: Mitigation of Climate Change,[403] a report by the IPCC released in early 2022, states "The deployment of CDR to counterbalance hard-to-abate residual emissions is unavoidable if net zero CO_2 or GHG emissions are to be achieved. The scale and timing of deployment will depend on the trajectories of gross emission reductions in different sectors. Upscaling the deployment of CDR depends on developing effective approaches to address feasibility and sustainability constraints especially at large scales." In line with that report, this Scoping Plan considers CDR as a complement to technologically feasible and cost-effective GHG emissions mitigation, and the size of its role will depend on the degree of success in reducing GHG emissions at the source across the economy. [404] The modeling shows that emissions from the AB 32 GHG Inventory sources will continue to persist even if all fossil related combustion emissions are phased out. These residual emissions must be compensated for to achieve carbon neutrality. Options for CDR include both sequestration in natural and working lands and mechanical approaches like direct air capture. Chapter 2 provides estimates on how much CO_2 removal is possible by our natural and working lands and how much must be removed by mechanical CDR.

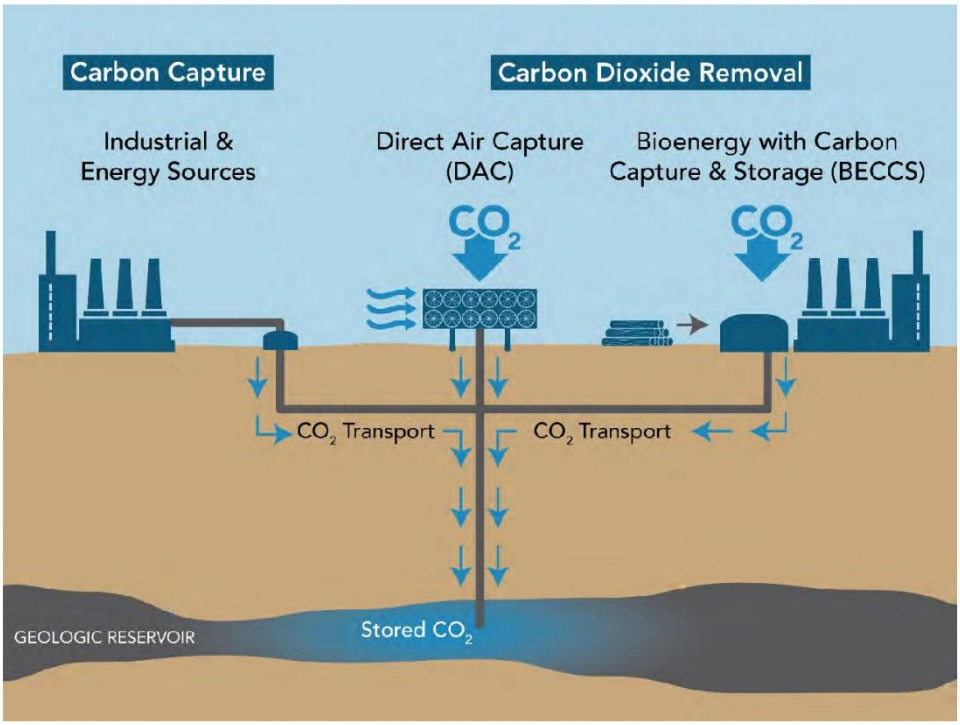
CCS, which is carbon capture from anthropogenic point sources, is described in Chapter 2 and involves capturing carbon from a smokestack of an emitting facility. Direct air capture, on the other hand, captures carbon directly from the atmosphere. Direct air capture technologies, unlike CCS, are not associated with any particular point source.

For this section, ***carbon management*** refers to the capture, movement, and sequestration of CO_2 through mechanical solutions for both capture at point sources and direct removal from the atmosphere through direct air capture.[405] Enabling policies and regulations across each of these steps are necessary for individual projects, and on a broader scale, for delivering reductions in support of the state's carbon neutrality and long-term carbon-negative goals. Figure 4-10 provides a graphic of the typical carbon management infrastructure.

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[403] IPCC. 2022. *Climate Change 2022: Mitigation of Climate Change.* https://www.ipcc.ch/report/sixth-assessment-report-working-group-3/.
[404] AB 32 EJ Advisory Committee. 2022 Scoping Plan Recommendations, F4.7. finalejacrecs.pdf (arb.ca.gov).
[405] CDR through natural and working lands is discussed in Chapter 2 and later in this chapter.

Figure 4-10: Carbon management infrastructure



Carbon dioxide removal directly from the atmosphere itself refers to a suite of carbon negative technologies that can be used to draw down ongoing and historical carbon emissions already in the atmosphere. Some CO_2 removal technologies leverage the abilities of both natural photosynthesis and mechanical removal by using biomass wastes as inputs to make low- or zero-carbon energy or fuels, all while capturing and storing produced CO_2.

Captured CO_2 from point sources or from the atmosphere is permanently stored in specialized geologic formations, typically half a mile or more underground. A recent Stanford University study estimated the state's commercial storage potential is nearly 70,000 million metric tons of CO_2, even when excluding oil and gas reservoirs.[406] California is well-positioned because few other places on the West Coast are suitable for

[406] Stanford Center for Carbon Storage. Opportunities and Challenges for CCS in California. https://sccs.stanford.edu/california-projects/opportunities-and-challenges-for-CCS-in-California.

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geologic storage at scale. To inform discussion around CO_2 removal, CARB held two full-day workshops exploring the types of options for carbon capture and geologic storage and utilization in products.[407,408,409]

The modeling results provided in Chapter 2 demonstrate the targeted need for CCS on large facilities such as refineries and cement. The CCS numbers do not include the potential additional applications for producing hydrogen with biomethane, other manufacturing, electricity, or other bioenergy. If CCS is not deployed, those emissions would be released directly into the atmosphere and instead need to be addressed through CDR to achieve carbon neutrality. Although a study finds California has 76 existing electricity and industrial facilities that are suitable candidates for CCS retrofit,[410] this Scoping Plan proposes a targeted role for this technology such that it would only be used to address sectors where non-combustion options are not technologically feasible or cost-effective at this time, to the extent needed to achieve the 85 percent reduction in anthropogenic emissions as called for in AB 1279. In future updates to the Scoping Plan, there may be additional options for technologically feasible or cost-effective technologies that may be deployed, which would further reduce the need for CCS and CDR except in situations to address historical GHG emissions.

Recognizing the need for carbon capture and utilization sequestration and removal, the Legislature passed, and the governor signed, SB 905. It includes several key requirements in the development of the state's Carbon Capture Removal, Utilization, and Storage Program. The following is a summary of the work to be completed to establish and administer this program. Many of these steps will address the need to evaluate the safety and efficacy of actions to support carbon removal, sequestration, and transfer via pipelines. Note that not all of these actions are under CARB's authority.

- Review technology to evaluate efficacy, safety, viability of CCUS/CDR methodologies.
- Develop monitoring and reporting requirements and schedules.
- Develop a unified permit application.
- Develop financial responsibility requirements.
- Develop a centralized public database for project status.

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[407] CARB. December 11, 2019. Carbon Neutrality Meetings & Workshops. https://ww2.arb.ca.gov/our-work/programs/carbon-neutrality/carbon-neutrality-meetings-workshops.
[408] CARB. August 2, 2021 Scoping Plan Meetings & Workshops. https://ww2.arb.ca.gov/our-work/programs/ab-32-climate-change-scoping-plan/scoping-plan-meetings-workshops.
[409] *Carbon utilization* refers to the use of captured carbon to produce products such as plastics and concrete.
[410] Glenwright, Kara. 2020. *Roadmap for carbon capture and storage in California.* Precourt Institute for Energy. https://earth.stanford.edu/news/roadmap-carbon-capture-and-storage-california#gs.ysj78g.

- Consult with CNRA on pore space requirements as CNRA develops a framework for pore space governing agreements.
- Establish a Geologic Carbon Sequestration Group to identify suitable injection well locations, subsurface monitoring, and potential hazards that may require suspension of injection.

SB 905 also has requirements for project developers such as to develop monitoring plans and to avoid any adverse health and environmental impacts at the carbon capture location—or mitigation of unavoidable impacts as required under existing requirements. For the site of injection, there are requirements for site stability, monitoring, and reporting plans. SB 905 also bans CCS with enhanced oil recovery in California and prohibits the transfer of CO_2 via pipeline until the U.S. Department of Transportation's Pipelines and Hazardous Materials Safety Administration (PHMSA) completes its current rulemaking to update existing CO_2 pipeline safety requirements.

An often-cited example of pipeline concerns involves a CO_2 pipeline in Mississippi. On February 22, 2020, a CO_2 pipeline operated by Denbury Gulf Coast Pipelines LLC (Denbury) ruptured in proximity to the community of Satartia, Mississippi. The rupture followed heavy rains that resulted in a landslide, creating excessive axial strain on a pipeline weld (DOT 2022). The combination of weather and topography resulted in a slower dissipation of the gas. The pipeline was also carrying hydrogen sulfide, a flammable and toxic gas. The pipeline failed on a steep embankment, which had recently subsided. Heavy rains are believed to have led to a landslide, which created axial strain on the pipeline and resulted in a full circumferential girth weld failure. The PHMSA investigation also revealed several contributing factors to the accident, including but not limited to: Denbury not addressing the risks of geohazards in its plans and procedures, underestimating the potential affected areas that could be impacted by a release in its CO_2 dispersion model, and not notifying local responders to advise them of a potential failure.

As the Satartia example highlights, appropriate pipeline safety and environmental standards in California are critical to minimize any risks from CO_2 transport in the future. As such, SB 905 also tasks CNRA, in consultation with the Public Utilities Commission, to, no later than February 1, 2023, provide a proposal to the Legislature to establish a state framework and standards for the design, operation, siting, and maintenance of intrastate pipelines carrying CO_2 fluids of varying composition and phase to minimize the risk posed to public and environmental health and safety. The recommended framework shall be designed to minimize risk to public health and environmental health and safety, to the extent feasible. Because SB 905 prohibits the transfer of CO_2 via pipeline until the PHMSA completes its current rulemaking to update existing CO_2 pipeline safety requirements, CCS or CDR projects that would require a pipeline to transfer CO_2 are not feasible at this time within California.

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Ultimately, and in accordance with SB 905, the merits of each CCS or CDR project must be evaluated on a case-by-case basis.[411] Deployment of CCS and CDR could support skilled jobs and workforces, including those in traditional fossil energy communities. Other co-benefits could include criteria air pollutant reductions and water production. It will be important to design projects that do not exacerbate community health impacts, include early and ongoing community engagement, and are in compliance with local, state, and federal public health and environmental protection laws. It also should be noted that, as these types of projects are an emerging area of governance, additional coordination and discussion will be needed among the various levels of authorities involved. SB 905 has already initiated this process by assigning specific agencies with tasks related to their expertise and authority.

Chapter 2 includes a more detailed discussion about the proposed role of CO_2 removal in this Scoping Plan.

Sector Transition

State,[412] national,[413,414] and global decarbonization analyses[415] indicate a significant role for carbon management infrastructure, yet relatively few projects are operational. Around the world, about two dozen large CCS projects are capturing tens of millions of metric tons of CO_2 each year, with about a dozen operating in the United States.[416] The vast majority of capacity is at industrial facilities, such as ethanol and fertilizer plants, that would otherwise vent nearly pure CO_2 into the atmosphere as a by-product of normal, non-combustion processes. Future research, development, and demonstration projects must refine and commercialize capture systems for more complex applications, especially

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[411] AB 32 EJ Advisory Committee. 2022 Scoping Plan Recommendations, F4.5. finalejacrecs.pdf (arb.ca.gov).
[412] E3. October 2020. Achieving Carbon Neutrality in California Report: Final Presentation. https://ww2.arb.ca.gov/sites/default/files/2020-10/e3_cn_final_presentation_oct2020_2.pdf.
[413] World Resources Institute. January 31, 2020. CarbonShot: Federal Policy Options for Carbon Removal in the United States. Working paper. https://www.wri.org/research/carbonshot-federal-policy-options-carbon-removal-united-states.
[414] C2ES. No date. Getting to Zero: A U.S. Climate Agenda — Center for Climate and Energy Solutions. https://www.c2es.org/getting-to-zero-a-u-s-climate-agenda-report/.
[415] IPCC. Mitigation Pathways Compatible with 1.5°C in the Context of Sustainable Development. Chapter 2. https://www.ipcc.ch/sr15/chapter/chapter-2/. All analyzed pathways limiting warming to 1.5°C with no or limited overshoot use CDR to some extent to neutralize emissions from sources for which no mitigation measures have been identified and, in most cases, also to achieve net negative emissions to return global warming to 1.5°C following a peak (high confidence). The longer the delay in reducing CO_2 emissions toward zero, the larger the likelihood of exceeding 1.5°C, and the heavier the implied reliance on net negative emissions after mid-century to return warming to 1.5°C (high confidence).
[416] Congressional Research Service. 2021. Carbon Capture and Sequestration (CCS) in the United States. R44902. https://crsreports.congress.gov/product/pdf/R/R44902?msclkid=e45e0012c25911ec8085ca575cb61e82.

for those with limited decarbonization options. It has only been in the last few years that attention has seriously turned to mechanical CDR. As new information and modeling on climate change have been made available, the science has become clearer that avoiding the most catastrophic impacts of climate change requires both reducing emissions and deploying mechanical CDR.

California is paving a path forward on a science-based carbon management infrastructure policy that can serve as an example for other jurisdictions. The LCFS, which reduces the carbon intensity of transportation fuels, includes a protocol for select carbon management projects to become certified and generate LCFS credits.[417] CCS is not a new concept or technology. Twenty years of CCS testing show it is a safe and reliable tool.[418] As mentioned in Chapter 2, while no new CCS projects have been implemented or generated any credits under the CARB CCS protocol, CCS projects have been implemented elsewhere since the 1970s. Moreover, there has been a U.S. Department of Energy CCS research program underway for more than two decades. These all form a foundation of information for future efforts. Certified projects must successfully demonstrate adherence to rigorous pre-construction, operational, and site closure standards designed to strengthen environmental performance, as described in CARB's CCS Protocol. The protocol is designed to layer on top of existing federal carbon sequestration regulations designed to protect the environment. The protocol would need to be reevaluated if CCS were to be more broadly applied across sectors beyond transportation fuel production.

Direct air capture and carbon mineralization have high potential capacity for removing carbon, but direct air capture is currently limited by high cost. Carbon mineralization may also have high potential for removing carbon from the atmosphere, but understanding of the technology is still limited.[419] Direct air capture could also be deployed at higher rates to remove legacy GHG emissions from the atmosphere. Chapter 2 contains additional information on the current status of CCS and mechanical CDR projects globally, as well as federal support of such technologies.

Strategies for Achieving Success

- Implement SB 905.

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[417] CARB. 2018. Carbon Capture and Sequestration Protocol under the Low Carbon Fuel Standard. August 13. https://ww2.arb.ca.gov/sites/default/files/2020-03/CCS_Protocol_Under_LCFS_8-13-18_ada.pdf.
[418] National Energy Technology Laboratory. Permanence and Safety of CCS. https://netl.doe.gov/coal/carbon-storage/faqs/permanence-safety.
[419] Aines, Roger. No date. Options for Removing CO_2 from California's Air. Lawrence Livermore National Laboratory. https://ww2.arb.ca.gov/sites/default/files/2021-08/llnl_presentation_sp_engineeredcarbonremoval_august2021.pdf.

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- Convene a multi-agency Carbon Capture and Sequestration Group comprised of federal, state, and local agencies to engage with environmental justice advocates, tribes, academics, researchers, and community representatives to identify the current status, concerns, and outstanding questions concerning CCS, and develop a process to engage with communities to understand specific concerns and consider guardrails to ensure safe and effective deployment of CCS.[420]
- Iteratively update the CARB CCS Protocol with the best available science and implementation experience.
- Incorporate CCS into other sectors and programs beyond transportation where cost-effective and technologically feasible options are not currently available and to achieve the 85 percent reduction in anthropogenic sources below 1990 levels as called for in AB 1279.
- Evaluate and propose, as appropriate, financing mechanisms and incentives to address market barriers for CCS and CDR.
- Evaluate and propose, as appropriate, the role for CCS in cement decarbonization (SB 596) and as part of hydrogen production pathways (SB 1075).
- Support carbon management infrastructure projects through core CEC research, development, and demonstration (RD&D) programs.
- Continue to explore carbon capture applications for producing or leveraging zero-carbon power for reliability needs as part of SB 100.
- Consider carbon capture infrastructure when developing hydrogen roadmaps and strategy, especially for non-electrolysis hydrogen production.
- Evaluate and streamline permitting barriers to project implementation while protecting public health and the environment.
- Explore options for how local air quality benefits can be achieved when CCS is deployed.
- Explore opportunities for CCS and CDR developers to leverage existing infrastructure, including subsurface infrastructure.
- Explore permitting options to allow for scaling the number of sources at carbon sequestration hubs.

Short-Lived Climate Pollutants (Non-Combustion Gases)

Short-lived climate pollutants (SLCPs) include black carbon (soot), methane (CH_4), and fluorinated gases (F-gases, including hydrofluorocarbons [HFCs]). They are powerful climate forcers and harmful air pollutants that have an outsized impact on climate change

[420] AB 32 EJ Advisory Committee. 2022 Scoping Plan Recommendations, F4.9. finalejacrecs.pdf (arb.ca.gov).

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in the near term, compared to longer-lived GHGs, such as CO_2. According to the IPCC's *Climate Change 2021: The Physical Science Basis*, in the near-term (i.e., 10- to 20-year time scale) the warming influence of all SLCPs combined will be at least as large as that of CO_2.[421] The United Nations Environment Programme's Global Methane Assessment[422] advises that achieving the least-cost pathways to limit warming to 1.5°C requires global methane emission reductions of 40–45 percent by 2030 alongside substantial simultaneous reductions of all climate forcers, including CO_2 and SLCPs. Action to reduce these powerful emissions sources today will provide immediate benefits—both to human health locally and to reduce warming globally—as the effects of our policies to transition to low carbon energy systems and achieve carbon neutrality further unfold.

In 2017, the Board approved the comprehensive Short-Lived Climate Pollutant Reduction Strategy (Strategy).[423] This strategy explained how the state would meet the following SB 1383-established targets:

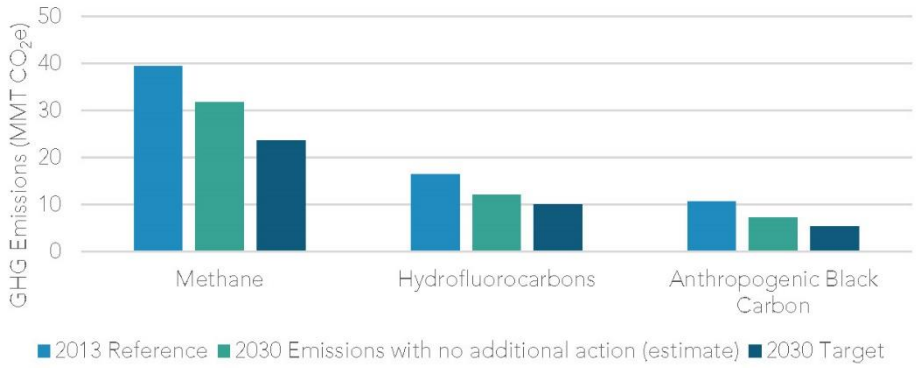
- 40 percent reduction in total methane emissions[424] (including a separate 40 percent reduction in dairy and livestock emissions)
- 40 percent reduction in hydrofluorocarbon gas emissions
- 50 percent reduction in anthropogenic black carbon emissions
- 50 percent reduction of organic waste disposal from 2014 levels by 2020, and 75 percent by 2025, including recovery of at least 20 percent of edible food for human consumption

The state is expected to achieve roughly half of the SB 1383 targeted emissions reductions by 2030 through strategies currently in place (See Figure 4-11). As directed by the Legislature under SB 1383, state agencies focused on voluntary, incentive-based mechanisms to reduce SLCP emissions in the early years of implementation to overcome technical and market barriers. Under this "carrot-then-stick" strategy, incentives are replaced with requirements as the solutions become increasingly feasible and cost-effective. To meet legislated targets, more aggressive action is needed.

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[421] IPCC. 2021. *Climate Change 2021:The Physical Science Basis*. https://www.ipcc.ch/report/ar6/wg1/.
[422] United Nations. Global Methane Assessment. Summary for Policymakers. https://wedocs.unep.org/bitstream/handle/20.500.11822/35917/GMA_ES.pdf.
[423] CARB. 2017. Short-Lived Climate Pollution Reduction Strategy. https://ww2.arb.ca.gov/sites/default/files/2020-07/final_SLCP_strategy.pdf.
[424] All SB 1383 emissions reductions are mandated to be realized by 2030 and are relative to 2013 levels.

Figure 4-11: Expected progress toward SB 1383 targeted emissions reductions by 2030 through strategies currently in place



While the state's overall GHG emissions have declined by 9 percent over the past decade, SLCP emissions reductions have not kept pace with broader progress toward decarbonization. After growing steadily in the preceding decade, methane emissions have remained relatively flat since 2013.

HFCs are the fastest growing source of GHG emissions, primarily driven by their use to replace ozone-depleting substances and an increased demand for cooling and refrigeration.[425] Since 2005, statewide HFC emissions have more than doubled. While the rate of increase has slowed in recent years due to the state's measures, HFC emissions are still on the rise in California, and have grown by over 50 percent since 2010.[426] Globally, as temperatures rise, adoption of cooling technologies (and refrigerants) is increasing rapidly. If no measures are taken, it is estimated that HFCs will account for 9 to 19 percent of the total global GHG emissions by 2050.[427]

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[425] CARB. 2022. *California Greenhouse Gas Emissions for 2000 to 2020: Trends of Emissions and Other Indicators*. https://ww2.arb.ca.gov/sites/default/files/classic/cc/inventory/2000-2020_ghg_inventory_trends.pdf.
[426] CARB. 2022. *California Greenhouse Gas Emissions for 2000 to 2020.* https://ww2.arb.ca.gov/sites/default/files/classic/cc/inventory/2000-2020_ghg_inventory_trends.pdf.
[427] Velders, G. J., D. W. Fahey, J. S. Daniel, M. McFarland, and S. O. Andersen. 2009. "The large contribution of projected HFC emissions to future climate forcing." *Proceedings of the National Academy of Sciences* 106(27), 10949–10954.

Methane

Human sources of methane emissions are estimated to be responsible for up to 25 percent of current warming.[428] Fortunately, methane's short atmospheric lifetime of ~12 years[429] means that emissions reductions will rapidly reduce concentrations in the atmosphere, slowing the pace of temperature rise in this decade. Further, a substantial portion of the targeted reductions can be achieved at low cost and will provide significant human health benefits. For example, the UN's *Global Methane Assessment* (2021)[430] found that over half of the available targeted measures have mitigation costs below $21/MTCO$_2$e, and that each million metric tons of methane reduced would prevent 1,430 premature deaths annually due to ozone pollution caused by methane.

Following the Twenty Sixth Conference of Parties (COP26) (the United Nations Convention on Climate Change in 2021), over 110 nations have signed onto the Global Methane Pledge (Pledge)[431] to limit methane emissions by 30 percent relative to 2020 levels. The Pledge covers countries that emit nearly half of all methane and make up 70 percent of global GDP. The UN's Global Methane Assessment[432] shows that human-caused methane emissions can be reduced by up to 45 percent this decade, which would avoid nearly 0.3°C of global warming by 2045.

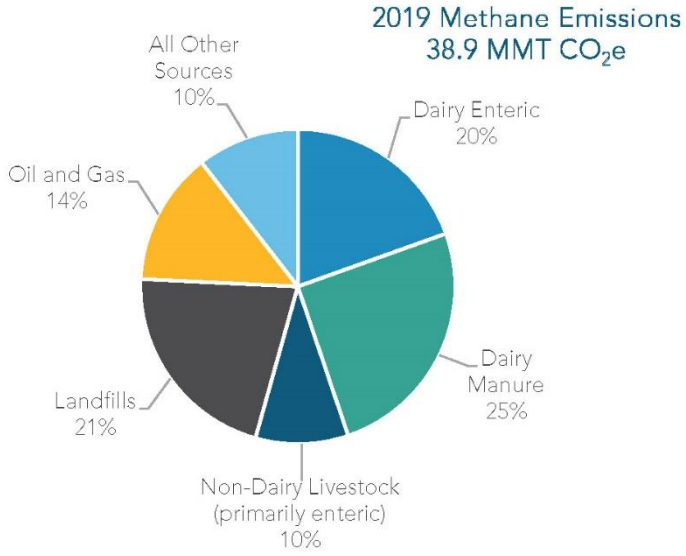
As shown in Figure 4-12, the three largest sources of California's methane emissions are the dairy and livestock industry, landfills, and oil and gas systems.

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[428] IPCC. 2021. *Climate Change 2021:The Physical Science Basis*. https://www.ipcc.ch/report/ar6/wg1/.
[429] In contrast, the lifetime of CO_2 is hundreds of years. The IPCC Third Assessment Report concluded that no single lifetime can be defined for CO_2 because of the different rates of uptake by different removal processes. According to IPCC Fourth Assessment Report, the majority of an increase in CO_2 will be removed from the atmosphere within decades to a few centuries, while the remaining 20 percent may stay in the atmosphere for many thousands of years.
[430] United Nations. 2021. Global Methane Assessment. https://wedocs.unep.org/bitstream/handle/20.500.11822/35917/GMA_ES.pdf.
[431] Global Methane Pledge. https://www.globalmethanepledge.org/.
[432] United Nations Environment Programme. 2021. Global Methane Assessment: Benefits and Costs of Mitigating Methane Emissions. https://www.unep.org/resources/report/global-methane-assessment-benefits-and-costs-mitigating-methane-emissions?msclkid=00661370c85811eca078eb8fdbd603d1.

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Figure 4-12: Sources of California methane emissions (2019)



Emissions from dairy and livestock operations come from two main sources: (1) enteric fermentation and (2) manure management operations, especially at dairies that employ open anaerobic lagoons that allow methane to escape into the atmosphere. Landfills, the second largest source of methane emissions, produce methane from the decomposition of organic waste. Although approximately 95 percent of all the waste that has been disposed of in the state has been deposited in a landfill that is equipped with a gas collection and control system, as required by California's Landfill Methane Regulation,[433] a portion of the methane still escapes into the atmosphere. Fugitive methane emissions can be intermittent and highly variable, both seasonally and spatially, particularly at landfills. Research has shown that landfills are complex systems and a wide range of conditions (e.g., atmospheric, operational, biological, chemical, and physical) may contribute to variability in rates of organic waste degradation, methane generation, and capture efficiency, so reducing the amount of organics deposited in landfills is critical to reducing overall landfill methane emissions. And despite the variability in individual landfill emissions, landfill gas collection and control systems remain the most effective strategy

[433] CARB. Landfill Methane Regulation. https://ww2.arb.ca.gov/our-work/programs/landfill-methane-regulation.

for reducing methane emissions from waste once it is placed in a landfill. Non-combustion methane emissions from the oil and gas sector are the third largest source of methane emissions in California. Almost three-quarters of the methane emissions from this sector come from leaks and venting from fossil gas transmission and distribution pipelines and equipment.

Hydrofluorocarbons

HFCs are synthetic GHGs that are powerful climate forcers. They are used mainly as refrigerants or heat transfer fluids in refrigeration, space conditioning, and heat pump equipment. Refrigerants are ubiquitous and are used everywhere from supermarkets, convenience stores, cold storage warehouses and wineries, to vending machines and residential and motor vehicle air-conditioners. Additionally, HFCs are also used as foam-blowing agents, solvents, aerosol-propellants, and fire suppressants. While HFCs remain in the atmosphere for a much shorter time than CO_2, the relative global warming potential (GWP) values of HFCs can be hundreds to thousands of times greater than CO_2. The mix of HFCs currently in use in California, weighted by usage (tonnage), have an average 100-year GWP of 1,700.[434] The average atmospheric lifetime of the mix of HFCs in use is 15 years.[435] Given the short average lifetimes, rapid reductions in HFC emissions can translate into near-term reductions in climate change effects.

As the global temperatures increase, the demand for cooling and refrigerants will continue to grow, as will the use of electric heat pumps to replace conventional fossil gas heating options. Unless addressed, continued use of high-GWP HFCs will perpetuate a feedback loop, where the cooling agents themselves cause additional warming.

In 2016, representatives from 197 nations signed the Kigali Amendment, which amended the existing Montreal Protocol (to reduce ozone-depleting substance production and consumption) to include a global phasedown in the production and consumption of HFCs beginning in 2019.[436] As of September 2022, 137 nations have either accepted, approved, or ratified the Kigali Amendment. On September 21, 2022, the U.S. Senate approved ratification of the Kigali Amendment, and it is expected that the United States

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[434] CARB. 2020. *Initial Statement of Reasons: Public Hearing to Consider the Proposed Amendments to the Prohibitions on Use of Certain Hydrofluorocarbons in Stationary Refrigeration, Chillers, Aerosols-Propellants, and Foam End-Uses Regulation*. October 20. https://ww2.arb.ca.gov/sites/default/files/barcu/regact/2020/hfc2020/isor.pdf?_ga=2.164659835.592460318.1646664679-912670513.1542398285.

[435] Zhongming, Z., et al. 2011. *HFCs: A Critical Link in Protecting Climate and the Ozone Layer: A UNEP Synthesis Report*.

[436] United Nations Treaty Collection. Chapter XXVII, Amendment to the Montreal Protocol on Substances that Deplete the Ozone Layer. https://treaties.un.org/Pages/ViewDetails.aspx?src=IND&mtdsg_no=XXVII-2-f&chapter=27&clang=_en.

will soon join the 137 nations that have already ratified.[437] In the United States, Congress enacted the federal *American Innovation and Manufacturing (AIM) Act* in December 2020.[438] The AIM Act authorizes the U.S. EPA to address HFCs in several ways, including a national HFC phasedown that nearly mirrors the schedule of the global phasedown under the Kigali amendment.[439]

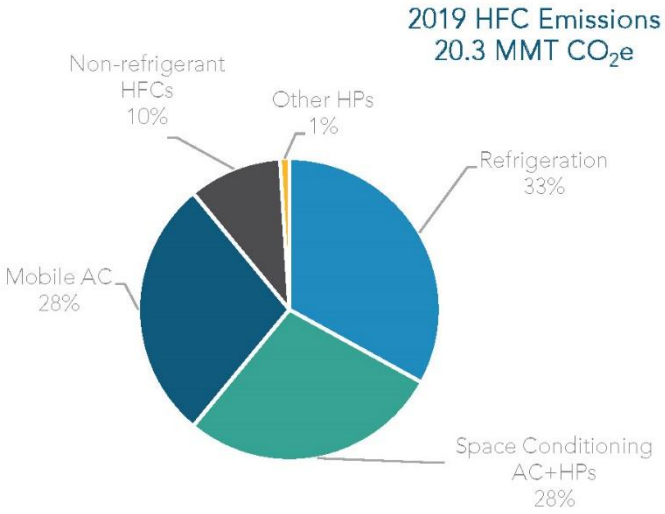
Nearly 90 percent of HFC emissions in California come from their use as refrigerants in the commercial, industrial, residential, and transportation sectors. The timescales over which the HFC emissions occur vary, depending on the type of application. Thus, strategies to reduce HFC emissions must be tailored by equipment type. CARB has several measures in place to tackle HFC emissions from the various sources shown in Figure 4-13 below. This includes the Refrigerant Management Program[440] that tracks and manages emissions from large commercial, industrial, and cold storage refrigeration facilities in the state. CARB has adopted regulations to reduce HFC emissions from consumer product aerosol propellants, semiconductor manufacturing, and small cans of automotive refrigerant.[441]

In 2018, California adopted HFC prohibitions via regulation and legislation for several sectors, including stationary refrigeration and foam end uses to backstop the partially vacated federal Significant New Alternatives Policy (SNAP) program.[442] Most recently, in 2020, CARB adopted additional measures that place GWP limits on refrigerants used in refrigeration and air conditioning equipment, which are the largest sources of HFC emissions, and are commonly used in residential, commercial, and industrial buildings. Additionally, CARB adopted a unique pilot program requiring the use of reclaimed refrigerant: the Refrigerant Recovery, Reclaim, and Reuse (R4) Program. The newly adopted HFC rules for the refrigeration and air conditioning sectors are the first of their kind in the nation.

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[437] U.S. Ratification of the Kigali Amendment - United States Department of State. https://www.state.gov/u-s-ratification-of-the-kigali-amendment/.
[438] 42 U.S.C § 7675, Pub. L. 116-260, § 103. https://www.epa.gov/sites/default/files/2021-03/documents/aim_act_section_103_of_h.r._133_consolidated_appropriations_act_2021.pdf.
[439] 42 U.S.C § 7675, Pub. L. 116-260, § 103.
[440] Cal. Code of Regs., tit. 17, §§ 95380, et seq.
[441] Contained in various sections, commencing with Cal. Code of Regs., tit. 13, §§ 1900 et seq.
[442] Cal. Code of Regs., tit. 17, §§ 95371, et seq.; California Cooling Act, Senate Bill 1013 (Lara, Stats. of 2018, Ch. 375, Health & Saf. Code § 39764).

Figure 4-13: Sources of hydrofluorocarbon (HFC) emissions (2019)

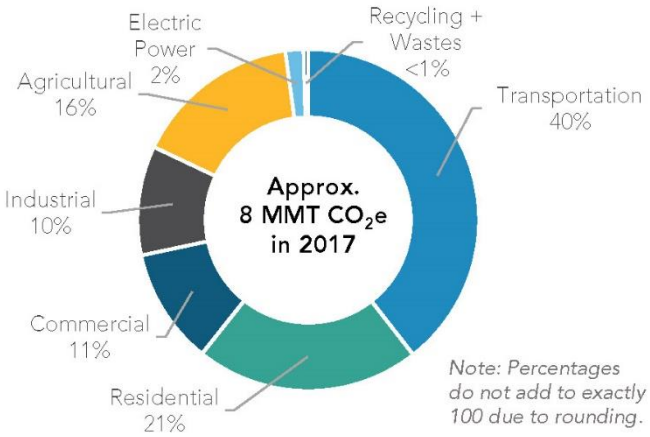


Anthropogenic Black Carbon

Black carbon is not included in AB 32 or the state's AB 32 GHG inventory that tracks progress toward the state's climate targets; however, it has been identified as a powerful climate forcer and is included California's Short-Lived Climate Pollutant Reduction Strategy. The majority of anthropogenic black carbon emissions come from transportation, specifically heavy-duty vehicles, and they have decreased since 2013 due to engine certification standards and in-use rules for on-road and off-road fleets, along with clean fuel requirements and incentives, including California Climate Investments and LCFS credits. Additionally, fuel combustion for residential, commercial, and industrial applications contribute significantly to overall black carbon emissions. Approximately 95 percent of residential black carbon emissions are due to wood combustion; these emissions are being reduced through programs like the Woodsmoke Reduction Program established by SB 563 (Lara, Chapter 671, Statutes of 2017). Alternatives to agricultural burning and policies that phase out agricultural burning will also result in agricultural black carbon emissions reductions. In 2021 CARB provided a preliminary estimate of 2017

black carbon emissions (Figure 4-14).[443] This estimate will be finalized as part of a future update to the Short-Lived Climate Pollutant Inventory.

Figure 4-14: Sources of anthropogenic black carbon (preliminary 2017 estimates; AR5 100-yr GWP 900)



Sector Transition

California has long recognized the importance of mitigating non-combustion SLCPs and took several early action measures as part of a comprehensive, ongoing program to reduce in-state GHG emissions under AB 32. The early action measures included CARB's Landfill Methane Regulation,[444] Refrigerant Management Program,[445] and Oil and Gas Methane Regulation.[446]

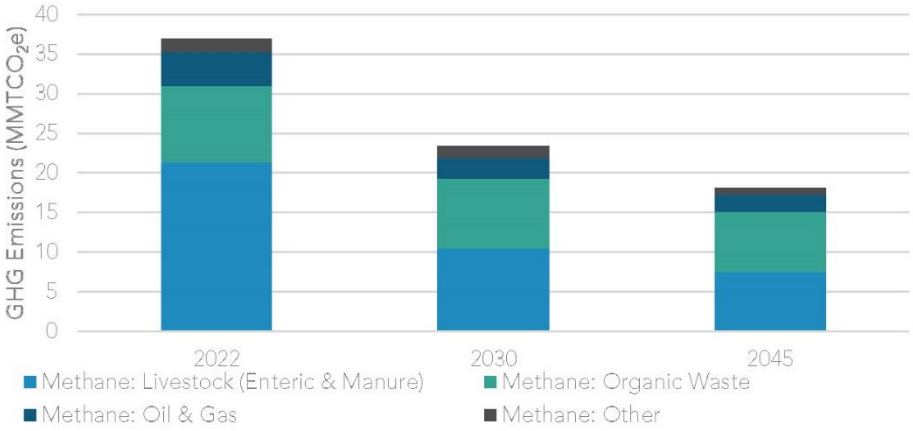
Methane

The methane abatement strategies currently in place are projected to achieve half of the methane emissions needed to meet the overall methane reduction target of SB 1383 (40 percent reduction by 2030). The reduction target translates to a limit of less than 24 MMTCO_2e in 2030 (Figure 4-15). It is anticipated that, since some sectors have fewer

[443] CARB. 2021. 2022 Scoping Plan Update – Short-Lived Climate Pollutants Workshop Presentation, September 8. https://ww2.arb.ca.gov/sites/default/files/2021-09/carb_presentation_sp_slcp_september2021_1.pdf.
[444] Cal. Code of Regs., tit. 17, §§ 95460, et seq.
[445] Cal. Code of Regs., tit. 17, §§ 95380, et seq.
[446] Cal. Code of Regs., tit. 17, §§ 95665–77.

strategies that can be implemented to reduce methane in the near-term, other sectors will need to go beyond the 40 percent reduction to meet the target.

Figure 4-15: Methane emissions in 2022, 2030, and 2045 in the Scoping Plan Scenario[447]



Dairy and Livestock Methane

California is the largest dairy-producing state, home to one in five U.S. dairy cows. To date, methane emissions reductions from the dairy and livestock sector have mainly been driven by a decreasing animal population and the growing adoption of manure management strategies, including anaerobic digesters and conversion to dry manure systems and pasture systems. CARB recently completed a detailed analysis of the emission reductions expected by 2030 and the estimated additional investment needed to reach the dairy and livestock sector methane reduction target. [448]

Assuming no adoption of additional manure management and enteric mitigations strategies beyond the projects that have committed funding, and a continued annual animal population decrease of 0.5 percent per year through 2030, further reductions of approximately 4.4 $MMTCO_2e$ will be needed to achieve the 2030 methane emissions reduction target for the sector set by SB 1383. If the remaining reductions are met through

[447] The *Organic Waste* category includes methane from landfills, wastewater treatment, and compost facilities.
[448] CARB. 2021. Analysis of Progress toward Achieving the 2030 Dairy and Livestock Sector Methane Emissions Target. June. https://ww2.arb.ca.gov/sites/default/files/2021-06/draft-2030-dairy-livestock-ch4-analysis.pdf.

a mix of dairy projects in which half are dairy digesters and half are alternative manure management projects, then it is estimated that at least 420 additional projects will be necessary. Additional emissions reductions beyond this level will likely be necessary to ensure that the overall state methane emissions reduction targets are met.

Despite the considerable methane emissions mitigation potential of enteric strategies like feed additives, little progress has been made, as few products with proven mitigation potential have become commercially available, and unlike manure management strategies, there is a lack of financial incentives for their adoption.

Market conditions favoring farm consolidation and improved production efficiencies have driven reductions in the California and U.S. dairy population over the past decade. [449] These efficiency gains have allowed California to maintain production levels despite the decreasing population. If demand for dairy and beef products remains steady or increases, continued improvements in production efficiency and adoption of effective manure management and enteric mitigation strategies will be important to support dairy and livestock methane emission reductions.

Strategies for Achieving Success

- Install state of the art anaerobic digesters that maximize air and water quality protection, maximize biomethane capture, and direct biomethane to sectors that are hard to decarbonize or as a feedstock for energy.
- Increase alternative manure management projects, including but not limited to conversion to "solid," "dry," or "scrape" manure management; installation of a compost-bedded pack barn; an increase in the time animals spend on pasture; and implementation of solid-liquid separation technology into flush manure management systems.
- Implement enteric fermentation strategies that are cost-effective, scientifically proven, safe for animal and human health, and acceptable to consumers, and that do not impact animal productivity. Provide financial incentives for these strategies as needed.
- Accelerate demand for dairy and livestock product substitutes such as plant-based or cell-cultured dairy and livestock products to achieve reductions in animal populations.
- In consideration of pace of deployment of methane mitigation strategies and the scale of complimentary incentives, consider regulation development to ensure that the 2030 target is achieved, assuming the conditions outlined in SB 1383 are met.

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[449] MacDonald, James M., Jonathan Law, and Roberto Mosheim. 2020. *Consolidation in U.S. Dairy Farming*. ERR-274. July. https://www.ers.usda.gov/webdocs/publications/98901/err-274.pdf.

Landfill Methane

Achieving the 75 percent organic waste disposal reduction target[450] of SB 1383, and maintaining that level of disposal in subsequent years, would bring annual landfill emissions in 2030 to just below the 2013 baseline. Annual methane emissions will be higher through 2030 than originally anticipated by the SLCP Strategy because the state did not achieve the anticipated reductions in organic waste disposal of 50 percent below 2014 levels by 2020. SB 1383 prohibited the organic disposal regulations from taking effect until 2022,[451] and, as a result, emissions have continued to increase.

Due to the multidecadal time frame required to break down landfilled organic material, the emissions reductions from diverting organic material in one year are realized over the course of several decades. For example, one year of waste diversion in 2030 is expected to avoid 8 $MMTCO_2e$ of landfill emissions, cumulatively, over the lifetime of that waste's decomposition.[452] Near-term diversion efforts are critical to avoid locking in future landfill methane emissions.

CalRecycle's 2020 report, ***Analysis of the Progress Toward the SB 1383 Waste Reduction Goals***,[453] estimated that 8 million short tons of composting and anerobic digestion capacity will be needed to manage organic wastes, above the existing and new capacity expected to be available by 2025. The 2019 report, ***Co-Digestion Capacity in California***,[454] from the State Water Resources Control Board estimated that at least 2.4 million tons of digester capacity is available at urban wastewater treatment plants if sufficient incentives or funding for collection, receiving, and processing operations are provided to enable utilization of this capacity. The CPUC approved a decision in February 2022 implementing the biomethane procurement program, which will require investor-owned utilities by 2025 to procure 17.6 billion cubic feet (BCF) of biomethane produced from organic wastes to support the landfill disposal reduction and SLCP target and reduce fossil gas reliance for

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[450] The target is from 2014 levels by 2025.
Public Resources Code, § 42652.5. CalRecycle approved the SLCP: Organic Waste Reductions regulations (*https://calrecycle.ca.gov/organics/slcp/*) in 2020 and began implementing them in January 2022. These regulations are designed to achieve the 2025 disposal reduction and edible food recovery targets.

[452] The life cycle emissions reduction is based on anticipated diversion of 27 million short tons of organic waste from CalRecycle (2020) Analysis of the Progress Toward the SB 1383 Organic Waste Reduction Goals (*https://www2.calrecycle.ca.gov/Publications/Details/1693*). Under CalRecycle's SLCP regulations, an alternative to landfill disposal must achieve a life cycle GHG reduction of 0.3 $MTCO_2e$ per short ton of waste diverted.

[453] CalRecycle. 2020. *Analysis of the Progress Toward the SB 1383 Waste Reduction Goals*. *https://www2.calrecycle.ca.gov/Publications/Details/1693*.

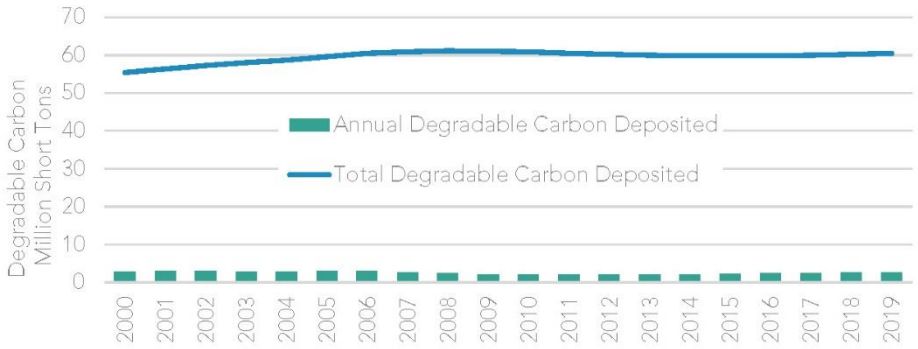
[454] State Water Resources Control Board. 2019. *Co-Digestion Capacity in California*. *https://www.waterboards.ca.gov/water_issues/programs/climate/docs/co_digestion/final_co_digestion_capacity_in_california_report_only.pdf*.

residential and commercial customers.[455] Additionally, the organic waste stream includes more than one million tons of edible food that could be recovered before it enters the waste stream through food rescue programs that combat hunger in communities throughout California.

While reducing organic waste disposal is the most effective means of achieving reductions in waste sector methane, strategies to reduce emissions from waste already in place in landfills also will play a role in achieving near-term reductions. As Figure 4-16 shows, the total degradable carbon (a measure of the amount of waste with potential to generate methane) that is accumulated from waste deposited in previous years is over 20 times greater than the amount added each year. This illustrates that even if we were able to entirely phase out landfilling of organic waste today, the existing waste in place at landfills would continue to generate methane for decades into the future.

Through a combination of improvements in operational practices, use of lower permeability covers, advanced landfill gas collection systems, and increased monitoring to detect and repair leaks, it is estimated that a direct emission reduction of 10 percent is achievable across the state's landfills by 2030. Technologies to utilize landfill gas efficiently can contribute further emission reductions in the energy sector.

Figure 4-16: Degradable carbon deposited in landfills



Strategies for Achieving Success

- Maximize existing infrastructure and expand it to reduce landfill disposal, with strategies including composting, anaerobic digestion, co-digestion at wastewater treatment plants, and other non-combustion conversion technologies.

[455] CPUC. 2022. Decision 22-02-025.

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- Expand markets for products made from organic waste, including through recognition of the co-benefits of compost, biochar, and other products.[456]
- Recover edible food to combat food insecurity.
- Invest in the infrastructure needed to support growth in organic recycling capacity.
- Utilize existing digesters at wastewater treatment facilities to rapidly expand food waste digestion capacity.
- Direct biomethane captured from landfills and organic waste digesters to sectors that are hard to decarbonize.
- Implement improved technologies and best management practices at composting and digestion operations.
- Reduce emissions from landfills through improvements in operational practices, lower permeability covers, advanced collection systems, and technologies to utilize landfill gas.
- Leverage advances in remote sensing capabilities to quickly pinpoint large methane sources and mitigate leaks, improve understanding of the factors that lead to better capture efficiency, and explore new technologies and practices that can reliably improve methane control at landfills.

Upstream Oil and Gas Methane Reduction

For oil and gas production, processing, and storage, California is currently on track to achieve a 41 percent reduction in methane emissions by 2025 relative to 2013. The additional reductions needed to meet the 2030 target may be achieved by implementing additional regulatory requirements to further reduce intentional venting of fossil gas from equipment. If necessary, additional reductions from transmission and distribution facilities may be achieved by requiring the utilities to increase inspection and repair activities or further reduce emissions from pipeline blowdowns by implementing methods such as using portable compressors, using plugs to isolate sections of pipelines, flaring vented gas, routing gas to fuel gas systems, and installing static seals on compressor rods. Advances in methane detection technologies (e.g., satellites equipped to detect large methane sources) may also help to identify and mitigate methane emissions quickly across the oil and gas sector.

As California transitions away from fossil fuels, in-state oil and gas production will likely decline. This could result in an increase over time in the number of long-term idle and orphan wells (idle wells lacking a financially solvent, responsible owner) in the state. While California has regulations aimed at helping ensure operators manage their idle wells,

[456] AB 32 EJ Advisory Committee. 2022 Scoping Plan Recommendations, F4.4. finalejacrecs.pdf (arb.ca.gov).

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there could likely be an increase in California's orphan well population. Plugging all orphan wells, of which there are currently over 5,000, could take decades due to the limited resources California has for orphan well plugging. The benefits from plugging wells include methane emission reductions and job creation; employment gains from well plugging and site remediation activities could help temporarily offset job losses from the oil and gas industry. The California Council on Science and Technology's 2018 report on orphan wells, *Orphan Wells in California: An Initial Assessment of the State's Potential Liabilities to Plug and Decommission Orphan Oil and Gas Wells*,[457] found that the potential cost to the state of plugging current orphan wells could be approximately $500 million, and the cost of plugging all active and idle wells could total over $9.1 billion. As oil and gas production in California declines due to reduced demand for fossil fuels, additional funding will likely be needed to cover the costs of plugging wells that have no viable operator.

Strategies for Achieving Success

- Mitigate emissions from leaks by regular leak detection and repair (LDAR) surveys at all facilities.
- Replace high emitting equipment with zero emission alternatives wherever feasible.[458]
- Have CARB and CalGEM lead a Task Force to identify and address methane leaks from oil infrastructure near communities.
- Pursuant to SB 1137, develop leak detection and repair plans for facilities in health protection zones, implement emission detection system standards, and provide public access to emissions data.
- Minimize emissions from equipment that must vent fossil gas by design (e.g., fossil gas powered compressors).
- Install vapor collection systems on high emitting equipment.
- Phase out venting and routine flaring of associated gas (gas produced as a by-product during oil production).
- Continuous ambient monitoring at fossil gas underground storage facilities to quickly detect large methane sources.
- Reduce pipeline and compressor blowdown emissions.

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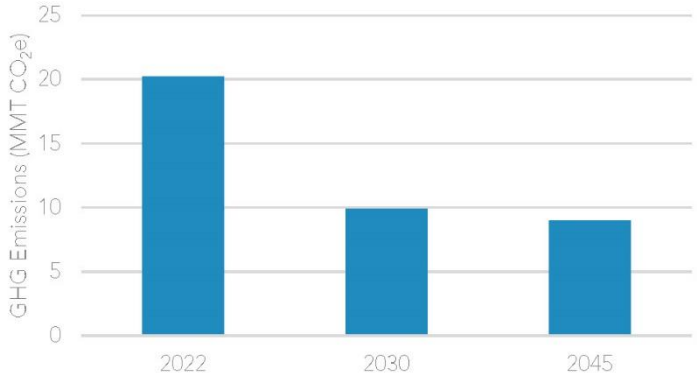
[457] The California Council on Science and Technology. 2018. *Orphan Wells in California: An Initial Assessment of the State's Potential Liabilities to Plug and Decommission Orphan Oil and Gas Wells.* https://ccst.us/wp-content/uploads/CCST-Orphan-Wells-in-California-An-Initial-Assessment.pdf.
[458] AB 32 EJ Advisory Committee. 2022 Scoping Plan Recommendations, P5. finalejacrecs.pdf (arb.ca.gov).

- Leverage advances in remote sensing capabilities to quickly pinpoint large methane sources and mitigate leaks.[459]

Hydrofluorocarbons

In California, all the HFC measures currently in place will help achieve more than 70 percent of the reductions needed to achieve the 2030 HFC goal and provide very significant emissions reductions by 2045 and beyond. However, new targeted measures will be needed to maintain the pace of reductions, as demand for technologies that currently predominantly use high-GWP refrigerants is anticipated to grow. Despite decarbonization efforts, high-GWP HFCs are expected to be among the last remaining persistent GHG emission sources, as shown in Figure 4-17.[460]

Figure 4-17: Hydrofluorocarbon emissions in 2022, 2030, and 2045 in the Scoping Plan Scenario



HFC emissions from new and existing sources should be addressed in tandem with building decarbonization efforts to maximize reductions.[461] As buildings are electrified in an effort to decarbonize them, the use of heat pumps for space conditioning, water heaters, and clothes dryers is expected to increase significantly. Heat pumps, while using

[459] AB 32 EJ Advisory Committee. 2022 Scoping Plan Recommendations, CC17. finalejacrecs.pdf (arb.ca.gov).
[460] Energy and Environmental Economics, Inc. 2020. *Achieving Carbon Neutrality*. https://ww2.arb.ca.gov/sites/default/files/2020-10/e3_cn_final_report_oct2020_0.pdf.
[461] AB 32 EJ Advisory Committee. 2022 Scoping Plan Recommendations, NF26. finalejacrecs.pdf (arb.ca.gov).

electricity, not fossil gas, currently rely predominantly on high-GWP refrigerants. Very low- or no-GWP technologies and solutions are either available or emerging for various heat pump technologies, and likely to develop further as international efforts to mitigate HFCs continue. However, most of these technologies are still nascent in the United States. In addition, some of the alternatives cannot be used until California building codes are updated, which is currently expected at the earliest in mid-2024 for some technologies based on the recently adopted provisions in AB 209[462] requiring the California Building Standards Commission to adopt the latest safety standards for refrigerant containing equipment into California's building codes. The current updates to the building codes will allow the use of many refrigerants with lower GWPs than HFCs currently in use. However, additional building code updates are needed to expand the choices of ultra-low-GWP alternatives, and that will need to happen in the next few years. The adoption of low-GWP refrigerants must occur in parallel with building decarbonization efforts; without such efforts, the vast GHG benefits of the latter will be partially offset, and the proportion of HFC emissions from buildings will continue to grow.

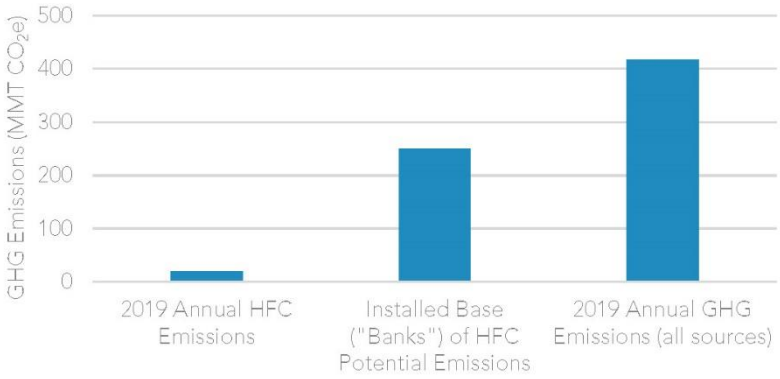
Leaks from existing air conditioning and refrigeration equipment are a major source of statewide and global HFC emissions. Once installed, refrigeration and air conditioning equipment can stay in place for decades, while leaking refrigerants into the atmosphere. This makes it very important that new installed equipment use refrigerants with a GWP as low as possible. The refrigerants inside existing equipment are sometimes collectively referred to as the ***installed base*** or ***banks*** of potential HFC emissions. If released spontaneously, the existing HFC banks would equal 60 percent of all annual statewide GHG emissions in California, as illustrated in Figure 4-18.[463]

The sales prohibitions on newly produced refrigerants set forth in SB 1206 (2022) and the national/international HFC phasedown will help in reducing HFC emissions from existing equipment by restricting the supply of and increasing the value of existing high-GWP HFCs, thus enabling a circular economy. In the 2022–2023 state budget, CARB received $45 million in incentive funding for climate-friendly refrigerant technologies; this funding will be critical in shifting the market toward the best available refrigerant technologies in various sectors.

[462] AB 209: Energy and climate change. https://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=202120220AB209.
[463] CARB. 2021. 2022 Scoping Plan Update – Short-Lived Climate Pollutants Workshop Presentation. September 8. https://ww2.arb.ca.gov/sites/default/files/2021-09/carb_presentation_sp_slcp_september2021_1.pdf.

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Figure 4-18: Potential emissions from refrigerants in existing equipment



Strategies for Achieving Success

- Expand the use of very low- or no-GWP technologies in all HFC end-use sectors, including emerging sectors, like heat pumps for applications other than space conditioning, to maximize the benefits of building decarbonization.[464]
- Convert large HFC emitters such as existing refrigeration systems to the lowest practical GWP technologies.[465]
- Prioritize small-scale and independent grocers serving priority populations in addressing existing "banks" of high-GWP refrigerants.[466]
- Improve recovery, reclamation, and reuse of refrigerants by limiting sales of new or virgin high-GWP refrigerants and requiring the use of reclaimed refrigerants where appropriate.[467]
- Assist low-income and disadvantaged communities in obtaining low-GWP space conditioning units to protect vulnerable communities from heat stress and wildfire smoke.[468]

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[464] AB 32 EJ Advisory Committee. 2022 Scoping Plan Recommendations, NF26. finalejacrecs.pdf (arb.ca.gov).
[465] AB 32 EJ Advisory Committee. 2022 Scoping Plan Recommendations, NF22. finalejacrecs.pdf (arb.ca.gov).
[466] AB 32 EJ Advisory Committee. 2022 Scoping Plan Recommendations, JT5 and JT6. finalejacrecs.pdf (arb.ca.gov).
[467] AB 32 EJ Advisory Committee. 2022 Scoping Plan Recommendations, JT1. finalejacrecs.pdf (arb.ca.gov).
[468] AB 32 EJ Advisory Committee. 2022 Scoping Plan Recommendations, NF28, JT5, and JT6. finalejacrecs.pdf (arb.ca.gov).

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- Accelerate technology transitions in California and the U.S. overall by collaborating with international partners committed to taking action on HFCs under the Kigali Amendment to the Montreal Protocol; this includes addressing barriers to adoption of very low- or no-GWP refrigerant technologies such as high upfront costs, shortage of trained technicians, and lag in updating safety standards and building codes.

Anthropogenic Black Carbon

Significant progress has been made since 2013 to reduce anthropogenic black carbon emissions, primarily from decreased combustion of distillate fuels in the agricultural sector, as well as improvements to provide cleaner, on-road combustion technologies. Under current strategies, anthropogenic black carbon from transportation is expected to be reduced by over 60 percent in 2030. Continued reductions in combustion emissions across all sectors from both the state's climate and air quality programs will also help reduce anthropogenic black carbon emissions going forward.

Strategies for Achieving Success

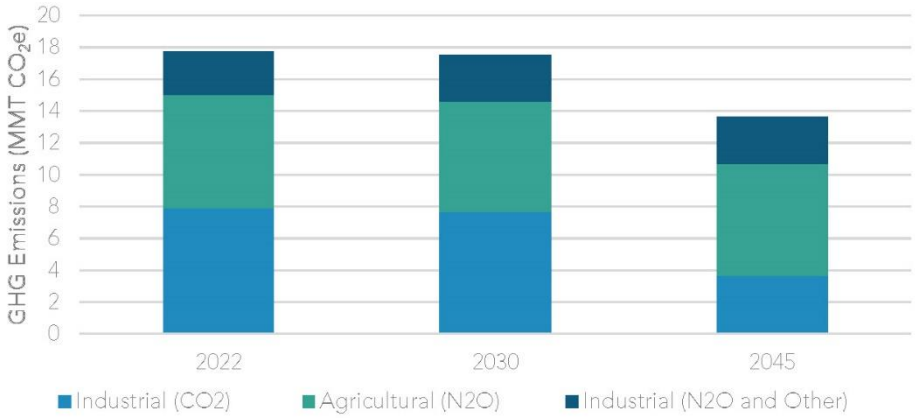
- Reduce fuel combustion commensurate with state's climate and air quality programs, particularly from reductions in transportation emissions and agricultural equipment emissions.[469]
- Invest in residential woodsmoke reduction.

In addition to SLCP emissions, some remaining non-combustion emissions are anticipated to persist in the coming decades, as shown in Figure 4-19. These include CO_2 from industrial processes such as cement manufacturing, oil and gas extraction, and geothermal electric power; N_2O from wastewater treatment, fertilizers, and livestock manure applied to agricultural soils; and other industrial, non-HFC GHG emissions.

[469] AB 32 EJ Advisory Committee. 2022 Scoping Plan Recommendations, F1A and Appendix A (Table Summary of Direct Emission Reduction Strategies). "Emissions reductions from energy consumed by California's agricultural sector, including post-harvest processing, use of tractors and other farm equipment, and water import and irrigation." finalejacrecs.pdf (arb.ca.gov).

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Figure 4-19: Remaining non-combustion emissions in 2022, 2030, and 2045 in the Scoping Plan Scenario



Natural and Working Lands

California's natural and working lands (NWL) cover approximately 90 percent of the state's 105 million acres,[470] and include forests, grasslands, shrublands and chaparral, croplands, wetlands, sparsely vegetated lands, and the green spaces in urban and built environments. These lands include California Native American tribes' ancestral and cultural lands, parks and green spaces in our cities and communities, and the waters and the iconic landscapes we know and love. The diverse landscapes and biodiversity found throughout California's NWL provide a multitude of benefits to the people of California, including clean water, clean air, biodiversity, food, economic prosperity, recreational opportunities, continuation of traditional tribal ways of life, mental health benefits, and many others.

Our lands are a critical sector in California's fight to achieve carbon neutrality and build resilience to the impacts of climate change. Healthy land can sequester and store atmospheric CO_2. Healthy lands also can reduce emissions of powerful SLCPs, limit the release of future GHG emissions, protect people and nature from the impacts of climate change, and build our resilience to future climate risks. Creation of healthy lands through

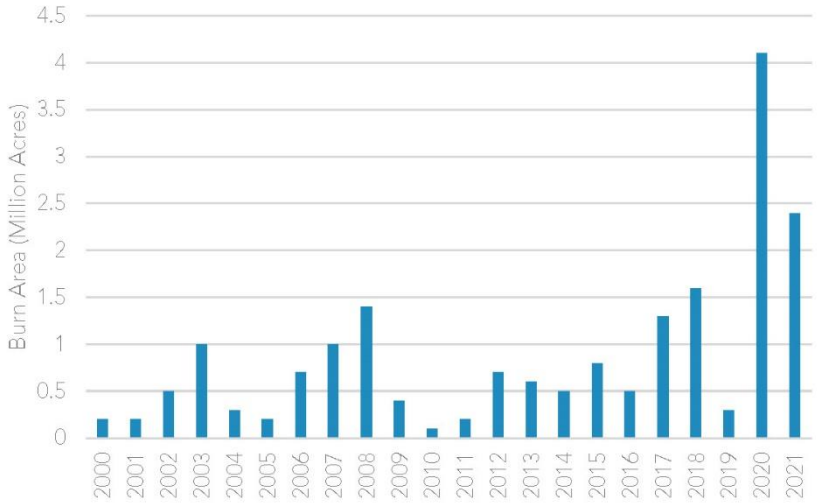
[470] CNRA. 2022. Natural and Working Lands Climate Smart Strategy. https://resources.ca.gov/-/media/CNRA-Website/Files/Initiatives/Expanding-Nature-Based-Solutions/CNRA-Report-2022---Final_Accessible_Compressed.pdf.

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multi-benefit and mitigation measures can also support tribal and local traditional lifeways. Unhealthy lands have the opposite effect—they release more GHGs than they store and are more vulnerable to future climate change impacts.

Climate change impacts have become more apparent in recent years and are having significant effects on communities throughout the state. One of these impacts is the much more frequent occurrence of unusually large, high-severity wildfires, which are being driven by climate change and by a recent history of fire-exclusion and land management practices that have resulted in forests with high levels of biomass. These recent large and high-severity wildfires have resulted in a significant amount of burned acreage and emissions in California (Figure 4-20).[471]

Figure 4-20: Acreage of burned wildland vegetation area



These wildfires deviate from the lower-severity fires that previously occurred at frequent intervals, around which California's forests evolved. As climate change accelerates, these large, uncharacteristic wildfires are likely to become more common and impact more of our landscapes. Climate change is also expected to have other significant effects on our lands, including more extreme droughts, floods, extreme heat, and the spread of invasive aquatic and terrestrial species, pests, diseases, and parasites. These impacts can lead

[471] CARB. 2022. Wildfire Emission Estimates for 2021. https://ww2.arb.ca.gov/sites/default/files/classic/cc/inventory/Wildfire%20Emission%20Estimates%202000-2021.pdf.

to negative feedback loops on human and ecological health; for example, increasing the spread of invasive species can lead to increases in pesticide use, if not managed through regulation or mitigation, which can pose risks to human health and the environment.

California's approach to climate action in the NWL sector is not solely focused on maximizing carbon stocks but instead on supporting carbon management that holistically fosters ecosystem health, resilience, provision of overall climate function, and other co-benefits.

Natural systems operate on a longer timescale than the energy and industrial sectors, and benefits from climate action on our lands can take decades to accrue. Scaling climate smart land management in California requires taking action now and playing the "long game" by establishing and maintaining consistent, patient approaches and programs.

Landscapes

For the first time, this Scoping Plan includes modeling for the NWL sector. The focus of the initial modeling is limited to seven land types that align with the those in the NWL Climate Smart Strategy.[472] Work will continue to incorporate more landscapes and management practices into the modeling over time. The initial landscapes included in the modeling for this Scoping Plan are:

- Forests
- Shrublands and Chapparal
- Grasslands
- Croplands
- Wetlands
- Developed Lands
- Sparsely Vegetated Lands

Each of these land types are a key component to the state's approach to increasing climate action in the NWL sector, as called for in Executive Order N-82-20 and AB 1757.[473] The Executive Order directs CARB to update the target for this sector in support of carbon neutrality by 2045 as part of this Scoping Plan, and to take into consideration the NWL Climate Smart Strategy. AB 1757 calls for the development of an

[472] CNRA. 2022. *Natural and Working Lands Climate Smart Strategy. Appendix B.* https://resources.ca.gov/-/media/CNRA-Website/Files/Initiatives/Expanding-Nature-Based-Solutions/Appendix-B_04132022_ada.pdf.
[473] AB 1757 California Global Warming Solutions Act of 2006: Climate Goal: Natural and Working Lands. https://leginfo.legislature.ca.gov/faces/billTextClient.xhtml?bill_id=202120220AB1757.

ambitious range of targets for the NWL sector to be integrated into the Scoping Plan and other state policies. It directs CARB and CNRA to work closely together to update the NWL Climate Smart Strategy, and establish an expert advisory committee to inform and advise on NWL modeling, targets, and implementation strategies.[474] Additionally, in 2021, the governor signed SB 27[475] (Skinner, Chapter 237, Statutes of 2021) into law. It directed CARB to establish CO_2 removal targets for 2030 and beyond and take into consideration the NWL Climate Smart Strategy. The governor's Executive Order, AB 1757, and SB 27 go beyond previous direction from the Legislature and past administrations. These directives emphasize the importance of quantifying land-based carbon both statewide,[476] and in programs and policies,[477] setting targets[478] for NWL to support the state's climate objectives, and advancing land management actions[479] that support the health and resiliency of these lands.

Blue carbon (also known as carbon captured and held in coastal vegetation and soils, such as seagrasses, seaweeds, and wetlands)—is also important to consider as we look at long-term climate goals. While this landscape is not currently covered by IPCC inventory guidelines or included in California's NWL Inventory, the United States was the first nation to include blue carbon in its national GHG emissions inventory. California's Ocean Protection Council and San Francisco Estuary Institute are partnering to create a new coastal wetlands, beaches, and watersheds inventory. CARB staff will utilize information from this effort and assess other available data to evaluate how this landscape may be integrated into our efforts in the future as more data become available.[480]

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[474] AB 32 EJ Advisory Committee. 2022 Scoping Plan Recommendations, N20. finalejacrecs.pdf (arb.ca.gov).
[475] SB 27 Carbon sequestration: state goals: natural and working lands: registry of projects. https://leginfo.legislature.ca.gov/faces/billTextClient.xhtml?bill_id=202120220SB27.
[476] SB 859 Public resources: greenhouse gas emissions and biomass (SB 859, Committee on Budget and Fiscal Review, Chapter 368, Statutes of 2016). https://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=201520160SB859.
[477] SB 1386. Resource conservation: working and natural lands. (SB 1386, Chapter 545, Statutes of 2016). https://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=201520160SB1386.
[478] CARB. 2017. 2017 Climate Change Scoping Plan Update. Board Resolution 17-46. https://ww2.arb.ca.gov/sites/default/files/barcu/board/res/2017/res17-46.pdf.
[479] Executive Department. State of California. EO B-52-18. https://www.ca.gov/archive/gov39/wp-content/uploads/2018/05/5.10.18-Forest-EO.pdf.
[480] AB 32 EJ Advisory Committee. 2022 Scoping Plan Recommendations, N2. finalejacrecs.pdf (arb.ca.gov).

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Trends of Carbon on Landscapes

CARB currently tracks the carbon stock changes though the Inventory of Ecosystem Carbon in California's Lands[481] (NWL Inventory), which is summarized in Chapter 1. The NWL Inventory is a key tool for tracking changes in carbon stocks across the state, and it will serve as the inventory of record for this sector, tracking sector-wide progress toward the target. The NWL Inventory provides a retrospective snapshot of the status of California's lands, and captures the gains or losses of carbon stocks that occur over time. In addition to tracking carbon stock changes, the NWL Inventory is an important tool for understanding the impacts of our efforts to increase climate action in this sector (such as those identified in this Scoping Plan and the NWL Climate Smart Strategy) on NWL carbon stocks. The inventory is also used as the foundation for Scoping Plan scenario modeling and target setting.

CARB's inventory shows that carbon stocks decreased in NWL lands from 2001 to 2011, releasing more carbon than they were storing, and then increased slightly from 2012 to 2014.[482] These trends highlight the interannual and interdecadal variability of lands and their ability to be both a source and a sink of carbon, and the importance of looking at NWL data and trends over multiyear and multidecadal time periods, as opposed to looking only at annual changes. This movement is part of the Earth's carbon cycle, where carbon transfers between the land, ocean, and atmosphere. As part of the carbon cycle, over decades or centuries, fire and plant respiration and decomposition move carbon from the land to the atmosphere, while plant growth and other processes move carbon from the atmosphere to the land. Emissions from fossil-fuel combustion are contributing to putting this cycle out of balance.

Additionally, some historic land management practices that have resulted in the loss of carbon from the soil are also contributing to the atmospheric rise of CO_2 while simultaneously exacerbating the imbalance of the water cycle, which is influenced by and linked to the carbon cycle. These emissions are also contributing to a feedback loop for California's lands: as CO_2 emissions accumulate in the atmosphere—and California experiences more warming, extreme heat events, and droughts—the risk and intensity of carbon losses also increases, which in turn transfers more carbon from the land to the atmosphere. And because forests and shrublands comprise approximately 85 percent of the carbon stocks in California, management strategies and disturbances in forest and

[481] CARB. *An Inventory of Ecosystem Carbon in California's Natural & Working Lands.* 2018 Edition. nwl_inventory.pdf (ca.gov). Accessed 3/2/2022.
[482] These trends are consistent estimates in the most recent AB 1504 reporting period.

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shrubland carbon play an important role in determining whether California's lands are providing either net carbon sequestration or net emissions on an annual basis.

The gains and losses of carbon on our lands will fluctuate in the future; what is important is to restore carbon in places where it has been lost and reduce large carbon losses on our NWL through active, attentive, and adaptive management. For additional details on the nexus between NWL and GHGs, see pages 5–6 of the NWL Climate Smart Strategy.

Goals and Accelerating Nature-Based Solutions

The state's climate mitigation targets are traditionally identified by individual years, (i.e., tons of GHG emissions in 2020 or 2030). However, because NWL processes fluctuate year to year and because it can sometimes take decades for climate action to fully impact carbon in NWL, it is important to consider the statewide, long-term trends of carbon stock change when identifying how this sector contributes to California's pathway to achieving carbon neutrality. Tracking carbon stock change over a multi-decadal period is the best way to assess the full direct impact climate action has on carbon storage. Such an approach filters out fluctuations from year-to-year weather variations and multi-year natural climate cycles, such as El Niño patterns.

Current data sources and methods allow us to track only certain carbon stocks that exist on NWL. For target tracking to be successful, each carbon pool must be inventoried using a methodology that can detect changes due to management and climate change. Certain carbon pools lack the scientific data and methodologies necessary for target-setting and tracking. For example, soils in forests, shrublands, and grasslands are not included in the Scoping Plan carbon stock target because, currently, there is no way to track statewide soil carbon through time in a way that would capture the effects of increased climate action and climate change.

When considering how NWL contribute to the state's goal of carbon neutrality, all lands' carbon stock gains and losses must be considered, and the Scoping Plan target is set in these terms. It is not sufficient to aggregate climate benefits only within areas where projects, management, or climate action occur. Much of the state does not receive active or quantifiable management, but these areas still contribute to the state's overall carbon stock change and GHG emissions. To incorporate the entire carbon balance toward true carbon neutrality, the Scoping Plan target is set in terms of carbon stock change across the entire state. This incorporates all lands that both receive and do not receive active management, and includes the end result of all sequestration, emissions, and other changes to carbon on the landscape.

However, carbon stock change is not equivalent to emissions. Currently, the data and emission quantification science is not sufficient to enable inventories to comprehensively track all NWL emissions in a way that would enable us to set an NWL target in terms of

statewide emissions and sequestration. There is a great need, across the entire NWL sector statewide, for more empirical data, science, and tools to track all carbon stocks across each carbon pool, and to begin to track emission and sequestration rates. As California implements AB 1757, there is an opportunity to update the data, science, and tools to enable this level of tracking and target setting in the future.

As outlined in Chapter 2, California is projected to lose carbon stocks over the coming decades, but this Scoping Plan analysis also shows that increasing the pace and scale of climate smart land management in California will reduce the carbon stock losses and GHG emissions from the NWL sector. In response to EO N-82-20 and AB 1757, the proposed target for NWL is shown in Table 4-1.

Table 4-1: Scoping Plan modeled target for NWL, based on increasing action on NWL

	Total Carbon Stock % Change from 2014
2045	-4

Achieving this target will require significant expansion of the pace and scale of climate action on California's NWL, including the following:

- Increasing climate smart forest, shrubland, and grassland management to at least 2.3 million acres a year—an approximate 10x increase in management from current levels.
- Increasing climate smart agricultural practices by at least 78,000 acres adopted a year, annually conserving at least 8,000 acres a year of croplands, and increasing organic agriculture to comprise at least 20 percent of cultivated acres in California by 2045—an approximate 7.5x increase in healthy soils practices from previous levels and a 2x increase in total acres of organic agriculture.
- Increasing annual investment in urban trees in developed lands by at least 200 percent above historic levels and establishing defensible space on all parcels by 2045.
- Restoring at least 60,000 acres, or approximately 15 percent of all Sacramento–San Joaquin River Delta (Delta) wetlands, by 2045.
- Cutting land conversion of deserts and sparsely vegetated landscapes by at least 50 percent annually from current levels, starting in 2025.

If the carbon stock target above is met, and the management actions above are implemented, the modeling for NWL indicates that California's lands will be a net source of emissions, producing approximately 7 $MMTCO_2e$ of average annual emissions.

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Additional climate smart management practices and additional landscapes, such as those included in the Climate Smart Strategy and discussed below in Additional Management Strategies, have the potential to increase carbon stocks and reduce GHG emissions from NWL beyond the levels modeled for this Scoping Plan.

The purpose of the NWL target and the above estimated outcomes is to provide a numerical guide that can support the state's efforts to accelerate both near-term and long-term climate action on California's lands, prioritizing durable solutions that deliver multiple outcomes. Taking these actions over the coming decades will reduce the potential carbon losses from NWL, reduce GHG emissions from some landscape types (such as croplands and Delta wetlands), and support sequestration of GHGs from NWL between 2025 and 2045. These actions will also deliver significant benefits to Californians beyond advancing our climate goals, such as reducing wildfire emissions and their associated health impacts, increasing habitat for biodiversity, reducing urban heat island effects, reducing harmful pesticide exposure, expanding economic opportunities, and others. Additional information on several economic and health outcomes from the Scoping Plan Scenario is included in Chapters 2 and 3.

Statewide planning and target setting for the NWL sector will only create meaningful change if followed by effective on-the-ground implementation. State government cannot accomplish this implementation alone. Effective large scale climate action is dependent on partnerships among tribal, federal, state, regional, and local partners, and across governmental, private, nonprofit, and commercial sectors. The NWL sector of the Scoping Plan sets a carbon target with climate action recommendations that can be used to achieve the quantified carbon, health, and economic outcomes. Implementation of these actions must be led by local or regional partnerships that plan and execute projects appropriate to the specific conditions. The technical expertise and local knowledge of land managers and stewards in all sectors must be elevated to ensure relevant, efficient, and effective climate action.

Implementation of climate action should contribute to state targets, maximize local benefits, and alleviate environmental injustices and other social inequities. On-the-ground action is largely executed and managed by local and regional actors, but state government agencies must support communities across the state in implementing nature-based climate solutions that address statewide objectives, such as the Scoping Plan carbon target. This includes providing resources and developing frameworks, while greatly increasing capacity and technical assistance to assist and empower local partners. Examples of how this can be done are the Regional Forest and Fire Capacity Program within the forestry sector, the UC Cooperative Extension in the agricultural and forestry sectors—as well as the work of the state's 10 regional Conservancies. These programs provide strong examples to emulate as they facilitate statewide coordination, and information and resource transfer from the state to the regional and local levels. The Regional Forest and Fire Capacity Program provides funding for local and regional groups

to build their organizational capacity to plan and implement wildfire and forest management projects that are informed by their own local expertise. The UC Cooperative Extension is an example of how the state provides technical assistance to local landowners and community organizations, helping them apply the latest science-based management strategies to their lands. California's regional Conservancies play a pivotal role in implementing regional conservation, restoration, and land management efforts through activities such as grant funding, science generation, and planning assistance.

The state also has identified the need to incorporate and elevate traditional indigenous knowledge into climate action on the regional and local scales. Accomplishing this requires close partnerships with tribes for mutual knowledge and resource sharing, while protecting culturally sensitive knowledge and resources. As Tribes are sovereign nations with specialized cultural knowledge and experience in managing lands, climate action on these lands that contribute to the State of California's climate targets can only be accomplished with the full participation and under the leadership of the Tribes that govern those lands.

Strategies for Achieving Success: Crosscutting Items for all NWL

- Implement AB 1757 and SB 27.
- Implement the Climate Smart Strategy.
- Accelerate the pace and scale of climate smart action, consistent with the management levels identified above, as part of a collective effort between federal, state, private, nonprofit, and individual land managers.
- Prioritize and practice equity, including through meaningful community engagement and prioritizing implementation of nature-based solutions that benefit the communities most vulnerable to climate change.[483]
- Advance multi-benefit, collaborative, landscape-level approaches that engage communities and landowners, and incorporate adaptive managements.
- Consult and partner with California Native American tribes to increase co-management and tribal management authority; restore, protect, and enhance natural cultural resources, traditional foods, and cultural landscapes; respect tribal sovereignty; and support tribes' implementation of tribal expertise and Traditional Ecological Knowledge and cultural easements.[484]

[483] AB 32 EJ Advisory Committee. 2022 Scoping Plan Recommendations, N8. finalejacrecs.pdf (arb.ca.gov).
[484] AB 32 EJ Advisory Committee. 2022 Scoping Plan Recommendations, N1, N6, N16, N17, N18. finalejacrecs.pdf (arb.ca.gov).

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- Leverage existing innovative financial and market mechanisms, and explore new ones, between the public, private, and philanthropic sectors to secure funding of climate smart land management.
- In partnership with communities, tribes, and the private sector, expand and develop new infrastructure for manufacturing and processing of climate smart agricultural and biomass products.
- Leverage and support technical assistance providers: such as the UC Cooperative Extension and California's 98 Resource Conservation Districts, that have track records of providing technical assistance to local landowners and implementing agriculture, forestry, natural resource management, and restoration projects across the state.
- Establish and expand mechanisms that ensure NWL are protected from land conversion and parcelization (e.g., conservation easements or Williamson Act), in line with the strategies outlined in CNRA's Pathways to 30x30 California.[485,486] Pair land conservation projects with management plans that increase carbon sequestration, where feasible.
- Increase opportunities for private and philanthropic investments in nature-based climate solutions, utilizing existing voluntary and compliance carbon markets, existing state and local programs, and the California Carbon Sequestration and Climate Resiliency Project Registry established pursuant to SB 27.
- Expand monitoring and tracking of management actions and outcomes consistent with the tracking and monitoring recommendations of the Climate Smart Strategy.

Forests, Shrublands, and Chaparral

At roughly 29 million acres, forests cover 27 percent of California. Shrublands and chaparral cover 31 percent of the state; roughly 33 million acres. Both types are distinct, with their own ecological dynamics and management strategies, and are modeled within a single model that is calibrated to treat them uniquely.

Together, forests, shrublands, and chaparral support a high biodiversity of plants and animals, in addition to high levels of carbon stocks. They provide important air and water quality benefits to all Californians, as well as recreational opportunities and, for forests, harvested wood products for the state. These landscapes are fire-adapted, and historical tribal management of these lands has fostered ecosystem health and resilience. Over the past century, these lands have been impacted severely by fire exclusion, including

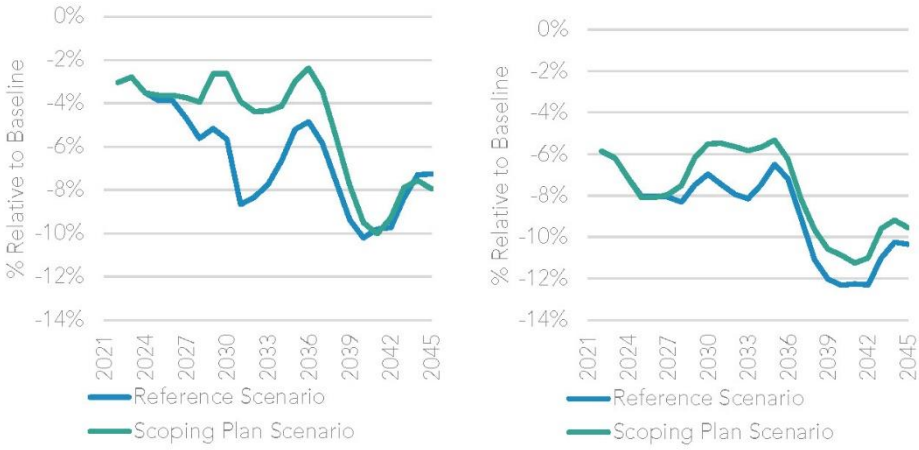
[485] AB 32 EJ Advisory Committee. 2022 Scoping Plan Recommendations, N5, N26, N27. finalejacrecs.pdf (arb.ca.gov).
[486] CNRA. 2022. *Pathways to 30x30 California*. https://www.californianature.ca.gov/pages/30x30.

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exclusion of indigenous people's management and past management practices, which has resulted in less resilient ecosystems and communities and more destructive wildfires today. This, along with drought induced stress and mortality, has changed these landscapes from a carbon sink to a carbon source. Climate smart management can help make forests more resilient to climate change and less prone to catastrophic wildfire. Climate-smart management in shrublands and chaparral face additional challenges and uncertainty, but can still provide protection for threatened communities and natural resources. This management, if conducted on a regular basis to maintain forest health, can help reduce emissions from forests, shrublands, and chaparral, and help strengthen and maintain the co-benefits that Californians experience from them.

Under all management levels, forests and shrublands are expected to lose carbon over the next two decades due to climate change and wildfire (Figure 4-21).

Figure 4-21: Forest (left) and shrubland (right) carbon stocks by 2045[487,488]



While this decrease in carbon stocks may be inevitable, forest management under the Scoping Plan Scenario can help direct where and how carbon loss occurs. By proactively managing forests and shrublands, the loss of carbon from wildfire can be lessened as the risk of high severity fire is decreased, with the removed biomass going toward a more

[487] AB 32 EJ Advisory Committee. 2022 Scoping Plan Recommendations, N13. finalejacrecs.pdf (arb.ca.gov).
[488] This analysis is the aggregation of all forests and shrublands from all ownerships across the entire state of California.

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useful purpose such as harvested wood products, bioenergy, and engineered carbon removal. Managing for a diverse and resilient forest landscape also can help forests recover more quickly so that when climate change and wildfire impacts occur, forests will be less affected and can continue to thrive and sequester carbon. Additional details on the climate benefit potential of forests and shrublands/chapparal can be found in Section 2 of the NWL Climate Smart Strategy.

Strategies for Achieving Success

- Accelerate the pace and scale of climate smart forest management to at least 2.3 million acres annually by 2025, in line with the climate smart management strategies identified in this Scoping Plan, the NWL Climate Smart Strategy, and the Wildfire and Forest Resilience Action Plan.[489]
- Establish and expand mechanisms that ensure forests, shrublands, and grasslands are protected from land conversion and that support ongoing, rather than one-time, management actions.
- In collaboration with state and local agencies, accelerate the deployment of long-term carbon storage from waste woody biomass residues resulting from climate smart management, including storage in durable wood products, underground reservoirs, soil amendments, and other mediums.
- Expand infrastructure to facilitate processing of biomass resulting from climate smart management.
- Expand permit streamlining in collaboration with state and local agencies to accelerate implementation of climate smart forest management while protecting natural resources.

Grasslands

Grasslands cover 9 percent of California, roughly 10 million acres, and are found throughout the state in various landscapes, with concentrations in the foothills surrounding the Sacramento and San Joaquin Valleys. In addition to carbon storage (primarily in the soil), grasslands provide open space, wild habitat, grazing land, and important water filtration and recharge benefits. The protection of grasslands provides an opportunity to reduce sprawl and complement VMT reduction strategies. As grasslands are susceptible to invasive species, climate smart strategies can increase grassland

[489] Forest Management Task Force. 2021. *California's Wildfire and Forest Resilience Action Plan: Recommendations of the Governor's Forest Management Task Force.* https://www.fire.ca.gov/media/ps4p2vck/californiawildfireandforestresilienceactionplan.pdf.

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resilience to climate change by improving species diversity and maintaining or increasing soil carbon stocks.

Modeling results show that increased fuels treatments and avoided land conversion can increase carbon stocks on grasslands by 2045, but sequestration rates fluctuate annually. Grasslands are capable of high carbon sequestration rates but are susceptible to carbon losses from wildfire and land conversion. Soil carbon is the major carbon pool on these lands, and continued future improvement of the monitoring and modeling of soil carbon is needed. Similar to forests and shrubland/chaparral, modeling alternatives that include fuels treatments resulted in greater carbon stocks compared to no management, and had lower wildfire emissions. Unlike forests and shrubland/chaparral, which have a general declining carbon stocks trend, the modeling results (Figure 4-22) show grasslands can maintain or increase carbon stocks with active management. Details on the climate benefit potential of grasslands can be found in Section 2 of the NWL Climate Smart Strategy.

Figure 4-22: Grassland carbon stocks by 2045



Strategies for Achieving Success

- Establish and expand mechanisms that ensure grasslands are protected from land conversion/parcelization and that support ongoing, rather than one-time, management actions that improve carbon sequestration.
- Deploy grassland management strategies, like prescribed grazing, compost application, and other regenerative practices, to support soil carbon sequestration, biodiversity, and other ecological improvements.

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- Increase adoption of compost production on farms and application of compost in appropriate grassland settings for improved vegetation and carbon storage, and to deliver waste diversion goals through nature-based solutions.

Croplands

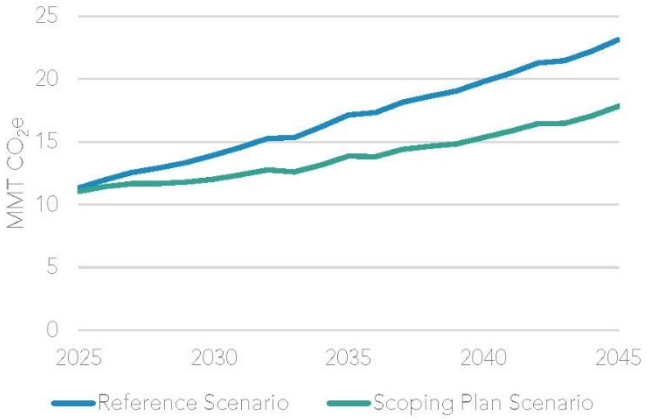
Croplands cover 9 percent of the state, roughly 9.5 million acres. This land is some of the most productive agricultural land in the world, and enables California to be a global leader in agriculture. Aside from developed lands, croplands are the most intensively managed landscapes in the state, and are closely tied to society through the food they produce and the constant, direct contact that people have with croplands through the course of management. In addition to food security, croplands provide considerable carbon storage in the soil and, in perennial croplands, in aboveground biomass. Climate smart practices can improve public health; for example, by reducing synthetic fertilizer and pesticide use. They also help to maintain or increase the climate resilience of cropland productivity through improved soil conditions and increased pollinator habitat.

There is also significant potential to transform this sector to increase soil carbon storage, reduce GHG emissions (Figure 4-23), and reduce pesticide exposure and health impacts. Moving to an agricultural system that improves soil health and water holding capacity reduces over-application of nitrogen, reduces the use of pesticides and fumigants, and increases biodiversity and pollinator habitat, supporting California's pathway to carbon neutrality while simultaneously improving the lives of those who live and work in the agricultural community. Croplands are intricately tied to people, communities, and their health, and through climate smart practices and cropland conservation, these lands have the potential to contribute more to society than just food.[490] The implementation of climate smart agricultural practices and diversified organic agriculture can help California achieve social and environmental benefits, like improving water use efficiency, increasing pollinator habitat, and reducing synthetic fertilizer and pesticide use.[491] Additional details on the climate benefit potential of croplands can be found in Section 2 of the NWL Climate Smart Strategy.

[490] AB 32 EJ Advisory Committee. 2022 Scoping Plan Recommendations In-part (N3, N4, N22), N5, N21. finalejacrecs.pdf (arb.ca.gov).
[491] AB 32 EJ Advisory Committee. 2022 Scoping Plan Recommendations, N11. finalejacrecs.pdf (arb.ca.gov).

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Figure 4-23: Cumulative CO_2e emissions from annual croplands in 2045[492]



CARB recognizes the complex nature of croplands, cross-sector relationships, and the need to build on this analysis to further our understanding of cropland dynamics. Many more aspects of cropland management need to be explored for potential climate benefits, such as water and nutrient use management, pest control methods, crop rotations, and other management practices. The impacts of climate change on water availability, annual/perennial crop growth, and future carbon sequestration trends are uncertain, and recent policies such as the Sustainable Groundwater Management Act may also influence cropland management in unforeseen ways. Nonetheless, it is clear that greater climate smart practice implementation can prepare California for the future and yield tangible benefits for the state.

Strategies for Achieving Success

- Accelerate the pace and scale of healthy soils practices to 80,000 acres annually by 2025, conserve at least 8,000 acres of annual crops annually, and increase organic agriculture to 20 percent of all cultivated acres by 2045.

[492] AB 32 EJ Advisory Committee. 2022 Scoping Plan Recommendations, N11. finalejacrecs.pdf (arb.ca.gov).

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- Utilize the recommendations included in CDFA's Farmer and Rancher-Led Climate Change Solutions[493] report to accelerate deployment of healthy soils practices, organic farming, and climate smart agriculture practices.
- Establish or expand financial mechanisms that support ongoing deployment of healthy soils practices and organic agriculture.[494]
- Support strategies that achieve co-benefits of safer, more sustainable pest management practices and the health and preservation of ecosystems, such as implementing the California Department of Pesticide Regulation's (DPR's) Sustainable Pest Management Work Group recommendations.[495]
- Conduct research on the intersection of pesticides, soil health, GHGs, and pest resiliency via a multi-agency effort with DPR, CDFA, and CARB.[496]
- Conduct outreach and education to develop and facilitate the increased adoption of safer, more sustainable pest management practices and tools; reduce the use of harmful pesticides; promote healthy soils; improve water and air quality; and reduce public health impacts.
- In collaboration with state and local agencies, accelerate the deployment of alternatives to agricultural burning that increase long-term carbon storage from waste agricultural biomass, including storage in durable wood products, underground reservoirs, soil amendments, and other mediums.
- Work across state agencies to reduce regulatory and permitting barriers around some healthy soils practices (e.g., composting), where appropriate.
- Utilize innovative agriculture energy use and carbon monitoring and planning tools to reduce on-farm GHG emissions from energy and fertilizer application or to increase carbon storage, as well as to promote on-farm energy production opportunities.

[493] California Department of Food and Agriculture. 2021. Farmer and Rancher Led Climate Change Solutions. https://www.cdfa.ca.gov/oefi/climate/docs/cdfa_farmer_and_rancher-led_climate_solutions_meetings_summary.pdf.
[494] AB 32 EJ Advisory Committee. 2022 Scoping Plan Recommendations, N5, N7. finalejacrecs.pdf (arb.ca.gov).
[495] AB 32 EJ Advisory Committee. 2022 Scoping Plan Recommendations N3, N4, N5, N7, N22. finalejacrecs.pdf (arb.ca.gov).
[496] AB 32 EJ Advisory Committee. 2022 Scoping Plan Recommendations, N11. finalejacrecs.pdf (arb.ca.gov).

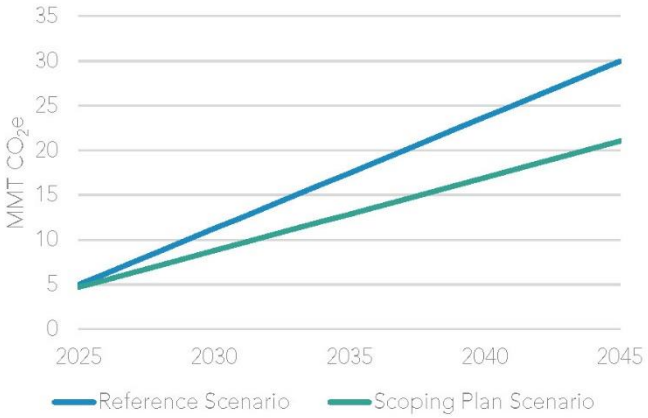
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Wetlands

Wetlands cover 2 percent of the state (roughly 1.7 million acres) and include inland and coastal wetlands, such as vernal pools, peatlands, mountain meadows, salt marshes, and mudflats. These lands are essential to California's communities as they serve as hotspots for biodiversity, contain considerable carbon in the soil, are critical to the state's water supply, and protect upland areas from flooding due to sea level rise and storms. Wetlands have been severely degraded through reclamation, diking, draining, and dredging practices in the past, resulting in the emissions of the carbon stored in the soils and the loss of ecosystem benefits. Climate smart strategies to restore and protect all the types of wetlands can reduce emissions while simultaneously improving the climate resilience of surrounding areas and improving the water quality and yield for the state. Restored wetlands also can reduce pressure on California's aging water infrastructure. These benefits beyond emissions reductions will help in the future, as climate change is predicted to negatively affect water supply.

Avoided conversion and restoration of Delta wetlands reduces CO_2 and methane emissions from wetlands, with GHG reductions scaling with implementation rates (Figure 4-24). Expansion of conservation and restoration efforts will generate benefits such as the conservation of biodiversity, improved water quality and supply, and reduced flood risk. Additional details on the climate benefit potential of wetlands can be found in Section 2 of the NWL Climate Smart Strategy.

Figure 4-24: Cumulative CO_2e emissions from Delta wetlands by 2045



Strategies for Achieving Success

- Restore 60,000 acres of Delta wetlands annually by 2045 to reduce methane emissions from wetlands and reverse the resulting subsidence.

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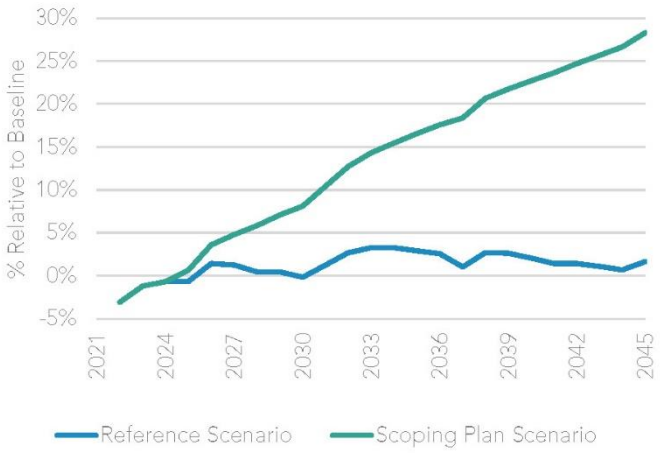
- Identify and prioritize wetland restoration efforts around climate vulnerable communities.
- Leverage other funding and institutions to support wetland restoration projects, including land trusts, local funding (e.g., San Francisco Measure AA), federal funding, and private and philanthropic funding to support wetlands restoration projects.
- Work across state agencies to reduce regulatory and permitting barriers around wetland restoration projects, where appropriate.

Developed Lands

Developed lands cover 6 percent of the state (roughly 6.8 million acres) and include urban, suburban, and rural areas, as well as transportation and supporting infrastructure throughout California. This area encapsulates the land on which the vast majority of Californians reside and call home. The vegetation within cities and communities, and along infrastructure, are all part of developed lands. This vegetation provides numerous benefits to surrounding areas, including carbon storage, air and water filtration, reduced urban heat island effect, and access to nature, aesthetics, and mental health, among others. These areas are susceptible to climate change as well, and climate smart strategies to protect and expand the urban forests, landscaping, green spaces, parks, and associated vegetation can increase their climate resilience and the benefits Californians derive from them. These strategies also have a significant opportunity to benefit disadvantaged communities, who may not have equitable access to these practices or the benefits they provide. Additional details on the climate and equity benefit potential of developed lands can be found in Section 2 and the Introduction of the NWL Climate Smart Strategy.

Urban forests have a significant potential to sequester carbon (Figure 4-25). They are vastly different from wildland forests, as they require investments to maintain and irrigate. This results in the need for a significant increase in investment to increase urban forest carbon. As urban forests become denser and management difficulty increases, the carbon stock returns on investment diminish, making it expensive to maximize carbon in urban forests. Water availability and irrigation efficiency are also an important consideration for increasing urban forest cover. As water becomes scarcer, the prioritization of irrigating trees over lawns or gardens may be required to achieve increases in urban forest carbon.

Figure 4-25: Carbon stocks in urban forests by 2045



Within wildland-urban interface (WUI) areas, defensible space can protect urban and rural communities from wildfire. Analysis results show that 48 percent of parcels are currently fully compliant with defensible space requirements. This highlights how much work needs to be done to protect communities and homes. Defensible space results in a decrease in carbon stocks, as expected when reducing fuels for wildfire.

Strategies for Achieving Success

- Increase urban forestry investment annually by 200 percent, relative to business as usual.
- Increase public awareness of urban forest benefits and, where appropriate, prioritizing irrigation of trees over lawns.
- Provide technical assistance and resources to disadvantaged communities to implement community urban greening projects to provide equitable access to the benefits of urban greening projects.[497]
- Work with state and local agencies to expand technical assistance for and enforcement of the defensible space requirements of PRC 4291 to reduce wildfire risk to homes and structures.

[497] AB 32 EJ Advisory Committee. 2022 Scoping Plan Recommendations, N8. finalejacrecs.pdf (arb.ca.gov).

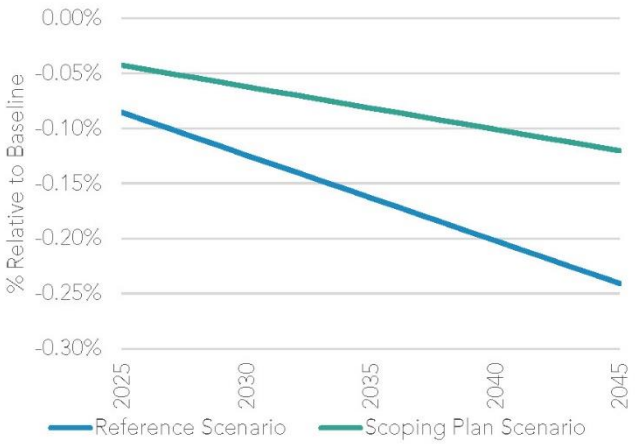
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Sparsely Vegetated Lands

Sparsely vegetated lands cover 10 percent of the state, roughly 10.2 million acres, primarily in the east and southern parts of California. These lands include deserts, beaches, dunes, bare rock, and areas covered in ice and snow (e.g., higher mountain elevations). The limited carbon storage of these lands varies from bare rock and mineral soil to more vegetated areas, though severe climate limits the amount of biomass. Nonetheless, sparsely vegetated lands are important for open space and provide rare and unique habitats for endemic species and a diversity of wildlife. These lands present important recreational opportunities for Californians and serve as important protective buffers in coastal and low-lying areas. Land use change threatens these lands, and conservation efforts are important for protecting these unique areas of California.[498]

Avoided conversion of sparsely vegetated lands reduces the organic carbon lost from the soil, which is the major carbon pool in this land type (Figure 4-26). In identifying the outcomes for sparsely vegetated lands, CARB modeled avoided land conversion to another land use.

Figure 4-26: Carbon stocks in sparsely vegetated lands by 2045



Strategies for Achieving Success

- Establish and expand mechanisms that ensure sparsely vegetated lands are

[498] AB 32 EJ Advisory Committee. 2022 Scoping Plan Recommendations, N26. finalejacrecs.pdf (arb.ca.gov).

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protected from land conversion, prioritizing those areas most vulnerable to climate change and loss.

Additional Management Strategies

Additional nature-based climate solutions beyond those management strategies modeled for this Scoping Plan are available for implementation, but either cannot currently be modeled and/or affect carbon and the landscape in ways that cannot currently be tracked. Nevertheless, it is important to take action even where these technical gaps exist. Some of these actions, such as cultural burning and indigenous farming practices, have been used on large scales for decades or even centuries, while others are relatively new concepts. The state nevertheless recommends implementing the additional solutions listed here to achieve potential additional climate benefits, as well as other co-benefits. These additional solutions were drawn from the NWL Climate Smart Strategy and stakeholder, tribal government, and interagency feedback.[499]

Considerations

Although these practices are recommended, because of the lack of in-depth modeling and analysis available, several considerations must be addressed when implementing them. These considerations also apply to the management strategies included in the Scoping Plan Scenario.

- Future climate change impacts are uncertain: The negative impact that climate change can have on the ability of these practices to maintain expected climate benefits is uncertain and may significantly change in the future. Climate change is expected to further diminish the already constricting growing conditions in California, with increasing droughts, more extreme weather events, and expanding disturbances from fire, insects, and disease. It is estimated that suitable habitat for many native plant and animal species could shift, creating novel ecosystems without historical precedent. Close monitoring of all practices, including no management, across our NWL will be critical to understand if and how future climate change affects outcomes and how to adapt management to meet the needs of the system under climate change.[500]

[499] AB 32 EJ Advisory Committee. 2022 Scoping Plan Recommendations, N24. finalejacrecs.pdf (arb.ca.gov).
[500] AB 32 EJ Advisory Committee. 2022 Scoping Plan Recommendations, N15. finalejacrecs.pdf (arb.ca.gov).

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- Local conditions: Not every practice is applicable, feasible, or even desirable in every location across California. Implementation of these practices should account for local conditions and needs that may affect the appropriateness of that practice.
- Long-term carbon storage: The ability to sequester additional carbon into NWL is only beneficial to the climate if that carbon stays out of the atmosphere. Many of the additional practices listed here may require continual incentives or interventions to ensure permanence of carbon storage in the soil and biomass. For example, in croplands, it is difficult to estimate how much of the carbon stored by no-tillage can be released by a single subsequent tillage, but a return to conventional tillage would usually be expected to erase most gains.[501,502]
- Scaling actions: There are uncertainties on how these practices may impact both the environment and communities when significantly expanded. For this reason, it is best to take a cautious and measured approach to ramping up actions to a larger scale.
- Infrastructure and operational needs: Scaling up the implementation of some of these practices demands transformational change in the supporting infrastructure and operational frameworks. For example, increasing forest management to the degree included in the Scoping Plan Scenario will require significant changes to wood-processing infrastructure, workforce capacity, permitting processes, technical assistance, and other operational constraints. The increased application of compost to croplands, and potentially to rangelands, will require a significant increase in organic waste and dairy manure collection to increase compost supply, in line with SB 1383. This will also require additional compost production facilities as well as compost/organic waste transportation and application methods.
- Co-benefits: Many co-benefits from these practices exist beyond the climate benefits. These co-benefits include improved public and worker health; improved microbial, insect, and wildlife habitat; enhanced biodiversity; greater labor demand in the nature-based economy; and improved climate resilience.
- Labor and Economics: Many of these practices require additional labor, and an evaluation of how many more jobs are needed to carry out many of these practices

[501] Muñoz-Romero, V., R. J. Lopez-Bellido, P. Fernandez-Garcia, R. Redondo, S. Murillo, and L. Lopez-Bellido. 2017. "Effects of tillage, crop rotation and N application rate on labile and recalcitrant soil carbon in a Mediterranean Vertisol." *Soil Tillage Res.* 169, 118–123.
[502] Mitchell, J. P., A. Shrestha, W. R. Horwath, R. J. Southard, N. Madden, J. Veenstra, and D. S. Munk. 2015. "Tillage and cover cropping affect crop yields and soil carbon in the San Joaquin Valley." *California. Agron. J.* 107, 588–596.

is currently unknown. There will also be the need to explore the costs and economic benefits of implementing these additional practices.

- Retreatments: All of these practices have limits on how long they can enhance carbon sequestration. Many of these practices need to be periodically repeated, followed by complementary practices, or maintained through time. This increases costs and requires diligence and long-term stewardship.

Additional NWL Actions and Strategies

Below is a set of additional actions that should be taken on California's natural and working lands. Again, these practices were not modeled for this Scoping Plan, and all of the considerations listed above should be taken into account before implementing the following actions.

- Conservation of all NWL types (in line with the NWL Climate Smart Strategy and CNRA's Pathways to 30x30 California) is critical to ensuring continued carbon sequestration and provision of co-benefits from these lands for all Californians.[503]
- Reforestation following disturbance, using appropriate species, is an impactful practice that can help prevent conversion away from forestland and establish new trees to sequester carbon. The number of acres that may need reforestation following high severity wildfires is estimated to continue to increase into the future.
- Restoration of shrublands, chaparral, riparian zones, and oak woodlands across California includes a variety of practices to alter their structure and return endemic species to the areas. These unique habitats provide multiple co-benefits to the state, such as clean water, reduced wildfire risk, and biodiverse habitats for flora and fauna.
- Conservation and restoration of wetlands, beyond the Delta wetlands included in the NWL modeling, can protect these unique habitats and the climate benefits they provide. These wetland types can include but are not limited to coastal wetlands, mountain meadows, vernal pool complexes, alkali sinks and meadows, and floodplains.
- Conservation and restoration of seagrasses and seaweeds provide a number of benefits, including carbon storage and sequestration, habitat provision for many culturally and commercially important species of fishes and invertebrates, shoreline protection, and tourism opportunities.[504]

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[503] AB 32 EJ Advisory Committee. 2022 Scoping Plan Recommendations, N26, N27. finalejacrecs.pdf (arb.ca.gov).
[504] AB 32 EJ Advisory Committee. 2022 Scoping Plan Recommendations, N2. finalejacrecs.pdf (arb.ca.gov).

- Prescribed herbivory utilizes various livestock to consume vegetation to reduce fuel loads across an area. This fuel management practice can be used in forests, grasslands, and shrublands as an effective alternative to herbicide use, and should be considered wherever local conditions allow.
- Urban and community greening efforts such as green schoolyards, urban farms, rain gardens, community gardens, community composting, and many more provide numerous health benefits to communities.
- Additional Healthy Soils Program practices on annual croplands such as conservation cover and crop rotation, biomass planting for borders, wind barriers, riparian areas, and improved nutrient management can improve soil health, water retention, and increase carbon stocks.
- Healthy Soils Program practices on perennial croplands and rangelands, such as compost application and alley cropping/cover cropping to improve soil health, water retention, erosion control, and biomass growth.[505]
- Stacking of these Healthy Soils Program practices, where appropriate, in perennial and annual systems, can synergistically improve soil health and provide multiple benefits.
- Mulching adds high carbon materials to croplands or fallowed lands to reduce competing vegetation and retain moisture. This practice can support other benefits such as reduced water use and reduced synthetic pesticide and fertilizer use, as well as provide a use for suitable forest and agricultural waste biomass.
- Reductions in the use of synthetic fertilizers in cropland management, generally supported by the implementation of new management tools or technologies, can lead to reductions in GHG emissions from the production and application of fertilizers. This benefit is in addition to the co-benefits of reduced chemical runoff into waterways and reduced exposure of human populations to their harmful effects.

[505] Various types of organic amendments are being researched for application to particular landscape types. For example, compost application to rangelands is a relatively new practice that has been shown to improve soil health and increase carbon sequestration in the short term, though the science on the long-term impacts of this practice is still developing and the supply of available compost may be limiting.

Chapter 5: Challenge Accepted

This chapter provides an overview of the next steps and partnerships that will be needed to successfully implement this Scoping Plan. The path forward is not dependent on one agency, one state, or even one country. It will take action on a global level to address the threat climate change poses. But, the work begins at home.[506] The state can lead by engaging Californians and demonstrating how action at the state, regional, and local levels of government, as well as action at community and individual levels, can contribute to addressing the challenge before us. We must build partnerships with academic institutions, private industry, and others to support and accelerate the transition to carbon neutrality. Ultimately, the success of this Scoping Plan will be measured by our ability to implement the actions modeled in the Scoping Plan Scenario at all levels of government and society. This will depend on a mix of legislative action, regulatory program development, incentives, institutional support, workforce and business development, education and outreach, community engagement, and research and development and deployment. Optimizing this mix will help to ensure that clean energy and other climate mitigation strategies are clear, winning alternatives in the marketplace and in communities—to promote equity, drive innovation, and encourage consumer adoption. Bold institutional action will catalyze continued research and push private investment to create jobs and bring innovative ideas to reality.

State-level Action

Achieving the targets described in this Scoping Plan will require continued commitment to and successful implementation of existing policies and programs and identification of new policy tools and technical solutions to go further, faster. California's Legislature and state agencies will continue to collaborate to achieve the state's climate, clean air, equity, and broader economic and environmental protection goals. It will be necessary to maintain and strengthen this collaborative effort, and to draw upon the assistance of the federal government, regional and local governments, tribes, communities, academic institutions, and the private sector to achieve the state's near-term and longer-term emission reduction goals and a more equitable future for all Californians.

[506] This "polycentric" approach to climate challenges, engaging many levels of government, was articulated in leading papers by Nobel laureate Elinor Ostrom. See, for example, Ostrom, E. 2014. "A Polycentric Approach to Coping with Climate Change." *Annals of Economics and Finance* 15-1, 97–134.

Regulations and Programmatic Development

Meeting the AB 32 2020 GHG emissions reduction target several years earlier than mandated demonstrated that developing mitigation strategies through a public process, where all stakeholders have a voice, leads to effective actions that address climate change and yields a series of additional economic and environmental co-benefits to the state. Following adoption of this Scoping Plan, state agencies will continue to update and implement new and existing programs to align with the outcomes in the plan. Community, tribal, and stakeholder engagement will be a critical part of this work. Several state agencies, including CARB, the CEC, the California State Transportation Agency (CalSTA), the CPUC, and others will need to be part of various subsequent rulemaking processes. Each of these agencies' leadership and technical staff will engage with the public through public meetings, written and oral comment, and other methods of engagement. This work will be informed by evaluations of the health, air quality, environmental, equity, and economic benefits and impacts of regulations, including an assessment of the societal cost of carbon, as required under AB 197.

Incentive Programs

As described in Chapter 1, incentive programs are one of the most important tools the state has in advancing our low carbon future, especially for climate vulnerable communities. The programs ensure clean technology and energy are accessible and are critical to closing ongoing opportunity gaps. These programs also leverage private-sector investment and build sustainable, growing markets for clean and efficient technologies, and they are particularly necessary to support GHG emission reduction strategies for priority sectors, sources, and technologies. Clean technologies are often already the best and lowest cost option over their lifetimes but incentive funding is critical to ensure that they are broadly available, especially in climate vulnerable communities. Incentives also build on California's long track record of driving innovative technology developments, and creating new industries, with targeted investment. The Inflation Reduction Act also provides a new source of funding and tax incentives that must be leveraged to help achieve the state's climate goals.

Many state funding programs are designed to achieve multiple objectives simultaneously: reduce emissions from GHGs, criteria pollutants, and toxic air contaminants; manage natural and working lands for carbon sequestration; and address health and opportunity gaps in disadvantaged communities. California's incentive programs focused on jump-starting the transition to a zero emission transportation future are a good example of this "stacked" approach. The state is investing billions of dollars through programs such as the On-Road Heavy-Duty Voucher Incentive Program and Clean Cars 4 All in order to replace the light- and heavy-duty vehicles most responsible for the state's GHG emissions and poor air quality, all while bolstering the nascent ZEV market. Further strategies aid in developing new technologies, in ramping up access for all, and in shifting to cleaner

modes of transport; for instance, by supporting investments in walkable, bikeable communities and transit, as well as in vehicles. This funding strategy is, of course, paired with the regulatory approach described above.

Local Action

Local action by cities can support and amplify efforts to reduce GHGs. For example, the City of Oakland requires all new construction to be all-electric and is currently working on electrifying existing buildings.[507] In addition, starting in 2023, the City of Sacramento will require all new buildings under three stories to be all-electric, and it extends the mandate to all new construction by 2026 with some limited exemptions. The City of Sacramento also requires levels of EV charging infrastructure in new construction starting in 2023, higher than the minimum state requirements, and provides parking incentives for zero-emission carsharing and EV charging.[508] Local governments asserting this type of leadership are critical partners in supporting state-level measures to contain the growth of GHG emissions associated with the transportation system and the built environment.

California must accommodate population and economic growth in a far more sustainable and equitable manner than in the past. Good climate policy can and should create affordable and pleasant places to live, with effective transport and clean air for all—a future in which local governments and communities are central partners. Local governments have the primary authority to plan, zone, approve, and permit how and where land is developed to accommodate population growth, economic growth, and the changing needs of their jurisdictions. They also make critical decisions on how and when to deploy transportation infrastructure, and can choose to support transit, walking, bicycling, and neighborhoods that do not force people into cars. Local governments also have the option to adopt building ordinances that exceed statewide building code requirements, and play a critical role in facilitating the rollout of ZEV infrastructure. As a result, local government decisions play a critical role in supporting state-level measures to contain the growth of GHG emissions associated with the transportation system and the built environment—the two largest GHG emissions sectors over which local governments have authority.

Local governments are also frequently the source of innovative and practical climate solutions that can be replicated in other areas. Their efforts to reduce GHG emissions within their jurisdictions are vital to achieving the state's near-term air quality and long-term climate goals. Local governments must continue to take action that affirmatively

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[507] City of Oakland. Building Electrification. https://www.oaklandca.gov/projects/building-electrification.
[508] City of Sacramento. Electrification of New Construction. http://www.cityofsacramento.org/SacElectrificationOrdinance.

builds the projects and expend the funds needed to further the state's collective path toward equitable emissions reductions. As such, aligning local jurisdiction action with state-level priorities to tackle climate change and the outcomes called for in this Scoping Plan is critical to achieving the statutory targets for 2030 and 2045. Local governments can implement climate strategies that can effectively engage residents by addressing local conditions and issues that also deliver local economic benefits.

Local Climate Action Planning and Permitting

California encourages local jurisdictions to take ambitious, coordinated climate action at the community scale; action that is consistent with and supportive of the state's climate goals.[509] As discussed in more detail in Appendix D (Local Actions), local jurisdictions can do much to enable statewide priorities, such as taking local action to help the state develop the housing, transport systems, and other tools we all need. Indeed, state tools—such as the Cap-and-Trade Program or zero-emission vehicle programs—do not substitute for these local efforts. Multiple legal tools are open to local jurisdictions to support this approach, including development of a climate action plan (CAP), sustainability plan, or inclusion of a plan for reduction of GHG emissions and climate actions within a jurisdiction's general plan. Any of these can help to align zoning, permitting, and other local tools with climate action.

Once adopted, the GHG emissions reductions plans detailed in CAPs can provide local governments with a valuable tool for coordinated climate planning in their community. When a local CAP complies with CEQA requirements, individual projects that comply with the CAP are allowed to streamline the project-specific GHG analysis.[510,511] Effectively, local governments that adopt a CEQA-compliant CAP enable project developers to use this streamlined approach. This saves time and resources and provides more consistent expectations for how GHG reduction measures are applied across projects in the jurisdiction. While the state encourages local governments to follow this approach, we acknowledge not all jurisdictions have the resources to develop a CAP that meets the CEQA requirements.

In addition to being required for a local CAP to comply with CEQA, local GHG reduction targets have long been recommended as part of the process of developing a climate

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[509] This plan provides more detailed guidance and tools to local governments in Appendix D (Local Actions).
[510] Cal. Code of Regs., tit. 14, § 15183.5.
[511] California Governor's Office of Planning and Research. n.d. "General Plan Guidelines - Chapter 8 Climate Change."

action plan.[512] One challenge local jurisdictions have faced is how to evaluate and adopt quantitative, locally appropriate goals that align with statewide goals. An effective response to this challenge is to focus on goals that can help implement overall state priorities—enabling the key transformations California needs.

There are many ways that local governments can make key contributions to this transformation, depending on the characteristics of their jurisdiction and community. For example, some jurisdictions will inherently have more land capacity to remove and store carbon, whether through natural and working lands or by other means. Other jurisdictions will be host to GHG-emitting facilities that serve necessary functions and will take time to transition to clean technology (e.g., municipal wastewater treatment plants, landfills, and energy generation and transmission facilities). It is important to recognize that we will need to build new energy production and distribution infrastructure, and repurpose existing ones, for clean technology and energy before we are able to phase down existing fossil sources. There also will be a need to handle the significant amount of biomass resulting from sustainable forest management for catastrophic wildfire prevention, agricultural waste, and landfill diversion.

Regional efforts can support change too: energy and transportation systems that serve Californians do not stop at jurisdictional boundaries, and some local decisions can have ramifications for other communities. For instance, Metropolitan Planning Organizations (MPOs) can help to integrate local efforts by planning consistent with the Scoping Plan and Climate Action Plan for Transportation Infrastructure, including by removing polluting roadway capacity expansions from project pipelines and instead focusing on climate-friendly solutions. These varied capabilities and needs should be taken into account in setting targets for local climate plans. For instance, although net zero targets can often be valuable and achievable, and mitigation is important, targets should be considered in the larger context of these goals. This all means any GHG targets on a local scale should take into consideration the actions and outcomes included in this Scoping Plan. Jurisdictions considering "net zero" targets should carefully consider the implications such targets may have on emissions in neighboring communities and the ability of the state to meet our collective targets.

Jurisdictions without formal CAPs also have important opportunities within this context. These jurisdictions can still take actions that effectively translate key state plans, goals, and targets, including those articulated in this Scoping Plan for local action. For instance, state ZEV targets can advance local efforts to promote broad and equitable access to charging and fueling. Similarly, local jurisdictions can enable reduced dependence on

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[512] Climate Smart Communities. 2014. Climate Action Planning Guide. https://cdrpc.org/wp-content/uploads/2015/05/CAP-Guide_MAR-2014_FINAL.pdf.

single-occupancy vehicles by supporting dense infill housing and transit, among other actions. Such actions can be reflected in particular project plans, in general plans, or through other local policies. Regional partnerships among these jurisdictions can also help tap resources and provide for more effective overall action.

Unlocking CEQA Mitigation for Local Success

The California Environmental Quality Act also provides important tools for lead agencies to support the achievement of the state's GHG and VMT reduction goals. Although many climate-friendly local government actions already fall into categories that may not require a full CEQA analysis, thanks to streamlining or other tools, and although certain product types (such as affordable infill housing) are generally clearly consistent with state climate goals, CEQA analyses may still sometimes be required. CEQA can be a powerful and useful tool to engage the public, identify additional opportunities to support climate efforts, and localize change. It is important that lead agencies look for ways to use CEQA to support these core purposes, ensuring that these processes do not become sources of delay but instead unlock more opportunities. The uncertainty analysis in Chapter 2 evaluates how project implementation delays can lead to missed state climate targets and continued dependence on fossil energy. Mitigation measures applied in the communities affected by projects subject to CEQA have the added benefit of improving health, social, and economic resiliency as climate impacts worsen.

Appendix D (Local Actions) explores the role of local government action and CEQA in detail. As discussed there, an important CEQA-related tool is mitigation—which can be used to further drive local action consistent with state climate goals. When a lead agency determines that a proposed project would result in potentially significant GHG impacts due to its GHG emissions or a conflict with state climate goals, the lead agency must impose feasible mitigation measures to minimize the impact. Appendix D (Local Actions) provides suggestions for prioritizing the various types of mitigation, starting with on-site GHG-reducing design features[513] and mitigation measures, such as methods to reduce VMT and support building decarbonization, access to shared mobility services or transit, and EV charging. After exhausting all the on-site GHG mitigation measures, CARB recommends prioritizing local, off-site GHG mitigation measures, including both direct investment and voluntary GHG reduction or sequestration projects, in the neighborhoods impacted by the project. This could include, for example, development of a neighborhood green space, investment in street trees, or expansion of transit services. Implementing GHG mitigation measures in the project's vicinity would allow the project proponent and the lead agency to work directly with the affected community to identify and prioritize the

[513] Cal. Code of Regs., tit. 14, § 15126.4(c)(2) and (3).

mitigation measures that meet their needs while minimizing multiple environmental and societal impacts.

Once all potential on-site and local off-site GHG mitigation measures have been incorporated to the extent feasible, Appendix D (Local Actions) provides further suggestions for prioritizing other mitigation types, including non-local off-site mitigation, and voluntary offsets issued by a recognized and reputable voluntary carbon registry (as listed on CARB's website[514]) may be appropriate. Additional in-state mitigation also may be available in the upcoming SB 27[515] (Skinner, Chapter 237, Statues of 2021) registry, which will serve as a database of projects in the state that drive climate action on natural and working lands. Lead agencies should use substantial evidence to demonstrate that the project proponent explored and prioritized investments in feasible, local mitigation prior to moving mitigation to a geography located farther away from the project.

Communities and Environmental Justice

As noted in Board Resolution 20-33,[516] it is incumbent on CARB to function as an agent of responsible social change, especially when it is clear that environmental injustices continue to persist for low-income communities, tribes, and communities of color.

State law defines ***environmental justice*** as the fair treatment of all people of all races, cultures, and incomes with respect to the development, adoption, implementation, and enforcement of environmental laws, regulations, and policies.[517] Government Alliance for Race and Equity (GARE)[518] defines ***racial equity*** as when race can no longer be used to predict life outcomes and outcomes for all groups are improved.

For this Scoping Plan to be successful, it must address environmental justice and advance racial equity. Implementation of the plan needs to address the needs of those communities that are disproportionately burdened by climate impacts and continue to face significant health and opportunity gaps. Now, we need to ensure our actions allow these communities to not only have a seat at the table, but also inform and shape the policies

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[514] CARB. 2022. Offset Project Registries. https://ww2.arb.ca.gov/our-work/programs/compliance-offset-program/offset-project-registries.

[515] SB 27. Carbon sequestration: state goals: natural and working lands: registry of projects. (SB 27, Skinner, Chapter 237, Statutes of 2021). https://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=202120220SB27.

[516] CARB. 2020. Resolution 20-33: A Commitment to Racial Equity and Social Justice. October 22. https://ww2.arb.ca.gov/sites/default/files/barcu/board/res/2020/res20-33.pdf.

[517] Gov. Code, § 65040.12, subd. (e).

[518] Local and Regional Government Alliance on Race and Equity. 2015. *Advancing Racial Equity and Transforming Government: A Resource Guide to Put Ideas into Action*. Page 9. https://racialequityalliance.org/wp-content/uploads/2015/02/GARE-Resource_Guide.pdf.

to ensure their communities thrive. With this Scoping Plan, the state also adds a new tool to identify which communities will be the least resilient in the face of selected climate impacts and will see disproportionate economic impacts as a result. As described in Chapter 3, the CVM will enable the state to target programs and policies to build resiliency in the specific regions that will feel climate impacts more acutely due to existing health and opportunity disparities leading to disproportionate economic impacts. This tool will be critical in the state's efforts to address climate impacts while accounting for environmental injustices and racial inequities. CARB will incorporate the CVM into its work as it moves forward and will share this new tool with other agencies to align our efforts. The goal is to keep expanding the CVM to incorporate additional climate impacts to better identify disproportionate economic impacts as community level data becomes available.

AB 617 is another important tool for both Air Districts and CARB to bring resources to communities that have long been disproportionately burdened by poor air quality. While AB 617 does not require local agencies to participate in the Community Air Protection Program, several AB 617 communities are finding ways to bring local land use agencies to the table to respond to community priorities. We look forward to more opportunities to foster relationships with local authorities and continued collaboration between state and air district programs.

In alignment with AB 32, and to ensure environmental justice and racial equity were integrated into this Scoping Plan, CARB reconvened the AB 32 Environmental Justice Advisory Committee (EJ Advisory Committee) to advise CARB on the development of this Scoping Plan. Since reconvening in May 2021, the EJ Advisory Committee has engaged in the following activities:

- In October 2021, the EJ Advisory Committee sent a letter to the governor requesting a timeline extension for the Scoping Plan process. In response to the EJ Advisory Committee's letter, CARB modified this Scoping Plan process[519] and committed to an active engagement with the EJ Advisory Committee following the approval of this Scoping Plan. The EJ Advisory Committee also presented to the CARB Board[520] at its October 2021 Board meeting, reiterating its request for a timeline extension, as well as sharing additional concerns about process.

[519] Randolph, L. M. 2021. LMR October 19 response to Environmental Justice Advisory Committee Letter. https://ww2.arb.ca.gov/sites/default/files/2021-10/LMR%20October%2019%20response%20to%20EJAC%20Letter%20Final.pdf.
[520] Argüello, M. D., K. Hamilton, S. Taylor, and P. Torres. 2021. EJ Advisory Committee Co-Chair Informational Presentation to CARB Board. October 28. https://ww2.arb.ca.gov/sites/default/files/barcu/board/books/2021/102821/21-11-4pres.pdf.

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- In December 2021, the EJ Advisory Committee shared its responses to Scenario Input Questions,[521] as well as a narrative document outlining their concerns[522] around the process, the need for evaluation, and the need for a tribal representative. In response to the EJ Advisory Committee Scenario Input Questions, CARB incorporated the EJ Advisory Committee responses into the Scenario Assumptions document,[523] and modeled results from PATHWAYS.[524] In response to the EJ Advisory Committee's concerns, CARB worked diligently to appoint a tribal representative[525] in February 2022, and to outline additional opportunities for the EJ Advisory Committee to engage in the Scoping Plan process.[526]
- In March 2022, the EJ Advisory Committee presented at the joint EJ Advisory Committee / CARB Board meeting[527] and walked through their preliminary draft recommendations to inform this Scoping Plan. In April, the EJ Advisory Committee shared its revised preliminary draft recommendations[528] to inform this Scoping Plan.
- In September 2022, the EJ Advisory Committee presented at the joint EJ Advisory Committee / CARB Board meeting[529] and engaged in discussion about priority items as they relate to incorporating environmental justice into the Scoping Plan. By the end of September, the EJ Advisory Committee shared its final

[521] EJ Advisory Committee. 2021. EJ Advisory Committee Final Responses to CARB Scenario Inputs. December 2. https://ww2.arb.ca.gov/sites/default/files/2021-12/EJAC%20Final%20Responses%20to%20CARB%20Scenario%20Inputs_12_2_21.pdf.
[522] EJ Advisory Committee. 2021. EJ Advisory Committee Responses to Scenario Input Questions. EJ Advisory Committee narrative document regarding scenario input recommendations. December 1. https://ww2.arb.ca.gov/sites/default/files/2021-12/EJAC%20Narrative%20Document%20re%20Scenario%20Input%20Recommendations%2012_1_2021.pdf.
[523] CARB. 2021. PATHWAYS Scenario Modeling. https://ww2.arb.ca.gov/sites/default/files/2021-12/Revised_2022SP_ScenarioAssumptions_15Dec.pdf.
[524] E3. 2022. CARB Draft Scoping Plan AB32 Source Emissions Initial Modeling Results. March 15. https://ww2.arb.ca.gov/sites/default/files/2022-03/SP22-Model-Results-E3-ppt.pdf.
[525] CARB. AB32 EJ Advisory Committee Meeting, February 28, 2022 CARB Update. https://ww2.arb.ca.gov/sites/default/files/2022-02/CARB%20EJAC022822presentation.pdf.
[526] Fletcher, C. 2021. CARB Response to EJ Advisory Committee Narrative. CARB. December 15. https://ww2.arb.ca.gov/sites/default/files/2021-12/CARB%20response%20to%20EJAC%20Narrative.pdf.
[527] EJ Advisory Committee. 2022. EJ Advisory Committee Presentation: Preliminary Draft Recommendations. March 10. https://ww2.arb.ca.gov/sites/default/files/barcu/board/books/2022/031022/ejacpres.pdf.
[528] AB 32 EJ Advisory Committee. Draft Recommendations. https://ww2.arb.ca.gov/sites/default/files/barcu/board/books/2022/031022/ejacrecsrevised.pdf.
[529] EJ Advisory Committee. 2022. EJAC Presentation. September 1. https://ww2.arb.ca.gov/sites/default/files/barcu/board/books/2022/090122/ejacpres.pdf

recommendations[530] to inform this Scoping Plan. To the extent possible, CARB has incorporated and cited these recommendations through this Scoping Plan.

In addition to the activities listed above, Central Valley EJ Advisory Committee members hosted a successful community engagement workshop[531] in San Joaquin Valley in February 2022 with over 100 attendees. Members of EJ Advisory Committee hosted a statewide community engagement workshop[532] in June 2022 with more than 165 attendees. Throughout the EJ Advisory Committee's process, members of the Committee continued to work with their communities to ground truth their recommendations to inform the development of the Scoping Plan. The EJ Advisory Committee worked hard to ensure the voices of those communities most burdened by climate impacts were reflected in the plan. The EJ Advisory Committee will continue to play an ongoing role in the implementation of this Scoping Plan to ensure environmental justice and racial equity are prioritized in our effort to address the climate challenge before us.

To the extent possible, the EJ Advisory Committee's recommendations were integrated throughout the plan. This plan directly cites instances where there is alignment between the plan and the EJ Advisory Committee recommendations. This approach seeks to ensure there is more transparency and identify consensus that exists, as well as relevant ways equity and environmental justice are addressed in this plan and in the planning for future related implementation activities. CARB is dedicated to its efforts to ensure this plan does not leave communities behind.

As this Scoping Plan moves into the implementation phase, there will be a need to better understand how to address EJ Advisory Committee recommendations on the following topics:

- Actions under the jurisdiction of other agencies: there are certain EJ Advisory Committee recommendations that are outside of CARB's jurisdiction. As the EJ Advisory Committee continues to convene, it would be helpful to understand the

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[530] EJ Advisory Committee. 2022. EJAC 2022 Scoping Plan Recommendations. September 30. https://ww2.arb.ca.gov/sites/default/files/barcu/board/books/2022/090122/finalejacrecs.pdf

[531] San Joaquin Valley Climate Justice & the Scoping Plan. 2022. https://ww2.arb.ca.gov/sites/default/files/2022-07/SJV%20Climate%20Justice%20%26%20the%20Scoping%20Plan%20Workshop%20Report%20out%20%26%20Recommendations_5.2022.pdf

[532] EJAC. 2022. *EJAC/Community Engagement Synthesis Report '22.* https://ww2.arb.ca.gov/sites/default/files/2022-07/EJAC-CommunityEngagement-SynthesisReport-2022-English%26Spanish.pdf.

role that CARB can play as it relates to the EJ Advisory Committee's recommendations for actions outside CARB's jurisdiction and coordinates with sister agencies.

- Actions that require legislative direction: there are certain EJ Advisory Committee recommendations that would require legislative action. As the EJ Advisory Committee continues to convene, it will be helpful to understand how CARB can work with the EJ Advisory Committee to share these recommendations with the appropriate members of the Legislature.
- Actions directly tied to implementation activities: This Scoping Plan is not an implementation document; it is a plan to chart a course to continue to reduce GHG emissions and achieve carbon neutrality. Once the Scoping Plan is approved, there will be follow-up action at CARB, as well as at other agencies. In these follow-up efforts, there will be a role for ongoing EJ Advisory Committee engagement.
- Actions to implement recent legislation, such as SB 905.

CARB proposes to continue to work with the EJ Advisory Committee to better understand how to move forward on EJ Advisory Committee recommendations that fall into the topics listed above and any other recommendations that were not included in this plan. It is also important to note that there are numerous recommendations where CARB shares the goals of the EJ Advisory Committee and can assist in implementation steps. Examples include the following:

- CARB shares the goal of prioritizing non-fossil energy generation and supports non-fossil projects and opportunities to locate behind-the-meter clean resources in communities of concern in programs such as the Solar on Multifamily Affordable Housing program.
- CARB will engage with agencies and academic institutions to further workforce development.
- Many other recommendations related to financial support for various energy projects, such as microgrids, are within the purview of the CPUC or local publicly owned utilities. Similarly, utility scale projects are within the jurisdiction of other agencies. However, CARB supports strategies identified in the recommendations such as offshore wind to reduce the reliance on fossil fuel generation.
- CARB is supportive of rooftop solar, although it is not within CARB's jurisdiction to determine how incentives for those projects are structured.
- CARB is supportive of strong energy decarbonization goals, recognizing that increased reliance on electrification in transportation and other sectors will create significant demand for electricity, and therefore ensuring reliability of a decarbonized grid is a critical need for the state.
- In the transportation sector, CARB is supportive of the EJ Advisory Committee's recommendations to maintain aggressive zero emission vehicle goals consistent

with its statutory mandate to ensure regulations are technologically feasible and in alignment with Governor Newsom's ZEV Executive Order (EO N-79-20). CARB looks forward to continued engagement on rulemakings that will implement these goals.

- As noted elsewhere in this plan, CARB is supportive of the Caltrans California Transportation Plan 2050 and the California Climate Action Plan for Transportation Infrastructure.
- CARB is supportive of additional public support for transit. CARB is supportive of locating EV charging in low-income communities and communities of color.
- CARB is supportive of prioritizing funding incentives for transit and heavy- and medium-duty vehicles, although CARB does believe there is an important role for incentives that support adoption of light-duty vehicles for the time being. CARB will also be opening a rulemaking on the Low Carbon Fuel Standard to ensure it continues to support clean fuels that will displace petroleum fuels and will consider the EJ Advisory Committee recommendations on this program.
- In the industrial sector, in addition to the strategies discussed more fully in this Scoping Plan, CARB continues to work with the Legislature, local agencies, and air districts to support, implement, and enforce effective reductions in emissions of GHGs and air pollutants in stationary sources. The air districts have the authority to directly issue permits addressing a facility's criteria pollutant and toxics emissions levels. These levels are set after careful permit review, under district regulation and statute. However, AB 617 directs and authorizes CARB to take several actions to improve data reporting from facilities, air quality monitoring, and pollution reduction planning for communities affected by a high cumulative exposure burden. CARB will continue to implement AB 617 and look for ways to strengthen the Community Air Protection Program.
- Considerations around the phaseout of oil and gas extraction and refining, and the role of carbon capture are discussed more thoroughly in Chapter 2.

As CARB continues to engage with the EJ Advisory Committee—in addition to the EJ Advisory recommendations that have been integrated throughout this plan—below are the following commitments that CARB is making to ensure that environmental justice is integrated in this plan and its implementation:

- Building decarbonization is a pillar of this Scoping Plan and CARB commits to working closely with state and local agencies to implement the EJ Advisory Committee recommendations that call for prioritization for residents in low-income communities and communities of color in this transition.
- CARB commits to sharing the EJ Advisory Committee's recommendations with the CEC, CPUC, and other agencies administering funds to support building

decarbonization, and to work closely with those agencies as they engage in public processes to further building decarbonization.

- CARB has committed to review the Cap-and-Trade program and determine what potential legislative or regulatory amendments could be necessary to ensure the program continues to deliver GHG reductions needed to achieve the statutory climate goals. In that process, CARB will consider the recommendations of the EJ Advisory Committee[533] and Independent Emissions Market Advisory Committee,[534] as well as others.

Critically, the EJ Advisory Committee makes numerous recommendations centered around tracking progress of the various strategies in this Scoping Plan. Currently, progress is tracked and reported in numerous ways, including the annual GHG inventory and reports to the Legislature. Part of the ongoing work of implementation, however, will include consideration of ways to provide more data and information to the public, such as rates of deployment of clean energy and technology as described in Chapter 1. CARB will also continue to collaborate with CDPH and OEHHA on health metrics to track cumulative benefits of air pollution and climate programs, especially in low-income communities and communities of color.

As noted earlier in this document, the EJ Advisory Committee will continue to play a vital role in the Scoping Plan and its implementation to ensure environmental justice and racial equity are prioritized in our effort to address the climate challenge before us. This includes ongoing EJ Advisory Committee engagement to advise CARB on the development of the Scoping Plan and any other pertinent matters in implementing AB 32. The ongoing EJ Advisory Committee will help to ensure integration of environmental justice in implementation efforts as it relates to AB 32, and also help CARB as we work toward a future where race is no longer a predictor for life outcomes.

Academic Institutions and the Private Sector

Academic institutions produce and present the latest science on both the impacts of, and actions to reduce, climate change damages. They are also leading the way by

[533] California Legislative Information. Bill Text – AB 32. Air pollution: greenhouse gases: California Global Warming Solutions Act of 2006. (AB 32, Nuñez, Chapter 488, Statutes of 2006). https://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=200520060AB32.

[534] California Legislative Information. Bill Text – AB 398. California Global Warming Solutions Act of 2006: market-based compliance mechanisms: fire prevention fees: sales and use tax manufacturing exemption. (AB 398). https://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=201720180AB398.

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establishing their own climate goals and GHG emissions reductions targets.[535, 536, 537] They are incubators for innovation and knowledge in clean energy and technology and play an important role in adding to the wealth of robust information to inform policies and programs. Academic institutions have the ability to fill knowledge gaps and push us toward new frontiers. As we move forward, we will continue to see these institutions as partners and resources that can help CARB look for ways to accelerate and introduce actions to reduce GHG emissions and remove and store carbon.

As such, it will be important to maintain and enhance relationships with academic institutions, including community colleges. Community colleges are more likely to have a large proportion of first generation students or students that come from low-income communities or communities of color. The perspective of this diverse student body will be critical to inform discussions on climate change damages and mitigation efforts. This student body is also a future workforce, and courses to teach the skills for a sustainable economy are a chance to close historical opportunity gaps. Importantly, many of the students at community colleges are local residents and community members. This engagement provides another way to invest in communities across our state. The Foundation for California Community Colleges is already leading the way through innovate programs such as their Good Jobs Challenge - California Resilient Careers in Forestry.[538] These types of programs could be replicated across other sectors. CARB will evaluate how to leverage the requirements in AB 680 on workforce development in the California Climate Investments programs with the work at the Foundation for California Community Colleges.

As noted in Chapter 1, public and private partnerships will be important as we move forward in the great energy transition. But the private sector is also important in the context of research and development and deployment. Many of these companies have the resources and expertise to build and produce the clean technology and energy we will need. It was through the efforts of several private companies (Bell, Exxon, Telecom

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[535] University of California. Our Commitment. https://www.universityofcalifornia.edu/initiative/carbon-neutrality-initiative/our-commitment.
[536] California State University. Energy, Sustainability, & Transportation. https://www.calstate.edu/csu-system/doing-business-with-the-csu/capital-planning-design-construction/operations-center/Pages/energy-sustainability.aspx.
[537] California Community Colleges Chancellor's Office. Climate Action and Sustainability. https://www.cccco.edu/About-Us/Chancellors-Office/Divisions/College-Finance-and-Facilities-Planning/Facilities-Planning/Climate-Action-and-Sustainability?msclkid=4a72350ec4f511ecaf292c6b14ac9a4f.
[538] Foundation for California Community Colleges. 2022. Good Jobs Challenge. Developing Resilient Careers in Forestry for Californians. https://foundationccc.org/What-We-Do/Workforce-Development/Good-Jobs-Challenge.

Australia) that the photovoltaic solar panels in use today were developed.[539] Similarly, it was companies such as General Electric and Texas Instruments that contributed to the development of hydrogen fuel cells.[540] This Scoping Plan includes the known and emerging clean technologies and fuels available today. The private sector spirit of invention, improvement, and innovation must continue to deliver new tools in the fight against climate change.

Individuals

This Scoping Plan not only projects ambitious availability of clean technology and energy, but also includes aggressive assumptions about consumer adoption of ZEVs, heat pumps, and other energy efficiency practices, among others. When it comes to climate change mitigation, the sum of the parts matters. Only when we add up the impacts of the choices we make do we understand the true impact on GHG emissions. Today, many Californians have opportunities to choose between driving a car, taking a bus, biking, or walking. Many can choose to install a heat pump or buy an electric cooktop. Together, we can increase these opportunities and pick the future we want. We can start or transform businesses that create clean jobs, innovate new technologies, or introduce new systems. We can engage with fellow workers to support durable paths for labor in a clean economy. And we can choose to engage with our community, tribes, and our governments to advocate for change, call out challenges, and propose solutions. Our choices will help determine California's climate future. Down one path is a future of climate impacts that will continue to worsen and further increase disparities across communities. Down the other is a future that avoids the worst impacts of climate change, improves air quality—especially for the most burdened communities—and fosters new economic and job opportunities to support a sustainable economy.

Importantly, we must acknowledge that historical decisions have resulted in health and opportunity gaps for residents in low-income communities and communities of color. Not everyone has the resources or access to make these choices—to buy a ZEV, install a heat pump, or use public transit to get to work. It is here that government can help. Government, at multiple levels, can fund programs and structure policies to provide consumers with more choice and to support them in adopting cleaner technology options. Whether through affordable energy rates or assistance in purchasing zero emission vehicles and appliances, we can use the transition to a carbon neutral economy as an opportunity to close some of these persisting opportunity gaps. By acting now, we can

[539] Californiasolarcenter.org. Passive Solar History. http://californiasolarcenter.org/old-pages-with-inbound-links/history-pv/.
[540] Fuel Cell Store. History of Fuel Cells. https://www.fuelcellstore.com/blog-section/history-of-fuel-cells?msclkid=04a19450c50211ec8d20f2afff4039fe.

change our planet's fate and build a more resilient, healthier, and equitable future for all Californians.

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Exhibit C

Caltrans SB 743 Program



Mitigation Playbook

July 2022

DRAFT

SUSTAINABILITY
People, planet, prosperity

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INTRODUCTION

Caltrans seeks to avoid inducing new traffic, as measured in VMT, as it manages and evolves the State Highway System. This commitment arises out of the department's implementation of CEQA as amended by SB 743 (2013) and the resultant OPR Technical Advisory (2018). It also responds to research findings that induced traffic from highway expansions tends to undermine the purpose of many of those expansions, congestion relief.

This guide describes mitigation methods for VMT induced by highway capacity projects. It should be noted, however, that mitigation is not the first option for addressing induced VMT. The primary method is to plan and develop projects in a way that does not induce VMT in the first place. Where induced VMT is unavoidable, design and lane-management strategies may minimize it. Mitigation is required when significant induced VMT remains after exhausting these options. Formally, mitigation is memorialized in an environmental document, where it must meet CEQA standards for additionality[1] – the need for mitigation must be caused by the project – and be enforceable – the mitigation must be firmly committed to by the relevant parties. The mitigation must also be additional to any other VMT reduction required by law, or which would occur otherwise. And, most relevant to this guide, it must be quantifiable and effective at reducing VMT.

For transportation agencies, mitigation is a familiar concept with respect to other types of environmental impacts. Mitigation for induced VMT is less familiar for most of those agencies, but it has a long history in other settings. Local and regional governments and Transportation Management Associations, for example, have run programs aimed at reducing SOV transportation demand for many years.[2] More recently, since passage of SB 743, many local governments in California have established VMT

[1] For more on additionality, see this Aug. 26, 2021, bulletin from the SB 743 Program.
[2] Note that many of these programs are aimed at reducing peak-period congestion, rather than VMT. Often, but not always, measures aimed at peak period congestion also reduce VMT. See "Modernizing Mitigation: A Demand-Centered Approach" (SSTI, 2018) for more details.

calculators or other tools, which describe a menu of quantifiable VMT-reduction measures that land-use developers can use for VMT mitigation.

That history means that there is a substantial body of work on which to base mitigation decisions. In California, a particularly authoritative compilation of VMT-reducing measures was published in 2010 and recently updated in December 2021 by the California Air Pollution Control Officers Association. "Handbook for Analyzing Greenhouse Gas Emission Reductions, Assessing Climate Vulnerabilities, and Advancing Health and Equity" is, as the title suggests, aimed at GHG impacts. However, in many instances described in the handbook, GHG reductions are accomplished through VMT reductions, and so the measure descriptions and quantification are useful in considering VMT mitigation for roadway expansions. The CAPCOA handbook is referred to frequently in the discussion on mitigation measures in this document, but we have not exhausted it as a source of mitigation ideas, so it is a recommended resource for anyone charged with the development and analysis of VMT mitigation.

Related, many local governments have developed VMT calculators, based on CAPCOA or the same body of literature used by CAPCOA. In this guide we use the Alameda County VMT calculator[3] as an example and list others in Appendix B. These calculators, like CAPCOA, can provide ways of assessing many potential VMT-reduction measures. Direct use is quite convenient because the calculators come pre-loaded with default data. Where such custom calculators do not exist, the formulas for making assessments can be useful, though the burden on the analyst to find data is greater.

With CAPCOA, the calculators, and other sources, we are able assess many mitigation measures for effectiveness. But not all. In this guide we include measures that are well-defined and quantified, and those that are conceptually effective but do not yet

[3] The Alameda County calculator referenced in this playbook uses 2010 CAPCOA data.

have standard metrics associated with them. We hope to develop some of these measures further both through ongoing Caltrans-funded research and through the efforts of the many stakeholders in the state and elsewhere. As development occurs, we will update and extend this guide.

Even though substantial and growing research to evaluate VMT mitigation measures exits, this does not mean mitigating VMT is easy. On the contrary, it is likely to be difficult, as highway capacity projects may generate VMT in the millions per year and creating offsetting reductions can be a significant undertaking. That is one reason the preferred route to VMT neutrality is to avoid VMT-inducing projects whenever possible. Best practices for considering VMT impacts early on in the project development process can be found in the SB 743 Environmental Essentials in Project Development and Delivery document, published by Caltrans.[4]

Caltrans and many stakeholders are interested in organizing mitigation efforts through banks or exchanges. If such efforts succeed, an entity would collect and validate VMT mitigation opportunities – from land-use developers, transit agencies, TMAs,[5] local active transportation programs and others – and make them available to transportation agencies whose projects are in need of mitigation. At the moment no such arrangement has emerged, so project development teams must either develop VMT-reduction measures, e.g. pedestrian facilities, or connect with mitigation providers themselves. Sharing this guide with likely providers in the area is one way to help surface possible mitigation options.

The rest of this guide summarizes mitigation measures, providing factors to consider, methods for measuring, and some examples of assessing measure efficacy.

[4] https://dot.ca.gov/-/media/dot-media/programs/sustainability/documents/sb-743-environmental-essentials-for-project-development-and-delivery-a11y.pdf

[5] See Appendix A for a list of TMAs in California.

HOW TO USE THIS PLAYBOOK

Though this playbook lays out various quantifiable approaches to mitigating VMT, it is not comprehensive. In some cases, entities may wish to use mitigations which are not in this playbook, are not readily available in other sources such as CAPCOA and may be difficult to quantify.

For example, take the case of transit facility comfort improvements such as benches and shade. These are both relatively low-cost system improvements, which—in theory—should have a positive effect on ridership, especially in places with higher temperatures and sun exposure. However, little research has been done on this question and no widely accepted quantification measures exist. If an entity wishes to use such improvements as VMT mitigation measures, more analysis would need to be done to develop a reasonable estimate. The analyst could review the existing literature on the topic—which is fairly scarce—to find any applicable evidence (either quantitative or qualitative) that would help build a case. Moreover, the analyst could rely on internal data, if such data showed an increase in transit ridership corresponding to the installation of shade facilities. Regardless of the specific methodology used, VMT reductions should be reasonable. In the shade facility installation case, it wouldn't be reasonable to expect a drastic ridership increase due to the installation of shade facilities and thus the VMT reduction would likely be fairly small in most cases.

This playbook includes other mitigation measures, such as park and ride lots, without given quantification approach. While various methodologies exist to calculate the VMT reductions from these mitigations, they are much more context sensitive and likely vary on a case-by-case basis. Additional research is likely needed in order to successfully quantify the effects of these mitigations. As Caltrans develops more guidance on these measures, this playbook will be updated.

Lastly, it is important to acknowledge that this playbook is not comprehensive and that the field and practice of VMT quantification and mitigation is rapidly evolving. Caltrans is currently funding a research project focused on assessing the effectiveness of

potential VMT mitigation measures, the outcome of which may supersede this playbook.

MITIGATION MEASURES

Table 1 summarizes many mitigation measures that could be applied to a project to offset induced travel. "Ease of implementation" is higher when costs are lower and fewer parties are involved. "Efficacy" is higher for measures that have the potential to reduce more VMT in most common situations. "On-System" or "Off-System" refers to whether the measure applies directly to the SHS or not. The ratings are general and actual conditions will vary with particular projects. Note that while these measures could constitute mitigation, they could alternatively serve as projects or elements of projects, reducing or eliminating the need for mitigation. For example, added highway capacity may induce 1 million VMT annually, while transit improvements that are part of the same project may reduce VMT by 500,000 annually, leaving 500,000 VMT in need of mitigation (per CEQA). Alternatively, the transit improvements may be funded as mitigation.

Mitigation measures may be combined. However, in most cases a combination would reduce the effectiveness of each individual measure. Consider a combination of new transit service and dense affordable housing, aimed at reducing 1 million VMT. By themselves we calculate transit would offset 10 percent or 100,000 of the VMT from a project, while the dense affordable housing would offset 20 percent or 200,000. However, if transit reduces VMT to 900,000, then the dense affordable housing effect would be 20 percent of that figure, or 180,000. Thus, the total reduction would be 280,000 VMT. CAPCOA p. 38 and in introductions to measure descriptions provides guidance for combining measures.

Table 1. VMT mitigation measures summarized. Note that this list is not exhaustive, and other measures that satisfy CEQA requirements could be developed.

Measure	Ease of implementation	Efficacy	On- or Off-System	Key considerations
Active transportation	High	Low[6]	Both (Note: for the SHS, may be most effective when integrated with conventional "main-street" highways)	Must provide access to destinations, not simply recreational opportunities.
Land use – residential	Low	High	Off	Requires partnership agreements with land use jurisdictions housing authorities, and private developers. VMT benefits come from density, affordability and location.
Land use – employment	Low	High	Off	Requires partnership agreements with land use jurisdictions housing authorities, and private developers. VMT benefits come from density and location.
TDM	High	Medium	Off	Services can be tailored to meet specific user needs. Must be supported with long term maintenance of effort.
Transit service improvement	Low to high	Low to high	Both	Usually requires partnership agreements with transit operators.
Local road networks/ connectivity	Low to high	Low to high	Off	Can relieve pressures on SHS and provide more direct, multimodal access to destinations.

[6] This is not to imply that Active Transportation projects are not a high priority for Caltrans and worth doing for their own sake. While Active Transportation projects do have a downward VMT effect, the amount of VMT that can be reduced by these projects is often much smaller than the VMT induced by highway projects. This scale is important to consider when developing mitigations.

Measure	Ease of implementation	Efficacy	On- or Off-System	Key considerations
Micro-mobility	High	Low	Both	Requires partnership agreements with transit operators and/or transportation network companies.
Telecommuting	High	Minimal	NA	Telecommuting tends to shift trip-making, but not reduce VMT. Any claim here would need careful, specific support.
Schedule-shifting	NA	None	NA	Reschedules rather than reduces trips. Likely increases VMT.
Road diets	High	High	Both	Lane removals can be considered roughly equivalent to lane additions for similar facilities.
Pricing	Low to high	High	Both	Operational details and market analysis needed during PA&ED.
Lane management	Low to high	Low	On	VMT effect depends on specific management strategy such as transit/HOV priority.
Parking pricing/ restrictions	High	High	Off (On in some limited cases)	Potentially powerful tool for specific land uses in a highway corridor.
Park and ride lots	High	Low	Both	Removes commute trips. Effect on total VMT needs to be addressed in mitigation plan.
Land preservation	High	Unclear	Off	Could work in theory but measurement is difficult. May be best combined with transfer of development rights to spur infill TOD.

Active transportation

Providing complete streets or dedicated active transportation facilities is an integral part of achieving Caltrans' goals. Safe and convenient walking and biking environments should be provided regardless of the need for VMT mitigation. When mitigation funds are used for active transportation, the active transportation improvement must reduce motor vehicle use. For example, a new or improved AT facility that garners only recreational use would not serve as mitigation (though it may be worthwhile for other reasons).

Factors to consider:

- Proximity: Most transportation-related use of AT facilities is for short trips – less than 20 minutes, or about a mile walking or 3 miles cycling. Demand curves are steep; an additional minute or two can reduce AT demand significantly. Therefore transportation-generating facilities must link land uses that are fairly close, with as few traffic stops or diversions (including lengthy stairs or ramp for overcrossings) as possible (see Figure 1). Therefore, projects that reduce travel time between relatively proximate land uses are good candidates for VMT reduction. For example, a pedestrian overpass connecting two relatively dense residential and commercial areas that are separated by a highway would be an ideal VMT-reducing active transportation project

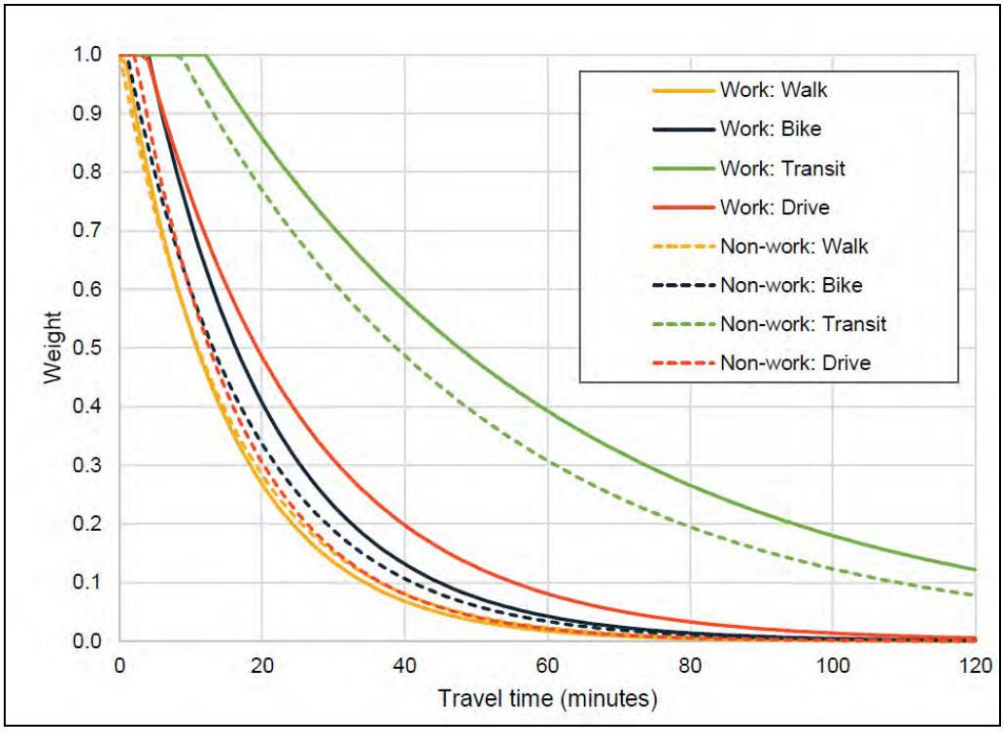


Figure 1. AT usage drops rapidly as time and distance increases. Source: SSTI.

- Level of traffic stress: Even if the network for AT appears robust on a map, with destinations in close proximity, travelers will not use it if it is perceived to be unsafe. Therefore, projects that reduce level of traffic stress, for example by providing buffered or separated cycling lanes, are good candidates for VMT reduction.
- Scale: Large highway projects generally have large impacts as they can affect auto accessibility across a region. AT projects are almost always more modest in scope, affecting in a narrower area, and in terms of VMT impact. In general AT improvements will offset a small percentage of induced VMT from a highway project.

Ways to measure VMT reduction:

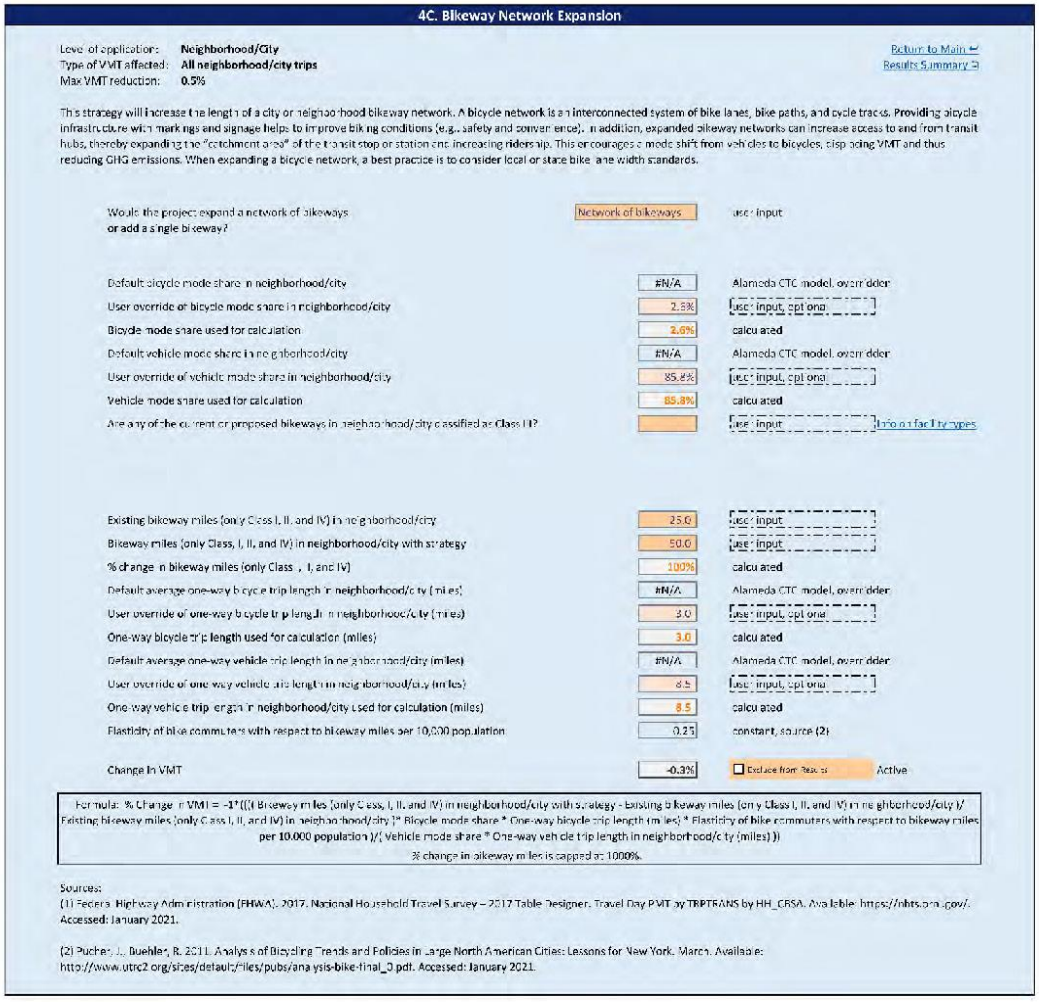
- Most demand models are unable to measure effects from AT projects, due to lack of granularity. Should a region invest in a parcel-based model, it could be so employed. For a very large new AT facility, such as a river or freeway crossing that links two transportation analysis zones, a conventional demand model might be employed.
- Various data/software packages are available to measure outputs from small network and land use changes. Urban Footprint is a commonly used package, and it could estimate effects from AT network changes. Caltrans' local partners may have access to this tool.
- Some local governments have adopted VMT estimation tools for use in evaluating land-use and transportation projects. These tools often include AT facility improvements as measures, giving VMT outcomes. An example is the Alameda CTC tool. Where these tools are available online or as macro-enabled spreadsheets, they can be of use in assessing VMT impacts from AT facilities. It may also be possible to use one of these tools where it exits in a neighborhood similar to one where the project will be, if there is no tool there. Alternatively, the underlying formulas may be of use with project-area data; the Alameda formulas are cited below.
- For new pedestrian facilities, several formulas exist, including[7]:
    - "Alternative Quantification Method" prepared for CARB in 2019. See pp. 26-30.
    - "Pedestrian Facility Improvement" prepared for Alameda County (similar to formulas used by other local governments). See pp. 34-35.

[7] Note that the changes in VMT indicated will be for a relatively small project area, compared to the area affected by highway VMT.

- For new bike facilities, several formulas exist, including[1]:
  - "Alternative Quantification Method" prepared for CARB in 2019. See pp. 5-7.
  - "Bikeway Network Expansion" and "Bike Facility Improvement" prepared for Alameda County (similar to formulas used by other local governments). See pp. 37-40.
- For improvements in level of traffic stress, formulas also exist. These may be applied along with the new-facility formulas; for example, if a facility may be considered utility-constrained by LTS, with improvements counting toward additional utility and VMT reduction:
  - "Low-Stress Bicycling and Network Connectivity" by the Mineta Transportation Institute in 2012. See pp. 17-22 for segments, pp. 23-26 for intersection approaches, pp. 27-30 for crossings.
  - "Level of Traffic Stress" by the State Smart Transportation Initiative in 2021. See pp. 27-29.
  - The Alameda County provides adjustment factors for various bike improvements. If a new Class II bike lane is the base, a new Class 1 bike path or Class IV bikeway will be 1.54 times as impactful, while a Class II to Class IV conversion will be 0.54 times as impactful. See pp. 38-9.
- Sometimes a more ad hoc or qualitative case can be made. This might be the case if new or improved AT facilities were designed to serve a particular, perhaps new, activity center. If trip lengths can be determined, the Auto Substitution rates in the CARB formulas may help estimate the VMT displaced. As well, facilities that clearly improve AT connectivity and/or traffic stress in relatively dense areas with a variety of land uses can be assumed to have beneficial VMT impacts. In the Sacramento region, SACOG's Project Performance Assessment tool provides density and land-use mix data for project areas, which can be easily inputted.

Examples:

- New AT elements: Consider an expansion of bikeways. The Alameda County calculator, or similar calculators in other cities, are a convenient way to determine VMT impacts. Figure 2 below shows the calculator estimate, using built-in default values and a handful of user inputs to show the location and extent of the bikeway improvements. The result is in terms of percentage of VMT, so a final step would be to apply that percentage to total VMT in the affected area, which could be obtained from the MPO or other planning entity, or from a big-data tool. Caltrans also tracks VMT at the municipal and county levels, though most active transportation improvements would affect much smaller geographies. Where calculators are not available, the formulas above or in the calculator may be used, but data burden will be higher.
- Improved AT elements: Consider an improvement to a facility, rather than new facilities. The analyst needs to make a finding about the improved utility. If the improvement is very significant, e.g. there was a pedestrian route but it was very difficult to use, not ADA compliant, and/or clearly unsafe, and the improved route addresses such issues, it might be considered to have as much impact as a new facility. More typically, an improved facility will get "partial credit." For example, the Alameda calculator documentation cited above would provide 54 percent of the VMT reduction for a Class II to Class IV conversion, compared to a new facility.



4C. Bikeway Network Expansion

Level of application: **Neighborhood/City**
Type of VMT affected: **All neighborhood/city trips**
Max VMT reduction: **0.5%**

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This strategy will increase the length of a city or neighborhood bikeway network. A bicycle network is an interconnected system of bike lanes, bike paths, and cycle tracks. Providing bicycle infrastructure with markings and signage helps to improve biking conditions (e.g., safety and convenience). In addition, expanded bikeway networks can increase access to and from transit hubs, thereby expanding the "catchment area" of the transit stop or station and increasing ridership. This encourages a mode shift from vehicles to bicycles, displacing VMT and thus reducing GHG emissions. When expanding a bicycle network, a best practice is to consider local or state bike lane width standards.

Would the project expand a network of bikeways or add a single bikeway?	Network of bikeways	user input
Default bicycle mode share in neighborhood/city	#N/A	Alameda CTC model, overridden
User override of bicycle mode share in neighborhood/city	2.6%	[user input, opt one]
Bicycle mode share used for calculation	2.6%	calculated
Default vehicle mode share in neighborhood/city	#N/A	Alameda CTC model, overridden
User override of vehicle mode share in neighborhood/city	85.8%	[user input, opt one]
Vehicle mode share used for calculation	85.8%	calculated
Are any of the current or proposed bikeways in neighborhood/city classified as Class IV?		[user input] Info on facility types
Existing bikeway miles (only Class I, II, and IV) in neighborhood/city	25.0	[user input]
Bikeway miles (only Class, I, II, and IV) in neighborhood/city with strategy	50.0	[user input]
% change in bikeway miles (only Class , I, and IV)	100%	calculated
Default average one-way bicycle trip length in neighborhood/city (miles)	#N/A	Alameda CTC model, overridden
User override of one-way bicycle trip length in neighborhood/city (miles)	3.0	[user input, opt one]
One-way bicycle trip length used for calculation (miles)	3.0	calculated
Default average one-way vehicle trip length in neighborhood/city (miles)	#N/A	Alameda CTC model, overridden
User override of one-way vehicle trip length in neighborhood/city (miles)	8.5	[user input, opt one]
One-way vehicle trip length in neighborhood/city used for calculation (miles)	8.5	calculated
Elasticity of bike commuters with respect to bikeway miles per 10,000 population	0.25	constant, source (2)
Change in VMT	-0.3%	☐ Exclude from Results Active

Formula: % Change in VMT = -1* ((((Bikeway miles (only Class, I, II, and IV) in neighborhood/city with strategy - Existing bikeway miles (only Class I, II, and IV) in neighborhood/city)/ Existing bikeway miles (only Class I, II, and IV) in neighborhood/city)* Bicycle mode share * One-way bicycle trip length (miles) * Elasticity of bike commuters with respect to bikeway miles per 10,000 population)/(Vehicle mode share * One-way vehicle trip length in neighborhood/city (miles)))
% change in bikeway miles is capped at 1000%.

Sources:
(1) Federal Highway Administration (FHWA). 2017. National Household Travel Survey – 2017 Table Designer, Travel Day PMT by TRIPTRANS by HH_CBSA. Available: https://nhts.ornl.gov/. Accessed: January 2021.

(2) Pucher, J., Buehler, R. 2011. Analysis of Bicycling Trends and Policies in Large North American Cities: Lessons for New York. March. Available: http://www.utrc2.org/sites/default/files/pubs/analysis-bike-final_0.pdf. Accessed: January 2021.

Figure 2. Alameda County VMT calculator, an Excel tool. Addition of 25 miles of bikeway results in a 0.3 percent reduction in VMT.

Land use – residential (density and affordability)

Compact housing can reduce VMT compared to housing that is lower density. Affordable housing produces less VMT compared to market-rate housing. To the extent a project contributes to such housing, it can take credit for the VMT reduction compared to business as usual. Compared to other options, denser, more affordable housing is a powerful VMT-reduction tool.

Factors to consider:

- Density of housing relative to typical or existing
- Affordability of new housing
- Current household VMT
- The level of contribution committed by the mitigation
- Location of the housing project

Ways to measure VMT reduction:

- For projects that provide density, CAPCOA provides an elasticity of -.22. That is, for every percentage increase in density, VMT decreases by -.22 percent. Additionally, there is a starting point; density must by higher than typical in order to qualify as a VMT reducer. CAPCOA sets that starting point at 9.1 units/acre. Lower density developments would not reduce VMT. And CAPCOA caps the reduction at 30 percent. For more details, see CAPCOA, pp. 70-72. Table A-3.1 shows VMT reductions in percentages and per household (assuming typical VMT), for various densities.

Equation 1: Increase Residential Density

$$A = \frac{B - C}{C} \times D$$

ID	Variable	Value	Unit	Source
Output				
A	Percent reduction in GHG emissions from project VMT in study area	0–30.0	%	calculated
User Inputs				
B	Residential density of project development	[]	du/acre	user input
Constants, Assumptions, and Available Defaults				
C	Residential density of typical development	9.1	du/acre	Ewing et al. 2007
D	Elasticity of VMT with respect to residential density	-0.22	unitless	Stevens 2016

See table A-3.1 in Appendix 3 for comprehensive VMT reduction values for increased residential density.

- For projects that include affordable multifamily housing[8], VMT for units dedicated as affordable can be estimated at 28.6 percent reduced from market. For more details, see CAPCOA, pp. 80-83.
- Note that the source material from CAPCOA considers density at the project level. However, if a very large housing project increases density in a larger

[8]CAPCOA defines affordable housing: "Multifamily residential units must be permanently dedicated as affordable for lower income families. The California Department of Housing and Community Development (2021) defines lower income as 80 percent of area median income or below, and affordable housing as costing 30 percent of gross household income or less."

geography, such as a TAZ or Census block group, it would be fair to consider the increase across the full geography, adding a VMT reduction for the existing homes to the calculation for the project itself.

- CAPCOA cautions that "This measure is most accurately quantified when applied to larger developments and/or developments where the density is somewhat similar to the surrounding neighborhood." It is unlikely that a small project would be attractive as mitigation for a highway project. However the second caution is important. A dense housing project in a very disconnected, low-density area will be unlikely to provide the VMT benefits desired. In other words, infill rather than edge development is the goal.
- If a project contributes half of the backing (funding, land, infrastructure, etc.) needed to deliver the housing units that reduce VMT by 10,000 miles/day, it could claim 5,000 miles/day as VMT reduction.
- Caltrans is working to acquire an accessibility tool to help quantify the effect of a project that is located with high destination activity – where residents and visitors can access many destinations with short auto trips, or by other modes. For now, this aspect can be cited directionally, e.g. to add more support to claims of reduced VMT for a dense housing project. See CAPCOA, p. 52.

Examples:

- New density: CAPCOA assumes a typical density of 9.1 dwelling units/acre. Housing provided at greater than 9.1 units/acre can be assessed for VMT reduction as follows: A new project will provide 1,000 housing units at a density of 10 units/acre, a 10 percent increase over BAU. Per the elasticity cited in CAPCOA, we should expect VMT to be reduced by 2.2 percent, or 427 miles annually for a typical household. For 1,000 units, the development will reduce VMT by 427,371 per year.

In addition, the project raises the density of the neighborhood (TAZ, block group or similar geography) by 5 percent, to 9.6 du/acre (above the 9.1 threshold). There are 2,000 existing households in the geography. The 5 percent increase in density equates to 1.2 percent reduction in VMT, or 237 miles/year/household. For 2,000 households, this produces another reduction of 474,857 VMT per year.

- Affordability: For the example above, if a project proposed 1,000 affordable housing units at the standard 9.1 units/acre, it could assume an annual VMT reduction of 5,618 per household based on the 28.6 percent reduction from the typical 19,641.8 per year. Based on this reduction, 1,000 units could claim a reduction of 5,617,555 VMT per year. If the project was also denser than 9.1 units/acre, it could claim both reductions from affordability and density, subject to the rules of combining measures in CAPCOA (discussed on page 6).
- Proportion of impact: Consider the affordability example. The project costs $20 million. Caltrans, in mitigating a highway mitigation project, provides surplus land valued at $3 million, in-kind infrastructure work valued at $4 million, and $3 million in funding, covering half the project cost. Caltrans could claim 2,808,777 annual VMT in mitigation.

Land use – employment (density)

As with residential density, job density can shorten trips and reduce VMT. If a transportation project contributes to development of dense employment facilities, it could claim some VMT reduction as mitigation.

Factors to consider:

- Density of prospective employment center.
- Typical VMT for employment in the area.
- Proportion of backing for the employment center from the mitigation effort.
- Per CAPCOA guidance, this measure is most effectively quantified when used in the context of either a large new development and/or a new development with similar surrounding densities.

Ways to measure impacts:

- CAPCOA (pp. 73-5) provides a density-to-VMT elasticity of -0.07. It sets 145 jobs/acre as a floor for seeing VMT benefits, and a cap of 30 percent on VMT reductions from density. Reductions are shown in Table A-3.2. These must be applied to typical commute VMT for the development, a number that may be developed during the traffic and parking study or may be available from the MPO or other planning entity. Local VMT calculators may also provide estimates. If typical commute VMT is not available, it could be calculated by referring to the ITE Trip Generation Manual and multiply the trips by trip lengths from a big-data tool.

Equation 2: Increase Job Density

$$A = \frac{B - C}{C} \times D$$

ID	Variable	Value	Unit	Source
Output				
A	Percent reduction in GHG emissions from project VMT in study area	0–30.0	%	calculated
User Inputs				
B	Job density of project development	[]	jobs per acre	user input
Constants, Assumptions, and Available Defaults				
C	Job density of typical development	145	jobs per acre	ITE 2020
D	Elasticity of VMT with respect to job density	-0.07	unitless	Stevens 2016

See table A-3.2 in Appendix 3 for comprehensive VMT reduction values for increased job density.

- Local VMT calculators may also provide estimates of outcomes from employment density. The Alameda County calculator does so, requiring the user to input location and density information.

Example:

- New job center: In order to mitigate VMT from a transportation project, funds are made available to an office developer that is planning a new activity center. The activity center will cost $20 million, and mitigation supplies $10 million in order to capture half the VMT reduction benefit as mitigation. The facility will house 2,000 workers at 400 employees per acre. From the table, this level of

density implies a 12.3 percent reduction in commute VMT compared to typical conditions. A traffic study for the project indicates typical commute VMT in the area is 75 miles per week per employee. The denser development will reduce commuting by 9.2 miles per week for 2,000 workers, or 18,466 per week, or 960,207 per year assuming a 52-week year, for the workforce. Because the project provided half the support to develop the employment center, it can claim 480,103 in reduced annual VMT as mitigation.

Transportation Demand Management (TDM)

Transportation Demand Management (TDM) is a longstanding practice most often aimed at getting workers to their jobs while reducing peak-hour vehicle travel. However, TDM can also be focused on other groups, such as students or tourists, or at a general community level. While TDM was developed as a response to peak-hour congestion, most of the measures commonly employed also tend to reduce VMT. Exceptions, discussed elsewhere in this guide, are telecommuting and schedule-shifting, which have peak-hour benefits but minimal or no VMT benefits. Measures that are more useful to consider include transit and micro-mobility pass discounts, carpool matching and incentives, parking pricing (discussed separately in this guide), bike facilities at workplaces, vanpools, emergency-ride-home service for non-driving employees, education and information on non-SOV travel, and more. "Modernizing Mitigation" (2018) from the State Smart Transportation Initiative, describes VMT-focused TDM in more detail.

Factors to consider:

- SB 743-relevant TDM measures may replace car trips with other modes or by increasing vehicle occupancy in motor vehicle trips (e.g. carpooling). As well, TDM measures could work in tandem with workplace and residential density measures to reduce distances traveled.
- TDM may be supported with capital mitigation funds as new highway capacity opens – resources would need to provide VMT reductions for the project's lifecycle – or it could be funded on an ongoing basis out of tolls from the project itself.
- TDM may be accomplished by requirements from local units of government. The various local VMT calculators in Appendix B are largely aimed at reducing VMT from new development through TDM and other measures. TDM is also offered by Transportation Management Associations (TMA), listed in Appendix A, and by Congestion Management Associations (CMA). TMAs are typically public-private partnerships, or entirely private organizations, frequently formed as voluntary

non-profit organizations by partnering jurisdictions and large employers. CMAs are typically governmental agencies, frequently incorporated under state and federal law by Regional Transportation Planning Agencies as a part of their planning, programming, and service delivery portfolios. Other providers include local governments, employers, college campuses, transit systems (e.g. with free or discounted transit passes), and residential landlords (e.g. with priced parking).

Ways to measure impacts:

- The large number of TDM measures available, combined with variable effects by setting, make it impossible to summarize measurement methods in this short guide. However, TDM providers may be able to calculate VMT effects of their services, based on the CAPCOA guide or similar literature, or their own analysis of their programming. Some of the local VMT calculators capture this effect; the Alameda County calculator calculates effects for employee and residential transit subsidies and vanpools for specific sites. (Note that the calculator does show reductions for telecommuting for employment sites, but it does not address effects other driving, so it would not be useful for VMT mitigation of a highway project.) If a TMA or other entity has ready evidence of program effectiveness, purchasing VMT reduction may be fairly straightforward. In other cases, project teams will have to work with the literature, local VMT calculators, or other sources to estimate VMT effects.

Example:

- Transit-pass subsidies: Consider a highway project that adds HOT lanes. The city through which the highway passes has piloted a mobility wallet program, which provides free passes for transit and bike- and scooter-share. The program costs $50 per participant per month, and surveys of pilot participants showed that on average each reduced their VMT by 50 miles per month while in the program. As part of its mitigation package, the highway project commits toll revenues of

$50,000 per month to support 1,000 users, claiming 50,000 miles of reduced VMT per month.

Transit service improvement

Transit can be an important VMT reduction strategy. Not only may it replace auto trips, but over time it can foster transit-oriented development (TOD), which provides low-VMT housing, employment, retail, and other land uses. TOD may be developed intentionally around transit service, or it may occur organically as land uses adapt with features such as higher densities (accomplished in part by parking reductions), walkability and public-area amenities, and a mixture of land uses in close proximity. Note that even community members who never ride transit will enjoy shorter trips via this effect. VMT reduction though the land use effect is sometimes referred to as a "transit multiplier."

Factors to consider:

- Mitigation should be based on actual transit service improvements. It is not enough to say that congestion reduction on a facility might allow for better service. It would be more compelling to work with a transit provider to determine the actual effect on travel times, headways and potential increased service would result from highway improvements, such as transit-signal priority, lane management and others. Direct support for transit that increases service would, of course, be an even more compelling case for mitigation.

Ways to measure impacts:

- Determining the VMT effect from increased transit service can be done with two calculations:
    - Ridership. For major transit projects, the provider will estimate ridership for New Starts, Small Starts or state capital funding. Such applications could provide the needed estimate, which should be in the form of passenger-miles-traveled. If such an application is not being made, the transit provider would need to make an estimate using similar methods.
    - VMT. Converting ridership into VMT is thoroughly discussed in "An Update on Public Transportation's Impacts on Greenhouse Gas Emissions" (TCRP, 2021). In summary, a passenger-mile on transit directly replaces .329 VMT

(not all transit trips would have been taken by car). Adding the powerful land-use multiplier effect, which reduces travel for transit users and non-users alike, the overall savings in VMT is 2 miles for every 1 passenger-mile.

- Alternatively, local VMT calculators may provide VMT reduction estimates. The Alameda County calculator provides estimates both for transit network expansions and for transit frequency improvements.

Example:

- Lane-management: A freeway expansion includes transit-priority at ramps and lane-management that gives buses markedly improved travel times and reliability[9]. The transit provider is able to improve headways as well, because buses are no longer stuck in traffic. As a result of these improvements, the transit provider estimates a ridership increase of 100,000 passenger-miles per year. With the TCRP formula discussed above, such ridership should reduce VMT by 200,000 per year. If the transit priority and lane-management strategies are committed for the project lifecycle, the 200,000 VMT reduction could be used to offset the VMT increase from the highway project (as part of the project's estimated net VMT or as a mitigation measure).
- Light-rail extension. A transit provider has a planned but unfunded light-rail extension in a corridor where Caltrans is adding an HOV lane, which will be converted to HOT, for $400 million. Capital cost of the transit project is $200 million. The freeway contributes $100 million in mitigation, and the transit provider raises the other $100 million for the project. The transit provider estimates the extension will grow ridership by 2 million passenger-miles per year. Employing the mode-shift factor and transit multiplier from TCRP, this ridership would imply a reduction of 4 million VMT per year. Project mitigation

[9] Bus on Shoulder (BOS) projects are another important type of transit service improvement on state highway facilities.

paid half the capital cost and could claim 2 million VMT in mitigation, assuming it also covers half the ongoing operating cost from toll revenues.

Local road networks/connectivity

Though highways were originally conceived as intercity or rural-serving facilities, today in most places they facilitate mostly local and intraregional travel. The large volume of short-distance traffic is both a problem – it undercuts highways' original purpose, for example by delaying intercity or farm-to-market freight in traffic – and an opportunity. In many cases local travelers use the state highway system (SHS) for short trips because local networks are incomplete or disconnected. Creating better-connected, multimodal networks off the SHS offers options for travelers to make more direct trips, sometimes by non-auto modes, reducing not only VMT but pressures to add expensive highway capacity. The planning literature cites "intersection density" as a measure of connectivity, and one that indicates lower VMT. Assisting owner-operators of local networks could thus reduce the need for highway capacity and mitigation and may provide mitigation opportunities where needed as well.

Factors to consider:

- Origins and destinations of travelers in a corridor or on a facility.
- Gaps and other identified needs in the local modal networks.

Ways to measure impacts:

- Needs and gaps can be demonstrated through the use of big data, to examine origins and destinations of travelers, and circuity of routing. Where travelers are diverting significantly from direct routes, or where they are nearly all driving despite origins and destination that are close by, improvements in the auto and active transportation networks are worth considering. See Figure 5 as an example.
- Accessibility tools can measure gaps in the multimodal systems as well, comparing existing accessibility to ideal accessibility where origins and destinations are linked directly.
- If local network improvements are sufficient to avoid capacity on the SHS, and they are screened as unlikely to induce VMT, mitigation is a moot issue. If new capacity on the SHS is still pursued, local network improvements may be applied

to mitigate some of the resulting induced VMT. Quantification of new active transportation facilities and improved transit service are discussed in a separate section. A more robust street network would likely require analysis with a travel demand model or a similar tool, e.g. Urban Footprint, to demonstrate it was not adding VMT-inducing capacity and to assess VMT reductions from greater connectivity.

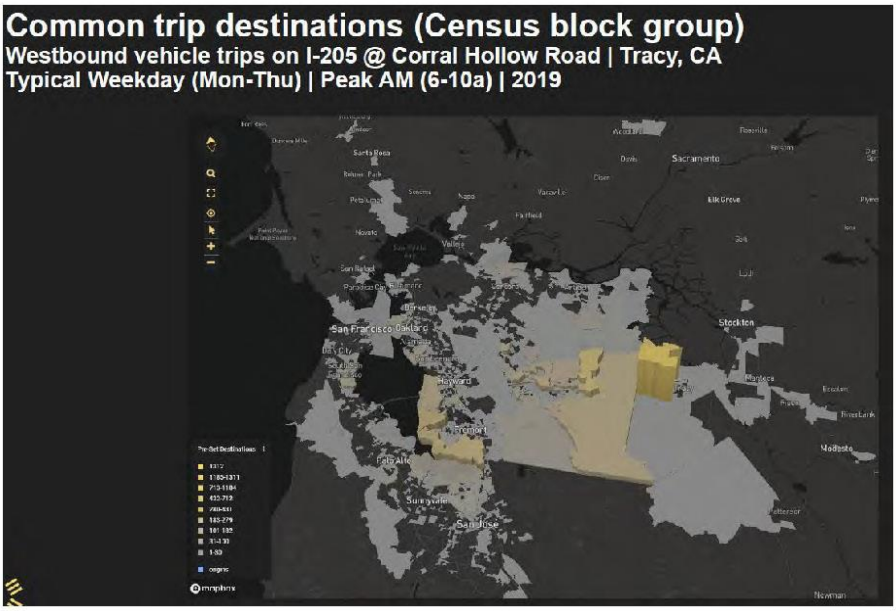


Figure 3. Big data indicates destinations of travelers passing through a select link in Tracy. While some travel long distances, a large number are making local trips, suggesting local network improvements might relieve pressures on the Interstate.

Example:

- Critical added link: A freeway serving a major activity center is experiencing congestion, and widening is under consideration. Some of the heaviest traffic occurs on a bridge connecting the activity center to medium-density neighborhoods and smaller activity centers. There is no nearby surface facility

paralleling the freeway bridge, but the locality has been studying such an option, potentially carrying autos, bikes, pedestrians, and extended light-rail service. Origin-destination studies show significant circuitous auto travel in the corridor, which might divert to the more direct route afforded by a new bridge. While the bridge is not screened as categorically unlikely to induce travel, travel-demand analysis suggest it will provide meaningful route-shortening, and a delphi panel determines that as a slow-speed, local-serving surface facility connecting likely infill areas, it is unlikely to induce low-VMT land use. Transit and active transportation provide additional VMT reductions. A decision is made to table the freeway widening and to support the local government in pursuit of the VMT-reducing reliever bridge.

Micro-mobility

Micro-mobility programs can reduce VMT and provide other benefits such as enhanced mobility. However, widescale deployment of micro-mobility programs is ongoing, and the VMT-reducing effects of such programs are not well-understood and vary greatly by context.

Factors to consider:

- For its cost, micro-mobility delivers fewer benefits than other potential mitigations.

Ways to measure impact:

- CARB recommends a simple approach to quantify VMT reductions from Micro-mobility implementation. Using default assumptions on bike and scooter share trip lengths and induced trips, VMT reductions can be derived given an expected number of micro-mobility trips. Equation 3 below can be used to estimate VMT reduction given an expected number of trips.

Equation 3: Implement micro-mobility

$$\boldsymbol{R = (T) \times (A) \times (L)}$$

ID	Variable	Value	Unit	Source
		Output		
R	Reduction in auto VMT	[]	VMT	calculated
		User Inputs		
T	Number of annual trips expected in the first year	[]	trips	user input
		Constants, Assumptions, and Available Defaults		
A	Adjustment factor to account for induced trips and recreational bike share use	0.5 (bike and scooter)	unitless	CARB 2019
L	Average length of micro-mobility trip	1.5 (bike), 1 (scooter)	miles	CARB 2019

Examples:

- At mitigation for a large highway widening project, Caltrans funds the rollout and operations of a dock-less bikeshare program for a one-year period in a mid-sized city where the widening will occur. Based on previous dock-less bikeshare rollouts in similar-sized cities, it is expected that approximately 500,000 trips will occur during the first year. Using the assumptions for bikes, the bike-share program is expected to reduce VMT by 375,000 annually, or by 1,027 per day. Since Caltrans funded the program, the full 375,000 annual VMT reduction can be claimed as mitigation for one year.

Telecommuting

Telecommuting is a tool that has been used to reduce peak-hour congestion, and one that has been popular as workplaces shut down during the COVID pandemic. It may appear attractive as a VMT-reduction measure, but caution is warranted.

Factors to consider:

- Telecommuting's effect in reducing VMT is doubtful, and it may actually generate more VMT. CAPCOA (p. 54) cautions that "While this measure [telework] certainly reduces commute-related VMT, recent research has shown that total VMT from telecommuters can exceed VMT from non-telecommuters (Goulias et al. 2020)." Pandemic-era VMT patterns documented in big data suggest "WFH didn't necessarily mean all workers were driving less. Many just may have been driving differently. Our analysis found a shift in peak driving hours, with a dip in morning driving but a slight rise and wider peak time for afternoon driving. Also, essential workers still commuted, and Census data showed a large increase in online retail, which created more delivery vehicle miles." More evidence of telecommuting's poor performance in reducing VMT is here and here.

Ways to measure impacts:

- Measuring reduction in commute VMT is straightforward if motor-vehicle-based commute volumes and distances are known, and the effect of a telecommuting program were also predictable. However, any claim for reduced VMT from telecommuting would need careful, specific support to show how it would address non-work travel, or longer work-travel distances created when workers who frequently telecommute move further from the workplace.

Examples:

- NA

Schedule-shifting

Alternative work schedules, encouraging workers to commute during non-peak hours, is a congestion-reduction strategy, but probably not a VMT-reduction strategy. Some alternative work schedule arrangements eliminate some workdays and thus some work trips. However, the impacts of such a policy may be limited and the removal of work trips doesn't necessarily reduce overall VMT (as discussed in the previous Telecommuting section).

Factors to consider:

- Because it shifts travel times rather than eliminating or shortening them, there is no rationale for considering it as a VMT-reduction measure. Schedule-shifting may actually increase VMT if it allows commuting during periods of faster traffic and/or involves off-peak work travel when transit service is less robust.

Ways to measure impacts:

- NA

Examples:

- NA

Road diets

Caltrans determines VMT impacts by considering highway capacity, essentially as a proxy for reduced travel times that spur additional driving. Because additional lane-miles are a critical factor in calculating increases in VMT, it may be useful to think about lane reductions, aka road diets, as a VMT-reduction measure. Road diets have become popular in recent years, as reduced road widths can improve safety at intersections or along the roadway due to speed reductions, and they can accommodate bike lanes and/or wider sidewalks, as well as parking for local destinations. They are screened as unlikely to induce VMT (TAF, p. 14). Where lane reductions can offset lane additions, the reduction can be used to offset VMT predicted to occur from the additions.

Factors to consider:

- Reducing lanes to offset added lanes can avoid burdens around calculating VMT outcomes. The showing of net-zero lane additions would be sufficient for full mitigation.
- The offsetting reductions must be reasonably equivalent to the lanes being added. A freeway lane-mile could not be offset by reducing a lane-mile on a collector street. In general, induced VMT decreases with functional classification. Therefore, it would be appropriate to cite lane reductions for a facility equal to or higher in functional classification of the facility receiving the additional lanes.
- Any multimodal benefits from the lane reduction such as added bikeways or sidewalks, or safer crossings or operating speeds, should be cited to provide extra evidence for the VMT-reducing effects of the road diet.
- The road diet does not need to be within the project boundaries of the capacity project, or in the same corridor. However, if the widening project adds VMT in a distressed community and the road diet benefits a different community, particularly one that is not distressed, equity would be a policy concern.

Ways to measure impacts:

- Show that lane reductions are equal or greater to lane additions both in terms of length of travel lanes affected and functional classification. Cite multimodal improvements as additional support.
- Where lane reductions do not fully mitigate a project's lane additions, they can be used in combination with other mitigation measures.
- It may be possible to show a mitigation benefit where functional classifications or project types are not easily comparable, e.g. where the road diet on a minor arterial is part of a mitigation package for a freeway addition or for an interchange. As of now there is no simple formula for this instance, and it would require substantial specific analysis by a project team and/or a consultant.

Example:

- Road diet offset: A project to add two lane-miles to a principal arterial in an industrial neighborhood (functional class 3) will generate 500,000 VMT annually. A mile away in a residential/commercial neighborhood, the locality is considering reducing a four-lane principal arterial to two travel lanes, a turn lane, and bike lanes. That project would reduce travel lanes by 2.5 miles. Conditioning the widening project on funding and construction of the road diet would lead to a net reduction of travel lanes and would satisfy the VMT mitigation requirement for the widening project.

Pricing

(Under development)

Pricing literally raises the cost of travel, which would seem to discourage driving and reduce VMT. However, when lanes are priced to improve flows, travelers may find it advantageous to pay the dollar cost in exchange for time-cost savings. In addition, some studies have shown that HOV-to-HOT conversions result in travelers paying to avoid carpooling, lowering vehicle occupancy and raising VMT. Determining when pricing reduces VMT, and by how much, remains under investigation.

Lane management
(Under development)

Lane management strategies vary and with them VMT outcomes. Caltrans guidance, for example, treats the addition of an HOV2+ lane as the equivalent in most cases as the addition of a general-purpose lane, because HOV2s on the facility simply sort themselves into the new lane. HOV3+ holds more promise for raising vehicle occupancy and reducing VMT compared to general purpose lanes. We are investigating ways to quantify outcomes from such strategies.

Parking

Parking management is one of the more powerful measures that either spurs driving or reduces it. Typically, these measures are applied at multifamily residential or employment land uses, in the form of parking charges or capacity limitations. As such, these measures could work in tandem, subject to the rules of combining measures, of denser housing or employment. There could be ways to achieve VMT benefits from parking management outside of specific land uses, though the calculations would be more complex. Note that some localities enforce parking minimums and would require exceptions for major capacity limitations.

Factors to consider:

- Standard parking-demand rates (based on unlimited free parking).
- Type and degree of parking management (extent of capacity limitation, amount of fees).

Ways to measure impacts:

- For capacity limits at residential land uses, CAPCOA calls for calculating the standard parking demand from the "ITE Parking Generation Manual," finding the difference between that figure and the proposed lower figure, and applying constants. The result is a percentage decrease in VMT compared to typical conditions; that percentage could be applied to an average household VMT figure to get the predicted reduction in VMT per household. The reduction is capped at 15.7 percent. An important caveat is that this measure will not work if free parking is readily available on the street or elsewhere near the housing project. For more details, see CAPCOA pp. 122-5.
- For parking charges at residential land uses, CAPCOA provides a formula that only requires the amount of the fee. Results are shown in Table A-3.3, based on the household VMT average from the 2017 NHTS. The percentage reduction would be applied to an average household VMT figure to get the predicted reduction in VMT per household. The reduction is capped at 15.7 percent. For more details, see CAPCOA, pp. 126-9.

Equation 4: Unbundle Residential Parking Costs from Property Cost

$$A = \frac{B}{C} \times D \times E$$

ID	Variable	Value	Unit	Source
Output				
A	Percent reduction in GHG emissions from project VMT in study area	0-15.7	%	calculated
User Inputs				
B	Annual parking cost per space	[]	$ per year	user input
Constants, Assumptions, and Available Defaults				
C	Average annual vehicle cost	$ 9,282	$ per year	AAA 2019
D	Elasticity of vehicle ownership with respect to total vehicle cost	-0.4	unitless	Litman 2020
E	Adjustment factor from vehicle ownership to VMT	1.01	unitless	FHWA 2017

See table A-3.3 in Appendix 3 for comprehensive VMT reduction values for unbundled parking costs.

- For parking charges at employment land uses, CAPCOA offers a variation on the residential formula. See CAPCOA, pp. 109-112. It produces percentage decreases in commute VMT associated with the land use, which would need to be separately calculated. It caps the reduction at 20 percent.
- Some local VMT calculators provide easy ways to calculate VMT reductions from parking policies. The Alameda County calculator, for example, has options for pricing residential and employee parking, as well as "parking cash-out" (another form of pricing), and for limiting parking supply.

Example:

- Unbundled residential parking: A highway expansion is mitigating induced VMT by supporting a new housing development (see Land Use – residential). The development will produce 1,000 housing units, and the project is providing half the backing to build the project. The development is located in an area where street parking requires residential permits, which are not available to residents of the new buildings. It will charge $200 per month for parking in addition to rent. Per Table 2, the $2,400 annual parking cost implies a reduction of 10.4 percent in VMT, or 2,051.8 in lowered VMT compared to typical households. The development as a whole produces 2,051,800 less VMT than typical in a year. Because mitigation is responsible for half the backing of the project, it amounts to 1,025,900 per year. If the housing is denser than 9.1 units per acre, it could also claim VMT reductions for density, subject to the rules of combining measures in CAPCOA.

Park-and-ride lots

(Under development)

Park-and-ride lots, when serving transit, can be important means of reducing commute travel. If they serve a well-defined activity center, calculating the VMT reduction is straightforward. If they serve carpooling or less-well-defined activity centers, the math becomes more complicated. Moreover, any rebound effects – do park-and-ride lots encourage employees to live further from work, in high VMT neighborhoods – are not clear.

Land preservation

(Under development)

Generally speaking, open space lands in regional hinterlands that are feasible to convert into residential uses, regional service centers, or large-scale, stand-alone employment centers can lead to sprawling development patterns that drive increases in VMT. There are several tools available to acquire and preserve or otherwise enter into agreements that place permanent conservation easements on developable open space and channel future growth toward VMT efficient development patterns. For example, Transfer of Development Rights (TDR) is a zoning technique used to permanently protect land with conservation value (such as farmland, community open space, or other natural or cultural resources) by redirecting development that would otherwise occur on this land (the sending area) to an area planned to accommodate growth and development (the receiving area). TDR programs financially compensate landowners for choosing not to develop some or all of their land. These landowners are given an option under municipal zoning to legally sever the development rights from their land and sell these rights to another landowner or a real estate developer for use at a different location. The land from which the development rights have been severed is permanently protected through a conservation easement or a restrictive covenant. The development value of the land where the transferred development rights are applied is enhanced by allowing for new or special uses; greater density or intensity; or other regulatory flexibility that zoning without the TDR option would not have permitted. Other land use planning tools such as the Density Bonus can also be paired with TDRs as a larger package of incentives intended to help make affordable, location efficient housing more economically enticing to develop. Density bonus tools include reduced parking requirements and concessions such as reduced setback and minimum square footage requirements. And a local government can purchase open space outright.

By establishing partnerships with local land use authorities and interested developers, Districts could engage and influence strategic TDRs and even directly participate in the creation of Development Agreements that steer future development to where it is adequately supported by active transportation, transit, intercity passenger rail, and similar non-auto mobility options. This might be a particularly valuable strategy where there is interest by local or regional governments (or even non-governmental conservation organizations) to employ land preservation strategies or where there is interest by individual developers to swap development rights for locations or increased densities that might be more lucrative or less expensive to develop.

The VMT effect of land preservation will be context-specific. It is even possible to increase VMT by creating more dispersed development. Caltrans is not aware of a simple way to measure the effect.

Appendix A: Congestion Management Authorities and Transportation Management Associations

Two potentially valuable sources of VMT mitigation partnerships are Congestion Management Authorities (CMAs) and Transportation Management Associations (TMAs). CMAs are governmental agencies incorporated under state law that typically provide TDM services as a part of their regional planning, programming, and service delivery portfolios. TMAs are typically private or public-private partnerships, frequently formed as voluntary non-profit organizations involving large employers.

These organizations each provide different services to different user groups in different travel sheds. They also have differing levels of data collection capabilities needed to document VMT reduction for use toward SB 743 mitigation purposes. Practitioners are advised contact the CMAs and TMAs in their areas and proactively participate in data collection and/or program development activities as needed. This could range from simply requesting available data from existing TDM measures to working collaboratively with relevant partners in order to identify expanded TDM services that could specifically serve as VMT mitigation measures for SHS projects. Given that Caltrans will likely not be the primary implementer of most regional TMD strategies, creating strong working relationships and mitigation agreements with CMAs and TMAs could also prove valuable when it comes to the long-term maintenance-of-effort that will likely be needed for them to be successful in reducing VMT.

CMAs

In order to identify a variety of potential mitigation measures for SHS projects, Caltrans practitioners can review relevant planning documents produced by CMAs, such as the Regional Transportation Plan or Short-Range or Long-Range Transit Development Plans. These types of regional planning documents outline specific mobility services, TDM measures, and in-fill development opportunity areas have been planned but are not fully funded and they provide valuable data such as service-specific ridership forecasts that could be used as the basis for estimating related VMT reductions if the services were to be funded as mitigation. Other good sources for identifying potential TDM measures and acquiring important data on potential VMT reduction is active participation on regional Transit Coordinating Committee and Social Services Transportation Advisory Councils, engaging in the annual Unmet Transit Needs Hearing process. In such venues, Caltrans staff may identify pilot services that are being planned for a test period to measure actual ridership against forecast ridership or to determine if farebox recovery requirements can be meet. Transit operators and CMAs may have also developed grant applications for new start or expansion services based on projected ridership. To attract and support this projected ridership, they may also have Transit Asset Management Plans that outline fleet needs, capital investments, or supporting infrastructure such as shelters or modal-transfer stations that could also be used as mitigation.

In essence, the planning processes that CMAs and RTPAs manage can provide valuable data on the potential for specific TDM services to reduce VMT. The most direct way to explore the potential mitigation partnerships and acquire related data is for relevant district staff, including District Transit Representatives, to schedule meetings with their transit operators and CMA counterparts to discuss it with them directly.

Below is a list of regional agencies that Districts can contact regarding information about California's CMAs and their VMT reduction efforts:



Table A-A.1: List of Congestion Management Authorities (CMAs)

Congestion Management Authorities (CMAs)
Alameda County Transportation Commission
City/County Association of Governments of San Mateo County
Contra Costa Transportation Authority
Fresno Council of Governments
Kern Council of Governments
Los Angeles County Metropolitan Transportation Authority
Napa Valley Transportation Authority
Orange County Transportation Authority
Placer County Transportation Planning Agency
Riverside County Transportation Commission
Sacramento Area Council of Governments
San Bernardino County Transportation Authority
San Diego Association of Governments
San Francisco County Transportation Authority
San Joaquin Council of Governments
Santa Barbara County Association of Governments
Santa Clara Valley Transportation Authority
Santa Cruz County Regional Transportation Commission
Shasta County Regional Transportation Planning Agency
Solano Transportation Authority
Sonoma County Transportation Authority
Stanislaus Council of Governments
Transportation Agency for Monterey County
Transportation Authority of Marin
Tulare County Association of Governments
Valley Transportation Authority (VTA)
Ventura County Transportation Commission
Yolo County Transportation District

TMAs

Although TMAs are typically non-governmental organizations and they do not carry out the same comprehensive regional transportation planning functions, they are similar to CMAs in that they may have identified TDM measures that they would like to implement but are not fully funded and could be used as potential mitigation measures. However, one significant difference between TMAs and CMAs that practitioners should be aware of is the differing levels of sophistication and capacity with regard to data collection and analysis. Specifically, while most all TMAs collect data on their service users in terms of "auto-trips avoided," additional data such as user trip lengths may need to calculate VMT reduction.

This is another example of the need for District Transit Representatives or similar staff members to proactively contact potential mitigation partners and discuss available options with them directly. Similar to identifying mitigation options and measuring effectiveness through the regional transit planning process, there are limitation on using existing VMT reduction methodologies based on current research, as TDM efficacy will vary based on context-specific market factors and travel-shed characteristics. Further, Districts will ultimately need to form long range relationships or even programmatic agreements to address and resolve issues such as monitoring, reporting, and maintenance-of-effort (i.e. the mitigation "performance period").

A partial list of TMAs in California is shown below:[10]

[10] https://www.apse.org/wp-content/uploads/docs/TMAs%20-%20National%20Directory.pdf

Table A-A.2: List of Transportation Management Associations (TMAs)

Transportation Management Associations (TMAs)	Location
50 Corridor Transportation Management Association	Sacramento
Altrans TMA	San Jose
Anaheim Transportation Network	Anaheim
Burbank Transportation Management Organization	Burbank
City of Santa Monica Transportation Management Association	Santa Monica
Emeryville Transportation Management Association	Emeryville
Glendale Transportation Management Association	Glendale
Hacienda Business Park	Pleasanton
McClellan Park TMA	McClellan
Moffett Park & Business Transportation Association	Sunnyvale
North Natomas TMA	Sacramento
Pajaro Valley TMA	Watsonville
Placer County Transportation Management Association	Auburn
Point West Area TMA	Sacramento
Ride-on TMA	San Luis Obispo
Sacramento TMA	Sacramento
San Francisco International Airport Commission	San Francisco
South Natomos TMA	Sacramento
Spectrumotion TMA	Irvine
The Presidio Trust	San Francisco
TMA of San Francisco	San Francisco
Traffic Solutions	Santa Barbara
Truckee North Lake Tahoe TMS	Truckee
Warner Center TMO	Woodland Hills
Yolo TMA	Woodland

A comprehensive list of local/regional transit operators, specialized transportation service providers, and Consolidated Transportation Services Agencies that has been assembled by the American Public Transportation Association can be found here.

For further information on opportunities to connect with mobility service providers, Districts can contact the California Association for Coordinated Transportation, or CalAct.

Appendix B: Local VMT calculators

Performance Assessment Tools and VMT Calculators: Several local planning jurisdictions and regional planning agencies such as SACOG have launched performance assessment tools to analyze anticipated outcomes from transportation investments at the project level. The goal of the Project Performance Assessment tool is to align with federal and state emphasis on outcome-based performance measurement and to prioritize cost-effective transportation projects with desired performance benefits, such as increased travel reliability and reducing VMT per capita. In light of the fact that these tools typically result from extensive development and data-collection efforts, development reports may be valuable references to cite the methodologies used, explain the variable considered, understand how to add user inputs, and how to extract VMT reduction figures from the tool's indicators output table. Caltrans practitioners are encouraged to contact their RTPA/MPO counterparts to identify the availability of any such tools for their collective use. For example, Appendix 3 of the tool's Development report, Supplemental Indicator Methodology, gives a detailed technical description of several complex data sources and indicators. Given that potential mitigation measures are similar in many respects to planned mobility improvements, performance indicators from these types of tools can be applied to assess their impact on VMT reduction. For VMT, the SACOG tool looks at the number of transit trips and average vehicle occupancy that a freeway project would add, the number of jobs and dwelling units, mixed uses, and neighborhood services that a complete-street project would provide access to, and the change in jobs, dwelling unit, mixed uses and neighborhood services that a transit or local network expansion would result in.

Similarly the City of Los Angeles Department of Transportation Vehicle Miles Traveled (VMT) Calculator uses an MXD methodology and was originally developed by the U.S. Environmental Protection Agency to better estimate trip generation in urban areas

considering a number of factors including the relative numbers of residents and jobs, the density of development, the connectivity for walking or driving among different activities, the availability of transit, the number of convenient trip destinations within the immediate area, vehicle ownership, and household size. The calculator's assumptions were validated and are explained in the calculator's development report for practitioners to cite in their analysis on the potential VMT reductions available from 22 different types of TDM site modifications, system improvements, and operational changes. The calculator follows CAPCOA guidance by either directly applying the CAPCOA methodology, applying the alternative literature methodology, or adjusting the methodology offered by CAPCOA to account for local needs. A methodology is specified for each TDM strategy, with individual levels of anticipated effectiveness identified. The calculator uses four place-types, or travel behavior zones, (Urban, Compact Infill, Suburban Center, and Suburban) and allows TDM strategies to be combined with a maximum VMT reduction result of 75% for measures in urban locations, 40% compact infill locations, 20% for suburban center locations, and 15% for suburban locations.

The calculator's TDM measures and maximum VMT reduction rates are show below and specific methodologies are provided here:

1. Reduce Parking Supply: 12.5%
2. Unbundle Parking: 26% of residential-based VMT
3. Parking Cash-Out: 7.7% of commute VMT
4. Price Workplace Parking: 19.7% of commute VMT
5. Residential Area Parking Permits: 0.25%
6. Reduce Transit Headways: 2.5%
7. Implement Neighborhood Shuttle: 13.4%
8. Transit Subsidies: 20%
9. Voluntary Travel Behavior Change Program: 8%
10. Promotions & Marketing: 4%

11. Required Commute Trip Reduction Program: 21% of commute VMT
12. Alternative Work Schedules and Telecommute Program: 5.5% of commute VMT
13. Employer Sponsored Vanpool or Shuttle: 13.4% of commute VMT
14. Ride Share Program: 15% of commute VMT
15. Car Share: 0.7%
16. Bike Share: 0.25%
17. School Carpool Program: 15.8% of school VMT, or 0.9% of overall VMT
18. Implement/Improve On-Street Bicycle Facility: 0.625%
19. Include Bike Parking: 0.625%
20. Include Secure Bike Parking and Showers: 0.625%
21. Traffic Calming Improvements: 1%
22. Pedestrian Network Improvements: 2%

A variety of similar VMT calculators have been developed for local and regional agencies across the state that Districts could explore for mitigation purposes. The following are among other VMT calculators and TDM assessment tools that have been developed by some of Caltrans external partners:

- Fresno Council of Governments
  - https://www.fresnocog.org/project/vmt-tool/
- San Gabriel Valley Council of Governments
  - https://www.sgvcog.org/vmt-analysis-tool
- Valley Transportation Authority
  - https://www.vta.org/projects/level-service-los-vehicle-miles-traveled-vmt-transition
- County of Santa Barbara
  - https://www.countyofsb.org/plndev/projects/SB743.sbc
- City of San Jose
  - https://www.sanjoseca.gov/your-government/departments-offices/transportation/planning-policies/vehicle-miles-traveled-metric

- San Diego Association of Governments
  - https://www.icommutesd.com/planners/tdm-local-governments
- San Diego Association of Governments
  - https://www.sandag.org/index.asp?classid=13&subclassid=97&projectid=592&fuseaction=projects.detail
- Alameda County Transportation Commission
  - AlamedaCTC_VMT_Final_Tool_20210826.xlsx (live.com)

Further, some local jurisdictions have already completed updates to their local impact assessment guidelines that include specific methodologies for estimating VMT reductions from various TDM mitigation measures that Caltrans District staff could adapt for use on transportation projects. For example, below are just a few examples from across the state that District staff could refer to:

- See Appendix H of the Escondido Transportation Impact Analysis Guidelines : https://www.escondido.org/Data/Sites/1/media/Engineering/TIACRAIG/EscondidoTransportationImpactAnalysisGuidelines2021.pdf
- See Appendix H of the City of Long Beach Transportation Impact Analysis Guidelines:

  https://www.longbeach.gov/globalassets/city-manager/media-library/documents/memos-to-the-mayor-tabbed-file-list-folders/2020/june-30--2020---vehicle-miles-traveled--vmt--standards-for-development-review

- See Appendices A-C of the City of Fremont's Transportation Impact Analysis Handbook:

  https://www.fremont.gov/DocumentCenter/View/48317/TIA-Handbook_Final_June2020?bidId=

- See Appendix C of the City of Carlsbad's VMT Analysis Guidelines: https://www.carlsbadca.gov/home/showpublisheddocument/312/637425981341500000

Appendix C: VMT Reduction Tables for Select Mitigation Measures

Table A-C.1: VMT effects from dense residential development following the CACOA formula. Household figures assume an adjusted typical household annual VMT of 19,641.8, from the 2017 NHTS.

Density (DU/acre)	Change in VMT from typical	Change in annual VMT for typical household
9.1	0.0%	0.00
9.2	-0.2%	-47.49
9.3	-0.5%	-94.97
9.4	-0.7%	-142.46
9.5	-1.0%	-189.94
9.6	-1.2%	-237.43
9.7	-1.5%	-284.91
9.8	-1.7%	-332.40
9.9	-1.9%	-379.89
10.0	-2.2%	-427.37
10.1	-2.4%	-474.86
10.2	-2.7%	-522.34
10.3	-2.9%	-569.83
10.4	-3.1%	-617.31
10.5	-3.4%	-664.80
10.6	-3.6%	-712.29
10.7	-3.9%	-759.77
10.8	-4.1%	-807.26
10.9	-4.4%	-854.74
11.0	-4.6%	-902.23
11.1	-4.8%	-949.71
11.2	-5.1%	-997.20
11.3	-5.3%	-1,044.68
11.4	-5.6%	-1,092.17
11.5	-5.8%	-1,139.66
11.6	-6.0%	-1,187.14
11.7	-6.3%	-1,234.63

Density (DU/acre)	Change in VMT from typical	Change in annual VMT for typical household
11.8	-6.5%	-1,282.11
11.9	-6.8%	-1,329.60
12.0	-7.0%	-1,377.08
12.1	-7.3%	-1,424.57
12.2	-7.5%	-1,472.06
12.3	-7.7%	-1,519.54
12.4	-8.0%	-1,567.03
12.5	-8.2%	-1,614.51
12.6	-8.5%	-1,662.00
12.7	-8.7%	-1,709.48
12.8	-8.9%	-1,756.97
12.9	-9.2%	-1,804.46
13.0	-9.4%	-1,851.94
13.1	-9.7%	-1,899.43
13.2	-9.9%	-1,946.91
13.3	-10.2%	-1,994.40
13.4	-10.4%	-2,041.88
13.5	-10.6%	-2,089.37
13.6	-10.9%	-2,136.86
13.7	-11.1%	-2,184.34
13.8	-11.4%	-2,231.83
13.9	-11.6%	-2,279.31
14.0	-11.8%	-2,326.80
14.1	-12.1%	-2,374.28
14.2	-12.3%	-2,421.77
14.3	-12.6%	-2,469.25
14.4	-12.8%	-2,516.74
14.5	-13.1%	-2,564.23
14.6	-13.3%	-2,611.71
14.7	-13.5%	-2,659.20
14.8	-13.8%	-2,706.68
14.9	-14.0%	-2,754.17
15.0	-14.3%	-2,801.65
15.1	-14.5%	-2,849.14
15.2	-14.7%	-2,896.63

Density (DU/acre)	Change in VMT from typical	Change in annual VMT for typical household
15.3	-15.0%	-2,944.11
15.4	-15.2%	-2,991.60
15.5	-15.5%	-3,039.08
15.6	-15.7%	-3,086.57
15.7	-16.0%	-3,134.05
15.8	-16.2%	-3,181.54
15.9	-16.4%	-3,229.03
16.0	-16.7%	-3,276.51
16.1	-16.9%	-3,324.00
16.2	-17.2%	-3,371.48
16.3	-17.4%	-3,418.97
16.4	-17.6%	-3,466.45
16.5	-17.9%	-3,513.94
16.6	-18.1%	-3,561.43
16.7	-18.4%	-3,608.91
16.8	-18.6%	-3,656.40
16.9	-18.9%	-3,703.88
17.0	-19.1%	-3,751.37
17.1	-19.3%	-3,798.85
17.2	-19.6%	-3,846.34
17.3	-19.8%	-3,893.82
17.4	-20.1%	-3,941.31
17.5	-20.3%	-3,988.80
17.6	-20.5%	-4,036.28
17.7	-20.8%	-4,083.77
17.8	-21.0%	-4,131.25
17.9	-21.3%	-4,178.74
18.0	-21.5%	-4,226.22
18.1	-21.8%	-4,273.71
18.2	-22.0%	-4,321.20
18.3	-22.2%	-4,368.68
18.4	-22.5%	-4,416.17
18.5	-22.7%	-4,463.65
18.6	-23.0%	-4,511.14
18.7	-23.2%	-4,558.62

Density (DU/acre)	Change in VMT from typical	Change in annual VMT for typical household
18.8	-23.5%	-4,606.11
18.9	-23.7%	-4,653.60
19.0	-23.9%	-4,701.08
19.1	-24.2%	-4,748.57
19.2	-24.4%	-4,796.05
19.3	-24.7%	-4,843.54
19.4	-24.9%	-4,891.02
19.5	-25.1%	-4,938.51
19.6	-25.4%	-4,986.00
19.7	-25.6%	-5,033.48
19.8	-25.9%	-5,080.97
19.9	-26.1%	-5,128.45
20.0	-26.4%	-5,175.94
20.1	-26.6%	-5,223.42
20.2	-26.8%	-5,270.91
20.3	-27.1%	-5,318.40
20.4	-27.3%	-5,365.88
20.5	-27.6%	-5,413.37
20.6	-27.8%	-5,460.85
20.7	-28.0%	-5,508.34
20.8	-28.3%	-5,555.82
20.9	-28.5%	-5,603.31
21.0	-28.8%	-5,650.79
21.1	-29.0%	-5,698.28
21.2	-29.3%	-5,745.77
21.3	-29.5%	-5,793.25
21.4	-29.7%	-5,840.74
21.5	-30.0%	-5,888.22

Table A-C.2: VMT reductions from increased job density, following the formula in CAPCOA.

Density (jobs per acre)	Percent VMT reduction from typical
145	0.0%
150	-0.2%
155	-0.5%
160	-0.7%
165	-1.0%
170	-1.2%
175	-1.4%
180	-1.7%
185	-1.9%
190	-2.2%
195	-2.4%
200	-2.7%
205	-2.9%
210	-3.1%
215	-3.4%
220	-3.6%
225	-3.9%
230	-4.1%
235	-4.3%
240	-4.6%
245	-4.8%
250	-5.1%
255	-5.3%
260	-5.6%
265	-5.8%
270	-6.0%
275	-6.3%
280	-6.5%
285	-6.8%
290	-7.0%
295	-7.2%
300	-7.5%
305	-7.7%

Density (jobs per acre)	Percent VMT reduction from typical
310	-8.0%
315	-8.2%
320	-8.4%
325	-8.7%
330	-8.9%
335	-9.2%
340	-9.4%
345	-9.7%
350	-9.9%
355	-10.1%
360	-10.4%
365	-10.6%
370	-10.9%
375	-11.1%
380	-11.3%
385	-11.6%
390	-11.8%
395	-12.1%
400	-12.3%
405	-12.6%
410	-12.8%
415	-13.0%
420	-13.3%
425	-13.5%
430	-13.8%
435	-14.0%
440	-14.2%
445	-14.5%
450	-14.7%
455	-15.0%
460	-15.2%
465	-15.4%
470	-15.7%
475	-15.9%
480	-16.2%

Density (jobs per acre)	Percent VMT reduction from typical
485	-16.4%
490	-16.7%
495	-16.9%
500	-17.1%
505	-17.4%
510	-17.6%
515	-17.9%
520	-18.1%
525	-18.3%
530	-18.6%
535	-18.8%
540	-19.1%
545	-19.3%
550	-19.6%
555	-19.8%
560	-20.0%
565	-20.3%
570	-20.5%
575	-20.8%
580	-21.0%
585	-21.2%
590	-21.5%
595	-21.7%
600	-22.0%
605	-22.2%
610	-22.4%
615	-22.7%
620	-22.9%
625	-23.2%
630	-23.4%
635	-23.7%
640	-23.9%
645	-24.1%
650	-24.4%
655	-24.6%

Density (jobs per acre)	Percent VMT reduction from typical
660	-24.9%
665	-25.1%
670	-25.3%
675	-25.6%
680	-25.8%
685	-26.1%
690	-26.3%
695	-26.6%
700	-26.8%
705	-27.0%
710	-27.3%
715	-27.5%
720	-27.8%
725	-28.0%
730	-28.2%
735	-28.5%
740	-28.7%
745	-29.0%
750	-29.2%
755	-29.4%
760	-29.7%
765	-29.9%

Table A-C.3. Calculated values for VMT reduction from CAPCOA formula.

Annual parking price	% VMT change	Absolute VMT change per household
$200	-0.9%	-171.0
$300	-1.3%	-256.5
$400	-1.7%	-342.0
$500	-2.2%	-427.5
$600	-2.6%	-512.9
$700	-3.0%	-598.4
$800	-3.5%	-683.9
$900	-3.9%	-769.4
$1,000	-4.4%	-854.9
$1,100	-4.8%	-940.4
$1,200	-5.2%	-1,025.9
$1,300	-5.7%	-1,111.4
$1,400	-6.1%	-1,196.9
$1,500	-6.5%	-1,282.4
$1,600	-7.0%	-1,367.9
$1,700	-7.4%	-1,453.3
$1,800	-7.8%	-1,538.8
$1,900	-8.3%	-1,624.3
$2,000	-8.7%	-1,709.8
$2,100	-9.1%	-1,795.3
$2,200	-9.6%	-1,880.8
$2,300	-10.0%	-1,966.3
$2,400	-10.4%	-2,051.8
$2,500	-10.9%	-2,137.3
$2,600	-11.3%	-2,222.8
$2,700	-11.8%	-2,308.3
$2,800	-12.2%	-2,393.8
$2,900	-12.6%	-2,479.2
$3,000	-13.1%	-2,564.7
$3,100	-13.5%	-2,650.2
$3,200	-13.9%	-2,735.7
$3,300	-14.4%	-2,821.2
$3,400	-14.8%	-2,906.7
$3,500	-15.2%	-2,992.2

Appendix D: TDM+ VMT Reduction Quantification Tool

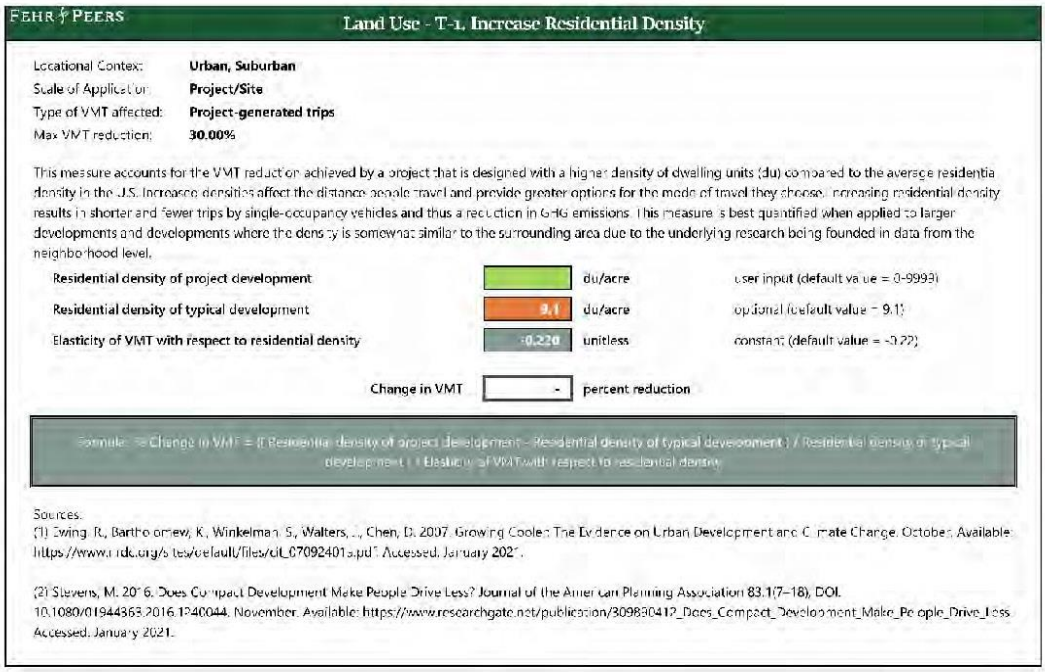


Figure 4. TDM+ Excel tool interface.

The TDM+ tool is a spreadsheet-based tool that calculates VMT reductions based on strategies presented in the 2021 CAPCOA handbook. Many of the strategies discussed in this playbook are included in the tool, which provides a simple interface to input project information and perform analysis.

Detailed instructions on how to use the tool are provided on the "START HERE" tab. Basic input data is required such as the mitigation type, geographic location and place type, and amount of mitigation being provided. The tool can automatically detect conflicting measures and flags them on the 'Conflicts' tab. For measures that can be combined (discussed earlier in this playbook on page 6), the tool automatically applies multiplicative dampening to make these adjustments.

The "Results" tab shows the combined VMT reduction (as a percentage) by the strategy type. For example, VMT reduction is reported for 'Land Use: Project Site',

which includes four strategies within it. With this information, the analyst can apply these percent reductions (once conflicts have been resolved) to a VMT estimate to estimate a VMT reduction in absolute terms.

This tool is currently a beta, and only includes six core-based statistical areas as available parameters. Future iterations of the tool will include expanded drop-down options. For each mitigation strategy, orange cells indicate default values, sometimes based on the selected core-based statistical area. These default values can be overridden if more accurate data is available. The TDM+ tool can be accessed here.

Exhibit D

EVALUATION OF THE SACRAMENTO AREA COUNCIL OF GOVERNMENTS' SB 375 2020 SUSTAINABLE COMMUNITIES STRATEGY

October 2020



This document has been reviewed by the staff of the California Air Resources Board and approved for publication. Approval does not signify that the contents necessarily reflect the views and policies of the California Air Resources Board, nor does the mention of trade names or commercial products constitute endorsement or recommendation for use.

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Background

The Sustainable Communities and Climate Protection Act (SB 375) is intended to support the State's broader climate goals by encouraging integrated regional transportation and land use planning that reduces greenhouse gas (GHG) emissions from passenger vehicle use. California's metropolitan planning organizations (MPO) develop regional Sustainable Communities Strategies (SCS) – as part of their regional transportation plans (RTP) – which contain land use, housing, and transportation strategies that, when implemented, can meet the per capita passenger vehicle GHG emission reduction targets for 2020 and 2035 set by the California Air Resources Board (CARB or Board). Once an MPO adopts an SCS, SB 375 directs CARB to accept or reject an MPO's determination that its SCS, when implemented, would meet the targets.

On November 18, 2019, the Sacramento Area Council of Governments (SACOG), which serves as the MPO for the Sacramento region, adopted its 2020 Metropolitan Transportation Plan/Sustainable Communities Strategy (2020 SCS).[1] SACOG provided for CARB staff's review a complete submittal of the 2020 SCS and all necessary supporting information on June 5, 2020. SACOG's 2020 SCS estimates a 14 percent and a 19 percent decrease in GHG per capita emissions from light-duty passenger vehicles by 2020 and 2035, respectively, compared to 2005. The region's per capita GHG emission reduction targets are 7 percent in 2020 and 19 percent in 2035, compared to 2005 levels, as adopted by the Board in 2018.[2] This report reflects CARB's evaluation of SACOG's 2020 SCS GHG quantification.

CARB's Evaluation

After CARB set the first SB 375 GHG emission reduction targets in 2010, CARB staff developed the first guidelines[3] on how SCSs would be evaluated for the purposes of CARB's determination in 2011. These 2011 Evaluation Guidelines focused on the technical aspects of regional travel demand modeling and analysis for how CARB would determine acceptance or rejection of an MPO's determination that it met its applicable

[1] Sacramento Area Council of Governments. *2020 Metropolitan Transportation Plan/Sustainable Communities Strategy*.
[2] Board Resolution 18-12 (March 22, 2018).
[3] California Air Resources Board. Description of Methodology for ARB Staff Review of Greenhouse Gas Reductions from Sustainable Communities Strategies Pursuant to SB 375. July 2011.

GHG emission reduction targets. In 2018, when CARB updated the SB 375 GHG emission reduction targets, the Board directed CARB staff to place greater attention on the strategies, key actions, and investments committed by the MPOs rather than on modeling outputs. Pursuant to Board direction, CARB staff updated its 2011 Evaluation Guidelines in the document *Final Sustainable Communities Strategy Program and Evaluation Guidelines*[4] (2019 Evaluation Guidelines). Under CARB staff's 2019 Evaluation Guidelines, evaluation of SCS strategies, key supporting actions and investments serve as the basis for accepting or rejecting an MPO's SB 375 GHG determination.

CARB's evaluation of the SCS consists of the determination and reporting components and is based on the general method described in CARB staff's 2019 Evaluation Guidelines. This report summarizes CARB staff's evaluation of SACOG's 2020 SCS.

The determination component covers the analyses conducted by CARB staff to determine whether the SCS would achieve the applicable GHG emission reduction targets when implemented. This component consists of a series of four policy analyses, which evaluate whether the strategies, key actions and investments from the SCS support its stated GHG emission reductions. These four analyses include Trend Analysis, Policy Analysis, Investment Analysis, and Plan Adjustment Analysis. CARB staff's evaluation relied on a review of SACOG's 2020 SCS, additional SCS submittal materials provided by SACOG further explaining its modeling inputs and assumptions, performance indicator trends, key actions, investments, and current trends and plan adjustments, as well as on information gathered in follow-up conversations with SACOG staff. For a summary of strategies and quantification methods evaluated as part of SACOG's 2020 SCS submittal see Appendix A.

With respect to the reporting component, the 2019 Evaluation Guidelines includes three elements: tracking implementation, incremental progress, and equity. Tracking implementation reporting captures progress the region has made toward its SCS implementation based on observed data, and whether it is on track to meet the GHG reduction targets based on how well the observed data tracks with what the plan said would happen. Incremental progress reports on whether an MPO's SCS includes more or enhanced strategies compared to its prior SCS that are consistent with the information the MPO shared during the 2018 target-setting process. The equity section identifies the efforts the MPO has undertaken to meet federal and State requirements

[4] California Air Resources Board. *Final Sustainable Communities Strategy Program and Evaluation Guidelines*. November 2019.

related to equity. The reporting component is included as Appendix C: MPO Reporting, and serves to identify the effectiveness of prior SCS implementation efforts and increase overall transparency of the SCS for the public and other stakeholders.

Trend Analysis

This section summarizes CARB staff's analysis of key plan performance indicators to determine if the data provided by SACOG supports the 2020 SCS's stated GHG and vehicle miles traveled (VMT) reductions. As part of the 2019 Evaluation Guidelines, CARB staff requested data on the following eight performance indicators: 1) household vehicle ownership, 2) mode share, 3) average travel time by mode, 4) daily transit ridership, 5) average trip length by mode, 6) seat utilization, 7) VMT per capita, and 8) GHG per capita. These indicators represent how a region can show changes to its per capita VMT over time through policies and investments undertaken and reflected in its SCS.

SACOG provided data associated with these metrics from the output of its travel demand model, SACSIM19. Staff analyzed how these metrics change over time (i.e., 2005 to 2035), and whether the change is directionality consistent with the 2020 SCS planned outcomes. In other words, staff determine whether these eight SCS performance indicators are trending in a direction that supports GHG/VMT reductions. Table 1 provides a summary of the trend analysis for SACOG's 2020 SCS. SACOG did not provide transit seat utilization data, so CARB staff could not review the trend for those data.

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Table 1. Trend Analysis Results

Performance Indicator	Forecast Change 2005 to 2035*	Trend Analysis
Average Trip Length	SOV (-8.6%) HOV (+0.7%) Transit (+15.8%) Walk/Bike (+45.4%)	SACOG's 2020 SCS forecasts a decrease in the average single-occupancy vehicle (SOV) trip length from 8.04 miles/day in 2005, to 7.85 miles/day in 2016 and 7.35 miles/day in 2035. Over the same time period, trip lengths for bike/walk increase from 1.63 (2005), 2.3 (2016) and 2.37 (2035), and transit increases from 5.39 (2005), 5.83 (2016) and 6.24 (2035). CARB staff finds these trends directionally supportive and consistent with the relationship shown in the empirical literature that reducing SOV trip length reduces VMT and GHG emissions. Please see Appendix B: Data Table for more details.
Average Travel Time	SOV (-6.7%) HOV (~0%) Transit (~0%)	SACOG's 2020 SCS forecasts a decrease in the average SOV travel time from 15 minutes in 2005 to 14 minutes in 2016 and 2035, with no changes in travel time for high-occupancy vehicle (HOV) (12 minutes in 2005 and 2035), and transit (40 minutes[5] in 2005 and 2035) over the same time period. CARB staff finds the 2005 to 2016 trend directionally supportive of reducing GHG emissions and consistent with the relationship shown in the empirical literature that travel time and trip length change proportionally. However, the lack of change in travel time in SOV trips beyond 2016, even though trip length decreases, as noted above, is not consistent and may not be supportive of reducing GHG emissions. Please see Appendix B: Data Table for more details.

[5] Note, for SACOG's equity analysis (see Appendix C), for accessibility to key destinations by transit SACOG uses a 30-minute benchmark for travel time.

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Performance Indicator	Forecast Change 2005 to 2035*	Trend Analysis
Mode Share	SOV (-2.2%) Transit (+1.1%) Walk/Bike (+2.6%)	SACOG's 2020 SCS forecasts that the mode share will modestly change by 2035. SOV decreases from 43.7% in 2005 to 41.5% in 2035; transit increases from 1.3% to 2.4%; and walk/bike increases from 9.2% to 11.8% over the same period. CARB staff finds these trends directionally supportive and consistent with the relationship shown in the empirical literature that shifting away from driving alone to other modes such as transit, walk and bike reduces per capita VMT and GHG emissions. Please see Appendix B: Data Table for more details.
Daily Transit Ridership	+172%	SACOG's 2020 SCS forecasts daily transit ridership increases from 138,460 riders in 2005 to 376,040 in 2035. CARB staff finds these trends directionally supportive and consistent with the relationship shown in the empirical literature that increasing transit ridership will reduce GHG emissions. However, CARB staff has concern about this trend when looked at in the context of transit travel in 2035 (40 minutes as noted above) compared to drive-alone trips (14 minutes as noted above). Transit travel time is almost three times longer than driving alone for similar trip lengths. This is not consistent with the empirical literature that longer travel time would increase transit ridership and reduce GHG emissions. Please see Appendix B: Data Table for more details.

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Performance Indicator	Forecast Change 2005 to 2035*	Trend Analysis
Household Vehicle Ownership	-5.7%	SACOG's 2020 SCS forecasts a decrease in household vehicle ownership from 1.9 vehicles per household in 2005 to 1.8 in 2016 and 2035. CARB staff finds the 2005 to 2016 trend directionally supportive of reducing GHG emissions and consistent with the relationship shown in the empirical literature that reducing vehicle ownership reduces GHG emissions. However, CARB staff has concern about this trend when looked at in the context of transit ridership per household trends (i.e., 0.18 in 2005 to 0.34 in 2035). The increase in transit forecasted may not be consistent with the modest reduction in vehicle ownership between 2016 and 2035 even though transit ridership increases over the same period. This is contrary to the empirical literature where a household uses more transit tends to own less vehicles. These results are not consistent and may not support reducing GHG emissions. Please see Appendix B: Data Table for more details.
VMT per Capita	-15.5%	SACOG's 2020 SCS forecasts VMT to decrease from 24.1 to 20.3 VMT/capita/day in 2035. CARB staff finds these trends directionally supportive and consistent with the relationship shown in the empirical literature that a reduction in VMT per capita will reduce GHG emissions. Please see Appendix B: Data Table for more details.
GHG per Capita Reduction Between 2005 and 2020	-14%	The GHG per capita reduction forecasted by SACOG meets the target established by CARB. Please see Appendix B: Data Table for more details.

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Performance Indicator	Forecast Change 2005 to 2035*	Trend Analysis
GHG per Capita Reduction Between 2005 and 2035	-19%	The GHG per capita reduction forecasted by SACOG meets the target established by CARB. Please see Appendix B: Data Table for more details.
Seat Utilization	SACOG did not provide data	NA

Note:
* (-) decreasing, (+) increasing, (~) no change
NA means not available

CARB staff finds that taken as a whole, the performance indicators used to conduct the Trend Analysis support the GHG reductions projected in SACOG's SCS.

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Policy Analysis

The following section summarizes CARB staff's evaluation of whether or not SACOG's 2020 SCS contains key policy, investment, and other actions that support its identified strategies for meeting its GHG emission reduction targets using the general method described in CARB's 2019 Evaluation Guidelines. This analysis focuses on what policy commitments are contained in the SCS to support implementation and provides CARB with qualitative evidence on whether an MPO's claimed GHG reductions from its SCS strategies are likely, risky, or unlikely. CARB staff's analysis is organized across four broad SCS strategy categories: land use and housing, transportation infrastructure and network, local/regional pricing, and electric vehicle and new mobility. Within each strategy category, CARB staff discusses: the applicable SCS strategies; the planned outcomes that the SCS assumes will occur in 2035 when strategies are fully implemented; and CARB staff's analysis of whether the SCS contains key policy and investment actions that will support implementation of the SCS strategies and planned outcomes.

CARB staff's analysis of key supporting actions looked at a number of policy factors that, when considered together, are expected to explain how the MPO region will achieve the development pattern, transportation network characteristics, and travel patterns assumed in its SCS by 2035. In general, across all strategy categories, CARB staff looked for:

- Whether the SCS provided policy actions that corresponded to each of its individual strategies.
- Whether the actions were clear with respect to scope, who will be involved, what will be done, and the anticipated implementation timeline.
- Whether the actions were measurable and included specific regional investment commitments in the RTP/SCS project list; policy and/or financial incentives; technical assistance; and if legislative or other entity action is needed, partnership activities to advance needed changes.

Information used for this effort was collected from SACOG's 2020 SCS and through additional supporting materials provided by SACOG in its submittal to CARB. See Appendix C for a summary table of SACOG's 2020 SCS strategies and identified associated key support actions.

Land Use and Housing Strategy Commitments

SACOG's 2020 SCS includes land use- and housing-related strategies that seek to support the creation of compact and diverse land uses and put residents and activity locations closer together, which would ultimately shorten passenger vehicle trips in the region and reduce per capita GHG emissions. SACOG's land use and housing strategies that shorten vehicle trips include: jobs-housing balance, infill development, and transit-oriented development. SACOG estimates these strategies, in aggregate, will result in a 5 percent decrease in per capita GHG emissions.

SCS Planned Outcomes

The SCS includes assumptions about the type and character of new land use and housing development that will take place in the region between 2016 and 2035, which include: [6]

- Adding 223,571 new housing units and 218,265 new jobs to the region.
- Increasing the region's residential density by 25 percent.
- Accommodating 95,834 new housing units (43 percent of total new units) as single-family housing, and 127,737 (57 percent) as multi-family or attached housing.
- Locating 133,100 new housing units and 87,332 new employees within a ½-mile of high-quality transit stations (a 25 percent and 16 percent increase, respectively, compared to 2016 levels).
- By 2040, accommodating 168,026 new housing units[7] (65 percent of total new units) and 228,902 new employees (85 percent of total new employees) through infill development in the region's center/corridor and established communities, and 92,102 new housing units (35 percent of the total new units) and 41,159 (15

[6] This subsection includes information based on the data table and compares demographic and land use indicators from the 2016 base year to 2035. CARB staff also looked at changes between the SB 375 2005 target baseline year and 2035, where SACOG provided 2005 data. However, given greater 2016 data availability across the SCS land use and transportation metrics, CARB staff have summarized what the SCS says needs to occur to meet the region's 2035 GHG emission reduction target compared to latest observed 2016 regional conditions.

[7] Information in this bullet point refers to data from Table 3.2: Summary of Expected Housing and Employment Growth by Community Type in the MTP/SCS. Data in this bullet compare the 2016 base year to the 2040 horizon year as no data were provided for 2035 by community types.

percent of the total new employees) in developing suburban and rural residential communities.

Supporting Actions

While MPOs create SCSs that forecast regional growth patterns, local government staff and elected officials have almost exclusive authority over land use decisions relevant to implementing the SCS. Achieving the plan outcomes discussed above will therefore require local government action. Local actions that do not align with regional goals, such as allowing leapfrog development out in natural or agricultural areas, and failing to allow enough infill, especially affordable housing and growth in walkable or transit-oriented areas, stifles the Sacramento region's ability to implement the plan.

CARB staff checked for evidence that appropriate funding, other incentives, technical assistance, or other key actions were present to support the assumed development pattern in the SCS. In particular, CARB staff considered whether the SCS identified region-specific funding or technical assistance programs that support developers and local governments in prioritizing growth in the SCS's preferred growth areas. In addition, CARB staff checked to see how the SCS's assumptions about future housing unit development within the SCS's preferred growth areas compared against existing local plans, as alignment of regional and local plans is an important first step toward ensuring that future needs can be accommodated.

CARB staff found that the 2020 SCS land use and housing planned outcomes are supported by region-specific funding and planning program actions. In particular, the 2020 SCS carries over a number of positive, well-established programs and commitments to support implementation of the Sacramento region's SCS land use and housing strategy. Notable examples include SB 375 California Environmental Quality Act (CEQA) streamlining resources and assistance, which allows for streamlined environmental review and analysis of residential or mixed-use projects that are consistent with the SCS.[8] SACOG also continues its Civic Lab Program[9], which focuses on designing and launching pilot projects that address regional challenges through action at the local level. This program includes projects to help address barriers to infill development, place-making, and private investment. The program recently focused on 12 commercial corridors in the Sacramento region, including corridors like

[8] SACOG CEQA streamlining.
[9] SACOG Civic Lab Program.

Main Street in the City of Isleton, Upper Broadway in the City of Placerville, and Del Paso Boulevard in the City of Sacramento.

The 2020 SCS also calls out the Green Means Go Pilot Program[10] as the key new mechanism to encourage infill development in the region. Through this pilot program, local jurisdictions will designate Green Zones, in which they must take specific actions to promote and accelerate infill development, provide travel options, and increase electric vehicle deployment. In addition, SACOG has introduced two additional supporting actions focused on the development of a Regional Housing Needs Plan with action steps and incentives, and an update to the region's Blueprint development plan.

Table 2 shows CARB staff's summary of SACOG's 2020 SCS land use and housing strategy commitments and associated supporting actions and investments.

[10] SACOG Green Means Go Program

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Table 2. SACOG's 2020 SCS Land Use and Housing Strategy Commitments and Supporting Actions

SACOG's SCS Strategies	Estimated GHG Emission Reductions in 2035	SCS Supporting Actions and Investments	CARB Staff's Analysis
Shortened Passenger Vehicle Trips: Jobs/ Housing Balance	-5% (When combined with all listed Shortened Passenger Vehicle Trips strategies)	SACOG will provide data, research, analysis, incentives, and other support to housing-rich communities actively trying to promote job growth and to jobs-rich communities to promote housing growth. SACOG will continue to provide incentives, tools, and other project support to grow regional jobs and housing. Examples include the Economic Prosperity Plan, Housing Policy Toolkit, SB 375 and SB 743 CEQA streamlining.	Actions Identified:[11] Yes Funding in the RTP/SCS Project List:[12] N/A[13] SACOG Program Funding Available:[14] Yes, SACOG has identified resources to provide research and technical assistance.

[11] Actions identified refers to if SACOG has identified how the SCS strategy will be implemented through actions.
[12] Funding in the RTP/SCS Project List refers to if there are identified projects and investments in the financially constrained project list that support the SCS strategy.
[13] N/A means not applicable.
[14] SACOG Program Funding Available refers to if SACOG has resources to support the SCS strategy.

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SACOG's SCS Strategies	Estimated GHG Emission Reductions in 2035	SCS Supporting Actions and Investments	CARB Staff's Analysis
Shortened Passenger Vehicle Trips: Infill Development	-5% (When combined with all listed Shortened Passenger Vehicle Trips strategies)	SACOG will develop a Regional Housing Needs Plan with action steps and incentives that put member agencies in a better position to accelerate infill housing production. SACOG will secure funding and implement the Green Means Go Pilot Program to encourage infill development and revitalization of commercial corridors through transit-supportive infrastructure. The Regional Housing Needs Plan, in combination and coordination with SACOG's Regional Early Action Plan funding, Local Early Action Plan funding, and SB 2 housing planning grants will help local jurisdictions with planning and zoning activity. SACOG will secure funding to allow the region's jurisdictions and stakeholders to revisit and update the Blueprint, which is SACOG's regional vision for future growth and development.	Actions Identified: Yes Funding in the RTP/SCS Project List: N/A SACOG Program Funding Available: Some program funds are available for RHNA and other work, however, CARB staff is concerned that this strategy will not be successful in reducing emissions because the Green Means Go Pilot Program remains unfunded and that jurisdictions have to be nominated to participate in the program. The Green Means Go Pilot Program needs further development and funding to support implementation.

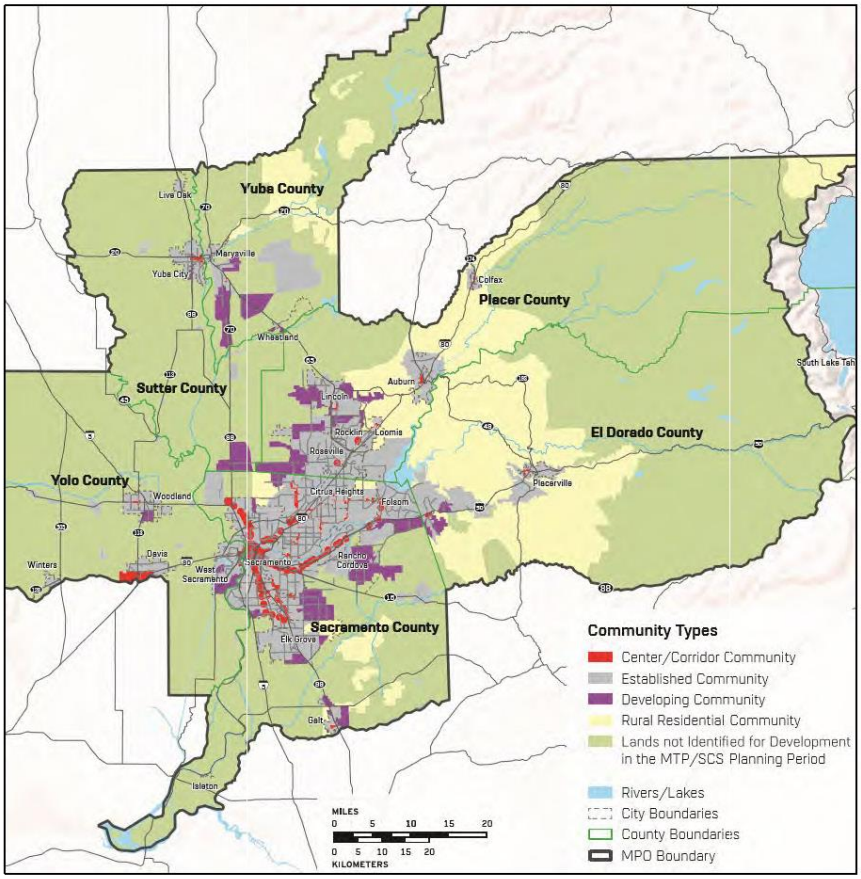
13

SACOG's SCS Strategies	Estimated GHG Emission Reductions in 2035	SCS Supporting Actions and Investments	CARB Staff's Analysis
Shortened Passenger Vehicle Trips: Transit-Oriented Development	-5% (When combined with all listed Shortened Passenger Vehicle Trips strategies)	SACOG will continue to provide technical assistance to support urban, suburban, and rural community revitalization. Examples include Civic Lab Year 2, Rural Main Streets Technical Assistance, and the Transit-Oriented Development Action Plan. SACOG will partner with cities and transit operators undergoing updates to transit plans, service changes, and transit-oriented development efforts. Examples include SacRT Forward, Transit Asset Management Planning, and the Transit-Oriented Development Action Plan.	Actions Identified: Yes Funding in the RTP/SCS Project List: N/A SACOG Program Funding Available: Yes, SACOG has existing programs and resources to provide funding, research and technical assistance.

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CARB staff also found that the 2020 SCS housing unit growth assumptions in the region's targeted infill areas are reasonably aligned with local general plan buildout capacities for 2035. Special attention was given to the region's place type, what SACOG refers to as "Community Types," and CARB staff focused on the categories of "Center and Corridor" and "Established Communities," as these are the areas where the SCS expects infill development to occur. Figure 1 is from SACOG's 2020 SCS and illustrates the Community Types being used to describe the region's land use forecast for the SCS planning period.

Figure 1. SACOG's 2020 SCS Community Types Map



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CARB staff found that local plans for these "Center and Corridor" and "Established Communities" are nearly fully consistent, and allow for the SCS's forecasted total units to be built by 2035, with the exception of the Center and Corridor Community areas in El Dorado County, Sacramento County (Gold and Blue line Station Areas), the City of Davis Core Area, and the City of Woodland. In these areas, the 2020 SCS assumes a greater number of housing units by 2035 than is currently in local plan build-out estimates. In aggregate, however, the net difference in total assumed infill housing units in the 2020 SCS versus what is allowable based on local planning is less than one percent of the total assumed housing units, indicating that the SCS's infill land use assumptions are reasonably aligned with local land use plans.

While CARB staff's analysis supports a conclusion that SACOG's 2020 SCS would meet the target, if implemented, CARB staff has significant concerns with SACOG's capability to implement the 2020 SCS strategies to achieve the planned outcomes. CARB staff recognizes that one of the SACOG region's strengths is having local plans in place that support the 2020 SCS's preferred infill housing growth scenario. However, while local plan alignment is an important first step to implementing future needs, it does not guarantee this housing will be built. As shown in CARB's *2018 Progress* Report: *California's Sustainable Communities and Climate Protection Act*,[15] prepared pursuant to SB 150 (Allen, Chapter 646, Statutes of 2017), local housing planning is nearly fully compliant with Regional Housing Needs Allocation (RHNA) law, but actual permits issued are lagging, especially for affordable housing. In the four largest regions, according to local jurisdiction reports submitted to the California Department of Housing and Development (HCD), most regions are ahead of schedule in issuing permits for housing for the wealthiest, "above moderate-income" households but are falling short in housing that is affordable for households in the three lower-income categories: moderate-income, low-income, and very low-income.

SACOG's process for developing the 2020 SCS acknowledges that the region is not on track to meet the region's infill goals, and identifies additional strategies and action items within the 2020 SCS to address the challenge of implementing infill. However, CARB staff found that these additional strategies and actions rely on funding that has yet to be secured and partnerships that have yet to be formed. For example, CARB's review of available program documentation for Green Means Go confirms that SACOG is actively advocating for funding and partners, however, the program is not yet funded and it is not clear what funding source would be used for this purpose, particularly as

[15] SB 150 Progress Report to the Legislature on Sustainable Communities Implementation.

revenue to the Greenhouse Gas Reduction Fund (GGRF) is expected to decline over time.[16] Furthermore, it is unclear what criteria SACOG will use for the Green Means Go Program to direct funds toward projects that will best support the SCS's infill goals. In addition, CARB staff's review of SACOG's SCS submittal materials and publicly available information on SACOG's identified Blueprint Update work and the Regional Housing Needs Plan and incentive work found a lack of specificity about milestones and how these actions would contribute to reducing emissions. CARB staff finds this approach of relying primarily on unspecified incentive actions to carry a high risk that the SCS will not be implemented as planned, especially since SACOG has not identified alternative actions if funding is not secured.

Transportation Infrastructure and Network Strategy Commitments

SACOG has included four transportation-related strategies in the 2020 SCS. Three of the strategies seek to complement its land use and housing strategies, and focus on increasing non-SOV mode share by increasing available alternatives to driving, including transit supportive infrastructure & investment, bicycle & pedestrian infrastructure & investment, and transportation demand management (TDM). Another strategy, intelligent transportation system & transportation system management (ITS & TSM), is also included that focuses on smoothing stop-and-go traffic, which can reduce GHG emissions per mile traveled. Together these transportation strategies support SACOG's goal of building and maintaining a safe, resilient, and multimodal transportation system. Altogether, SACOG estimates these strategies will result in a 6.5 percent decrease in per capita GHG emissions.

SCS Planned Outcomes

These strategies translate into assumptions about changes to the transportation infrastructure and network that will serve the region between 2016 and 2035, [17] which include:

[16] Proceeds from the Cap-and-Trade Program help facilitate comprehensive and coordinated investments throughout California that further the State's climate goals through the GGRF. However, the Cap-and-Trade Program's cap on economy-wide emissions declines over time, making fewer allowances available to purchase, and thus less proceeds available for deposit into the GGRF.

[17] This subsection includes information based on the data table and compares transportation indicators from the 2016 base year to 2035. CARB staff also looked at changes between the SB 375 2005 target baseline year and 2035, where SACOG provided 2005 data. However, given greater 2016 data availability across the SCS land use and transportation metrics, CARB staff have summarized what the SCS says

- Increasing the region's total transit operational miles by 67 percent, compared to 2016.
- Increasing the region's total bike and pedestrian lane-miles by 79 percent, compared to 2016.
- Decreasing freeway/general purpose lanes (3 percent), collector lanes (1 percent) and rural roadways (8 percent); and increasing freeway HOV lanes (28 percent) and arterial/expressways (27 percent), compared to 2016.[18]

Supporting Actions

Per the 2019 Evaluation Guidelines, CARB staff checked for evidence that appropriate funding, other incentives, technical assistance, or other key actions were present to support the development of the transportation network in the SCS. In particular, CARB staff looked for alignment against the project list adopted with the 2020 SCS to see whether the projects are planned and funded within the target timeframe. CARB staff also considered whether SACOG identified other region-specific funding or technical assistance programs to support implementation of its transportation strategies. In addition, CARB staff evaluated the extent to which the projects included in the SCS complement its land use and housing strategies, with a particular focus on capacity-increasing projects that carry a high risk of inducing travel and therefore increasing VMT/GHG emissions.

CARB staff found that the 2020 SCS transit, active transportation, TDM, and ITS/TSM assumptions are supported by region-specific funding and planning program actions, as well as through direct investments in the project list adopted with the 2020 SCS. In particular, the 2020 SCS includes a number of positive project commitments that align with the Sacramento region's SCS land use strategy and help advance GHG emission reductions. As part of the project list adopted with SACOG's 2020 SCS, CARB staff found multi-modal projects that are intended to improve transit, bike and walk options in the region by the 2035 target year. Examples include:

- Extension of the Green Line light rail service to North Natomas Town Center ($390 million).

needs to occur to meet the region's 2035 GHG emission reduction target compared to latest observed 2016 regional conditions.

[18] The decrease in freeway general purpose lanes is due to these facilities being converted to HOV lanes, while the reduction in collector lanes and rural roadways, typically two-lane roads with one-lane in each direction, is due to those facilities converting into multiple-lane arterials and expressways.

- Construction of phases 1 and 2 of the Downtown/Riverfront Streetcar in Sacramento and West Sacramento ($239 million).[19]

- SacRT Green Line Light Rail Loop and transit improvements along K and H streets in Sacramento. These improvements would accommodate a future Streetcar Project, as well as future Green Line service ($60 million).

- Construction of phases 3 and 4 streetscape improvements on West Capitol Avenue in West Sacramento, including wider sidewalks, new lighting, and planting treatments ($25 million).

- Construction of a Class 1 bike lane between Davis and Woodland ($10 million).

Table 3 shows CARB staff's summary of SACOG's 2020 SCS transportation infrastructure and network strategy commitments and associated supporting actions and investments.

[19] In September 2020, SacRT recently voted to move forward with a scaled back version of this project. Instead of being 4.4 miles long from Midtown to downtown West Sacramento, it will now only be 1.5 miles long and go from Sacramento Valley Station to Sutter Health Park (formerly Raley Field) in West Sacramento.

Table 3. SACOG's 2020 SCS Transportation Infrastructure and Network Strategy Commitments and Supporting Actions

SACOG's SCS Strategies	Estimated GHG Emission Reductions in 2035	SCS Supporting Actions and Investments	CARB Staff's Analysis
Increase Non-SOV Mode Share: Transit Supporting Infrastructure/ Investments	-6% (When combined with all listed Increase Non-SOV Mode Share strategies)	SACOG has allocated $10.1 billion to bus and rail operations and maintenance, paratransit services, strategic bus and rail infrastructure expansion and transit vehicle purchases. This is a slight reduction in investment of $0.5 billion compared to the 2016 SCS. SACOG is currently seeing a ridership decline compared to 2005. However, SACOG is projecting a tripling of ridership by 2035 from 120,500 in 2016 to 376,040. SACOG is working on its Next Generation Transit Study to help address the declines in transit and re-envision and explore new opportunities for transit. The SCS's actions support providing better traveler information for trip planning, reliable service and coordination between operators and supports ways for transit agencies to secure funding to improve frequency, span, and coverage of productive transit service.	Actions Identified: Yes Funding in the RTP/SCS Project List: Yes, but transit investment has declined compared to the 2016 SCS. CARB staff is concerned that transit ridership forecasts are overly ambitious and do not connect with on the ground realities of declining ridership and reduced investment. CARB staff would expect to see significant increases in transit investment that correspond with the SCS forecasted transit ridership increases. Additionally, if pricing strategies are not implemented then funding for transit improvements may be at risk. SACOG Program Funding Available: Yes, SACOG has existing programs and resources to provide funding, research and technical assistance.

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SACOG's SCS Strategies	Estimated GHG Emission Reductions in 2035	SCS Supporting Actions and Investments	CARB Staff's Analysis
Increase Non-SOV Mode Share: Improved Bicycle and Pedestrian Infrastructure/ Investments	-6% (When combined with all listed Increase Non-SOV Mode Share strategies)	SACOG has programmed and planned for $2.5 billion to go towards bicycle facilities, pedestrian improvements, and Americans with Disabilities Act (ADA) retrofits. This number reflects direct investments in bicycle and pedestrian improvements. However, some bicycle and pedestrian improvements are included as part of the costs of road and highway capacity projects. The exact costs for these elements as part of larger investments are not readily available for the planned projects in the 2020 SCS. The direct investment has decreased by $0.3 billion compared to the 2016 SCS. SACOG is currently seeing a slight increase in bicycle and pedestrian mode share compared to 2005, and is projecting a slight increase in bicycle mode share from 2.5% in 2016 to 2.8% by 2035, and in pedestrian mode share from 7.8% in 2016 to 9% in 2035. The total number of miles of bicycle infrastructure is projected to increase from 37% in 2016 to 79% in 2035.	Actions Identified: Yes Funding in the RTP/SCS Project List: Yes, but bicycle and pedestrian investment has declined compared to the 2016 SCS. CARB staff is concerned that mode share forecasts do not connect with reduction in investments. CARB staff would expect to see increases in bicycle and pedestrian infrastructure investments to correspond to increases in mode share. Additionally, if pricing strategies are not implemented then funding for bicycle and pedestrian improvements may be at risk.

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SACOG's SCS Strategies	Estimated GHG Emission Reductions in 2035	SCS Supporting Actions and Investments	CARB Staff's Analysis
Increase Non-SOV Mode Share: Improved Bicycle and Pedestrian Infrastructure/ Investments (continued)	-6% (When combined with all listed Increase Non-SOV Mode Share strategies) (continued)	SACOG encourages investment in bicycle and pedestrian infrastructure to support healthy, active transportation trips and provide recreation opportunities for residents and visitors. SACOG provides online resources regarding active transportation options for the use of local planning practitioners and stakeholders. SACOG also provides technical assistants regarding complete streets and active design, which promotes improved health outcomes by designing spaces that promote and facilitate regular physical activity.	(Continued) SACOG Program Funding Available: Yes, SACOG has existing programs and resources to provide funding, research and technical assistance.
Increase Non-SOV Mode Share: Transportation Demand Management (TDM)	-6% (When combined with all listed Increase Non-SOV Mode Share strategies)	SACOG has allocated $3.1 billion to program, safety, and systems management and operations, of which approximately $12.9 million goes to TDM strategies. These funds are used for outreach, education and incentives to drivers to reduce driving. SACOG will develop and implement new and innovative employer and residential-based TDM programs. SACOG's Civic Lab Innovative Mobility Accelerator Program will provide mini grants to fund this effort.	Actions Identified: Yes Funding in the RTP/SCS Project List: Yes, but CARB staff is surprised that TDM programs are not funded through 2035.

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SACOG's SCS Strategies	Estimated GHG Emission Reductions in 2035	SCS Supporting Actions and Investments	CARB Staff's Analysis
Increase Non-SOV Mode Share: Transportation Demand Management (TDM) (continued)	-6% (When combined with all listed Increase Non-SOV Mode Share strategies) (continued)	The project list includes a regional TDM program throughout SACOG, as well as a TDM Program through the Placer County Congestion Management Program, however, these programs are only for the 2020-2025 timeline.	(Continued) SACOG Program Funding Available: Yes, SACOG has existing programs and resources to provide funding, research and technical assistance.
Intelligent Transportation System & Transportation Systems Management (ITS & TSM)	-0.5%	SACOG is investing $3.1 billion in program safety and systems management and operations. A large portion of this funding goes to funding ITS & TSM strategies and used for intelligent technology and management systems to monitor traffic and incidents, to convey information to drivers, and to manage driver movements. The project list includes projects such as ramp metering, changeable message signs, and traffic signalization. SACOG plans to implement ITS and TSM through implementing and raising funding through tolling or pricing strategies, and prioritizing investments in transportation improvements that reduce GHG and VMT. SACOG has an Intelligent Transportation Systems Committee/Sacramento Region ITS Partnership that works to advance ITS in the region.	Actions Identified: Yes Funding in the RTP/SCS Project List: Yes, but if pricing strategies are not implemented then funding for ITS and TSM may be at risk. SACOG Program Funding Available: Yes, SACOG has existing programs and resources to provide funding, research and technical assistance

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CARB staff also found that the 2020 SCS includes hundreds of millions of dollars in funding for roadway capacity expansion projects that are not well-aligned with the region's adopted SCS land use and housing strategy, including segments of the Capital Southeast Connector project. Capacity expansion projects, especially those that are not aligned with the long-term vision for accommodating new growth, increase VMT and work against achieving the State's climate and air quality goals.[20] [21] As part of its SCS submittal, SACOG conducted analysis on the anticipated long-term effects on VMT due to the roadway capacity expansion projects within the SCS by comparing its SACSIM19 model results with research-based elasticity calculations.[22] Based on SACOG's elasticity calculations, it estimates that all together these types of roadway projects are increasing the region's VMT as high as 12 percent and as low as 7 percent between 2016 and 2040, through induced travel.[23] SACOG included forecasted VMT increases from these projects as part of its overall 2020 SCS emissions estimate and determined that it will still be able to meet its SB 375 GHG reduction target, if implemented. CARB staff reviewed SACOG's approach to capturing the short- and long-term VMT/GHG impacts of its 2020 SCS roadway capacity expansion projects and found them to be reasonable in the context of aggregate impacts on SCS performance. However, for the next SCS, SACOG should evaluate and discuss the VMT impacts of individual capacity projects in comparison with the aggregate analysis used for the SCS. Results of this effort could be used to further refine how SACOG assesses the VMT impacts of capacity projects on its SCS.

While CARB staff's analysis supports a conclusion that SACOG's 2020 SCS would meet the target, if implemented, CARB staff has significant concerns with SACOG's capability to implement the 2020 SCS transportation system strategies and achieve its estimated GHG reduction benefits. CARB staff is especially concerned with the region's ability to fund and deliver the transit and active transportation projects that are needed to support the 2020 SCS planned outcomes. This is important given the fact that the region wants to overcome recent declines in transit ridership since 2012 and increase transit ridership 212 percent compared to 2016 levels. SACOG's 2020 SCS plans to achieve this, in part, through increasing transit service miles by over 67 percent

[20] See CARB's Policy Brief: Impact of Highway Capacity and Induced Travel on Passenger Vehicle Use and Greenhouse Gas Emissions.
[21] See the information regarding the relationship between reducing VMT and responding to the State's Climate Goals.
[22] See *SACOG MTP/SCS Appendix E: Plan Performance*.
[23] Through induced travel, or increases in travel due to changes in the number of trips and trip distances (destination changes); shifts in travel modes, the time-of-day travel occurs, and routes; as well as changes in residence and workplace locations.

compared to 2016. However, this is contrary to planned transit and active transportation project investments, which have declined between the 2016 and 2020 SCS, with $0.5 billion less in the 2020 SCS for total transit investment compared to the 2016 SCS. SACOG attributes this to a delay in the Green Line light rail extension to the airport to after 2040. Further delays or removals of transit and active transportation projects will prevent SACOG from meeting its regional targets.

This is particularly true for SACOG's 2020 SCS, which is estimated to only just achieve the GHG emission reduction targets, and contains roadway capacity-increasing projects that could undermine target achievement and are prioritized over other projects that are more likely to reduce GHG emissions.[24] SACOG will need to be vigilant about monitoring implementation of the particular balance of transportation projects through 2035, and funding transportation projects that support the region's adopted SCS land use and housing strategy prior to other projects in order to ensure net reductions are achieved.

Local and Regional Pricing Strategy Commitments

SACOG has included two new pricing strategies in the 2020 SCS. These strategies include facility-based congestion pricing through managed express lanes and a regional mileage-based user fee. The facility-based pricing program will charge drivers for use of managed express lanes by considering time of day and congestion level. Drivers in the region would be given the choice of purchasing their way into the managed express lane in exchange for a faster and more reliable trip. The regional mileage-based user fee, which SACOG calls the Pay Go Program, will charge drivers for use of all roadways across the region on a per-mile basis. SACOG estimates that these strategies will decrease congestion, increase transit, walking, and biking, improve road/highway conditions, generate revenue for funding transportation infrastructure in the region, and result in a 1 to 2 percent decrease in per capita GHG emissions.

SCS Planned Outcomes

These strategies translate into assumptions about changes to the cost of transportation options, specifically, the cost to drivers for use of the roadway network in the region between 2016 and 2035, which include:

[24] CARB staff analyzed how projects that might erode VMT/GHG benefits are prioritized relative to projects that are more aligned with the SCS, see "Investments Analysis" for discussion

- Starting in 2031, decrease congestion and overall roadway travel demand with new priced managed lanes along two corridors with an estimated dynamic charge rate of $0.10 cents to $2.12 dollars per mile for passenger vehicles utilizing the lanes during peak period.[25] Figure 2 shows the proposed draft managed lane locations.

Figure 2. Proposed Managed Lanes in the SACOG Region



- Starting in 2030, decrease overall roadway travel demand and encourage increased transit, walking, and biking, with a new per-mile charge for drivers along all roadways throughout the region with an estimated charge rate of 3.5 cents per mile.[26]

[25] SACOG, Toll Charges by Facility. July 2020.
[26] The SCS states that there is still much work to be done on identifying how this program will be implemented and does not provide details on how the fee would be collected. To estimate the GHG benefits for this program, SACOG assumed all drivers in the region would be charged this fee. This includes $0.012 California Mileage-Based User Fee, which equals the California State Fuel Tax, and $0.023 SACOG Mileage-Based User Fee.

Supporting Actions

Per the 2019 Evaluation Guidelines, CARB staff checked for evidence that appropriate funding, other incentives, technical assistance, or other key actions were present to support the assumed local and regional pricing strategies in the SCS. In particular, CARB staff looked for alignment against the project list adopted with the 2020 SCS to see whether the actions are planned and funded within the target timeframe. CARB staff also considered whether SACOG identified other region-specific funding or programs to support implementation of its pricing strategies. In addition, CARB staff looked for whether and how SACOG considered equity, which is a key implementation concern for pricing strategies.[27]

CARB staff found that the 2020 SCS local and regional pricing assumptions are supported by region-specific funding and planning program actions, as well as through direct investments in the project list adopted with the 2020 SCS. In particular, the 2020 SCS project list includes the same managed express lane corridor projects for funding by 2035 that SACOG assumed when quantifying the SCS's GHG benefits in 2035. The SCS also identifies some initial supporting actions to further support its two pricing strategies. One action is to work with Caltrans and other local partners to identify options for governance and administration of revenues from facility-based pricing, in coordination with ongoing managed lane studies. Another action is to work with regional partners to develop pilot programs and pursue funding for piloting roadway pricing mechanisms, such as facility-based pricing (e.g., managed express lanes) and mileage-based fees (e.g., Pay Go Program), in partnership with the State, federal, and local agencies and private sector organizations. SACOG recently applied, in partnership with SCAG and SANDAG, for a Caltrans planning grant to design a pricing pilot.

Table 4 shows CARB staff's summary of SACOG's 2020 SCS local and regional pricing strategy commitments and associated supporting actions and investments.

[27] CARB staff also checked to see to what extent the proposed strategies were tied to the SCS's overall revenue and investment assumptions to see what if any impacts implementation could have on other SCS strategy commitments. See the "Investments Analysis" section for further discussion.

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Table 4. SACOG's 2020 SCS Local and Regional Pricing Strategy Commitments and Supporting Actions

SACOG's SCS Strategies	Estimated GHG Emission Reductions in 2035	SCS Supporting Actions and Investments	CARB Staff's Analysis
Facility-Based Pricing: Congestion Pricing/Managed Express Lanes	-2% (When combined with all listed pricing strategies)	The project list adopted with the 2020 SCS includes express lane projects. SACOG has stated that revenue generated from facility-based pricing should be used to build and maintain a regional network of priced express lanes and, where surplus revenue is available, on strategic transit services (e.g., express buses) or other mobility solutions that can reduce VMT and provide multiple travel options along priced corridors. SACOG has stated that they want to work with Caltrans and other local partners to identify options for governance and administration of revenues from facility-based pricing. In 2020, as the lead applicant, SACOG applied for a Caltrans Sustainable Transportation Planning grant with SCAG and SANDAG. The grant has not been approved.	Actions Identified: Yes, SACOG has made some initial steps to plan and analyze facility based-pricing. CARB staff is concerned that this pricing program will not be implemented within the identified timeframe and that other SCS projects are at risk due to a lack of revenue if these facilities are not in place as anticipated. CARB finds that further action and buy-in from local jurisdictions, stakeholders, and the public is needed to advance implementation. Funding in the RTP/SCS Project List: Yes, for a few of the identified corridors.

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SACOG's SCS Strategies	Estimated GHG Emission Reductions in 2035	SCS Supporting Actions and Investments	CARB Staff's Analysis
(Continued) *Facility-Based Pricing:* Congestion Pricing/Managed Express Lanes	(Continued) -2% (When combined with all listed pricing strategies)	SACOG also collaborated with Caltrans on managed lane studies.	SACOG Program Funding Available: Somewhat. SACOG can provide funding, research and technical assistance, however, more work needs to be done around program development and implementation, specifically around fee collection, and revenue allocation, that should include equity opportunities.
Mileage-Based User Fee: Pay Go Program	-2% (When combined with all listed pricing strategies)	The project list adopted with the 2020 SCS does not include projects identified for mileage-based user fees. SACOG plans to implement pricing strategies by piloting roadway pricing mechanisms through implementing tolling or pricing of specific lanes, providing technical assistance to local jurisdictions (e.g. Civic Lab 2), working with Caltrans and other partners for administration of revenues, and supporting local agencies in implementing local fees and taxes for transportation improvements.	Actions Identified: Yes, SACOG has made some initial steps to plan and analyze implementation of mileage-based user fees. CARB staff is concerned that this pricing program will not be implemented within the identified timeframe, because this strategy requires congressional and state enabling legislation, as well as local action.

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SACOG's SCS Strategies	Estimated GHG Emission Reductions in 2035	SCS Supporting Actions and Investments	CARB Staff's Analysis
(Continued) *Mileage-Based User Fee*: Pay Go Program	(Continued) -2% (When combined with all listed pricing strategies)	SACOG assumed a mileage-based user fee would be implemented region-wide to replace gas taxes. The fees are estimated to generate $959 million. The facility-based and mileage-based fees have been identified as critical for SACOG to provide a sustainable revenue source for funding the region's transportation system. The SCS states that there is still much work to be done on identifying how this program will be implemented and does not provide details on how the fee would be collected.	CARB staff is further concerned that other SCS projects are at risk due to a lack of revenue if these facilities are not in place as anticipated. CARB staff finds that further legislative action and buy in from state and local agencies, stakeholders, and the public is needed to advance implementation. Funding in the RTP/SCS Project List: N/A SACOG Program Funding Available: Somewhat. SACOG can provide funding, research and technical assistance, however, more work needs to be done around program development and implementation, specifically around fee collection, and revenue allocation, and equity considerations.

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CARB staff also found that SACOG analyzed and discussed the effects of roadway pricing on equity. This analysis included discussion of different options to mitigate the potential impacts of facility pricing on lower-income households. It also included analysis to compare the change in household auto operating cost with SCS pricing strategies by community type and income level. SACOG's Board also adopted a policy framework for its pricing strategies, that includes a provision to avoid negative impacts on lower-income and rural households.

While CARB staff's analysis supports a conclusion that SACOG's 2020 SCS would meet the target, if implemented, CARB staff has significant concerns with SACOG's capability to implement the 2020 SCS local and regional pricing strategies and achieve its estimated GHG reduction benefits. CARB staff acknowledges the significant leadership and partnership work needed to realize the 2020 SCS pricing strategies. Given that SACOG's application for a planning grant to pilot pricing was rejected and the planning grant was a primary supporting action necessary to implement this strategy, SACOG needs to identify and implement new supporting actions to advance these strategies along the timeline assumed in the 2020 SCS, and SACOG will need to demonstrate further progress to implement these strategies by its next plan cycle for SACOG to continue receiving the full amount of GHG emission reductions assumed.

Electric Vehicle and New Mobility Strategy Commitments

SACOG has included three strategies related to electric vehicles (EV) and new mobility services, which include EV infrastructure, EV incentives, bike share and micromobility. These strategies seek to accelerate the penetration of EVs and increase micromobility options like bike share and scooter share in the region. These strategies are intended to support SACOG's goal of providing additional clean travel options and induce mode shift away from driving. Altogether, SACOG estimates these strategies will result in a 0.5 percent decrease in per capita GHG emissions.

SCS Planned Outcomes

These strategies translate into assumptions about the availability of EV-supportive infrastructure, bike share and other micromobility fleets that will serve the region between 2016 and 2035, which include:

- Adding 150 new public chargers[28] by 2035 in the region.
- Increasing EV market penetration between 13.3 to 16.8 percent by 2035.

[28] SACOG Off-Model Assumption Calculation, May 1 2020 Table 3.

- Providing the same level of local EV incentives/rebates in 2035.
- Deploying a total of 25,000 to 50,000 electric bikes and electric scooters[29] through sharing applications around the majority of High Frequency Transit Areas. This represents an increase of between 20,500 and 45,500 new electric bikes and scooters (456 to 1,011 percent) by 2035.

Supporting Actions

Per the 2019 Evaluation Guidelines, CARB staff checked for evidence that appropriate funding, other incentives, technical assistance, or other key actions were present to support the assumed availability of EV-supportive infrastructure, bike share and other micromobility fleets in the SCS. In particular, CARB staff looked for alignment against the project list adopted with the 2020 SCS to see whether the actions are planned and funded within the target timeframe. CARB staff also considered whether SACOG identified other region-specific funding or technical assistance programs to support implementation of its EV and new mobility strategies.

CARB staff found that the 2020 SCS EV and new mobility strategy assumptions are supported by region-specific funding and planning program actions, as well as through direct investments in the project list adopted with the 2020 SCS. In particular, the 2020 SCS project list includes EV infrastructure installation projects that are expected to be completed by 2035. In addition, SACOG'S 2020 SCS carries over actions and programs from the 2016 SCS that will support innovative education and TDM programs in the region to pilot, test and scale new mobility options and programs. These include technical assistance for transit and local agencies to pilot these options and implement new employer- and residential-based TDM programs through the region's Civic Lab Innovative Mobility Accelerator Program; leading a collaborative effort to shape a vision of next-generation transit through SACOG's Next Generation Transit Study with strategies to integrate traditional transit services with new mobility options; and potential funding support through the region's Green Means Go Pilot Program.

Table 5 shows CARB staff's summary of SACOG's 2020 SCS EV and new mobility strategy commitments and associated supporting actions and investments.

[29] SACOG Off-Model Assumption Calculation, May 1, 2020 Table 4

Table 5. SACOG's 2020 SCS EV and New Mobility Strategy Commitments and Supporting Actions

SACOG's SCS Strategies	Estimated GHG Emission Reductions in 2035	SCS Supporting Actions and Investments	CARB Staff's Analysis
EV and New Mobility: Electric Vehicle Charging Infrastructure	-0.5% (When combined with all listed EV and New Mobility strategies)	SACOG is planning to support local EV programs by pursuing new funding and planning opportunities to support EV infrastructure, and by implementing the Green Means Go Pilot Program. According to the project list adopted with the 2020 SCS, SACOG is allocating $36.8 million (to support charging infrastructure in the region. The project list includes a partnership with the City of Davis and Valley Clean Energy to install EV charging infrastructure at various locations such as between UC Davis, downtown Davis, and the Davis Amtrak Station. The project list also calls for the installation of 14 EV charging units and related equipment to facilitate the introduction of electric propulsion buses to the Unitrans bus fleet. Both of these projects are anticipated to be completed in the 2020-2025 timeframe. However, other EV charging infrastructure are expected to be complete in the 2036-2040 timeframe. Examples include adding new electric bus charging infrastructure for Sacramento Regional Transit District and for the Placer County Transportation Planning Agency.	Actions Identified: Yes Funding in the RTP/SCS Project List: Yes SACOG Program Funding Available: Some program funds are available, however, CARB staff is concerned that the Green Means Go Pilot Program remains unfunded and that jurisdictions have to be nominated to participate in the program. The Green Means Go Pilot Program needs further development and funding to support implementation.

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SACOG's SCS Strategies	Estimated GHG Emission Reductions in 2035	SCS Supporting Actions and Investments	CARB Staff's Analysis
EV and New Mobility: Electric Vehicle Incentives	-0.5% (When combined with all listed EV and New Mobility strategies)	The project list adopted with the 2020 SCS does not include projects identified for EV incentives. Incentives/rebates for EV purchase are provided in the SACOG region to accelerate and increase market penetration of electric vehicles. For example, El Dorado County Air Quality Management District's (EDCAQMD) Drive Clean! incentive program provides a $1,000 incentive to County residents who purchase EVs within El Dorado County. Another example is SMUD's Charge Free for 2 Years program, which provides a $600 incentive for EV purchasers, based on the approximate value of two years' worth of electricity for an EV. SMUD has contracted with the EV advocacy organization Plug-In America to perform outreach and training for car dealership staff to better advertise and educate prospective car buyers about the costs, benefits, and lifestyle considerations related to purchasing an EV. In addition, the program offers participating dealerships a $300 incentive for each EV they sell.	Actions Identified: Yes Funding in the RTP/SCS Project List: No SACOG Program Funding Available: No, SACOG relies on other programs to provide incentives. CARB staff is concerned that without a dedicated revenue stream these incentive programs may not continue to be available in the timeframe of the plan. CARB staff recommend that SACOG develop a plan to ensure incentives are available to support planned EV outcomes

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SACOG's SCS Strategies	Estimated GHG Emission Reductions in 2035	SCS Supporting Actions and Investments	CARB Staff's Analysis
EV and New Mobility: Bike Share & Micromobility	-0.5% (When combined with all listed EV and New Mobility strategies)	The project list adopted with the 2020 SCS does not include bike share or micromobility projects. SACOG plans to continue to assist transit and local agencies in finding ways to develop, test, and pilot new mobility services such as micro-transit micro-mobility through the SACOG's Civic Lab Innovative Mobility Accelerator Program and TDM Program. SACOG will support piloting innovations in new mobility and transit service as part of its Next Generation Transit Study.	Actions Identified: Yes Funding in the RTP/SCS Project List: No SACOG Program Funding Available: SACOG has some funds available to encourage new mobility but the region is primarily relying on private investment from new mobility companies. CARB staff recommend that SACOG continue to work with and provide incentives to local jurisdictions and bike share and micromobility companies to ensure planned outcomes.

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While CARB staff's analysis supports a conclusion that SACOG's 2020 SCS would meet the target, if implemented, CARB staff has significant concerns with SACOG's capability to implement the 2020 SCS EV and new mobility strategies and achieve its estimated GHG reduction benefits. CARB staff are concerned that the supporting actions for these strategies primarily rely on funding and partnerships outside of SACOG's control. In particular, the 2020 SCS assumes that these strategies will be able to rely on continuing previously available incentives and rebate programs through the region's air district and local utilities, building on the region's demonstrated partnerships with private micromobility providers, as well as continuing to further demonstration projects through the region's Civic Lab Program and Green Means Go Program without long-term dedicated projects or funding in the SCS through 2035. The nature of these programs is dynamic, and not always favorable or within the control of the region. For example, Jump, a major provider of electric bikes and electric scooters in the region, temporarily ceased operations, but has since returned at a smaller scale.[30] SACOG will need to be vigilant about monitoring implementation of these strategies through 2035 and making adjustments as necessary to ensure planned reductions are achieved.

Looking across all four policy analysis categories, CARB staff's analysis found that SACOG's 2020 SCS includes evidence of policy commitments for its strategies, that if implemented would meet the target. However, areas of concern for CARB staff are that many strategies still require identification of funding sources and/or legislative changes to be implemented.

Investments Analysis

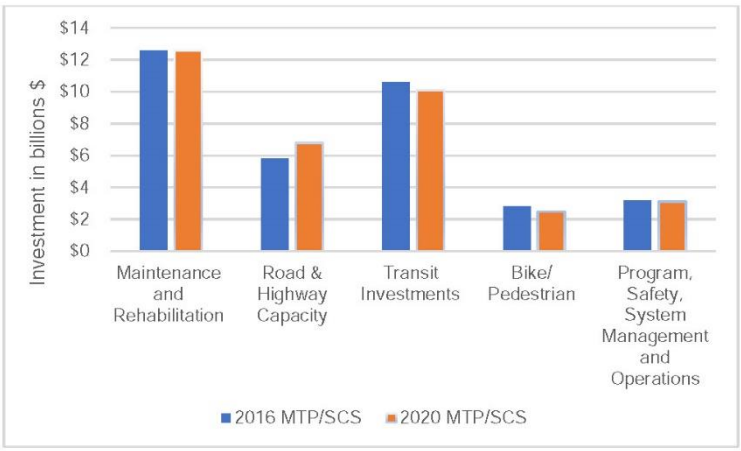
CARB staff evaluated whether the 2020 investments support the expected GHG emission reductions, by looking for evidence within the project list adopted with the 2020 SCS for commitments to funding SCS-consistent projects by 2035. CARB staff also qualitatively assessed the risk of delay to delivering projects that advance SCS goals based on assumed available funding sources.

Based on CARB's review of SACOG's project list, CARB staff found that the 2020 SCS included a number of projects in the project list for funding that would advance implementation of the SCS, as discussed in the "Policy Analysis" section of this report. However, CARB staff also identified significant concerns with whether SACOG's overall

[30] Jump ceased operations in March 2020 due to COVID-19. In May 2020, Uber, which owned Jump, sold the bikes to its competitor Lime. As of September 2020, Jump bikes are back in Sacramento.

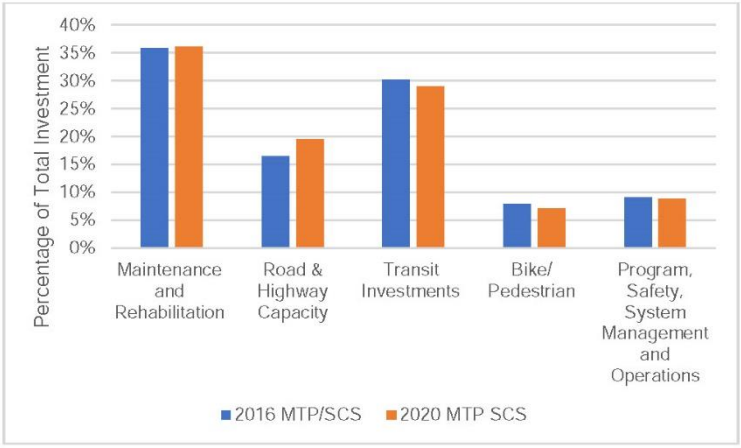
investment plan would sufficiently support implementation of the 2020 SCS strategies to achieve its estimated GHG reduction benefits. Specifically, CARB remains concerned with the latest decrease in funding for transit and active transportation projects. A comparison between the 2016 and 2020 SCS investments by mode are shown in Figures 3 and 4. Total spending decreased from approximately $35.2 billion to $34.9 billion between the 2016 and 2020 SCSs. The largest increase in investment occurred in the category of road and highway capacity, which grew from $5.8 billion to $6.8 billion (17 to 19 percent), while the portion of the plan devoted to transit fell from $10.6 billion to $10.1 billion (30 to 29 percent). The category of active transportation also decreased from $2.8 billion to $2.5 billion (less than 8 to 7 percent). The decline in anticipated investments to transit, bike and pedestrian projects, is not well-aligned with SACOG's assumptions around increased non-SOV mode share, increased transit ridership, and forecasted declines in VMT and GHG emissions. CARB staff is particularly concerned with how the region will be able to implement the SCS's 212 percent increase in transit ridership compared to 2016 levels with a reduced transit investment.

Figure 3. Investments by Mode in SACOG's 2020 SCS Compared to the 2016 SCS (Total Dollars)



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Figure 4. Investments by Mode in SACOG's 2020 SCS Compared to the 2016 SCS (Percent of Total Investment)



Furthermore, CARB staff is concerned with the risk of delivering SCS-supportive projects on the project list by 2035. As shown in Figure 5, almost every modal category has nearly half or more of total investments planned for the last 5 years of the plan (i.e., post 2035), and are not associated with any firm funding sources. The exception to this is the road and highway capacity category, which has 73 percent of total investments programmed by 2030.

Figure 5. SACOG's 2020 SCS Investments by Mode

Category	2020-2025	2026-2030	2031-2035	2036-2040
Bike & Ped	30%	23%	3%	44%
Road & Highway Capacity	27%	46%	11%	17%
Maint & Rehab	24%	15%	1%	60%
Programs & Plans	8%	1%	21%	71%
Transit	9%	6%	2%	82%
System Management, Operations and ITS	16%	16%	2%	65%

The 2020 SCS does include new revenue assumptions from its new roadway user fee strategies ($959 million 2031 to 2035). While these funds are not yet programmed toward specific projects, the SCS states that revenues generated from facility-based pricing should be used to build and maintain a regional network of paid express lanes. Where surplus revenue is available, revenues should be spent on strategic transit services (e.g., express buses) or other mobility solutions that can reduce vehicle miles

traveled and provide multiple travel options along priced corridors. Additionally, the SCS includes the policy that new taxes and fees, including mileage-based fees, intended to raise additional funding for transportation purposes should prioritize closing the gap for system maintenance and state-of-good repair needs before investing in system expansion. While commitment of these potential funds toward SCS-supportive projects is helpful, CARB staff remains concerned that if the SCS pricing strategies are delayed or not implemented, the transit and active transportation projects tied to the 2031-2035 time period will not be delivered in time.

The 2020 SCS also includes revenue assumptions of yet to be adopted local sales tax measures.[31] For example, SACOG assumes voters will renew Measure A, a half-cent general sales tax in Sacramento County. Specifically, SACOG assumes that Measure A will be approved in November 2020 and generate approximately $2.9 billion by 2040 in nominal dollars. SACOG also assumes a proposed half-cent general sales tax in Placer County will be approved by voters in November 2020 and will generate approximately $1.2 billion by 2040 in nominal dollars. This is particularly concerning since both sales tax measures were not placed on the November 2020 ballot and it is unclear how this affects the projects in the project list approved with the 2020 SCS and the expected GHG emissions of the plan.

In addition, SACOG includes revenue assumptions around the Cap and Trade Program and GGRF. Specifically, SACOG assumes the region will capture 35 percent of auction proceeds that are allocated to Affordable Housing & Sustainable Communities, Intercity Rail, and Low Carbon Transit Programs, or approximately $817 million by 2040 in nominal dollars. The region's capture of these revenues assumes SACOG member agencies will receive revenues roughly equivalent to the region's share of statewide population and assumes 5 percent average annual growth. As of May 2020, the SACOG region has captured just 4.8 percent of all GGRF funds implemented. CARB staff is concerned with these assumptions, as these dollars would be applied to support SCS implementation, but are also not firm funding amounts as program dollars are competitive and total amounts available vary by time period. Further, as mentioned above, GGRF revenues are expected to decline over time. CARB staff's concern is further exacerbated when considering further anticipated impacts to available transportation revenues due to the COVID-19 pandemic.

[31] This section includes information from the 2020 MTP/SCS Appendix B – Revenue Forecast.

On the whole, CARB staff finds that the 2020 RTP/SCS project investments do not sufficiently support the implementation of the 2020 SCS strategies and achievement of the SCS's estimated GHG reduction benefits. In particular, reduced transit investment does not support the SCS's strategy of growing transit ridership 212 percent from 2016 levels. CARB staff have also identified considerable risk to delivery of SCS-supportive projects on the project list by 2035, as they are not associated with any firm funding sources.

Plan Adjustment Analysis

The Plan Adjustment Analysis evaluates whether and what measures are being taken, as necessary, to correct course to meet an MPO's target if the region is falling behind on implementation of its SCS strategies. CARB staff reviewed how the implementation of SACOG's SCS has performed to date using observed land use and transportation system data.[32] CARB staff found that SACOG is not on track to achieve SACOG's previous, 2016 SCS planned outcomes for 2020 and 2035. Observed land use and travel data for the region shows declines in transit ridership and significant unrealized new development within infill areas in the region, which are inconsistent with the trends and values assumed in the 2016 SCS to meet the region's GHG reduction targets.

Given this finding, CARB staff looked for evidence that SACOG's 2020 SCS considered these challenges and either changed its SCS strategies, or put additional measures in place to accelerate implementation of its SCS strategies in order to stay on track to meet its GHG reduction target.[33]

CARB staff's review of the 2020 SCS found that the plan maintains phased and coordinated land use development and transit as its key strategies for achieving an even more aggressive 2035 GHG reduction target. SACOG adjusted the 2020 SCS's[34] transit ridership assumptions down 25 percent compared to what was assumed in the 2016 SCS; for land use, it assumed a 26 percent decrease in housing within a ½-mile of transit. In addition, 65 percent of new growth is assumed to occur in infill areas such as center/corridor and established communities, which is even higher than the 58 percent

[32] See "Tracking Implementation" section of Appendix C: MPO Reporting.
[33] See "Incremental Progress" section of Appendix C: MPO Reporting for SACOG's quantitative assessment of how changes to its SCS strategies between the 2016 SCS and 2020 SCS contributed to achievement of its 2035 target.
[34] This section compares performance indicators from its 2020 SCS data table to its 2016 SCS data table.

of new growth in infill areas it assumed in its 2016 SCS. Adjustments to the plan's transit and housing near transit assumptions, while less supportive of GHG emissions reductions, directionally align with declining and stagnant transit service and ridership findings from SACOG's Regional Progress Report[35] (Progress Report), which was prepared in 2017 to inform the policy focus of the 2020 SCS. Increased infill assumptions in the 2020 SCS that support the region's GHG reductions, however, are identified as a challenge area based on housing permit data trends shown in the Progress Report. At the same time, SACOG has added new assumptions and strategies to its 2020 SCS regarding the implementation of new and shared mobility travel options, as well as regional roadway pricing that are anticipated to also support the region's GHG reductions. Taken as a whole, these adjustments suggest that the region is doubling down on land use strategies, reducing reliance on transit uptake, and further diversifying the strategies it plans to use to help meet the region's more aggressive 2035 target.

Specifically, CARB observed the following policy changes and adjustments to SACOG's 2020 SCS compared to its 2016 SCS.

Land Use and Development

- Green Means Go Pilot Program initiative is added to help catalyze the development planned in the region's infill areas.
- Regional Housing Needs Plan with action steps and incentives is added to put member agencies in a better position to accelerate infill and affordable housing production.
- Blueprint update effort is added to allow the region's jurisdictions and stakeholders to revisit and update the region's growth and development vision.

Transportation

- Transit assumptions are adjusted for the 2035 target year. Transit ridership is assumed to decreased from 499,800 to 376,040 average daily boardings (25 percent) between the 2016 SCS and 2020 SCS.

[35] SACOG. Sacramento Area Regional Progress Report. June 2017.

- Bike and pedestrian lane miles are adjusted for the 2035 target year and decrease from 3,508 to 1,565 (55 percent) between the 2016 SCS and 2020 SCS.

Roadway Pricing:

- Two new pricing strategies are added to help address concerns about transportation funding sustainability, while also helping to support VMT reduction.
- Coordination with Caltrans, and other local partners, on managed lane studies is added to help support implementation of the new facility-based pricing strategy.
- Work with regional partners to develop pricing pilot projects is added to support implementation of the new pricing strategies.

Electric Vehicle and New Mobility:

- Assistance for transit and local agencies to develop, test, and pilot new mobility services such as micro-transit, bike share, and micro-mobility through SACOG's Civic Lab Innovative Mobility Accelerator Program is added to support incorporation of new mobility options into the region.
- Next Generation Transit Study development is added to support strategies to integrate traditional transit services with new mobility options.
- New employer- and residential-based transportation demand management program development is added through SACOG's Civic Lab Innovative Mobility Accelerator Program to support further incorporation of new mobility options in the region in a way that supports the SCS goals.
- EV charging strategy is adjusted to assume 150 additional public chargers will be deployed by 2035. SACOG previously included an EV charging strategy in the 2016 SCS, which assumed future deployment of over 120 public charging stations by 2020, and over 200 by 2035. As of 2020, SACOG had over 280 public chargers.

CARB staff finds that the 2020 SCS shows evidence of changes and adjustments made that are intended to help meet the region's more aggressive targets and are based on lessons learned from previous SCS performance.

CARB's Determination

ACCEPT

(WITH CONCERNS REGARDING IMPLEMENTATION)

Based on a review of all available evidence and in consideration of CARB's 2019 Evaluation Guidelines, CARB staff accepts SACOG's determination that its 2020 SCS would meet the target of a 19 percent reduction by 2035, compared to 2005 levels, when fully implemented.

CARB staff commends SACOG and its member jurisdictions for the innovative thinking and leadership shown in adopting new pathways for the region to address smart growth and increase mobility choices in its 2020 SCS. Furthermore, the region's addition of roadway pricing mechanisms in the 2020 SCS, both paid express lanes and mileage-based fees/Pay Go, demonstrate needed leadership on tough-to-implement strategies that can help provide mobility benefits to residents and achieve the region's GHG target. CARB staff's policy evaluation of the 2020 SCS concludes that the plan includes: sufficiently supportive indicator trends; near-term policy support actions; active transportation, transit, and other SCS-supportive project investments; and adjustments in response to observed implementation challenges that when fully implemented, will lead the Sacramento region to achieve its 2035 GHG reduction target.

CARB staff, however, continue to have serious concerns with the 2020 SCS, regarding the absence of a 2020 target determination and whether SACOG and its local members are putting in place the actions necessary to fully implement the region's SCS strategies by 2035. Specific to the 2020 target determination, SACOG did not make a determination as to whether the 2020 SCS meets the 7 percent GHG reduction target by 2020 compared with 2005 levels. Statute requires MPOs to show how they will meet the CARB-set targets for years 2020 and 2035. The overarching intent of SB 375 was to enact the magnitude of change that would lead to actual GHG reductions from passenger vehicles and light trucks in line with the targets set by CARB. Failing to evaluate and determine whether the strategies would meet the 2020 target could hinder this goal by allowing backsliding on GHG reductions achieved or backloading of strategies to meet the 2035 target, both of which threaten the ability of the region to meet the targets. This would be counter to the intent of SB 375 and frustrates California's ability to meet its climate commitments, which depend on local land use and transportation actions to reduce transportation GHG emissions. For these reasons, SACOG and every MPO should submit a determination as to whether or when it will

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meet the 2020 target in every SCS based on latest observed data and SCS strategy implementation progress.

While SACOG's plan forecasts bold changes to the region's future land use and transportation system by 2035, the implementation actions identified concern CARB staff. For example, these actions rely heavily on SACOG and its local members securing new funding sources and State legislative changes in the near-term to pilot and eventually launch some first-of-a-kind regional programs. CARB is concerned that any underperformance in the region's current and planned advocacy efforts to bring new programs and authorities to timely fruition means that the Sacramento region will not meet the targets. SACOG has already missed anticipated milestones for key supporting actions in the 2020 SCS, which raises concerns about the viability of fully implementing its included strategies by 2035. In addition, SACOG anticipates reducing funding for transit and active transportation projects and, the SCS appears to backload those critical projects, while prioritizing projects such as capacity expansion roadway projects that are known to encourage more people to drive.[36]

To support successful implementation of the SCS, and to continue fully supporting the GHG benefits claimed in the 2020 SCS, SACOG and its local members will need to undertake additional actions to deliver and monitor its SCS strategies, as well as quickly adjust its strategies for any lost opportunities that need to be replaced or mitigated. To address these concerns, CARB staff has the following recommendations and requests that SACOG set up regular monitoring of the implementation actions associated with its SCS strategies in consultation with CARB and other relevant agencies.

Recommendations

- Prioritize Funding for Transportation Projects that Advance SCS Implementation and Goals

  SACOG should adjust regional transportation funding award programs, like its Regional and Community Design Programs to target and prioritize certain projects. Specifically, projects with the best demonstrated performance outcomes for implementing the SCS strategies and goals of reducing VMT per capita, accelerating infill, and providing cleaner, multi-modal travel options should be prioritized.

[36] CARB - Research on Effects of Transportation and Land Use-Related Policies

SACOG should prioritize projects that meet the regional GHG reduction targets when seeking funding through the Solutions for Congested Corridors Program (SCCP) and Trade Corridor Enhancement Program (TCEP), under SB 1. SACOG and its member jurisdictions should align project nominations with the region's SCS by ensuring that all project nominations will support growth in the region's location-efficient infill areas, particularly in areas that already include a mix of uses and transportation options that foster lower VMT.

To help maintain the years of regional collaboration that informed SACOG's SCS and both the region and the State's ability to meet respective climate and air quality targets, future local sales tax measures in the region should limit funding roadway capacity expansion projects that are not well-aligned with the region's adopted SCS land use and housing strategy. Local sales tax measures comprise approximately 17 percent of the Sacramento region's projected transportation revenues. These measures list specific projects, locking them in for years or decades. Often, these measures do not fully fund their listed projects, and go on to capture a region's otherwise flexible State and federal funds. Within the SACOG region, some of these measures have been supportive of SB 375 goals, while other projects have not. Considering projects' impacts on VMT is more important than ever. Going forward, investments should focus on transit, active transportation, transportation electrification, and increasing mobility options that discourage solo driving and reduce VMT.

- Monitor Implementation of the Adopted Transportation Project List

  SACOG will need to be vigilant about monitoring the balance of transportation projects through 2035 to ensure planned reductions are achieved. Delays or removals of transit and active transportation projects will prevent SACOG from meeting its GHG emission reduction target. Amendments to the project list should be accompanied by recalculation and discussion of whether and how SCS target achievement is maintained.

- Accelerate Infill to Further SCS Implementation and Goals

  Given that Green Means Go is a key strategy that SACOG is pursuing and anticipates will contribute significantly to helping address previous challenges with implementing its SCS's infill assumptions, it is imperative that the locations and policies within the program's "green zones" align with the planned outcomes assumed in the SCS. Furthermore, SACOG could assist with identifying priority locations for "green zones" that would result in more

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successful implementation. In addition, SACOG and its local jurisdictions may need to also explore other mechanisms to level the cost of infill to make it more financially attractive than greenfield development. Some areas that could be explored are local implementation of SB 743 and development of a regional mitigation bank to support catalytic infill project development in the region, and developing a regional site inventory and feasibility study for infill potential that aligns with the growth assumed in the SCS.

- State and Regional Partnership on Pricing Pilot Options

  SACOG will need to engage in close collaboration with State partners at Caltrans and CalSTA to ensure successful implementation of the pricing mechanisms identified in the 2020 SCS. Given that SACOG's pilot project grant application was not funded this round, SACOG needs to work with both Caltrans and CalSTA on identifying alternative joint actions for advancing pilot work in the next four years. CARB expects SACOG to identify further progress on implementing this strategy in its next SCS in order to continue receiving credit for the full GHG emission reductions assumed in this 2020 SCS.

- Provide All Trend Analysis Metrics

  SACOG's SCS submittal lacks data on transit seat utilization, which is one of the eight trends that CARB analyzes as part of the trend analysis. This information is important as it can be used to demonstrate how transit strategies in the SCS support growth in public transit ridership and GHG reductions. Providing more meaningful performance indicators like this may require SACOG to update its travel demand model and collect additional information. CARB requests that this metric be included in SACOG's next SCS.

- Improve Modeling and Data

  As new data emerge, CARB recommends that SACOG update its model and its components as new data such as travel surveys, transit boarding surveys, and big data become available. Among other updates, CARB recommends that the model incorporate TNCs and autonomous vehicles.

- Analyze Induced Travel Demand

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Induced travel is a phenomenon that is caused by roadway expansion that increases VMT when drivers reroute from congested roads to longer, uncongested roads, shift from alternative modes to driving, or make more frequent trips. Road expansion projects can also lead to long-term induced travel in the region. Long-term effects may also occur if households and businesses move to more distant locations or if development patterns become more dispersed in response to the capacity increase. Induced travel is important to analyze as it can affect VMT and GHG emissions. SACOG has included several road expansion projects in its 2020 SCS. Currently SACOG is using an elasticity-based approach to assess the long-term effect of induced travel. While this approach can estimate the magnitude of VMT change, it cannot identify the geographic areas of induced travel or synergistic effects of induced travel with other strategies, and thus may not be directly helpful to future planning and mitigation actions. CARB staff recommends that SACOG continue to explore methods that analyze the long-term induced travel demands of road expansion more thoroughly in future SCSs, using an integrated land use and travel demand model that captures change in transportation investments or neighborhood changes (residential and employment locations). Further, this will improve the capability to analyze the impact of land use policies such as smart growth strategies, transit-oriented development, and bike/pedestrian-friendly developments on travel demand.

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Appendix A: SACOG's 2020 SCS Strategy Table

This is a summary table based on SACOG's submittal that compares the key land use and transportation strategies between the 2016 and 2020 SCSs. This table also illustrates how GHG emissions were estimated for each strategy.

Strategy Category: 2020 SCS Strategy Name	New/Carryover Strategy from 2016 SCS	Analysis Type	Estimated GHG Emission Reduction in 2035
Land Use & Housing: Shortening Passenger Vehicle Trips: Jobs/Housing Balance, Infill Development, Transit-Oriented Development	Carryover	On-Model	-5%
Transportation: Increasing Non-SOV Mode Share: Transit Supportive Infrastructure & Investment, Bicycle and Pedestrian Infrastructure & Investment, Transportation Demand Management (TDM)	Carryover	On-Model	-6%
Local/ Regional Pricing: Managed Express Lane Pricing & PAYGO	New	On-Model	-2%
Transportation: Intelligent Transportation System & Transportation System Management (ITS & TSM)	Carryover	Off-Model	-0.5%
Electric Vehicles and New Mobility:	Carryover	Off-Model	-0.5%

A-1

Strategy Category: 2020 SCS Strategy Name	New/Carryover Strategy from 2016 SCS	Analysis Type	Estimated GHG Emission Reduction in 2035
Electric Vehicle Charging Infrastructure	Carryover	(Continued)	(Continued)
Electric Vehicle Incentives	Carryover		
Bike Share/Micromobility	New		
Aging Population[37]	Carryover	Exogenous Variable	-2%
Increase in Auto Cost[38]	Carryover	Exogenous Variable	-3%
Total Reduction	NA	NA	**19%**

Note:
NA means not available

[37] SACOG is claiming GHG reductions from there aging population, which is an exogenous variable.
[38] SACOG is claiming GHG reductions from increased auto operating cost, which is an exogenous variable

A-2

Appendix B: Data Table

Modeling Parameters	2005	2016 (base year)	2020 With Project [1]	2035 With Project	2040 With Project	Notes for CARB
Modeled Population	2,139,955	2,376,311	2,482,749	2,903,090	2,996,832	MPO Estimated
Vehicle Operating Costs ($/mile)	$0.22	$0.19	n/a[3]	$0.24	$0.24	In 2017 dollars, Includes federal fuel tax assumed to remain constant for all future scenarios. Fuel, Maintenance and Tires
State Fuel Tax or Mileage Fee Price ($/mile)	$ n/a	$ n/a	n/a	$0.012	$0.012	In 2017 dollars, California State Fuel Tax or Mileage fee per mile range from ($0.012-$0.019) Assumed low range for SCS. Refer to 3d - Auto Operating Costs, Fuel Taxes and Mileage-Based Fees
SACOG Mileage Fee Price ($/mile)	$ n/a	$ n/a	n/a	$0.023	$0.023	2017 dollars, SACOG Mileage fee per mile may range from ($0.007-$0.023) Assumed high range for SCS. Refer to 3d - Auto Operating Costs, Fuel Taxes and Mileage-Based Fees

B-1

Modeling Parameters	2005	2016 (base year)	2020 With Project [1]	2035 With Project	2040 With Project	Notes for CARB
Average Median Household Income ($/year)	$72,270	$61,970	n/a	$61,520	$61,500	In 2017 dollars
Total Number of Households	774,312	881,799	n/a	1,100,474	1,136,599	MPO Estimated
Total Number of Jobs	1,000,887	1,060,751	n/a	1,279,016	1,330,813	MPO Estimated
Total Developed Acres	n/a	686,847	n/a	728,790	733,247	MPO Estimated
Total Housing Units (DU)	n/a	921,123	n/a	1,144,694	1,181,251	MPO Estimated
Total Single-Family Housing Units (DU)	n/a	664,718	n/a	760,552	784,841	Refer Table C-4 in Appendix C, 2020 MTP/SCS
Share of Single-Family Housing Units (%)	n/a	72%	n/a	66%	66%	Refer Table C-4 in Appendix C, 2020 MTP/SCS
Total Multi-Family Housing Units (DU)	n/a	256,405	n/a	384,142	396,410	Refer Table C-4 in Appendix C, 2020 MTP/SCS
Share of Multi-Family Housing Units (%)	n/a	28%	n/a	34%	34%	Refer Table C-4 in Appendix C, 2020 MTP/SCS
Net Residential Density Regional Total	n/a	1.2	n/a	1.5	1.5	dwelling units/acre
Net Residential Density Center and Corridor	n/a	11.0	n/a	13.9	14.0	dwelling units/acre
Net Residential Density Established	n/a	2.4	n/a	2.5	2.5	dwelling units/acre
Net Residential Density Developing	n/a	1.4	n/a	3.0	2.9	dwelling units/acre

B-2

Modeling Parameters	2005	2016 (base year)	2020 With Project [1]	2035 With Project	2040 With Project	Notes for CARB
Net Residential Density Rural Residential	n/a	0.2	n/a	0.2	0.2	dwelling units/acre
Total Housing Units Within ½-Mile of a High-Quality Transit Station	n/a	536,075	n/a	669,175	690,960	High Frequency Transit Areas are those areas of the region within ½-mile of a major transit stop (existing or planned light rail, street car, or train station) or high-quality transit corridor. A high-quality transit corridor is a corridor with fixed route bus service with service intervals no longer than 15 minutes during peak commute hours (Pub. Resources Code, § 21155).
Total Employees Within ½-Mile of a High-Quality Transit Station	n/a	553,756	n/a	641,088	658,323	High Frequency Transit Areas are those areas of the region within ½-mile of a major transit stop (existing or planned light rail, street car, or train station) or high-quality transit corridor.

B-3

Modeling Parameters	2005	2016 (base year)	2020 With Project [1]	2035 With Project	2040 With Project	Notes for CARB
Total Employees Within ½-Mile of a High-Quality Transit Station	n/a	553,756	n/a	641,088	658,323	A high-quality transit corridor is a corridor with fixed route bus service with service intervals no longer than 15 minutes during peak commute hours (Pub. Resources Code, § 21155).
Freeway and General Purpose Lanes - Mixed Flow, auxiliary, etc. (lane miles)	1,401	1,705	n/a	1,648	1,670	General purpose + auxiliary lane miles.
Freeway Express Lanes (lane miles)	0	0	n/a	273	273	Express Lanes during AM peak hour. Includes taking a lane from GP and implementing reversible lanes.
Average Express Lane Price ($/mile)	n/a	n/a	n/a	$ 0.83	$0.68	Based on dynamic demand corridor pricing rollup of average SOV + commercial vehicles across only priced corridors during peak hour periods only, off peak hours is free for all vehicle types. All other freeway and other roadway lanes not along Express Lane are free. 2017 dollars

B-4

Modeling Parameters	2005	2016 (base year)	2020 With Project [1]	2035 With Project	2040 With Project	Notes for CARB
Freeway HOV Lanes (lane miles)	64	124	n/a	159	171	HOV lanes miles during AM peak period lane configuration.
Arterial/Expressway Lanes (lane miles)	2,935	3,392	n/a	4,324	4,477	Expressways, Major, Minor Arterials, and American River Crossings
Rural Roadway Lanes (lane miles)	3,203	3,103	n/a	2,849	2,854	Rural Highways and Rural Arterials
Collector Lanes (lane miles)	2,336	2,425	n/a	2,410	2,414	MPO Estimated
Average Transit Headway (minutes)	n/a	n/a	n/a	n/a	n/a	MPO Estimated
Total Transit Operation Miles	4,916	5,558	n/a	9,308	9,368	Vehicle Service Miles
Transit Total Daily Vehicle Service Hours	3,588	3,994	n/a	8,212	8,223	MPO Estimated
Bike and Pedestrian Lanes (class I, II, & IV) Miles	639	876	n/a	1,565	1,576	MPO Estimated
Household Vehicle Ownership	1.92	1.82	n/a	1.81	1.80	MPO Estimated
Average Trip Length (miles/day) Drive Alone	8.04	7.85	n/a	7.35	7.33	Average trip length for all trips by mode.
Average Trip Length (miles/day) Shared Ride	6.73	6.89	n/a	6.78	6.78	Average trip length for all trips by mode.
Average Trip Length (miles/day) Public Transit	5.39	5.83	n/a	6.24	6.24	Average trip length for all trips by mode.
Average Trip Length (miles/day)Bike & Walk	1.63	2.3	n/a	2.37	2.37	Average trip length for all trips by mode.

B-5

Modeling Parameters	2005	2016 (base year)	2020 With Project [1]	2035 With Project	2040 With Project	Notes for CARB
Average Travel Time by Trip Purpose (minutes) Commute Trip	25	24	n/a	25	25	Half of work tours
Average Travel Time by Trip Purpose (minutes) Non-Commute Trip	17	19	n/a	19	19	Half of non-work tours
Average Trip Travel Time Drive Alone (minutes)	15	14	n/a	14	13	Average trip travel time for all trips by mode.
Average Trip Travel Time Drive Alone (TNC)	n/a	n/a	n/a	n/a	n/a	TNC not a mode in the MTP/SCS
Average Trip Travel Time Shared Ride	12	12	n/a	12	12	Average trip travel time for all trips by mode.
Average Trip Travel Time Shared Ride (pooled TNC)	n/a	n/a	n/a	n/a	n/a	TNC pool not a mode in the MTP/SCS
Average Trip Travel Time Public Transit	40	46	n/a	40	40	Average trip travel time for all trips by mode.
Average Trip Travel Time by Mode (minutes) Bike	21	28	n/a	29	29	Average trip travel time for all trips by mode.
Average Trip Travel Time by Mode (minutes) Walk	23	30	n/a	32	32	Average trip travel time for all trips by mode.
Average Travel Time for Low-Income Populations	14	15	n/a	16	16	Low Income Population defined as households less than 200% the U.S. Poverty Line.
Mode Share (%) Drive Alone	43.7%	42.1%	n/a	41.5%	41.5%	MPO Estimated
Mode Share (%) Drive Alone (TNC)	n/a	n/a	n/a	n/a	n/a	TNC not a mode in the MTP/SCS

B-6

Modeling Parameters	2005	2016 (base year)	2020 With Project [1]	2035 With Project	2040 With Project	Notes for CARB
Mode Share (%) Shared Ride	43.8%	45.1%	n/a	43.3%	43.2%	MPO Estimated
Mode Share (%) Shared Ride (pooled TNC)	n/a	n/a	n/a	n/a	n/a	TNC pool not a mode in the MTP/SCS
Mode Share (%) Public Transit	1.3%	1.2%	n/a	2.4%	2.4%	MPO Estimated
Mode Share (%) Bike	1.9%	2.5%	n/a	2.8%	2.8%	MPO Estimated
Mode Share (%) Walk	7.3%	7.8%	n/a	9.0%	9.0%	MPO Estimated
Mode Share (%) Other	2.0%	1.2%	n/a	1.0%	1.0%	MPO Estimated
Seat Utilization	n/a	n/a	n/a	n/a	n/a	MPO Estimated
Transit Ridership (Average daily boarding's)	138,460	120,500	n/a	376,040	385,901	MPO Estimated
Total VMT per weekday (all vehicle class) (miles)	57,820,351	58,442,986	60,832,404	67,499,956	69,812,811	MPO Estimated
Total VMT per weekday for passenger vehicles (CARB vehicle classes LDA, LDT1, LDT2, and MDV)	51,543,000	51,440,387	53,449,298	59,052,790	61,073,845	2005 from EMFAC 2007, all other scenarios are from EMFAC 2011.
SB 375 vehicle population vehicles (CARB vehicle classes LDA, LDT1, LDT2, and MDV)	1,916,792	1,356,213	1,410,022	1,579,658	1,634,419	2005 from EMFAC 2007, all other scenarios are from EMFAC 2011.
GHG Emissions Per Person Vehicle VMT	0.986	0.948	0.948	0.950	0.951	2005 from EMFAC 2007, all other scenarios are from EMFAC 2011.

B-7

Modeling Parameters	2005	2016 (base year)	2020 With Project [1]	2035 With Project	2040 With Project	Notes for CARB
Total II VMT per weekday for passenger vehicles (miles)	39,714,178	40,775,623	n/a	46,522,031	48,125,117	MPO Estimated
Total IX/XI VMT per weekday for passenger vehicles (miles)	10,746,419	9,584,515	n/a	11,054,439	11,421,881	MPO Estimated
Total XX VMT per weekday for passenger vehicles (miles)	1,082,403	1,080,248	n/a	1,476,320	1,526,846	MPO Estimated
SB 375 VMT per capita	24.09	21.65	21.53	20.34	20.38	2005 from EMFAC 2007, all other scenarios are from EMFAC 2011.
Total CO2 emissions per weekday (all vehicle class) (tons/day)	32,970	31,417	32,924	36,905	29,021	2005 from EMFAC 2007, all other scenarios are from EMFAC 2011.
Total SB375 CO2 emissions per weekday for passenger vehicles (CARB vehicle classes LDA, LDT1, LDT2, and MDV) (tons/day)	25,410	24,373	25,404	28,051	29,045	2005 from EMFAC 2007, all other scenarios are from EMFAC 2011.
Total II CO2 emissions per weekday for passenger vehicles (tons/ days)	19,579	19,320	n/a	22,099	22,887	2005 from EMFAC 2007, all other scenarios are from EMFAC 2011.
Total IX / XI CO2 emissions per weekday for passenger vehicles (tons/day)	5,298	4,541	n/a	5,251	5,432	2005 from EMFAC 2007, all other scenarios are from EMFAC 2011.

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Modeling Parameters	2005	2016 (base year)	2020 With Project [1]	2035 With Project	2040 With Project	Notes for CARB
Total XX CO2 emissions per weekday for passenger vehicles (tons/day)	534	512	n/a	701	726	2005 from EMFAC 2007, all other scenarios are from EMFAC 2011.
SB 375 CO2 per capita (lbs./day) (Through Trips removed with factors 0.979 for 2005/2016/2020 and 0.975 for 2035/2040)	23.25	20.00	20.03	18.84	18.90	2005 from EMFAC 2007, all other scenarios are from EMFAC 2011.
EMFAC Adjustment Factor	n/a	n/a	3.50%	3.7%	n/a	Applied to SB375 CO2 per capita. This is the adjustment factor for EMFAC version 2007 to 2011
Off-Model CO2 Emissions Reductions RTP/SCS Strategy 1: ITS/TSM	n/a	n/a	-0.15%	-0.36%	n/a	2020: Estimates of actual off model adjustment. 2035: Applied midpoint of low-high forecast range.
Off-Model CO2 Emissions Reductions RTP/SCS Strategy 2: TDM + Car Sharing	n/a	n/a	-0.80%	-2.00%	n/a	2020: Estimates of actual off model adjustment. 2035: Applied midpoint of low-high forecast range.
Off-Model CO2 Emissions Reductions RTP/SCS Strategy 3: EV	n/a	n/a	-0.05%	-0.55%	n/a	2020: Estimates of actual off model adjustment. 2035: Applied midpoint of low-high forecast range.

B-9

Modeling Parameters	2005	2016 (base year)	2020 With Project [1]	2035 With Project	2040 With Project	Notes for CARB
Off-Model CO2 Emissions Reductions RTP/SCS Strategy 4: Bike Share	n/a	n/a	-0.10%	-0.42%	n/a	2020: Estimates of actual off model adjustment. 2035: Applied midpoint of low-high forecast range.
Off-Model CO2 Emissions Reductions RTP/SCS Strategy : Average Combined	n/a	n/a	-1.10%	-3.33%	n/a	2020: Estimates of actual off model adjustment. 2035: Applied midpoint of low-high forecast range.
Total RTP Expenditure ($ in billions) [2]	n/a	n/a	n/a	n/a	n/a	n/a
Road & Highway Capacity expansion ($)	n/a	n/a	n/a	n/a	n/a	n/a
Roadway Maintenance & Rehabilitation ($)	n/a	n/a	n/a	n/a	n/a	n/a
Transit Investments ($)	n/a	n/a	n/a	n/a	n/a	n/a
Transit operations ($)	n/a	n/a	n/a	n/a	n/a	n/a
Bike and pedestrian projects ($)	n/a	n/a	n/a	n/a	n/a	n/a
Other (Program, Safety, System Management & Operations) ($)	n/a	n/a	n/a	n/a	n/a	n/a

[1] 2020 forecast based on an interpolation between 2016 and 2027. No land use scenario was prepared for 2020.

[2] SACOG did not provide investment information in the data table provided to CARB. SACOG referred CARB to the 2020 MTP/SCS DEIR Table 2-16 Summary of Proposed Investments in the Plan Area for the Proposed MTP/SCS, and Appendix A Transportation Project List for investment information.

[3] n/a means not available

B-10

Appendix C: MPO Reporting Components

This section will focus on discussing the three reporting components of the 2019 Evaluation Guidelines: tracking implementation, incremental progress, and equity. The three reporting components are included to identify the effectiveness of prior SCS implementation and increase overall transparency of the SCS for the public and other stakeholders. These reporting components will demonstrate the efforts put forward by MPOs and the progress made towards meeting their SB 375 GHG targets.

C-1

Tracking Implementation

The purpose of this section is to report on the progress the SACOG region has made implementing its SCS. Specifically, staff compared observed data for transportation, housing, and land use performance metrics to plan performance to determine whether the region is on track to meet its targets. Performance metrics used in this analysis were chosen based on the availability of observed data and plan performance indicators provided by SACOG and represent a snapshot of where the region is currently. Metric trends that are not heading in the right direction relative to expected plan outcomes are areas that CARB staff look at in the Plan Adjustment analysis, to understand whether the current SCS modifies or adds its strategies or actions to get the region on track with expected plan outcomes.

Regional Average Household Vehicle Ownership

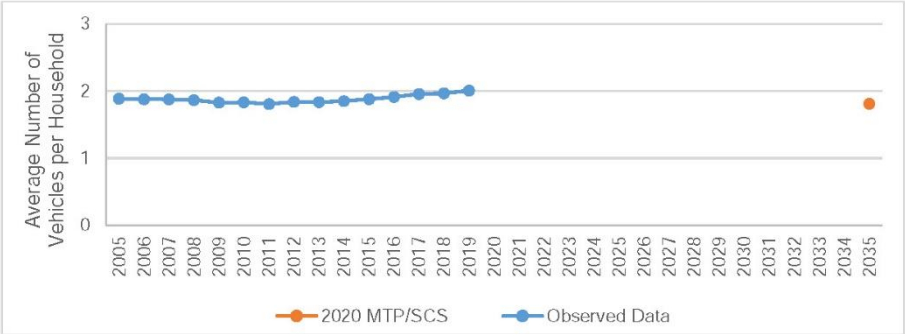
CARB staff analyzed the trend in household vehicle ownership for SACOG from 2005 to 2019. This indicator reports the average number of private vehicles owned by each household in SACOG (i.e., the total number of household vehicles divided by the number of households). Total county-level, privately owned vehicle and household data for 2005 to 2016 were obtained from the American Community Survey (ACS) reports[39] and Department of Finance,[40] respectively.

Figure 6 shows historical SACOG average household vehicle ownership from 2005 to 2019 in comparison to SACOG's 2035 forecasted household vehicle ownership from its travel demand model (See Appendix B: Data Table). While average household vehicle ownership increased by 6.4 percent in SACOG from 2005 to 2019, there was a decline between 2005 and 2012, with a subsequent rebound. The 2035 forecasted SCS household vehicle ownership is 4 percent below 2005 levels and the trend in observed data from 2012 forward is heading in the wrong direction relative to expected plan outcomes.

[39] U.S. Census Bureau, American Community Survey, 2005 – 2019 ACS 1-year Estimates.
[40] Department of Finance, Demographics.

C-2

Figure 6. SACOG Region Average Household Vehicles



Annual Transit Ridership

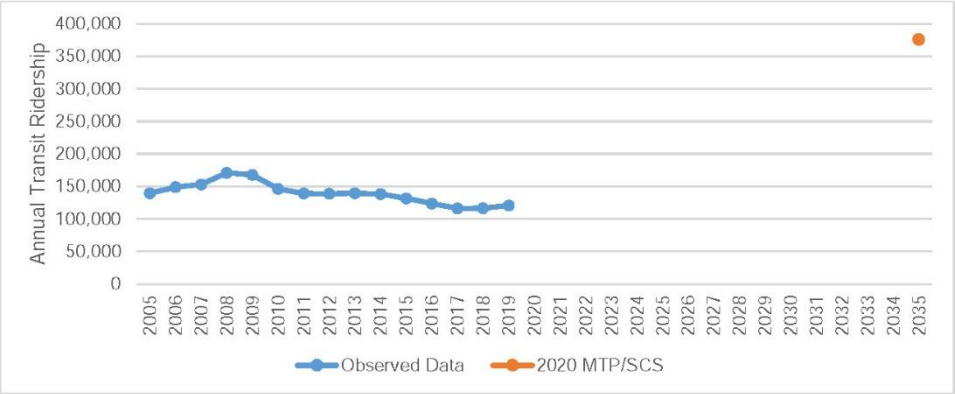
CARB staff used the National Transit Database (NTD)[41] published monthly transit boarding numbers (unlinked trips) reported by local transit agencies to determine the historical monthly and annual boarding numbers in the SACOG region. This dataset cover 2005 to 2017.

Figure 7 shows observed annual transit ridership in SACOG in comparison to 2035 plan performance. The observed data generally increase from 2005 throughout 2008 and then generally decrease through 2019, while SACOG's MTP/SCS forecasted transit ridership is twice that of historical levels. The trend between 2008 and 2019 is heading in the wrong direction relative to the expected plan outcomes.

[41] Federal Transit Agency, National Transit Database.

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Figure 7. SACOG Region Annual Transit Ridership



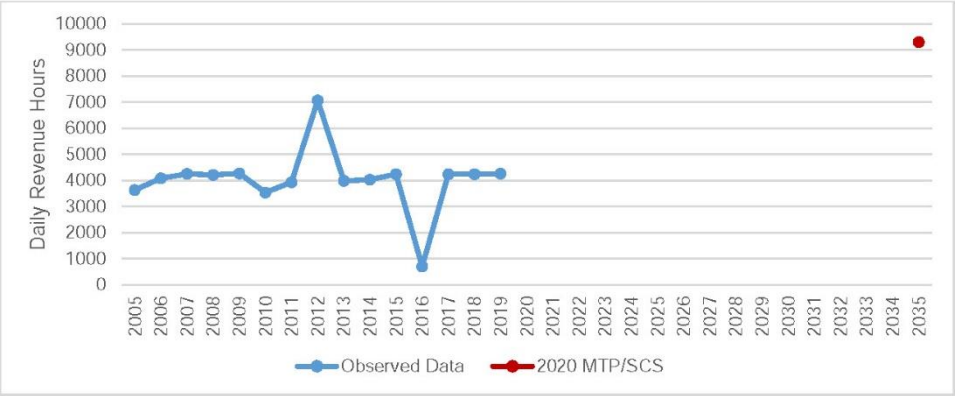
Daily Transit Service Hours

The National Transit Database (NTD) publishes monthly boarding numbers (unlinked trips) reported by local transit agencies. CARB staff calculated the monthly and annual revenue hours in the SACOG region based on this NTD dataset from 2005 to 2019[42]. Total transit revenue hours in SACOG were then adjusted to daily transit revenue hours.

Observed NTD transit revenue hours shows slight increase from 2002 to 2006, and then remained relatively steady through 2019. SACOG's 2020 MTP/SCS forecasts transit revenue hours to more than double from 2019 observed transit revenue hours.

[42] National Transit Database (NTD).

Figure 8. SACOG Region Transit Revenue Hours



Commute Trip Travel Time

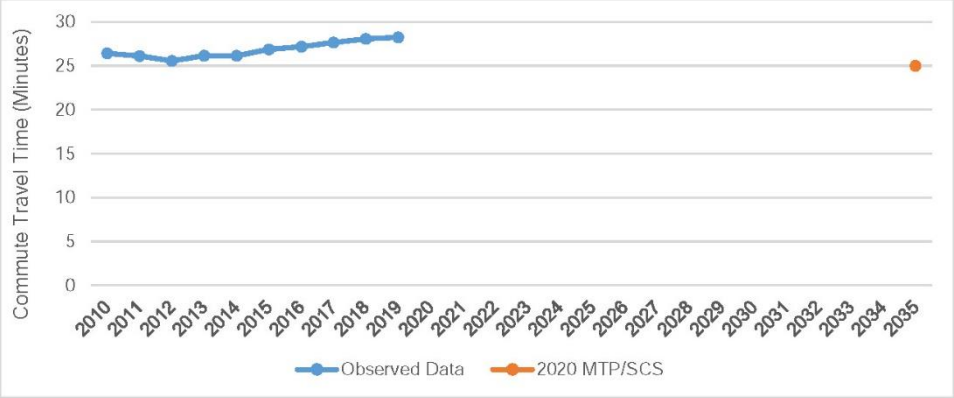
CARB staff analyzed commute trip travel times from 2010 to 2019 using data from the American Community Survey[43] data. A population weighted approach was used to calculate total travel times by county and then aggregated to the SACOG region.

Figure 9 shows historical commute time in comparison to SACOG's 2020 MTP/SCS average commute time. SACOG's 2020 MTP/SCS forecasts a 3-minute reduction in commute time for the region by 2035, while the observed data slightly increase from 2010 to 2019, away from the expected plan outcomes.

[43] U.S. Census Bureau, American Community Survey

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Figure 9. SACOG Commute Time



New Homes Built By Type

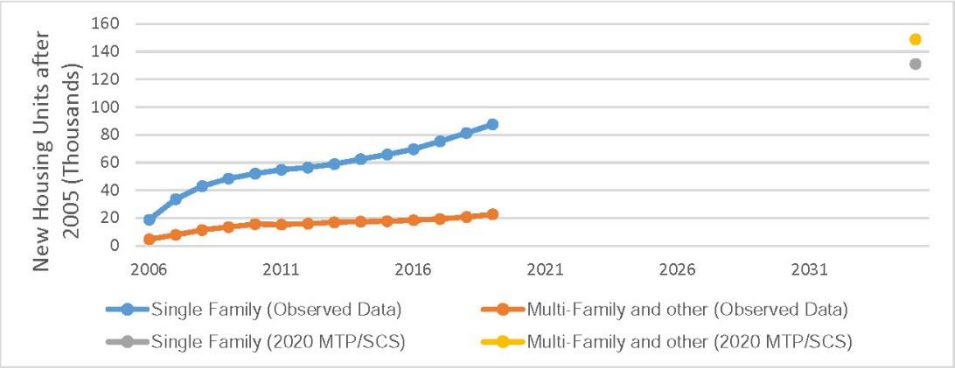
CARB staff analyzed the rate of new homes being built by type in the SACOG region from 2005 to 2016 using the California DOF datasets including E-5 (for years 2011 to 2016) and E-8 (for years 2005 to 2010)[44]:

Figure 10 shows the historical number of new single-family and multi-family housing units in the SACOG region. Since 2005, there have been 808,214 new single-family and 217,011 new multi-family housing units built in the region. During this period, single-family housing has represented a much greater share of the new housing units built and that share has risen rather than declined. In 2019, 87,470 new single-family housing units and 22,630 new multi-family housing units were built. The 2020 SACOG MTP/SCS forecasts 131,241 new single-family housing units and 148,842 multi-family housing units to be built in 2035, with multi-family housing units representing a greater share of housing than single-family housing units. While the total number of observed housing units is increasing consistent with the plan, the share of single-family is heading in the wrong direction relative to the expected plan outcomes.

[44] California Department of Finance, rate of new homes being built by type.

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Figure 10. SACOG Region Housing Units Mix



In summary, CARB staff compared the observed data for regional average household vehicle ownership, annual transit ridership, daily transit service hours, commute trip travel time, and new homes built by type with the projected plan performance indicators provided by SACOG. Based on the analysis none of the observed data heading in the right direction toward the expected plan outcomes. CARB staff concluded that SACOG is not on track to meet its GHG targets.

C-7

Incremental Progress

CARB staff reviewed the incremental progress of SACOG's 2020 SCS compared to its 2016 SCS in place in October 2018, in accordance with Board direction and the 2019 Evaluation Guidelines.[45] As background, during the 2018 target update process, some of the MPOs reported to CARB that, due to external factors, even greater effort would be required to achieve the same level of per capita GHG emissions reduction reported in the current SCSs. According to the MPOs, simply staying on course to achieve the previously demonstrated SB 375 GHG emission reduction targets will be a stretch of current resources, let alone achieving the more aggressive targets adopted by the Board in 2018. For example, in 2018, SACOG determined that the 2016 SCS would achieve approximately 3 to 5 percent less than when it was adopted in 2016 simply due to changes in exogenous assumptions (e.g., auto operating cost and growth forecasts)[46]. In other words, if during the target setting process, SACOG updated its 2016 SCS with exogenous assumptions current at the time, it would only achieve 11 to 13 percent per capita GHG reduction in 2035, well below its target of 16 percent. At that time, SACOG communicated that in order to meet its new target of 18 to 19 percent, it would need to include another 5 to 8 percent GHG reductions in new and/or enhanced SCS strategies (i.e., incremental progress) in its 2020 SCS.

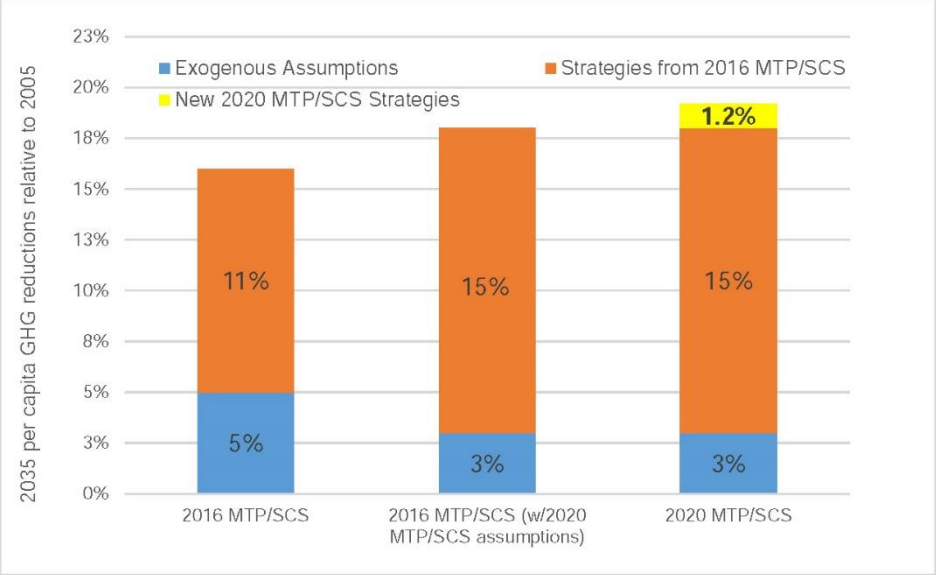
To determine whether SACOG is achieving the level of incremental progress consistent with what it reported during the target setting process, CARB staff compared[47] GHG emissions for both the 2016 SCS to the 2020 SCS under varying assumptions using data and information provided by SACOG.[48] Figure 11 illustrates the incremental progress between SACOG's 2016 and 2020 SCSs when controlling for as many exogenous factors as possible. As you can see, the 2016 SCS achieves a 16 percent GHG reduction from 2005 levels in 2035, with 5 percent coming from exogenous variables and the remaining 11 percent from the plan's land use and transportation strategies along with the related demographic assumptions. When adjusting the 2016 SCS with exogenous assumptions from the 2020 SCS, the 2035 per capita GHG reductions are approximately 18 percent, with 3 percent coming from exogenous variables and 11 percent from the plan's land use and transportation strategies along with the related demographic assumptions. Lastly, under the 2020 SCS, the 2035 per capita GHG reductions are approximately 19 percent, with 3 percent coming from exogenous variables and 16 percent from the

[45] Board Resolution 18-12 (March 22, 2018).
[46] California Air Resources Board. Final Staff Report Proposed Update to the SB 375 Greenhouse Gas Emission Reduction Targets: Appendix B. MPO Scenario and Data Submittals. October 2017.
[47] For a detailed description of CARB's analysis approach, please refer to: California Air Resources Board. *Final Sustainable Communities Strategy Program and Evaluation Guidelines*. November 2019.
[48] For a detailed description of SACOG's approach to demonstrating incremental progress, please refer to SACOG's 2020 SCS Submittal to CARB for Technical Review: 1c. Analysis of Incremental Progress, April 15, 2020.

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plan's land use and transportation strategies along with the related demographic assumptions.

Figure 11. SACOG's Incremental Progress



When adjusting the 2016 SCS with exogenous assumptions from the 2020 SCS, the contribution of exogenous assumptions went from 5 percent down to 3 percent primarily due to lower auto operating cost, while the contribution from land use, transportation and demographic characteristics went from 11 percent to 15 percent. This change in the contribution from land use and transportation strategies is in the opposite direction from what CARB expected given the information SACOG shared during the 2018 target update process. CARB expected the contribution from these strategies to go down instead of up. SACOG staff indicated that this change is due to improvements they made to the sensitivity of its travel demand model, SACSIM19, to various variables such as regional auto and transit accessibility, residential density, proximity to transit, street pattern, and mix of land uses. However, CARB staff found this increased sensitivity (elasticities) to be higher than the existing literature would suggest (e.g., regional accessibility, mix of use and residential density).[49] This

[49] SACSIM 19 is more sensitive (i.e., model elasticities) to land use and transportation factors when compared to SACSIM15 used in SACOG's 2016 SCS. Some of the elasticities are higher than elasticities in the existing literature, which may result in an overestimation of land use and transportation

C-9

oversensitivity may overestimate the contribution of the plans land use and transportation strategies. Finally, when comparing the 2016 SCS adjusted with exogenous assumptions from the 2020 SCS to the 2020 SCS SACOG plan performance of 19 percent, you can see the new plan has achieved an incremental 1.2 percent per capita GHG reductions in 2035.

While incremental progress is not used for CARB's SCS determination, CARB expects MPOs to achieve incremental progress due to its SCS land use and transportation strategy commitments from its second SCS to its third SCS consistent with information shared during the GHG emission reduction target setting process. Information SACOG submitted during the target setting process indicated it would achieve 5 to 8 percent incremental progress as part of the 2020 SCS, however, it only achieved 1.2 percent. As such, SACOG did not include new/enhanced strategies consistent with the information they shared during the 2018 target setting process.

SACOG did not include enough new/enhanced strategy reductions to show incremental progress consistent with the information they shared during the 2018 target setting process.

strategies. For example, elasticities for regional accessibility in SACSIM 19 are -0.38; mix of use -0.31; residential density -0.27; street pattern -0.31. While the literature suggests reasonable elasticities are in the range of -0.05 to -0.25 for region accessibility; -0.01 to -0.17 for mix of use; -0.05 to -0.12 for residential density, and -0.005 to -0.2 for street pattern. For a more detailed description of SACOG's sensitivity test results, please refer to SACOG's 2020 SCS Submittal to CARB for Technical Review: 3b. SACSIM19 Sensitivity Test Report, April 15, 2020.

C-10

Equity

MPOs may report to CARB a summary of how they conducted equity analyses as part of the development of their SCSs in accordance with the *CTC's 2017 Regional Transportation Plan Guidelines for Metropolitan Planning Organizations.*[50] Appendix H of SACOG's 2020 SCS documented SACOG's equity analysis. CARB staff reviewed this appendix and prepared this section to summarize SACOG's 2020 SCS equity work, including identified communities of concern, equity performance measures, equity analysis, and public participation efforts.

Identifying Vulnerable Communities

SACOG's 2020 SCS states that its environmental justice (EJ) and Title VI analysis strives to go beyond its federal and State legal requirements in addressing the actual needs within the MPOs most vulnerable communities and of its residents. While SACOG identified and addressed EJ areas in its previous two SCSs, for the 2020 SCS, SACOG convened an equity working group to review and refine its methodology for defining EJ areas. Through this process, EJ communities were developed for areas within each SACOG county (excluding the Tahoe Basin portions of El Dorado and Placer Counties). Criteria for establishing these EJ areas included[51] race/ethnicity, low income status, and vulnerability criteria, such as the concentration of older adults aged 75 years or older, concentration of linguistically isolated households, concentration of single parent households with children under the age of 18, concentration of low educational attainment with less than a high school diploma or GED for the population aged 25 or more, concentration of severely housing cost burdened households, and concentration of households with at least one person with a disability. In addition, another criterion for identifying EJ areas considered CalEnviroScreen 3.0, a screening tool that evaluates the burden of pollution from multiple sources in communities while accounting for potential vulnerability to the adverse effects of pollution. Based on these criteria, key characteristics of the region's EJ analysis areas included:

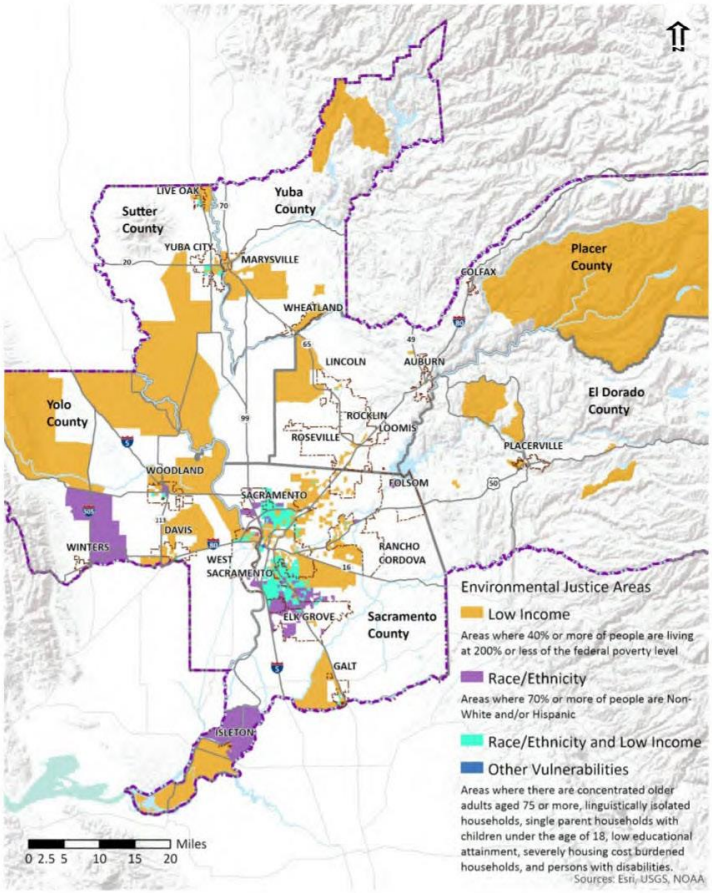
- About 38 percent of the region's population lives in one of the defined EJ communities. See Figure 12 for Environmental Justice Areas within the SACOG Region.
- People in the EJ communities are nearly twice as likely to be classified as low income as people in other areas.
- The number of EJ block groups increased from the 2016 plan.

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[50] California Transportation Commission. 2017 Regional Transportation Plan Guidelines for Metropolitan Planning Organizations. January 2017.
[51] SACOG, Appendix H: 2020 MTP/SCS EJ Analysis, Page 5

- Households in EJ Communities tend to use transit, walk, and bike at significantly higher rates than non-EJ households — more than twice the rate for transit use and a 65 percent greater rate for walking and bicycling region-wide.[52.]

Figure 12. Environmental Justice Areas in the SACOG Region



SACOG, 2020 MTP/SCS, Appendix H Environmental Justice

[52] SACOG, Appendix H: 2020 MTP/SCS EJ Analysis, Page 6

Equity Performance Measures

SACOG's EJ analysis attempted to determine if the SCS has a disproportionate negative impact on the low-income population and/or people of color living in the community or the region and if there are any disparate impacts specifically based on race, color, or national origin. SACOG's EJ analysis examined the effect of the SCS on access by both transit and auto from both EJ and non-EJ communities to key destinations.

Accessibility Performance Measures

SACOG assessed changes in transit and auto access to a variety of destinations over the SCS timeframe, such as job sites, medical services, higher education, and parks, for residents of both EJ and Non-EJ communities. For both transit and auto accessibility performance measures, SACOG used a 30minute travel time to destinations as a benchmark.

The trends of SACOG's performance measures for both the EJ and Non-EJ communities appeared generally to improve. Throughout the duration of the SCS, accessibility by transit or auto to job sites, medical services, higher education sites, and parks seemed to increase.

Health and Environment Performance Measures

SACOG's EJ analysis also looked at human health and environmental effects of EJ and non-EJ communities. One measure SACOG analyzed was the number of people in EJ and non-EJ communities that would live within 500 feet of major roadways. SACOG used this as an indicator of risk of exposure to toxic air contaminants. SACOG also looked at the number of people in EJ and non-EJ communities that get at least 30 minutes of physical activity from active modes of transportation.

SACOG's EJ analysis identified that approximately two percent of the MPO's population lives within the 500-foot Sensitive Receptor[53] buffer, with EJ communities even slightly higher at about three percent.

SACOG's analysis of its active transportation measure showed the SCS resulting in increased use of active transportation modes and more physical activity, especially in EJ communities.

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[53] ARB, 2005 Sensitive Receptors guidance: 500-foot buffer (homes, schools, day care centers, parks, hospitals, etc.) of major roadways, defined as freeways or urban roads with traffic volumes of 100,000 or more vehicles per day or rural roads with 50,000 or more vehicles per day.

Public Outreach and Engagement

SACOG held eight outreach meetings for the SCS. SACOG used the locations and times of the meetings as a significant way to reach out to the community, where workshops were hosted at locations that already convened people and focused on communities of color and lower-income residents. In addition, an online survey was conducted that reduced barriers of having to attend in person to participate.

SACOG also convened an Equity Working Group (EWG) to vet ideas and receive feedback on its EJ Analysis. Additional EWG tasks included analysis on the existing travel behaviors, updating the existing methodology for the required EJ analysis, identifying an accessible public workshop format, and developing inclusive outreach strategies.

In addition, SACOG developed "EJ Fact Sheets" as a resource for local agencies as they consider the infrastructure needs of their communities.[54] The EJ fact sheets were prepared for each city, county, and unincorporated area in the region and contain baseline demographics and transportation trend comparisons between the EJ and Non-EJ communities within the jurisdiction.

[54] SACOG, Appendix H: 2020 MTP/SCS EJ Analysis

Exhibit E

Congestion Pricing Home
About Congestion Pricing
Pricing Initiatives
Project Examples
Resources
Contacts

Home > About Congestion Pricing

Benefits of Congestion Pricing

Congestion pricing benefits drivers and businesses by reducing delays and stress, by increasing the predictability of trip times, and by allowing for more deliveries per hour for businesses. It benefits mass transit by improving transit speeds and the reliability of transit service, by increasing transit ridership, and by lowering costs for transit providers. It benefits State and local governments by improving the quality of transportation services without tax increases or large capital expenditures, by providing additional revenues for funding transportation, by retaining businesses and expanding the tax base, and by shortening incident response times for emergency personnel and thus saving lives. By preventing the loss of vehicle throughput that results from a breakdown of traffic flow, pricing maximizes return on the public's investment in highway facilities. By revealing where and how much motorists are willing to pay for highway use, it provides signals to better identify where to make new investments in transportation. And it benefits society as a whole by reducing fuel consumption and vehicle emissions, by allowing more efficient land use decisions, by reducing housing market distortions, and by expanding opportunities for civic participation.

Benefits to Transit Riders and Carpoolers

Pricing in combination with transit services provides bus riders with travel time savings equivalent to those for drivers and reduces waiting times for express bus riders due to more frequent service.

The 95 Express project in Miami and Ft. Lauderdale, Florida, introduced new Bus Rapid Transit in January, 2010. By November 2011, total ridership had increased by 145 percent. While the addition of new routes had a significant impact upon ridership, so did the dramatic improvement in express lane travel speeds along the corridor utilized by transit (Average speeds in AM Peak increased from 20 mph on the original HOV lanes to 62 mph on the 95 Express Lanes).

Introduction of pricing in central London and Stockholm has resulted in significant shifts of commuters to transit, particularly buses. Bus delays in central London dropped by 50 percent after the pricing scheme was introduced. There was a 7 percent increase in bus riders (Transport for London - *Central London Congestion Charging: Impacts Monitoring Fifth Annual Report* (PDF, 2.4MB)). In Stockholm, 200 new buses were put into service in August 2005, several months in advance of the pricing trial, which began in January 2006. After the pricing scheme was implemented, daily public transportation use compared to the same month in 2005 was up by 40,000 riders daily. Ridership on inner-city bus routes rose 9 percent compared with a year earlier (2Transek - Cost-benefit analysis of the Stockholm Trial (PDF, 547KB)).

Within three months of the opening of the priced express lanes on California's SR-91, a 40 percent jump occurred in the number of vehicles with more than three passengers. Ridership on buses and a nearby rail line have remained steady (Edward Sullivan - SR 91 Value-priced Express Lanes). On San Diego's I-15 HOT lanes, revenues

generated by toll-payers financed transit improvements that contributed to a 25 percent increase in bus ridership (San Diego Association of Governments (SANDAG) - I-15 Fastrak Lanes).

After the HOV lanes were converted into HOT lanes on I-15 in San Diego, carpooling increased significantly, even though there was no change in incentives to carpool - carpoolers continued to use the lanes free of charge, as they did before the lanes were converted. Similar effects were observed (although to a lesser extent) when the HOV lanes on I-25 in Denver were converted to HOT lanes in June 2006. Carpooling increases have not been experienced by all of the HOT lane conversion projects. However, none have observed dramatic declines, which had been projected on some of the early projects, as drivers could now opt to pay a fee instead of creating and maintaining a car pool. It's not clear why observed carpooling increases have occurred - it could be a result of the extra publicity by the media, coupled with assigning a "value" (i.e. toll rate) to the time savings.

Benefits to Drivers

On the State Route 91 priced lanes in Orange County, California, traffic during rush hours moves at over 60 mph, while the traffic in adjacent lanes crawls at average speeds of 15 mph or less. Commuters on the priced express lanes thus save as much as half an hour each way on the 10-mile trip, or as much as an hour a day (Lee County's variable pricing project, Institute of Transportation Engineers. ITE Journal, April 2002 by Burris, Mark W; Swenson, Chris R; Crawford, George L).

If we could use pricing to restore free-flowing traffic conditions on other metropolitan freeways during rush hours, similar results could be achieved. An average commuter using a 5-mile freeway segment twice each day (i.e., once in each direction) would save about half an hour each day, or 120 hours annually - equal to three weeks of work or leisure time!

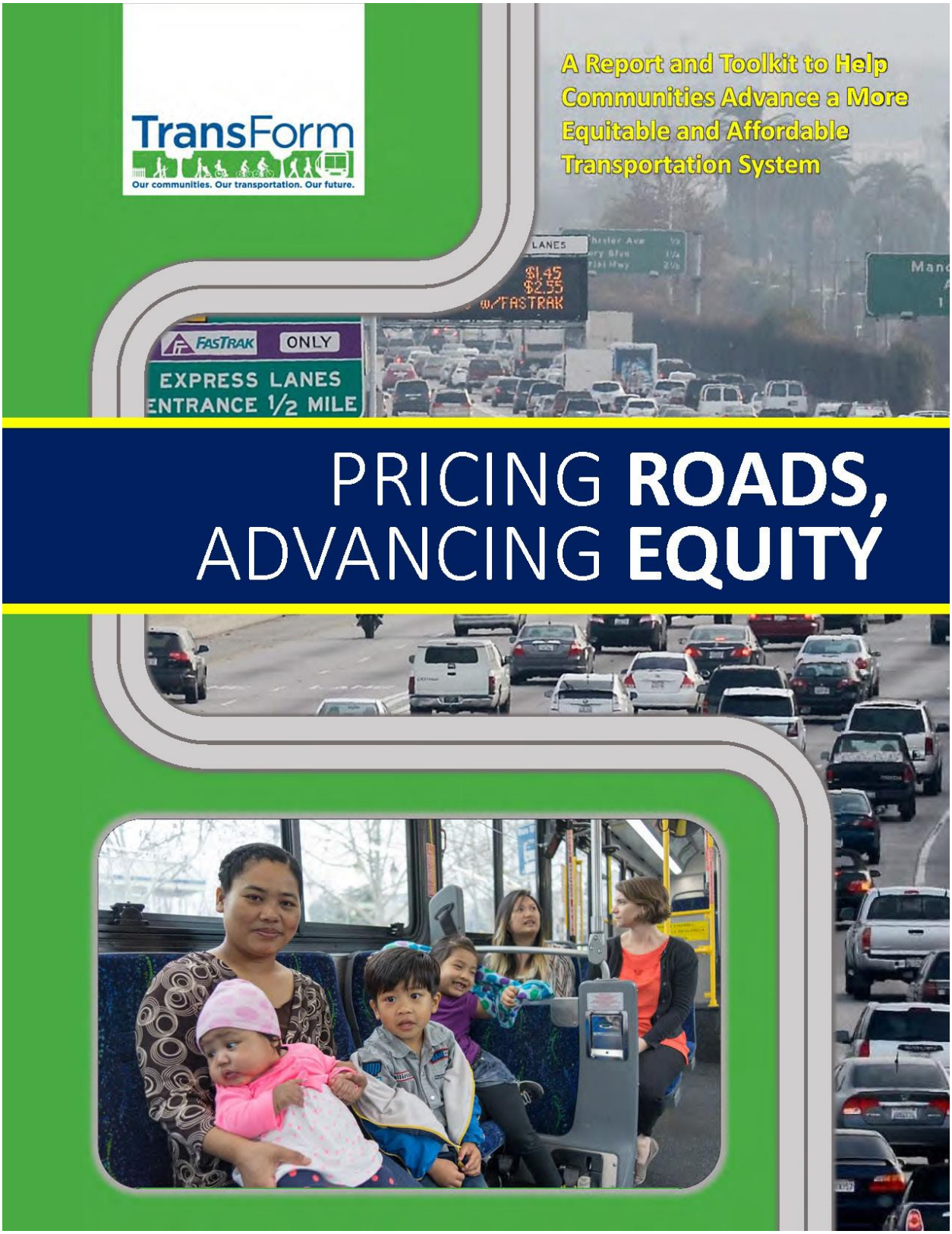
The day-to-day variation in travel times is now understood as a separate component of the public's and business sector's frustration with congestion. An important benefit of pricing is that it guarantees toll-paying vehicles a reliable trip speed and travel time.

Benefits to Businesses

Growing congestion and unreliability threatens truck transportation productivity and ultimately the ability of sellers to deliver products to market. Additionally, when deliveries cannot be relied upon to arrive on time, businesses must keep extra "buffer stock" inventory on hand, which can be expensive. Pricing of the nation's major thoroughfares to guarantee free flow of traffic will ensure that reliability is restored to the transportation system, keeping business and transportation costs low. Lower costs will increase the competitiveness of U.S. businesses in international markets and boost the U.S. economy.

You may need the Adobe Acrobat Reader to view the PDFs on this page.

Exhibit F


TransForm
Our communities. Our transportation. Our future.
A Report and Toolkit to Help Communities Advance a More Equitable and Affordable Transportation System
LANES
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ENTRANCE 1/2 MILE
PRICING ROADS, ADVANCING EQUITY

PRICING **ROADS**, ADVANCING **EQUITY**



TransForm promotes walkable communities with excellent transportation choices to connect people of all incomes to opportunity, keep California affordable, and help solve our climate crisis. With diverse partners we engage communities in planning, run innovative programs, and win policy change at the local, regional, and state levels.

www.transformca.org

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INTRODUCTION

Pricing Roads, Advancing Equity Report and Toolkit

Inequities have long been ingrained in our transportation system. Vulnerable communities—which include low-income households, people of color, and those disadvantaged due to ability, age, or other factors—have long borne the brunt of negative transportation impacts while paying a proportionally larger share of their income to get where they need to go.

Meanwhile, in response to worsening road congestion, inadequate funding for transportation, and the climate crisis, cities and regions across North America have begun implementing road pricing programs, primarily on highways. While equity issues are often analyzed when setting up these programs, the primary focus has been on minimizing negative and disproportionate impacts on vulnerable communities as opposed to maximizing benefits and redressing historic or systemic inequities.

A host of major US cities, including New York and several on the West Coast, are now considering "congestion pricing," as it is commonly called, in or around their downtowns. Many of them will undertake major studies in 2019 where equity will be considered a cornerstone of the program. These cities want a clear focus on social and racial equity, based on concerns that road pricing programs may burden low-income drivers with new costs, potentially deepening existing inequities.

These concerns are both valid and helpful. TransForm believes that if public agencies prioritize equity goals and deep community engagement to guide road pricing studies from the beginning, the ultimate programs can greatly benefit vulnerable communities. Road pricing and smart investment strategies can lead to more frequent and affordable public transit, safer pedestrian and bicycle routes, and improved health outcomes for vulnerable communities. Discounts and exemptions for low-income households can create progressive pricing structures. In short, pricing can deliver a wider range of mobility options that are fast, frequent, and affordable, improving access to economic, recreational, social, and other opportunities.

The goal of this report is to challenge policymakers and equity advocates to act on this key proposition: that structural inequity in our transportation system may be remedied in part by effective, equitable road pricing. The companion toolkit complements the report and is designed to help planners implement equitable road pricing strategies.

Chapter 1 of this report explains the need for road pricing and the forms it can take, as well as the equity concerns involved. It looks especially at HOT (High-Occupancy Toll) Lanes and Cordon or Area Pricing. HOT lanes are free for carpools, while any excess capacity may be used by solo drivers willing to pay a toll, which typically varies based on supply and demand. Cordon

or Area Pricing, is where autos pay a charge to enter and/or circulate within a defined zone. This is often referred to as congestion pricing, but recent nomenclature includes "decongestion pricing" (Vancouver, Canada) and "Go Zones" (California). Cordon or Area Pricing has not yet been implemented anywhere in North America but is of growing interest as a means of decongesting city centers and similarly dense zones. London, Stockholm, and Singapore have used this kind of pricing to achieve positive transportation, public health, and even equity outcomes.

Chapter 2 looks at examples of cities in the U.S. and Canada that have studied road pricing, both as an alternative to road expansion and to manage downtown congestion, and further looks at how equity concerns were incorporated into these studies.

Chapter 3 examines a range of strategies to achieve equitable outcomes, focused on full participation in the planning process as a way to achieve greater affordability, access to opportunity, and community health. There is no shining example, yet, of road pricing done as a way to redress transportation inequities. Still, the report provides examples of strategies that are being implemented in cities in the US and around the world that can form the building blocks of an equitable road pricing program.

Chapter 4 introduces the companion toolkit, which outlines five key steps for implementing a pricing program. Each step includes questions to ask, sample performance measures, and references to additional resources. While the toolkit is primarily intended for policymakers and equity advocates that are actively considering a road pricing strategy, it includes many case studies and tools that are interesting and useful in their own right for a variety of audiences.

Road pricing is increasingly being looked at to help solve the interrelated problems of traffic congestion, climate change, transit sustainability, and economic vitality. The *Pricing Roads, Advancing Equity* report and toolkit offers a roadmap to ensure that vulnerable populations can derive real, tangible benefit from road pricing projects—no matter what the other goals of these projects may be.

CHAPTER 1

How Can Road Pricing Advance Equity?

Transportation has reinforced inequality

America's transportation investments and policies have helped to create—and reinforce—racial and social inequities. Since the 1950s, the emphasis on moving cars quickly, combined with sprawling land use patterns, has imposed real costs on *vulnerable communities*. Those within such communities—which include low-income households, people of color, immigrants, and those disadvantaged due to ability, age, or other factors—are less likely to own cars and are more reliant on walking and public transit. Yet the combination of unsafe walking and bicycling conditions and inadequate public transportation has limited access to opportunities for those who need it most.[1] A recent Harvard study found that such access (measured as commuting time) was the *single strongest factor* shaping whether people can escape poverty.[2]

Transportation investments have not only favored those with the resources to own, operate, or otherwise gain access to a motor vehicle; they have often funded roads that ripped right through vulnerable communities. Many of these investments have left multi-generational scars that include physical division of the community, safety issues due to high-speed traffic, and lower property values. Vulnerable communities have also borne the brunt of air quality impacts, with elevated rates of asthma and other illnesses triggered by air pollution.[3] Racial inequities, in particular, are deep, pervasive, and persistent in the United States, and the transportation sector is no exception.

Lower-income families also spend a much higher percentage of their income on transportation.[4] Transportation spending will likely continue to increase for these families, as low-income renters are increasingly priced out of walkable neighborhoods near public transit. This displacement itself can decrease access to opportunities and increase costs as families rely on private vehicles for more and longer trips.

The right transportation policies and investments, along with real and effective participation of vulnerable communities in decision-making, are critical to overcoming some of the most important barriers that limit too many people from finding and keeping a good job, getting an education, and being healthy.

Regions are searching for new transportation strategies

Planning agencies increasingly acknowledge transportation inequities. Cities and metropolitan regions, however, face a host of other transportation challenges that demand attention and

investment, such as traffic congestion, flat or declining transit ridership, growing maintenance costs, and the need to reduce greenhouse gas emissions.

Traffic congestion often tops the list of public grievances and it is getting worse in almost every region.[5] New roads and wider highways don't solve the problem—they just invite more driving.[6] Even the massive Katy Freeway in Houston has seen congestion levels return to what they were before its expansion to 23 lanes, with afternoon commute times on the 29-mile stretch from Pin Oak to Downtown increasing 55% between 2011 and 2014.[7]

Many investments in public transit over the past few decades have also not fully realized their potential. Most bus and some light rail systems get caught in congestion, leading to higher operating costs. Most U.S. systems are losing ridership—and fare revenue—as passengers opt for faster options.[8] It is worth noting, though, that in places like Seattle that are working to get buses out of traffic, bus ridership is growing.

Building our way out of these transportation challenges is an increasingly dim prospect. Almost every city and region in North America is struggling with higher costs to operate and maintain aging road and transit infrastructure (and maintenance backlogs often play out inequitably, hitting vulnerable communities hardest). It is also increasingly expensive to add highway lanes and new rail lines, especially in areas that are already developed.

More recently, the threat of climate change is motivating action. Transportation is now the country's largest source of climate pollution and continues to be a top source of local air pollution, especially in urban areas and areas adjacent to freeways.[9] In transportation planning, climate considerations are rising on the policy agenda.

To overcome these challenges, planning agencies across North America are desperately searching for tools – and few are as powerful as road pricing.

What is road pricing?

The U.S. already has over 5,000 miles of tolled roadways.[10] While tolling has traditionally been applied to whole roads, bridges, and tunnels, two relatively new forms of pricing, aimed specifically at managing demand, are taking center stage in North America: *HOT lanes* and *cordon and/or area pricing*.

HOT lanes are quickly expanding across the country. These "High-Occupancy Toll" lanes, often called express lanes, are essentially carpool lanes that also allow solo drivers in for a fee, when there is unused capacity. The revenue from express lanes is often used to fund the highway expansion needed to create the lane, although sometimes existing carpool or HOV lanes or road shoulders are converted to create the HOT lane. These lanes can be more efficient overall than carpool lanes since there is a way to make use of unused capacity.

Cordons are a form of pricing that charge a fee every time a vehicle enters or exits a defined area or zone. ***Area pricing*** is similar, except that vehicles are charged for circulating *within* that

zone as well. Cities such as Stockholm, Milan, and Singapore have cordon pricing to enter their downtowns, while London employs area pricing for driving within its central zone.

Types of Road Pricing	
Cordon pricing	Cordon pricing is typically applied to a Central Business District or other similar traffic-congested zone; motorists pay a charge to enter the zone, typically using an electronic transponder in the vehicle or license plate readers at entry points.
Area pricing	Similar to cordon pricing, except vehicles that travel *within* the designated zone also pay a fee.
Congestion point charging	Vehicles pay a charge or toll when crossing select key points.
Distance-based charging	Vehicles are charged based on distance traveled. Sometimes referred to as a VMT (vehicle miles travelled) fee.
Full-facility tolling	All users of the facility pay the toll. A "facility" may be a highway, a bridge, a tunnel, or any other roadway.
Managed lanes	Typically located within freeways, a lane or lanes for which access is restricted to HOVs or those paying a toll. Toll pricing on managed lanes may vary in response to changing congestion conditions, and HOVs may travel free or at discounted tolls.
HOT lanes	"High Occupancy/Toll" lanes are for use by carpools, with excess capacity available to single-occupancy cars that pay a toll. HOT lanes use electronic toll collection and traffic information systems to provide variable, real-time toll pricing. Drivers decide whether or not to use the HOT lanes or the general-purpose lanes based on price levels and travel conditions received via message signs.
Express lanes	Express lanes are toll lanes, available for any car paying a toll which varies with demand. Unlike HOT lanes, Express lanes charge all vehicles (including HOVs) for passage. In some cases, discounts may be given to HOVs. Enforcement is simpler and less costly than HOT lanes because there is no need to enforce vehicle occupancy. (Note that some places like the Bay Area now use the moniker "express lanes" for their HOT lanes, conflating these two definitions).
Flat rate tolls	These are toll rates that do not change, such as $5 to cross a toll bridge regardless of time of day or demand.
Dynamic or variable pricing	Rates vary with demand: when the tolled facility is lightly used, rates are low; as the lane begins to fill, rates rise to ensure that fewer cars enter the facility (usually to maintain free-flow speeds).

London exempts many vehicles from paying the congestion charge, including those belonging to and/or driven by people with disabilities, low-emission vehicles, and for-hire-vehicles such as taxis and ride-hailing services. Rapid growth of the latter, though, has contributed to new congestion and is forcing a reevaluation of the pricing strategy to keep it current and effective.[11]

Both New York and San Francisco have considered cordon pricing as a way to reduce congestion, but neither has yet moved forward, in part due to equity concerns.[12] Vancouver

(Canada), Seattle, Auckland (New Zealand), and Los Angeles are also starting to consider congestion pricing in or around their downtowns and other congested zones.

Pricing strategies are gaining traction

Road pricing can be a powerful tool for helping achieve transportation system goals; it can simultaneously reduce demand during peak times, make more efficient use of infrastructure, and create a new source of funding for more equitable transportation solutions. It can significantly improve the efficiency of a transportation system that is reeling from overuse and severe capacity constraints.[13]

Road pricing is based on a fundamental economic principle: ***when people have to pay the true cost for something, they use it more efficiently.*** The true costs of driving are not just reflected in construction and maintenance costs, or what people pay in taxes; they also include the *external* costs of congestion, pollution, collisions, etc. When road pricing reflects some or all of these costs, some people make changes to at least some of their trips. They may move some to off-peak times, choose different destinations, switch modes (whether occasionally or regularly) or consolidate their trip-making, reducing the pressure on roadways.[14] Those that pay enjoy a faster, more reliable trip. Even a relatively small reduction in the number of vehicles on a congested road can improve a road's throughput, significantly reducing delays for *everyone*.

Yet pricing can generate its own set of issues. ***If implemented without a clear focus on social and racial equity, it can deepen existing inequities in our transportation system and in society at large.*** It can burden low-income commuters with new costs, just when skyrocketing housing costs are forcing some to move out of transit-rich urban centers and rely on private vehicles for more and longer trips. If the revenue raised by road pricing is used primarily to build new roads, pricing could end up inviting yet more driving, increasing emissions and climate pollution, and limiting the potential to support alternatives.

It is important to evaluate the impact and efficacy of road pricing not in a vacuum, but in comparison to viable alternatives or the status quo. For example, sales taxes and parcel taxes—which we often use to fund transportation—are not only *regressive,* but also *inefficient,* since they make it seem like use of the roads is free, and thus induce excess driving.[15] Road pricing charges are paid only by users, rather than the entire public, so they don't impose an unfair burden on non-driver households (which are often low-income people of color).

Equity and sustainability concerns with road pricing

Some equity concerns are common to road pricing strategies. The most potent is that they might be regressive. Another is whether the mechanics of toll payment (such as requiring users to front sums of money or have bank accounts to link to their transponders) limit access for low-income people.

Perhaps the biggest affront for many people is that road pricing can appear to create a two-tier transportation system. For HOT lanes that means those who can afford it are able to drive quickly while those on limited budgets are relegated to sit in traffic congestion (hence the moniker "Lexus Lanes" that has stuck in some areas). While people of all incomes do use the lanes and surveys show that people of all incomes appreciate the choice of using the lanes when needed, it is also true that middle- and upper-income drivers use them more frequently.

For cordon or area pricing, there is often concern that people from vulnerable communities might be unable to afford to make trips they currently make, especially their regular commute. For some people this may lead to detours, shifting modes or their time of travel, or even changing their designation to avoid the new charges. It may also create new costs with regard to both time and increased gas and vehicle use.

London's program has received the most attention in the U.S. London has conducted regular analyses of equity impacts both before and after implementing area pricing. Concerns about the equity of the London program center on whether it is *progressive* overall (due to the focus on expanding and improving public transit links) or *regressive* (as low-income drivers who drive into the central zone pay the congestion charge).[16]

Cordon and area pricing have generally reduced driving by 15-20% and congestion by 30% or more.[17] Several of these programs started as pilots since they were not popular when first proposed. In Stockholm just a third of the public was in favor of the program before the pilot. After the pilot was implemented, support eventually rose to two-thirds as people came to understand the policy and enjoy the benefits.[18]

In some cases, HOT lanes have reduced average vehicle occupancy as some carpoolers opt to drive solo and pay the charge—especially when there is a conversion of HOV-2 (HOV lanes open to cars carrying at least 2 people per vehicle) to HOT-3 (lanes open to cars carrying at least 3 people or to those in other vehicles willing to pay the toll).[19]

These concerns are all valid. Yet it is also possible to design a system that overcomes them. It is possible to harness the efficiency of road pricing to move public transit more quickly, support new mobility choices, and decrease driving and pollution. With targeted discount and exemption programs, it is even possible that people from vulnerable communities who still need to drive can *benefit* from the decrease in congestion and increase in reliability.

CHAPTER 2

More Regions Are Considering Pricing

Most road pricing projects implemented in North America, to the extent they truly considered social equity, have focused on mitigating harm. Out of all the projects reviewed, Los Angeles' HOT lane implementation took equity issues most seriously and this report's companion toolkit features several of Los Angeles' strategies.

Discussed below are six efforts that suggest a new model for using the efficiency of pricing as a tool to advance social and economic equity. While the examples are all in coastal states, some of the good work being done in places like Dallas/Fort Worth (featured in the toolkit) points to the potential for a wide range of geographies and political environments.

One thing is certain, though: ***we will not effectively resolve inequities in our transportation system unless improving equity is a major project goal for road pricing proposals.*** Such concerns need to help drive and lead the agenda, not follow it. This report focuses on two major ways road pricing can advance an equity agenda: as an alternative to highway widening and as a tool for managing congestion in downtowns and similarly dense urban areas.

Pricing as an alternative to highway widening

Portland, Oregon, offers an interesting example of the potential for road pricing to serve as an alternative to highway expansion—and some of the obstacles. When the Oregon Department of Transportation (ODOT) proposed expanding capacity on the I-5, I-205 and 217 freeways, a broad range of groups, spearheaded by the Nature Conservancy with the Oregon Environmental Council (and including business groups, Metro, and the Port of Portland), recommended that ODOT look into congestion pricing as a way to manage demand. This recommendation was incorporated into the state's $5.3 billion transportation funding package which passed in April 2017.[20] In addition to various fees and taxes, it directs the Oregon Transportation Commission to develop a proposal for congestion pricing on I-5 and I-205.[21]

To advise the pilot pricing projects on the two freeways, ODOT formed a 24-member advisory committee including representatives of local governments, business, highway users, and equity, transit, and environmental advocates.[22] The group made a host of recommendations in 2018, aimed at expanding public transportation and other travel choices as well as asking for a more detailed set of equity mitigations for low-income commuters, to be studied in future phases.

In addition, a group of organizations came together as the No More Freeways Coalition to oppose the widenings with a particular focus on a 1.7-mile section in the Rose Quarter. The added capacity would run right past a historically black middle school and cost over $450 million. Groups from the Sierra Club's Oregon Chapter to NAACP Portland Branch signed on.

Many of the coalition members argued that "decongestion pricing" should be tried as a way to manage demand. The group continues to battle this widening.

There is growing support for pricing at the city and regional level. The Portland City Council passed a resolution calling for implementation of congestion pricing and TDM options "as soon as feasible and prior to opening of this (Rose Quarter) project."[23] In a clear indication of how complex transportation-decision making can be, in February 2019, the Metro Council (Portland's regional planning agency) informed ODOT of its plan to move forward with a complementary pricing study—one that would consider a broader range of pricing strategies including cordon pricing and full freeway tolling.[24] Although Metro does not have the legal authority to implement road pricing at this time, several of their planning documents seek to "expand use of pricing strategies to manage travel demand."

As the Oregon studies move forward, they are faced with a paradox: while many of the agencies see pricing as a way to reduce the need for future road widenings, the State's constitution requires that toll funds be spent on roadway projects (though there can be exceptions for rebates to fund transportation allowances).[25] For equity groups, there may be a strong benefit in working to amend the constitution, or at least in ensuring that pricing is part of a larger package of transportation measures that has overall equity benefits.

San Francisco Bay Area. TransForm has led a multi-year campaign in the Bay Area to fight the proposed widening of eight-lane Highway 101 between San Jose and San Francisco, and instead promoted the conversion of an existing general purpose lane in each direction to HOT-3.

TransForm made the case that the financial savings from converting rather than widening, in addition to HOT lane revenues, should be used to expand and improve transit options and to provide incentives for vanpooling and carpooling. TransForm also pushed for an equity strategy to expand successful programs like free transit passes for service workers. The regional transportation planning agency, MTC, performed a study in 2015 that confirmed the effectiveness of this approach: a convert and optimize strategy had strong mobility benefits, but without the negative impacts of widening. [26]

While the Environmental Impact Report (EIR) that began in 2015 included the conversion alternative, the lead agencies couldn't model all of the interrelated elements of TransForm's proposal, such as the transportation demand management and new mobility strategies, only including some new express bus service in the model. Another critical component of the alternative, San Francisco's study of lane conversion all the way to their downtown, was not far enough along in the planning process to include. As a result, the EIR's conversion alternative routed the express buses through highly congested lanes once they neared San Francisco, resulting in too little improvement in mobility and reducing the apparent viability of the alternative. The conversion alternative was thus rejected by planning staff (even though congestion would also increase significantly in the widening alternative that was adopted).[27]

While that particular proposal for conversion rather than widening on 13 miles was rejected, three elements of TransForm's framework for equitable pricing are moving forward:

- Both San Mateo and San Francisco counties will soon initiate equity analyses for the Highway 101 corridor.

- Two of the agencies are analyzing conversion of general purpose lanes along the corridor; SamTrans for the Dumbarton Bridge[28] and the SFCTA for the San Francisco portion of the corridor. MTC is also now analyzing the potential for lane conversion to create a complete regional express network. [29],[30]

- Six transportation agencies have agreed to develop a 101 Mobility Action Plan to optimize the use of the lanes. Equity-driven solutions and the potential for social mobility are key parts of the project mission.

Congestion pricing for downtowns

Congestion pricing for downtowns is not yet practiced in North America, but as big cities get more congested and as climate concerns rise on their policy agendas, it is of growing interest. The authors' review of downtown pricing proposals suggests that these have greater potential to advance equity than HOT lanes—in part because the vast majority of low-income commuters into city centers are not driving their personal vehicles, but would gain mightily from expanded, faster, and more reliable transit. Four current efforts to implement congestion pricing are briefly described below.

New York City has seen several congestion pricing proposals since 2006. In 2014, former Traffic Commissioner Sam Schwartz—looking to overcome opposition to Mayor Bloomberg's pricing plan that drew the ire of the outer boroughs—proposed a "Move NY" plan that focused on both geographic and income equity. The chart on the next page is adapted from Move NY's infographic explaining the proposal; it highlights how the charge could produce real and significant benefits to low-income New Yorkers through support of transit and travel discounts. State-level legislation to implement Move NY was introduced in 2016 but did not pass.

In response to continued overcrowding and delays on subways and buses another plan was developed in 2018.[31] The Fix NYC Advisory Panel Report directly linked congestion pricing to new investments in transit, particularly for the outer boroughs and suburbs—recommending that such investments begin even before the implementation of a cordon charge.

The phased approach included a proposal, adopted by the state legislature, to charge $2.50 for taxis, $2.75 for Uber, Lyft or other for-hire vehicles, and 75 cents for app rides that are shared. This charge was first levied in February, 2019. The final phase of the plan included a new congestion charge for other vehicles entering downtown and was expected to raise between $810 million and $1.1 billion annually, much of which would be invested in the public transit system where it would provide benefits for many of the city's low-income residents.[32]

At the end of 2018, the bipartisan city/state Metropolitan Transportation Sustainability Advisory Group released a report recommending a congestion pricing zone in the Manhattan

commercial district with all proceeds going to the MTA for transit capital and operations.[33] Governor Cuomo, in his 2019 state budget proposal, has called for congestion pricing to be finally adopted for New York City.[34] In February 2019, Mayor de Blasio also came out in support of congestion pricing, greatly increasing its odds of passage.

Move NY's Solution to Get NY Moving Again[35]			
THE PROBLEM	**For far too long transportation needs of New Yorkers have gone unanswered.**		
	Our roads are clogged with traffic and ridden with potholes.	**Our transit** is outdated and buses are overcrowded, service is scarce in parts of the city.	**Our tolls & fares** are skyrocketing with little return on our investment.
THE SOLUTION	**Create a sustainable, dedicated revenue stream for our transportation system.**		
	Adopt A fairer tolling system that reduces tolls where there's less traffic and fewer transit options and adds them where traffic is heaving and transit options are plentiful.	**Empower** communities and their representatives to make local transit investment decisions.	**Safeguard** the revenue through bond covenants to avoid robbing Peter to pay Paul.
INVESTMENTS	**PayGo** Total: $1.465 billion per year	**Bonded** Total: $15 billion	
CITYWIDE BENEFITS	Extend citywide commuter rail discounts for 7 days a week Create new discounted monthly pass for combined commuter rail, subway, and bus rides $2.8 billion per year in increased economic activity Fair Fares (discounted metro cards for low-income New Yorkers)	Faster travel inside & outside the Central Business District New ferry service 30,000+ new, local jobs Improved roads and bridges Toll relief on 7 MTA bridges $1 off all Express Bus fares	
THE NUTS & BOLTS	**Reduce tolls up to 48%** Toll savings on Triboro, Throgs Neck, Gil Hodges, Henry Hudson, Cross-Bay, Whitestone & Verrazano **Equalize entrance into CBD (Central Business District)** Tolls on East River Bridges and across 60th Street same as Brooklyn Battery and Midtown Tunnels **Treat "For-Hire Vehicles" equally** Uniform surcharge within Manhattan taxi zone; CBD toll exemption **Protect small businesses** Tolls capped at one round-trip per day; 2-3 more daily deliveries or service calls possible per business due to less traffic **Adopt variable pricing** Drivers avoid higher tolls by opting to travel during off-peak hours		

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San Francisco completed a study of downtown cordon pricing in 2010, and with congestion rising quickly since then, the San Francisco County Transportation Authority (SFCTA) is again studying the strategy. The 2010 study found that a cordon around the city's northeast quadrant, encompassing the Central Business District (CBD) as well as several congested neighborhoods, would be the most practical. The study found that less than six percent of peak period travelers to the focus area were low-income drivers. SFCTA proposed a 50% discount for those commuters as well as for people with disabilities. The vast majority of low-income travelers would be accessing the area by other modes and would benefit significantly from expanded, faster, more reliable transit, as well as better walking and bicycling infrastructure.

SFCTA is also moving forward with another tolling strategy for Treasure Island, an ex-naval base in the middle of San Francisco Bay. Massive development is proposed for the island, even though the only way to *drive* on and off the island is via the heavily congested Bay Bridge. SFCTA plans to charge all vehicles coming onto Treasure Island beginning in 2021. Details of their equity strategy for the project are described in the next chapter.

Vancouver has been exploring regional congestion pricing through a careful and deliberate process, which has identified two potential road pricing alternatives for further consideration—distance-based charges and congestion point charges, the latter a form of cordon pricing.

Three overarching objectives are guiding their process: reducing traffic congestion, promoting fairness, and supporting transportation investment. Equity considerations are embedded in the principle of promoting fairness and have been a primary part of the planning process from the beginning. Impacts on vulnerable communities are among the core issues being addressed, including estimating the level of revenues that would need to be reinvested in low-income communities so that the pricing element of any plan would not be regressive.

Seattle is exploring the use of pricing to reduce congestion, address climate change goals, and generate new revenues. At the same time, the City of Seattle has embraced equity as central to transportation planning, having established a Transportation Equity Program in 2017. This program "provides safe, environmentally sustainable, accessible, and affordable transportation options that support communities of color, low-income communities, immigrant and refugee communities, people with disabilities, people experiencing homelessness or housing insecurity, LGTBQ people, women and girls, youth, and seniors..."[36]

Funded through the Seattle Transportation Benefits District, the Transportation Equity Program allocates up to $2 million annually to support equity programs, including:

- Subsidized and youth transit passes;
- Partial rebate on vehicle licensing fees;
- Discounted car-share memberships and driving minutes; and
- Ongoing community consultation.

Funding from a road pricing project could be used to help maintain or expand these programs, as well as enhance transit services.

CHAPTER 3

Achieving Equitable Outcomes

Defining equity outcomes

To understand how road pricing strategies can drive an equity agenda, the desired outcomes need to be clearly understood. There are dozens of papers describing different types of equity outcomes in relation to congestion pricing.[37] These include overall ideas of fairness, such as by geography, not just those related to vulnerable communities. ***This report focuses on two dimensions of equity: Process Equity and Outcome Equity.***

For **Process Equity**, the key measure is the full participation of vulnerable communities in planning, implementation, and project follow-up. Process Equity is central to the long-term task of making transportation systems more equitable for all people while addressing *historical inequities* that continue to affect vulnerable communities. For **Outcome Equity**, TransForm identifies three key measures: affordability, access to opportunities, and community health. Step #2 of the Toolkit has more detailed explanations of each measure as well as sample indicators for each.

Type of Equity:	*Key Measures:*
Process Equity	Full Participation
Outcome Equity	Affordability
	Access to Opportunity
	Community Health

This chapter lists sample strategies for each of these four measures. Many of these examples are taken from existing pricing programs, while others could easily be introduced as part of a pricing program.

The solutions for each city and region will vary. Some of the most relevant strategies may have been identified previously in local or regional plans, or in recommendations made by community groups for other projects. In such cases, road pricing may become the means to fund promising strategies that otherwise might not get implemented.

Step 4 of the toolkit suggests specific performance indicators that can measure progress towards each of these four outcomes.

Full participation

There are countless resources available for supporting strong public participation from vulnerable communities. The chart below indicates the kinds of participation efforts that are more or less likely to empower communities.

Increasing Degree of Participation[38] →					
Level	**Minimal**				**Optimal**
Public Participation Goal	Vulnerable Communities are provided information on the project.	Vulnerable Communities provide feedback to the goals.	Solicitation of public concerns and aspirations is ongoing	Agencies closely partner with community groups throughout the project.	Vulnerable communities have a seat at the decision-making table.
Sample Outreach Strategies	• Fact sheets • Websites • Open houses	• Public meetings • Public comment • Focus groups • Surveys	• Workshops • Deliberative polling	• Advisory committees comprised of residents • Consensus building • Participatory decision-making	• Citizen juries • Ballots • Delegated decisions • Formal representation on decision-making groups

The expectations for the level of engagement are somewhat different for different pricing proposals. HOT lanes seem to get the least scrutiny and carry the lowest expectations. This may be because drivers can opt to use the free lanes some or all of the time, and because carpooling, vanpooling, and transit are not charged for entering the lanes.

For cordon or area pricing proposals—like those described above for San Francisco, NYC and Seattle—the bar is typically very high. In part this is because all drivers (unless there are exemptions) would have to pay for something that had been "free." In addition, elected leaders and residents in these cities are increasingly prioritizing social equity, especially as inequality widens. Finally, cordon pricing is still a new and untested concept in the U.S., so there are no domestic examples of its benefits for transit and pollution or direct examples of mitigation measures for its costs.

For cities and agencies engaged in pricing studies, an important consideration is the degree to which they've already developed an effective approach to operationalizing equity in community participation processes. These measures include:

- Having equity experts on staff;

- Developing or adopting general racial and social equity tools;
- Training staff in equity issues and processes; and
- Contracting with members of vulnerable communities as consultants in community participation work.

A major concern with achieving full participation is ensuring that representatives from vulnerable communities are present *from the beginning* on project advisory boards, sharing local knowledge and concerns. Their input is vital at the earliest stages of project visioning to help determine equity needs and community desires and concerns, as well as to identify metrics to help determine project success.

Vancouver: Community engagement around outcomes and indicators. In exploring the use of road pricing in the metro Vancouver region, the Mobility Pricing Independent Commission engaged in extensive community consultation, making a notable effort to reach out to vulnerable communities (see graphic below). Their engagement identified a number of issues related to equity concerns with road pricing, including the need for improved infrastructure for transit and safe bicycling and walking; finding equitable ways to mitigate impacts on seniors, lower income, and/or differently abled people; providing discounted transit fares; and general affordability concerns.[39]

Vancouver's Mobility Pricing Study Public Participation Results[40]

- Conducted **2** rounds of public opinion polling in September 2017 and March 2018 with **2,000** residents across the region
- Launched **2** multilingual public education campaigns on the Commission's work and mobility pricing in the region in **16** local distribution and **11** non-English newspapers and reaching **898,099** residents on Facebook and **65,752** website page-views
- Conducted online public engagement and in-person workshops to inform the principles, hearing from **6,078** residents and **176** stakeholders and government officials in Phase 1 and hearing from **11,474** residents and **130** stakeholders in Phase 2
- Increased accessibility by translating the online platforms into Traditional Chinese, Simplified Chinese, and Punjabi (the region's largest non-dominant languages), receiving **310** completed paper surveys from over **16** regional community offices, and conducting outreach with social service organizations
- Convened a citizen-based User Advisory Panel of **15** members representative of Metro Vancouver (selected through an external recruitment firm) to advise and provide input at key stages of the project

New York City DOT: Street Ambassadors Program. The New York City Department of Transportation created its Street Ambassadors Program to help improve process equity in its planning efforts by stimulating broader public participation in the planning process. Street

Ambassadors are recruited through external temporary employment programs that support the "diversity pipeline" in order to bring in a range of language skills and cultural backgrounds.[41]

The program was designed to be:

- *Equitable*, by intentionally hearing from as many affected people as possible, actively seeking out underrepresented groups, and speaking with them in multiple languages;
- *Flexible*, by meeting people where they were, including at rush hour, in the evenings, and on weekends; and
- *Respectful*, by honoring people's time and not making people go out of their way to participate.

As a measure of the success of the program, in 2016 the program supported 82 street improvement projects with over 32,000 conversations with the public.[42]

TransForm's companion toolkit has a section on full participation that includes indicators to show whether the program is achieving strong participation.

Affordability

At the heart of the affordability question is: Will the proposed pricing project make transportation *more expensive* for some members of vulnerable communities, and by how much*?* **It is just as important, however, to ask if there are ways transportation can be made *more affordable* through such projects.**

How can road pricing make transportation more affordable, when it seemingly adds a new expense? There are several ways.

- Unlike sales taxes, fuel taxes, and many other *regressive* sources of revenue, pricing programs can offer means-based affordability options that reduce costs for low-income drivers. Sample strategies for this are described below under "Subsidies, discounts, caps, and exemptions for drivers."

- Pricing programs can also provide lower cost options or subsidies and discounts for people who are already using alternatives (for example, by distributing free or discounted transit passes). Sample strategies for this are described below under "Affordability for transit riders and other mobility options" and "Bike share discounts."

- Finally, an improved set of alternative choices—funded by pricing revenues or simply by speeding up public transit—may allow people to save money on gas, car maintenance, and parking, and even reduce the need for vehicle ownership for some.

One way to understand impacts on affordability is to look at *overall* household expenditures on transportation. What percent of a household's income goes to all transportation expenses? The Oakland-based Greenlining Institute, in its *Mobility Equity Framework*, recommends a general

target that households in vulnerable communities devote no more than 20% of their income to transportation.[43] This figure will necessarily vary by region/city, but is a good starting point.

Subsidies, discounts, caps, and exemptions for drivers

The most direct way to mitigate the cost of a pricing program on low-income drivers is to consider a range of subsidies, discounts, credits, caps (the maximum amount that someone might need to pay, usually over a certain period of time), and toll exemptions. While these may benefit those drivers, such discounts, caps, and exemptions need to be carefully weighed against other program goals such as moving traffic more efficiently or reducing greenhouse gas emissions. It is essential to define, up-front, the process for identifying and harmonizing these potential conflicts, including programs to transparently monitor, evaluate, and adjust program elements to ensure that all goals are met.

Some planners have proposed comprehensive transportation subsidies, applicable not only for driving fees or tolls, but for transit and other sustainable options as well. Sometimes referred to as a "mobility wallet," these subsidies could address equity without creating an incentive to drive. While the concept may face implementation hurdles it is worth pursuing as a way to achieve both equity and efficiency outcomes.

Usually, a single threshold is set to qualify for discounts, but it doesn't need to be that way. A Seattle focus group in 2014 suggested tolling should be different for drivers under 30% AMI (Annual Median Income) and those earning 30-60% AMI, to maximize benefits.[44] The following are two examples of existing programs and two that are proposed.

Los Angeles: Transponder Credits. L.A. Metro provides a one-time $25 transponder credit and waives the monthly maintenance fee for L.A. county residents who fall below an income threshold (about twice the Federal Poverty Level).[45] Their transit rewards program, the first of its kind, gives transit riders a $5 credit to use the express lanes for every 16 transit trips during peak hours using the I-10 El Monte Busway or I-110 Harbor Transitway.[46]

London: Exemptions. London offers various discounts and exemptions to disabled drivers. Notably, the London congestion charge includes a 'Blue Badge Program' for drivers with disabilities, which offers a 100 percent discount to them and those driving them. Participants may register up to two vehicles in the program.[47] Refunds are also available for certain people traveling to hospital appointments.[48]

In order to make the congestion charge more politically acceptable, the transportation authority offered many different exemptions. For instance, residents within the charging zone received a 90 percent discount, and there were exemptions for alternative fuel vehicles.[49] The number of exemptions has muted the traffic and emissions reduction benefits, especially as ride hailing services grow. As a result, London has been reviewing and restructuring some of these benefits.

New York City: Caps on Tolls. The Move NY cordon pricing program proposed a cap on tolls for small businesses, essentially permitting multiple crossings of the cordon line in any given day

after the first toll is paid. With the expected reduction in traffic delays, it is estimated that the average business could add an additional two to three deliveries or service calls per day.[50]

San Francisco: Treasure Island Transportation Affordability Program. Beginning in 2021, SFCTA will implement a program that has many characteristics of a cordon price. The Treasure Island Mobility Management Program merges the concepts of cordon pricing and road tolling by charging all vehicles that drive onto Treasure Island, a former naval station that is being redeveloped.[51] The program, to be funded in part by the tolls, will provide new residents of Below-Market Rate (BMR) units a discount on a variety of modes through a multimodal Transportation Affordability Program (TAP), which includes transit and car-sharing. Combined with new or improved transit services and lower transit costs, the program is expected to benefit many more residents than a toll credit of any kind. Longtime households and existing BMR residents would also receive one non-tolled daily round-trip (or an equivalent TAP benefit) until July 2026.[52] The program is expected to both reduce costs and improve mobility for low-income residents of the island, while also reducing congestion, air pollution, and time spent driving.

Affordability for transit riders and other mobility options

New York City "Fair Fares." Means-based fare reductions were proposed as part of the Move NY program in 2015. Implementation started in January 2019, even though the full pricing program has yet to be approved. The program offers half-priced MetroCard transit passes for city residents whose incomes are below the Federal Poverty Line, potentially covering up to 800,000 New Yorkers.[53]

Seattle ORCA fares. After passing a Transportation Equity Resolution, Seattle adopted a number of programs to increase transportation access and equity. Seattle built on the already-established King County ORCA Lift program, which offered half-price transit fares for those who qualify based on income, with the ORCA Opportunity program, providing free, unlimited transit for high school students, income-qualified middle school students at Seattle Public Schools, and Seattle Promise Scholars.[54] Finally, Seattle is starting a low-income car-share program to provide income-eligible residents with discounted car share memberships and driving minutes.[55] While currently funded through other sources, many of these equity programs could be funded through a congestion pricing plan. Places like Seattle that already have such programs in place can more readily expand or deepen them with funds from congestion pricing.

Bike share discounts

As bike share increases in reach and popularity, discounted and improved bike share programs can be an important benefit to vulnerable communities that may be funded, at least in part, through congestion pricing revenues. Bikeshare isn't just an alternative mode on its own; it can be an important element of a transit program, offering people a convenient "first mile/last mile" solution for accessing transit from beyond a comfortable walking distance, extending the reach of a station significantly.

Chicago's bike share program, Divvy, provides a $5 annual membership that allows for cash payment for Chicago residents below 300% of the Federal Poverty Line. The cost goes up every year, reaching a $75 annual membership in year four. Members can add money to their account using cash at participating 7-Eleven, CVS, and Family Dollar stores.[56]

In the Bay Area, a similar Bike Share for All discount, combined with a regionally coordinated equity outreach program, helped increase the number of low-income members from 3% to 20% in the span of a year.[57]

The City of Portland, Oregon, offers highly discounted rates on its bike share program. Low-income residents who qualify can purchase a monthly pass under the Biketown-for-All program for just $3/month (with the first month free), compared to the standard fee of $19/month. Low-income residents can further earn credits to reduce their out-of-pocket costs to zero.[58]

Vancouver, British Columbia, has recently launched its "Vancity Community Pass" bike share program for low-income residents, offering a year of bicycle access for just $20. Qualification piggybacks off other low-income passes, including those offered through the transit agency and community centers, as well as third party referrals from partner organizations, and no credit card is required.[59]

Access to opportunity

Transportation affordability is a central issue, but just as critical of an issue is *access*—can people get to the many and diverse places they need or want to go?

Transportation systems should connect people to *opportunities*, including employment sites, retail centers, medical services, recreational destinations, schools and libraries, social services, friends and family, gathering spots, places of worship, and entertainment sites. When access is limited, people may find fewer jobs within reach, their retail options may be more limited and expensive, and they might incur greater expense, both in time and money, to access important destinations.

A transportation system looking to improve equitable outcomes must provide greater access to opportunities for low-income households and members of historically marginalized groups. Equity advocates should be thinking in terms of an overall strategy to address transportation equity in which road pricing plays a role. This can range from the direct benefits of pricing, such as faster bus service, to a better mix of transportation choices funded by the potential revenue from road pricing.

Bus users, for example, are some of the biggest winners from congestion pricing in London and Stockholm. Both cities increased the number of buses in advance of implementing cordon or area charges, increasing accessibility. In central London, bus wait times fell by 30% and delays due to traffic congestion fell by 60%.[60] In New York City, a recent study suggests that congestion charging would provide significant time savings to riders of express buses.[61]

Los Angeles uses revenues from its Metro ExpressLanes to fund a range of improvements, including express transit routes, commuter routes, and walking and bicycling projects, all targeted within three miles of the two existing ExpressLanes.[62] The transit routes improve access for residents of the corridor to reach major employment centers. Los Angeles is also considering the use of revenues from the ExpressLanes to help convert lanes on additional freeways to express operations.

Twin Cities. Minnesota state legislation requires that one-half of "remaining" money generated through tolled express lanes be dedicated to the expansion and improvement of bus transit services in the related corridors.[63]

Pierce County Transit and Lyft. Ride-hailing services like Lyft and Uber have increasingly started to work with transit agencies to help improve access to and from transit, often referred to as "first- and last-mile solutions." These services could help provide connections to residents of suburban and rural areas who would otherwise have the hardest time accessing public transportation.

Washington's Pierce College Puyallup, for example, partnered with Pierce County Transit and Lyft to bridge first-last miles gaps to both bus and light rail stations. In addition, the project will also provide students at Pierce College Puyallup a grant-funded Lyft ride home from some locations near campus in the evening after transit services have ended. This program demonstrates that there is no one-sized fits all solution, and that creativity is needed to serve a wider range of people that would otherwise be largely car-dependent.[64]

Lyft also recently started working directly through community groups to give qualifying members free-rides.[65] This could help in areas not well served by public transit.

Making sure tolled facilities are accessible

Road pricing programs often assume that people will have the ability to use the priced roads or the transit options, discounts etc. Electronic tolling and transit cards make it efficient to use those facilities, but only if one has the resources to participate. Such systems often depend on:

- *Transponders* that automate the toll collection process;
- *Credit cards* that may be tied to transponders or accounts;
- *Languages* required to understand instructions;
- *Bank accounts* that may be tied to transponders or accounts; and
- *Smartphones* that run the apps used for some services (such as shared rides).

Since many low-income households may not have bank accounts or credit cards, be able to afford the initial deposit on a transponder, or be sufficiently fluent in English, they might not be able to take advantage of either the newly tolled facility or many of the alternatives. It is critical to overcome these barriers (the Los Angeles program described in this report is an example).

All of the examples in this chapter raise the question as to *where and how* the decisions about road pricing programs are made. The answer varies by locale; a good guide to the types of decisions and requirements that apply to different governmental agencies and stakeholders may be found in the National Cooperative Highway Research Program's *Assessing the Environmental Justice Effects of Toll Implementation or Rate Changes: Guidebook and Toolbox*.[66]

Community health

Transportation systems too often impose negative health impacts on vulnerable communities. Major roads and freeways are often built in or adjacent to such communities, subjecting them to higher levels of air pollution and the various serious health problems that accompany it. Projects that end up increasing road traffic in vulnerable communities also increase safety hazards for pedestrians and bicyclists. Chronic disinvestment in these communities often means that likely destinations are not within safe walking distance, limiting physical activity and increasing emissions, contributing further to negative health outcomes.

Healthy communities are a clear and major equity goal. Road pricing should reduce overall driving and result in improved air quality when effectively implemented. A clear-cut example of improvements in air quality comes from Sweden, where a Johns Hopkins study found that improvements in air quality in the central zone due to reduced traffic led to a 50% decrease in asthma attacks among young children.[67]

Funding can go to clean air buses as well as improved conditions for walking and bicycling. Even though community health benefits are likely, it is important to analyze the potential (and actual) diversion of traffic so that vulnerable communities do not see an increase in traffic.

Los Angeles: Clean Air Buses. Purchased in part with $1.4 million from the Metro ExpressLanes program, Foothill Transit recently acquired two double-decker electric buses. The buses can hold up to 80 passengers and provide a quieter, less bumpy ride than traditional articulated buses, while reducing GHG emissions by 80-90% compared to diesel buses.[68] L.A. has also invested revenues in bicycle and pedestrian infrastructure along the corridor.

King County, Washington: Prioritizing clean air buses for vulnerable communities. In March 2017, King County Metro released a feasibility plan to achieve a zero-emission fleet. The goals included climate and racial and social equity objectives. The report adopted a methodology for identifying the areas with the greatest vulnerabilities based on air quality, health, and social conditions (such as demographics, linguistic isolation, and rates of high school completion). The analysis revealed where zero-emission bus routes would have the greatest positive impact on equity. The results were meant to both inform near-term decisions and provide an analytic framework that could be used in the future. Since most pricing programs will direct revenues to expanding and potentially cleaning the bus fleet, this methodology provides a strong example of how to maximize equity and health benefits.[69]

CHAPTER 4

Putting It All Together

Equitable pricing can support equitable transportation

This report has outlined many possibilities to work with impacted and vulnerable communities to design systems that make transportation more fast, affordable, and healthy than it is today. So why do road pricing strategies, especially congestion pricing in downtowns, often fail based on concerns about social equity? There are at least three reasons.

First, is the lack of an exemplar for road pricing. That is why our implementation strategies do not highlight just one region, and why the report pulls ideas from places that are implementing pricing as well as some which are considering doing so.

Second, there are usually many layers of decision-making and approvals that are needed to implement pricing strategies, making defeat possible at the local, regional, and state level.

The third is suggested by Professor Michael Manville of UCLA's Department of Urban Planning: that we have a strong human tendency to strictly scrutinize the potential implication of changes.[70] Changes are noticeable and they require an act of commission. The status quo of free roads, with all of their inefficiencies, congestion, and pollution that disproportionately harms vulnerable communities, persist with little or no scrutiny—that's the privilege of the status quo. The failure to act (omission) carries less weight than acts of commission. As a result, people strictly scrutinize harms that arise from changing the status quo, and downplay or overlook harms that arise from the status quo itself.

To counter that, Professor Manville posits a future where all freeways are priced:

> Maybe the best way to think about congestion pricing's fairness is to imagine a world where the roads are already priced—a world where we allocate road space like we already allocate water or electricity or other infrastructure. In this world, drivers would pay for the valuable public land they used; congestion would be far lower and so would pollution; transit would run faster; and governments would use some of the toll revenue to mitigate congestion pricing's burden on low-income drivers.
>
> Now imagine a proposal to make all roads free. Free roads would let the poor and rich drive free, but the rich drive much more than the poor. Congestion would rise, buses would slow, and pollution would increase. The pollution would fall most heavily on the poor, but without tolls, there would be no revenue to redistribute and compensate the people it fell on. Making the roads free would undermine efficiency (the transportation

> system would work less well) and equity (free roads would harm the disadvantaged and reward the more advantaged).
>
> In the real world, this unequal proposal is not a proposal at all. It's the status quo, and its normalcy prevents us from thinking about its fairness. It is appropriate to worry that priced roads might harm the poor while helping the rich. But we should also worry that free roads do the same, and think about which form of unfairness we are best able to mitigate. People who worry about harms to the poor when roads are priced, and not when roads are free, may be worried more about the prices than the poor.[71]

We don't live in that future where equitable road pricing is widespread. But it is not far-fetched. In both London and Stockholm, pricing was not popular when first proposed. Once people experienced the benefits, including transit riders who got expanded service and faster rides, pricing became an accepted—even popular—component of the transportation system.

While road pricing is not a panacea, it can be an important piece of the transportation equity puzzle. If we listen to community voices, engage community expertise, and work collaboratively to develop more affordable, accessible, and healthy transportation options, road pricing can contribute to a more just, sustainable world where everyone has the opportunity to thrive.

Pricing and investment strategies: equity impacts

We can sum up the general impacts on equity of a variety of pricing and investment strategies. The following two charts should be useful as a means of understanding the relative impacts of different alternatives.

PRICING STRATEGY EQUITY MATRIX

PRICING STRATEGY	*EQUITY IMPACTS*
24 hour **Flat-rate pricing**	Likely to be most regressive strategy, charging low-income drivers who often don't commute at peak commute hours. Least efficient at reducing congestion. Used on many tolled facilities.
Dynamic pricing varies with time or congestion	Efficient charging system but may be regressive (though likely less regressive than gas and sales taxes).
Dynamic pricing with some means-based discounts or rebates	Less regressive due to discounts.
Means-based pricing with targeted caps and/or exemptions	System designed specifically not to be regressive. Some loss of efficiency as plentiful discounts, caps and exemptions may limit the congestion and climate benefits.

REVENUE INVESTMENT EQUITY MATRIX	
INVESTMENT STRATEGY	*EQUITY IMPACTS*
Road expansion	Does not add more affordable options.
Mix of road expansion and transit	Some drivers can shift to new, more affordable modes. Transit users also benefit.
Transit, walking, and bike infrastructure with targeted carpool, vanpool, and new mobility options where needed	Allows greater shift to more affordable and sustainable modes.
Transit, walking, and bike infrastructure with an **intensive focus on vulnerable communities**	Significant expansion of commute options and a reduction in user costs (if fares are reduced on transit and other mobility options).

Five steps to equitable outcomes: TransForm's companion toolkit

While this report is the "why," the toolkit that accompanies this report is the "how." It lays out a roadmap of five primary steps to help ensure that road pricing studies improve the equitability of the transportation system.

1. Identify Who, What, and Where
2. Choose Equity Outcome and Performance Indicators
3. Determine Benefits and Burdens
4. Devise Programs to Advance Transportation Equity
5. Provide Accountable Feedback and Evaluation

With several cities and regions considering progressive programs, this is an important time for policymakers and equity advocates engage in road pricing studies to see if we can use road pricing as tool to advance racial and social equity. The toolkit lays out a process for fulfilling this vision.

Notes

[1] Martin Wachs, in his history of transportation planning in Los Angeles, notes that L.A. had for decades planned a relatively balanced set of modal investments, with transit an important component, but the U.S. Federal Interstate Highway Act led to most local and state transportation funds going to freeway building. Martin Wachs, "The Evolution of Transportation Policy in Los Angeles: Images of Past Policy and Future Prospects," in Allen J. Scott and Edward Soja, eds., *The City: Los Angeles and Urban Theory at the End of the Twentieth Century* (Berkeley and Los Angeles: University of California Press, 1996), 106-159.

[2] Mikayla Bouchard, "Transportation Emerges as Crucial to Escaping Poverty," *New York Times* (7 May 2015), p. A3, www.nytimes.com/2015/05/07/upshot/transportation-emerges-as-crucial-to-escaping-poverty.html. Accessed on 2 October 2018. This article is a useful summation of the actual study, which is otherwise quite technical.

[3] American Public Health Association, "Improving Health Through Transportation and Land-Use Policies," policy statement (10 November 2009), www.apha.org/policies-and-advocacy/public-health-policy-statements/policy-database/2014/07/31/08/21/improving-health-through-transportation-and-land-use-policies. Accessed 18 October 2018.

[4] Pew Charitable Trusts, "Household Expenditures and Income," chartbook (March 2016), 7, www.pewtrusts.org/-/media/assets/2016/03/household_expenditures_and_income.pdf.

[5] David Schrank, Bill Eisele, Tim Lomax, and Jim Bak, *2015 Annual Urban Mobility Scorecard* (College Station, TX: Texas A&M Transportation Institute & INRIX, August 2015), static.tti.tamu.edu/tti.tamu.edu/documents/mobility-scorecard-2015.pdf.

[6] Susan Handy, "Increasing Highway Capacity Unlikely to Relieve Traffic Congestion," National Center for Sustainable Transportation Policy Brief (October 2015), http://www.dot.ca.gov/newtech/researchreports/reports/2015/10-12-2015-NCST_Brief_InducedTravel_CS6_v3.pdf

[7] Joe Cortright, "Reducing Congestion: Katy Didn't," CityObservatory (16 December 2015), cityobservatory.org/reducing-congestion-katy-didnt. Accessed 26 September 2018.

[8] Geneviève Boisjoly, Emily Grisé and Ahmed El-Geneidy, "Service Matters: Examining Ridership Trends in 25 North American Cities Over Time," guest blog, *TransitCenter* (29 May 2018), transitcenter.org/2018/05/29/service-matters.

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[11] en.wikipedia.org/wiki/List_of_toll_roads_in_the_United_States.

[11] Mobility Pricing Independent Commission, Metro Vancouver Mobility Pricing Study (Vancouver, BC, May 2018), www.translink.ca/~/media/Documents/plans_and_projects/regional_transportation_strategy/Research/Metro_Vancouver_Road_Pricing_Research_Study_Report.ashx

[12] www.sfcta.org/mobility-access-and-pricing-study-about. Accessed on 2 October 2018. And Bruce Schaller, "New York City's Congestion Pricing Experience and Implications for Road Pricing Acceptance in the United States" *Transport Policy 17* (August 2010), www.nyc.gov/html/dot/downloads/pdf/schaller_paper_2010trb.pdf. It should be noted that New York is indeed moving closer to congestion pricing just in 2019: Winnie Hu, "Your Taxi or Uber Ride in Manhattan Will Soon Cost More," *New York Times* (31 January 2019), www.nytimes.com/2019/01/31/nyregion/uber-taxi-lyft-fee.html. Accessed on 14 February 2019.

[13] John Rennie Short, "Are Traffic-Clogged US Cities Ready for Congestion Pricing?" *The Conversation* (7 February 2018), theconversation.com/are-traffic-clogged-us-cities-ready-for-congestion-pricing-90814. Accessed on 27 August 2018.

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[15] Regressive in their incidence, or how people pay. It is feasible to shape a measure that includes significant funds for local transit and other expenditure that can create an overall benefit for vulnerable communities.

[16] For a more detailed discussion, see David Levinson, "Equity Effects of Road Pricing: A Review," *Transport Reviews* (University of Minnesota: Nexus Research Group, Working Papers 30, 2010).

[17] Booz Allen Hamilton and Seattle Department of Transportation, *Seattle Variable Tolling Study* (May 2009), www.seattle.gov/Documents/Departments/SDOT/About/DocumentLibrary/Reports/FINALTollingStudyreportrevised6.25.10.pdf. An excellent chart comparing the cities may be found on pages 75-80.

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[27] Chris Lepe, "Proposed Express Lanes Won't Fix Traffic on 101....What Will?" TransForm Blog (20 December 2017), www.transformca.org/transform-blog-post/proposed-express-lanes-wont-fix-traffic.

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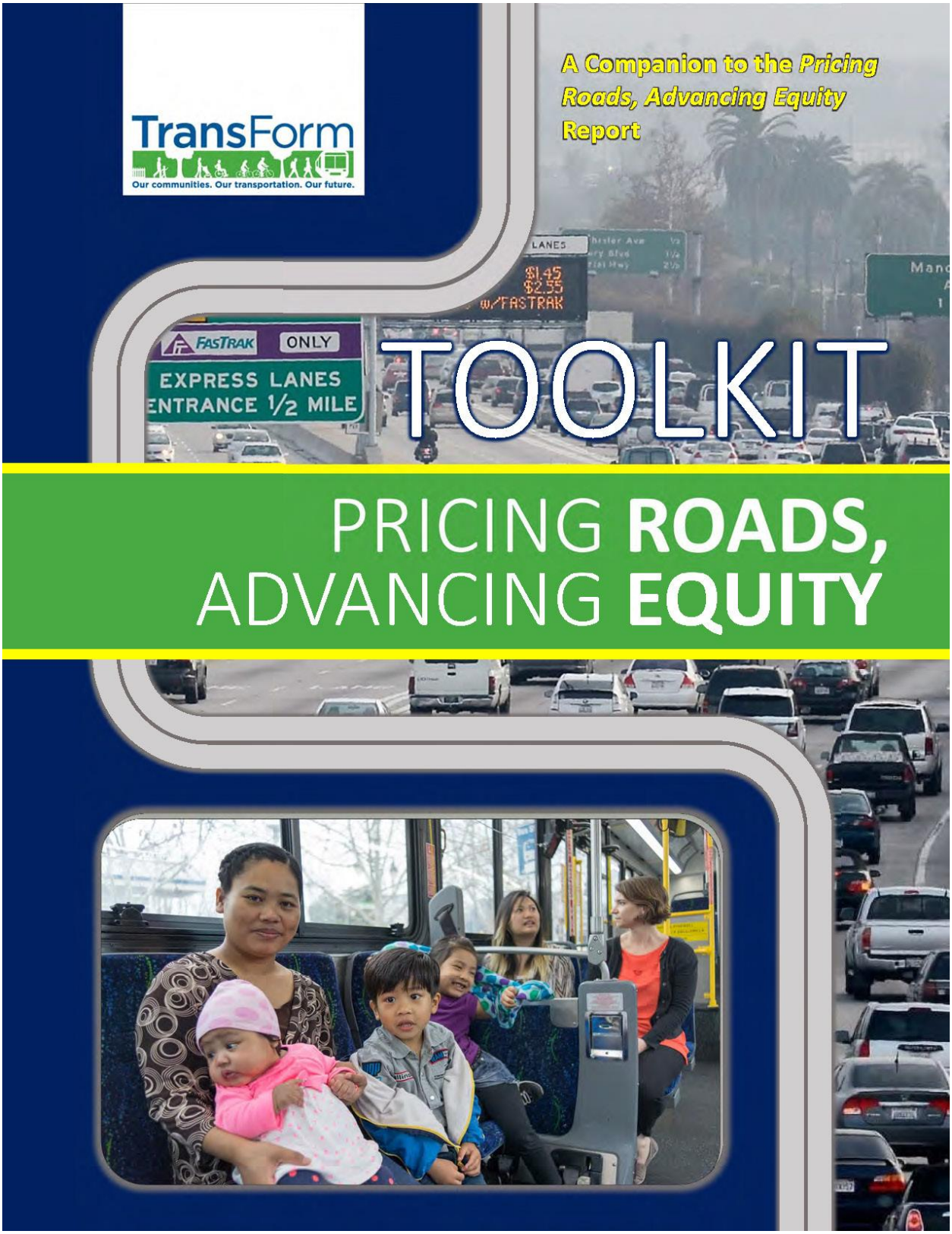
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EQUITY TOOLKIT

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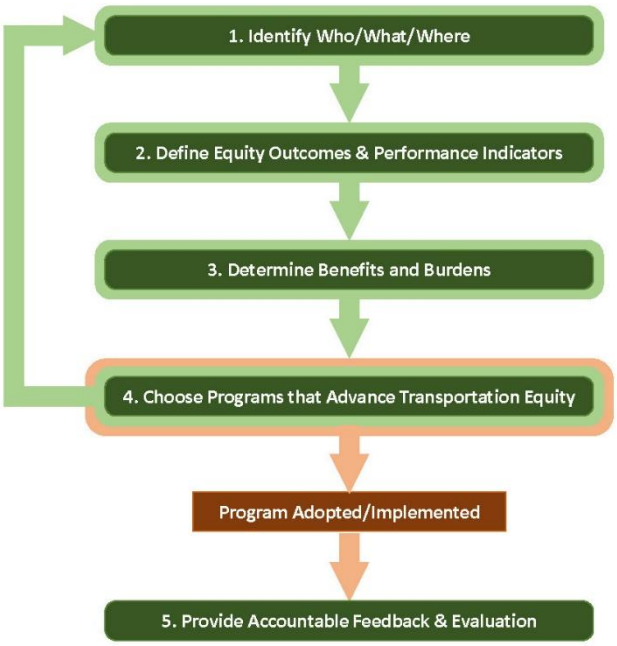
EQUITY TOOLKIT

Introduction

Five Steps Toward Equitable Outcomes

TransForm's report, *Pricing Roads, Advancing Equity,* suggests that road pricing strategies have the potential to produce notable benefits for vulnerable communities by addressing historic inequities (such as slow, infrequent, and unreliable bus transit). For these benefits to happen it is important to develop a clear sense of what a more equitable system might look like and then understand how a road pricing project can help get our communities closer to that system.

This toolkit is designed to help both equity advocates and decision-makers better understand how to effectively engage at key steps in the planning process. The toolkit is built on five *iterative* steps that form a conceptual framework, as shown in the graphic below.



As a pricing and investment strategy advances, it will be necessary to revisit earlier steps. For example, once a comprehensive strategy emerges from Step #4, it will be necessary to test it against the three earlier steps with an eye to further *refining* and *optimizing* the program along key indicators. In some cases, especially with cordon or area pricing proposals, as many as 5-10 iterations may be required to arrive at a solution worth implementing.[1] For HOT lanes and similar projects, fewer iterations are typical.

Strong participation and deep engagement from the most vulnerable communities is critical throughout the process, from inception through implementation and beyond. That's why this toolkit does not have a stand-alone step for "public participation." Indeed, the focus of the toolkit is to support equity advocates and decision-makers in achieving full participation at each step. Equity advocates can help planners reach vulnerable communities by helping develop the Public Involvement Plan component of the study, which is discussed in greater detail in this toolkit's companion report. Equity advocates should ensure that representatives of vulnerable communities are incorporated at every phase of a road pricing project.

An excellent guidebook and toolbox for planners that are leading road pricing studies is the National Cooperative Highway Research Program's (NCHRP), *Assessing the Environmental Justice Effects of Toll Implementation or Rate Changes.* With an intended audience of practitioners such as agency staff and consultants, the document is long and can be quite technical. Yet it has many excellent examples of where a particular tool, analysis, or strategy has been used to help advance equity.[2]

NCHRP's Tool #4, "Preparing, Implementing, and Assessing a Public Involvement Plan," for example, has a useful table with strategies that can address challenges to participation. While many of these strategies may be obvious to community members, they may not be as obvious to planners and other public officials. It can very useful to delineate these strategies in chart form to help create a common template for advocates and project planners to walk through ideas for the Public Involvement Plan.

Since we encourage equity advocates who dive deep into planning to reference the NCHRP guide, it is important to know how TransForm's five steps line up with the steps they propose. The following chart shows TransForm's five steps and how they correspond with steps in the NCHRP guidebook.

TransForm's Five Steps		NCHRP Planning Steps
1. Identify Who, What, and Where	→	1. Frame the Project 2. Identify the Applicable Requirements Governing Decisions 3. Recognize the Relevant Decision-Makers and Stakeholders

2. Define Equity Outcome and Performance Indicators	→	4. Scope Approach to Measure and Address Impacts
3. Determine Benefits and Burdens	→	5. Conduct Impact Analysis and Measurement
4. Choose Programs that Advance Transportation Equity	→	6. Identify and Assess Mitigation Strategies
5. Provide Accountable Feedback and Evaluation	→	7. Document Results for Decision-Makers and the Public 8. Conduct Post-Implementation Monitoring

For road pricing projects, the agencies leading the studies should consult both TransForm's Toolkit and NCHRP's. The "additional resources" box at the end of each of TransForm's five steps can help with that deeper dive.

Format of the Toolkit

For each of the five steps outlined above, the toolkit has five components:

- Purpose
- Discussion
- Case studies or example (where appropriate)
- Questions to ask
- Additional resources

In addition, a worksheet template for recording your answers to the questions may be downloaded from www.transformca.org/pricing-equity-worksheet.

To make it easier to flip through to a specific component, the toolkit has color-coded text boxes, as follows.

CASE STUDIES	Case studies are displayed on a light blue background.
QUESTIONS TO ASK	Questions to consider asking are listed on a light pink background.
ADDITIONAL RESOURCES	Additional resources are described on a light green background.

TOOLKIT | PRICING ROADS, ADVANCING EQUITY **TK-5**

EQUITY TOOLKIT

Step #1

Identify Who, What, and Where

Purpose

The early stages of a pricing equity study are where several key decisions are made, namely:

***Who*?**	The *populations* that need to be considered from an equity perspective.
***What*?**	The type and nature of *pricing* to be considered, along with any viable alternatives.
***Where*?**	The *geographic reach* of the study area, including key destinations accessed by vulnerable populations.

In planning terms, this stage is where the study's *scope* is developed.

Discussion

Who: Populations to be Studied

Any equity study is required to look at the impacts of major transportation projects on vulnerable populations—low-income communities and minorities. Under U.S. federal guidelines, *minority* populations include Black, Hispanic or Latino of any race, Asian American, American Indian and Alaskan Native, Native Hawaiian, and Other Pacific Islanders. It also includes individuals with limited English proficiency of any race. Low-income populations are any whose household incomes are at or below Federal poverty guidelines, though advocates may seek higher poverty thresholds for purposes of a pricing study since Federal thresholds are so low.

From an equity perspective, it is often important to consider other vulnerable populations such as seniors, persons with disabilities, immigrants and refugees, local small businesses, and even services like non-profit meal delivery services.

Federal policies also outline the fundamental principles of Environmental Justice:[3]

- To avoid, minimize, or mitigate disproportionately high and adverse human health and environmental effects, including social and economic effects, on minority populations and low-income populations.
- To ensure the full and fair participation by all potentially affected communities in the transportation decision-making process.
- To prevent the denial of, reduction in, or significant delay in the receipt of benefits by minority and low-income populations.

A key first step is to identify the data sources that can give you the demographic characteristics of the populations in the study area, and to parse this demographic data at different geographic scales. To start with, check if the regional planning agencies, county, or city may already have produced maps and datasets identifying communities of concern and travel patterns. Another first stop will be census data.

These sources all have limitations. They may be supplemented with a survey of key transportation destinations, such as schools, hospitals, and senior centers. In addition, it is critical to tap into local knowledge through interviews with community leaders, focus groups with residents, and possibly surveys to understand community concerns and travel patterns.

One of the key issues is what minimum population size merits an analysis of impacts. It is often typical, for example, for agencies to focus on census block groups (all urbanized regions in the U.S. are divided into these units) in which at least 50% of residents are low-income or minority. In areas that have a large percentage of minority residents, the 50% threshold may not be as useful, so agencies can use a "meaningfully greater" threshold to identify areas that have greater concentrations relative to the surrounding communities or region. In some cases, it might be useful to create an index that assigns points based on several criteria in order to select the zones that score highest on the combined criteria, such as was done in Dallas/Forth Worth.[4]

The population frame of reference can have a notable impact on the predicted outcomes. For example, the standard practice for estimating *regressivity* in road pricing projects looks at the toll's potential impact only on households with workers who would drive on those tolled facilities. One study made this estimation for the Puget Sound region of Washington State and found the toll to be quite regressive. If the study looked at all commuters (e.g. transit riders), not just those who paid the toll, it was less regressive. When the analysis was extended to the whole population, whether or not they commuted, regressivity fell even further.[5]

None of these levels of analysis is right or wrong by itself. Rather, it depends on the question you are trying to answer. If you want to study discount or exemption programs—how much they would cost and how they might be structured—then you need to focus on likely users of the tolled facility or zone. If you are trying to understand whether pricing would be less regressive than other funding mechanisms like sales or property taxes that are distributed across the whole population, then this broader analysis of the toll's cost is the correct reference.

Any community can have environmental justice concerns, even if they don't meet a given threshold. The NCHRP provides guidance that environmental justice determinations are made based on effects, not population size.[6] Page 95 of that guide also has an excellent table outlining the various methods to get data about populations.

QUESTIONS TO ASK:	
1.1	Are all populations adequately addressed in the study? *Should priority be given to certain populations? Why?*
1.2	Does the way groups are defined capture all relevant people?
1.3	Are the criteria used to identify groups fair and accurate? *For example, does the measure of household income adequately capture the target population? In some metro areas households earning up to twice the Federal poverty level may still be economically disadvantaged and in need of more equitable policies.*

CASE STUDY
Los Angeles[7]

In framing the objectives of its study of the impact of freeway HOT lanes on low-income populations, Metro (the L.A. transportation agency) chose as its primary focus "group equity"—ensuring that low-income commuters as a group are not being disadvantaged by the toll lanes by mitigating any excessive burdens. Additionally, Metro noted its concern for "market equity"—ensuring that shares of benefit are in proportion to the charges paid *because the financial burden of tolls should not exceed the value of travel time savings.*

Metro first described how "low-income" was defined. Then, using four distinct methods to understand the potential range of outcomes, they estimated the likely demand for the ExpressLane corridors by low-income commuters.

The authorizing legislation (SB 1422) explicitly mandated that eligibility requirements for "low-income" toll credits be set at a level no lower than five other referenced state and local programs serving the needs of low-income populations. In response to this requirement, Metro compared existing eligibility thresholds set by these programs and benchmarked other Los Angeles County programs, planned or in use, such as the Metro Rider Relief Program for low-income transit users.

Following this review, Metro set a threshold of $35,000 (in 2009 dollars) based on an annual income for a household of three persons, which was double the federal poverty level.

What: The Proposal and Viable Alternatives

Like with many transportation studies, road pricing studies may begin with a specific "favored" proposal, such as building a toll lane or converting an HOV lane to HOT. The projected *impacts* of this proposal are then compared with the projected impacts of one or more alternatives, as well as a scenario in which no action is taken.

Some highway widening studies may put road expansion into each of the alternatives (except the "no action" scenario). Like with the Portland and Bay Area examples in Chapter 2 of this toolkit's companion report, a road pricing alternative can be used as a way to question the assumption that widening is required, and whether a "no widening" alternative can better meet *both* transportation and equity goals.

In other cases, a large number of mechanisms could be considered from the beginning. This is especially true when congestion pricing is being considered for downtowns and the areas surrounding them. The following table, derived from one created for Seattle's current congestion pricing study, is a useful summation of a number of pricing tools that may be considered.

Pricing Tools Summary

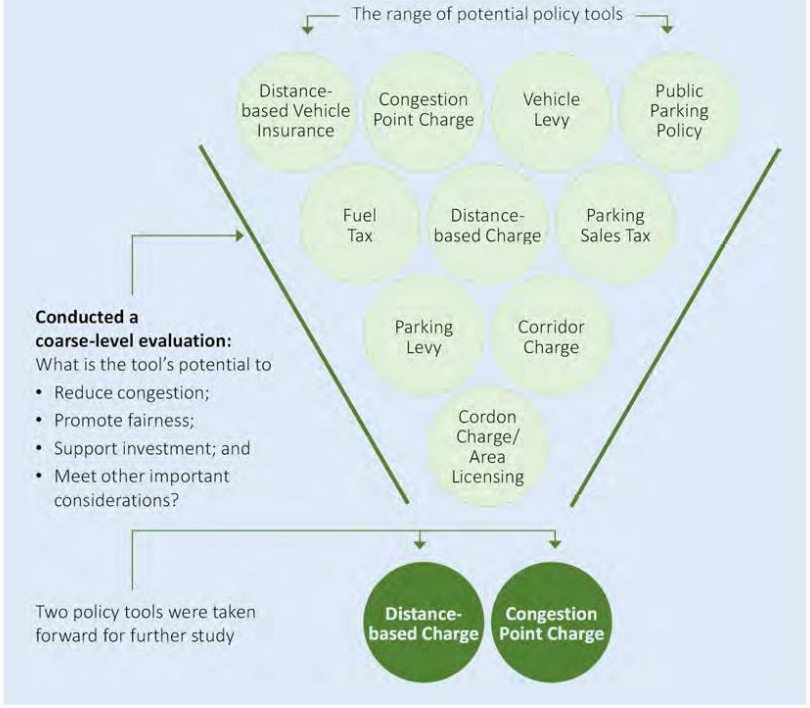
PRICING TOOL:	DESCRIPTION:
Cordon Pricing	Charge vehicles crossing the boundary into a cordon pricing zone.
Area Pricing	Charge vehicles crossing the boundary into *as well as driving within* an area pricing zone.
Fleet Pricing	Apply targeted pricing to specific vehicle types entering a zone, such as ride-hailing fleets or commercial vehicles.
Road User Charge (RUC)	Restrict access to a zone to vehicles enrolled in an RUC program that replaces fuel taxes with payment per mile traveled.
Arterial Toll Roads	Price entire arterial road(s).
Arterial Express Lanes	Convert or add lanes on arterial roads as tolled lanes, such as by converting bus-only lanes or an existing general-purpose lane.
On-Street Parking Pricing	Vary street parking prices to control demand.
Off-Street Parking Pricing	Apply a fee/tax to off-street parking facilities.
Vehicle Occupancy (HOT)	"High Occupancy Toll" lanes give free or discounted access to vehicles carrying a specified number of people (2 or 3 is typical), while charging a toll to all others.

During the first step, or at least after going through the first three steps, it is possible that the types of pricing to be studied are narrowed down to a manageable number by conducting an initial screening of the impacts and benefits of the options. The most promising options will then be subject to a more detailed analysis.

This is illustrated by the process Vancouver, British Columbia, is employing, as described in the case study below.

CASE STUDY
Vancouver[8]

Vancouver has mounting congestion, continued population growth, and two bridges that are tolled while others are not, leading to concerns about the fairness of the system. While some type of bridge tolling or congestion charging seemed a likely outcome, Vancouver created an Independent Pricing Commission that studied a broad range of alternatives. They first adopted a set of transportation goals that included promoting fairness in transportation costs and impacts. They then evaluated which alternatives, if any, could best achieve their goals. After detailed analysis and community input, they settled on the two potential alternatives that seemed to be the best fit: distance-based charges and congestion point charges (similar in principle to cordon charges).



QUESTIONS TO ASK:	
1.4	Are there any additional pricing strategies which should definitely be considered? *Put another way, does the list of project alternatives include all the options that best serve vulnerable communities? Have representatives of vulnerable communities provided input on measures, strategies, and goals?*
1.5	Do the scope and budget of the planning study allow for a number of iterations so as to maximize the equity outcomes of identified actions?
1.6	Have we identified community priorities from existing studies that may be relevant?

Where: The Geographic Reach of the Study

Road pricing can affect people who might live or work at some distance from the roadway or from downtown pricing zones. It is important at an early stage to set the project boundaries so that vulnerable populations which may be impacted are included within the study area or project scope.

For example, a city considering cordon pricing or a region considering conversion of an HOV lane to HOT will need to have a sense of which drivers will be affected, where they're coming from and going to. While it's not possible for a study to include *every* commuter or traveler that uses the road—some might be passing through from distant cities, for example—it is desirable to include as many as possible. These initial geographies are also important because they help determine who should be the focus of the public engagement plan.

Decisions about the geographic reach of a study should follow a "macro-level" analysis of the potential effects on access to opportunities for vulnerable populations. It should describe the location and function of the project relative to the existing transportation network, the location of vulnerable populations, and the destinations (work, healthcare, religious, educational, retail, and public services) served by the facilities or areas being studied for pricing. The geographic reach may shift or expand once the first rounds of analytical results come in; some openness in redefining boundaries might be useful.

In practice, many studies adopt multiple geographic "levels" of analysis. For example:

- For commute impacts and predicting costs by population, a very large *travelshed* or "extended impact area" may be studied;
- A "direct impact area" is most likely to experience the potential direct impacts (such as noise, emissions, and traffic) from project construction or operation, and would typically be within a short distance of the proposed toll facility or priced zone and likely alternative routes;

- For cordon pricing proposals, the impacts on other issues need to be identified (such as, but not limited to, parking just inside and outside the boundary).

QUESTIONS TO ASK:	
1.7	Are all potentially impacted and vulnerable populations within the project study boundaries?
1.8	Do we know the critical services (such as shopping, medical care, education, and recreation) that are regularly used by the relevant populations? Are these included within the study boundaries? *Examples of such services include shopping, medical care, education, religious, and recreation.*
1.9	What are the growth projections for the city or region and should the planning process be using current population for the study, or projections for a future year?

ADDITIONAL RESOURCES

NCHRP's *Assessing the Environmental Justice Effects of Toll Implementation or Rate Changes: Guidebook and Toolbox* has a good introduction (pp. 9-18) to the eight kinds of road tolling or pricing actions that are typically considered, the kinds of impacts these are most likely to generate, and the initial identification of environmental justice issues. The checklists on pp. 366-372 are also useful summations of the important points to be considered in framing an impact study. It does not deal directly, though, with cordon or area pricing.

In addition, Tool #1, "Developing a Socioeconomic Profile and Community Characteristics Inventory for Environmental Justice Assessments," explains how the census can be used, including the kind of metrics available and the data tables that report those variables.

Two other equity toolkits are also worthwhile for the insights they provide. The Race & Social Justice Initiative's *Racial Equity Toolkit* was developed to help implement the vision of the Seattle Race and Social Justice Initiative.[9] Likewise, the Greenlining Institute's *Mobility Equity Framework: How to Make Transportation Work for People* is a guide to creating a more community-centered transportation planning process.[10]

EQUITY TOOLKIT

Step #2

Define Equity Outcome and Performance Indicators

Purpose

Another important part of project planning is defining the primary goals, referred to here as *outcomes*. It is important to then match these outcomes with *indicators*—the measures that we will use to gauge success or failure, and how the program can be evaluated and improved. These more detailed performance indicators help us answer the core question: does this project advance equity?

There are dozens of papers describing different types of equity in relation to congestion pricing.[11] These include overall ideas of fairness, such as by geography, not just those related to vulnerable communities. TransForm recommends a focus on two types: *Process Equity* and *Outcome Equity*.

For *Process Equity,* the key measure is the full participation of vulnerable communities in planning, implementation, and project follow-up. Process Equity is central to the long-term task of making transportation systems more equitable for all peoples, and of addressing *historical inequities* that continue to affect vulnerable communities.

As discussed in *Pricing Roads, Advancing Equity*, TransForm's Outcome Equity framework focuses on three key measures, as shown in the following table.

Type of Equity:	*Key Measures:*
Process Equity	Full Participation
Outcome Equity	Affordability
	Access to Opportunity
	Community Health

Road pricing projects typically pursue goals such as congestion relief, revenue generation, and—for cordon pricing especially—impacts on greenhouse gas emissions and air quality. Social and racial equity concerns have never been at the top of the list in any of the U.S. projects implemented so far, though Seattle's recently-initiated process does prioritize such concerns.

It is important to be clear on outcomes as well as their relative priority, since some equity strategies (such as giving toll exemptions to different groups) may seemingly work against other project goals (such as reducing climate emissions and local air pollution).

This is where it is crucial to have equity advocates at the table and to build strong participation. Proposed outcomes should highlight key social equity objectives. These can then be matched with *performance indicators*—the measures that will be used to gauge success or failure, and how the program can be evaluated and improved (Step 5). These outcomes and indicators should not just be in the mix, they need to be clear and *prioritized*.

It is usually necessary to do *comparative analysis* in order to determine the real impacts of proposed changes in the transportation system. At its simplest, two kinds of comparative analysis are useful. The first compares impacts from the road pricing proposal with what may be expected if road pricing is *not* adopted. The second compares the impacts on vulnerable populations with the impacts on the general population. These projections are often made for when the project is first implemented and for one or more time points in the future (such as in 10 years and/or 25 years).

The following chart depicts these comparative analyses, with arrows showing where the comparisons take place:[12]



These aggregate or "big picture" analyses can help people understand what it would take to achieve certain goals. For example, Vancouver calculated how much low-income, medium-income and high-income households might spend on different kinds of congestion pricing. People in high-income households generally drive more, so were projected to pay more as an absolute dollar figure, but low-income households would pay a larger percentage of their income. Vancouver calculated that, in order to ensure everyone paid the same proportion of their income as the high-income households would, around 20 percent of the net revenues

(between CD $170-345 million annually) would need to be returned to low-income households through rebates, discounts, or other measures. This kind of analysis can be used to compare how equitable—or inequitable—different kinds of road charges are.

These comparative analyses can be useful in highlighting unfair advantages or burdens at the group or "population" level. But, ultimately, it is also important to understand the real impacts—both benefits and burdens—on *individuals* in certain communities. How much will it cost for an individual who has no option but to drive during peak hours? Are reasonable alternatives like transit readily available and useful? What are the alternative routes, or times of day, that low-income travelers might use to avoid the extra costs and how burdensome would the lost time or change in schedule be? Even if the number of such individuals is not large, the tolls may be a real burden for them.

CASE STUDY
Los Angeles[13]

For its I-10 and I-110 ExpressLane pricing study, Metro identified several potential performance measures for considering effects on low-income users, including:

1. Number of low-income commuters [including percentage of Transit Access Program (TAP) users] who sign up for a transponder.
2. Number of peak-period low-income users of HOT lanes (and percentage of overall HOT lane users).
3. Usage of HOT lane credits for low-income drivers (credit redemptions).
4. Mode choice of low-income drivers (carpool versus single-occupant vehicle), compared with mode choice before the project is implemented.
5. Performance of transit service (average speed, trip time, time savings, and trip reliability) in the ExpressLanes corridors during the demonstration period.
6. General purpose lane speeds during the demonstration period.
7. Account balance problems of low-income commuters compared with non-low-income.
8. Share of time savings by low-income ExpressLanes drivers compared with the share of tolls and transponder costs they pay.
9. Trends in trip distance and trip time by low-income commuters compared with non-low-income.
10. Toll revenue investment.

Discussion

In this section we provide a short discussion of each TransForm's four equity outcomes. This is followed by a chart with some sample indicators for each outcome. Note that most of these indicators—such as changes in transit ridership or the percent of toll revenue spent to benefit vulnerable communities—can be predicted ahead of time using models and formulas; they can also serve as indicators to monitor, evaluate, and improve the program.

Full Participation

Process equity is focused on *participation* in the planning and decision-making process. In a road pricing program, process equity will continue to remain important during program implementation and evaluation.

Since low-income groups and communities of color have historically been disenfranchised from full participation, the issue is how to ensure that the views and concerns of these communities, *as community members understand and articulate them*, are fully solicited, valued, and reflected throughout the process, *especially by those making the final decisions on the project*.

A goal of full participation is to increase the level of positive impact and benefits for vulnerable communities.

Full Participation	
CATEGORY	*SAMPLE INDICATORS*
Activities	• Number of meetings and focus groups with vulnerable communities. • Dollar amount and/or percentage of project budget dedicated to equity outreach programs.
Communications	• Share of principal languages spoken in the community into which materials are translated. • Number of ethnic media outlets that receive information and publish articles about the proposal, or are targeted for advertising community meetings.
Organizations	• Staff time dedicated to technical support and funding for Community-Based Organizations (CBOs) to conduct/participate in needs assessment.
Participants	• Number of individual voices that have contributed to the community needs assessment.
Responsiveness	• Number of community-identified priorities that are being implemented as part of the program.

There are several best practices for full participation not noted in these indicators, such as having language translation at meetings, offering child care, and holding some meetings in the evenings and on weekends. This toolkit's companion report has a useful chart in Chapter 3 to show the degrees of participation.

QUESTIONS TO ASK:	
2.1	Where is the planning process on the "Degree of Participation" scale (found in Chapter 3 of this toolkit's companion report)? *Does it need more resources or political support to increase the degree of community empowerment?*
2.2	Are the efforts planned to reach vulnerable populations likely to reach people where they are, or do they expect people to come to planning events?
2.3	Are the comments and priorities of vulnerable communities being actively catalogued? *Are there plans to address these priorities in a clear and transparent way?*
2.4	Have equity outcomes been prioritized in the list of project goals?

Affordability

At the heart of the affordability question is: Will the proposed pricing project make transportation *more expensive* for some members of vulnerable communities, in both time and money? If so, by how much? Are there ways that transportation can become *more affordable* to some or most, for example through additional public transit discounts? Chapter 3 of this toolkit's companion report includes a section on affordability, with some examples of places that are working to directly address affordability as part of their pricing program.

It is especially important to capture the financial impact of *cordon pricing* and fully tolled roadways on vulnerable communities, since there may be no realistic alternative for some low-income travelers but to use those facilities. While it is useful to understand the financial impacts of HOT lanes, most of those highways also have general purpose lanes that are free to use. In surveys of HOT facilities, satisfaction is often similar between lower- and upper-income commuters, as there is widespread appreciation of the choice to avoid congestion for solo drivers, even if lower-income commuters use them less frequently.

The table on the following page illustrates sample indicators for assessing impacts on affordability.

Affordability	
CATEGORY	*SAMPLE INDICATORS*
Discounts	• Discount level on tolls for low-income and other populations. • Discounts on transit fares or other alternatives (subsidized by tolls).
Regressiveness	• Degree to which tolls are regressive, and how much revenue redistribution is needed to make them progressive (or neutral, as was calculated by Vancouver). • Household budget spent on transportation, by income level (total amount and percentage of income). • Change in share of household income spent on transportation and housing, by income category. • Change in generalized cost of transportation (time and money) for those switching mode/route/time of travel.
Participants	• Number of people from vulnerable communities participating in (or eligible to participate in) discounted tolls or transit fares. • Ratio of those who are eligible for equity pricing programs (both for car drivers and for non-driving strategies like discounted transit) to those that have actually signed up.
Subsidies	• Amount of toll revenue invested in transportation subsidies for vulnerable communities (and as a share of total net revenue).
Savings	• Total expected savings from toll and other subsidy programs for vulnerable communities.
Alternatives	• Cost of using transit or other modes instead of driving.

QUESTIONS TO ASK:	
2.5	How will congestion pricing change the travel costs of low-income drivers and non-drivers?
2.6	How do we ensure that members of vulnerable communities have ways to overcome financial barriers to participation, including for the unbanked and for those who may have trouble putting up deposits for transponders or other required technologies?
2.7	Do we have enough data on travel patterns and the potential changes in travel behavior to understand the potential financial impact of the tolls? *Would it be useful to complement that data with focus groups or surveys?*

CASE STUDY Greenlining Institute

In its 2018 *Mobility Equity Framework*,[14] the Greenlining Institute suggests, as a default, households spend no more than 20% of their budgets on transportation.

Access to Opportunity

The purpose of the transportation system is to link people to all kinds of opportunities: jobs, education, health care, and social, recreational, and commercial activities. So the question of how a proposed pricing (or infrastructure) proposal may change *access* to these places is critical. A well-designed pricing strategy should be able to increase access, especially for those who rely on public transit and for drivers who find it worth the expense to use the priced facility or zone.

There are two big areas of concern with regard to access. The first is for drivers from vulnerable communities who may decide to detour, shift modes or travel time, or even choose a different destination to avoid paying a toll or cordon charge. Pricing creates both a time cost (which essentially reduced access), and potentially increased costs for gas and vehicle use. A related issue, discussed in Step #1, is how trip diversion might impact affected roads and communities.

The second concern is whether the mechanics of toll payment restrict opportunity by creating barriers to use (for example, requiring users to front sums of money, such as for transponders or prepaid tolls, or to have credit card or bank accounts to link to their toll accounts).

Access to Opportunity	
CATEGORY	***SAMPLE INDICATORS***
Funding	• Absolute dollar amount invested in transit and mobility options that benefit vulnerable communities including: ➢ New transit routes ➢ Increased frequency ➢ Subsidies for vanpools, new mobility options, etc. • Percent of funds from tolls dedicated to supporting expanded mobility options that benefit vulnerable communities.
Service Quality	• Changes in transit speed, reliability, and quality that directly impact vulnerable communities. • Changes in travel speeds and/or reliability for cars, HOVs, and those paying tolls.
Service Levels	• Number of new transit miles, routes, or transit vehicle levels/frequencies that benefit vulnerable communities.

Transit Use	• Increase in target population's transit ridership attributed to transit investments. • Increase in the number of riders that use discounted fares each year.
Ratios	• Number of people from vulnerable communities paying the toll compared to those that change routes to avoid the toll (this information will require extensive surveys). • Amount of investment in vulnerable communities vs. other communities.
Access	• Change in the number of jobs, services, etc., that people from vulnerable communities can access within a 30, 45, or 60 minute window, by mode.

CASE STUDY Dallas / Fort Worth[15]

The North Central Texas Council of Governments (NCTCOG), the Metropolitan Planning Organization for the Dallas–Fort Worth Metroplex, developed an Environmental Justice Index that rated "Traffic Survey Zones" (TSZs) based on population density, minority population, and low-income population, for use in its Regional Tolling Analysis.

TSZs were ultimately divided into Protected zones—those with significant environmental justice concerns—and Unprotected. Analysis then focused on the impacts to these two zones using measures of accessibility and mobility as follows:

Accessibility:
- Number of jobs accessible within 30 minutes by auto
- Number of jobs accessible within 60 minutes by transit
- Population within 30 minutes to special generators (e.g., universities, regional shopping centers, hospitals)

Mobility:
- Average level of congestion
- Average travel time

QUESTIONS TO ASK:	
2.8	Are key community destinations being analyzed and are any missing?
2.9	What alternative transportation choices (roads, transit, etc.) will be available to those who cannot afford the toll? For those who are likely to drive alternative routes, what is the time penalty? For those shifting to transit or other modes, what time penalties may be involved?
2.10	Are potential benefits being fully considered, such as the potential increase in bus speed, both when the project is implemented and at some future point?

Community Health

Vulnerable communities have historically borne a greater share of the negative health impacts of transportation systems. Freeways were often built through vulnerable communities, imposing higher levels of asthma and other health impacts of air pollution. Unsafe streets mean vulnerable communities also have higher death and injury rates from walking and bicycling.

Pricing strategies can be a way to minimize some of these impacts, by reducing the amount of overall driving taking place, by reducing the need to expand roads and freeways, and by creating revenue streams that can support transit improvements, bicycle and pedestrian infrastructure, and/or clean vehicles (serving the needs of workers as well as families, seniors, children, and those with special needs).

Another important issue to consider is access to health care. Transportation is frequently the top barrier preventing vulnerable residents from accessing medical facilities, especially for chronic and preventive care. This issue can be assessed in several ways including by noting the location of health facilities and whether they are inside or outside of a congestion pricing zone, and determining whether discounts and exemptions are feasible for trips to those destinations. There are also potential benefits of pricing strategies, such as improvements in speed and reliability for emergency vehicles and whether some revenues can be reinvested in shuttles or other modes that connect vulnerable communities to health facilities.

Community Health	
CATEGORY	*SAMPLE INDICATORS*
Infrastructure	• Miles of effective/safe bike lanes and sidewalks added or improved.
Funding	• Absolute dollar amount of funds spent on bike and pedestrian improvements in vulnerable communities. • Percent of toll revenues spent on bike and pedestrian improvements in vulnerable communities. • Absolute dollar amount and percent of toll revenues spent on clean air buses serving vulnerable communities.
Safety	• Change in collisions, death, and injury rates on facilities that receive investment.
Trips	• Change in the number of bicycle and pedestrian trips.
Air Quality	• Number/percentage of new clean air buses, funded as part of the toll investment strategy, in vulnerable communities. • Change in particulate matter or other criteria pollutants in identified impact areas.
Health	• Anticipated health benefits, disease reduction, and improvements in life expectancy (can be predicted using ITHIM or another model).

QUESTIONS TO ASK:	
2.11	Do the main health indicators include the ones that were prioritized by vulnerable communities?
2.12	Is data on health impacts detailed enough to ascertain impacts on residents within a short distance of the tolled facility and/or other impacted roadways?
2.13	What changes in air pollution are expected? *Where do these occur? Who do they affect?*
2.14	What impacts on bicycle and pedestrian safety are projected?
2.15	Will changes resulting from road pricing reduce traffic and bring more community cohesion? *May it further isolate some communities or populations?*

ADDITIONAL RESOURCES

NCHRP's *Assessing the Environmental Justice Effects of Toll Implementation or Rate Changes: Guidebook and Toolbox* has several lists that are useful for additional perspective:

- A checklist for understanding the role of quantitative and qualitative performance indicators (pp. 358-359).
- Table 3 (pp. 135-138), "Practical approaches for reaching low-income, minority, and other traditionally underserved populations," presents an agency-level perspective on reaching members of vulnerable populations.

The Greenlining Institute's *Mobility Equity Framework* identifies 12 indicators recommended for equity studies (pp. 11-13).[16]

EQUITY TOOLKIT

Step #3

Determine Benefits and Burdens

Purpose

Once a set of *performance indicators* is adopted, planners will conduct studies to determine the impacts of the proposed alternatives. There is no single approach to determining such impacts; several are discussed later. The analyses that will go into determining benefits and burdens should be tailored to:

- the *scale* of impacts,
- community *interest* in those impacts, and
- the *potential* of those impacts to help or hurt vulnerable populations.

Discussion

From an equity perspective, there are two fundamental ways to think about impacts. The first is whether the indicators are *relative* or *absolute*. The second is the *level of analysis*, whether at the individual, group/population, or geographic scale.

Relative impacts compare vulnerable populations with non-vulnerable ones. For example, one project alternative might result in non-vulnerable populations paying an additional 2% of household income on transportation, but vulnerable populations 5% more. In this case, vulnerable populations would pay a larger share of their household income *relative* to non-vulnerable populations.

Absolute impacts focus on the actual change experienced by individuals and groups; they're used to help maximize the potential benefit of a project on vulnerable communities. At an individual scale, this may involve looking at a set of typical trips taken during the course of the day by different individuals and then predicting the impact on them of pricing strategies and investment alternatives.

At this individual scale it is easier to understand the costs that some low-income commuters may face. These realistic scenarios can help us better understand the impacts of different types of mitigations (such as discounts, caps, and/or exemptions). These illustrative examples and case studies are a vital complement to the indicators that aggregate population data.

Impact analyses may include technical modeling. Technical models simulate future scenarios by predicting how people will choose among different options. For example, a transit ridership model might predict that a faster bus route will attract about 15% more riders; the model would also estimate where these riders come from and the impact of fewer cars on the road.

Technical models are often complex and they typically rely on incomplete or generalized information. Models can be extremely useful, though, for depicting likely reactions to changes in the transportation system and producing numbers that decision-makers (and the broader community of stakeholders) can more easily understand and work with. Just the same, equity advocates will need to work with planners to know the limits of the models, their strengths and weaknesses, and to ensure that models properly serve the needs of vulnerable communities.

Cordon pricing and area pricing proposals carry their own set of modeling challenges; the lack of U.S. examples makes it that much harder to *confidently* predict the response of people to such programs, since consumer demand must be inferred from other examples. Still, quality modeling can help us understand what changes might occur in travel patterns and choices.

One issue with pricing studies is that decision-makers and the public often focus on *costs* divorced from potential *benefits*; models can help raise a deeper awareness of those benefits. In New York City, the Move NY plan used an integrated spreadsheet model to assess traffic improvements, revenue generation, and other benefits expected from reforming road tolls and transit fare policies. It created a way to test different scenarios and measure their impacts, to understand the costs *and* benefits of saved time for transit riders and drivers, as well as to predict environmental benefits and improvements in active transportation.[17]

The following list of questions addresses the range of impacts equity advocates should be looking at. Some of these questions reflect issues already raised in this toolkit and its companion report, but are also useful to consider at this stage.

QUESTIONS TO ASK	
3.1	***Affordability.*** How will the pricing change affect the travel costs of the low-income user? Will low-income drivers be "priced out" of certain trips? Will the requirements to use newly tolled facilities be too burdensome? *Also, will low-income individuals have ready access to transponders and means of paying tolls that don't require credit card or bank accounts, or the fronting of significant amounts of cash?*
3.2	***Choices.*** What reasonable alternative transportation choices (roads, transit, etc.) will be available to those who cannot afford the toll?
3.3	***Travel Time.*** If pricing produces travel-time savings, are they experienced by all users? *Will the non-toll alternatives be equitable in terms of travel time or distance? Will low-income commuters change their travel times or modes as a result of road pricing?*

3.4	***Transit***. What impact will the project have on transit (e.g., changes to bus routes, travel time, frequencies)?
3.5	***Local Roads***. Will the project divert a substantial amount of traffic through a vulnerable community? *If so, what impacts on air quality, noise, and safety (bicycle and pedestrian) might be expected? Will there be shifts in demand for parking that impact these communities?*
3.6	***Social Impacts***. Will broad changes resulting from road pricing reduce traffic and bring more community cohesion? *May it further isolate some communities or particular populations?*
3.7	***Access to Opportunities***. How will the project impact the access that people from vulnerable communities have to likely destinations? *Likely destinations include jobs, schools, hospitals, social services, places of worship, shopping, as well as to cultural and recreational resources.*
3.8	***Businesses***. How will the project impact business access for both customers and deliveries? *Are any small and local businesses at risk, and if so, are there measures that can protect them?*
3.9	***Noise***. Will there be noise impacts attributable to road pricing?
3.10	***Rents***. Are there foreseeable changes in housing or commercial rents and/or land values attributable to changes in access to opportunities?
3.11	***Environmental***. What impacts will pricing have on air quality, and where are these impacts likely to be felt? *In addition to impacts on air quality, will the toll facility improve or worsen water quality and drainage conditions for particular populations? Will it increase the number of vehicles carrying hazardous materials through or near vulnerable communities?*
3.12	***Locations***. What physical infrastructure (such as tolling barriers) will need to be built, and how much of it will be located in vulnerable communities? *Will eminent domain be required? Whose homes are likely to bear the burden?*

ADDITIONAL RESOURCES

NCHRP's *Assessing the Environmental Justice Effects of Toll Implementation or Rate Changes: Guidebook and Toolbox* has several useful resources for this step. Tool #7, "Using Travel Demand Models for Environmental Justice Assessments," as well as Tool #8, "Applying a Select Link Analysis to Assess Trip Patterns," provide excellent background on the potential uses and limitations of these two modeling techniques.

EQUITY TOOLKIT

Step #4

Choose Strategies to Advance Transportation Equity

Purpose

The purpose of this step is to identify which set of policies and investments can best maximize equity across all groups, redress historic inequities, and minimize the harm to vulnerable populations.

Discussion

Chapter 3 of this toolkit's companion report identifies a range of strategies that can advance equity. Some of the most relevant strategies—whether for affordability, access or health—may have been identified previously and even implemented (in part) in local or regional plans or in recommendations made by community groups.

A growing number of public agencies may have already adopted a stated equity strategy; if they do, that is a great place to start. Examples include San Francisco Muni's equity strategy and the priority list for Seattle's Transportation Equity Program.[18]

While there are many different actions that can be taken to help improve the equity of the transportation system, their relative impact will vary based on a wide range of conditions and circumstances. It is for this reason that it is never enough to merely *specify* an equity program, but to develop a range of options, analyze them for their potential impacts, and make adjustments so as to minimize negative impacts (and costs) and maximize positive results. This process is necessarily iterative; the number of iterations depends on the scale of expected impacts, the resources available to deal with them, and how widespread those impacts are.

It is only after a set of iterations that the final pricing proposal and associated equity strategy may advance to the decision-making bodies for formal approval—a process that may require equity advocates to conduct further outreach to both vulnerable communities and to decision-makers.

What kinds of strategies or actions may be implemented as part of an equity program? The table below provides a quick outline of some sample strategies; others can be found in this toolkit's companion report, while still others might be identified by the communities themselves.

STRATEGY	EXAMPLES	ISSUES
Affordability and Driver Assistance	**Driver Discounts, Caps & Exemptions,** such as: • Free or discounted transponders • Toll discounts or credits for low-income households • Exemptions for people with disabilities • No tolls during off-peak hours	If there are too many of these, then other components of the program, like increasing bus and carpool speeds or climate benefits, may be heavily impacted.
	Cash Payments (for those without credit cards or bank accounts)	Must be convenient to access and minimize up-front deposits.
	Transit Discounts • Free or discount transit passes • Subsidize bike and car share costs	
Greater Mobility Options and Safer Active Transportation Networks	**Improved Transit Service** • New routes to more destinations • Faster, more reliable service • Improved stations/stops	Must ensure routes serve vulnerable communities, operate at beginning and end of shifts; minimize need to transfer; not impose undue time penalties; and get as close as possible to job sites.
	Carpool and Vanpool Programs • Carpool matching services such as Scoop • New vanpool routes • Additional park-and-ride lots	These may often be the most effective way to serve suburban and rural areas.
	Pedestrian/Bike Improvements • Improved pedestrian network • Improved bicycle network • Pedestrian-scale lighting	Must be useful to enough people to qualify as an equity promotion measure.
	New Mobility Programs, such as: • Bike share • Car share • Creative use of ride-hailing or other services to connect to transit • Shuttles/Microtransit • Carpool apps and programs	Even when affordable, access might be limited. Options should exist for people without smartphones.

Programs for Seniors and People with Disabilities	**Accessible Information** (senior help lines, materials)	Must be easy for seniors to access and plan trips.
	Targeted Transit/Shuttle Routes	Must serve destinations accessed frequently by seniors at the right times.
Healthier Communities	**Encourage Clean Air Vehicles** • Credits for drivers of clean vehicles • Purchase clean transit vehicles	Transit should be prioritized on routes that pass through marginalized communities.

QUESTIONS TO ASK:	
4.1	What strategies are most promising to provide greater affordability, and potentially price certainty, as part of the pricing proposal?
4.2	What strategies will most help *commuters* from vulnerable communities?
4.3	What strategies will most benefit *non-commuters* in vulnerable communities?
4.4	What strategies have affected communities *already identified* as part of other planning processes that can be implemented/supported through funding from the road pricing project? *Such plans may be in-depth and already have broad community support, so their value can be considerable.*
4.5	Can planners run the transportation models on the final alternatives to get a finer grain prediction of impacts?

ADDITIONAL RESOURCES

For more information on cutting-edge equity strategies:

- **San Francisco MUNI**: www.sfmta.com/projects/muni-service-equity-strategy
- **Seattle:** www.seattle.gov/transportation/projects-and-programs/programs/transportation-equity-program

EQUITY TOOLKIT

Step #5

Provide Accountable Feedback and Evaluation

Purpose

Road pricing strategies, once implemented, will lead to shifts in travel behavior. Toll revenues will also begin to flow to programs and efforts aimed at delivering equitable outcomes. Ongoing monitoring and evaluation can help identify problems or issues that may emerge, as well as point to new opportunities to help advance equity.

Equity advocates need to ensure that:

- Monitoring and evaluation occur along a reasonable timeline (though it should also be understood that some impacts, like health and traffic safety, may by their nature take some time to become clear);
- There are agreed-upon mechanisms for providing feedback to decision-makers on both the successes and shortcomings of the program, as well as to highlight and act upon emerging opportunities; and
- The results of monitoring and evaluation are communicated clearly and consistently with affected communities.

Discussion

In more traditional transportation projects, community engagement is focused on the period from project scoping through project completion. Congestion pricing, however, should be considered more of a *dynamic process*. Downtown congestion pricing projects especially will have to be evaluated and modified at regular intervals. It is therefore important to plan for formal, continuous community engagement and collaboration *throughout* implementation, evaluation, and ongoing project monitoring and modifications.

The *Public Involvement Plan* should lay out the process for involving stakeholders and community members in all stages of the project.

It is also important to note that the final set of outcomes and indicators should still be relevant during this evaluation phase. The indicators, to the extent feasible, should be used for ongoing

project evaluation and monitoring, much as London has done.[19] In this way the original goals can continue to exercise influence over the project.

Several of the downtown congestion pricing programs have started as pilot programs, in part because of public resistance and the uncertainty of their impacts. Pilots allow for evaluation and modifications to address concerns before the permanent adoption of the program. While pilots can be useful, they can also be complicated and expensive to administer. Any pilot program needs to have clearly described milestones and decision points, with clear opportunities for impacted communities to influence the project's ultimate status.

A road pricing proposal not only presents an opportunity to advance equity at a project level; it can usher in and even institutionalize a stronger equity focus in transportation planning. Equity advocates should look for opportunities to ensure that transportation planning agencies, and the elected bodies that oversee them, make equity representation and goals a permanent and central part of the process.

CASE STUDY
Stockholm[20]

Stockholm, a city of 1.2 million, implemented a 7-month pilot cordon pricing charge for the central city in 2006. Though initially unpopular, public sentiment shifted once the benefits of the program were experienced and people saw that the negative impacts were not as large as they feared. A referendum approved making the program permanent.

After the trial period, Stockholm commissioned a study analyzing the equity impacts of the cordon pricing scheme. Among the key findings, the city learned:

- High-income individuals were affected more than low-income;
- Men paid 65% more congestion prices than women;
- Relatively few drivers paid the majority of congestion charges – but most paid occasionally;
- Young and low-income individuals benefitted from lower transit fares; and
- Journeys in central areas were shorter, with a lower percentage by car.
- Program improvements have also included 18 new regional bus lines and 2,800 new regional park-and-ride spaces.

While planners had an explicit goal of reducing car traffic around the cordon by 10 – 15%, traffic has actually decreased by 22%, while greenhouse gas emissions have fallen by 14%. Businesses in the central city saw sales grow by 5%; while the rise cannot be definitively tied to the pricing program, it certainly demonstrates that there were minimal to no negative impacts on businesses. Deliveries also became easier due to decreased congestion.

CASE STUDY
Portland, Oregon

After adopting a "Strategic Plan to Advance Racial Equity, Diversity and Inclusion" in 2016, Oregon Metro created a 15-member advisory and oversight community body that reports directly to the Metro Council. The body advises the Council and staff on

racial equity work, provides community oversight and accountability, and serves as a conduit of information to and from the community. In this way, impacted communities have a voice in future decision making and build the expertise, personal relationships, and power to engage over the long-term, rather than on a case-by-case basis.

CASE STUDY
New York City

Move NYC—the congestion pricing proposal spearheaded by Sam Schwartz—includes provisions for a way to "lockbox revenue" to ensure the money raised by tolling would be used on relevant transportation projects in Manhattan. By creating a new financial authority to which bridge tolls would flow, the estimated $720 million in new revenues would be directed to the MTA and its agencies. Additional legal safeguards, including commitments to bondholders, would further cement local control of the new tolls.

The revenue design addressed one of the largest equity concerns raised by opponents of road pricing strategies: distrust of government officials to spend revenues on critical, applicable transportation projects within the region. The proposed mechanism was a novel solution for protecting revenues. The pricing scheme also contained provisions to ensure that drivers who lacked effective transit alternatives would not be unduly penalized.

QUESTIONS TO ASK:	
5.1	What *priority* is given to project funding commitments, which *entity* is making those commitments, and who specifically is accountable for follow-through? *Are commitments, implementation, and adjustment reported publicly and transparently?*
5.2	Who is responsible for determining if the project meets its goals and commitments to vulnerable populations, and on which timeline?
5.3	If the project includes a pilot program, • What is the proposed timeline? • What milestones or targets are included? • What data needs to be generated and disseminated to the public? • Who is responsible for making the decision whether to make the program permanent, make further changes, or terminate the program?
5.4	Who is responsible for providing continuous oversight of equity issues following project implementation?
5.5	What equity issues remain to be dealt with? How heavily will decision-makers weigh the adopted equity outcomes and indicators, relative to other priorities?
5.6	Are there ongoing opportunities for vulnerable communities to participate in the entire transportation planning process?

Notes

[1] Communication with Dan Firth, X DATE, the Executive Director of Vancouver's Independent Mobility Pricing Commission. Dan recounted how even a relatively simple system like the downtown cordon in Gothenburg, Sweden, required eight such iterations. Dan had previously worked with London's and Stockholm's programs.

[2] It should be noted that the NCHRP document is mostly oriented to highway pricing strategies; while some of its insights and frameworks may be useful for cordon or area pricing proposals, there are issues and concerns with these that are not fully covered.

[3] National Cooperative Highway Research Program (NCHRP), *Assessing the Environmental Justice Effects of Toll Implementation or Rate Changes: Guidebook and Toolbox* (Washington, DC: National Academies Press, 2018).

[4] NCHRP, pp. 281-286.

[5] Richard D. Plotnick, et al., "A Geography-Specific Approach to Estimate the Distributional Impact of Highway Tools: An Application to the Puget Sound Region of Washington State," *Journal of Urban Affairs* (7 August 2011), 33(3), pp. 345–366.

[6] NCHRP, p. 95.

[7] NCHRP, pp. 303-314.

[8] Mobility Pricing Independent Commission, Metro Vancouver Mobility Pricing Study (Vancouver, BC, May 2018), www.translink.ca/~/media/Documents/plans_and_projects/regional_transportation_strategy/Research/Metro_Vancouver_Road_Pricing_Research_Study_Report.ashx.

[9] Seattle Race and Social Justice Initiative, "Racial Equity Toolkit to Assess Policies, Initiatives, Programs, and Budget Issues" (Seattle Office for Civil Rights, August 2012), www.seattle.gov/civilrights/programs/race-and-social-justice-initiative/racial-equity-toolkit.

[10] Hana Creger, Joel Espino, and Alvaro S. Sanchez, *Mobility Equity Framework: How to Make Transportation Work for People* (Oakland, California: Greenlining Institute, 2018), greenlining.org/publications/2018/mobility-equity-framework/.

[11] A particularly useful paper is Brian Taylor, "How Fair is Road Pricing? Evaluating Equity in Transportation Pricing and Finance," (National Transportation Policy Center, 29 September 2010).

[12] Adopted from NCHRP, p. 56.

[13] NCHRP, p. 310.

[14] Hana Creger, et. al. (2018).

[15] NCHRP, pp. 281-286.

[16] Hana Creger, et. al. (2018).

[17] Charles Komanoff, "The Fix: NYC Congestion Pricing Plan Looks Solid – If Cuomo Aims High," in *Streetsblog NYC* (23 January 2018), nyc.streetsblog.org/2018/01/23/the-fix-nyc-congestion-pricing-plan-looks-solid-if-cuomo-aims-high/.

[18] SFMTA, "Muni Service Equity Strategy," www.sfmta.com/projects/muni-service-equity-strategy. Accessed on 12 December 2018. And Seattle Race and Social Justice Initiative (2012).

[19] Transport for London, *Changes to the London Congestion Charge Scheme: Integrated Impact Assessment* (July 2018). On page 17 there is a summary chart comparing a proposed change to the original project goals. There is much more detail that follows, including an "equalities analysis" that begins on page 67.

[20] Jonas Eliasson, "The Stockholm congestion charges: an overview," CTS Working Paper (Stockholm: Center for Transport Studies, 2014), www.transportportal.se/swopec/cts2014-7.pdf; Transek, *Equity Effects of the Stockholm Trial* (Stockholm, 2006), www.stockholmsforsoket.se/upload/Sammanfattningar/English/Equity Effects of the Stockholm Trial.pdf; and San Francisco County Transportation Authority, *San Francisco Mobility, Access, and Pricing Study,* Final Report to the Authority Board (San Francisco: SFCMTA, December 2010), p. 6.

Exhibit G

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January 11, 2024

Carter Rubin
Natural Resources Defense Council
1314 Second Street
Santa Monica, CA 90401

Subject: Comments on the Yolo 80 Corridor Improvements Project

Dear Mr. Rubin,

I have reviewed the VMT impacts in the Yolo 80 Corridor Improvements Project Draft Environmental Impact Report / Environmental Assessment ("DEIR") dated November 2023. I make the following findings:

1) The DEIR underestimates induced vehicle miles traveled ("VMT"). Applying the current version of the National Center for Sustainable Transportation (NCST) Induced Travel Calculator, the project would induce up to 44.4% higher VMT than presented in the DEIR.

2) The DEIR states that SACSIM is incapable of properly accounting for induced travel and estimates VMT impacts outside SACSIM. However, the DEIR improperly relies on SACSIM calculated traffic volumes and speeds for accounting for other project impacts. In particular:

    a. The model outputs relied on for the traffic analyses and the traffic metrics are useless, and it cannot even be determined if any of the alternatives satisfy the project's purpose and need.

    b. The region is an air quality nonattainment area and conformity must be demonstrated both at the project level and the regional level. The model outputs relied on for the project level air pollution metrics are useless. The DEIR fails to address how induced travel affects regional air pollution.

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c. The model outputs relied on for the energy metrics and the energy metrics are useless.

3) The DEIR's conclusions that the project would not induce land use growth are contradicted by the SACSIM modeling.

4) The DEIR overestimates the VMT reductions that would follow the proposed mitigation. Problems in the DEIR VMT mitigation estimates include:

   a. The voluntary trip reduction program would expand Yolo Commute to the entire region. Yolo Commute includes a 50 percent reduction on monthly transit fares. The DEIR includes a 50 percent fare reduction as a separate mitigation measure, i.e., double counting. The DEIR also assumes the maximum VMT reduction percentage that would occur through an employer implementing a trip reduction program with the assistance of Yolo Commute. It cannot be assumed just giving Yolo Commute more money is the same as every employee in the region implementing a trip reduction program with involvement of their human resources staff.

   b. Adding three trains in each direction on the Capitol Connector would only return service to pre-pandemic levels. This should not be considered mitigation for the proposed project.

   c. Microtransit is a new service provided by Yolo Commute that provides "last mile" transit access through subsidizing vehicles that operate like shared Ubers in very limited geographic areas. The DEIR falsely assumes that expanding the microtransit area would have the same multiplier effect on regional transit ridership as increasing fixed route service miles or service hours by 25%, which would be much more costly.

   d. The DEIR acknowledges that counting mitigation benefits for both subsidizing monthly transit passes and reducing transit fares is double counting the benefits, but then does this anyway. As the reduction in monthly transit fares is also counted in the voluntary trip reduction program benefits, the DEIR is triple counting reduced transit fares.

5) I estimate that the proposed mitigation would only offset 7.5% to 7.8% of induced VMT versus the 43% claimed in the DEIR.

6) California's 2022 Scoping Plan for Achieving Carbon Neutrality calls for VMT per capita reductions of 30% per capita by 2045 relative to a 2019 baseline. It states that reducing VMT per capita will require "more sustained action." A good start would be to stop digging the hole deeper, which the proposed project would do.

The DEIR Underestimates Induced Travel

The DEIR acknowledges that the SACSIM model is incapable of accounting for induced travel. The DEIR states:

> Since the SACSIM travel demand model does not pass the TAF (Caltrans 2020b) checklist for travel demand models to adequately estimate induced demand, the National Center for Sustainable Transportation (NCST) Induced Travel Calculator was applied as outlined by the TAF procedures. (DEIR, p. 2-117)

Alternatives 2a, 3a, 4a and 5a each add 1 additional lane in each direction. The DEIR reports 180,784,500 induced total annual VMT for these alternatives. (DEIR, Table 2.1-26, p. 2-123.

The project length is 20.8 miles (DEIR, p. Summary-2) Therefore, the project adds 41.6 lane miles of freeway capacity. I applied the Calculator on December 20, 2023, and the estimated induced travel was 174.1 – 261.1 million VMT per year, i.e., up to 44,4% higher than the value given in the DEIR (see below).



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It is possible that the Calculator has been updated since the DEIR analysis was performed, but it would be conservative to assume the higher end of the induced travel estimated range, i.e., 261.1 million VMT per year.

The DEIR estimates 4.2% higher induced VMT for the alternatives with median ramps - 2b, 3b, 4b and 5b. This indicates that these alternatives add about 1.74 additional lane miles of capacity. Factoring up the Calculator range by this same percentage results in an estimate of 181.4 – 272.1 million VMT per year. it would be conservative to assume the higher end of the induced travel estimated range for these alternatives, i.e., 271.1 million VMT per year.

The SACSIM Model Fails to Account Properly for Induced Travel

The DEIR states that SACSIM is incapable of properly accounting for induced travel, and estimates VMT impacts outside SACSIM. However, as discussed in detail below, the DEIR relies completely on SACSIM for accounting for other project impacts including traffic, energy consumption, and air pollution. As these other impacts are all based on travel volumes, it is improper to calculate these impacts from SACSIM as it has been accepted in the DEIR that SACSIM's traffic forecasts are wrong.

The document "Caltrans 2020b" cited in the DEIR in determining that SACSIM is incapable of properly estimating induced travel demand is Transportation Analysis Framework First Edition: Evaluating Transportation Impacts of State Highway System Projects (September 2020). Table 4 in this document is checklist "for evaluating adequacy of travel demand models for estimated induced travel" with five sets of review questions. The DEIR does not include the answers for the SACSIM model but acknowledges that the model fails the first question on the checklist:

> "Is the model's specification of future land use sensitive to travel time and cost, i.e., varying across modeling scenarios to simulate the land use response to network changes?"

The Traffic Demand Modeling Report: Interstate 80/U.S. Highway 50 Managed Lanes (March 2023) states:

> For long-term effects, the SACSIM19 model does not include a process for capturing potential changes in trip generation or land use growth allocation between no build and build alternatives. According to SACOG, the SACSIM19 model represents future conditions (including long-term induced vehicle travel effects) expected to occur under the build alternatives. What is not captured is how the no build alternative would affect long-term effects on trip generation and land use growth allocations. (p. 40)

The Traffic Demand Modeling Report (p. 40) states that the land use and trip generation inputs applied for all alternatives are "expected to occur under the build alternatives," and that "how the no build alternative would affect long-term effects on trip generation and land use growth allocation" "is not captured." This convoluted language captures the mindset of the entire DEIR, i.e. that induced land use and traffic growth are certain, but the authors don't know how to back this out for a no build alternative. This clearly is backwards. The no build condition should be the baseline, and induced land use and traffic should be estimated.

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This mindset leads to faulty reasoning. Given that the induced land use and traffic growth are assumed as inevitable, only build alternatives can satisfy this induced demand. This causes nonsensical no build traffic forecasts as documented in the Traffic Demand Modeling Report Table 25 (p. 60) reproduced below.[1]

Table 25: Daily VMT Change and Induced VMT

Alternative	SACSIM19 Daily VMT Change		NCST Long-Term Induced Daily VMT
	2029	2049	
1 (No Build)	-	-	-
2 (Add HOV)	+2,088,000	-3,003,000	+495,300
3 (Add HOT2+)	+2,066,400	-2,883,300	+495,300
4 (Add HOT3+)	+1,985,000	-3,029,000	+495,300
5 (Add Toll)	+2,035,600	-3,095,200	+495,300
6 (Add Transit)	+1,574,800	-2,598,300	-
7 (Convert HOV)	+1,787,200	-3,050,400	+12,300
8 (Add HOV with Median Ramps)	+2,120,300	-2,909,900	+516,000
9 (Add HOV without Enterprise Crossing)	+2,178,100	-2,919,000	+495,300
10 (Add GP)	+1,866,900	-2,599,100	+495,300
11 (Add HOT2+ with Median Ramps)	+2,073,000	-2,880,700	+516,000
12 (Add HOT3+ with Median Ramps)	+1,991,600	-3,026,300	+516,000
13 (Add Toll with Median Ramps)	+2,042,200	-3,092,500	+516,000
14 (Add Transit with Median Ramps)	+1,574,800	-2,598,300	-
15 (Convert HOV with Median Ramps)	+1,819,300	-2,957,400	+33,000

Notes: The SACSIM19 model includes two additional counties (Sutter and Yuba). Annual VMT converted to daily VMT using a factor of 300 to account for less travel on weekends and holidays. Long-term induced daily VMT estimated with an elasticity of 1.0 using NCST Induced Travel Calculator based on 2019 VMT in the four-county MSA (El Dorado, Placer, Sacramento, and Yolo).

In the table reproduced above, SACSIM19 shows much lower VMT in 2049 for all build alternatives relative to the no build alternative. This is simply wrong and is contradicted by real world evidence from dozens of induced travel studies.

[1] The numbers in the "NCST Long-Term Induced Daily VMT" column in the Table above were calculated by dividing the annual estimated reported in DEIR Table 2.1-26 (p. 2-123) by 365 days/year. A smaller divisor should have been used to compare to the average weekday volume in SACSIM to properly account for lower traffic volumes on weekends. Therefore, the Calculator values should be higher than those shown, even without accounting for the higher current Calculator induced travel range discussed above.

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The Travel Demand Modeling Report explanation for these erroneous results is:

> In the SACSIM model, the travel time savings under 2029 build conditions are sufficient to induce new vehicle trips and increase regional VMT. Under 2049 conditions, much higher levels of congestion exist under no build conditions such that traffic re-routes long distances during peak periods. The build alternatives improve travel times and allow this traffic to remain on the most direct freeway routes causing a reduction in regional VMT. The 2049 demand forecasts were produced through linear extrapolation of the 2040 forecasts. While this approach minimizes the potential to underestimate future volumes, it may contribute to less reasonable induced VMT forecasts under 2049 conditions especially considering the model's limited sensitivity to congestion due to static assignment. Therefore, the 2029 results offer a more reasonable assessment of short-term induced travel effects. (Travel Demand Modeling Report, p. 60)

This weak attempt at a justification simply highlights the severity of the underlying errors, i.e. that induced land use and trip generation is the baseline, and the failure to accommodate this induced land use and trip generation in the no build alternative would result in "much higher levels of congestion exist under no build conditions such that traffic re-routes long distances during peak periods." This is backwards, as it is the build alternatives that would induce land use and traffic growth. In the no build alternative land use and trip generation growth would be discouraged, and the modeled "much higher levels of congestion" would not occur.

The land use and trip generation inputs used in the no build alternative modeling are invalid, and all outputs from the no build modeling are invalid. As discussed below, this invalidates not only the SACSIM induced VMT estimates, but all other metrics derived from SACSIM and relied on in the DEIR including traffic operations, air quality and energy.

The Growth Conclusions in the DEIR are Contradicted by the SACSIM Modeling

The SACSIM modeling results reproduced above demonstrate that the land use assumptions are inconsistent with the 2049 no build alternative but are consistent with the build alternatives. This is evidence that the build alternatives will induce land use changes that are assumed with the build alternatives.

> According to SACOG, the SACSIM19 model represents future conditions (including long-term induced vehicle travel effects) expected to occur under the build alternatives. What is not captured is how the no build alternative would affect long-term effects on trip generation and land use growth allocations. (Traffic Demand Modeling Report, p. 40)

Therefore, proper growth analysis requires different no build and build land use forecasts which the DEIR fails to do. Instead, the DEIR makes baseless assertions that there would be no induced land use:

> Build Alternatives 2a and 2b would not directly increase development of residential land uses, encourage growth outside of existing growth boundaries, or alter existing access to residential and employment areas. Therefore, no adverse effects associated with growth would be anticipated.
>
> [Build Alternatives 3a and 3b] … the effects would be the same as effects described under Build Alternatives 2a and 2b.
>
> [Build Alternatives 4a and 4b] ... the effects would be the same as effects described under Build Alternatives 2a and 2b. (DEIR, p. 2-53 -2-54)

These assertions are contradicted by the SACSIM modeling that shows that the land use inputs are inconsistent with the no build alternative but are consistent with the build alternative. This demonstrates a strong likelihood of induced land use that is not disclosed in the DEIR.

The Traffic Metrics Relied on in the DEIR Taken from the Invalid SACSIM Model are Useless

The DEIR states:

> The purpose of the proposed project is to:
>
> - Ease congestion and improve overall person throughput
> - Improve freeway operation on the mainline, ramps, and at system interchanges
> - Support reliable transport of goods and services throughout the region
> - Improve modality and travel time reliability
> - Provide expedited traveler information and monitoring systems.

The DEIR relies on SACSIM to evaluate how well the alternatives satisfy the project purpose. DEIR Table 2.1-25 (p. 2-121) based on SACSIM outputs summarizes many of the performance metrics related to the project purpose.

Table 2.1-25. Alternatives Comparison – Horizon Year 2049

Performance Measure	Alt 1	Alt 2a	Alt 3a	Alt 4a	Alt 5a	Alt 6a	Alt 7a	Alt 2b
Regional VMT	5	2	3	2	1	4	2	3
Corridor PMT	5	2	1	3	4	5	5	2
Persons served at bottlenecks	3.5	1	2	2.5	2.5	3.5	5	1
General purpose lane peak hour travel time	3.5	1.5	1.5	2	2	3	5	2
General purpose lane peak hour planning time index	4	2	2	2.5	1.5	3	5	2.5
Managed lane peak hour travel time	4.5	2	1.5	1.5	1.5	3	5	1.5
Vehicle hours of delay	4	2	2.5	2	1.5	2.5	5	1.5
Average speed	4	1.5	2.5	2	2	2.5	5	1
Total vehicles served	3.5	1.5	2	3	3	3	5	1
Total persons served	3	1	2	4	3	2.5	5	1
Deficient segments	5	2.5	2.5	2	1.5	3	4	1.5
Average score	4.1	1.7	2.0	2.4	2.1	3.2	4.6	1.6

Source: Caltrans 2023d
Notes: Comparison is based on a scale of 1 to 5, where 1 represents very good performance and 5 represents very poor performance.
Key: VMT = Vehicle miles traveled; PMT = Personal miles traveled

In the table, the no build Alternative 1 rates worst on "Regional VMT", i.e., highest, because the metric is based on the invalid 2049 no build modeling documented above that falsely indicates higher no build VMT. This is clearly wrong. Similarly, none of the other metrics listed for the no build alternative are valid. Travel time and delay are overestimated because the no build modeling was done with build land use and trip generation. Speed is underestimated because the no build

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modeling was done with build land use and trip generation. The number of "deficit segments" is overestimated because the no build modeling was done with build land use and trip generation. All the no build metrics are wrong.

And because the no build metrics are all wrong, the comparisons of the build metrics with the no build metrics are also wrong. There is no way to know from the invalid 2049 modeling whether any of the build alternatives satisfy the project purpose and need better than the no build alternative, or whether any build alternative would better satisfy the project purpose than any other build alternative. The traffic metrics relied on in the DEIR taken from the invalid SACSIM model are useless.

The Air Pollution Metrics Relied on in the DEIR Taken from the Invalid SACSIM Model are Useless

The DEIR's Air Quality Report states that the region is Nonattainment for air pollutants including:

- Ozone – State Status Nonattainment and Federal Status Nonattainment – Severe 15
- PM_{10} - State Status Nonattainment
- $PM_{2.5}$ - Federal Status Sacramento and Yolo Counties Nonattainment – Moderate[2]

The DEIR includes extensive air pollution analyses of traffic operations for the study corridor and concludes that for every alternative – both no build and build – there would be "No effect" for project-level conformity (CO), Project-level conformity (PM2.5) or roadway vehicle emissions/criteria pollutant emissions.

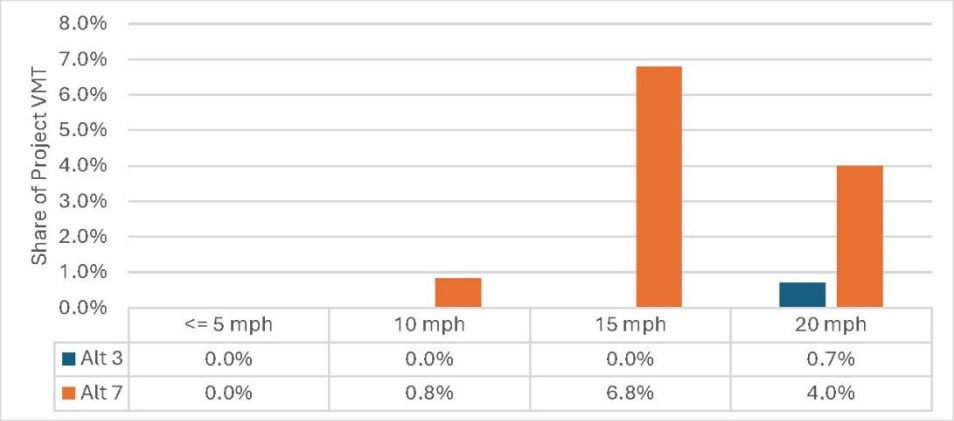
The foundation for the DEIR air pollution analyses are the modeled traffic volumes and traffic speeds from the invalid 2049 SACSIM alternatives modeling. This is erroneous both for calculating study corridor emissions and regional emissions.

In the study corridor emissions analyses, SACSIM forecasts excessive delay and high emissions per mile in the non-widening alternatives. Appendix G of the Air Quality Report includes Summary Tables of CT-EMFAC Results for 2049 for Alternatives 2, 3, 4, 5, 6 and 7 – but not for Alternative 1, the No Build alternative. As the Alternative 1 model results are unavailable, Alternative 7, Take-A-Lane, will be used to represent a non-widening alternative and compared to Alternative 3, adding HOT lanes.

As shown in the figure below, the SACSIM model outputs input to CT-EMPAC have 16.4 times as much of the daily VMT operating below 20 mph for Alternative 7 vs Alternative 3.

[2] Air Quality Report: YOLO 80 Corridor Improvements Project, August 2023. p. 7.

CT-EMPAC VMT Speed Bin Outputs for 2049 Reported in Appendix G of the Air Quality Report

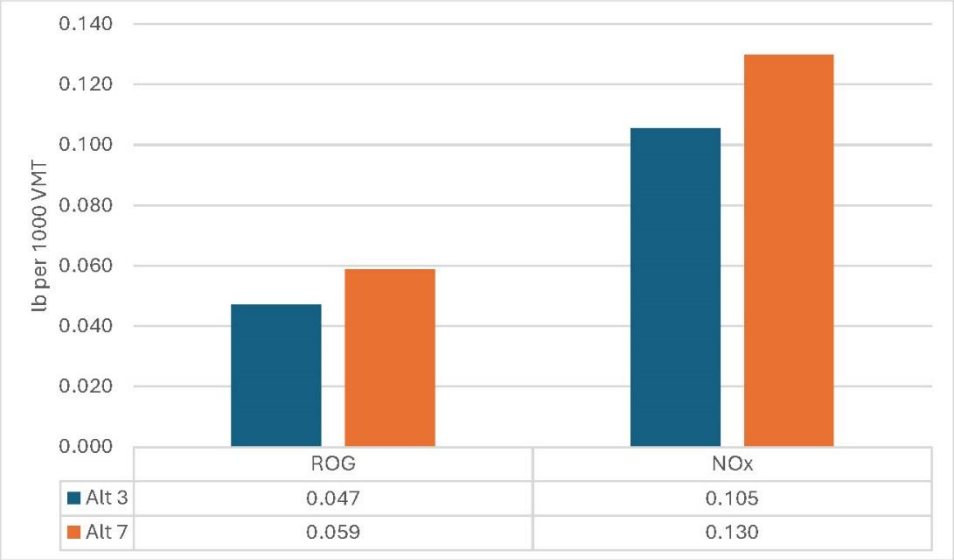


	<= 5 mph	10 mph	15 mph	20 mph
Alt 3	0.0%	0.0%	0.0%	0.7%
Alt 7	0.0%	0.8%	6.8%	4.0%

As referenced above: "According to SACOG, the SACSIM19 model represents future conditions (including long-term induced vehicle travel effects) expected to occur under the build alternatives." Therefore, the extreme congestion forecast for Alternatives 1 and 7 is unrealistic for the non-widening alternatives, and a false basis for estimating emissions.

The figure below shows that this false congestion results in significantly higher ozone precursors (ROG and NOx) emissions per mile for Alternative 7 relative to Alternative 3.

CT-EMPAC VMT Emissions/VMT Outputs for 2049 Reported in Appendix G of the Air Quality Report



	ROG	NOx
Alt 3	0.047	0.105
Alt 7	0.059	0.130

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Given these false levels of modeled congestion in the non-widening alternatives, the study corridor air pollution analyses cannot properly account for induced travel from the build alternatives. Therefore, the air pollutant metrics relied on in the DEIR are useless.

There are even greater air quality impacts at the regional level. The DEIR states:

> "Transportation Conformity" applies to highway and transit projects and takes place on two levels: the regional (or planning and programming) level and the project level. The proposed project must conform at both levels to be approved. (DEIR, p. 2-180)

The DEIR makes no effort to demonstrate conformity at the regional level, but instead relies on conformity analysis done in conjunction with the Regional Transportation Plan ("RTP"). (DEIR, p. 2-181). The RTP conformity analysis again leads back to the SACSIM model that fails to properly account for induced travel. If induced travel were properly considered, it is likely the build alternatives would result in more regional air pollution than the no build alternative. Regional air pollution is not properly analyzed in the DEIR.

The Energy Metrics Relied on in the DEIR Taken from the Invalid SACSIM Model are Useless

The DEIR falsely claims, based on the invalid SACSIM modeling, that:

> When compared to No Build Alternative 1, Build Alternatives 2a and 2b are expected to result in a 14.5 percent and 0.8 percent, respectively, decrease in energy use in the year 2049 (Table 2.2-34). The project's proposed improvements under Build Alternatives 2a and 2b would improve roadway operations and reduce traffic delay within the project limits. Excess fuel consumption associated with vehicle delay and congestion within the project limits would decrease compared to No Build Alternative 1. (DEIR, p. 2-268)

The DEIR purports that the other build alternatives also result in lower energy consumption than the no build alternative.

The SACSIM modeling falsely shows these results because it improperly includes induced land use and trip generation in the no build alternative. This exaggerates congestion and fuel consumption in the no build alternative and makes model comparisons with the build alternatives useless.

DEIR Overestimates VMT Mitigation Reductions

The DEIR overestimates the VMT reductions that would follow the proposed mitigation. Problems in the DEIR VMT mitigation estimates include:

1) The voluntary trip reduction program would expand Yolo Commute to the entire region. Yolo Commute includes a 50 percent reduction on monthly transit fares. The DEIR includes a 50 percent fare reduction as a separate mitigation measure, i.e., double counting. The DEIR

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also assumes the maximum VMT reduction percentage that would occur through an employer implementing a trip reduction program with the assistance of Yolo Commute. It cannot be assumed just giving Yolo Commute more money is the same as every employee in the region implementing a trip reduction program with involvement of their human resources staff.

2) Adding three trains in each direction on the Capitol Connector would only return service to pre-pandemic levels. This should not be considered mitigation for the proposed project.

3) Microtransit is a new service provided by Yolo Commute that provides "last mile" transit access through subsidizing vehicles that operate like shared Ubers in very limited geographic areas. The DEIR falsely assumes that expanding the microtransit area would have the same multiplier effect on regional transit ridership as increasing fixed route service miles or service hours by 25%, which would be much more costly.

4) The DEIR acknowledges that counting mitigation benefits for both subsidizing monthly transit passes and reducing transit fares is double counting the benefits, but then does this anyway. As the reduction in monthly transit fares is also counted in the voluntary trip reduction program benefits, the DEIR is triple counting reduced transit fares.

These problems are discussed in greater detail in the following sections.

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Voluntary Trip Reduction Program VMT Is Overestimated

The largest component in the DEIR VMT mitigation is "voluntary trip reduction program in Yolo County" with a reduction of 24.7 million VMT per year, which is 43% of the mitigation. The VMT Mitigation Memo describes the program this way:

> The Voluntary Trip Reduction Program mitigation measure would expand the current program provided by Yolo Commute, the Yolo County transportation management association, to apply for all residents and workers. The program could include features such as community-based travel planning, ridesharing, transit pass subsidies, and pay-per-mile auto insurance. An estimated 20 percent of workers are currently eligible. This measure would expand the program to cover the other 80 percent. CAPCOA strategy T-5 estimates a 4 percent reduction in home-based work trips when employees in a study area participate in the voluntary trip reduction program. If transit pass subsidies are included as part of this strategy, then the separate reduction in Table 2 would not apply. (VMT Mitigation Memo p. 4)

The reference for the 4% reduction, The California Air Pollution Control Officers Association (CAPCOA) Handbook for Analyzing Greenhouse Gas Emission Reductions, Assessing Climate Vulnerabilities, and Advancing Health and Equity ("Handbook") states:

> Voluntary CTR programs must include the following elements to apply the VMT reductions reported in literature.
>
> * Employer-provided services, infrastructure, and incentives for alternative modes such as ridesharing (Measure T-8), discounted transit (Measure T-9), bicycling (Measure T-10), vanpool (Measure T-11), and guaranteed ride home.
> * Information, coordination, and marketing for said services, infrastructure, and incentives (Measure T-7). (p. 83)

Yolo Commute provides all these services today including 50% off Yolobus monthly passes.[3]

The Handbook text reads "employer-provided" services, and it is not clear that it will be possible to expand these programs to all workers. While Yolo Commute would receive additional funding, there are no resources provided for funding human resources staff in what are currently non-member businesses to actively promote these programs to their workers, and many work in small business without human resources staff.

Using the example of the guaranteed ride home, all workers would need to know of the eligibility requirements and the mechanics of getting reimbursed as shown on the following page.

[3] https://www.yolocommute.net/incentives-programs/

Yolo TMA Guaranteed Ride Home Process
https://www.yolocommute.net/incentives-programs/)

You may use the Yolo TMA's Guaranteed Ride Home up to six (6) times a year for the following circumstances:

- Your ridesharing partner has an emergency and you have no way to get home
- Unscheduled, approved overtime
- You are ill and must go home
- You must get to a family emergency
- Your commute bicycle broke down and cannot be repaired at your work site
- Unexpected severe weather is preventing you from bicycling or walking home after work today

The following uses are not eligible for reimbursement:

- Personal errands
- Medical or dental appointments
- Building evacuations
- Business travel
- Job related injuries
- A natural disaster (floods)
- Transit problems (the transit provider is responsible for providing another bus)
- Missed bus, carpool or vanpool ride home
- Other reasons deemed invalid by program administrator

How To Use...

When an urgent need requires you to get home, we know you don't have time to deal with vouchers or pre-authorizations. That's why Yolo Commute makes it easy: just use the options below and we'll reimburse you.

Taxi, Lyft, Uber and Via:

Use who you want. Yolo Commute will reimburse for up to $50. Simply fill out the below form after your trip.

Rental Car:

Commuters traveling 20 or more miles from work will use Enterprise Rent-a-Car. You are responsible for returning the car to the rental agency within 24 hrs, with the same fuel level as when rented. A credit/debit card will be necessary to initiate the rental; however, only Yolo Commute will be charged for the vehicle cost, less gas refill and optional insurance.

Reimbursement:

Fill out the below form for GRH reimbursement...

Yolo Commute Member Organization *(Required)*

Only Yolo Commute members are eligible... [followed by rest of form]

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To get reimbursed, the form needs to be completed and submitted. Today, there are only 14 employer members listed and the submitter enters one of them. It is likely that sometimes Yolo Commute checks with the employer members about claims, particularly in the case of repeat claims. How will this work with hundreds of small employers, including sole proprietors?

The VMT Mitigation Memo states:

> An estimated 20 percent of workers are currently eligible. This measure would expand the program to cover the other 80 percent. CAPCOA strategy T-5 estimates a 4 percent reduction in home-based work trips when employees in a study area participate in the voluntary trip reduction program. If transit pass subsidies are included as part of this strategy, then the separate reduction in Table 2 would not apply. (p. 5)

Yolo Commute includes a 50% transit pass price reduction; therefore, the transit fare subsidy listed as a separate mitigation measure cannot be included.

The Handbook specifies that the 4% maximum should be reduced for "Employees who might not be able to participate could include those who work nighttime hours when transit and rideshare services are not available or employees who are required to drive to work as part of their job duties. (p. 84) The DEIR includes no downward adjustment for these workers.

It is unrealistic to assume a 4% reduction across the board by giving Yolo Commute additional funds. This program will be very complicated to implement at a county level, and the effects likely would be much less than the 4% reduction assumed. A more realistic estimate, that also considers those who cannot participate, is half, i.e., a 2% average reduction.

Expand Capitol Corridor Frequency VMT Reduction Is Overestimated

The second largest component in the VMT mitigation is expanding the Capitol Corridor frequency. The DEIR states that this would mitigate 12.6 million VMT per year (22% of the total mitigation):

> The addition of three roundtrip train services on the Capitol Corridor route from Oakland to Sacramento would also reduce VMT, as mentioned in the attached VMT Mitigation Plan. The calculations and basis for the VMT reduction is based on a Traffic Congestion Relief Program (TCRP) equation, that utilizes a direct effect and indirect effect of train services. In this case, the three additional roundtrips save 6.3 million passenger miles, which is then multiplied by 2 to obtain the VMT reduction. Hence, the VMT reduction number of 12.6 million is shown in the VMT Mitigation Plan. (DEIR p. 2-31)

The YOLO 80 Managed Lanes Project Draft VMT Mitigation Plan dated October 20, 2023 states

> Currently running 12 roundtrip trains, this measure would allow for a total of 15 roundtrip trains (p. 2)

This 25% increase sounds impressive, but with a closer look, this appears to be only returning to pre-pandemic service levels. A local news report in 2021 stated:

> Capitol Corridor service was cut from 30 trains per day pre-pandemic to just 10 per day, seven days per week last year.
>
> Weekday service increased to 16 daily trains last June, but ridership is still nearly 90 percent below pre-pandemic levels, according to data from Capitol Corridor's February 2021 performance report.[4]

The report says there were 30 trains per day (15 trains in each direction) pre-pandemic.

The Capitol Corridor website states:

> **Service Levels**
>
> Over the course of the year, the Capitol Corridor increased service, except for a brief summer period when Amtrak experienced workforce shortages. A January 24, 2022, schedule change provided more midday service in the eastbound direction, as well as increased late afternoon and evening weekday service. The temporary reduction in service, which began August 15, 2022, ended on October 3, 2022, when we returned to full service on weekends and to 12 of 15 roundtrips on weekdays.[5]

This excerpt indicates that 15 roundtrips a day is considered the normal service level. Returning to normal service levels after the pandemic does not count as mitigation.

Even if the added frequency were true mitigation, the estimated VMT reduction doesn't make sense. It is based on a multiplier of 2.0 that is taken from a "Traffic Congestion Relief Program (TCRP) equation, that utilizes a direct effect and indirect effect of train services." I was unable to find documentation for this multiplier. There are several reasons why the true multiplier is less than 1.0 including:

- Parties traveling together would otherwise be in a multiple-occupant vehicle rather than a single-occupant vehicle.
- VMT associated with rail station access – Capitol Corridor reports 36% drop or pickup[6], i.e., extra VMT from roundtrips to and from the stations as well one-way trips from 16% park-and-ride, and
- Induced trips – induced travel is not only from roads; improved transit service also induces travel.

Getting to a multiplier of 2.0 requires heroic assumptions about indirect effects such as significant changes in land use and auto ownership that are illogical for a change in frequency. A multiplier of 0.7 would be more appropriate, i.e., a 65% reduction from what is assumed in the DEIR, and again, that is only if the increased frequency is considered as true mitigation rather than just a return to pre-pandemic service levels.

---

[4] Bay City News. Capitol Corridor Sees Uptick in Ridership Amid Pandemic, March 23, 2021. https://patch.com/california/martinez/capitol-corridor-sees-uptick-ridership-amid-pandemic

[5] https://www.ccperformance.org/#helthsafety

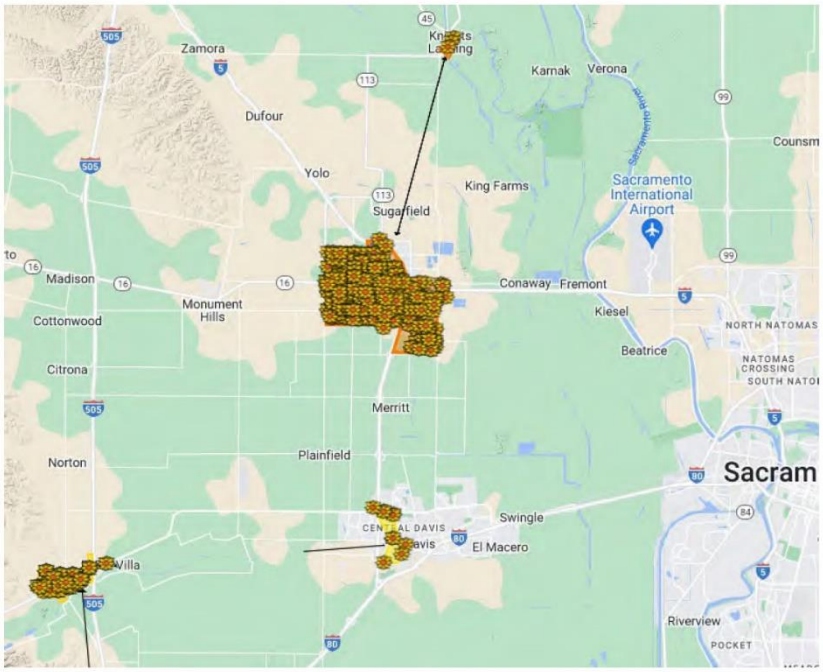
[6] https://www.ccperformance.org/#helthsafety

Micro Transit in Yolo County VMT Reduction is Overestimated

The third highest VMT mitigation component is "Micro Transit in Yolo County" – "Expand transit service by 25% to add flexible route buses with more frequent service and/or longer service hours, add more buses to an existing route; no physical improvements; payment to Yolo County." (DEIR, p. 2-125) This description appears to be trying to bridge a contradiction between the proposed measure and the Handbook measure relied on to calculate the benefits. The words "micro transit" and "flexible route" describe the proposed service. The words "more frequent service and/or longer service hours" are taken from the Handbook and do not describe the proposed service.

The word "microtransit" has a particular meaning for Yolobus that is distinct from either "fixed route" or "paratransit."[7] The Yolobus microtransit service, labeled "BeeLine" "is a shared on-demand transportation service which allows users to request a ride where and when they need it rather than scheduled fixed route service which stops at bus stops following a set schedule."[8] It is operating as a limited area service like a shared Uber or Lyft for a fare of $4 subsidized by state and local funds. It currently has only a small service area as shown on this map.

Current BeeLine Interactive Map (October 2023)[9]



[7] https://yolobus.com/wp-content/uploads/2022/06/YCTD-Final-Budget-for-FY-2022-23.pdf
[8] https://yolobus.com/wp-content/uploads/2021/10/MicrotransitFAQ.pdf
[9] https://www.google.com/maps/d/u/0/embed?mid=1XL64pzso_2pgrkOYGHlk-yz5TNyEyLo&ehbc=2E312F&noprof=1&ll=38.64159722236725%2C-121.75868239853513&z=11

This is a new service with an introductory fare of $1 in at least some areas, and there do not appear to be reliable performance metrics yet. However, it is likely that the subsidies per ride will be large. The most recent Fiscal Year budget (2022-2023) shows expenses of $878,000 and passenger fares of only $7,000.[10]

In the areas where the microtransit service is available, it can link to Yolobus fixed route service and provide the "last mile" service that is missing in many rural and suburban areas. The DEIR appears to be suggesting that adding $1.5 million a year to this program can expand the Yolobus geographic service area by 25%. This 25% is different from increasing "transit service miles or service hours" by 25%. Therefore, it is wrong to use the equation for Handbook measure T-25 Extend Transit Network Coverage or Hours to estimate VMT mitigation.

There is insufficient data for the microtransit service yet to estimate the VMT benefits, but an upper limit to the benefits would be proportional to the percentage increase in regional transit subsidy. The proposed $1.5 million per year is much less than 25% of regional transit subsidies today. The VMT Mitigation Memo states: "The additional transit service is expected to be provided by Unitrans or Yolobus." (p. 4) In its most recent annual report to the Federal Transit Administration (2022), the Yolo County Transportation District (which operates Yolobus) reported operating expenses of $13,144,190 with fare revenues covering only 10.2% of the expenses.[11] In Fiscal Year 2021-2022, Unitrans expenses totaled $7,358,000.[12] The largest component of the budget is student fees; non-subsidy cash income including fares, advertising and miscellaneous totaled only $225,000. Subsidized expenses for the two services were $19 million for these past years, and certainly at least $20 million today. Therefore, the upper limit to the potential service increase would be $1.5 million / $20 million = 7.5% - not 25%, i.e., 30% of what is assumed in the DEIR. The upper limit for VMT reduction would be 30% of what is assumed in the DEIR.

Furthermore, this is the upper limit of potential benefits. The actual benefits are likely to be much smaller because the likely subsidies per passenger and per passenger mile are likely to be significantly greater than for existing fixed route service.

Subsidize Monthly Transit Passes in Yolo County and Reduce Transit Fares

The fourth and fifth highest VMT mitigation components both involve reducing net transit fares. The VMT Mitigation Memo analyses these two approaches separately:

- Subsidize Monthly Transit Passes in Yolo County with TDM+/Handbook
- Reduce Transit Fares with SACSIM

The VMT Mitigation Memo acknowledges the overlap in these approaches and states:

> Some portion of the VMT reduction may not apply if the monthly transit pass subsidy strategy in Table 2 above is also implemented. The strategies offer different methods for reducing transit costs but may end up targeting similar people that could dampen the reported effectiveness. (Footnote 2, p. 17)

[10] https://yolobus.com/wp-content/uploads/2022/06/YCTD-Final-Budget-for-FY-2022-23.pdf
[11] www.transit.dot.gov/sites/fta.dot.gov/files/transit_agency_profile_doc/2022/90090.pdf
[12] https://unitrans.ucdavis.edu/media/uploads/2022/12/21/gmfy22annualrpt_final.pdf

The DEIR double counts these benefits anyway but goes beyond that. As discussed above, the DEIR also counts these benefits in the Trip Reduction measure, so they are triple counted in the DEIR.

In my revised estimates, I keep the monthly transit pass subsidies as part of the Trip Reduction measure and zero it out here.

The DEIR also exaggerates the VMT reduction from reducing transit fares because it double counts the benefits for Yolobus monthly pass holders. In my revised estimate, I reduce the DEIR estimate by 50%.

Revised VMT Mitigation Estimates

The table below adjusts the DEIR VMT mitigation estimates to more realistic values.

VMT Mitigation Estimates (million VMT per year)

measure	DEIR	realistic	notes
Voluntary trip reduction program in Yolo County	24.7	12.35	50% due to challenges
Expand Capitol Corridor frequency between Oakland and Sacramento	12.6	0.00	just returning to pre-pandemic service
Micro transit in Yolo County	6.2	1.86	upper limit on benefits
Subsidize monthly transit passes in Yolo County	5.6	0.00	double counted
Reduce transit fares	3.7	1.85	partly doubled counted
Expand Causeway Connection Route 138	3.1	3.10	not reviewed in detail
Expand Unitrans	1.2	1.20	not reviewed in detail
total	57.1	20.36	

The Proposed VMT Mitigation Is Inadequate

As discussed above, the DEIR uses annual induced travel estimates of 180,784,500 VMT for Alternatives 2, 3, 4 and 5 and 188,340 VMT for Alternatives 2a, 3a, 4a and 5a. These numbers are also in Table 1 of a November 16, 2023, Fehr and Peers Memorandum re I-80/US 50 Managed Lanes – VMT Mitigation Estimates ("VMT Mitigation Memo").

As documented above, these induced travel estimates are significantly lower than the values given in the current Calculator. The most conservative estimates are 261.1 million VMT per year and 271.1 million VMT per year for the two sets of alternatives.

The VMT Mitigation Memo takes the initial induced VMT number – which is too low – and reduces it by 29% because of an estimate that 19-29% of the induced travel is commercial driving. The VMT Mitigation Memo takes the higher value of 29% and reduces the induced travel by this amount. The Memo states that this "change was tentatively accepted by Caltrans headquarters (HQ) staff."

Approval by HQ staff is not a valid rationale for this assumption. The only justification I can think of for this reduction is that the mitigation measures do not apply to commercial driving, and that this assumed 29% of the induced VMT cannot be mitigated. If this is the intent of the 29% reduction, is

important that the DEIR states this clearly with a statement like: "The 29% of inducted travel that is from commercial driving cannot be mitigated."

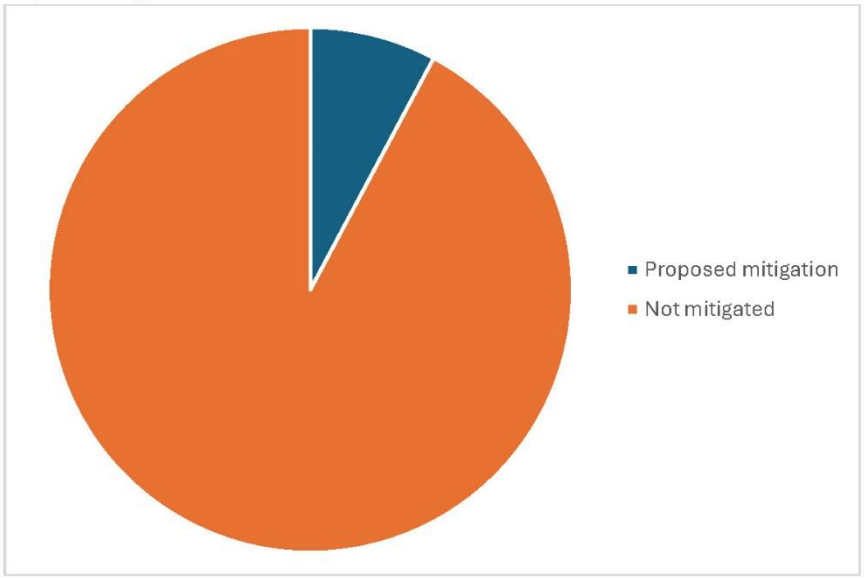
Instead, the DEIR appears to be pretending that the "commercial driving" VMT can be simply ignored as it claims that the mitigation totaled, 57.1 million, represents "43% of induced VMT" (Table 2.1-27, p. 2-126). In fact, it represents only:

- 31.6% of DEIR estimated induced VMT for Alternatives 2, 3, 4 and 5
- 30.3% of DEIS estimated induced VMT for Alternatives 2a, 3a, 4a and 5a
- 21.9% of more conservative induced VMT for Alternatives 2, 3, 4 and 5
- 21.1% of more conservative induced VMT for Alternatives 2a, 3a, 4a and 5a

Substituting the more realistic VMT mitigation estimate of 20.36 million VMT per year documented above, the mitigation represents only:

- 7.8% of more conservative induced VMT for Alternatives 2, 3, 4 and 5
- 7.5% of more conservative induced VMT for Alternatives 2a, 3a, 4a and 5a

Proposed Mitigation Is Less Than a Tenth of the Induced VMT



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The Proposed VMT Mitigation Includes Projects that are Necessary to Meet the State's Climate Goals – Without Digging a Deeper Hole

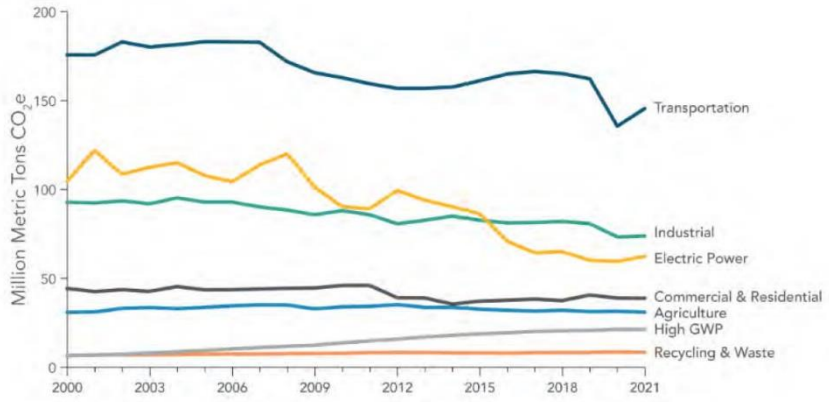
California's 2022 Scoping Plan for Achieving Carbon Neutrality states:

> The 2022 Scoping Plan models vehicle miles travelled (VMT) reductions of 25% per capita below 2019 levels by 2030 and 30% per capita below 2019 levels by 2045. These targets are not regulatory requirements, but would inform future planning processes. Functionally, achieving these targets would require more sustained action than the prior targets to further shift the transportation system away from dependency on personal vehicles and broaden choice.[13]

As stated in this excerpt, reducing VMT per capita will require "more sustained action."

In the most recent California GHG, transportation GHG emissions are not only higher than other sectors but are increasing.[14]

2000–2021 GHG Emissions by Category as Defined in the Scoping Plan



Part of this more sustained action regarding VMT is to stop digging a deeper hole.

Sincerely,

Norman L. Marshall

Norman L. Marshall

[13] ww2.arb.ca.gov/sites/default/files/2022-12/2022-sp-appendix-b-final-environmental-analysis.pdf
[14] https://ww2.arb.ca.gov/ghg-inventory-graphs

21

Resume

NORMAN L. MARSHALL, PRESIDENT

nmarshall@smartmobility.com

EDUCATION:

Master of Science in Engineering Sciences, Dartmouth College, Hanover, NH, 1982
Bachelor of Science in Mathematics, Worcester Polytechnic Institute, Worcester, MA, 1977

PROFESSIONAL EXPERIENCE: (32 Years, 18 at Smart Mobility, Inc.)

Norm Marshall helped found Smart Mobility, Inc. in 2001. Prior to this, he was at RSG for 14 years where he developed a national practice in travel demand modeling. He specializes in analyzing the relationships between the built environment and travel behavior and doing planning that coordinates multi-modal transportation with land use and community needs.

Regional Land Use/Transportation Scenario Planning

Portland Area Comprehensive Transportation System (PACTS) – the Portland Maine Metropolitan Planning Organization. Updating regional travel demand model with new data (including AirSage), adding a truck model, and multiclass assignment including differentiation between cash toll and transponder payments.

Loudoun County Virginia Dynamic Traffic Assignment – Enhanced subarea travel demand model to include Dynamic Traffic Assignment (Cube). Model being used to better understand impacts of roadway expansion on induced travel.

Vermont Agency of Transportation-Enhanced statewide travel demand model to evaluate travel impacts of closures and delays resulting from severe storm events. Model uses innovate Monte Carlo simulations process to account for combinations of failures.

California Air Resources Board – Led team including the University of California in $250k project that reviewed the ability of the new generation of regional activity-based models and land use models to accurately account for greenhouse gas emissions from alternative scenarios including more compact walkable land use and roadway pricing. This work included hands-on testing of the most complex travel demand models in use in the U.S. today.

Climate Plan (California statewide) – Assisted large coalition of groups in reviewing and participating in the target setting process required by Senate Bill 375 and administered by the California Air Resources Board to reduce future greenhouse gas emissions through land use measures and other regional initiatives.

Chittenden County (2060 Land use and Transportation Vision Burlington Vermont region) – led extensive public visioning project as part of MPO's long-range transportation plan update.

Flagstaff Metropolitan Planning Organization – Implemented walk, transit and bike models within regional travel demand model. The bike model includes skimming bike networks including on-road and off-road bicycle facilities with a bike level of service established for each segment.

Chicago Metropolis Plan and Chicago Metropolis Freight Plan (6-county region)— developed alternative transportation scenarios, made enhancements in the regional travel demand model, and used the

enhanced model to evaluate alternative scenarios including development of alternative regional transit concepts. Developed multi-class assignment model and used it to analyze freight alternatives including congestion pricing and other peak shifting strategies.

Municipal Planning

City of Grand Rapids – Michigan Street Corridor – developed peak period subarea model including non-motorized trips based on urban form. Model is being used to develop traffic volumes for several alternatives that are being additional analyzed using the City's Synchro model

City of Omaha - Modified regional travel demand model to properly account for non-motorized trips, transit trips and shorter auto trips that would result from more compact mixed-use development. Scenarios with different roadway, transit, and land use alternatives were modeled.

City of Dublin (Columbus region) – Modified regional travel demand model to properly account for non-motorized trips and shorter auto trips that would result from more compact mixed-use development. The model was applied in analyses for a new downtown to be constructed in the Bridge Street corridor on both sides of an historic village center.

City of Portland, Maine – Implemented model improvements that better account for non-motorized trips and interactions between land use and transportation and applied the enhanced model to two subarea studies.

City of Honolulu – Kaka'ako Transit Oriented Development (TOD) – applied regional travel demand model in estimating impacts of proposed TOD including estimating internal trip capture.

City of Burlington (Vermont) Transportation Plan – Led team that developing Transportation Plan focused on supporting increased population and employment without increases in traffic by focusing investments and policies on transit, walking, biking and Transportation Demand Management.

Transit Planning

Regional Transportation Authority (Chicago) and Chicago Metropolis 2020 – evaluated alternative 2020 and 2030 system-wide transit scenarios including deterioration and enhance/expand under alternative land use and energy pricing assumptions in support of initiatives for increased public funding.

Capital Metropolitan Transportation Authority (Austin, TX) Transit Vision – analyzed the regional effects of implementing the transit vision in concert with an aggressive transit-oriented development plan developed by Calthorpe Associates. Transit vision includes commuter rail and BRT.

Bus Rapid Transit for Northern Virginia HOT Lanes (Breakthrough Technologies, Inc and Environmental Defense.) – analyzed alternative Bus Rapid Transit (BRT) strategies for proposed privately-developing High Occupancy Toll lanes on I-95 and I-495 (Capital Beltway) including different service alternatives (point-to-point services, trunk lines intersecting connecting routes at in-line stations, and hybrid).

Roadway Corridor Planning

I-30 Little Rock Arkansas – Developed enhanced version of regional travel demand model that integrates TransCAD with open source Dynamic Traffic Assignment (DTA) software, and used to model I-30 alternatives. Freeway bottlenecks are modeled much more accurately than in the base TransCAD model.

South Evacuation Lifeline (SELL) – In work for the South Carolina Coastal Conservation League, used Dynamic Travel Assignment (DTA) to estimate evaluation times with different transportation alternatives in coastal South Caroline including a new proposed freeway.

Hudson River Crossing Study (Capital District Transportation Committee and NYSDOT) – Analyzing long term capacity needs for Hudson River bridges which a special focus on the I-90 Patroon Island Bridge where a microsimulation VISSIM model was developed and applied.

PUBLICATIONS AND PRESENTATIONS (partial list)

DTA Love: Co-leader of workshop on Dynamic Traffic Assignment at the June 2019 Transportation Research Board Planning Applications Conference.

Forecasting the Impossible: The Status Quo of Estimating Traffic Flows with Static Traffic Assignment and the Future of Dynamic Traffic Assignment. *Research in Transportation Business and Management* 2018.

Assessing Freeway Expansion Projects with Regional Dynamic Traffic Assignment. Presented at the August 2018 Transportation Research Board Tools of the Trade Conference on Transportation Planning for Small and Medium Sized Communities.

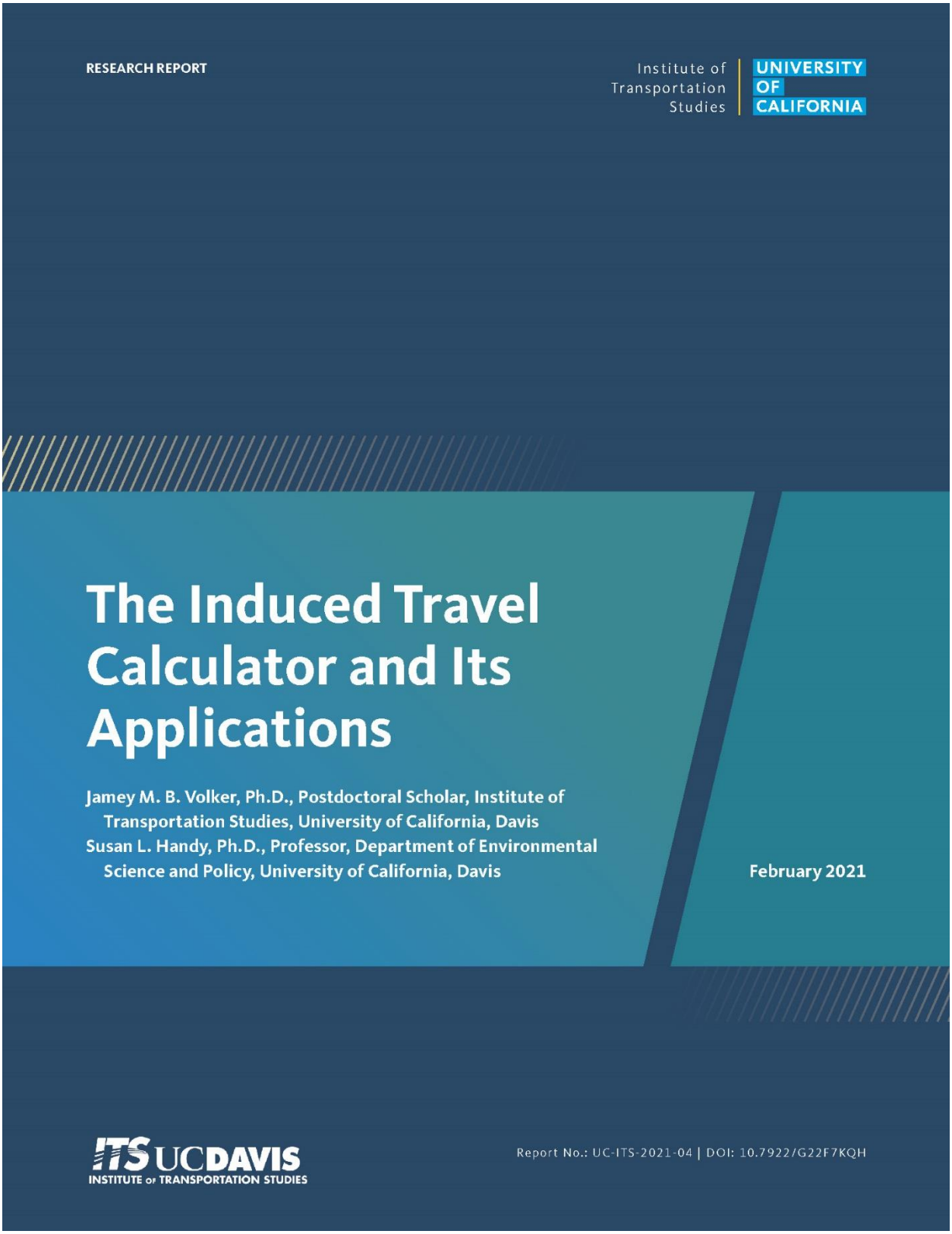
Vermont Statewide Resilience Modeling. With Joseph Segale, James Sullivan and Roy Schiff. Presented at the May 2017 Transportation Research Board Planning Applications Conference.

Assessing Freeway Expansion Projects with Regional Dynamic Traffic Assignment. Presented at the May 2017 Transportation Research Board Planning Applications Conference.

Pre-Destination Choice Walk Mode Choice Modeling. Presented at the May 2017 Transportation Research Board Planning Applications Conference.

A Statistical Model of Regional Traffic Congestion in the United States, presented at the 2016 Annual Meeting of the Transportation Research Board.

Exhibit H


RESEARCH REPORT
Institute of Transportation Studies
UNIVERSITY OF CALIFORNIA
The Induced Travel Calculator and Its Applications
Jamey M. B. Volker, Ph.D., Postdoctoral Scholar, Institute of Transportation Studies, University of California, Davis
Susan L. Handy, Ph.D., Professor, Department of Environmental Science and Policy, University of California, Davis
February 2021
ITS UCDAVIS
INSTITUTE OF TRANSPORTATION STUDIES
Report No.: UC-ITS-2021-04 | DOI: 10.7922/G22F7KQH

Technical Report Documentation Page

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		14. Sponsoring Agency Code UC ITS	
15. Supplementary Notes DOI:10.7922/G22F7KQH			

16. Abstract

The National Center for Sustainable Transportation's Induced Travel Calculator (Calculator) has generated substantial interest in the professional community as a method for estimating the additional vehicle miles traveled (VMT) induced by expanding the capacity of major roadways. The Institute of Transportation Studies at the University of California, Davis (ITS-Davis) initiated a technical assistance project to support Caltrans and others in applying the Calculator. This report: (1) provides an overview of the Calculator and the induced vehicle travel effect, (2) summarizes the results from an earlier study comparing the Calculator's estimates with other induced travel analyses, (3) describes the technical assistance efforts and outcomes, and (4) discusses plans for future improvements to the Calculator. During the project, ITS-Davis advised Caltrans as it developed its Transportation Analysis Framework to guide transportation impact analysis for projects on the State Highway System. Caltrans published the final document in September 2020, in which it recommends that the Calculator be used where possible to estimate induced VMT. ITS-Davis also advised on efforts to apply the Calculator's elasticity-based method to estimate induced VMT from out-of-state highway capacity expansion projects, including projects in Portland, Oregon, Washington, D.C., Kenya, and China. In a follow-up project, ITS-Davis will work with Caltrans to improve the Calculator documentation to answer questions raised by Caltrans and others, explore possible technical improvements to the Calculator, and explore opportunities for assessing the validity of the Calculator's induced VMT estimates.

17. Key Words Vehicle miles of travel, travel demand, road construction, traffic, traffic forecasting, calculators, mathematical models		**18. Distribution Statement** No restrictions.	
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The University of California Institute of Transportation Studies (UC ITS) is a network of faculty, research and administrative staff, and students dedicated to advancing the state of the art in transportation engineering, planning, and policy for the people of California. Established by the Legislature in 1947, ITS has branches at UC Berkeley, UC Davis, UC Irvine, and UCLA.

Acknowledgments

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Disclaimer

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Institute of Transportation Studies | UNIVERSITY OF CALIFORNIA

The Induced Travel Calculator and Its Applications

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February 2021

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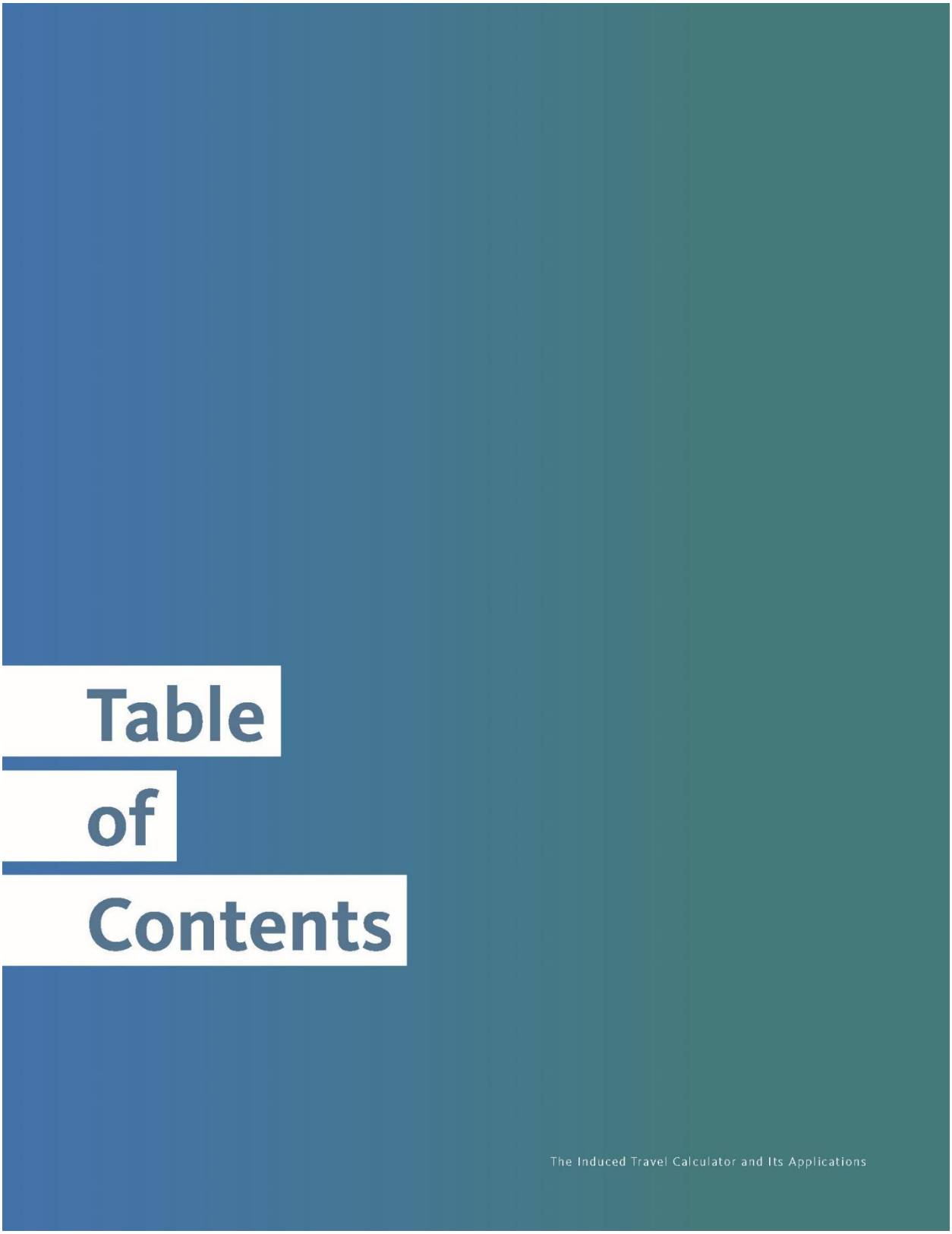

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The Induced Travel Calculator and Its Applications

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Glossary

Caltrans	California Department of Transportation
CEQA	California Environmental Quality Act
FWHA	Federal Highway Administration
HOV	high-occupancy vehicle
HPMS	Highway Performance Monitoring System
MSA	metropolitan statistical area
NCST	National Center for Sustainable Transportation
TSN	Transportation System Network
VMT	vehicle miles traveled


Executive
Summary
The Induced Travel Calculator and Its Applications

Executive Summary

In early 2019, the National Center for Sustainable Transportation developed and launched an online tool that allows users to estimate the additional vehicle travel induced by expanding the capacity of major roadways in California's urbanized counties (i.e., counties within Census-defined metropolitan statistical areas). The Induced Travel Calculator (Calculator) has generated substantial interest among policymakers and practitioners as a method for estimating induced vehicle miles traveled (VMT). Approximately 1,800 people used the Calculator at least once in 2020. At the Institute of Transportation Studies at University of California, Davis (ITS-Davis), we initiated a technical assistance project to support Caltrans and others in applying the Calculator.

This report describes our technical assistance efforts and outcomes, as well as our plans for future improvements to the Calculator. We also discuss the induced vehicle travel effect, our impetus for developing a tool to estimate induced VMT, and how the Calculator works. In addition, we summarize the results from an earlier study we conducted to better understand how the Calculator's induced VMT estimates compare to other induced travel analyses. In that study we applied the Calculator to estimate the VMT induced by five highway expansion projects in California and compared our estimates with the induced travel analysis completed for the projects' actual environmental impact assessments.

During the project we advised Caltrans as it developed its Transportation Analysis Framework to guide transportation impact analysis for projects on the State Highway System. Caltrans published the final document in September 2020, in which it recommends that the Calculator be used where possible to estimate—or at least benchmark—induced VMT. We also advised on efforts to apply the Calculator's elasticity-based method to estimate induced VMT from out-of-state highway capacity expansion projects, including projects in Portland, Oregon, Washington, D.C., Kenya, and China.

With growing usage, it is essential that the Calculator be maintained and, where feasible, improved to better meet transportation impact analysis needs in California and elsewhere. To that end, we will work with Caltrans on a follow-up project to: (1) improve the Calculator documentation to answer questions raised by Caltrans and others; (2) explore possible technical improvements to the Calculator; and (3) explore opportunities for assessing the validity of the Calculator's induced VMT estimates.


Contents
The Induced Travel Calculator and Its Applications

Introduction

Roadway capacity expansion is often proposed as a solution to traffic congestion and even as a way to reduce greenhouse gas (GHG) emissions. The cited logic is often that increasing roadway capacity increases average vehicle speeds, which improves vehicle fuel efficiency and reduces per-mile emissions of GHGs and local air pollutants. But that logic is flawed because it fails to account for the induced vehicle travel effect. Constructing new highway lanes generally increases the average speed of highway traffic and thereby reduces the effective cost of driving on the highway. That, in turn, induces more travel on the highway and more vehicle miles traveled (VMT), which often increase traffic congestion back to pre-expansion levels.

Despite its importance, the induced travel effect is often not fully accounted for in travel demand models or in the environmental review process for capacity expansion projects. This often results in agencies overestimating the benefits of highway capacity expansions (like reduced traffic congestion) and underestimating the environmental costs (like emissions of GHGs and local air pollutants) (Naess, Nicolaisen and Strand, 2012; Milam et al., 2017).

With these problems in mind, we developed an online tool to help agencies estimate the VMT induced annually by adding lanes to major roadways in California's urbanized counties. The website[1] for the Induced Travel Calculator (Calculator) went live in early 2019, and we followed its release with several education and outreach activities, including a recorded webinar[2] in May 2019. Our outreach efforts spurred continuing discussions with the California Department of Transportation (Caltrans) and others about incorporating the Calculator into environmental impact analyses for highway capacity expansion projects. Those discussions highlighted three things in particular:

1. a need to better understand how the Calculator's estimates of induced VMT compare to other induced travel analyses;
2. a need for the National Center for Sustainable Transportation (NCST) to provided continued technical assistance to agencies and other practitioners in applying the Calculator; and
3. an ongoing need to maintain the Calculator and update and improve its functionality where feasible.

We started to address the first need as part of an earlier project, where we applied the Calculator to estimate the VMT induced by five highway expansion projects in the state that had undergone environmental review within the last 15 years. This short-term follow-up project focused on the second and third needs. We provided continued advice and technical assistance to Caltrans as it formulated its Transportation Analysis Framework – its guidance for the evaluation of environmental impacts for highway projects under the California

[1] The Calculator is currently available here: https://blinktag.com/induced-travel-calculator. Note that we might move the Calculator to a new website in the coming year. Regardless of where the Calculator is hosted, this page will always contain a link to the correct page: https://ncst.ucdavis.edu/research-product/induced-travel-calculator.
[2] Available at https://its.ucdavis.edu/webinar/a-new-web-tool-to-calculate-induced-travel.

Environmental Quality Act (CEQA). We also consulted with other agencies and practitioners about applying the Calculator, including adapting it for use outside of California. In addition, we developed a plan and obtained funding for improving the Calculator in 2021.

This report proceeds as follows. The next (second) chapter provides background on induced travel. The third chapter describes the Calculator. The fourth chapter summarizes the results from our comparative analysis of the induced VMT estimation for five capacity expansion projects in California. The fifth chapter summarizes our technical assistance efforts and outcomes. The sixth chapter discusses our plan for improving the Calculator. And the seventh concludes.

Background on Induced Vehicle Travel

Induced travel is a well-documented effect in which expanding capacity on a highway (or other major roadway) increases the average travel speed on the highway or provides access to previously inaccessible areas, both of which reduce the perceived "cost" of driving and thereby induce more driving (Handy, 2015). In the shorter term, the reduced time cost of vehicle travel can cause people to substitute driving for other travel modes, elongate their driving routes, or take additional trips. These behavioral responses can affect both personal and commercial driving (Duranton and Turner, 2011; Milam *et al.*, 2017). In the longer term, it can lead people to live farther away from where they work (or vice versa) and even spur commercial or residential growth in the region (Duranton and Turner, 2011; Milam *et al.*, 2017). Figure 1 illustrates the induced travel effect.

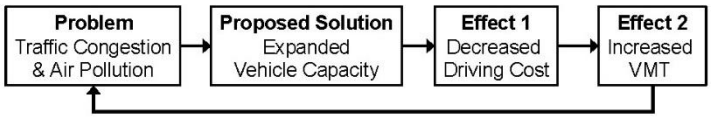


Figure 1. Induced Vehicle Travel Effect of Highway Capacity Expansions

The magnitude of the induced travel effect is typically measured as the elasticity of VMT with respect to lane miles, as shown in Equation 1. The elasticity is the percentage in VMT that results from a 1% increase in lane miles. An elasticity of 1.0 means that VMT will increase by the same percentage as the increase in lane miles.

$$\text{Elasticity} = \frac{\%\ \text{Change in VMT}}{\%\ \text{Change in Lane Miles}} \qquad \text{(Eq. 1)}$$

There is ample support in the literature for the induced travel effect. Handy and Boarnet (2014, p. 4) reviewed the induced travel studies published between 1997 and 2011 and concluded that the "best estimate of the long-run effect of highway capacity on VMT is an elasticity close to 1.0." That means that within 5 to 10 years after construction of the capacity expansion, VMT will have increased by a commensurate percentage, likely negating any initial reduction in traffic congestion.

Most recent studies have estimated elasticities in the same ballpark for capacity expansions on major roadways—like interstates, freeways, highways, expressways, and principal arterials—in urbanized areas (Duranton and Turner, 2011; Melo, Graham and Canavan, 2012; Graham *et al.*, 2014; Hsu and Zhang, 2014; Hymel, 2019). The consistency is particularly robust because the studies have used a wide range of methods to control for other VMT-inducing factors and the bi-directional relationship (simultaneity) between VMT and capacity expansion. Table 1 summarizes the five econometric studies of induced travel in urbanized areas that we identified from our review of the peer-reviewed journal literature over the last 10 years (2011-2020).

Table 1. Recent Studies Estimating Induced Travel Elasticities

Authors	Study Location	Study Years	Roadway Types	Methodology (Estimator)	Elasticity
Duranton & Turner (2011)	United States (metropolitan statistical areas)	1983–2003	Interstate highways	2-stage least squares regression with instrumental variables	1.03 (10 year)
			Other highways, principal arterials, collectors, and minor arterials	Pooled ordinary least squares	0.67–0.89 (10 year)
Melo et al. (2012)	United States (urbanized areas)	1982–2010	Arterials	Generalized method of moments	0.98 (~10 year)
Graham et al. (2014)	United States (urbanized areas)	1985–2010	Freeways and arterials	Propensity score	0.77 (~10 year)
Hsu & Zhang (2014)	Japan (urban employment areas)	1990–2005	National expressways	2-stage least squares regression with instrumental variables	1.24–1.34 (3-5 year)
Hymel (2019)	United States (urban areas)	1981–2015	Freeways and other limited-access roads	2-stage least squares regression with instrumental variables	0.89–1.06 (5 year)

Notes: Most of the studies compared multiple estimators and model specifications. The table attempts to summarize the preferred estimators and elasticities reported by the studies' authors.

The Induced Travel Calculator

A growing body of empirical evidence demonstrates the induced travel effect, and mitigating induced VMT is vital to reducing GHG emissions. Nonetheless, induced travel is often not fully accounted for in travel demand models or in the environmental review process for capacity expansion projects (Naess, Nicolaisen and Strand, 2012; Milam *et al.*, 2017). The primary issue is that most models do not include all of the feedback loops necessary to capture the behavioral changes caused by capacity expansion (Milam *et al.*, 2017; Litman, 2019). For example, not many models feed changes in estimated travel times back into the trip distribution or trip generation stages of the model, which ignores the possibility that improved travel times from a capacity expansion will: (a) increase the number of trips that households and freight operators choose to make, or (b) cause them to choose more distant trip destinations. Neither do most models feed changes in estimated travel times back into assumptions about the growth and distribution of population and employment.

With these limitations in mind, we developed an online tool to help agencies estimate the VMT induced annually by adding lanes to major roadways in California's urbanized counties. We followed Milam et al.'s (2017, p. 6) recommendation to produce "elasticity-based estimates of VMT levels derived from the project's lane mile changes" and the elasticity values reported in the literature. The Induced Travel Calculator estimates project-induced VMT using the project length entered by the user, lane-mile and VMT data from Caltrans, and estimates of elasticities from peer-reviewed studies. To estimate the induced VMT for capacity expansion projects, the Calculator solves the following equation (Equation 2) based on the user-specified project geography and lane mile length:

$$\%\,\Delta \text{ Lane Miles} * \text{Existing VMT} * \text{Elasticity} = \text{Project-Induced VMT} \qquad \text{(Eq. 2)}$$

The Calculator produces long-run estimates of induced VMT—the additional annual VMT that could be expected 5 to 10 years after facility installation. All estimates account for the possibility that some of the increased VMT on the expanded facility is traffic diverted from other types of roads in the network, though the studies generally show that "capacity expansion leads to a net increase in VMT, not simply a shifting of VMT from one road to another" (Handy & Boarnet, 2014, p. 5).

The Calculator currently applies only to public (not private) facilities with Federal Highway Administration (FHWA) functional classifications of 1, 2, or 3 in one of California's urbanized counties (the 37 counties within a metropolitan statistical area [MSA]). That corresponds to interstate highways (class 1), other freeways and expressways (class 2), and other principal arterials (class 3). The Calculator is also limited to use for capacity expansions (lane additions, roadway lengthening, and new facility construction). It cannot be used to estimate the VMT effects of capacity reductions, and it should not be used to estimate the induced VMT from lane type conversions without supplemental analysis. In addition, the Calculator is conservatively limited to use for additions of general-purpose and high-occupancy vehicle (HOV) lanes. It should not be used to estimate induced VMT from additions of toll lanes without supplemental analysis. Other caveats also apply to using the Calculator,

which are enumerated on the Calculator website.[3] We describe below the data sources and specifications for the inputs to the Calculator equation.

Lane Mile Data

The Calculator uses 2016 lane mileage data from Caltrans' Transportation System Network (TSN) database (similarly reported in the Highway Performance Monitoring System [HPMS]). The percent change in lane miles is calculated by dividing the number of project-added lane miles (input by the user) by the total lane miles of the same facility type in the same geography. For interstate highways (FHWA functional class 1), lane mileage is calculated at the MSA level. For other Caltrans-managed freeways, expressways and major arterials (classes 2 and 3), lane mileage is calculated at the county level. The choice of geographies is discussed further below, in conjunction with elasticities. The data are available on the Calculator website.

VMT Data

The Calculator uses 2016 VMT data retrieved using Caltrans' TSN and HPMS database. The VMT is tallied for each county and each FHWA functional classification. Existing VMT on interstate highways (FHWA functional class 1) is calculated at the MSA level, and existing VMT on other Caltrans-managed freeways, expressways, and major arterials (classes 2 and 3) is calculated at the county level. The data are available on the Calculator website.

Elasticities

The Calculator uses an elasticity of 1.0 for lane additions to interstate highways, and an elasticity of 0.75 for lane additions to class 2 or 3 facilities.

For interstate highways (class 1 facilities), the 1.0 elasticity derives from Duranton and Turner (2011) and is consistent with the more recent studies that likewise use robust statistical methods to estimate induced travel elasticities while addressing the simultaneity bias (the fact that increasing VMT can spur roadway expansion in addition to being caused by it) (see Table 1). At the time we developed the Calculator, Duranton and Turner (2011) was the most recent study we could find that used data across broad areas of the United States to estimate induced travel elasticities for class 1 facilities. And it remains perhaps the most thorough and stringently vetted induced travel study to date. Duranton and Turner's study used data from 1983, 1993, and 2003 for all MSAs in the US that had nonzero interstate lane mileage in all three years. Among other modeling, the study used a two-stage least squares regression with three instrumental variables to estimate the elasticity

[3] The Calculator is currently available here: https://blinktag.com/induced-travel-calculator. Note that we might move the Calculator to a new website in the coming year. Regardless of where the Calculator is hosted, this page will always contain a link to the correct page: https://ncst.ucdavis.edu/research-product/induced-travel-calculator.

of vehicle kilometers traveled on interstate highways in the 228 studied MSAs with respect to interstate lane kilometers in those MSAs. The authors concluded that their estimation method better controls for the possible bi-directional relationship between VMT and lane miles than do the methods used in previous studies. Using that "preferred estimation method," their "preferred estimate" was a long-run (10-year) elasticity of 1.03. However, while the authors concluded that "diversion of traffic from other road networks does not appear to play a large role," they cautioned that they could not "rule out the absence of a substitution effect" (p. 2646). They estimated that the "diversion of traffic from other classes of roads accounts for between 0 and 10 percent of the total [induced] interstate VKT [vehicle kilometers traveled]" (p. 2644).

Like Duranton and Turner (2011), the Calculator uses MSAs as the unit of analysis for interstate highway capacity expansions. The Calculator also uses a similar VMT elasticity (1.0), albeit rounded down (in part to account for the small potential substitution effect). That accords with Handy and Boarnet's (2014) conclusion that the best estimate for the long-run VMT elasticity for highway lane additions is close to 1.0. It is also consistent with the more recent econometric studies that have estimated long-run induced VMT elasticities (Table 1).

For other publicly managed highways, expressways and major arterials (class 2 and 3 facilities), the 0.75 elasticity derives from Duranton and Turner (2011) and Cervero and Hansen (2002), as well as the subsequent studies summarized in Table 1. While Duranton and Turner (2011) could not use their preferred method to estimate elasticities for state highways and other "major roads"[4] besides interstates, their elasticity estimates using ordinary least squares regression all fall between 0.67 and 0.89. Cervero and Hansen (2002) similarly estimated an intermediate-run (5-year) VMT elasticity of 0.79 for lane mile additions to state-owned roadways in California's urbanized counties (then numbering 34, and now 37), using three-stage least squares regression. Those elasticities are similar to other longer-term elasticities calculated for combined major road types (not just interstate highways) in California and across the US (see Table 1 for recent studies; see Handy and Boarnet (2014) for earlier studies).

Like Cervero and Hansen (2002), the Calculator uses urbanized counties (those within MSAs) as the unit of analysis for capacity expansions on non-interstate highways, expressways, and major arterials managed by a governmental agency (mostly Caltrans). The Calculator also uses a similar VMT elasticity (0.75) for those facilities as Cervero and Hansen (2002) estimated for state-owned and maintained roadways (0.79), and within the range Duranton and Turner (2011) found for non-interstate "major roads" in the urbanized areas of MSAs (0.67 to 0.89). The Calculator's 0.75 elasticity is rounded down from the estimates of Cervero and Hansen (2002) and Duranton and Turner (2011), in part to account for the small potential substitution effect discussed in Duranton and Turner (2011). The 0.75 elasticity is also consistent with the longer-term elasticities calculated in other recent studies for combined major road types in the US (Melo, Graham and Canavan, 2012; Graham *et al.*, 2014; Hymel, 2019).

[4] Besides non-interstate highways, these "major roads" included principal arterials, minor arterials, and collectors.

Comparing the Calculator Estimates to the Induced Travel Analyses for Five Highway Projects in California

Our conversations with Caltrans and others highlighted a need to better understand how the Calculator's induced VMT estimates compare to other induced travel analyses. We started to address that need as part of an earlier project, where we applied the Calculator to estimate the VMT induced by five highway expansion projects in the state that had undergone environmental review within the last 15 years. The five projects are: (1) the U.S. Highway 101 HOV Widening (Marin-Sonoma Narrows), (2) State Route 1 Corridor Analysis of HOV Lanes (Santa Cruz), (3) the State Route 210 Mixed-Flow Lane Addition (San Bernardino), (4) the State Route 99 South Stockton Six-Lane Project, and (5) the Interstate 405 HOV Widening. After estimating each project's induced VMT using the Calculator, we compared each estimate with the corresponding induced travel analysis completed for the project's actual environmental impact assessments (Volker, Lee and Handy, 2020).

We found that the environmental analysis documents for the five projects varied wildly in their discussion of induced vehicle travel impacts. Two documents did not discuss the induced travel phenomenon at all. And the only two documents to analyze it in detail did so in responses to comments, not in the original analysis. Even when the documents did analyze induced travel in detail, the discussion of the effect was internally inconsistent and inconsistent with the induced travel literature.

In terms of quantitative analysis, three of the five documents reported estimates of induced VMT. And all three estimates were lower than what we estimated using the Calculator. In two of the three cases, the estimates were an order of magnitude lower. Figure 2 compares the estimates.

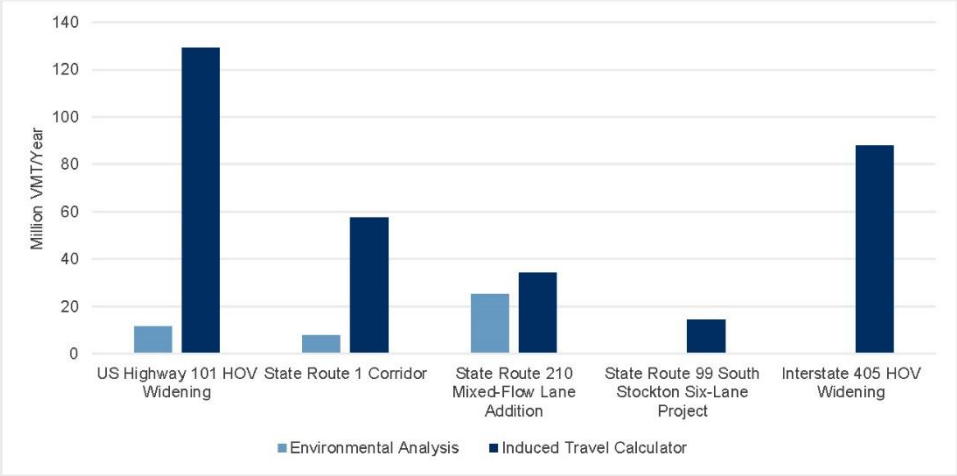


Figure 2. Induced VMT Estimates for the Five Highway Expansion Projects

Overall, our results provide additional evidence that environmental analyses often fail to consistently and accurately discuss—let alone estimate—the induced travel effects of highway capacity expansion projects. Our full analysis is published in the Transportation Research Record: Journal of the Transportation Research Board (Volker, Lee and Handy, 2020).

Technical Assistance Efforts and Planned Improvements to the Calculator

Our conversations with Caltrans and others highlighted several needs in addition to better understanding how the Calculator compares to other induced travel analyses. These additional needs were: (1) for NCST to provided continued technical assistance to agencies and other practitioners in applying the Calculator; and (2) ongoing maintenance of the Calculator, and updates and improvements to its functionality where feasible. This short-term project focused on those two goals. We summarize our efforts and upcoming plans below.

Technical Assistance

Throughout 2020, we were in frequent communication with staff at Caltrans and other practitioners about how to use the Calculator more formally in environmental analyses of highway expansion projects, both in California and elsewhere. Most prominently, we provided technical assistance to Caltrans as it developed its Transportation Analysis Framework, which helps guide CEQA transportation impact analysis for projects on the State Highway System. That technical assistance entailed numerous emails and calls regarding how the Calculator works, the research and data that underpins it, and potential ways to improve the Calculator and the information on the Calculator website. We also conducted further literature reviews as part of this process and iteratively updated the Calculator website along the way. In addition, Dr. Handy was a panelist on the expert panel convened by Caltrans to guide its choice of induced travel estimation methods for the Transportation Analysis Framework. Dr. Volker also consulted with the panel in an informal capacity. Caltrans published the Transportation Analysis Framework in September, in which it recommended that the Calculator be used where possible to estimate—or at least benchmark—induced VMT: "In cases where the NCST Calculator can be directly used, it should either be used exclusively or used to benchmark results from a [travel demand model]" (California Department of Transportation, 2020, p. 14).

In addition to working with Caltrans, we also communicated about the Calculator with other agencies, NGOs, consultants, academics, and other interested people, primarily in response to queries about how to apply the Calculator (or induced travel concepts generally) to analyze highway capacity expansion projects, including projects elsewhere in the United States (outside of California) and even internationally. For example, we consulted with the Institute for Transportation and Development Policy about estimating the induced VMT from two proposed highway project in other countries. We advised consultants regarding estimating induced travel from highway projects in the Washington, D.C. and Portland, Oregon regions. We met with the Regional Modeling Working Group in the San Francisco Bay Area to discuss the Calculator. And we frequently receive and respond to informational queries about the Calculator from members of the public.

Overall, our technical assistance efforts have both responded and contributed to the substantial interest in the Calculator. Across the last calendar year (2020), approximately 1,800 people used the Calculator at least once, according to Google Analytics.

Updating and Improving the Calculator

Particularly now that Caltrans has recommended using the Calculator in transportation impact analyses for projects on the State Highway System, it is essential that the Calculator be maintained and, where feasible, improved to better meet transportation impact analysis needs in California and elsewhere. To that end, we executed a contract agreement with Caltrans (State Agreement 65A0686) to explore, implement, and recommend possible improvements to the Calculator. More specifically, we plan to do three things.

First, we will improve the Calculator documentation to answer questions raised by Caltrans and others. That will include adding an FAQ page to the website, with answers to frequently asked questions like these:

- Are auxiliary lane miles included in the data used to estimate the elasticities?
- Is truck VMT included in the estimates of the elasticities?
- How do the econometric methods used in the empirical studies from which the elasticities are taken control for factors such as population growth, economic downturn, and gas price change?
- Is it appropriate to apply lower elasticities in areas with less traffic congestion?

Second, we will explore possible technical improvements to the Calculator. These include both near-term improvements based on available research and data, as well as long-term improvements that would require additional research and/or data collection. Potential improvements we will explore include the following:

- Updating the lane mile and VMT data from 2016 to more recent data;
- Applying the Calculator to toll lanes;
- Providing induced VMT estimates specific to general purpose lanes, HOV lanes, and high-occupancy toll lanes;
- Allowing users to adjust the induced VMT calculations based on project context; and
- Providing guidance using an elasticity-based method to estimate induced VMT from projects outside of California.

Third, we will explore opportunities for assessing the validity of the Calculator's induced VMT estimates. This might involve, for example, applying the Calculator to actual projects in a variety of contexts and comparing its estimates to those from travel demand models. However, a true validation of the Calculator might not be possible, given the long periods of time over which projects are constructed and induced travel effects occur, as well as the challenge of isolating the effect of capacity expansion from the effects of other factors in real-world settings.

Conclusion

The induced travel effect is often not fully accounted for in travel demand models or in the environmental review process for capacity expansion projects. We developed an online tool—the NCST Induced Travel Calculator—to help agencies estimate the VMT induced annually by adding lanes to major roadways in California's urbanized counties. We also provided technical assistance on the Calculator and induced VMT estimation to Caltrans, other agencies, NGOs, consultants, academics, and other interested people. Caltrans now officially recommends using the Calculator in transportation impact analyses for projects on the State Highway System. Efforts have also been made to apply the Calculator's elasticity-based method to estimate induced VMT from out-of-state highway capacity expansion projects. With growing usage, it is essential that the Calculator be maintained and, where feasible, improved to better meet transportation impact analysis needs in California and elsewhere. To that end, we have a new contract with Caltrans to (1) improve the Calculator documentation to answer questions raised by Caltrans and others; (2) explore possible technical improvements to the Calculator; and (3) explore opportunities for assessing the validity of the Calculator's induced VMT estimates.

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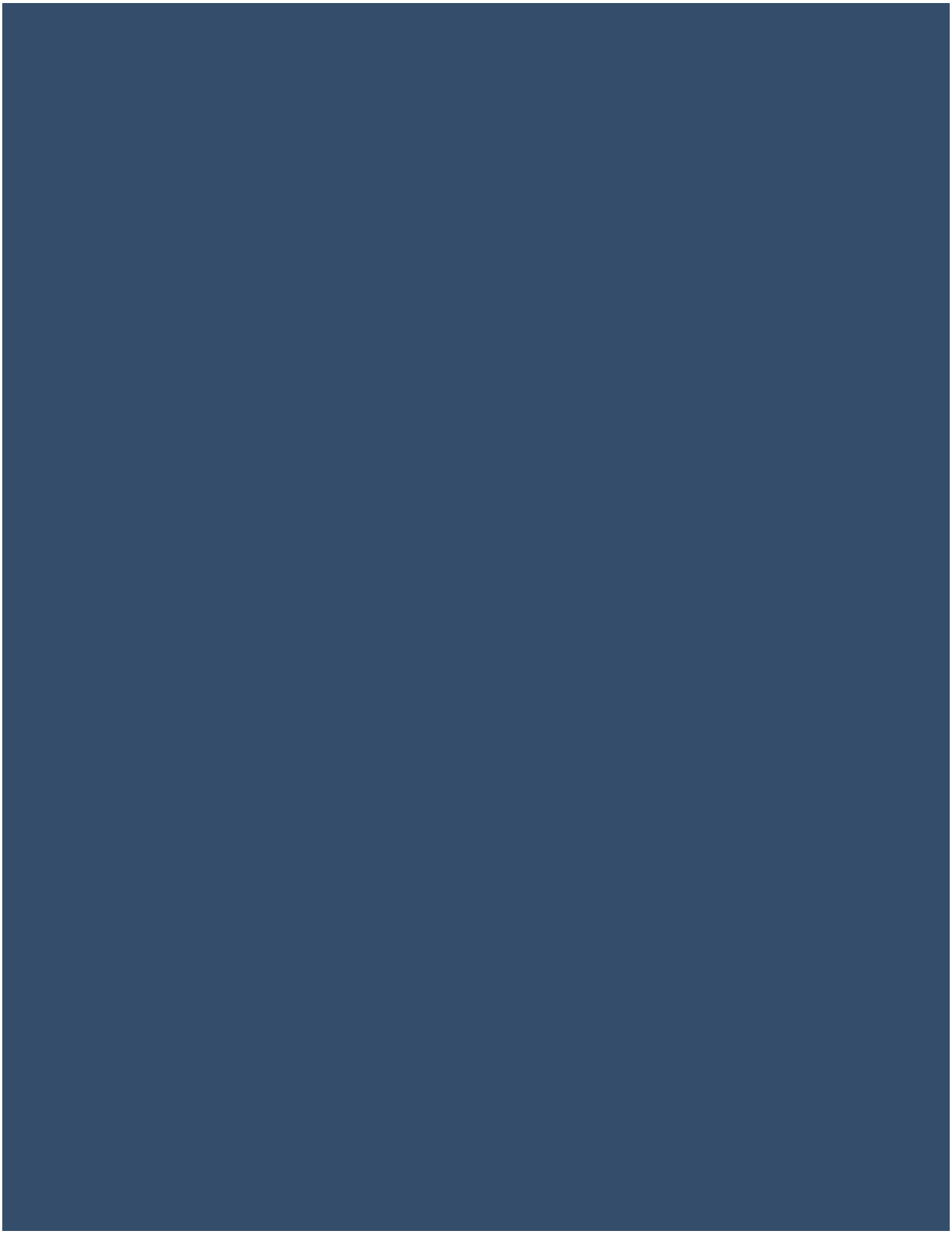


Exhibit I



Transportation Analysis Framework

First Edition

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Evaluating Transportation Impacts of State Highway System Projects

California Department of Transportation
Sacramento, California
September 2020

ACKNOWLEDGEMENTS

The *Transportation Analysis Framework* (TAF) and *Transportation Analysis Under CEQA* (TAC) were prepared by the California Department of Transportation working with State Administration partners and Stakeholders from the public, private and non-profit sectors. Contributors within the Department included staff and management from the Headquarters Divisions of Environmental Analysis, Transportation Planning, Traffic Operations, and Legal, as well as from the Director's Office Sustainability Team. The Headquarters team benefitted from input provided by the Caltrans Executive Team as well as by staff and management from Caltrans districts.

The documents are the products of a collaboration among State government partners. Throughout the development of the documents, the Caltrans team worked closely with technical and policy experts from the Governor's Office of Policy and Research and the California Air Resources Board.

A list of the individuals who contributed to the preparation of the TAF and TAC is included at the end of this document. We are grateful for the time and effort that they generously gave to develop and document the Department's new approach to analyzing and evaluating transportation impacts of projects on the State Highway System.

LETTER FROM THE DIRECTOR

To Caltrans staff, partners, and stakeholders,



I am pleased to issue the enclosed guidance document: *Transportation Analysis Framework* (TAF) as part of the California Department of Transportation's (Caltrans) continuing commitment to implement the California Environmental Quality Act (CEQA) in alignment with State goals and policies. The TAF, and its companion document, *Transportation Impacts Analysis under CEQA for Projects on the State Highway System* (TAC) provides Caltrans policy along with guidance for implementing Senate Bill (SB) 743 (Steinberg, 2013) codified at Public Resources Code section 21099.

The new processes being implemented through Caltrans' environmental program are a key part of Caltrans' increasingly important work to confront the challenge of climate change and build more livable communities. Caltrans is actively implementing strategies to reduce emission of greenhouse gases, including initiatives to use clean fuels and vehicles, and to reduce waste. Perhaps most importantly, we are rethinking the way we invest so people can drive less.

Reducing total driving, or Vehicle Miles Traveled, is the focus of the TAF, TAC and the associated changes to transportation impact analysis under CEQA for projects on the State Highway System. In plain terms, the more we drive our cars, the more damage we cause to the environment and our health—and the less time we spend with our families and communities. A Vehicle Miles Traveled-based approach supports transportation projects that create more travel choices, such as new rail lines, improved bus service, trails, paths, and safer streets for walking and bicycling. As these modes of transportation grow, we can reduce the dependence and burden on our already congested highway system.

Thank you to our partners and stakeholders, as well as to Caltrans staff, whose contributions have helped to shape this document. I look forward to your continued partnership as we make the changes needed to meet California's goals for climate, air quality, and public health. It's an exciting time to continue our commitment to provide more transportation options to Californians and reduce our dependence on driving.

Sincerely,

Toks Omishakin
Director

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FOREWORD

The *Transportation Analysis Framework* (TAF) and *Transportation Analysis under CEQA* (TAC) guide CEQA transportation impact analysis for projects on the State Highway System (SHS). The California Department of Transportation (Caltrans) has prepared these documents to guide implementation of Senate Bill (SB) 743 (Steinberg, 2013). The TAF and TAC establish Caltrans guidance on how to analyze induced travel associated with transportation projects and how to determine impact significance under CEQA, respectively. These documents guide transportation impact analysis for projects on the SHS only. The non-capacity-increasing maintenance projects like re-paving and filling potholes are unaffected, as are many safety improvements, including traffic calming measures to slow traffic, and transportation projects that create facilities for pedestrians and cyclists and transit projects.

In response to a high level of interest in the guidance from Caltrans' transportation partners, climate and environmental advocates and others, Caltrans has hosted a total of 130 meetings with stakeholders and provided a 60-day informal feedback period on the draft documents. Statewide outreach events included two external webinars attended by over 850 participants, and three external technical roundtables attended by more than 150 participants. These Caltrans events were supplemented by OPR's webinar and Office Hours outreach which reached over 3,500 participants. Additionally, Caltrans met regularly through the guidance development process with key stakeholders including the Self-help Counties Coalition, the ClimatePlan coalition, and the Rural Counties Task Force.

Caltrans received feedback on the drafts from 37 agencies including counties, cities, and MPOs as well as from consultants, advocates, coalitions and other State agencies. Throughout the process, a small number of controversial issues stood out. To address the difference of opinions around key technical issues, Caltrans convened an expert panel of academics and practitioners through UC Berkeley Tech Transfer. The panel chair presented the group's conclusions to stakeholders at a virtual Technical Roundtable prior to finalizing the group's recommendations. Caltrans and State partners have accepted the panel's recommendations, which are reflected in the guidance documents.

The Caltrans TAF and TAC guidance documents reflect a cultural shift for how Caltrans interprets, analyzes and mitigates transportation impacts. This shift will impact the entire project delivery process and shape the future of California's transportation system. The September 2020 TAF and TAC are the first versions of these materials, and we anticipate future improvement as our understanding and expertise deepens through implementation. Your continuing input and partnership with Caltrans will help further improve the guidance. Your commitment and participation in this ongoing work is appreciated.

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1 INTRODUCTION

1.1 OVERVIEW OF GUIDANCE DOCUMENTS

This document, *Transportation Analysis Framework: Evaluating Transportation Impacts of State Highway System Projects (TAF)* is one component of a set of materials prepared by Caltrans to guide the implementation of SB 743 (Steinberg, 2013). The TAF is a companion to the *Transportation Analysis under CEQA (TAC)*, which describes changes to the environmental review process for many projects on the State Highway System (SHS). These changes better align the analysis of transportation impacts with State objectives for greenhouse gas emissions reduction, preservation of the environment, and public health. Practitioners should consult both documents in conducting a transportation analysis.

Additionally, the Governor's Office of Planning and Research (OPR) has prepared a Technical Advisory on *Evaluating Transportation Impacts in CEQA* (OPR 2018) to assist agencies conducting a transportation impact analysis for both land use and transportation projects based on Vehicle Miles Traveled (VMT). Caltrans relied on OPR's recommendations in developing this guidance. Practitioners should consult the OPR Technical Advisory when evaluating transportation impacts of projects on the SHS.

1.2 PURPOSE OF THE TRANSPORTATION ANALYSIS FRAMEWORK

The purpose of this *Transportation Analysis Framework* is to assist Caltrans district staff and others responsible for assessing likely transportation impacts as part of environmental review of proposed projects on the SHS by providing guidance on the preferred approach for analyzing the VMT attributable to proposed projects (induced travel) in various project settings. The TAF and TAC together provide the guidance needed to implement amendments to the 2018 CEQA Guidelines and Caltrans policy for analyzing transportation impacts. The policy states:

Consistent with the language of Section 15064.3 of the CEQA Guidelines, Caltrans concurs that VMT is the most appropriate measure of transportation impacts under CEQA. The determination of significance of a VMT impact will require a supporting induced travel analysis for capacity-increasing transportation projects on the SHS when Caltrans is lead agency or when another entity acts as the lead agency.

Many types of projects will be unaffected by the use of VMT as the metric for determining transportation impacts because they are assumed not to lead to a substantial increase in vehicle travel. See Section 5.1 of the TAC for further detail regarding screening. Note that for transportation projects not on the SHS, per the CEQA Guidelines, local agencies have the discretion to select a different metric for determining transportation impacts.

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This Framework focuses on the analysis of transportation impacts only. It is not intended to supersede guidance for analysis under CEQA of other resources (such as air quality or noise) or under the National Environmental Policy Act (NEPA). Those analyses have their own distinct requirements.

The TAF is to be used in conjunction with the guidance provided in the TAC. The flow chart provided in Figure 1 illustrates the steps for transportation impact analysis using the TAC and TAF. As shown, if a project is determined to be of a type that is likely to induce travel, the analyst follows the framework described in the TAF. The TAF framework should be applied to the proposed project and all project alternatives. The results of applying the TAF's analytical framework is intended to provide the substantive information from which significance determinations under CEQA can be made, as further described in the TAC.

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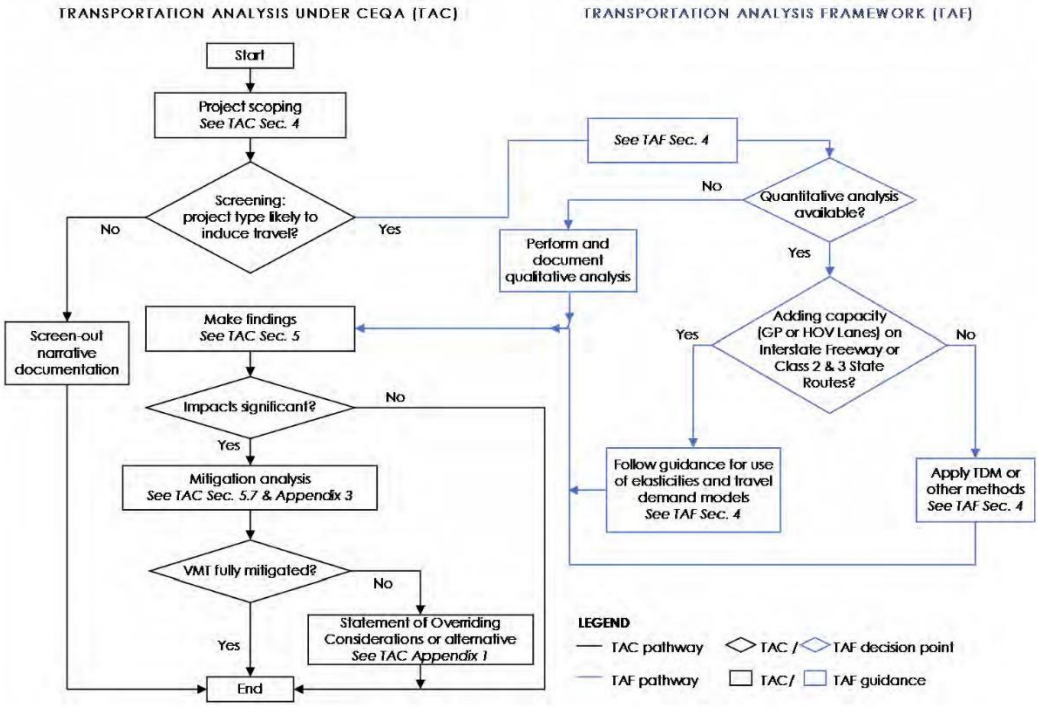


Figure 1. Steps in CEQA Transportation Impact Analysis for SHS Projects

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2 FUNDAMENTALS

2.1 FOCUS OF TRANSPORTATION IMPACT ANALYSIS

CEQA analysis of transportation impacts of proposed projects on the SHS focuses on the amount of driving attributable to the proposed project, measured as change in VMT. CEQA requires identifying, assessing and disclosing potentially adverse environmental impacts resulting from a project, i.e. impacts that would not occur but for the project. Generally stated, the transportation impact of a roadway project is the overall increase in VMT that is attributable to the project, distinct from any background changes in VMT due to other factors such as population or economic growth. The transportation impact is the difference in VMT with the project and without the project. The difference in VMT may be negative for some projects that reduce VMT; zero for projects which do not affect VMT or positive for those projects which are associated with an increase in VMT. The analysis reflects the phenomenon of induced travel, which is discussed below.

Generally, the project types associated with an increase in the total amount of driving are projects that add passenger vehicle and light duty truck capacity to the SHS. Many project types, including maintenance and rehabilitation projects as well as most safety projects, will be identified as unlikely to induce travel, requiring only screening and a narrative documenting that analysis and conclusion. Such projects are identified through the screening process depicted in Figure 1 and discussed in Section 5 of the TAC. Other types of projects are specifically excluded from transportation impact analysis process. These types of projects typically include pedestrian, bicycle and transit infrastructure projects.

2.2 INDUCED TRAVEL DEFINITION AND ILLUSTRATION

2.2.1 INDUCED TRAVEL DEFINITION

When transportation system changes effectively reduce the cost of travel to individuals and businesses, there is typically a change in user behavior. Induced travel is the term used to describe this phenomenon, which is illustrated conceptually in Figure 2. The reduction of travel time from T_1 to T_2 ($T_1>T_2$) due to network improvement leads to increased VMT from VMT_1 to VMT_2 ($VMT_1<VMT_2$).The reduced "cost" may be due to reduced travel time as shown in Figure 2, increased reliability, lower price, or some combination of factors.

The induced travel phenomenon manifests itself in multiple ways:

- Longer trips. The ability to travel a long distance in a shorter time increases the attractiveness of destinations that are farther away, increasing trip length and vehicle travel.

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- Changes in mode choice. When transportation investments reduce automobile travel time, travelers tend to shift toward automobile use from other modes, increasing vehicle travel.
- Route changes. Faster travel times attract more drivers to the altered route, which can increase or decrease VMT, depending on whether trips are shortened or lengthened.
- Newly generated trips. Shorter travel times can induce additional trips, which increases vehicle travel. For example, an individual who previously telecommuted or shopped online might choose to accomplish those tasks with car trips as they become quicker and less stressful.
- Location and land use changes. In choosing where to live or where to locate or expand a business, households and investors take travel costs into account. In choosing where to allow development, local governments take available capacity into account, as do investors in new development. Over the long term, changes associated with these decisions lead to further changes in the other aspects of travel (routes, modes, destinations, number of trips made) as people adjust to the choices available at the new location.

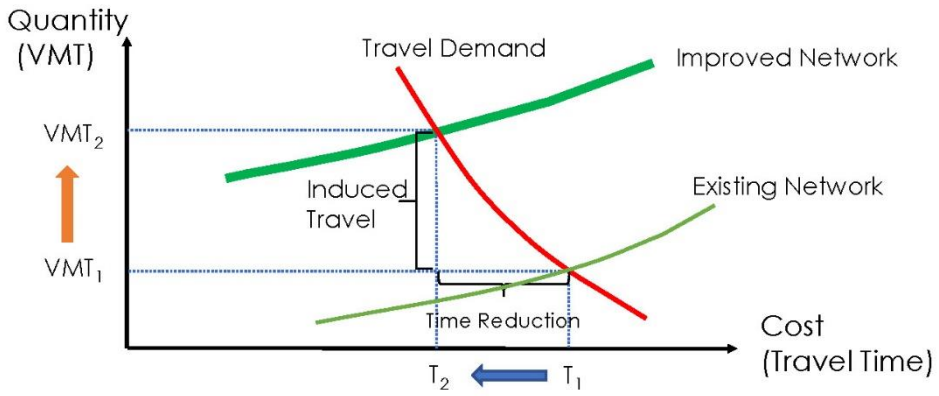


Figure 2. An Illustration of Induced Travel due to Reduced Travel Time

A variety of road project types can create the conditions where induced travel can occur (Noland and Lem, 2002). Importantly, induced travel is not limited to increased travel on the facility that has been changed. Trip-making in a wider area will be affected because of the various types of change described above. As illustrated conceptually in Figure 3a, a new connection across a natural barrier, a river in this case, may not only see increased travel between the points that directly benefit from the new connection (Town A and Town B); but may also alter travel patterns in a wider area. In the longer term, the nearby areas may see new development that would not have occurred in the absence of the increased transportation network capacity. In Figure 3b, the bypass will not only divert traffic away from the town

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center but may in the longer term generate development along the new connection and alter the travel pattern of the entire area. For example, town center stores may give way to big box stores along the new connection, stimulating additional driving.

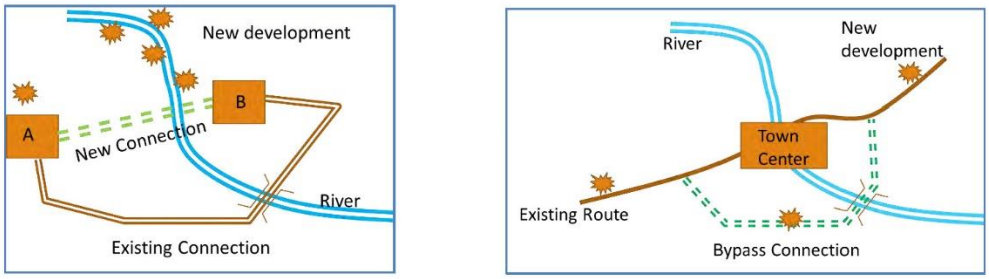


Figure 3. Connectivity and Induced Travel - Conceptual Sketches

As noted above, the changes in travel are not limited to the specific project and its environs, nor do they necessarily appear immediately; some of these changes are seen in the short term and in the project corridor, while others occur over a wider area (potentially, the commute shed and beyond) and play out over a time frame of many years. Some academic studies of the induced travel effect quantify both "short run" and "long run" induced travel effect magnitudes. Generally, "short run" magnitudes measure induced travel that occurs in the first year or two, while "long run" magnitudes measure induced travel that occurs in 5-10 years. The long-run induced travel effect that combines direct impacts with the indirect impacts stimulated by land use change is the full effect of a project. Even roads that simply provide greater access under conditions of no congestion may facilitate development in locations that lead to increased travel.

Additional vehicle travel provides additional mobility benefits to users and may also support expanded access to housing and employment opportunities. However, additional travel also tends to increase negative externality costs. Induced travel will reduce the effectiveness of capacity expansion as a strategy for alleviating traffic congestion and may reduce the benefits of such projects in lowering emissions. Mobility and accessibility increases can still be valuable, but their benefits may be offset partially or entirely by the impacts of added travel.

2.2.2 INDUCED TRAVEL - ILLUSTRATION

With a hypothetical project, Figure 4 illustrates the induced travel effect unfolding over time. The baseline trend, shown in the figure by the line labeled "VMT Without Project", shows the VMT on the network growing over time, perhaps the result of population and/or economic growth. On the other hand, the increase in vehicle travel associated with the increase in network capacity is shown by the line labeled

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"VMT With Project". The VMT attributable to the project, or induced travel, is the difference between VMT on the network with the project compared to VMT on the network without the project counted in the horizon year.

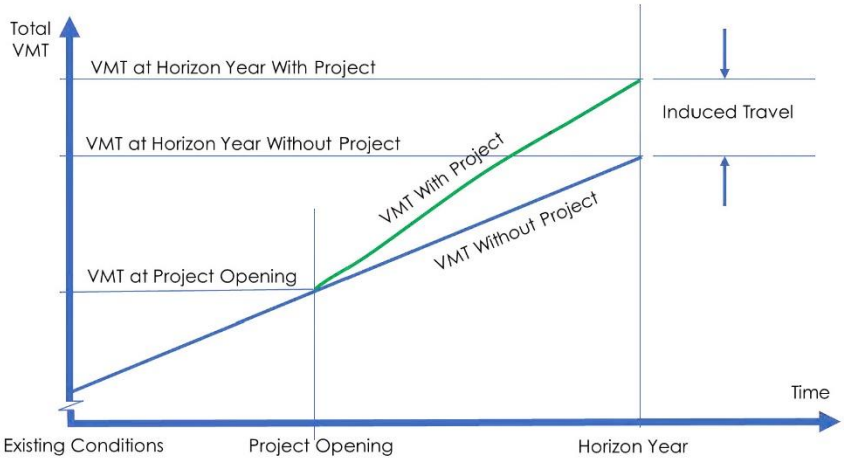


Figure 4. Identification of Induced Travel (VMT Attributable to a Transportation Project)

While the theory behind induced travel is straightforward, empirically estimating this effect has proven to be complicated, as a brief overview of the literature illustrates. The extent to which travel changes occur depends on the elasticity of travel demand, but how to estimate that elasticity and its effects over a network and over time has been debated. The next section of the TAF describes the most common tools for estimating induced travel. Section 4 then provides guidance on selecting the appropriate tools for analysis of specific projects. See, e.g., literature reviews in Cervero, 2002; Noland and Lem, 2002; Duranton and Turner, 2011; Handy and Boarnet 2014a; Handy and Boarnet 2014b; and Milam et al. 2017.

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3 TOOLS FOR ESTIMATING INDUCED TRAVEL

3.1 OVERVIEW

Projecting the amount of induced travel attributable to a project is complex. Travel growth associated with overall population and economic growth need to be separated from the likely effects of system investments, and changes can occur over many years and a large area. It is not a simple matter of monitoring traffic on the particular facility and its immediate environs, because some of the travel changes are likely to affect other elements of the overall transportation system. As described above in Section 2, induced travel can result in trips diverted to different routes, trips switched to different modes; longer trips reflecting the choices of farther destinations, and additional trips. In addition, transportation improvements can affect the relative attractiveness of different locations for both housing and commercial development, leading to land development projects that in the longer term can reshape the pattern of activity and trip making in the region. Because of these complexities, studies of induced travel have turned to a variety of models to help identify the key factors affecting VMT.

Methods used to study induced travel include models specifically investigating the effects of transportation investments on induced travel, travel demand models designed for multiple analysis and forecasting tasks and sometimes used to estimate the share of travel that is induced, and case studies of travel growth and its causes in particular corridors and regions. The guidance provided in Section 4 directs CEQA practitioners to select and apply a single method or a combination of methods based on project characteristics and context and the applicability of the available tools. A general discussion of the two primary tools available for estimating induced travel in connection with infrastructure investments is provided below. Elasticity-based methods including the National Center for Sustainable Transportation (NCST) induced travel calculator are discussed in Section 3.2 and use of travel demand models is discussed in Section 3.3.

3.2 ELASTICITY-BASED METHODS

A key approach in representing the induced travel effect is reporting it as an elasticity based on empirical studies of changes in travel associated with past increases in roadway capacity. Mathematically, the elasticity of VMT is the percent increase in VMT associated with a given percent increase in roadway lane miles. Over time, both short-term and longer-term estimates of the elasticity of VMT with respect to highway improvements (most commonly measured in lane miles) have been produced for different types of facilities and for different geographic scales, with increasingly sophisticated methods controlling for the overall effects of growth and other factors also affecting VMT.

The NCST at the University of California at Davis has developed an online tool, the NCST induced travel calculator, that uses elasticities to estimate induced travel

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associated with the addition of new general purpose (GP) or high occupancy vehicle (HOV) lanes on the SHS. Guidance for the use of the NCST induced travel calculator, (referred to here as "the NCST Calculator" or "the Calculator"), is provided in Section 4. This Section describes strengths and limitations of the Calculator to provide users with a deeper understanding of this tool.

The NCST Calculator incorporates elasticities of VMT with respect to capacity increases, drawing on the best available peer-reviewed papers on the topic; other recent high-quality studies have reported similar elasticities to those used in the Calculator (NCST 2019a; NCST 2019b; and Panel Report 2020). The cited studies control for other factors that could confound the estimates. The use of these elasticities in the estimation of induced travel is reasonable. However, analysts need to be aware that they are long-term average elasticities for the particular highway types and contexts studied. Some project-to-project variation is to be expected. Recognizing this, the guidance in Section 4 advises using the Calculator's results to benchmark results from other methods, and it also provides analysts with an opportunity to document why particular projects can be reasonably expected to result in changes that vary more substantially from the Calculator's results.

The panel of academics and practitioners that advised the team developing this guidance concluded that:

- The peer-reviewed studies the Calculator has chosen to rely upon are widely considered to be the best available, and other recent studies have found similar elasticities, adding credence to those used by the Calculator;
- The standard errors for the models estimating the elasticities are reported in the papers and are at acceptable levels;
- The elasticities extracted from the studies account for the full set of possible impacts and distinguish infrastructure-induced VMT impacts from other factors that could be driving observed changes (e.g., general growth in population and economic activity);
- Since the elasticities in the calculator are based on traffic count and lane mileage data and are derived from econometric analyses that use advanced methods to control for possible confounding variables, they are a strong indicator of likely regional average, long-run responses (Panel Report 2020).

The Calculator elasticities are long-term elasticities. Some studies such as Cervero and Hansen (2002) also produce short-term elasticities, either by looking at a short time frame or by omitting factors that tend to appear over the longer term, such as land use changes. ("Short term" in this context means under five years and can be as little as a year or two; "long term" can be 10 years into the future.) While the studies in the literature use differing time frames, there is no clear conclusion to be drawn from the literature regarding how fast the changes occur. Highly congested areas are likely to have considerable unsatisfied demand for travel; and therefore, the response to new capacity may be rapid. Areas at the urban fringe have also been found to generate high levels of induced traffic, more likely to manifest over time, as new facilities alter development opportunities, business and housing locations, and users' overall travel patterns.

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3.2.1 SENSITIVITY TO DIFFERENT PROJECT TYPES

Any project that adds capacity to the SHS has the potential for generating additional travel. However, the studies used to construct the NCST Calculator are limited to only GP and HOV lane facilities; and thus, the Calculator is applicable for assessing induced travel of GP and HOV lane addition only and not for special purpose lanes such as high-occupancy toll (HOT)/ managed lanes or truck lanes. The Calculator treats GP and HOV lanes identically.

Because there is a lack of a strong evidence base for estimating the induced travel effects of HOT lanes and other types of priced lanes, the NCST Calculator cannot be used for priced lanes such as HOT lanes. This limitation is reflected in the guidance provided in Section 4. Adding a lane restricted to a special purpose, such as a toll lane, freight or transit lane, may induce travel by particular users. It may also make capacity available in the GP lanes, in turn inducing traffic into the GP lanes. It can be complex to determine how much capacity is added by a managed lane, as its capacity is related to design, operating rules, and driver choices. Features including the number, location and design of entry and exit points can make a difference in facility performance and use. Operating hours, occupancy requirements, toll levels for HOT lanes, enforcement/violation rates may also influence impact on VMT.

HOT lanes, whereby single occupancy vehicles (SOVs) can legally use the HOV lane for a toll, are particularly complex. They are relatively new and therefore have not been studied extensively, though HOT lanes have been used in California and several other states and generated case studies (e.g., in Texas and Minnesota) as well as scenario-based analyses.

Like an HOV lane, a new HOT lane may attract vehicles from GP lanes due to their travel time benefit. However, the toll option is likely to lead to more complex travel behaviors than would an HOV lane. SOVs may move from GP lanes to the HOT lane, attracting new trips and longer trips formerly deterred by congestion, and inducing mode shift such as HOVs to SOVs.

3.2.2 SENSITIVITY TO PROJECT CONTEXT

Many practitioners raise concerns about the NCST Calculator's apparent lack of sensitivity to project context. For example, questions have been asked about whether the studies that underlie the Calculator match the background conditions where projects are being proposed - particularly non-metropolitan planning organization (MPO) counties, smaller MPOs, and rural areas of larger MPOs. Considerations include land use patterns and densities, modal choices and route options. In fact, similar concerns apply to the Travel Demand Models (TDMs), too. The aggregate data and estimated coefficients used in the TDMs reflect heavily the more urbanized, populous, modally diverse portions of the modeled region.

Whether the metropolitan statistical area (MSA) or urban county data apply to the more rural areas of a given county will depend on how integrated the area in question is to the broader urban economy. The MSA designation assumes that they

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are indeed integrated through commute patterns, which are a significant indicator of interconnectedness. Therefore, the Calculator is applicable throughout MSA areas. However, the Calculator is not applicable to rural counties. It will be used for projecting induced travel for GP and HOV lane projects in MSA counties as shown in Table 2. Section 4.4 provides an opportunity for analysts to describe cases where specific conditions make the induced travel effects of a project likely to be substantially different from the estimate derived from the Calculator.

As noted earlier, available studies do not offer a definitive answer about whether outlying areas are more or less likely to experience induced travel resulting from capacity increases. Several such studies suggest that the elasticity of demand may be higher in the outlying areas partly because of the relative percent increase in capacity, and partly because of the potential for location and land use shifts and increased travel to and from other parts of the metropolitan region (Panel Report 2020). Case examples also show that rural areas and areas with limited congestion can still experience induced travel resulting from new capacity because the new capacity improves travel times/ reduces costs and creates new patterns of accessibility and new location and land use opportunities. Available studies such as Duranton and Turner (2011) also indicate that accounting for transit services at the levels of service and geographic scales of availability experienced in most US contexts do not significantly alter the induced travel estimates.

3.2.3 SENSITIVITY TO DIFFERENT REGIONS

The NCST Calculator uses a constant elasticity across a county or an MSA. However, it accounts for variation in the travel-inducing strength between counties and regions by using the base year level of VMT as an input. Counties and regions that start with more traffic (higher existing VMT per lane mile) experience more induced travel for a given lane-mile addition. For example, a county or region that has twice the existing traffic per lane mile would see twice the amount of induced travel per lane mile added.

3.3 TRAVEL DEMAND MODELS

3.3.1 OVERVIEW

Travel models are often called Travel Demand Models (TDMs), though they also include models of transport supply. TDMs are widely used in California and throughout the United States as transportation system analysis and forecasting tools. Among their many applications, the travel models are used to measure network performance and identify deficiencies, to forecast future levels of service under anticipated levels of growth and change, and to generate the traffic data and projections needed for air pollution emissions estimates.

TDMs vary considerably in their specifications. Some MPOs and a few counties and cities in California have developed advanced activity-based models; many others

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use trip-based models. Some are run as part of an integrated land use-transportation modelling process while others handle current and future land use as a separate analysis step and use the results as inputs to the travel models. Models also vary in the extent to which they cover such issues as trip scheduling, time-of-day of travel, transit service characteristics (e.g., bus vs. rail), nonmotorized modes, and freight movements. Highway networks usually cover major collector and higher-level roads, but some models also include local roads.

TDMs vary also in their ability to estimate induced travel associated with highway investments. Some models can estimate induced travel reasonably well and some others cannot. For example, some model systems do not have the capability to account for changes in origin-destination patterns, increases in trip rates, and changes in location and land use resulting from transportation investments. In addition, models are not always applied in a way that fully uses their capabilities.

Many improvements have been made to travel models over the last two decades, but there remains considerable variation in the level of detail and the sophistication of the models in use in California and elsewhere. Depending on the specifics of model specification, estimation, and application, travel models may provide a reasonable estimate of induced travel, or they may under- or over-estimate induced travel. As Volker et al. (2020) reported, induced travel estimates set forth in some published environmental documents are well below those estimated by empirical studies, and underestimation is a concern. The likely reasons for such differences include:

- Land use changes and associated travel are a significant component of induced travel, but some transportation planning models treat land use as exogenous and some further assume it is fixed (i.e., land use is not altered as a result of transportation system changes.)
- Some travel models, either in specification or in application, do not include a mechanism to feedback network travel times and travel costs to land use mode choice, destination choice, and trip frequency modeling elements (Marshall 2018)
- Price and income are sometimes treated in limited ways; and therefore, important impacts on travel choice are not well represented in the models
- Reliability is often not represented by the travel model even though it can be important to the traveler: a small reduction in travel time can be accompanied by a large reduction in travel standard deviation, providing a meaningful improvement in reliability.
- Network levels of detail may be insufficient to reflect traffic conditions, available route and mode choices.
- Boundary cutoffs may mean that a portion of travel outside the model's boundaries is not well represented in model analyses, though it may be impacted by system changes.
- Models are not always run to traffic assignment equilibrium where network congestion is minimized.

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- Models are often calibrated to observed data such that the alternative-specific constants take a large (outsized) importance in the choice models, rendering them less sensitive to time and cost.
- Finally, models may not have been thoroughly validated over a period of time in which travel times and costs have changed (such that it should be possible to see if the models would have predicted such changes.) (Panel Report, 2020)

A review of the capabilities of available travel demand models and their applications is therefore in order before relying solely on their outputs as a basis for evaluating induced travel impacts of projects on the SHS. The checklist in Section 4.5 provides specific guidance for evaluating whether a travel demand model is appropriate for use in estimating induced travel.

3.3.2 SOURCES FOR MODELING IMPROVEMENT GUIDANCE

Recent reports from the National Cooperative Highway Research Program (Erhardt et al. 2019) provide additional guidance on evaluating errors in models and could be valuable sources of advice. Guidance on modeling has been produced by State of California agencies, including the California Transportation Commission, the Governor's Office of Planning and Research, and the California Air Resources Board.

The Federal Highway Administration (FHWA) has also produced extensive advice on modeling, especially through its Travel Model Improvement Program (TMIP). The FHWA-HEP-10-042 report prepared by Cambridge Systematics, Inc. (2010) discussed the best practices on how to calibrate/adjust and validate/test TDMs, checking them for reasonableness. Note that checking the model can reveal underlying problems that need to be corrected; e.g., if VMT per household is unreasonably high or low, it would be advisable to make sure data errors were not introduced. Data from the US Census and travel surveys such as the National Household Travel Survey (NHTS) (https://nhts.ornl.gov/) provides useful comparisons. (NHTS data covers trip modes, lengths, and purposes, and all areas of the country, urban and rural.)

The TMIP advises that to be useful, tests of reaction to change must be done through applications of the model in full production mode. However, this is not always done in practice. Also, many models are validated on a reserved set of base year data; it would be useful to further validate predictive capabilities against a future year when such data are available.

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4 GUIDANCE TO PRACTITIONERS

4.1 APPLICABILITY OF GUIDANCE

The TAF should be consulted when a transportation project on the SHS could lead to a measurable and substantial increase in vehicle travel. The OPR Technical Advisory states that these projects would "…generally include… Addition of through lanes on existing or new highways, including general purpose lanes, HOV lanes, peak period lanes, auxiliary lanes, or lanes through grade-separated interchanges" (OPR 2018). Refer to Section 5.1 of the TAC for the project screening process and the list of project types that would not likely lead to a substantial or measurable increase in vehicle travel, and therefore generally should not require an induced travel analysis.

4.2 SELECTING THE ANALYSIS APPROACH

4.2.1 OVERVIEW

Section 5.1 of the TAC guides the analyst through the process of screening a project on the SHS to determine whether a VMT significance determination is necessary. This process applies to both the project and project alternatives being considered. Such a determination requires analysis of induced travel impacts using one of the analysis approaches described in this section of the TAF.

Following a decision that induced travel analysis is needed, the analyst must select the analysis approach based on project location, facility type, and available tools as described in the following sections. The selection process applies equally to project alternatives under consideration. In a typical document, multiple alternatives will be described and analyzed. Analysis of induced travel may be necessary for each alternative, requiring selection and application of appropriate methods for each.

This guidance provides analysts with the basis for identifying the best available analysis approach for the project and alternatives. Table 1 guides the selection of preferred analysis approaches based on project location, project and facility type, and applicability of tools.

1. **Applicability of tools.** Section 4.3 provides a general discussion of the tools for estimating induced travel. In cases where the NCST Calculator can be directly used, it should either be used exclusively or used to benchmark results from a TDM. Where the NCST Calculator is not applicable and a TDM is suitable for use, a TDM should be used. The TDM should be assessed as adequate for assessing induced travel based on the checklist presented as Table 4 or should

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undergo modifications in order to remedy identified deficiencies. Section 4.4 and 4.5 provide additional detail.

2. **Project location.** Whether the project is in an MSA or a rural county will influence the approach selected, since the NCST Calculator is not applicable in non-MSA counties. For projects in rural counties, the best available method should be selected by analysts and reasons for selecting the method should be documented. This would preferably be a TDM or other quantitative method. A qualitative assessment will be acceptable if it takes into account the potential for capacity additions to induce travel as a result of changes in travel behavior in response to reduced travel cost, improved reliability, or long-term land use change likely to be associated with the project.

3. **Project and Facility Type.** Only projects adding general purpose or HOV lanes can use the NCST Calculator directly. The Calculator's applicability varies by facility type as shown in Table 1.

4.2.2 Guidance for Selecting Analysis Approach

Table 1 provides a selection matrix to be used in identifying the preferred VMT assessment method(s) based on location and project type. The application of the NCST Calculator and the TDM is described in Section 4.3 and 4.4, respectively. Table 1 applies only to the forecasting of induced travel associated with projects on the SHS for CEQA analysis. Depending on the method selected, other methods and tools may be necessary to forecast total VMT in the horizon year for other CEQA impact analysis and for NEPA analysis when applicable. Consult with Caltrans Division of Environmental Analysis (DEA) for details.

4.3 Application of the NCST Calculator

The NCST Calculator can be applied to mainline general-purpose lane additions and mainline HOV lane additions on Class 1 facilities (Interstate freeways) and Class 2 and 3 facilities (Other Freeways, Expressways, and Other Principal Arterial state routes) as defined by the FHWA. See Appendix A for facility class definitions. Of the 58 counties in California, the Calculator can be applied directly in 37 counties that belong to MSAs but not in the remaining 21 non-MSA rural counties. See Table 2 for a list of the 37 MSA counties, and Table 3 for a list of the 21 non-MSA rural counties.

For a Class 1 facility, the NCST Calculator must be applied at the MSA level; while for Class 2 and 3 types of facilities, the Calculator must be applied at the county level. This is because the NCST Calculator was based on studies that examined only those geographies. As shown in Table 2, the Calculator applies to all Class 1, 2, and 3 facilities in 23 MSA counties. In 14 MSA counties the Calculator applies to Class 2 and

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3 facilities only because either there are no Class 1 facilities in the county, or the Class 1 facility mileage is less than one mile in the county.

Table 1. Selection Matrix for Preferred Induced Travel Assessment Method for Projects on the SHS[1]

Project Type / Project Location	GP or HOV Lane Addition to Interstate Freeway	GP or HOV Lane Addition to Class 2 & 3 State Routes	Other VMT Inducing Projects and Alternatives
County in MSA with Class I Facility	Apply the NCST Calculator by MSA and/or TDM[2] benchmarked with NCST Calculator.	Apply the NCST Calculator by county and/or TDM[2] benchmarked with NCST Calculator.	Apply TDM[2] or other quantitative methods
Other MSA County	Apply TDM[2] or other quantitative methods		
Rural County	Apply TDM[2] or other quantitative methods		

[1]If preferred methods are not available, qualitative assessment is acceptable as shown in Figure 5.
[2]TDMs must be checked for applicability as described in Sections 4.4 and 4.5.

Freeway ramps and minor arterials or collector-distributor roads associated with a freeway fall outside the scope of application for the NCST Calculator. The VMT inducing effects for ramp, minor arterial, and collector-distributor road capacity projects should be evaluated as "Other VMT Inducing Projects" in Table 1.

The NCST Calculator allows users to directly assess the likely average increase in VMT resulting from induced travel associated with the planned addition of GP or HOV lane miles. The Calculator output represents the increase on area-wide facilities, not solely on the facility that the project would alter. It uses 2016 lane-mile and VMT data from Caltrans databases (and therefore applies only to California, as currently presented) together with long-term elasticities taken from the literature, specifically the Duranton and Turner (2011) nationwide estimate for Interstate facilities (which the Calculator rounds to 1.0) and the Cervero and Hansen (2002) California county-level estimate for class 2 and 3 facilities (0.75 as implemented in the Calculator). The user specifies the category of facility and lane miles being added and the county or Metropolitan Statistical Area (MSA) of application; the Calculator is only applied to counties for which there are data and for which the studies are applicable (Tables 2 and 3 indicate the Calculator's applicability to California counties).

While use of the online Calculator is the recommended approach to applying the elasticity-based method, the method may also be applied manually by the analyst.

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A standard formula for estimating project induced VMT is embedded in the Calculator:

Project-Induced VMT = %Δ Lane Miles x Existing VMT x Elasticity

where,
%Δ Lane Miles = The increase of lane miles expressed as a percentage of the total lane miles in the study area. This must be a positive number.

Table 2. The 37 MSA Counties where the NCST Calculator Applies

23 MSA Counties: The NCST Calculator Applies to Class 1, 2, and 3 Facilities		
Alameda	Merced	San Joaquin
Contra Costa	Orange	San Mateo
Fresno	Placer	Santa Clara
Imperial	Riverside	Shasta
Kern	Sacramento	Solano
Kings	San Bernardino	Stanislaus
Los Angeles	San Diego	Yolo
Marin	San Francisco	
14 MSA Counties: The NCST Calculator Applies to Class 2 and 3 Facilities only		
Butte	San Benito	Sutter
El Dorado	San Luis Obispo	Tulare
Madera	Santa Barbara	Ventura
Monterey	Santa Cruz	Yuba
Napa	Sonoma	

Table 3. The 21 Rural Counties where the NCST Calculator does not Apply

Alpine	Inyo	Nevada
Amador	Lake	Plumas
Calaveras	Lassen	Sierra
Colusa	Mariposa	Siskiyou
Del Norte	Mendocino	Tehama
Glenn	Modoc	Trinity
Humboldt	Mono	Tuolumne

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Additional details on application of the Calculator are available online at https://ncst.ucdavis.edu/research-product/induced-travel-calculator and also discussed in Appendix A.

As described above, the NCST Calculator uses empirical data to establish elasticities that reflect the likely change in travel volumes associated with a change in roadway capacity. The Calculator's output reflects an average areawide change, not simply the change in volumes on the facility itself. The NCST Calculator reports long-run induced travel results for the horizon year. Estimates for intermittent years can be determined with linear interpolation. The NCST Calculator does not distinguish between GP and HOV lanes, so the tool cannot be used to assess any potential difference in induced travel between those two project types.

The NCST tool may in some cases be used to provide a valuable point of reference in a quantitative assessment of the impacts of project types other than GP and HOV lanes. For example, while the NCST calculator does not apply directly to HOT lanes, in the absence of a travel demand model capable of projecting induced travel based on the checklist assessment, the NCST Calculator may supply a useful data point for consideration in the analysis of a HOT lane project.

4.4 Application of Travel Demand Models

As shown in Table 1, TDMs will be used to assess induced travel in the following two situations:

1. Applied in combination with the NCST Calculator as discussed below;
2. Applied alone when the NCST Calculator is not applicable.

Where a travel model is used, often the regional travel model will be the most appropriate scale to capture the entire area over which induced VMT is observed. However, as discussed above, some TDMs lack key elements for assessing induced travel. For example, some model systems do not have the capability to account for changes in origin-destination patterns, increases in trip generation rates, and changes in location and land use resulting from transportation investments. In addition, models are not always applied in a way that fully exercises these capabilities. Analysts should document the models, the calibration steps taken, reasonableness tests performed, and validation tests against later year conditions. Documentation should indicate both verification that the model has the capacity to reflect travel behavior accurately, and that it is run correctly, in order to assess induced travel.

When a travel model is used to assess induced travel, the following steps must be followed:

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1. Assess the travel model and off-model processes using the checklist provided in Section 4.5.

2. If the NCST Calculator can be applied to the project, and the travel model passes the checks, apply both methods.
    a) Use the TDM results, if within 20 percent of the value provided by the NCST Calculator.
    b) If travel demand model results differ from that of the Calculator by more than 20 percent, use the Calculator's results exclusively, or use the TDM results and provide specific quantitative evidence explaining this variation. The evidence may include reference to quality academic studies, or analysis of specific project features or context justifying that the project's induced travel could be substantially higher or lower than the average value indicated by the NCST Calculator.

3. If the NCST Calculator cannot be applied to the project, and the travel model passes the checks, then apply travel models only.

4. If the NCST Calculator cannot be applied to the project, and the travel model does not pass all the checks, then:
    a) Disclose and document the areas of deficiency and make improvements to the model to address those issues. If that is not possible in the timeframe of the project analysis, use other options below.
    b) Apply off-model approaches using the best available information or tools to compensate for TDM's deficiencies, making approximations as needed where more precise data or information are not available.
    c) Where a quantitative assessment cannot be reasonably undertaken, a qualitative assessment may be undertaken (see Section 4.6).

When both the NCST Calculator and TDMs are used as guided by Table 1, a detailed method selection flow chart is provided in Figure 5 to further facilitate the process of selecting an analysis approach.

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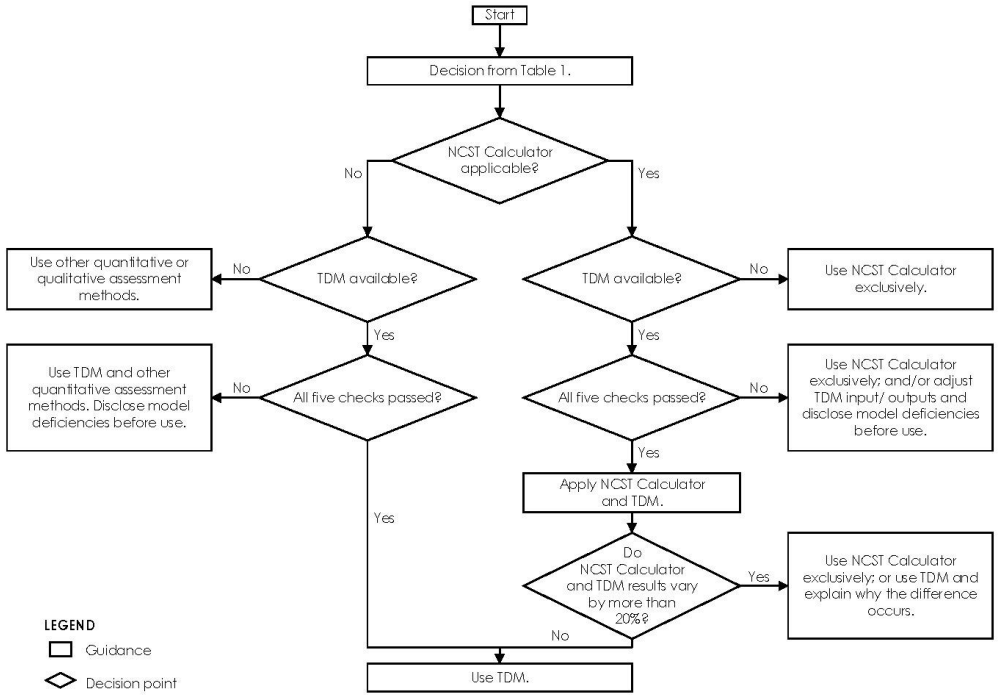


Figure 5. A detailed assessment method selection flow chart.

4.5 THE CHECKLIST FOR EVALUATING MODEL ADEQUACY

The checklist in Table 4 specifies model capabilities required for induced travel assessment. The checklist focuses on both modeling mechanisms and modeling practices. The purpose is to ensure induced travel modeling mechanisms are built in, and established modeling practices are followed in implementing a TDM for induced travel modeling. There are five checks in total. In general, a model should pass all five checks before the analyst concludes that the TDM is appropriate for making projections of induced travel. As noted elsewhere, assessments made using models that do not satisfy all checks should include disclosure of deficiencies, documenting ways in which the deficiencies may affect results.

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Table 4. A Checklist for Evaluating Adequacy of Travel Demand Models for Estimating Induced Travel

Check 1. Land use response to network changes[1]. Check the box if the answer to the question is "yes". "Check 1" passes if either box 1a or 1b is checked.	
1a ☐	Is the model's specification of future land use sensitive to travel time and cost, i.e., varying across modeling scenarios to simulate the land use response to network changes?
1b ☐	If future year land use is exogenous to the modeling process, are land use assumptions determined via a Delphi method (Linstone and Turoff eds., 1975; Rand Corp, 1969; Cavalli-Sforza and Ortolano, 1984; and Melander 2018) or through examination of outcomes under a range of modeling scenarios, including both build and no build alternatives?
[1] Any TDM used to assess induced travel must be paired, or iterated, with an approach for predicting changes in land use caused by the project. OPR's Technical Advisory (*Appendix 2, Induced Travel Mechanisms, Research, and Additional Assessment Approaches*, p. 34) lists options for incorporating land use effects in a travel model-based assessment.	
Check 2. Sensitivity of trip-making behavior to network travel times and travel costs[2]. Check the box if the answer to the question is "yes". "Check 2" passes when box 2a, 2b, and 2c are all checked.	
2a ☐	Do changes in network travel times and travel costs by mode (e.g. vehicle operating costs, tolls, parking costs, transit fares, etc.) influence mode choice, destination choice (including workplace location), route choice, and trip frequency?
2b ☐	Are the network travel times and costs fed back into the mode choice, destination choice, route choice, and trip frequency models so that travel times and costs are roughly consistent with the "converged" travel times and costs from traffic assignment?
2c ☐	Does the modeling reflect the heterogeneity and complexity of travelers' responses to time and cost changes relevant to the examined project?

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Table 4. A Checklist for Evaluating Adequacy of Travel Demand Models for Estimating Induced Travel (cont'd)

[2]. If the trip generation sub-model is not sensitive to travel time, then the analyst will need to provide for a manual intervention in the trip generation stage of the model to adjust the trip generation rates in the model for off-line computed induced travel effects of the project, its alternatives, and potential mitigation measures. The analyst can employ activity based travel model parameters that are available from a similar region to manually estimate off-model the effects of the project, its alternatives, and potential mitigation measures on trip generation with and without the project for the desired forecast years (with the land use linkage described above activated) and noting the predicted percentage change in trip generation by purpose predicted by the activity based TDM parameters. These percentages, which will vary by project alternative, may then be applied to the output of the trip generation stage of the trip-based model.	
Check 3. Sufficiency of detail and coverage of modelled roadway and transit networks[3]. Check the box if the answer to the question is "yes". "Check 3" passes if both box 3a and 3b are checked.	
3a ☐	Are the roadway and transit networks provided in sufficient detail and coverage to reflect the full set of route and mode choices available to the traveler?
3b ☐	If the project would lead to induced travel extending beyond the model's boundary, has the model been modified to incorporate the larger geography, or has an off-model assessment captured the additional travel generated?
[3]. In cases where the project would lead to induced travel that extends beyond the model's boundary, the model should either be modified to incorporate that geography (e.g. by adding "halo zones") or an off model assessment should be made to capture the additional travel (e.g. where that travel is destined for a population center outside the model area, multiply gateway volumes by distance from the gateway to that population center). For sufficiency of geographical coverage, the analyst should use select link analysis to check whether links that run up to the model's edge show increased volumes as a result of the project. If they do, VMT increases likely continue outside the model's boundary. Where that is the case, one of three approaches can be used to capture that VMT. First, "halo zones" can be added to capture the additional VMT within the model. Second, a reasonable assumption can be made about length of the missing portion of the trip (e.g. use the distance to next major jobs or population center, if trips are likely allocated there), and that distance can be multiplied by the volume. Third, a model with greater coverage, such as the California Statewide Travel Demand Model (CSTDM), can be used.	

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Table 4. A Checklist for Evaluating Adequacy of Travel Demand Models for Estimating Induced Travel (cont'd)

For temporal coverage, the analyst should examine the peaking of traffic flows in the area served by the project to determine the needed temporal coverage of the model (weekday peak hours, peak periods, daily, weekends and holidays, recreational seasons, full year), and then check to ensure the model assesses those time periods.	
Check 4. Network assignment processes[4]. Check the box if the answer to the question is "yes". "Check 4" passes if box 4a is checked.	
4a ☐	Is the modeling guidance published by FHWA (Cambridge Systematics, 2008, 2010) followed, in order to provide a sufficient level of convergence in network assignment such that the differences in outcomes between modeling scenarios can be reliably attributed to the differences in scenario definitions rather than the network assignment process itself?
[4]. For static roadway assignment, a relative gap between model runs of 0.001 is a good safe harbor.	
Check 5. Model Calibration and Validation[5]. Check the box if the answer to the question is "yes". "Check 5" passes if box 5a is checked.	
5a ☐	Has the model been validated across points in time and changes in travel time and cost in order to confirm that it is appropriately sensitive to changes in these factors?
[5]. In order to preserve sensitivities, alternative specific constants shall not deviate substantially in overall magnitude relative to the other variables unless the resulting sensitivity is validated based on observed data.	

4.6 Qualitative Assessment Approach

The CEQA Guidelines 15144 specify, "Drafting an EIR or preparing a Negative Declaration necessarily involves some degree of forecasting. While foreseeing the unforeseeable is not possible, an agency must use its best efforts to find out and disclose all that it reasonably can." Specifically addressing transportation impact analysis, CEQA 15064.3 states, "…if existing models or methods are not available to estimate the VMT for the particular project being considered, a lead agency may analyze the project's vehicle miles traveled qualitatively. For many projects, a qualitative analysis of construction traffic may be appropriate." When neither the NCST Calculator nor an appropriate TDM is available, modeling improvement cannot practically be accomplished, and no other quantitative assessment approach can be identified, a qualitative assessment approach may be appropriate.

When a project type is identified from the screen-out list contained in Section 5.1 of the TAC, a simple narrative will generally suffice in terms of induced travel assessment.

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4.7 DOCUMENTATION

Documenting the factual and analytic basis for the decisions made throughout the project development process is critical to explaining how those decisions were made. The mandate to document facts and analysis used in reaching a conclusion applies to both the decisions made in analyzing a proposed project for whether a VMT analysis is required and if so, the technical level details as to how it was performed. These requirements apply to CEQA alternatives as well as to the proposed project.

Documentation of each fact relied upon, each inference derived from established facts and the logical approach taken to reach a conclusion are necessary so others, including a court if the matter is litigated, can follow the analytical path taken by the practitioner. The requirement to adequately document the analytical path applies whether the practitioner is a Caltrans staff member, a partner agency staff member or a consultant retained to prepare the analysis.

4.7.1 CALTRANS UNIFORM FILING SYSTEM

Caltrans has established a formal "Uniform Filing System" which must be the framework for documenting the facts, inferences and conclusions reached when reviewing a project's potential impacts. Taken together, the Uniform Filing System's components form the "Administrative Record" for the project. Training for how to apply the Uniform Filing System, and the creation and maintenance of the Administrative Record, is available through the Division of Environmental Analysis. See, e.g., http://etp.dot.ca.gov/env/files/admin-record/presentation_html5.html for additional background. Note that for those projects where NEPA compliance is required, similar procedures for records retention are required. See, e.g., https://dot.ca.gov/programs/environmental-analysis/standard-environmental-reference-ser/volume-1-guidance-for-compliance/ch-38-nepa-assignment#files.

Caltrans, like many other entities, has enterprise-level policies relating to the automatic deletion of emails after a certain amount of time elapses. While those policies generally apply, in order to assure retention of the records which document the analytical path taken in performing an analysis, relevant emails and any attachments should be retained in the project file, either in electronic format or by printing and saving to the project's paper file.

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APPENDIX A. THE NCST INDUCED TRAVEL CALCULATOR

SCOPE OF NCST INDUCED TRAVEL CALCULATOR

The technical documentation for the NCST Induced Travel Calculator states that (see https://ncst.ucdavis.edu/research-product/induced-travel-calculator *accessed August 11, 2020*):

- The calculator is limited to use for capacity expansions. It cannot be used to estimate VMT effects of capacity reductions or lane type conversions.
- The calculator is limited to use for additions of general-purpose and high occupancy vehicle (HOV) lanes.
    - It should not be used for additions of toll lanes or high occupancy-toll (HOT) lanes.
    - Hundreds of both general-purpose and HOV lane mile additions were included in the two studies used to derive the elasticities for the Calculator (Duranton & Turner, 2011); (Cervero & Hansen, 2002). By contrast few toll and high-occupancy toll (HOT) lanes were added before the end of the data collection periods for the two studies. The studies' estimated elasticities therefore might not reflect toll and HOT lanes. This Calculator should not be used to estimate the induced travel impacts of toll and HOT lanes.
- The calculator produces long-run estimates of induced VMT, the additional annual VMT that could be expected 5 to 10 years after facility installation.
- All estimates account for the possibility that some of the increased VMT on the expanded facility is traffic diverted from other types of roads in the network. In general, the studies show that "…capacity expansion leads to a net increase in VMT, not simply a shifting of VMT from one road to another" (Handy & Boarnet, Impact of Highway Capacity and Induced Travel on Passenger Vehicle Use and Greenhouse Gas Emissions Policy Brief, 2014)
- The Calculator currently uses 2016 lane mileage and VMT data from the Highway Performance Monitoring System (HPMS), including both passenger and heavy-duty vehicle data. The data will be updated periodically as new data become available.
- Knowledge of local conditions can help contextualize the calculator's estimates.

FHWA FUNCTIONAL CLASSIFICATION SYSTEM

The FHWA functional classification system used in the UC Davis NCST Induced Travel Calculator is defined in an FHWA memorandum (https://www.fhwa.dot.gov/policy/ohpi/hpms/fchguidance.cfm):

Functional Class 1 = Interstate
Functional Class 2 = Other Freeways and Expressways

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Functional Class 3 = Other Principal Arterial

A variety of roadway facilities in California are represented within these functional classifications and in the corresponding Caltrans HPMS data, including but not limited to: State Highway System (SHS), local roadways, Department of Defense roads, State Parks roads, and U.S. Forest Service roads.

Note that according to the technical documentation for the NCST Induced Travel Calculator, functional classes 1, 2, and 3 are within the scope of the NCST Calculator if they are state highways.

CONCEPTS

Handy and Boarnet (2014a, 2014b) define "induced travel" as an "increase in vehicle miles traveled (VMT) attributable to increases in capacity." Handy and Boarnet (2014a, 2014b) then state:

> *"Increased highway capacity can lead to increased VMT in the short run in several ways: if people shift from other modes to driving, if drivers make longer trips (by choosing longer routes and/or more distant destinations), or if drivers make more frequent trips. Longer-term effects may also occur if households and businesses move to more distant locations or if development patterns become more dispersed in response to the capacity increase. Capacity expansion can lead to increases in commercial traffic as well as passenger travel."*

Handy and Boarnet (2014a, 2014b) also state:

> *"The induced-travel impact of capacity expansion is generally measured with respect to the change in VMT that results from an increase in lane miles, determined by the length of a road segment and its number of lanes (e.g. a two mile segment of a four-lane highway equates to eight lane miles). Effect sizes are usually presented as the ratio (elasticity) of the percent change in VMT associated with a one percent change in lane miles."*

According to a survey of the literature by Handy and Boarnet (2014a, 2014b), "Elasticity estimates of the short-run effect of increased highway capacity range from 0.3 to 0.6. Estimates of the long-run effect of increased highway capacity are considerably higher, mostly falling in the range from 0.6 to just over 1.0.

RESEARCH BASIS

Handy and Boarnet (2014a, 2014b) provide some of the technical background for six of the studies they included in their policy brief. Key characteristics shared by many of the research studies upon which the elasticity estimates are based are:

- They measure changes in regional, county, or statewide VMT and lane-miles of road in most cases only on freeways. Some focused on state-owned

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highways. One used sample from the US DOT Highway Statistics database for all road types in that database.

- Data on changes in capacity and traffic volumes for non-freeways, minor roads and arterials was not available to the researchers in most cases, so they could not account for diversion effects, where traffic shifts to and from minor roads and arterials in the region to the freeways. The background documentation for the NCST Calculator states that Duranton estimated this unmeasured diversion effect to be between zero and 10% (which would have no effect or would reduce the reported elasticity).
- The long-term time frames considered varied from 14 years to 22 years.
- Researchers fitted log-linear regression models with lane-miles as one of various explanatory factors for observed changes in regional or county VMT.
- They all included changes in population as one of the explanatory factors but varied in what additional variables impacting VMT were included. Some included income, some employment density, some fuel cost. The additional explanatory factors usually lowered the elasticity with respect to lane-miles.
- They used different approaches to control for demand driven capacity construction, called "simultaneity bias."
- Three of the studies used only California data. Three used data from around the United States.

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APPENDIX B. PANELIST BIOGRAPHICAL SKETCHES

As mentioned in the Foreword of this document, in Spring 2020 Caltrans convened an expert panel of academics and practitioners through the University of California Berkeley Tech Transfer in order to provide recommendations on key issues associated with analysis of induced travel impacts. The panel was charged with making recommendations on how to estimate travel "attributable to the project", best tools to use, reasons for differences in estimates from various tools, and ways to resolve or reconcile differences if they occur. The panel also provided advice on "next steps", including the need for further guidance and additional research. A short biography of each of the eight panelists is presented here.

Elizabeth Deakin (Panel Chair) is Professor Emerita of City and Regional Planning and Urban Design at UC Berkeley and an affiliated faculty member of the Energy and Resources Group. She previously was Director of the UC Transportation Center (1999-2008) and co-director of the Global Metropolitan Studies Center (2004-2009). She also served as vice-chair and then chair of the UC Berkeley Academic Senate (2013-2015).

Deakin's research and teaching focus on transportation and land use policy, the environmental impacts of transportation, and equity in transportation, and she has published over 300 journal articles, conference papers, book chapters, and research reports. Since her retirement she has continued to carry out research projects and mentor students and has co-edited a book on international experiences with high speed rail and edited a book on transportation, land use, and environmental planning.

She has been appointed to several government posts including city and county commissions and state advisory boards in California. She has testified on transportation legislation before the US Senate Public Works Committee, the House Technology and Infrastructure Committee and the House Science Committee, as well as before California Senate and Assembly committees and city councils.

She was the co-creator of several transportation-land use plans that won prizes from APA and AIA and has received awards for best paper (TRB energy committee) and best reviewer for a journal (ASCE).

Fred Dock is the former Director of Transportation for the City of Pasadena, California. During his tenure and under his direction, Pasadena pioneered the use of VMT and multi-modal transportation performance metrics and developed a Complete Streets Framework that focused on achieving the City's goals for safety and sustainability. Now retired from the City, he advises on transportation policy and practice with emphasis in urban transportation issues and performance measures.

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Prior to joining the City of Pasadena, Mr. Dock consulted for engineering and planning firms in northern and southern California, Chicago, and Minneapolis for 30 years. He directed and prepared a variety of engineering and planning projects ranging from impact analysis to corridor studies to regional plans. He was one of the principal investigators for the University of Minnesota's research on Transportation and Regional Growth. His work in operations included advanced traffic control systems and simulation modeling of complex traffic networks.

He led a nationwide initiative on urban street design that developed a context-based framework for street design and resulted in the publication of *Designing Walkable Urban Thoroughfares* (ITE, 2010). That work is the basis for the modified system of functional classification in the 7th Edition of the AASHTO Green Book. His work with transit-oriented development is nationally recognized by the Transportation Research Board for both policy and practice and by the Urban Land Institute, for which he authored *Developing Around Transit* (ULI, 2005) with other nationally recognized individuals.

Mr. Dock has received various awards, including the 2015 Dale Prize for Excellence in Urban and Regional Planning when the theme was *Streets for Everyone: Advancing Active Transportation*. Mr. Dock earned both bachelor's and master's degrees in civil engineering from the University of California at Berkeley. He is currently a registered Civil Engineer and Traffic Engineer in California, a PTOE and an AICP. He was previously registered as a Professional Engineer in the states of Illinois, Michigan, and Montana.

Gordon Garry is currently mostly retired after a professional career of 40 years. He keeps an active role professionally through various projects with government agencies and NGOs.

From 1990 to 2017 he was a senior staff member at the Sacramento Area Council of Governments. Mr. Garry developed and managed an increasing array of data, forecasting, and scenario programs to support the agency's transportation, air quality, land use planning, and climate change efforts. Mr. Garry was responsible for modeling projections and analyses in these areas that meet local, state, and Federal planning requirements. Also, while at SACOG he worked with a number of regional agencies across California and the country to develop and implement these technical tools in support better decision making for public agencies.

Prior to joining SACOG he worked at the City of Santa Rosa CA, SRF Consulting in Minneapolis, and the South Dakota Department of Transportation. Mr. Garry received his B.S. in Economics at South Dakota State University and his Master's in City and Regional Planning at the Harvard Kennedy School of Government.

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Susan Handy is a Professor in the Department of Environmental Science and Policy and the Director of the National Center for Sustainable Transportation at the University of California, Davis. She is internationally known for her research on the relationships between transportation and land use, particularly the impact of neighborhood design on travel behavior. Her current work focuses on bicycling as a mode of transportation and on strategies for reducing automobile dependence.

Dr. Handy holds a B.S.E. in Civil Engineering from Princeton University, an M.S. in Civil Engineering from Stanford University, and a Ph.D. in City and Regional Planning from the University of California at Berkeley.

Michael McNally is Professor of Civil and Environmental Engineering and of Urban Planning and Public Policy, and a Faculty Associate of the Institute of Transportation Studies at the University of California, Irvine. He received his Ph.D. in Engineering in 1986 from UC Irvine and was with the School of Urban and Regional Planning and the Department of Civil Engineering at USC prior to joining the faculty at UCI in 1987. Research interests focus on the study of complex travel behavior, investigations of interrelationships between transportation and land use, and the development of new technologies and modeling methodologies which reflect and support these research areas.

Among various research awards, he received a Presidential Young Investigator Award from the National Science Foundation. He has served as Principal Investigator on a variety of funded projects, including research and development relating to: operational models of activity-based travel forecasting, web-based self-administered travel surveys, GPS-based, wireless in-vehicle data collection systems, information technology for shared-use station car programs, multi-jurisdictional corridor decision support systems with integrated traffic microsimulation models, the role of information on traveler behavior, and the evaluation of advanced traffic management and control technologies.

Elizabeth Sall is a Principal at UrbanLabs LLC a mission-driven urban science and research firm. Ms. Sall specializes in the intersection of policy with data and technology especially as it relates to travel behavior and multi-modal transportation network management. She is currently serving as the Mobility Data Team lead for the California Integrated Travel Project at CalSTA/Caltrans and is the technical lead on several travel model development projects.

Ms. Sall has served in numerous capacities as a consultant and through appointed volunteer positions with the Transportation Research Board (TRB) and Zephyr Foundation for Improved Travel Analysis. She has served as a task lead for the recently published NCHRP Report 934 *Travel Forecasting Accuracy Assessment Research* and is serving on the panel for NCHRP 08-121 *Accessibility Measures in Practice: Guidance for Agencies*. In the past, she has served as the chair for SHRP2 C46 *Resource on Advanced Integrated Models and Implementation Strategy*, on the panel for NCHRP Report 775 *Applying GPS Data to Understand Travel Behavior*,

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and as a researcher for NCHRP Report 716 *Travel Demand Forecasting: Parameters and Techniques.* Ms. Sall is currently serving the TRB as a member of Committee on Travel Demand Forecasting and the Transportation Research Record Advisory Board and has served in the past on the following committees: Planning Applications, Travel Forecasting Resource, Metropolitan Policy and Practices, and the Task Force on Bring Activity-Based Models to Practice. She has served on seven of the past eight organizing committees for the TRB Innovations in Travel Modeling Conference series and six of the past TRB Planning Applications Conferences including as conference chair and technical track leads. Outside TRB, she is the co-founder and workforce development lead for the Zephyr Foundation for Improved Travel Analysis, a former leader of the Washington DC Chapter of ITE, and frequent collaborator and presenter with NACTO, MobilityData IO, and a variety of Universities. Ms. Sall serves frequently on Peer Review Panels facilitated by the Travel Model Improvement Program and a variety of other expert panels for both research and policy.

As the former Deputy Director for Technology, Data and Analysis of the San Francisco County Transportation Authority Ms. Sall was responsible for developing, maintaining, and applying an Activity-Based Travel Demand Model that served as the basis for local long-range planning documents, FTA New- and Small-Starts submissions, the environment review process, and various land use and transportation studies. Ms. Sall began her career as a consultant working on a variety of projects ranging from project-level forecasting and travel impact analysis to urban and rural long-range transportation plans and neighborhood planning studies. She has Civil Engineering degrees from North Carolina State University (B.S.) and the University of Texas at Austin (M.S.).

Alex Skabardonis is an internationally recognized expert in traffic flow theory and models, traffic management and control systems, design, operation and analysis of transportation facilities, intelligent transportation systems (ITS), energy and environmental impacts of transportation. He is a Professor at the University of California, Berkeley, and program Leader at California PATH, a statewide ITS research center. He has worked extensively in the development and application of models and techniques for traffic control, performance analysis of highway facilities and applications of advanced technologies to transportation. He has served as Principal Researcher for 85 extramurally funded contracts and grants totaling over $30M and has published over 350 papers and technical reports. He is co-developer of the California Freeway Performance Measurement System (PeMS) and the Berkeley Highway Laboratory that produced the NGSIM vehicle trajectories database used by transportation researchers worldwide.

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Dr. Skabardonis teaches graduate courses on transportation modeling and analysis, traffic operations and intelligent transportation. He has advised and supported more than 120 graduate students toward their MS and PhD degrees at UC Berkeley. He also developed and taught workshops on traffic management, control systems and traffic simulation models attended by more than 500 transportation professionals. He holds an undergraduate degree in Civil Engineering from the Technical University of Athens and master's and PhD degrees in CE from Southampton University in the United Kingdom.

Joan Walker conducts research on behavioral modeling, with an expertise in discrete choice analysis and travel behavior. She works to improve the models that are used for transportation planning, policy, and operations. Professor Walker joined UC Berkeley in 2008 as faculty in the Department of Civil and Environmental Engineering and a member of the interdisciplinary Global Metropolitan Studies (GMS) initiative. She received her Bachelor's degree in Civil Engineering from UC Berkeley and her Master's and PhD degrees in Civil and Environmental Engineering from Massachusetts Institute of Technology. Prior to joining UC Berkeley, she was Director of Demand Modeling at Caliper Corporation and an Assistant Professor of Geography and Environment at Boston University. She is a recipient of the Presidential Early Career Award for Scientists and Engineers (PECASE) – the highest honor bestowed by the U.S. government on scientists and engineers beginning their independent careers. She served for six years as the Chair of the Committee on Transportation Demand Forecasting (ADB40) for the Transportation Research Board of the National Academies. She is an instigator and founding stakeholder of The Zephyr Foundation, which aims to advance rigorous transportation and land use decision-making for the public good and was awarded its Leadership Award in 2020. She has served as Acting Director of UC Berkeley's Institute of Transportation Studies (ITS).

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APPENDIX C. GLOSSARY OF ACRONYMS AND TERMS

Caltrans	California Department of Transportation
CEQA	California Environmental Quality Act
CSTDM	California Statewide Travel Demand Model
DOT	Department of Transportation
EIR	Environmental Impact Report (State)
EIS	Environmental Impact Statement (federal)
FHWA	Federal Highway Administration
GHG	Greenhouse Gas
GP	General Purpose lane
HCM	Highway Capacity Manual
HOT	High Occupancy Toll lane
HOV	High Occupancy Vehicle lane
HPMS	Highway Performance Monitoring System database hosted by Federal Highway Administration and maintained by Caltrans Division of Research, Innovation, and System Information
IS	Initial Study
MPO	Metropolitan Planning Organization
MTP	Metropolitan Transportation Plan or Metropolitan Transportation Program
MSA	Metropolitan Statistical Area
NCST	National Center for Sustainable Transportation, University of California, Davis
ND	Negative Declaration
NEPA	National Environmental Policy Act
OPR	Governor's Office of Planning and Research
PA&ED	Project Approval and Environmental Document
PDT	Project Development Team
PEAR	Preliminary Environmental Analysis Report
PRC	California Public Resources Code
SB	Senate Bill
SHS	State Highway System
SOV	Single Occupancy Vehicle
TA	Office of Planning and Research Technical Advisory on Evaluating Transportation Impacts in CEQA (2018)
TAC	*Transportation Analysis under CEQA* (Caltrans guidance document for implementing SB 743)
TAF	*Transportation Analysis Framework* (Caltrans guidance document for implementing SB 743)
TBM	Trip-Based Model
TDM	Travel Demand Model

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TMIP	Travel Model Improvement Program
VMT	Vehicle Miles Traveled
Elasticity	Elasticity is a measure of a variable's sensitivity to a change in another variable. In economics, elasticity is the measurement of the percentage change of one economic variable in response to a change in another. In transportation forecasting, an example is elasticity of travel demand, which can be expressed as the percent change in regional VMT divided by the percent change in regional lane-miles of state highways.
Induced Travel	Induced travel (or the VMT attributable to a transportation capacity increase) is the increased amount of vehicle travel on the transportation network that is caused by travel behavior changes associated with decreased cost of travel due to improved travel times, improved reliability, or reduced price of travel. Over the short run, travel behavior changes including longer trips, more trips, mode shift, and route shift all tend to occur as a result of a highway capacity increase. Over the long run, these effects intensify (e.g. as people shift job or residential location to benefit from the infrastructure), and also land use development may become more dispersed, adding additional vehicle travel; for these reasons, long run induced travel is generally greater than short run induced travel.
Latent Demand	Latent demand is the travel that would occur on the transportation network if travel times (or costs) were reduced. Much like any public utility (e.g. electricity or water), consumers will use more of it when its cost or impedance of use is reduced or made free. Note that unless the current price of travel is zero (instantaneous travel at will at no cost), there is always latent demand.
Metropolitan Statistical Area	A U.S. metropolitan statistical area (MSA) is a geographical region with a relatively high population density at its core and close economic ties throughout the area, as defined by the U.S. Office of Management and Budget and used by the Census Bureau and other federal government agencies for statistical purposes.
Transit	Transit generally includes all forms of shared common carrier passenger ground transportation in moderate to high capacity vehicles ranging from dial-a-ride vans to buses, trolleys, light rail, commuter rail, and intercity rail transportation.
Travel Demand Model	A travel demand model is any relatively complex computerized set of procedures for predicting future trip making as a function of land use, demographics, travel costs, the road system, and the transit system. These models may cover an entire metropolitan area, a single city or county, or the entire State..

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Trip-Based Model	Trip-based travel models use the individual person trip as the fundamental unit of analysis. Trip-based models are often referred to as "4-step" models because they split the trip making decision process into 4 discrete steps: trip generation by time of day, destination choice, mode choice, and route choice (traffic assignment).
Trucks	Trucks are a subtype of the heavy vehicles category which includes trucks, intercity buses, and recreational vehicles. This Framework follows the Highway Capacity Manual definition of what constitutes a heavy vehicle: "A vehicle with more than four wheels touching the pavement during normal operation." This is consistent with the Caltrans Traffic Census definition of a truck: "The two-axle (truck) class includes 1-1/2-ton trucks with dual rear tires and excludes pickups and vans with only four tires."
Vehicle Miles Traveled	The number of miles traveled by motor vehicles on roadways in a given area over a given time period. VMT may be subdivided for reporting and analysis purposes into single occupant passenger vehicles (SOVs), high occupancy vehicles (HOV's), buses, trains, light duty trucks, and heavy-duty trucks. For example, an air quality analysis may require daily VMT by vehicle class and average speed or vehicle operating mode (idle, acceleration, cruise, deceleration, etc.). For a CEQA compliant transportation impact analysis, automobile VMT (cars and light trucks) may be evaluated.
VMT Attributable to a Project	In the context of a CEQA analysis, the VMT attributable to a transportation project, or induced travel, is the difference in passenger VMT between the with project and without project alternatives. VMT attributable to a project is equivalent to induced travel in this context.

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APPENDIX D. ACKNOWLEDGEMENTS

TECHNICAL ROUNDTABLE

Made up of over 35 practitioners and stakeholders, the following participants met three times to provide detailed technical input for the development of the guidance documents:

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- Maura Twomey, Association of Monterey Bay Area of Governments
- Liza Zorn, Bay Area Metropolitan Transportation Commission
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Substantial contributions were made by the following organizations in a consulting role to Caltrans:

- Alta Vista Solutions
- Emergent Transportation Concepts
- Kittelson and Associates, Inc.
- MIG, Inc.
- P & D Consulting

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Exhibit J



Transportation Analysis under CEQA

First Edition

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Evaluating Transportation Impacts of State Highway System Projects

California Department of Transportation
Sacramento, California
September 2020

ACKNOWLEDGEMENTS

The *Transportation Analysis Framework* (TAF) and *Transportation Analysis Under CEQA* (TAC) were prepared by the California Department of Transportation working with State Administration partners and Stakeholders from the public, private and non-profit sectors. Contributors within the Department included staff and management from the Headquarters Divisions of Environmental Analysis, Transportation Planning, Traffic Operations, and Legal, as well as from the Director's Office Sustainability Team. The Headquarters team benefitted from input provided by the Caltrans Executive Team as well as by staff and management from Caltrans districts.

The documents are the products of a collaboration among State government partners. Throughout the development of the documents, the Caltrans team worked closely with technical and policy experts from the Governor's Office of Policy and Research and the California Air Resources Board.

A list of the individuals who contributed to the preparation of the TAF and TAC is included at the end of this document. We are grateful for the time and effort that they generously gave to develop and document the Department's new approach to analyzing and evaluating transportation impacts of projects on the State Highway System.

LETTER FROM THE DIRECTOR

To Caltrans staff, partners, and stakeholders,



I am pleased to issue the enclosed guidance document: *Transportation Analysis under the California Environmental Quality Act (CEQA) for Projects on the State Highway System* (TAC) as part of the California Department of Transportation's (Caltrans) continuing commitment to implement the California Environmental Quality Act in alignment with State goals and policies. The TAC, and its companion document, *Transportation Analysis Framework* (TAF), provides Caltrans policy along with guidance for implementing Senate Bill (SB) 743 (Steinberg, 2013) codified at Public Resources Code section 21099.

The new processes implemented through Caltrans' environmental program are a key part of Caltrans' increasingly important work to confront the challenge of climate change and build more livable communities. Caltrans is actively implementing strategies to reduce emission of greenhouse gases, including initiatives to use clean fuels and vehicles, and to reduce waste. Perhaps most importantly, we are rethinking the way we invest so people can drive less.

Reducing total driving, or vehicle miles traveled, is the focus of the TAC, TAF and the associated changes to transportation impact analysis under CEQA for projects on the State Highway System. In plain terms, the more we drive our cars, the more damage we cause to the environment and our health—and the less time we spend with our families and communities. A vehicle miles traveled-based approach supports transportation projects that create more travel choices, such as new rail lines, improved bus service, trails, paths, and safer streets for walking and bicycling. As these modes of transportation grow, we can reduce the dependence and burden on our already congested highway system.

Thank you to our partners and stakeholders, as well as to Caltrans staff, whose contributions have helped to shape this document. I look forward to your continued partnership as we make the changes needed to meet California's goals for climate, air quality, and public health. It's an exciting time to continue our commitment to provide more transportation options to Californians and reduce our dependence on driving.

Sincerely,

Toks Omishakin
Director, Caltrans

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FOREWORD

The *Transportation Analysis Framework* (TAF) and *Transportation Analysis under CEQA* (TAC) guide transportation impact analysis for projects on the State Highway System (SHS) as part of the California Environmental Quality Act (CEQA) process. The California Department of Transportation (Caltrans) has prepared these documents to guide implementation of Senate Bill (SB) 743 (Steinberg, 2013). The TAF and TAC establish Caltrans guidance on how to analyze induced travel associated with transportation projects and how to determine impact significance under CEQA, respectively. These documents guide transportation impact analysis for projects on the SHS only. The non-capacity-increasing maintenance projects like re-paving and filling potholes are unaffected, as are many safety improvements, including traffic calming measures to slow traffic, and transportation projects that create facilities for pedestrians and cyclists and transit projects.

In response to a high level of interest in the guidance from Caltrans' transportation partners, climate and environmental advocates and others, Caltrans has hosted a total of 130 meetings with stakeholders and provided a 60-day informal feedback period on the draft documents. Statewide outreach events included two external webinars attended by over 850 participants and three external technical roundtables attended by more than 150 participants. These Caltrans events were supplemented by OPR's webinar and Office Hours outreach which reached over 3,500 participants. Additionally, Caltrans met regularly through the guidance development process with key stakeholders including the Self-help Counties Coalition, the ClimatePlan coalition, and the Rural Counties Task Force.

Caltrans received feedback on the drafts from 37 agencies including counties, cities, and MPOs as well as from consultants, advocates, coalitions and other State agencies. Throughout the process, a small number of controversial issues stood out. To address the difference of opinions around key technical issues, Caltrans convened an expert panel of academics and practitioners through UC Berkeley Tech Transfer. The panel chair presented the group's conclusions to stakeholders at a virtual Technical Roundtable prior to finalizing the group's recommendations. Caltrans and State partners have accepted the panel's recommendations, which are reflected in the guidance documents.

The Caltrans TAF and TAC guidance documents reflect a cultural shift in how Caltrans interprets, analyzes and mitigates transportation impacts. This shift will impact the entire project delivery process and shape the future of California's transportation system. The September 2020 TAF and TAC are the first versions of these materials, and we anticipate future improvement as our understanding and expertise deepens through implementation. Your continuing input and partnership with Caltrans will help further improve the guidance. Your commitment and participation in this ongoing work is appreciated.

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1 INTRODUCTION/BACKGROUND

The intent of this guidance is to provide information to support Caltrans' CEQA practitioners in making CEQA significance determinations for transportation impacts of projects on the SHS.

With the passage of Senate Bill (SB) 743 (Steinberg, 2013) codified at Public Resources Code (PRC) section 21099, California embarked on a new approach for analyzing transportation impacts under CEQA. These changes require updates to both the Caltrans Local Development-Intergovernmental Review (LD-IGR) function and project delivery for projects on the SHS.

In SB 743, the California State Legislature (Legislature) found and declared the following:

> *(1) With the adoption of Chapter 728 of the Statutes of 2008, popularly known as the Sustainable Communities and Climate Protection Act of 2008, the Legislature signaled its commitment to encouraging land use and transportation planning decisions and investments that reduce vehicle miles traveled and contribute to the reductions in greenhouse gas emissions required in the California Global Warming Solutions Act of 2006 (Division 25.5 (commencing with Section 38500) of the Health and Safety Code). Similarly, the California Complete Streets Act of 2008 (Chapter 657 of the Statutes of 2008) requires local governments to plan for a balanced, multimodal transportation network that meets the needs of all users of streets, roads, and highways for safe and convenient travel.*
>
> *(2) Transportation analyses under the California Environmental Quality Act (Division 13 (commencing with Section 21000) of the Public Resources Code) typically study changes in automobile delay. New methodologies under the California Environmental Quality Act are needed for evaluating transportation impacts that are better able to promote the state's goals of reducing greenhouse gas emissions and traffic-related air pollution, promoting the development of a multimodal transportation system, and providing clean, efficient access to destinations.*

The legislative intent of SB 743 is to do both of the following:

1) Ensure that the environmental impacts of traffic, such as noise, air pollution, and safety concerns, continue to be properly addressed and mitigated through the CEQA.
2) More appropriately balance the needs of congestion management with statewide goals related to infill development, promotion of public health through active transportation, and reduction of greenhouse gas (GHG) emissions.

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In December 2018, the Office of Administrative Law approved updates to the formal CEQA regulations prepared by OPR. The formal regulations are generally referred to as the CEQA "Guidelines." The update contained, among other things, a new section 15064.3 addressing transportation impacts. OPR also released the *Technical Advisory on Evaluating Transportation Impacts in CEQA* which contains recommendations on assessing vehicle miles traveled (VMT), significance, and mitigation measures.[1]

Section 15064.3 of the Guidelines separately addresses the analysis of transportation impacts arising from land use projects and those arising from transportation projects. For Caltrans, SB 743 means major changes in two activities:

1) Review of a proposed land use project's or a proposed plan's potential impact to the SHS, which are generally addressed through the Caltrans Local Development-Intergovernmental Review Program.
2) CEQA analysis of capacity-increasing transportation projects on the SHS.

These changes are consistent with both the CEQA Guidelines and OPR's Technical Advisory. Together, they aim to reduce automobile use while increasing use of more sustainable modes of transportation that are essential to supporting our growing population and economy, while also meeting climate goals. Reducing VMT corresponds with the goals detailed in Caltrans' Strategic Management Plan. It is also consistent with and will aid Caltrans in continuing to meet its policy aims for the Environment (Director's Policy [DP-004]); Freeway System Management (DP-08); Energy Efficiency, Conservation, and Climate Change (DP-023-R1); Climate Change (DP-30); and Sustainability (DP-033), among others.

This guidance establishes Caltrans' process for analyzing a transportation project's impacts under CEQA due to increases in VMT attributable to that project and offers an initial list of potential mitigation measures for significant impacts. This guidance augments but does not change any of the basic processes currently in place for evaluating projects under CEQA and other applicable laws or regulations. This guidance is not intended to address transportation impacts resulting from land-use projects which are addressed in the separate *Transportation Impact Study Guide* (TISG). Nor is this guidance intended to provide detailed instruction on performing the induced travel analysis itself, which can instead be found in the *Transportation Analysis Framework* (TAF).

The TAC is to be used in conjunction with the guidance provided in the TAF. The flow chart provided as Figure 1 illustrates the relationship between the TAC and TAF.

[1] Office of Planning and Research, *Technical Advisory on Evaluating Transportation Impacts in CEQA* (December 2018).

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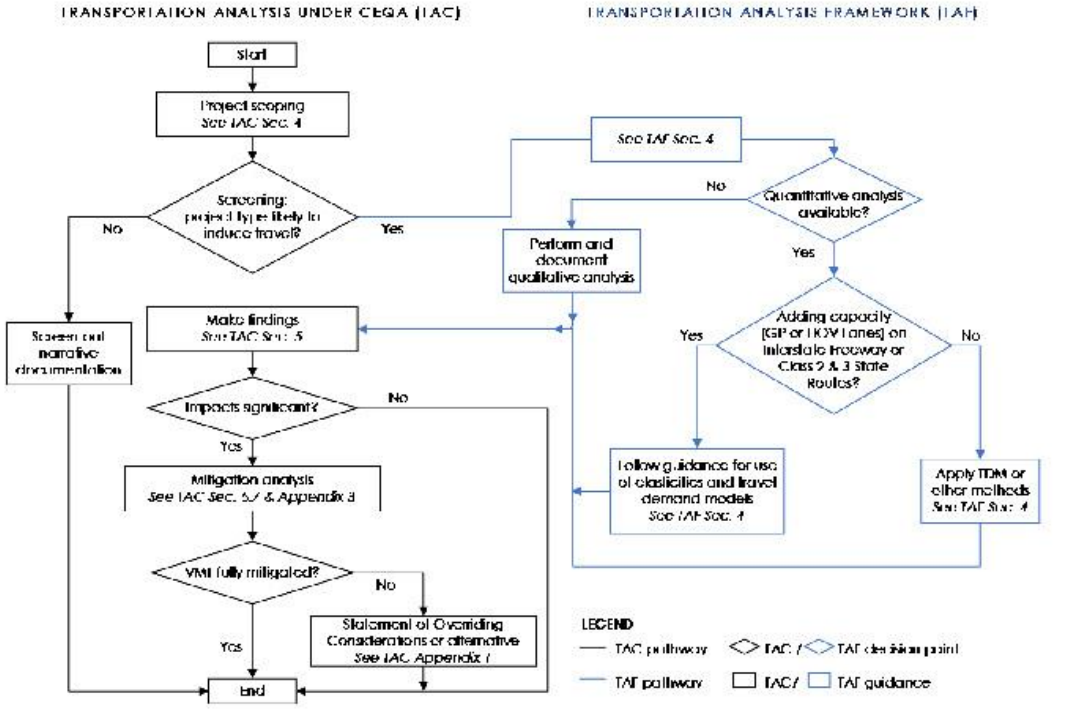


Figure 1. Relationship Between the TAC and TAF Documents

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2 REGULATORY SETTING

This section contains a listing of relevant laws, regulations, documents, and references for project-level VMT analysis.

Regional VMT analysis takes place during the development of the Regional Transportation Plans (RTPs), which are prepared and adopted every five years by the 26 rural Regional Transportation Planning Agencies (RTPAs), and every four years for the 18 Metropolitan Planning Organizations (MPOs) located in air quality non-attainment areas and at least every five years for MPOs located in air quality attainment areas. An RTP is a long-range, fiscally constrained plan prepared subject to federal and State requirements. It provides a vision for regional transportation investments over a period of 20 years or more and analyzes the transportation system and its relationships to a region's economy, environment, livability, and more.

2.1 SUSTAINABLE COMMUNITIES AND CLIMATE PROTECTION ACT OF 2008

Senate Bill 375 (Steinberg), known as the Sustainable Communities and Climate Protection Act, was enacted in 2008. SB 375 directed the California Air Resources Board (CARB) to adopt regional GHG emissions reduction targets applicable to each MPO region. SB 375 also required the State's 18 MPOs to: 1) prepare a sustainable communities strategy (SCS) to achieve the GHG-reduction target as part of the RTP; or 2) prepare an "alternative planning strategy" if the SCS does not achieve the reductions called for by the regional targets.

Senate Bill 375 also required the California Transportation Commission, in conjunction with CARB, to maintain guidelines for the travel demand models used in the development of RTPs.

Each RTPA or MPO must also complete an environmental analysis of its RTP pursuant to CEQA. These environmental documents analyze the anticipated environmental effects arising from the implementation of the region's RTP, including transportation impacts. The environmental documents prepared by the RTPAs and MPOs report a variety of VMT-related metrics or performance measures in their analyses including total annual VMT, per capita VMT, and congested VMT.

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2.2 CEQA GUIDELINES

Section 15064.3 of the CEQA Guidelines (Guidelines) addresses *Project-level VMT analysis* under CEQA.

The portion of the Guidelines that address transportation projects (rather than land use projects), begins at section 15064.3(b) and reads:

> *(2) Transportation Projects. Transportation projects that reduce, or have no impact on, vehicle miles traveled should be presumed to cause a less than significant transportation impact. For roadway capacity projects, agencies have discretion to determine the appropriate measure of transportation impact consistent with CEQA and other applicable requirements. To the extent that such impacts have already been adequately addressed at a programmatic level, such as in a regional transportation plan EIR, a lead agency may tier from that analysis as provided in Section 15152.*
>
> *(3) Qualitative Analysis. If existing models or methods are not available to estimate the vehicle miles traveled for the particular project being considered, a lead agency may analyze the project's vehicle miles traveled qualitatively. Such a qualitative analysis would evaluate factors such as the availability of transit, proximity to other destinations, etc. For many projects, a qualitative analysis of construction traffic may be appropriate.*
>
> *(4) Methodology. A lead agency has discretion to choose the most appropriate methodology to evaluate a project's vehicle miles traveled, including whether to express the change in absolute terms, per capita, per household or in any other measure. A lead agency may use models to estimate a project's vehicle miles traveled, and may revise those estimates to reflect professional judgment based on substantial evidence. Any assumptions used to estimate vehicle miles traveled and any revisions to model outputs should be documented and explained in the environmental document prepared for the project. The standard of adequacy in Section 15151 shall apply to the analysis described in this section.*

Several broader observations about section 15064.3 and how it relates to this guidance are important to note:

- Per section 15064.3, VMT is "Generally the most appropriate measure of transportation impacts." The simplest definition of VMT, or vehicle mile traveled, is "One vehicle traveling on a roadway for one mile" (Sacramento Area Council of Governments 2016 MTP/SCS). Section 15064.3(a) defines "vehicle miles traveled" as "The amount and distance of automobile travel attributable to a project." This is a significant change from previous

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methodologies which typically analyzed Level of Service (LOS)[2], a travel time and congestion metric, as the most important consideration in transportation impacts analysis. When evaluating transportation impacts on the SHS, Caltrans will now evaluate the "induced travel," or the change in VMT attributable to an individual transportation project.

- Certain project types, primarily those which are non-capacity increasing, are presumed to result in a less than significant transportation impact and therefore generally do not require analysis of vehicle miles traveled. Those project types are discussed in section 5.1 of this document and are also described in the OPR Technical Advisory.
- A lead agency may in some cases tier its transportation impact analysis, as appropriate, from the environmental impact reports (EIRs) prepared for regional transportation plans/sustainable community strategies (RTP/SCS).[3] See the discussion in section 5.1.2. of this document to assess whether transportation impacts have been adequately analyzed at the programmatic level, and whether tiering from an RTP/SCS EIR or other analysis may be appropriate.
- Quantitative analysis is most appropriate for transportation projects which increase roadway capacity. Please refer to Section 4 of the TAF for further discussion.
- Qualitative analysis may be appropriate for certain transportation projects, particularly when technical models are not available, as discussed in TAF Section 4. The use of a qualitative analysis should generally be limited to those situations in which quantitative tools are unable to adequately assess a transportation project's impacts. Please refer to Section 4 of the *Transportation Analysis Framework: Induced Travel Analysis* (TAF) for more details.

  Caltrans has chosen to express change in VMT in absolute terms.

[2] The Highway Capacity Manual, which first introduced the concept of LOS in 1965, defines LOS as follows: "Level of service (LOS) is a quality measure describing operational conditions within a traffic stream, generally in terms of such service measures as speed and travel time, freedom to maneuver, traffic interruptions, and comfort and convenience. Safety is not included in the measures that establish service levels." Additionally, "each facility type that has a defined method for assessing capacity and level of service also has performance measures that can be calculated. These measures reflect the operating conditions of a facility, given a set of roadway, traffic, and control conditions. Travel speed and density on freeways, delay at signalized intersections, and walking speed for pedestrians are examples of performance measures that characterize flow conditions on a facility" (Highway Capacity Manual, 2000).

[3] It should be noted that some RTPs/SCSs are not consistent with the state's climate goals, according to CARB. See CARB, "CARB 2017 Scoping Plan," 4. A close review of the applicable EIR for the RTP will be required in order to "tier" from its analysis.

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3 OTHER RELEVANT DOCUMENTS AND REFERENCES

3.1 TECHNICAL ADVISORY ON EVALUATING TRANSPORTATION IMPACTS IN CEQA (OPR TECHNICAL ADVISORY)

The OPR Technical Advisory provides recommendations on assessing VMT, significance, and mitigation measures. Practitioners should consult the OPR Technical Advisory when evaluating transportation impacts of projects on the SHS.

3.2 CALIFORNIA AIR RESOURCES BOARD CLIMATE CHANGE SCOPING PLAN

In 2006, the Legislature passed Assembly Bill 32 (AB 32, Nunez), known as the California Global Warming Solutions Act of 2006. which created a comprehensive, multi-year program to reduce GHG emissions in California. AB 32 required CARB to develop the Scoping Plan to describe the approach California would take to reduce GHGs to meet the target of reducing emissions to 1990 levels by 2020. The Scoping Plan was first approved by CARB in 2008 and updated in 2014 and again in 2017.[4]

In 2016, the Legislature passed SB 32 (Pavley), which codified a statewide 2030 GHG emissions-reduction target of 40 percent below 1990 levels. Along with SB 32, the Legislature passed companion legislation, AB 197 (Eduardo Garcia), which provided additional direction for updating the Scoping Plan. These changes were reflected in the second update to the Scoping Plan completed in 2017.

3.3 CALIFORNIA AIR RESOURCES BOARD'S MOBILE SOURCE STRATEGY

In May 2016, CARB released the updated Mobile Source Strategy which demonstrates how the State can simultaneously meet air quality standards, achieve GHG emissions reduction targets, decrease health risk, and reduce petroleum consumption from the transportation sector through a modeling scenario—the "Cleaner Technologies and Fuels Scenario" (CTF). Although the majority of GHG reductions in the scenario are assumed to be attributable to new vehicle technologies and low carbon fuels, the CTF also demonstrates the need for a 15 percent reduction in total light-duty VMT by 2050 as compared to baseline 2050 levels. This scenario would require light-duty VMT growth of only five percent by 2030, compared to the current growth trajectory of approximately 11 percent.[5] The combined strategies within the CTF scenario, including VMT reduction, would achieve a 45 percent reduction in on-road GHG emissions by 2030, and an

[4] California Air Resources Board, "2017 Scoping Plan Documents." Available at https://ww2.arb.ca.gov/our-work/programs/ab-32-climate-change-scoping-plan/2017-scoping-plan-documents.
[5] California Air Resources Board, "Mobile Source Strategy," (May 2016), 37.

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approximately fifty percent reduction in on-road petroleum demand by 2050, meeting both climate targets. CARB continues to implement the 2016 Mobile Source Strategy and in 2020 is in the process of updating the Strategy, as required by Senate Bill 44 (Skinner).[6]

3.4 California Air Resources Board's Sustainable Communities and Climate Protection Act Progress Report

In November of 2018, CARB published the "2018 Progress Report: California's Sustainable Communities and Climate Protection Act" (Progress Report). The Progress Report indicates California is not on track to meet the GHG reductions expected under SB 375. According to the Progress Report, actual statewide per capita VMT had not declined as expected under SB 375 but at the time the report was written, was increasing. The fundamental finding in CARB's Progress Report is that California is not on track to meet GHG emissions reductions expected under SB 375 and will not meet SB 32 GHG emissions targets without significant changes to how communities and transportation systems are planned, funded, and built.[7]

[6] California Air Resources Board, "2020 Mobile Source Strategy." Available at https://ww2.arb.ca.gov/resources/documents/2020-mobile-source-strategy.

[7] California Air Resources Board, "2018 Progress Report: Sustainable Communities and Climate Protection Act". (November 2018), 3, 5.

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4 PROJECT SCOPING

Formal scoping will continue to follow established procedures identified under CEQA, including preparation of a Notice of Preparation for an EIR. Scoping a project on the SHS is a collaborative process.

Preliminary environmental scoping occurs even earlier, during the "Project Initiation Phase" and this phase culminates in the "programming" of transportation projects. Transportation programming is the commitment of transportation funds to particular projects, to be available over a period of several years. Separate programming documents, prepared and adopted for somewhat different purposes, are required under both federal and State law.

Deviating from the programmed scope, schedule or budget is an uncertain process, and represents a potential risk to a project's successful delivery. Projects that do not have an accurate scope may face cost increases and schedule delays. Because of fiscal and schedule constraints, it may become increasingly difficult to achieve feasible and proportional project-level VMT mitigation as a roadway capacity-increasing project proceeds from initial scoping to final design. Therefore, it is important to thoroughly consider a range of feasible project alternatives and/or mitigation which meet the purpose and need of the project, as well as feasible mitigation which can potentially minimize, or avoid altogether, the additional VMT from capacity-increasing projects.

The following options, and others which may avoid VMT impacts, require close coordination with federal, state, and regional transportation partners, and should be considered as early as possible in the planning process, as part of the range of VMT-reducing alternatives to capacity-increasing projects.

- Invest in multimodal transportation infrastructure: Caltrans and/or partnering agencies could directly invest in infrastructure likely to support VMT reduction in order to mitigate the impacts of capacity increasing projects.
- Expand toll lane use or develop other pricing-based strategy options: This option would consist of expanding the use of toll lanes or developing other pricing strategies, such as increasing parking prices in an area, to reduce VMT.

Other potential options to reduce project-level VMT impacts are discussed in the mitigation section of this document (section 5.7).

In addition to mitigation, another consideration during the preliminary scoping of project involves the determination of the appropriate level of environmental document. For new projects, Project Development Teams (PDTs) should consider the likelihood of a potentially significant environmental impact (applying the methods in Section 5) when determining the appropriate level of document. PDTs should also evaluate whether projects initially determined to require a Negative Declaration/Mitigated Negative Declaration (ND/MND) may instead require an EIR if there is a potential for a significant impact, and, if no feasible alternative or

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mitigation substantially reduces that impact, a Statement of Overriding Considerations may be appropriate.

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5 THE CEQA ANALYSIS

This guidance document is primarily intended to address the following question on the CEQA checklist found in Guidelines Appendix G, section XVII(b):

Would the project conflict or be inconsistent with CEQA Guidelines section 15064.3, subdivision (b)?

The portion of section 15064.3(b) of the CEQA Guidelines pertaining to transportation projects provides that for roadway capacity projects "…agencies have the discretion to determine the appropriate measure of transportation impact consistent with CEQA and other applicable requirements." Consistent with the language of Section 15064.3 of the CEQA Guidelines, Caltrans concurs that VMT is the most appropriate measure of transportation impacts under CEQA. The determination of significance of a VMT impact will require a supporting induced travel analysis for capacity-increasing transportation projects on the SHS when Caltrans is lead agency or when another entity acts as the lead agency.

Whether a project is in conflict or inconsistent with CEQA Guidelines section 15064.3(b) will be evaluated by practitioners based on its potential to increase VMT attributable to the project, (i.e., induced travel), as discussed in the Section 5.6 below. The guidance in this document further explains the types of projects and impacts that would be considered significant within this context.

The remaining CEQA checklist questions generally associated with transportation impacts are listed in Appendix G of the CEQA Guidelines and are addressed in Appendix B of this document. Each question should be analyzed independently. If other potential impacts are identified for a particular project, the standard CEQA analytical process would apply and significance determinations made for each, as appropriate.

5.1 SCREENING

The use of VMT as the CEQA transportation metric will, in many cases, lead to a determination that roadway capacity-increasing projects result in significant transportation impacts. For many other types of transportation projects, however, a VMT impact analysis beyond the screening process is not necessary. Generally, there are two reasons such an analysis may not be warranted. The first is because the type of project would not be likely to lead to a measurable and substantial increase in VMT. The second is because the project's VMT impacts have already been analyzed and, when necessary, mitigated to the extent feasible in an earlier CEQA document. In the latter case the analysis may "tier" from or otherwise rely on that earlier analysis.

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5.1.1 SCREENING BY PROJECT TYPE: NON-CAPACITY-INCREASING VS. CAPACITY-INCREASING PROJECTS

Understanding the purpose and scope of the proposed project will assist the practitioner in determining which project types have the potential for a significant transportation impact. Determination of the project type usually occurs early in the project development process and is supported by the "purpose and need" of the project. A key consideration for the practitioner which is addressed below is determining whether a project type has the potential to induce travel.

If a project increases capacity, it will generally require an analysis to determine if there will be a significant transportation impact caused the increase in VMT attributable to the project. Many projects Caltrans regularly undertakes such as maintenance projects including culvert repairs, overlays, and restriping, do not increase capacity. During the screening review, practitioners should examine the specific project circumstances to ensure that there are no unusual circumstances which could otherwise lead to an increase in VMT. Then, practitioners should provide a brief discussion in the environmental document that describes why the project is not expected to increase VMT.

Taken directly from OPR's Technical Advisory, the following excerpt describes types of projects likely to lead to measurable and substantial increases in VMT:

i) ***Project Types Likely to Lead to a Measurable and Substantial Increase in Vehicle Travel[8]***

Addition of through lanes on existing or new highways, including general purpose lanes, HOV lanes, peak period lanes, auxiliary lanes, or lanes through grade-separated interchanges, and other projects adding capacity to the State Highway System.

These are project types that include the construction of new facilities or expansion of existing ones. These are common types of capacity-increasing projects that Caltrans constructs. These projects are likely to lead to a measurable and substantial increase in VMT. Therefore, an induced travel analysis is required to determine how much of the increase in VMT is attributable to the project (versus other variables such as the economy and population growth), and where impacts are significant, whether mitigation can reduce the impacts to a less than significant impact. Only the VMT that is directly attributable to the project should be analyzed (See TAC Figure 2). The TAF provides guidance for analyzing induced travel.

[8] Office of Planning and Research, *Technical Advisory on Evaluating Impacts in Transportation* (OPR December 2018), 20.

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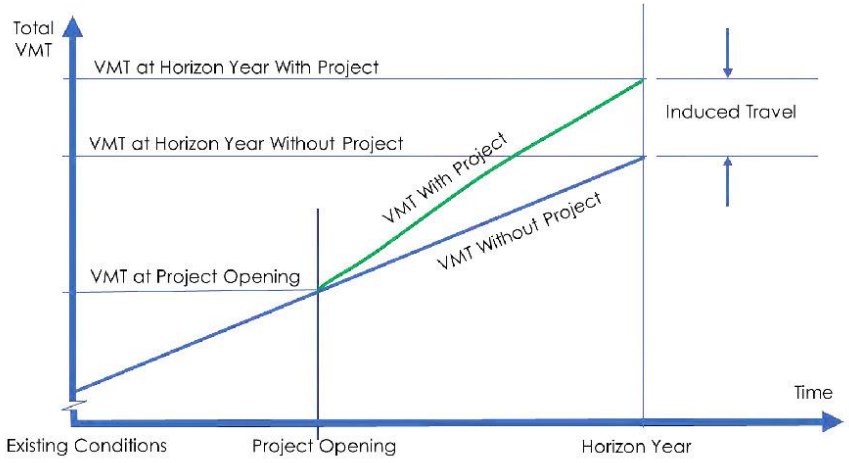


Figure 2. Identification of Induced Travel
(VMT Attributable to a Transportation Project)

The emphasis of this guidance is to identify those projects that will lead to a measurable and substantial increase in vehicle travel. The following describes projects not likely to lead to a measurable and substantial increase in VMT and which therefore generally should not require an induced travel analysis per OPR's Technical Advisory. The final six bullets on the list of project types not likely to lead to a measurable and substantial increase, beginning with "HOV bypass lanes on on-ramps" were added based on discussion with OPR. These are expected to be added to OPR's list of project types in a future update of the Technical Advisory. Note the deletion of the category of project described as "Addition of tolled lanes, where tolls are sufficient to mitigate VMT increase," which was also an outcome of discussion between Caltrans and OPR during the course of producing the TAC and TAF.

ii) Project Types Not Likely to Lead to a Measurable and Substantial Increase in Vehicle Travel[9]

- *Rehabilitation, maintenance, replacement, safety, and repair projects designed to improve the condition of existing transportation assets (e.g., highways; roadways; bridges; culverts; Transportation Management System field elements such as cameras, message signs, detection, or signals; tunnels; transit systems; and assets that serve bicycle and pedestrian facilities) and that do not add additional motor vehicle capacity*

[9] OPR, *Technical Advisory on Evaluating Transportation Impacts in CEQA* (December 2018), 20-21.

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- *Roadside safety devices or hardware installation such as median barriers and guardrails*
- *Roadway shoulder enhancements to provide "breakdown space," dedicated space for use only by transit vehicles, to provide bicycle access, or to otherwise improve safety, but which will not be used as automobile vehicle travel lanes*
- *Addition of an auxiliary lane of less than one mile in length designed to improve roadway safety*
- *Installation, removal, or reconfiguration of traffic lanes that are not for through traffic, such as left, right, and U-turn pockets, two-way left turn lanes, emergency truck pullovers, or emergency breakdown lanes that are not utilized as through lanes*
- *Addition of roadway capacity on local or collector streets provided the project also substantially improves conditions for pedestrians, cyclists, and, if applicable, transit*
- *Conversion of existing general-purpose lanes (including ramps) to managed lanes or transit lanes, or changing lane management in a manner that would not substantially increase vehicle travel*
- *Addition of a new lane that is permanently restricted to use only by transit vehicles*
- *Reduction in number of through lanes*
- *Grade separation to separate vehicles from rail, transit, pedestrians or bicycles, or to replace a lane in order to separate preferential vehicles (e.g., HOV, HOT, or trucks) from general vehicles*
- *Installation, removal, or reconfiguration of traffic control devices, including Transit Signal Priority (TSP) features*
- *Installation of traffic metering systems, detection systems, cameras, changeable message signs and other electronics designed to optimize vehicle, bicycle, or pedestrian flow*
- *Timing of signals to optimize vehicle, bicycle, or pedestrian flow*
- *Installation of roundabouts or traffic circles*
- *Installation or reconfiguration of traffic calming devices*
- *Adoption of or increase in tolls*
- *Initiation of new transit service*
- *Conversion of streets from one-way to two-way operation with no net increase in number of general purpose or continuous through traffic lanes*
- *Removal or relocation of off-street or on-street parking spaces*
- *Adoption or modification of on-street parking or loading restrictions (including meters, time limits, accessible spaces, and preferential/reserved parking permit programs)*
- *Addition of traffic wayfinding signage*
- *Rehabilitation and maintenance projects that do not add motor vehicle capacity*
- *Addition of new or enhanced bike or pedestrian facilities on existing streets/highways or within existing public rights-of -way*

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- *Addition of Class I bike paths, trails, multi-use paths, or other off-road facilities that serve non-motorized travel*
- *Installation of publicly available alternative fuel/charging infrastructure*
- *Addition of passing lanes, truck climbing lanes, or truck brake-check lanes in rural areas that do not increase overall vehicle capacity along the corridor*
- *HOV bypass lanes on on-ramps*
- *Local and collector roads in rural areas that don't include sidewalks where there would be no pedestrian traffic to use them*
- *Lanes through grade-separated interchanges without additional receiving lanes downstream*
- *Adding vehicle storage to a ramp without further reconfiguration*
- *Park and Ride facilities*
- *Truck size and weight inspection stations*

While the above list is thorough, it is not necessarily comprehensive. There may be types of projects in addition to those listed that would not lead to a measurable and substantial increase in VMT. When concluding that a particular project may be screened out from further analysis, the practitioner should review and fully document the rationale supporting the conclusion that the particular project would not likely lead to a measurable and substantial increase in VMT.

5.1.2 TIERING

As outlined in PRC sections 21068.5, 21093 and 21094, as well as Guidelines sections 15152 and 15385, tiering is a means of reducing redundancy, focusing analysis and ensuring consistency with earlier CEQA analyses. As defined in the PRC, tiering "…refers to using the analysis of general matters contained in a broader EIR (such as one prepared for a general plan or policy statement) with later EIRs and negative declarations on narrower projects; incorporating by reference the general discussions from the broader EIR; and concentrating the later EIR or negative declaration solely on the issues specific to the later project."

Tiering the project-level analysis from the regional analysis completed for the RTP/SCS EIR, or another EIR such as one prepared for a general plan or specific plan, would be the ideal method of determining the significance of transportation impacts. This is particularly true for an EIR prepared for an RTP/SCS, because if the regional modeling performed for a particular suite of projects (those that increase VMT and those that reduce VMT) has already accounted to some extent for the individual project's contributions, then the effects of the proposed project ideally would have already been mitigated entirely or in part. Although current RTP/SCS EIRs have limited utility for tiering transportation impact analysis, over time, tiering may become more available. Considerations to ensure that transportation impacts have been adequately evaluated and mitigated at the programmatic level include:

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- The EIR must adequately evaluate the phenomenon of induced travel. The modeling performed for the suite of transportation projects and initiatives in a region must accurately capture the induced VMT from land use effects of those projects.
- If tiering from an RTP/SCS EIR, the EIR must demonstrate consistency with the State's GHG reduction targets because meeting the current SB 375 targets alone is not enough to demonstrate broad consistency between the RTP/SCS's VMT analysis and state climate goals. A transportation project which substantially increases VMT may conflict with State climate goals, even if the project was included in an RTP/SCS that meets the applicable GHG reduction targets called for by SB 375[10]. This is because the current RTPs/SCSs are anticipated to achieve an 18 percent reduction in statewide per capita, on-road light-duty, transportation-related GHG emissions relative to 2005 by 2035, if those RTP/SCSs are fully implemented. However, the State forecasts a 25 percent reduction is needed to meet the State's climate goals[11].
- All feasible mitigation measures normally considered at the project level must be fully considered and properly applied at the plan level.

Note that even when tiering is not available, the CEQA Guidelines allow for the "incorporation by reference" of materials from a broader EIR. For example, the "environmental setting" for a project could be incorporated by reference from a broader EIR, thus streamlining the project-level analysis. Please see Guidelines §15150 for more information and the requirements for incorporation by reference.

5.2 BASELINE DETERMINATION

CEQA requires the comparison of impacts caused by a project to a "baseline" to determine whether those impacts are significant (Guidelines §15125).

Normally, future conditions with the project are compared to a baseline of "existing conditions." However, alternatives to an existing conditions baseline may be appropriate in certain circumstances, as included in the recent CEQA Guidelines update that reflects case law on determining the baseline to use in CEQA documents:

> *Generally, the lead agency should describe physical environmental conditions as they exist at the time the notice of preparation is published, or if no notice of preparation is published, at the time environmental analysis is commenced, from both a local and regional perspective. Where existing conditions change or fluctuate over time, and where necessary to provide the most accurate picture practically possible of the project's impacts, a lead*

[10] California Air Resources Board, "CARB 2017 Scoping Plan-identified VMT Reductions and Relationship to State Climate Goals," (January 2019), 4.
[11] California Air Resources Board, "CARB 2017 Scoping Plan-identified VMT Reductions and Relationship to State Climate Goals," (January 2019), 3.

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> *agency may define existing conditions by referencing historic conditions, or conditions expected when the project becomes operational, or both, that are supported with substantial evidence. In addition, a lead agency may also use baselines consisting of both existing conditions and projected future conditions that are supported by reliable projections based on substantial evidence in the record (Guidelines § 15125(a)(1)).*
>
> *A lead agency may also use projected future conditions (beyond the date of project operations) baseline as the sole baseline for analysis only if it demonstrates with substantial evidence that use of existing conditions would be either misleading or without informative value to decision-makers and the public. Use of projected future conditions as the only baseline must be supported by reliable projections based on substantial evidence in the record (Guidelines §15125(a)(2)).*

Transportation projects are typically built years after the CEQA analysis is completed, and comparing to existing conditions would combine the project's VMT effects with other effects on VMT that occur over time, such as increases in population or economic activity, in effect misleading the public and decision-makers by obscuring the impacts of the project itself. When comparing future build conditions to future no-build conditions, the difference is the addition of the project itself and associated changes that may occur to land use and travel behavior. The environmental document will need to include information on the traffic modeling, including the planning projections included in the model.

Regardless of whether a quantitative or qualitative analysis is performed, in order to fully provide context and information, beyond the future build condition, the CEQA analysis for VMT must also include the current condition and the future no-build condition. In other words, the future build alternative should be compared to the future no-build conditions (i.e., the conditions expected to exist in the future absent the project) to determine the amount of VMT attributable to the project per the CEQA Guidelines and the Technical Advisory. Additionally, and for informational purposes, the comparison to the existing condition should also be provided. However, a comparison only to existing conditions would not provide an accurate picture of the project's effects. Only by taking into account other variables not caused by the project, such as the projected future regional transportation system, population growth, economic growth and land use changes, can the *VMT that is attributable to the project* be separated from a general increase or decrease in VMT in a region overall. In order to fully apprise the reader of the total change in VMT anticipated, VMT for existing conditions should also be provided.

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5.3 Direct Impacts to Vehicle Miles Traveled, Including Induced Travel

Any analysis of VMT impacts must 1) determine whether the project will cause a significant transportation impact, and 2) be supported by "substantial evidence" as defined in Guidelines §15384. The CEQA Guidelines allow a qualitative approach to analyzing transportation impacts when quantitative methods are unavailable. A qualitative analysis describes why or why not an increase in VMT is likely; how much induced travel is created, if any; and whether that increase, if any, will have a significant impact.

5.3.1 INDUCED TRAVEL

Some projects have the potential to result in a significant transportation impact because they are likely to induce vehicle travel. Induced travel, or induced vehicle travel, is the "Additional vehicle travel that occurs when the cost [for travel] is lower," after travel constraints, such as congestion, are reduced.[12] It is the increase in travel that occurs when auto travel is made more convenient by new roadway capacity. The extent that this occurs due to new roadway capacity versus other variables such as the economy (wage changes, gas prices, parking prices) and population growth varies across the body of research, but in general, changes in travel times and costs affect demand and therefore VMT. For this reason, capacity-increasing projects generally need to be evaluated for their potential induced travel. The mechanisms by which induced travel occur include:

- Route changes (may increase or decrease overall VMT)
- Mode shift to automobile use (increases overall VMT)
- Longer trips (increases overall VMT)
- More trips (increases overall VMT)
- Location and land use changes (increases overall VMT)

Induced travel can reduce the benefits of capacity expansion projects and increase VMT over time. While a project may reduce trip duration and increase travel speed on a short-term basis, this effect may be temporary as drivers may change their travel behavior in response to the newly expanded facility, particularly during peak periods of travel (work commutes). In the long run, an expanded facility may also facilitate land development around the project. Ultimately, induced demand can lead to more and longer trips, increasing VMT; thereby, reducing travel time benefits of capacity increasing projects.[13] See Section 2.2 of the TAF for further details on induced travel.

[12] Ronald T. Milam and Jerry Walters, et al., "Induced Travel Technical Investigation Final," Prepared For Caltrans (April 24, 2016), 1.

[13] This discussion is adapted from Cervero, "Road Expansion, Urban Growth, and Induced Travel," *Journal of the American Planning* Association Vol. 69, No. 2 (Spring 2003): 146 and Duranton and Turner, "The Fundamental Law of Road Congestion: Evidence from US Cities," *American Economic*

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5.3.2 QUANTITATIVE OR QUALITATIVE ANALYSIS.

TAC Figure 3, reproduced from the TAF, provides insight on when to apply quantitative versus qualitative methods. Users should refer to the TAF for additional guidance regarding analysis of VMT impacts. There are two potential quantitative methods identified below, the travel demand model (TDM) and the National Center for Sustainable Transportation (NCST) Induced Travel Calculator. The NCST calculator is an elasticity-based tool that estimates annual induced VMT for capacity expansion projects. More information on the calculator is available at: https://ncst.ucdavis.edu/research-product/induced-travel-calculator.

Table 1. Selection Matrix for Preferred Induced Travel Assessment Method for Projects on the SHS[1]

Project Type / Project Location	GP or HOV Lane Addition to Interstate Freeway	GP or HOV Lane Addition to Class 2 & 3 State Routes	Other VMT Inducing Projects and Alternatives
County in MSA with Class I Facility	Apply the NCST Calculator by MSA and/or TDM[2] benchmarked with NCST Calculator.	Apply the NCST Calculator by county and/or TDM[2] benchmarked with NCST Calculator.	Apply TDM[2] or other quantitative methods
Other MSA County	Apply TDM[2] or other quantitative methods		
Rural County	Apply TDM[2] or other quantitative methods		

[1]If preferred methods are not available, qualitative assessment is acceptable as shown in TAF Figure 5.
[2]TDMs must be checked for applicability as described in TAF Sections 4.4 and 4.5.

Travel demand models must be checked for capability to assess induced travel as described in Sections 4.4 and 4.5 of the TAF.

The environmental document should include a discussion of the selection of induced travel methodology utilized in the traffic analysis.

Review Vol. 101, No. 6 (2011), 2616-2617. It should be noted that there may be other benefits to congestion relief and capacity increasing projects.

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5.3.3 CONSTRUCTION IMPACTS

Impacts associated with construction of a project may also require VMT analysis, particularly for large projects or projects located a considerable distance from urbanized areas. Generally, a qualitative analysis of VMT impacts associated from the construction of the project would be appropriate. Although in some cases lane closures may result in out-of-direction travel as people seek to avoid the construction area, the reduction in capacity would usually disincentivize highway travel; thereby, possibly reducing VMT. Public information campaigns prior to and during roadway construction periods can effectively alert travelers to options such as available transit services and reducing trips during peak construction periods. Vehicle trips used for construction purposes would be temporary, and any generated VMT would generally be minor and limited to construction equipment and personnel and would not result in long-term trip generation.

5.4 CUMULATIVE AND INDIRECT IMPACTS

The term *cumulative impacts* refers to two or more individual effects which, when considered together, are considerable, compound, or increase other environmental effects. Pursuant to Guidelines section 15064(h), impacts are "cumulatively considerable" when the incremental effects of an individual project are significant when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects.

For transportation impacts and with respect to VMT, a cumulative impact is a project's potential, when combined with other projects in an area or region, to significantly increase VMT. In other words, a project may contribute to a potential impact through its incremental addition to regional VMT when examined in combination with the effects of other past, present, and probable future projects. A project at an interchange, for example, may not significantly induce new VMT on its own, but when considered cumulatively with other past, present, or future probable projects in a travel corridor or region, it may be cumulatively considerable and therefore significant.

If a project has no potential to induce new VMT, or if it reduces VMT, then a cumulative analysis is not required, as the project could not contribute to a cumulatively considerable transportation impact.

Lead agencies are not required to mitigate for effects caused by other past or future projects—mitigation is required only for the project under consideration. When a project might contribute to a significant cumulative impact, but the contribution will be rendered less than cumulatively considerable through project-specific mitigation, then the impact can be considered less than significant.

A project's cumulative impacts may also be rendered less than cumulatively considerable if the project was analyzed as part of, and will comply with the

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requirements of, a previously-approved plan or mitigation program which includes enforceable requirements that will avoid or substantially lessen the cumulative impact within the geographic area in which the project is located (Guidelines §15064(h)(3)). See section 5.1.2. above for considerations related to compliance with a previously approved plan or mitigation program.

5.5 Consistency with Plans

Section 15125(d) of the CEQA Guidelines requires that an EIR,

> *…discuss any inconsistencies between the proposed project and applicable general plans, specific plans, and regional plans. Such regional plans include, but are not limited to, the applicable air quality attainment or maintenance plan or State Implementation Plan, area-wide waste treatment and water quality control plans, regional transportation plans, regional housing allocation plans, regional blueprint plans, plans for the reduction of GHG emissions, habitat conservation plans, natural community conservation plans and regional land use plans for the protection of the Coastal Zone, Lake Tahoe Basin, San Francisco Bay, and Santa Monica Mountains.*

Consistency with CARB's 2017 Scoping Plan as it pertains to both GHG emissions and any increase in VMT attributable to the project should be discussed in the "Consistency with State, Regional, and Local Plans and Programs" section of the environmental document, with references back to the Transportation and Climate Change sections, as needed. Capacity-increasing projects with the potential to lead to a measurable and substantial increase in VMT are likely to be inconsistent with State climate goals. Modeling completed by CARB for the Mobile Source Strategy shows capacity for statewide light-duty VMT growth is only five percent by 2030, as compared to the current growth rate of approximately eleven percent.[14] As stated previously, consistency with an RTP/SCS does not imply consistency with State climate goals.

5.6 Determining Significance

At the project level, the purpose of the CEQA analysis is to determine, and identify feasible mitigation for, adverse environmental impacts, such as increases in VMT attributable to the project. CEQA does not require an improvement over baseline or existing conditions, just that a lead agency consider reasonable project alternatives and mitigate significant environmental effects of the project to the extent feasible. A "significant effect on the environment" means "A substantial, or potentially substantial, adverse change in any of the physical conditions within the area

[14] California Air Resources Board, "Mobile Source Strategy," May 2016, pg. 37

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affected by the project including land, air, water, minerals, flora, fauna, ambient noise, and objects of historic or aesthetic significance."

5.6.1 DETERMINING SIGNIFICANCE FOR PROJECTS IN RURAL (NON-MPO) COUNTIES

For projects within the rural, non-MPO counties, significance should be addressed on a case-by-case basis, taking into account context and environmental setting.

5.6.2 DETERMINING SIGNIFICANCE FOR PROJECTS IN MPO AREAS

The determination of significance will be based on the projection of induced travel attributable to the project.

Within the MPO areas (including RTPAs within MPOs), a project that results in an increase in VMT when comparing the future build alternative to the future no-build alternative (i.e., the VMT is higher under the future build scenario) will generally be considered significant, and mitigation will be required. Small increases of VMT attributable to a project that are consistent with the level of increase associated with the project types on the screened list (Section 5.1), would likely not be deemed significant.

Determining significance is a three-step process. First, the impact is evaluated without any consideration of mitigation, to determine if the impact is significant or not. If the impact is significant, mitigation is required and then "applied" to the project. The level of induced travel projected generally represents the level of VMT to be mitigated in order to reduce transportation impacts to a level that is less than significant. The remaining impact is then evaluated again to determine if it remains significant or if the mitigation has reduced the impact to a less than significant level. If the impact remains significant after all feasible mitigation has been incorporated, and there are no additional, feasible alternatives which would avoid or lessen the adverse impact, a statement of overriding considerations may be appropriate to approve the project. There are instances in which an element of a project or a project feature may reduce adverse transportation impacts and should be taken into account prior to the initial significance determination.

5.7 MITIGATION

A lead agency under CEQA has the authority to require feasible changes in any or all activities involved in the project in order to substantially lessen or avoid significant adverse impacts on the environment. Where changes to the project or project alternatives cannot avoid or substantially lessen the significant impact, mitigation is required. There must be a rational relationship between the impact and the mitigation for that impact (i.e., "nexus"), and the mitigation must be roughly proportional to the impact (i.e., "proportionality") (Guidelines §15041(a)).

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Mitigation must be feasible and enforceable. "Feasible" under CEQA means "Capable of being achieved in a successful manner within a reasonable amount of time, taking into account economic, environmental, legal, social, and technological factors" (Guidelines § 15364). When specific economic, social, or other conditions make mitigation measures or project alternatives infeasible, individual projects may be approved in spite of one or more significant effects of the project (PRC § 21002; see also, Appendix A, "Considerations for Statements of Overriding Considerations").

As noted in the "Project Scoping" section of this document (Section 4), as a project proceeds toward final design it becomes increasingly difficult to achieve feasible, proportional project-level VMT mitigation for a capacity-increasing roadway project. Therefore, for capacity-increasing projects, early coordination and scoping of mitigation opportunities is advisable whether on-system or off-system mitigation is pursued. The following subsections of this document discuss on-system and off-system mitigation. Off-system mitigation, in particular, requires considerable time to identify willing partners and opportunities, perform analyses of the opportunities, and negotiate and execute agreements to fulfill mitigation commitments.

On-system mitigation are measures which can be implemented within the Caltrans right-of-way. On-system mitigation may include mitigation within or outside the initial project limits of any given capacity increasing project. Caltrans, as owner and operator of the SHS and associated right-of-way, exercises more direct authority over on-system measures as opposed to off-system measures. Off-system mitigation, outside Caltrans' right-of-way, requires cooperation with those jurisdictions that have influence over land use and transportation systems outside of Caltrans direct control.

5.7.1 MITIGATION OFF THE SHS

The Caltrans Division of Transportation Planning recently completed a literature review and assessment of VMT and GHG reduction strategies. The measures that resulted in the largest decreases in VMT are generally off-system and not under Caltrans' direct control, such as land use authority, cordon pricing[15] authority, parking management/pricing, and employer-based transportation demand management strategies. Close coordination with federal, state, and regional transportation partners would be required to implement such off-system VMT mitigation.

Similarly, the most cost-effective measures identified in the literature review also tended to be outside of Caltrans' direct control (e.g., transit-oriented development, transportation demand management).

[15] "Cordon pricing" is a form of zone-based pricing in which drivers are charged either fixed or variable fees to drive within or into a congested area within a city (FHWA, "Zone-Based Pricing" available at: https://ops.fhwa.dot.gov/congestionpricing/strategies/involving_tolls/zone_based.htm.

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There will be a need for cost-effective, feasible, and proportional VMT mitigation measures, not just for Caltrans' projects, but for local lead agencies statewide that must comply with CEQA. Caltrans may ultimately develop or participate in a VMT credit or banking and exchange system[16] operated by Caltrans, an MPO, RTPA, or another entity. Under a banking system, Caltrans could purchase mitigation credits to reduce project impacts related to VMT. The revenues from the credit purchases could be utilized by the bank to facilitate the development of VMT-reducing projects. For example, the bank could invest in infrastructure improvements such as pedestrian facilities or aid in the development of regional transportation options, such as light rail. An exchange system might be similarly structured. In exchange for implementing a project that induces VMT, Caltrans would invest in a project identified by a local or regional transportation partner that reduces VMT. One example of a system that relies on VMT reduction as a nexus is the City of Los Angeles Westside Mobility Plan Transportation Impact Fee Program.

VMT-reduction measures in rural areas may benefit from a coordinated approach. OPR has posted a document that includes strategies for different types of rural communities which can be found at: http://opr.ca.gov/docs/Mitigating_Vehicle-Miles_Traveled_(VMT)_in_Rural_Development.pdf.

5.7.2 MITIGATION ON THE SHS

As indicated previously, on-system mitigation tends to be more within Caltrans' direct authority. However, this does not mean that Caltrans may unilaterally decide to implement measures within its right-of-way. For example, tolling strategies will require early coordination or consideration as a project scoping alternative, with appropriate transportation planning agencies and may require approval from other agencies such as the California Transportation Commission or the Federal Highway Administration. In many cases, tolling strategies have the potential to provide substantial VMT reduction.

In addition to the measures noted above, all projects should consider strategies within the direct control of Caltrans and on the SHS. Measures listed in TAC Table 2 may be implemented to reduce VMT. Incorporating these types of measures as early as possible in the project development process will increase their feasibility. In certain circumstances, on-system measures may be able to sufficiently mitigate VMT attributable to a project or provide additional mitigation in situations where strategies beyond Caltrans' direct control are limited.

Additional measures and their approximate VMT-reduction potential can be found in the Caltrans Division of Transportation Planning's *Literature Review and Assessment of VMT and GHG Mitigation Strategies* as well as the transportation measures found in the California Air Pollution Control Officers Association's (CAPCOA) *Quantifying Greenhouse Gas Mitigation Measures: A Resource for Local Government to Assess*

[16] Vehicle miles traveled banking and exchange systems are discussed in more detail in papers referenced in Appendix C.

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Emission Reductions from Greenhouse Gas Mitigation Measures. See Appendix C in this document for more information on these and other resources related to mitigation.

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Table 2. Project-Level Measures to Reduce VMT on the SHS

Description
1. Include detours for bicycles and pedestrians in all areas potentially affected by project construction.
2. Incorporate Complete Streets Elements
3. Consider and accommodate alternate modes of transportation consistent with the purpose and need of the project: • Bicycle paths and facilities • Pedestrian infrastructure and pedestrian-friendly features (wide sidewalks, overpasses on busy roads, signalized intersections with appropriate signal timing, etc.) • Routes connecting to public transportation
4. Include measures to support multi modal transportation that will offset project impacts: additional Park & Ride lots
5. Social marketing efforts and incentives promoting mass transportation and carpooling. (Possible use of Cap and Trade Funds)
6. Social marketing and public education activities to improve awareness of the impacts of driving habits and opportunities to reduce climate change impacts.
7. Incorporate infrastructure electrification into project design (e.g., charging for electric bikes).
8. Implement intelligent transportation systems and transportation demand management elements to smooth traffic flow and increase system efficiency.
9. Implement Traffic Management Strategies: • Modify roadways to allow more efficient bus operation, including bus lanes and signal priority/preemption where necessary. Coordinate improvements on the SHS with arterials roadways. • Create an interconnected transportation system that allows a shift in travel from private passenger vehicles to alternative modes, including public transit, ride sharing, car sharing, bicycling and walking, if determined feasible and applicable by the Lead Agency.

5.8 Related Mitigation

It is important to note that mitigation that reduces VMT may also be identified as mitigation for adverse impacts associated with noise, energy, GHG emissions, criteria air pollutants, or toxic air contaminants resulting from the project.

5.9 Statements of Overriding Considerations

If the lead agency cannot identify and implement feasible and enforceable mitigation to reduce the impact to a level that is less than significant, then it should document and disclose those impacts as significant and unavoidable. Under CEQA, if a lead agency approves a project which will result in significant effects that are identified in the final EIR but are not avoided or substantially lessened, and if those impacts are outweighed by the economic, legal, social, technological, or other benefits of the project, including region-wide or statewide environmental benefits, the lead agency shall state in writing the specific reasons to support its decision

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based on the final EIR and/or other information in the record. This "statement of overriding considerations" shall be supported by substantial evidence in the record and included in the record of the project approval. It should also be mentioned in the Notice of Determination filed with OPR.

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APPENDIX A. CONSIDERATIONS FOR STATEMENTS OF OVERRIDING CONSIDERATIONS

A statement of overriding considerations may be prepared when the project's effects are significant and not fully mitigable. According to Guidelines Section 15021(d):

> *CEQA recognizes that in determining whether and how a project should be approved, a public agency has an obligation to balance a variety of public objectives, including economic, environmental, and social factors and in particular the goal of providing a decent home and satisfying living environment for every Californian.*

The specific requirements for a statement of overriding considerations are found in the Guidelines Section 15093:

> *(a) CEQA requires the decision-making agency to balance, as applicable, the economic, legal, social, technological, or other benefits, including region-wide or statewide environmental benefits, of a proposed project against its unavoidable environmental risks when determining whether to approve the project. If the specific economic, legal, social, technological, or other benefits, including region-wide or statewide environmental benefits, of a proposed project outweigh the unavoidable adverse environmental effects, the adverse environmental effects may be considered "acceptable."*
>
> *(b) When the lead agency approves a project which will result in the occurrence of significant effects which are identified in the final EIR but are not avoided or substantially lessened, the agency shall state in writing the specific reasons to support its action based on the final EIR and/or other information in the record. The statement of overriding considerations shall be supported by substantial evidence in the record.*
>
> *(c) If an agency makes a statement of overriding considerations, the statement should be included in the record of the project approval and should be mentioned in the notice of determination. This statement does not substitute for, and shall be in addition to, findings required pursuant to Section 15091.*

Good places to start for the statement of overriding considerations are both the Purpose and Need statement for the project as well as the rationale used for the selection of the preferred alternative. Beyond the Purpose and Need Statement, lead agencies have substantial discretion in weighing specified economic, environmental and social factors which are relevant to their decision making. Any supporting factors relied upon by the lead agency should be documented in the agency's records relating to the project.

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APPENDIX B. CEQA GUIDELINES, APPENDIX G CHECKLIST QUESTIONS

The Traffic and Transportation section of the environmental document should address the following remaining CEQA Checklist questions for each alternative under consideration, including the no-build alternative.

Would the project:

Conflict with a program, plan, ordinance, or policy addressing the circulation system, including transit, roadway, bicycle and pedestrian facilities?

The practitioner should assess and discuss the consistency of the alternatives with the relevant plans that address the circulation system including any Caltrans plans for the project area, the circulation element of the general plan, area-specific plans, transit planning document, district-specific bicycle and/or pedestrian plans, regional transportation plans, etc. Be certain to discuss the relevant project features (including standardized measures) that have been incorporated into the project to avoid or minimize the project's environmental impacts. If an alternative was modified to achieve consistency with an adopted program, plan, ordinance or policy addressing the circulation system, describe that here. *Please note that consistency with California's 2017 Climate Change Scoping Plan will be addressed in the Greenhouse Gas section of the environmental document under the applicable CEQA Checklist question.*

Substantially increase hazards due to a geometric design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment)?

In general, a transportation project is unlikely to substantially increase hazards.

Include information here from the project's purpose and need and project description to determine how a project will address non-standard geometric features such as horizontal and vertical curves, median width, shoulder width, access control, measures included to reduce flooding events, interchange improvements, separated bike lanes and/or other improvements for bicyclists and/or pedestrians or incompatible uses (for example, including wider shoulders for farm equipment in rural areas).

If the project is a safety project, explain how the project will improve safety. A project-level traffic analysis should include a safety analysis based on the Caltrans Traffic Accident Surveillance and Analysis System or other historical safety performance results. The implementation of performance-based decision-making using the Highway Safety Manual is encouraged to facilitate the integration of quantitative collision frequency and severity performance measures into roadway planning, design, operations, and maintenance decisions.

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Result in inadequate emergency access?

In general, most projects either improve, or do not diminish, emergency access and/or response times. For example, projects that provide prioritized signalization to emergency vehicles can decrease emergency response time. Projects that create another means of ingress and egress can also improve emergency access. Projects that widen shoulders can provide additional areas for emergency response vehicle staging. There could be temporary construction impacts related to emergency access. This should be addressed in the Transportation Management Plan for the project and Caltrans should coordinate with local emergency officials as part of the development of that plan.

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APPENDIX C. MITIGATION

Strategies to mitigate VMT are available within the following resources. Additional mitigation resources will be added to Caltrans SB 743 Implementation webpage. The following pages include additional information on the CAPCOA report (as referenced in item "a" below) and the literature review (as referenced in item "b" below).

a. California Air Pollution Control Officers Association's (CAPCOA) 2010 Quantifying GHG Mitigation Measures is a current source of VMT reduction by mitigation strategy. (See attached table 6-2 from the CAPCOA report summarizing mitigation options).

b. Literature Review and Assessment of VMT and GHG Mitigation Strategies. Prepared in December 2019 by Caltrans Division of Transportation Planning. (See following page for more information).

c. Governor's Office of Planning and Research's CEQA Guidelines Update and Technical Advisory website has information on VMT reduction strategies, even for rural areas.

d. A 2018 research paper from University of California Berkeley School of Law's Center for Law, Energy & the Environment focuses on two innovative models that could be used to implement programmatic VMT mitigation strategies for land use or transportation projects. VMT mitigation "banks" and "exchanges" are compared, and examples provided of ways to mitigate VMT under CEQA or the mitigation fee act. These models are conceptually similar to existing mitigation frameworks such as regional impact fee programs or habitat conservation banks.

e. A 2020 white paper prepared by Fehr & Peers VMT Mitigation Through Banks and Exchanges: Understanding New Mitigation Approaches highlights potential VMT mitigation programs including impact fee programs, mitigation exchange, and mitigation banks.

f. State Smart Transportation Initiative (SSTI) 2018 report Modernizing Mitigation: A Demand-Centered Approach outlines partnerships possible to reduce the demand for driving.

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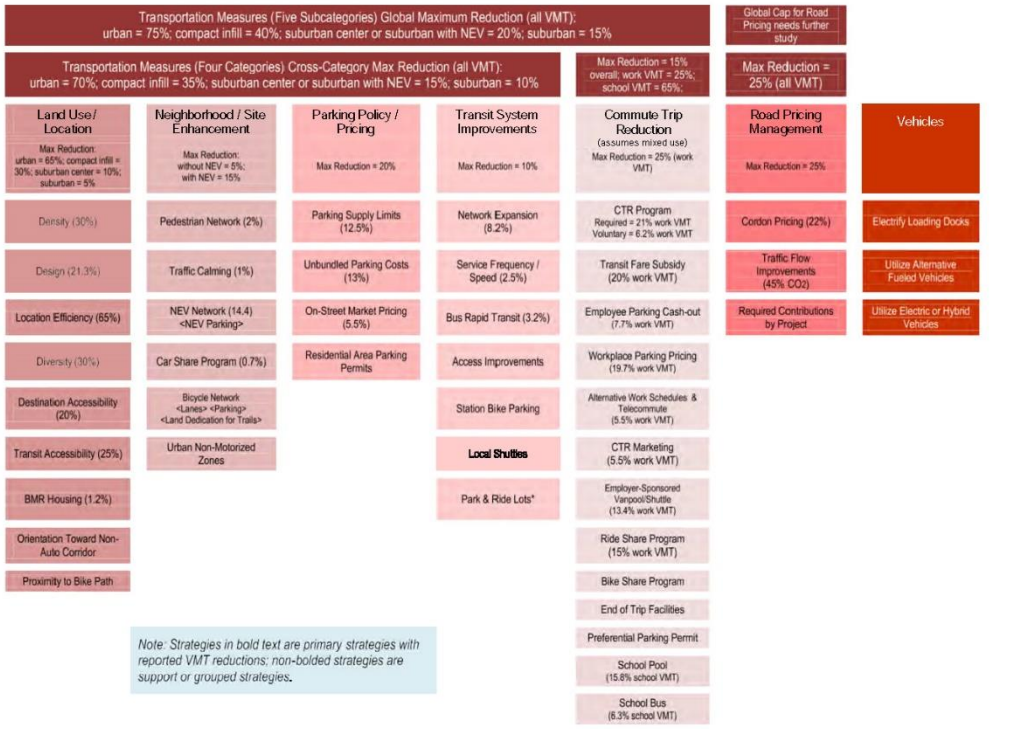


Figure C-1. Chart 6-2 of the CAPCOA Report

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LITERATURE REVIEW AND ASSESSMENT OF VMT AND GHG MITIGATION STRATEGIES

Prepared in December 2019 by Caltrans Division of Transportation Planning

This report contains the results of a detailed, comprehensive review and synthesis of literature in order to compile estimates of the impacts of VMT and transportation GHG emission reduction strategies at the program, plan, and project level. The study focused on strategies that influence emissions from users of the transportation system, as opposed to strategies that target transportation project construction and maintenance activity. In addition, the study focused on strategies that can reduce GHG emissions either by reducing VMT or by changing traffic speed or flow; the study did not review strategies that seek to increase the deployment of low emission vehicles or alternative fuels.

METHODOLOGY

This research reviewed a wide variety of sources, including original peer-reviewed literature, previous meta-analyses and compilations, practitioner-oriented guidance documents, plans and feasibility studies, and select calculator tools that provide information on VMT and GHG emissions impacts. The extent and quality of research varies widely across the types of strategies considered. For some types of strategies (e.g., certain land use changes), more than 10 original research studies have quantified effects on VMT. Other types of strategies (e.g., bicycle and pedestrian facilities) have received far less attention from researchers seeking to quantify VMT or GHG emission impacts.

IMPLEMENTATION ROLE FOR CALTRANS

The implementation of VMT and GHG emission reduction strategies can be led by a variety of public and private sector organizations. The scale of strategy implementation can include employer-level, development project, neighborhood, transportation project, corridor, city, metropolitan area, or state-wide. Caltrans may have a lead or supporting role in implementation depending on the type of strategy and scale of application. The table below shows the strategies for which Caltrans has a supporting role and strategies for which Caltrans could lead implementation:

Table C-1. Mitigation Strategies by Caltrans Role

Strategy Category	Strategies for which Caltrans has a Support Role	Strategies for which Caltrans has a Lead or Support Role
Bicycle, Pedestrian, and Urban Design Strategies	Bikeshare	Bikeway network expansion Bike lane/path development Pedestrian facility network expansion Pedestrian facility development Street connectivity
Transit Strategies	Transit system expansion Transit frequency improvements Transit travel time improvements Transit reliability improvements Transit fare reduction	
Land Use and Parking Strategies	Land use mixing Higher density development Transit oriented development Destination accessibility Parking management and pricing	
Transportation Demand Management Strategies	Employer alternative commute option programs Rideshare Carsharing programs Telework Community-based travel marketing	Park and ride lots
Transportation System Management Strategies		Roadway pricing Arterial signal timing Ramp metering Traffic incident management programs HOV and HOT lanes

SUMMARY OF FINDINGS

The following table lists each of the strategies, the number of sources identified within the report that quantify the impact of those strategies with respect to VMT/GHG, and key findings.

Table C-2. Quantifiable mitigation strategies with respect to VMT/GHG

Strategy	Number of sources identified that quantify VMT or GHG impacts	Key Findings
Bikeway network expansion	2	Doubling bikeway density (in terms of bikeway miles per square mile or per capita) can reduce city-wide VMT by 0.05% to 0.1%

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Strategy	Number of sources identified that quantify VMT or GHG impacts	Key Findings
Bike lane or bike path development	2	A new class 2 or 4 bikeway can reduce GHG emissions by 1 to 85 metric tons (MT) per year. The wide range reflects different assumptions for facility usage.
Bikeshare program expansion	3	The Bay Area Bike Share pilot program reduced GHG emissions by 79 tons in the first year. Several other documents report negligible impacts on VMT and GHG emissions.
Pedestrian facility network expansion	5	A 10% increase in sidewalk coverage can reduce area-wide VMT by 0.2% to 0.5%.
Pedestrian facility development	1	CARB's calculator tool estimates a pedestrian facility project will reduce 4 to 22 MT of GHG emissions per year.
Street connectivity improvement	11	A 10% increase in intersection density (in terms of intersections per square mile) can reduce area-wide VMT by 1.2%
Transit frequency improvements	3	Doubling transit frequency can reduce VMT by 0.5% to 2.5% in affected areas.
Transit travel time reduction	1	One study found that a 10% reduction in transit travel time is associated with an approximately 2.5% reduction in VMT and vehicle GHG emissions in affected areas.
Transit service expansion	3	In larger urban areas, increases in bus route miles of 10-42% were found to reduce region-wide VMT by an average of 0.13%.
Transit fare reduction	2	A calculator tool suggests that a 50% reduction in transit fares would typically reduce community wide VMT by 0.2%.
Land use mixing	8	A 10% increase in land use mixing (measured using an entropy index) is associated with 0.1% to 1.7% lower VMT.
Higher density development	8	A 10% increase in residential density is associated with 0.5% to 1.2% lower VMT.
Transit oriented development	5	Residents of transit-oriented development (TOD) in California are observed to have a transit mode share that is 4.9 times higher than residents of surrounding areas. Residential building in a transit-oriented location can reduce project VMT by up to 15% compared to building the project in a non-TOD location.
Destination accessibility	10	Locating a residential development 10% closer to the central business district is associated with a 2.3% reduction in VMT. A 10% improvement in regional jobs accessibility is associated with a 1.3% to 2.5% reduction in VMT.
Parking management and pricing	11	Doubling of parking prices can reduce VMT by 3% at lower parking price levels and 15% at higher parking price levels. Employer-based parking cash out programs are observed to reduce VMT by 12% for employees who opt in.

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Strategy	Number of sources identified that quantify VMT or GHG impacts	Key Findings
Employer alternative commute option programs	8	Implementation of a voluntary employer-based alternative commute option program has been shown to reduce VMT associated with the employer site by 4% to 6%. Larger VMT reductions are reported for programs that involve mandatory monitoring, reporting, and targets.
Rideshare	8	Carpool and vanpool programs can reduce VMT by 3% to 8% at participating employers. Region-wide, rideshare programs are typically estimated to reduce VMT by less than 1%.
Telework	7	Participants in telework programs reduce their daily VMT by 50% to 75% on telecommute days. The community or region-wide VMT and GHG impacts of telecommute programs depend heavily on assumptions regarding levels of participation and have not been studied in recent years.
Carsharing programs	6	Participants in carsharing programs reduce their personal or household VMT and GHG emissions. Studies for MPOs suggest that expansion of carsharing programs can reduce community or region-wide VMT by 0.5% to 2%.
Community-based travel marketing	2	Studies of community-based travel marketing programs have found reductions in SOV trips of roughly 10% in targeted neighborhoods. Large-scale program deployment in the Bay Area was estimated to reduce per capita light duty vehicle GHG emissions by 1.2% to 1.7%.
Park and ride facilities	4	Among park and ride lots serving carpoolers, the observed average annual VMT reduction per lot was 156,000 in New York (7 lots) and 608,000 in Maine (39 lots). The annual VMT reduction per parking lot space is estimated to range from 2,700 to 7,200.
Roadway pricing	8	Tolling of the roadway system for the purpose of VMT and GHG reduction has not been implemented in the U.S., and thus the potential impacts are not well understood. Simulation modeling in the Seattle region found that tolling applied to all freeways would reduce regional VMT by 6%. Implementation of cordon pricing has resulted in a VMT reduction of approximately 15% in several international cities.
Arterial signal timing	5	During the time period of implementation, traffic signal coordination has been shown to reduce GHG emissions by 1% to 10% on the facility affected. Reductions may be over-estimated because they do not account for induced vehicle traffic effects.
Ramp metering	1	A study in South Korea found that ramp metering reduced system-wide GHG emissions by 7.3%.

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Strategy	Number of sources identified that quantify VMT or GHG impacts	Key Findings
Traffic incident management programs	6	Statewide incident management programs in Florida and Maryland are estimated to reduce annual GHG emissions by 238,000 and 65,000 MT, respectively. At the corridor level, estimated GHG reductions range from 0.07% to 4%.
HOV and HOT lanes	7	There is little recent academic research regarding the VMT and GHG impacts of HOV and HOT lanes. Projects that added HOV lanes to freeways in the 1980s or 1990s resulted in an increase in average vehicle occupancy (AVO) by an average of 9%. Other research concludes that HOV lanes do not encourage carpooling because HOV travel time savings do not provide a statistically significant carpooling incentive. Conversion of HOV to HOT (express) lanes appears to reduce carpooling. Development of new HOV lanes typically increases VMT and GHG emissions as compared to a no-build alternative.

CONCLUSIONS

This report illustrates the breadth and variety of literature covering VMT and transportation GHG reduction strategies. The relevant documents differ widely in terms of the level of rigor applied for determining results, which can make it challenging to compare and summarize results across multiple sources.

For many of the strategies that Caltrans could lead or support to reduce VMT and GHG emissions, there has been relatively little research to quantify VMT or GHG emissions impacts. Relevant research is particularly limited for bicycle and pedestrian strategies, as well as for transit strategies and some types of transportation system management strategies such as ramp metering. There is generally more VMT and GHG emission impacts research for land use strategies and employer-based transportation demand management strategies.

In addition to the limited sources, several factors can make it challenging to apply research findings to estimate VMT or GHG emissions impacts in the context of Caltrans' decision-making processes. Results are sometimes reported as a wide range, with other factors having a strong influence on the level of VMT or GHG reduction. This can make it difficult to generalize about the effectiveness of one strategy versus another. Research results are also sometimes reported at a scale that is inconsistent with Caltrans' processes.

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APPENDIX D-1. EXAMPLE PROJECT 1: CONSTRUCTION OF HIGH-OCCUPANCY VEHICLE (HOV) LANES IN SUNSHINE COUNTY

NOTE: The purpose of this example project is to show the process for determining significance under CEQA for operational impacts resulting from induced vehicle demand. Discussions and analysis are intended to show the basic steps in the process and are not intended to reflect the complexity or detail that may be required for specific projects, including the need to analyze construction impacts and/or cumulative impacts. The VMT provided in this analysis are illustrative only and are not drawn from a specific project.

PROJECT DESCRIPTION:

In this example, Caltrans is proposing to construct 10 miles of high-occupancy (HOV) lanes in each direction (for a total of 20 miles), on a Class I Interstate facility in Sunshine County, California. The purpose of the project is:

- Increase the mode share of high-occupancy vehicles such as carpools, vanpools, and transit;
- Enhance the reliable movement of inter-regional goods and increasing access to jobs and housing in the corridor; and
- Provide greater HOV network connectivity in the Sunshine metropolitan area.

The project as proposed has four alternatives. The HOT lane alternative was added when the project reached the Project Approval and Environmental Document (PA&ED) phase in order to include a priced and revenue-generating alternative as recommended in the Preliminary Environmental Analysis Report (PEAR) for this project (see "Project Scoping" below).

- Alternative 1 would construct 10 new miles of mixed-flow or general-purpose lanes on this facility in each direction from postmile (PM) 10.1 to 20.1.
- Alternative 2 would construct 10 new miles of HOV lanes on this facility in each direction from PM 10.1 to PM 20.1.
- Alternative 3 would construct 10 new miles of HOT lanes on this facility in each direction from PM 10.1 to PM 20.1.

Alternative 4 is the No-Build Alternative. The No-Build Alternative would not add any improvements to the existing facility.

The proposed project is funded by Measure Z. Sunshine County voters passed this ballot measure in the 2016 election. The project is listed in Measure Z and the 2018 Sunshine Metropolitan Transportation Plan (MTP). Among the alternatives,

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Alternative 2 is the most consistent with Measure Z and is therefore the locally preferred alternative.

See Figure D-1 below depicting the study limits. Note that the project limits depict the physical extent of construction work, traffic study limits will extend beyond this area.

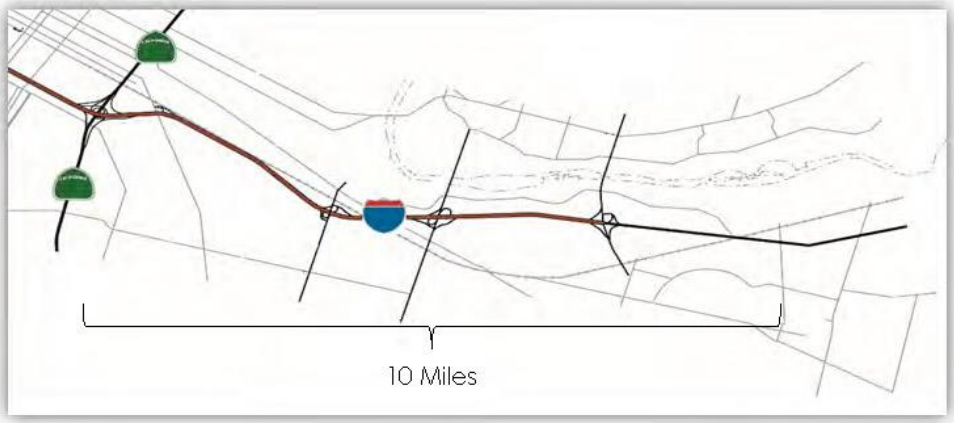


Figure D-1. Example Project Map

THE ANALYSIS:

This section will go through the steps required to determine if an induced travel analysis is required for the proposed project, and if so, the steps needed to carry out the analysis. Each step identifies the relevant section(s) in the *Traffic Analysis Framework* (TAF) or *Transportation Analysis under CEQA* (TAC) where more detailed guidance can be found.

Project Scoping (TAC Section 4)

The PEAR that was prepared for this project indicated that the project would likely require an EIR under CEQA because 1) the project would increase capacity on the SHs and the project type is listed in the Governor's Office of Planning and Research's *Technical Advisory on Evaluating Transportation Impacts in CEQA* as a project type that "would likely lead to a measurable and substantial increase in vehicle travel" and 2), due to anticipated impacts to biological resources. The NCST Induced Travel Calculator was used to provide a benchmark assessment of induced travel and for estimating necessary mitigation in later phases of the

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project. The PEAR also considered tolled lane alternatives in order to potentially reduce the additional VMT resulting from the project. The PEAR recommended that an express (HOT) lane be evaluated at PA&ED.

Project Screening (TAC Section 5.1.1)

As noted in the PEAR, the project is capacity increasing and will require an induced travel analysis.

Project Tiering (TAC Section 5.1.2)

To determine if the proposed project could possibly tier off the travel analysis prepared for the MTP, the planner examined the MTP but found that it did not meet the requirements for tiering outlined in Section 5.1.2 of the TAC.

Selection of Traffic Analysis Methodology (TAF and TAC Table 1)

Since the project is located on a Class I Interstate Facility in an urban area, the Selection Matrix for Preferred Induced Travel Assessment Methods for Projects on the SHS indicates that a quantitative analysis is required and that the NCST calculator should be applied, and that the Sunshine County Travel Demand Model (TDM) could be used if it meets checklist requirements for assessing induced travel and the model results are within 20 percent of the NCST calculator results. In this example, the Sunshine County TDM was chosen because the Sunshine County TDM is able to output link volumetric speed bin data, which will be useful for analysis of other impacts. The Sunshine County TDM was evaluated for its ability to model induced travel using the checklist in the TAF and it was determined that with a few modifications, the model could likely assess induced travel with reasonable accuracy so long as it was provided with likely land use changes. A Delphi panel of land use experts would determine the likely land use changes that would be attributable to the project in the horizon year. Existing conditions (2020) and the design/horizon year (2042) were assessed, applying the model with land use inputs from the panel of land use experts. For the General-Purpose Lane and HOV Lane Alternatives (Alternatives 1 and 2), the NCST calculator is applicable, and was used to estimate induced travel. The NCST calculator provides a long-run estimate of induced travel for the added lane miles. Modeling results are shown in Table D-1. For the HOT Lane Alternative (Alternative 3), the NCST Calculator is not applicable, and only the results from the TDM were included.

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Table D-1[17]. Project Alternatives and VMT Evaluation

Project Alternative	County TDM Model Estimated Absolute Annual Million VMT[18]	County TDM Model Estimated Project Induced Annual Million VMT	NCST Estimated Project Induced Annual Million VMT[19][20][21]
Existing Conditions 2020	5,000	N/A	N/A
No Build Alternative 2042	5,950	0	0
Add General Purpose Lanes 2042	6,080	130	132
Add HOV Lanes 2042	6,064	114	132
Add HOT Lanes 2042	6,072	122	N/A

The NCST is the benchmark Caltrans uses for induced travel analysis when it is applicable. Where travel model results are within 20 percent of the NCST calculator, they may be used in its place. In this case, the travel model results are within 20 percent of the NCST calculator, so the project team utilized these results for determining significance.

[17] The numbers in the table are based on a regional/county type assessment.
[18] Vehicle-miles of travel for the forecast year.
[19] Note that the NCST calculator uses a "baseline" year of 2016 for the metropolitan statistical area.
[20] For purposes of analysis the NCST calculator result in utilized for the horizon year. Note that the NCST calculator does not use a specific forecast year, but instead produces a "long-run estimate of induced VMT, the additional annual VMT that could be expected 5 to 10 years after facility installation."
[21] Note that the NCST calculator does not distinguish between general purpose and HOV lanes, so the same numbers are used for both alternatives.

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Analyze Impacts and Determine CEQA Significance (TAC Sections 5.3 through 5.6)

As shown by Table D-1, each of the build alternatives results in an increase in VMT over both the existing conditions and when compared to the future No-Build Alternative. The change in VMT from the future no-build alternative (i.e., the conditions expected to exist in the future absent the project) to the future build alternatives is the amount of VMT that is directly attributable to the project so that is the induced VMT. This is the impact that is the basis of the determination of significance.

The project is located in a metropolitan area and each alternative increases VMT over both existing conditions and compared to future conditions without the project. Therefore, according to the guidance in the TAC, each build alternative is found to have a significant effect on the environment and each alternative is found to conflict with CEQA Guidelines Section 15064.3(b).

It was also determined that the negligible and temporary increase in construction vehicles during construction of the project would be less than significant for each build alternative.

In the "Consistency with State, Regional, and Local Plans and Programs" section of the environmental document, each build alternative was also found to have a significant impact because the project was found to be inconsistent with state climate goals which call for a 15 percent reduction in total light-duty VMT by 2050 as compared to baseline 2050 levels.

Finally, each alternative was found to have a significant cumulative impact, because when combined with other past, current, and probable future projects in the region, the project would result in a significant increase in VMT.

Mitigation (TAC Section 5.7)

Mitigation was required for this project because the PDT determined that each of the build alternatives would result in a significant transportation impact under CEQA. Various mitigation options were considered for this project. Some were determined to be infeasible or ineffective and this determination was documented in the project file. For this example project, the PDT is proposing to add a 100-space Park and Ride lot near the southern end of the project limits. The addition of a Park and Ride lot is both feasible because is within Caltrans' jurisdiction and enforceable as Caltrans has direct control over on-system mitigation. According to a literature review conducted by Caltrans Division of Transportation Planning, Park and Ride lots have been estimated to reduce annual VMT by 2,700 to 7,200 per parking space, so Caltrans utilized the mid-point

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of that range for an annual VMT reduction of 4,950 per parking space for a total of 495,000 VMT. This amount of VMT will be subtracted from the total amount of VMT generated by each build alternative in order to make a final CEQA conclusion for the project.

Final CEQA Conclusion

Although the PDT was able to incorporate mitigation measures to reduce VMT, the impact will remain significant and unavoidable, because the remaining annual induced VMT is still significant. Because the mitigation was unable to reduce the impact to less than significant, a statement of overriding considerations will be considered. More guidance on the statement of overriding considerations can be found in Section 5.9 of the TAC.

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APPENDIX D-2. EXAMPLE PROJECT 2: CONSTRUCTION OF TRUCK CLIMBING LANES IN RAINBOW COUNTY

NOTE: The purpose of this example project is to show the process for determining significance under CEQA for operational impacts resulting from induced vehicle demand. Discussions and analysis are intended to show the basic steps in the process and are not intended to reflect the complexity or detail that may be required for specific projects, including the need to analyze construction impacts and/or cumulative impacts.

PROJECT DESCRIPTION:

In this example project, Caltrans is proposing to construct four miles of continuous truck climbing lanes in the westbound direction of a State highway in northern rural California that is part of the National Highway System and considered essential to Rainbow County's economy, defense, and mobility. The purpose of the project is to:

- Improve safety and operations by separating slower moving vehicles and trucks from faster moving passenger vehicles that are climbing the existing grade.

The proposed project has two alternatives:

- Alternative 1 would add four miles of continuous truck climbing lanes in the westbound direction from postmile (PM) 13.4 to 17.4.
- Alternative 2 is the No Build Alternative.

The proposed project is included in the 2018 Rainbow County Regional Transportation Plan. Rainbow County is not within the limits of an MPO or MSA.

THE ANALYSIS:

This section will go through the steps required to determine if an induced travel analysis is required for the proposed project, and if so, the steps to complete the analysis. Each step will include the relevant section(s) in the *Traffic Analysis Framework* (TAF) or *Transportation Analysis under CEQA* (TAC) where more detailed guidance can be found.

Project Scoping (TAC Section 4)

The PEAR that was prepared for this project indicated that the project would likely require an Initial Study (IS) and probable Negative Declaration (ND) under CEQA. Although the project type is listed in the OPR *Technical Advisory on Evaluating Transportation Impacts in CEQA* as the type of project that "would not likely lead to a measurable and substantial increase in vehicle travel" (e.g., addition of

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passing lanes, truck climbing lanes, or truck brake-check lanes in rural areas that do not increase overall vehicle capacity along the corridor), it was also believed that four continuous miles of truck climbing lanes could potentially be viewed as a project that would "increase overall vehicle capacity along the corridor" and the determination was made to prepare an IS. Furthermore, an IS was recommended due to potential biological impacts resulting from the construction of the project.

Project Screening (TAC Section 5.1.1)

The project type is identified as being unlikely to lead to a measurable and substantial increase in VMT, per the OPR Technical Advisory and Section 5.1.1 of the TAC. Specifically, Caltrans' TAF and OPR's Technical Advisory each indicate that the addition of passing lanes, truck climbing lanes, or truck brake-check lanes in rural areas that do not increase overall vehicle capacity along the corridor, are unlikely to lead to a measurable and substantial increase in VMT. However, because a fair argument might be made that a four-mile addition of truck climbing lanes may increase overall vehicle capacity, the PDT determined that a qualitative analysis was a reasonable approach during the PA&ED phase in order to the support the conclusion that the project would not likely lead to a measurable and substantial increase in VMT, because overall capacity of the corridor is not increased and overall speeds will not change substantially.

Project Tiering (TAC Section 5.1.2)

To determine if the proposed project could possibly tier off the travel analysis prepared for the RTP, the planner examined the RTP but found that it did not meet the requirements for tiering outlined in Section 5.1.2 of the TAC.

Selection of Traffic Analysis Methodology (TAF and TAC Table 1)

Since the project is located outside an MSA on a State highway in rural northern California, the Induced Travel Assessment Method Selection Matrix for Projects on the SHS indicates that a qualitative analysis can be completed. To determine existing and projected conditions in the vicinity of the project, the RTP and the county's general plan were consulted. Traffic data in the RTP indicated that congested areas were limited to the one "town center within the county," some 30 miles west of the project area. The general plan indicated that very little growth is expected in the county overall for the next 20 years, and that no land use changes are anticipated near the project that could increase overall congestion. Note that even in the absence of congestion, roads that simply provide greater access may facilitate development in locations that lead to induced travel. However, it was determined that demand for development in this location is considered unlikely and the truck climbing lanes would not provide greater access.

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Analyze Impacts and Determine CEQA Significance (TAC Sections 5.3 through 5.6)

It was determined from the qualitative analysis that the transportation impacts of the project would be "no impact" and that the build alternative would not be in conflict with CEQA Guidelines Section 15064.3(b). In this instance, although four miles of truck climbing lanes could be viewed as a project that would "increase the overall vehicle capacity along the corridor," the project would not induce travel (despite the added capacity) because there is no present or forecasted demand for the capacity and the project would not lead to substantially decreased travel times. Additionally, the demand for development in this location is considered unlikely and the truck climbing lanes would not provide greater access to land uses likely to induce additional travel.

It was also determined that the negligible and temporary increase in construction vehicles during construction of the project would be less than significant for the Build Alternative.

In the "Consistency with State, Regional, and Local Plans and Programs" of the environmental document, the build alternative was found to have "no impact" because the project would not result in induced travel.

Finally, because the build alternative was found to have "no impact," it will not contribute to a cumulative impact.

Mitigation (TAC Section 5.7)

No mitigation is required because the PDT determined that the project would result in "no impact.

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APPENDIX E. GLOSSARY OF ACRONYMS AND TERMS

AB	Assembly Bill
CAPCOA	California Air Pollution Control Officers Association
CARB	California Air Resources Board
CEQA	California Environmental Quality Act
CTF	Cleaner Technologies and Fuels Scenario
EIR	Environmental Impact Report (state)
FHWA	Federal Highway Administration
GHG	Greenhouse gas
HCM	Highway Capacity Manual
HOV	High Occupancy Vehicle
HOT	High Occupancy Toll
HSM	Highway Safety Manual
IS	Initial Study (state)
LD-IGR	Local Development-Intergovernmental Review
LOS	Level of Service
MND	Mitigated Negative Declaration (state)
MPO	Metropolitan Planning Organization
MTP	Metropolitan Transportation Plan
NCST	National Center for Sustainable Transportation
ND	Negative Declaration (state)
NEPA	National Environmental Policy Act
OPR	Governor's Office of Planning and Research
PDT	Project Development Team
PRC	Public Resources Code (state)
RTP	Regional Transportation Plan
RTPA	Regional Transportation Planning Agency
SB	Senate Bill
SCS	Sustainable Communities Strategy
SHS	State Highway System
TAF	Caltrans Transportation Analysis Framework
TISG	Transportation Impact Study Guide
VMT	Vehicle Miles Traveled
Capacity	The Sixth Edition of the Highway Capacity Manual defines capacity as: The maximum sustainable hourly flow rate at which persons or vehicles reasonably can be expected to traverse a point or a uniform section of a lane or roadway during a given time period under prevailing roadway, environmental, traffic, and control conditions.

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Elasticity	Elasticity is a measure of a variable's sensitivity to a change in another variable. In economics, elasticity is the measurement of the percentage change of one economic variable in response to a change in another. In transportation forecasting, an example is elasticity of travel demand, which can be expressed as the percent change in regional VMT divided by the percent change in regional lane-miles of state highways.
Induced Travel (VMT)	Induced travel (or the VMT attributable to a transportation capacity increase) is the increased amount of vehicle travel on the transportation network that is caused by travel behavior changes associated with decreased cost of travel due to improved travel times, improved reliability, or reduced price of travel. Over the short run, travel behavior changes including longer trips, more trips, mode shift, and route shift all tend to occur as a result of a highway capacity increase. Over the long run, these effects intensify (e.g. as people shift job or residential location to benefit from the infrastructure), and also land use development may become more dispersed, adding additional vehicle travel; for these reasons, long run induced travel is generally greater than short run induced travel.
Network	The connectivity of a transportation system. Changes in connectivity may change travel time and cost. Travel demand models will usually represent network connectivity within modes and across modes through a set of links connecting nodes.
Travel Demand Model	A travel demand model is any relatively complex computerized set of procedures for predicting future trip making as a function of land use, demographics, travel costs, the road system, and the transit system. These models often cover an entire metropolitan area or the entire State, but may also focus on a single city or county.
Transit	Transit generally includes all forms of shared common carrier passenger ground transportation in moderate to high capacity vehicles ranging from dial-a-ride vans to buses, trolleys, light rail, commuter rail, and intercity rail transportation.

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Trucks	Trucks are a subtype of the heavy vehicles category which includes trucks, intercity buses, and recreational vehicles. This Framework follows the Highway Capacity Manual definition of what constitutes a heavy vehicle: "A vehicle with more than four wheels touching the pavement during normal operation." This is consistent with the Caltrans Traffic Census definition of a truck: "The two-axle (truck) class includes 1-1/2-ton trucks with dual rear tires and excludes pickups and vans with only four tires."
Vehicle Miles Traveled (VMT)	The number of miles traveled by motor vehicles on roadways in a given area over a given time period. VMT may be subdivided for reporting and analysis purposes into single occupant passenger vehicles (SOVs), high occupancy vehicles (HOV's), buses, trains, light duty trucks, and heavy-duty trucks. For example, an air quality analysis may require daily VMT by vehicle class and average speed or vehicle operating mode (idle, acceleration, cruise, deceleration, etc.). For a CEQA compliant transportation impact analysis, automobile VMT (cars and light trucks) may be evaluated.
VMT Attributable to a Project.	In the context of a CEQA analysis, the VMT attributable to a transportation project, or induced travel, is the difference in passenger VMT between the with project and without project alternatives. VMT attributable to a project is equivalent to induced travel in this context.

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APPENDIX F. ACKNOWLEDGEMENTS

TECHNICAL ROUNDTABLES

Made up of over 35 practitioners and stakeholders, the following participants met three times to provide detailed technical input for the development of the guidance documents:

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- David Somers, LADOT
- Tony Petros, LSA
- Carter Rubin, Natural Resources Defense Council
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Substantial contributions were made by the following organizations in a consulting role to Caltrans:

- Alta Vista Solutions
- Emergent Transportation Concepts
- Kittelson and Associates, Inc.
- MIG, Inc.
- P & D Consulting

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Response to Comment 1 in 20240112, Natural Resources Defense Council

This introductory comment expresses the commenter's view on past roadway projects and general concerns about the project. It does not discuss the adequacy of the EIR/EA. No changes to the Draft EIR/EA are necessary.

Response to Comment 2 in 20240112, Natural Resources Defense Council

This comment summarizes the four comments on the EIR/EA that are expressed in more detail in subsequent sections of the letter. No changes to the Draft EIR/EA are necessary.

Response to Comment 3 in 20240112, Natural Resources Defense Council

The commenter states the project was improperly piecemealed. Please refer to Master Response C for responses related to this comment.

Response to Comment 4 in 20240112, Natural Resources Defense Council

The commenter states the Draft EIR/EA's consideration of alternatives is misleading and incomplete, in part, based on faulty traffic modeling which overstated the no-build alternative's congestion. Please refer to Master Response A and D for responses related to VMT calculation and modeling methodologies, respectively.

Response to Comment 5 in 20240112, Natural Resources Defense Council

The commenter states Caltrans omitted alternatives that would have achieved the project's purpose with fewer environmental impacts. Please refer to Master Response B for responses related to project alternatives considered. The commenter also suggested alternatives that improved local public transportation, active transportation, TDM strategies, and are VMT neutral. While these scope elements are part of the project (active transportation improvements) and part of the VMT mitigation plan as indicated in Mitigation Measure TRANS-1 in the Draft EIR/EA (improved local transit/capital corridor improvements/TDM strategies), they would not meet the purpose and need of the project as standalone alternatives. The Draft EIR/EA also includes 3 alternatives that are VMT neutral. For additional information related to tolling and congestion, please refer to response to comment 3 in 20240110, California Air Resources Board.

Response to Comment 6 in 20240112, Natural Resources Defense Council

The commenter expresses concern with the project traffic analysis and associated air quality, GHG, and energy assessments. The commenter asserts the GHG analysis is misleading because it accounts for future vehicle efficiencies and technologies that will reduce the carbon intensity of the statewide transportation sector.

The travel forecasting and modeling techniques used in the analysis conform to existing standards, guidance, policies, and best practices. Please refer to Master Response A and D for responses related to VMT calculation and modeling methodologies. See also Master Response I for discussion on the nexus among the traffic data and air quality, GHG, and energy analyses.

In the context of GHG planning, VMT cannot be analyzed in insolation. It must be considered alongside all variables that influence emissions generation, including vehicle technologies and low-carbon fuels. Contrary to the commenter's assertion, excluding the impact of state regulations on vehicle emissions would mischaracterize future emissions generated by the project. It would also be inconsistent with modeling prepared by CARB and local MPOs to support the state's GHG inventory and regional transportation plans. Refer to Response to Comment 12 in 20240111, Center for Biological Diversity and Response to Comment 7 in 20240112, Sarah Kolarik for additional discussion.

Response to Comment 7 in 20240112, Natural Resources Defense Council

The commenter states the Draft EIR/EA vastly underestimates the induced VMT. Please refer to Master Response A for responses related to VMT calculation methodologies.

Response to Comment 8 in 20240112, Natural Resources Defense Council

The commenter states the Draft EIR/EA fails to adequately measure the growth induced by the project. Please refer to Response to Comment 11 in 20240108 Sierra Club Yolano Group.

Response to Comment 9 in 20240112, Natural Resources Defense Council

The commenter states the Draft EIR/EA fails to adequately analyze the project's marginal impacts on species and habitats. Caltrans deems the Draft EIR/EA to contain adequate analyses and mitigation for the project's Build Alternatives and their impacts and that the document complies with CEQA and NEPA, including determining potential impacts to sensitive natural resources including wildlife connectivity, special-status species, and sensitive habitats. Please also see responses to comment letter 20240112, California Department of Fish and Wildlife for further discussion of biological resources. No changes to the Draft EIR/EA are necessary.

Response to Comment 10 in 20240112, Natural Resources Defense Council

The commenter states the Draft EIR/EA fails to adequately mitigate against induced VMT, even though there are feasible mitigation measures. Please refer to Master Response A for responses related to VMT mitigation.

Response to Comment 11 in 20240112, Natural Resources Defense Council

The commenter states it requested technical studies on November 16 and 27, 2023, and did not receive the studies until December 13, 2023, and further information was provided on January 11, 2024, when the deadline for public comments was extended until January 12, 2024.

As the commenter states, Caltrans extended the review period an additional 7 days from the previously announced 53-day review period. The review period was initially given an extra 8 days from the CEQA required 45-day review period due to the holiday season. Due to multiple requests to extend the review period from 53 days, Caltrans extended to 60 days, which is15 days more than required by law. As the commenter stated, requested technical studies were provided on December 13, 2023. The commenter subsequently requested additional information

on January 4, 2024. The requested information consisted of CT-EMFAC results for the output for 2049 Alternative 1 and was provided on January 11, 2024. This information was not readily available and had to be retrieved from the project consultant. The Draft EIR/EA and technical studies were provided with adequate time to review and provide comments.

Response to Comment 12 in 20240112, Natural Resources Defense Council

Commenter states the Draft EIR/EA has numerous shortcomings which must be corrected before the project can be lawfully approved. Caltrans finds the Draft EIR/EA to contain adequate analyses and mitigation for the project's build alternatives and their impacts and that the document complies with CEQA and NEPA. No changes to the Draft EIR/EA are necessary.

20240112, NextGen California, et.al.



January 12, 2024

Tony Tavares
Director
California Department of Transportation
1120 N St
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RE: Yolo 80 Corridor Improvements Project

We, a statewide coalition of climate, transportation, and environmental justice advocates, are writing to express our deep concern regarding the recent Draft Environmental Impact Report (DEIR) provided for the Yolo 80 Corridor Improvements Project. We find the analysis therein to be flawed and misleading on the potential impacts that each of the project alternatives will have on traffic, air quality, and greenhouse gas (GHG) emissions. The California Department of Transportation (Caltrans) proposes to mitigate less than half of the project's projected impact on vehicle miles traveled (VMT), meaning that there is no plan to align the project with state or regional climate goals. In addition, parts of the project appear to be already underway, in what may be an abuse of road maintenance funds. 1 2

For these reasons, we believe that the public has been deprived of proper disclosure of the Yolo 80 Corridor Improvement Project's environmental impacts, sufficient mitigation of the project's environmental impacts, and the opportunity to fully participate in the environmental review process, pursuant to the California Environmental Quality Act (CEQA). 2 cont.

The California Air Resources Board (CARB) says that the state must dramatically reduce car dependence statewide to reach carbon neutrality as required by AB 1279 (Muratsuchi, 2022). Highway expansions – in addition to being counterproductive in efforts to reduce congestion – are a key hurdle to reducing car dependence and emissions from the transportation sector writ large. Decades of research concludes that adding lanes to a highway increases how much people drive while also promoting sprawling, inefficient land use development. This fundamental reality is acknowledged by a growing body of administrative reports and policy directives,[1] underscoring its role as a barrier to achieving emissions reductions. Simply put, projects like the Yolo 80 Corridor Improvement Project impede climate progress.

As advocates, we fear that this project represents the intensification of already compulsive, wasteful highway widening practices. If a project of this scale and cost is allowed to proceed with the quality of analysis provided in this DEIR, it will set a dangerously low bar for proposed highway projects everywhere in the state, at a time when California needs to be swiftly transitioning away from building infrastructure that further entrenches car dependence. 3

While the Yolo 80 Corridor Improvement Project DEIR contains a number of internal contradictions and flawed assumptions, three issues stand out as the most urgent for Caltrans to address:

1. **The DEIR incorrectly claims that adding a lane will reduce emissions.**
2. **The DEIR proposes to mitigate less than half of induced VMT.**
3. **Parts of the project appear to be already under construction.**

Each of these concerns is discussed in more detail below.

1) The DEIR incorrectly claims that adding a lane will reduce emissions.

The GHG analysis within the DEIR makes the dubious claim that in the long term, adding a new lane along the Yolo-80 corridor will reduce emissions regionally compared to a no-build scenario. This assertion conflicts with a decades-old body of empirical evidence demonstrating that increasing highway capacity leads to more driving, and in turn, increased tailpipe emissions.[2] We are given no reason to believe that this project has a unique design or circumstance that will enable it to reduce emissions while adding highway capacity, compared to a scenario where expansion does not occur. 4

[1] See: 2022 Progress Report, California's Sustainable Communities and Climate Protection Act, California Air Resources Board; California Transportation Assessment Report, 2022, Strategic Growth Council
[2] Handy, Susan. "Increasing Highway Capacity Unlikely to Relieve Traffic Congestion," National Center for Sustainable Transportation. 2015.

It is clear that the GHG analysis is hindered by flawed traffic modeling assumptions. In her dissertation, *The Policy and Politics of Highway Expansions,*[3] Dr. Amy Lee recounts an interview with a transportation expert who had knowledge of the project and its modeling:

> "…a transportation expert also discussed the travel modeling analysis of HOT lanes on I-80. They discussed the various modeling approaches and scenarios that had been used to analyze the project, including scenarios to estimate long-term changes in VMT that included land use changes and used dynamic traffic assignment. Caltrans rejected these scenarios that showed long-term increases in VMT in favor of scenarios that used static traffic assignment, which showed that VMT would decrease with the highway expansion project because people would re-route off of a longer, parallel route through Woodland and back onto I-80. Caltrans "liked" the model run using static assignment because it gave quantitative support for the expansion project. Comparisons of dynamic versus static assignment are well-documented in academic literature – generally, static assignment fails to account for the tendency of people to change their departure time as a result of travel time. But in reality, 'way more people would change their departure time before they would go all the way around through Woodland.'"(Lee 2023, p. 279)

4 cont.

The resulting GHG analysis is not only in conflict with decades of research, it also contradicts other parts of the DEIR itself. In the VMT analysis, Caltrans finds that adding a lane to the Yolo 80 corridor would generate 180 million additional miles of vehicle travel annually. According to the Rocky Mountain Institute's State Highway Induced Frequency of Travel Calculator,[4] **such an increase in driving can be expected to generate anywhere between an additional .5 and 2 million metric tons of CO_2 equivalent emissions by 2050.** For comparison, Yolo County as a whole emitted just over 1 million metric tons of CO_2 equivalent GHGs in 2016.[5] Using the U.S. EPA's 2023 social cost of carbon, this project would cost society between $100 million and $400 million in climate damages.[6]

These diverging assessments of the project's impacts cannot be reconciled. The GHG analysis is misleading, leaving decision makers with the impression that expanding the highway will somehow help our climate.

In the interest of a more accurate and complete disclosure of the project's impacts on emissions, we ask that Caltrans re-do the traffic assessment, using a dynamic trip assignment model in order to produce an analysis that is better suited to the nature of the project.

2) The DEIR proposes to mitigate less than half of induced VMT.

Most of the Yolo 80 project alternatives will construct a new traffic lane, creating over 180 million additional miles of vehicle travel each year. In the DEIR, Caltrans has proposed measures to mitigate only 43% of that new VMT, citing a limited budget. With CARB's advisory that the

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[3] Lee, Amy. "The Policy and Politics of Highway Expansions," University of California, Davis.
[4] SHIFT Calculator, Rocky Mountain Institute. 2023.
[5] Yolo County GHG Inventory Update Technical Memo, 2018.
[6] Since the EPA's social cost of carbon metric ramps up over time, and most of the tailpipe emissions induced by this project will occur between 2029 and 2049, this estimate likely falls on the lower end of the project's true impact.

state must reduce VMT dramatically in order to achieve its climate goals, a failure to even plan for full mitigation on a project of this scale is unconscionable.

According to CEQA guidelines, Caltrans is obligated to minimize environmental harm by implementing mitigation measures and exploring project alternatives. Regrettably, the DEIR fails to assess several feasible mitigation measures and project alternatives that could more effectively minimize the project's impacts.

To illustrate, the DEIR fails to evaluate a project alternative that was previously modeled in the 2020 Metropolitan Transportation Plan/Sustainable Community Strategy by the Sacramento Council of Governments. This plan, serving as the region's guide for reducing transportation emissions, proposed two high occupancy toll lanes in each direction. These improvements could potentially address VMT by implementing pricing on multiple lanes, while also generating supplementary toll revenue to support other VMT mitigation measures. It is unclear why this particular alternative is omitted from the DEIR's considerations.

Additionally, many of the VMT mitigation measures that Caltrans proposes lack convincing evidence for their effectiveness in reducing VMT. Several of the proposed mitigation measures rely on improving transit service to offset increases in driving from a new lane; however, research has shown that increasing transit ridership does not necessarily put a dent in VMT, since highways will return to a congested equilibrium even in the face of significant mode shift.[7]

Instead of offering mitigation measures with slim evidential backing, Caltrans could invest in more durable options – such as low-VMT housing, which can demonstrably reduce vehicle travel in aggregate by reducing vehicle trips and trip length within a region.

Clearly, there are several feasible options available to Caltrans to better mitigate this project and minimize its environmental impact. Many of these options go unexplored in the Yolo 80 DEIR. Some of these options may even do a better job of achieving the project's purpose and need than the alternatives being proposed, leaving us to wonder why they have not been considered in the first place.

5 cont.

3) Parts of the project appear to be already under construction.

Recent reporting in the Los Angeles Times[8] and Politico[9] suggests that segments of the Yolo 80 project are already underway, despite the fact that the environmental review process is ongoing. Caltrans appears to be actively widening the roadbed along sections of I-80, effectively laying the foundation for the additional lane planned for several of this project's alternatives. Beginning construction on VMT-increasing projects without completing the environmental review process is a blatant violation of CEQA.

6

[7] Duranton and Turner, "The Fundamental Law of Road Congestion: Evidence from US Cities," American Economic Review. 2011.
[8] Uranga, Rachel. "A Caltrans executive questioned a freeway expansion. Then she was demoted," The Los Angeles Times, October 2023.
[9] Khan, Debra. "Caltrans official says she was demoted for objecting to highway expansion," Politico, October 2023.

We are also concerned by the apparent abuse of voter-approved roadway maintenance funds. The pavement rehabilitation project that is currently widening the roadbed is funded by SB 1 (Beall, 2017) dollars specifically set aside for roadway maintenance. Maintenance projects receive CEQA streamlining, the assumption being that impacts from repaving will be insignificant. Taking advantage of this fact to surreptitiously begin work on a project that will have significant impacts on the environment violates the trust of the legislators, voters, and administrative officials who approved those funds, and the taxpayers who foot the bill. It also means that a majority of the project alternatives considered in this DEIR – those that would use the segment of roadbed that is currently being widened as a vehicle travel lane – are likely illegal.

6 cont.

Conclusion

The Legislative Analyst's Office recently forecasted that California would face a $68 billion deficit in the 2024-25 fiscal year.[10] A subsequent report warns that declining gas tax revenue will lead to significant shortfalls in transportation funds over the next few decades.[11] The Yolo 80 Corridor Improvement project is not yet fully funded, with several hundred million dollars in outstanding costs that likely would have to be covered by state and local funds.

Given the DEIR's failure to sufficiently disclose the project's impacts, present a comprehensive plan for how it will mitigate stated and unstated impacts, and align with state climate goals, we fail to see how this project is a worthwhile use of public dollars.

7

We ask that Caltrans go back to the drawing board and re-do its analysis to be consistent with industry best practices, and present an EIR with realistic GHG impact outputs and a plan to fully mitigate project impacts. Further, we ask that the proposed project alternatives reflect, at the minimum, a set of projects that would not violate state law by making use of pavement rehabilitation dollars for highway expansion.

Sincerely,

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Climate Policy Advisor
NextGen California

Jared Sanchez
Policy Director
CalBike

Jason John
Associate Director
Sierra Club California

Kevin Shin
Deputy Director
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Craig Segall
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Evergreen Action

Carter Rubin
Senior Transportation Lead
National Resources Defense Council

[10] "The 2024-25 Budget: California's Fiscal Outlook," The Legislative Analyst's Office, December 2023.
[11] "Assessing California's Climate Policies – Implications for State Transportation Funding and Programs," Legislative Analyst's Office, December 2023.

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Stuart Wood
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Sustainable Claremont

Kathy Kerridge
Board Member
Good Neighbor Steering Committee of Benicia

Casey Law
South Pas Active Streets

Response to Comment 1 in 20240112, NextGen California, et.al.

This comment provides an introduction and summarizes the commenters' concern regarding impacts related to traffic, greenhouse gas emissions, and air quality that are discussed in more detail later in the letter. Responses are provided for summarized concerns in subsequent comments.

Response to Comment 2 in 20240112, NextGen California, et.al.

The commenter states that the project appears to be already underway and discusses the inadequacy of the EIR/EA in broad terms, summarizing subsequent sections. Responses are provided for summarized concerns in subsequent comments.

Response to Comment 3 in 20240112, NextGen California, et.al.

The commenter laments projects that impede climate progress and provide their list of inadequacies of the Draft EIR/EA, summarizing subsequent sections. Responses are provided for summarized concerns in subsequent comments.

Response to Comment 4 in 20240112, NextGen California, et.al.

An increase in project-level VMT does not immediately constitute a significant GHG impact or conflict with statewide GHG reduction policy, as suggested by the commenter. As discussed in Section 3.2.8 Greenhouse Gas Emissions, the emissions modeling performed for the project confirms that while VMT is expected to slightly increase, "GHG emissions for the Build Alternatives would be lower for design year 2049 compared to existing year (see Table 3.4-2)." CEQA determinations of significance are made by evaluating changes to existing conditions (baseline) from implementation of the project. Therefore, the project directly supports the state's long-term target of carbon neutrality by 2045, as outlined in the 2022 Scoping Plan and pursuant to Assembly Bill 1279. Please refer to Response to Comment 12 in 20240111, Center for Biological Diversity and Response to Comment 7 in 20240110, California Air Resources Board for additional discussion. See also Master Response A and D for responses related to induced travel, VMT calculation and modeling methodologies, and VMT mitigation. See Master Response I for additional discussion on the GHG analysis.

Response to Comment 5 in 20240112, NextGen California, et.al.

Please refer to Master Response A for responses related to VMT mitigation and Master Response B for a discussion of Alternatives.

Response to Comment 6 in 20240112, NextGen California, et.al.

Please refer to Master Response C for responses related to this comment.

Response to Comment 7 in 20240112, NextGen California, et.al.

The commenter states the proposed project is using pavement rehabilitation dollars for highway expansion. For more information on this please see Master Response C. The commenter asks

that Caltrans recirculate the environmental document with new alternatives and new analysis. Caltrans deems the Draft EIR/EA to contain adequate analyses and mitigation for the project's various Build Alternatives impacts and that the document complies with CEQA and NEPA. Please also refer to Response to Comment 4 above. No changes to the Draft EIR/EA are necessary.

20240112, Planning & Conservation League

PLANNING AND CONSERVATION LEAGUE

January 12, 2024

Gurtej Bhattal, PE
Project Manager, California Department of Transportation, District 3
703 B Street
Marysville, CA 95901
Submitted via email

RE: Yolo 80 Corridor Improvements Project DEIR Comments

Dear Mr. Bhattal,

I write on behalf of the Planning and Conservation League (PCL) to express our concerns for the draft Environmental Impact Report (DEIR) for the Yolo 80 Improvements Project.

PCL finds the DEIR fundamentally flawed in systemic ways. We find that the impact assessment of vehicle miles travelled (VMT) and associate impacts of GHG, air quality, and energy to be inaccurately underestimated, and the prescribed mitigation for these impacts to be grossly inadequate. 1

PCL recommends a revision and recirculation of the environmental review to assess the full impacts of the project and to identify alternatives that fully mitigate these impacts.

In 2008, SB 375, California's Sustainability and Climate Protection Act, was passed, mandating transportation planning that significantly reduces VMT, as is necessary to meet California's GHG reduction mandates. Yet, after 15 years, the California Air Resource Board has repeatedly documented in its progress reporting on SB 375 that per capita VMT has continued to rise in all regions of the state. It is time to change our ways. 2

We urge Caltrans and our state's transportation agencies to take this opportunity to demonstrate their true commitment to realizing our climate goals with a rethinking of this project.

Comment Period:

On December 15, PCL submitted a letter to Caltrans requesting that the technical appendices be posted to the project website and that the comment period be extended 45 days from the time of that posting. This was among many other known requests from other stakeholders for the same.

We appreciate the one-week extension of the comment period that has been made since, but considering the length of time that essential materials have not been made readily available to the public, PCL feels that the comment deadline should be further extended. We recommend that the comment period be extended for at least the minimal amount of time required by the California Environmental Quality Act (CEQA) from the date that the full materials are made available to avoid violation of CEQA noticing requirements. 3

Yolo I-80 Pavement Rehab Project:

The "rehabilitation" of the I-80 Yolo Causeway, funded by the State Highway Operation and Protection Program (SHOPP) and exempted from CEQA, began construction in August 2023. This project is described by Caltrans District 3 as a maintenance-only project, entirely separate from the ensuing "Yolo 80 Corridor Improvements Project" undergoing environmental review now. However, a simple visual inspection of the construction under way makes clear that much more than maintenance and surface rehabilitation is proceeding. Clear expansion of the facility is underway, making way for the capacity expansion envisioned in the "Yolo 80 Corridor Improvements Project."

Capacity expansion of the facility would disqualify a project from use of SHOPP funds and the CEQA exemption the "Rehab" project received.

The expansive construction underway now for the "rehab" project is the most physically intensive work that will be done on this portion of the "Improvements Project," in the middle of a nature preserve. The Yolo Bypass is home to multiple sensitive species, both flora and fauna. This is all documented in the DEIR for the "Improvements Project," where mitigation strategies are also discussed at length. But this analysis and future mitigation does not address the impact of the construction already underway. 4

For example, three species of bats inhabit the raised structure of the causeway itself. It is difficult to imagine, with the intensity of the construction already taking place, that this habitat has not been disrupted. The "Improvements Project" DEIR discusses the development of a mitigation plan for the bats specifically, but to our knowledge no plan has been developed to date. At this time, we have no knowledge of any measures being taken to avoid or mitigate impacts to bats or other sensitive species in the by-pass that are likely occurring now.

PCL believes that these two projects are indeed phases of the same project, that the "rehab" project misused SHOPP funds, and that it could be found that construction has proceeded illegally without environmental clearance. Halting of current construction may be warranted until such time that the projected impacts are properly assessed and mitigated, including the biological impacts that may have already occurred.

Deficiencies of the "Yolo 80 Corridor Improvements Project" environmental review:

As stated above, PCL believes that the DEIR greatly underestimates the VMT impacts of the project across the alternatives analyzed, and in turn also underestimates associated impacts to GHG, air quality, and energy (as described in more detail below). This aside, the DEIR demonstrates significant increases in VMT from the project as it is, and only proposes to mitigate 43% of that VMT impact.

This lack of mitigation alone fails to meet the requirements of the California Environmental Quality Act, as there are feasible options available to mitigate these impacts. This proposed capacity expansion without adequate mitigation also runs contrary to California law including SB 375 (Steinberg, 2008), SB 743 (Steinberg, 2013) and multiple policy directives including Executive Order N-19-19, the California Air Resources Board's (CARB) Scoping Plan, CARB's Progress Report on Implementation of Sustainable Communities and Climate Protection Act (SB 375), the Climate Action Plan for Transportation Infrastructure (CAPTI), The Office of Planning and Research's (OPR) Technical Advisory on Evaluating Transportation impacts under CEQA, and Caltrans' own guidance on SB 743 implementation.[1] [2] [3] [4] [5] 5

The technical comments that follow rely heavily on the analysis provided by CARB in their letter regarding this DEIR, dated January 10, 2024. PCL concurs with many of the conclusions of the CARB analysis, and feels that it is warranted to emphasize some of CARB's primary concerns along with our own observations.

Inadequate traffic analysis; underestimation of VMT, GHG and associated impacts:

Contrary to current best practice, Caltrans chose to use a static traffic assignment travel demand model, rather than a dynamic traffic assignment model, to conduct its traffic analysis and projections of VMT. As CARB and others have noted, the limitations of a static traffic assignment model in these conditions has likely significantly distorted the outcomes of the analysis. The distortion overestimates the VMT impacts of the no-project alternative in comparison to the expansive project alternatives, minimizing the apparent impacts of the project.

As is generally accepted and well documented at this point, most research of induced travel demand observes VMT increases with roadway capacity expansion[6] [7]. This DEIR's modeling reports unintuitively 6

[1] *2022 Scoping Plan for Achieving Carbon Neutrality*. available at https://ww2.arb.ca.gov/our work/programs/ab-32-climate-change-scoping-plan/2022-scoping-plan-documents

[2] *2022 Progress Report: California's Sustainable Communities and Climate Protection Act*. available at https://ww2.arb.ca.gov/sites/default/files/2023-05/2022-SB150-MainReport-FINAL-ADA.pdf

[3] *Climate Action Plan for Transportation Infrastructure*. available at https://calsta.ca.gov/-/media/calsta media/documents/capti-july-2021-a11y.pdf

[4] *Technical Advisory on Evaluating Transportation Impacts in CEQA*. Governor's Office of Planning and Research, 2018

[5] *Caltrans Transportation Analysis Framework*. CA Department of Transportation, 2020

[6] *If you build it, they will drive: Measuring induced demand for vehicle travel in urban areas*, Hymel, 2019

[7] *Impact of Highway Capacity and Induced Travel on Passenger Vehicle Use and Greenhouse Gas Emissions:*

high VMT for the no-project alternative and an eventual reduction of regional VMT for the preferred with-project alternative of more than 3%.

Yet, the DEIR's technical appendices illustrate in multiple places that Caltrans was aware of the limitations of the static-assignment modeling, and the likelihood that the outputs were distorted. These acknowledgments include:

> Another limitation of the SACSIM19 model is the use of static assignment rather than dynamic assignment of vehicle trips. With congested conditions, static assignment can result in volumes that exceed capacity for the analysis period. With dynamic assignment, trips are rerouted or shifted in time so that capacity is met. If dynamic assignment were used, VMT could be lower if trips are shifted in time to more direct routes or if trips are shifted to different destinations due to congested conditions. VMT could also be higher if longer routes must be used to avoid congested links. (Transportation Analysis Report, Interstate 80/US Highway 50 Managed Lanes, November 2023, page 78)

And:

> Based on the static validation and knowledge that the model relies on static assignment of vehicle trips instead of dynamic traffic assignment, the model's peak period (and peak hour) forecasts may be higher than would occur. (Interstate 80/U.S. Highway 50 Managed Lanes Travel Demand Modeling Report, p. 27)

6 cont.

As CARB explains, a primary factor in the inflated VMT projection of the no-project alternative as determined by the static assignment modeling is that it projects drivers rerouting around the I-80 Causeway, through Woodland 10 miles to the north, to avoid congestion and adding significant amounts of travel miles—a rather unrealistic presumption. A dynamic assignment model would, however, have the ability to anticipate typical human behavior and adjust travel times to avoid peak congestion rather than reroute for a much longer trip. A dynamic model would produce a more accurate assessment of travel behavior in these conditions and likely project much lower VMT for the no-project alternative.

Again, Caltrans was aware that improved modeling options were available, but chose to use the static assignment approach anyway. *The Policy and Politics of Highway Expansions* [8] describes an interview with a transportation expert with knowledge of the modeling for the project:

> ...a transportation expert also discussed the travel modeling analysis of HOT lanes on I-80. They discussed the various modeling approaches and scenarios that had been

Policy Brief. Handy and Boarnet, 2014

[8] *Policy and Politics of Highway Expansions*, Amy Lee, 2023, Page 279. Available at: https://escholarship.org/uc/item/13x3n8zr

> used to analyze the project, including scenarios to estimate long-term changes in VMT that included land use changes and used dynamic traffic assignment. Caltrans rejected these scenarios that showed long-term increases in VMT in favor of scenarios that used static traffic assignment, which showed that VMT would decrease with the highway expansion project because people would re-route off of a longer, parallel route through Woodland and back onto I-80. Caltrans 'liked' the model run using static assignment because it gave quantitative support for the expansion project. Comparisons of dynamic versus static assignment are well-documented in academic literature – generally, static assignment fails to account for the tendency of people to change their departure time as a result of travel time. But in reality, "way more people would change their departure time before they would go all the way around through Woodland." (p. 279)

6 cont.

Caltrans knowingly chose a modeling approach with acknowledged limitations, because the outputs make the benefits of the project look better than the likely are, in justification of the expansion of the facility. This acknowledgment, and the fact that available dynamic assignment modeling could be more appropriate for an accurate analysis of this project's conditions, warrants a full revision of the traffic assessment and its VMT projections.

Another distorting deficiency of the traffic and VMT analysis is the lack of consideration of land use growth factors across the no-project and various with-project alternatives. As CARB notes,

> Ample research has documented highway expansion changes on land use development patterns [9], and those changes comprise a substantial portion of the overall induced travel effect of highway projects [10]. This is well understood, and Caltrans' own guidance on assessing induced travel requires that land use development effects be assessed[11]. Guidance from the Governor's Office of Planning and Research also establishes the need to assess land use effects of highway capacity projects[12].

7

Transportation infrastructure affects land use patterns, and land use patterns affect transportation behavior. More specifically, VMT reducing transportation infrastructure promotes a more compact land use footprint, that in turn will induce a greater low VMT travel behavior. Likewise, VMT increasing transportation infrastructure promotes more expansive land use growth, which in turn begets more high-VMT travel behavior. To omit the potential land use growth factors between the no-project and with-project alternative is to neglect this compounding reciprocal effect on travel between these alternatives.

---

[9] *Highway-Induced Development: Research Results for Metropolitan Areas*. Ewing 2008

[10] Many induced travel studies distinguish short-term effects, generally caused by change in destination, mode, route, or number of trips from long term effects, generally caused by changes in land use patterns, and find the long-term component adds substantially to the short-term component. (CARB, letter to Caltrans, Jan,10th 2024)

[11] *Caltrans Transportation Analysis Framework*. CA Department of Transportation, 2020. Pg 21

[12] *Technical Advisory on Evaluating Transportation Impacts in CEQA*. Governor's Office of Planning and Research, 2018, pages 33-34

Again, Caltrans acknowledges this in the technical appendices, but decided to keep the land use conditions the same across all alternatives anyway:

> Reviewers should note that the model inputs for land use growth have the largest effect on future travel demand. (Interstate 80/U.S. Highway 50 Managed Lanes Traffic and Revenue Report, p. 10)
>
> Land use inputs were not developed for each individual alternative. Instead, the SACOG 2020 MTP/SCS land use forecasts associated with specific model years 2016, 2027, and 2040 were used without modification. Then the resulting vehicle trip tables from the SACSIM19 model were factored to produce 2029 and 2049 vehicle trip tables that were used in the final assignment. This approach limits the sensitivity of the traffic and revenue forecasts to any unique land use effects associated with each alternative. (Interstate 80/U.S. Highway 50 Managed Lanes Traffic and Revenue Report, p. 10)

The lack of consideration of the land use factors across the alternatives of the proposed expansion project eliminates assessment of the addition travel that the project could incur from those land use factors.

7 cont.

PCL will further note that use of the Sacramento Area Council of Governments' (SACOG) Metropolitan Transportation Plan/Sustainable Community Strategy (MTP/SCS) is not appropriate for any of the DEIR analyzed alternatives, because none of the alternatives match the improvements of the Yolo I-80 Corridor as envisioned in the MTP/SCS (as discussed further below). As such, none of the analyses for any of the alternatives is accurate in this regard.

The lack of consideration of differing land use effects across the alternatives further distorts the traffic assessment, under-estimating with-project VMT projections, and, again, warrants revision.

8

One further distortion of the traffic analysis and the relevant impact projections is the inconsistent values used for truck-VMT across impact determinations. As noted by CARB, Caltrans uses a large induced truck-VMT determination to subtract from the project's overall induced VMT (as is allowed under CEQA), but then uses a much smaller induced truck-VMT figure for calculating the associated impacts of GHG, air quality, energy, and noise. The effect is to minimize the impact of the project in all of these categories.

CARB analyzed the discrepancy between the truck-VMT value used for the overall VMT assessment and the corresponding GHG, air quality, energy, and noise assessments across each of the capacity-adding alternatives and found that the difference ranged from 201% - 565%. This is fully illustrated in the table on page 13 of CARB's letter to Caltrans on this DEIR, dated January 10th.

That Caltrans would use different truck-VMT determinations in an apparent attempt to cloak the full impacts of the project is disturbing.

9

This, compounded with the other distortions of the traffic assessment described above, demonstrates that the impact determinations for VMT, GHG, air quality, energy and noise are all to be seen as inaccurate, if not grossly underestimated. These determinations are not supported by substantial evidence as is required by CEQA[13] , and the impact analysis must be revised. 9 cont.

Insufficient mitigation and inadequate alternatives analysis:

As described above, PCL believes that VMT and all associated impacts are inaccurately under-represented in the DEIR, but of the significant amount of added VMT that is acknowledged in the analysis, Caltrans proposes to mitigate only 43% of the impact (and proposes funding for far less).

This alone is unacceptable. Caltrans cites cost constraints as the reason for further mitigation to be infeasible, but offers no evidence or justification for how this is so. This does not meet the criteria for infeasibility under CEQA, as there are other options and alternatives to the project that could offer the difference of mitigation required that have not been analyzed in the review. There are multiple alternatives not analyzed that better address congestion, have less impact, and provide more funding for mitigation. 10

It is true that Caltrans would not necessarily have control of the implementation of all such mitigation, and agreements with local and regional entities may indeed be needed to do so, but this is possible and warranted for a project of this scale and import. Compliance with local and regional plans would be a good place to start.

For example, PCL is unclear as to why Caltrans would choose not to analyze a project alternative that is consistent with that envisioned for the Yolo I-80 corridor by SACOG's MTP/SCS. Compliance with the regional plan would serve multiple purposes, not least among them that SCS consistency is generally considered to be a basic litmus test for demonstrating compliance to California's climate laws.

SACOG's MTP/SCS analysis depends on a configuration of the Yolo I-80 corridor described as this: 11

> Dual express lane each direction. SOVs tolled. One lane added, one converted from GP lane during peak hours (7am-10am and 3pm-6pm).

Reportedly, the Yolo County Transportation District requested that this scenario be analyzed for the project as well, but Caltrans chose not to.

Two priced lanes would potentially offer greater congestion management, while greatly increasing revenue from the facility that could be an ongoing source of funding for mitigation of the VMT impacts of the project, including far more improved transit capacity operations on the corridor.

It must be noted that, due to continued road expansion, lack of transit investment, and continued

[13] See Cal. Pub. Resources Code § 21168.5.

expansive growth in the Sacramento region, there is a potential likelihood that SACOG's next update of the MTP/SCS will be challenged to meet its required GHG reduction target pursuant to SB 375. It is likely that further restrictions on capacity expansion will be needed on the region's major roadways, including I-80, to meet the plan's requirements.

It would be in the region's interest for Caltrans to have the foresight to also analyze alternatives that anticipate the need for both greater performance and less impact than is currently envisioned in the current MTP/SCS. A clear option would be to consider the pricing of more lanes, or the entire facility, without any capacity expansion, as CARB and others have recommended. Such alternatives could offer the optimal amount of congestion management, have far less impacts, and provide far more ongoing funding for mitigation and more sustainable mobility options, at a fraction of the cost. 11 cont.

PCL urges Caltrans to revise the analysis of the project--including that of the current "rehab" project--to assess the full extent of the impacts of its alternatives, and to identify a project that fully mitigates those impacts in a feasible, funded, additional, and enforceable manner in compliance with California's GHG reduction mandates. 12

Again, this is a moment for our state transportation agencies to reimagine the functioning of our roadways to demonstrate that California is truly committed to realizing our climate goals, almost two decades in the making.

PCL herein incorporates, by reference, comments made on the Yolo 80 Corridor Improvements Project DEIR by CARB, the Natural Resources Defense Council, the ClimatePlan coalition, the Sierra Club Yolano Group, and ECOS. 13

Thank you for the opportunity to comment.

Sincerely,



Matthew Baker, Policy Director
Planning and Conservation League

CC:
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Response to Comment 1 in 20240112, Planning & Conservation League

This comment discusses the inadequacy of the EIR/EA in broad terms, indicating that the Draft EIR/EA fails to adequately assess and mitigate the project's impacts to VMT, GHG, air quality, and energy. These concerns are discussed in more detail later in the letter. Responses are provided for summarized concerns in subsequent comments.

Caltrans deems the Draft EIR/EA to contain adequate analyses and mitigation for the project's various Build Alternatives impacts and that the document complies with CEQA and NEPA. No changes to the Draft EIR/EA are necessary.

Response to Comment 2 in 20240112, Planning & Conservation League

This introductory comment does not discuss the adequacy of the EIR/EA. No changes to the Draft EIR/EA are necessary.

Response to Comment 3 in 20240112, Planning & Conservation League

Caltrans extended the review period an additional 7 days from the previously announced 53-day review period. The Draft EIR/EA was posted on November 13, 2023 and the review period closed on January 5, 2024, allowing for 8 days more than the CEQA required 45-day review period due to the holiday season. Due to multiple requests to extend the review period, Caltrans extended it an additional 7 days, to 60 days, which is 15 days more than required by law. As was stated on the project website, technical documents were available upon request, which was the case throughout the circulation period. Technical documents are not required to be posted to the State Clearinghouse, which is the location to post all necessary materials in accordance with CEQA noticing requirements. Hard copies of the Draft EIR/EA were delivered to the Yolo County Library on December 5, 2023, and the West Sacramento Library on December 6, 2023. (Public Resources Code § 21092(b).) The public notice identified that hard copies of the Draft EIR/EA would be available for public review at these locations. The Draft EIR/EA was available at these locations for the entire public circulation period.

Response to Comment 4 in 20240112, Planning & Conservation League

Please refer to Master Response C for responses related to this comment.

Response to Comment 5 in 20240112, Planning & Conservation League

Please refer to Master Response A for responses related to VMT mitigation.

Response to Comment 6 in 20240112, Planning & Conservation League

Please refer to Master Response D for responses related to modeling methodologies.

Response to Comment 7 in 20240112, Planning & Conservation League

Please refer to Master Response A for responses related to induced travel and VMT calculation methodologies. For a discussion of land use and growth, please refer to Response to Comment 11 in 20240108, Sierra Club Yolano Group.

Response to Comment 8 in 20240112, Planning & Conservation League

Please refer to Master Response A for responses related to VMT calculation and modeling methodologies and Master Response B for a discussion of alternatives including those presented in SACOG's MTP/SCS.

Response to Comment 9 in 20240112, Planning & Conservation League

The commenter expresses concern that different VMT measurement methods were used in the Draft EIR/EA. CEQA provides lead agencies flexibility in the selection of appropriate analytical methods, so long as those methods are supported by substantial evidence (CEQA Guidelines, § 15064.4, subd. (a).). Caltrans selected the VMT measurement methods based on existing standards, guidance, policies, and best practices. Please refer to Response to Comment 4 in 20240112, Dr. Susan Handy, Dr. Amy Lee, Dr. Jamey Volker. See also Master Response A, D, and I for responses related to induced travel and VMT calculation methodologies.

Response to Comment 10 in 20240112, Planning & Conservation League

Please refer to Master Response A for responses related to VMT mitigation and Master Response B for a discussion of alternatives.

Response to Comment 11 in 20240112, Planning & Conservation League

Please refer to Master Response B for responses related to project alternatives considered. For additional information related to tolling and congestion, please refer to response to comment 3 in 20240110, California Air Resources Board.

Response to Comment 12 in 20240112, Planning & Conservation League

Please refer to Master Response C for responses related to this comment. The commenter suggests Caltrans revise the analysis of this project. Caltrans deems the Draft EIR/EA to contain adequate analyses and mitigation for the project's various Build Alternatives impacts and that the document complies with CEQA and NEPA. No changes to the Draft EIR/EA are necessary.

Response to Comment 13 in 20240112, Planning & Conservation League

The commenter incorporates by reference, comments provided by CARB, the Natural Resources Defense Council, the ClimatePlan Coalition, the Sierra Club Yolano Group, and ECOS. Please refer to Response to comments for the following letters herein:

20240110, California Air Resources Board

20240112, Natural Resources Defense Council

20240112, NextGen California.

20240108, Sierra Club Yolano Group

20240111, Environmental Council of Sacramento

20240112, Sacramento Area Bicycle Advocates

January 12, 2024

Masum A. Patwary
Environmental Scientist C
California Department of Transportation, District 3
703 B Street
Marysville, CA 95901

RE: Yolo 80 Corridor Improvements Project Draft Environmental Impact Report (DEIR)

Dear Dr. Patwary,

On behalf of Sacramento Area Bicycle Advocates (SABA), this letter provides our comments on the Yolo 80 Draft Environmental Impact Report (DEIR). SABA is a non-profit advocacy organization dedicated to enabling people in all communities to make more and safer trips by bicycle.

While we do not purport to be experts in the field of air quality or environmental science, a significant number of those in the field have submitted and informed interested parties as to the shortcomings and misgivings expressed in the DEIR analysis with respect to impacts on air quality and resulting emission levels as a result of this project. We stand behind their assertions and support their calls for Caltrans to rectify false, misleading, or incorrect analysis which will more accurately reflect the negative consequences of pursuing the project as proposed. 1

Upon review of the DEIR, it is clear that the alternatives presented fail to compensate for the lane expansion in each direction and therefore result in increased vehicle miles traveled (VMT) as is widely documented to be the outcome of all freeway widening projects without sufficient mitigation treatments. The resulting effects will have significant negative outcomes as a direct result of poorer air quality and increasing GHG emissions, but with significant secondary impacts as well. The increased VMT that will result from this project will severely hinder Sacramento Area Council of Government's (SACOG) ability to demonstrate that they are on track with meeting the 19% reduction in GHG emissions required under SB 375. The inability to meet these goals will result in a significant loss of funding at the federal level which would support numerous critically needed transportation projects that support reduced VMT, emissions reductions, and safety improvements along our roadways. 2 3

As for all modes of travel, however particularly so for active mode users, the Yolo causeway remains the most direct connection between Davis and West Sacramento. As such, all efforts should be made to ensure that the route is safe, convenient, and encouraging for cyclists. As it stands, the route is considered dangerous, particularly along the stretch of County Road 32A that possesses no cycling infrastructure and along the causeway deck where less than a shoulder high barrier and loose weave chain link fence is all that protects active mode users from debris, noise, or vehicle exhaust. The DEIR 4

909 12th Street, Suite 110 | Sacramento, CA 95814 | www.sacbike.org

does not mention or consider the growing prominence of e-bikes as a viable mode of transportation and one that with appropriate infrastructure would make the already used causeway a desirable and efficient means of transporting oneself between the destinations on either side.

In review of the proposed Active Transportation improvements associated with the project, SABA proposes the following in support of VMT mitigation by way of improving the safety and comfort of active mode users along the Yolo 80 corridor:

West Sacramento Bicycle Path Connecting W. Capitol Ave. and the Causeway Deck

- Where West Capitol Avenue meets the current bike trail taking active mode travelers around the Arco and Chevron gas stations, the entrance on the W. Capitol Avenue side should be widened to facilitate smoother access to the path for all cyclists, but particularly for those traveling by bikes with unconventional dimensions such as some e-bikes, cargo bikes, or tandems.
- Wayfinding signage should be made overtly clear to westbound cyclists that the path exists and that it is the recommended route for accessing the causeway deck. If this falls out of Caltrans purview, all efforts to coordinate the appropriate jurisdictions should be made to facilitate this.

Causeway Deck

- The physical barrier separating cyclists and vehicular traffic should be elevated so that the solid barrier may provide improvements to the noise pollution currently experienced by cyclists.
- A tighter weave, coated chain link fence, such as that used along Caltrans pedestrian overpasses should replace the existing chain link fence. This would allow greater physical protection from roadway debris and provide improved experiences for path users by limiting the immediate visibility of the moving traffic.
- Clear directional signage should be installed at the western most end of the path where the causeway deck intersects with the raised levee path. Upon completion, two paths, one along the levee and one as a continuation along the off-ramp will exist, however the levee path will eliminate unnecessary interactions with County Road 32A and therefore should be the recommended path.

Levee Path/County Road 32A

- The gate currently restricting vehicle access between the levee road and CR 32A is too narrow for the comfortable passage of cyclists, particularly for those who may utilize larger bikes such as cargo bikes. Widen the access from the current width to a clear path of travel of 6'.

Offramp Bicycle Path/County Road 32A

- Where the proposed extension of the causeway deck along a newly constructed protected bike path intersects with CR 32A we recommend the following traffic control interventions listed by importance:
    - Alternative 1: Install a fully controlled traffic light to support with speed control of vehicles and facilitate safe crossings of cyclists to the proposed Class I bike trail along the northside of CR 32A
    - Alternative 2: Install an RRFB for the same purpose as above.

County Road 32A Class I Bike Path

While the proposed Class I Bike Path is a critically needed addition in support of active transportation, its termination at the western portion of CR 32A and subsequent downgrade to a Class II bike lane poses significant continued risks to cyclists. The road is inherently dangerous with fast moving traffic and at the western end, poor sight lines due to the elevation change and railroad tracks. Additionally, due to the condition of the Davis bike path and high concentrations of unhoused communities along the path, the real world travel patterns of cyclists are to use CR 32A between Mace Boulevard and County Road 105. We provide the following recommendations:

- Alternative 1-
  - Extend the Class I bike path along the entirety of CR 32A from the levee road to Mace Boulevard.
- Alternative 2-
  - If the Class I bike path can't be extended up to the railroad track on the southeastern portion, then upgrade the proposed Class II to a Class II-buffered bike lane with total width including buffer and bike lane no less than 10'. Continue the Class I bike path along the northwestern portion of CR 32A between CR 105 and Mace Boulevard.
- Alternative 3-
  - Provide a midroad crossing of the Class I bike path where the current transition to a Class II is proposed and construct and continue the Class I path along the southern side of CR 32A. This alternative should be accompanied by improvements to the surface condition of the Davis bike path and fencing providing barriers between the path and encroaching materials.

Cycling is an equitable, environmentally friendly, and widely beneficial means of transportation addressing a multitude of the region's goals as they pertain to reductions in GHG emissions, traffic collisions, and congestion while improving equity. It is our vision that all people should be able to safely and practically arrive wherever they want to go.

If you have any questions or comments pertaining to the content of this letter, please feel free to contact me at 707 972-3580 or david@sacbike.org.

Sincerely,

David Moore, Policy and Planning, Sacramento Area Bicycle Advocates

909 12th Street, Suite 110 | Sacramento, CA 95814 | www.sacbike.org

Response to Comment 1 in 20240112, Sacramento Area Bicycle Advocates

This comment introduces the comments and expresses support for other commenters who assert that the analysis of air quality and emissions is incorrect. Caltrans deems the Draft EIR/EA to contain adequate analyses and mitigation for the project's various Build Alternatives impacts and that the document complies with CEQA and NEPA. For more information on the air quality analysis, please see Master Response I. For more information on the traffic analysis used to support the air quality analysis, refer to Master Response A.

Response to Comment 2 in 20240112, Sacramento Area Bicycle Advocates

The Draft EIR/EA discussed air quality impacts in Section 2.2.6.3 (Environmental Consequences). Caltrans determined "less than significant" air quality impacts for all other project alternatives as each of the Build alternatives would improve operations, reduce congestion, and increase vehicle occupancy within the travel corridor as compared to the No Build alternative.

The Draft EIR/EA discussed GHG impacts in Section 3.2.8 Greenhouse Gas Emissions. Emissions modeling performed for the project confirms that while VMT is expected to slightly increase, "GHG emissions for the Build Alternatives would be lower for design year 2049 compared to existing year (see Table 3.4-2)." The project is included in the SACOG MTP/SCS 2020. By helping to provide a continuous managed lane system, the project, combined with other in-progress and proposed managed lane projects, would provide reliable travel times, and help contribute to the completion of the regional transportation network envisioned in the SACOG MTP/SCS. Thus, the project is consistent with statewide GHG reduction goals and SACOG's MTP/SCS.

For more information, please refer to Master Responses A and I.

Response to Comment 3 in 20240112, Sacramento Area Bicycle Advocates

Caltrans is seeking federal funding for this project, so support from the federal government will be expressed therein. If the federal government pulls its funds as the comment suggests, the project will not be built. This is not a comment on the Draft EIR/EA.

Response to Comment 4 in 20240112, Sacramento Area Bicycle Advocates

Please refer to Master Response F for more information about improvements to the bicycle facilities in the corridor. E-bike improvements are part of the proposed Mobility Hub, where e-bike and e-scooter considerations are considered. While not called out specifically, e-bikes are also given consideration in the design of bicycle infrastructure as described in Section 1.3.1.1, *Bicycle and Pedestrian Facilities* in the Draft EIR/EA.

No changes to the Draft EIR/EA are necessary.

Response to Comment 5 in 20240112, Sacramento Area Bicycle Advocates

Please refer to Master Response F for more information about the improvements to the bicycle/pedestrian path.

Caltrans has collaborated with Yolo County on an Active Transportation Program (ATP) grant that aims to facilitate the construction of a bicycle lane along CR 32A, including the widening of CR 32A between County Road 105 and the existing west end of the Yolo Causeway levee. Constructing the bike lane would be completed as a part of Yolo County's County Road 32A Realignment Project. The proposed Yolo County bicycle lane improvements on CR 32A would connect to the existing bike lane on the Yolo Causeway levee constructed with this project. This would be done as a separate project, separate from the project addressed in this Draft EIR/EA.

No changes to the Draft EIR/EA are necessary.

Response to Comment 6 in 20240112, Sacramento Area Bicycle Advocates

This closing comment voices support for cycling. It is not a comment on the project or the Draft EIR/EA. No response is required.

4.3.5 Individuals

20231114, Ian Ratliff

From: Ian Ratliff
To: Yolo80Corridor@DOT
Subject: Public Transit not Tolls
Date: Tuesday, November 14, 2023 5:46:23 PM

EXTERNAL EMAIL. Links/attachments may not be safe.

Hello,

I think CalTrans and the state of California are diluting themselves if they think a toll lane would do anything except hurt low income commuters and cause more traffic. The only way to reduce congestion is to get people to take an alternate method of transit.

Which is where these dollars would be better spent. Please expand bus services and invest in a solution to expand light rail or other mass transit options. More lanes will just make the traffic jam worse but with more lanes, increasing pollution and causing aguish to commuters. 1

Do not add a toll lane, this is just a tax on the people that can least afford it. Expand transit options, and spend the money fixing the terrible on ramps in Davis.

Thank you,
Ian Ratliff

Response to Comment 1 in 20231114, Ian Ratliff

This comment expresses the commenter's opposition to the proposed project and to toll lanes and the commenter's preference for expansion of transit services. This preference is noted. The adequacy of the EIR/EA is not addressed. No changes to the Draft EIR/EA are necessary.

20231114, Jim Ratliff

From: Jim Ratliff
To: Yolo80Corridor@DOT
Cc: Assemblymember Joe Patterson; assemblymember.gallagher@assembly.ca.gov; kevin.kiley@mail.house.gov
Subject: I80 Toll Road idea for the Yolo Causeway, Caltrans dream
Date: Tuesday, November 14, 2023 8:01:06 PM

EXTERNAL EMAIL. Links/attachments may not be safe.

To: CalTrans
https://www.abc10.com/article/traffic/i80-causeway-toll/103-964d74d6-9fac-4251-bfad-f6fb9b2d88da

I am 100% opposed to any plans by Caltrans along with any dreams from our most disturbed Governor at making any freeway lanes in California as toll lanes. (See news story link above. 1

Caltrans really should be ashamed of itself for how poorly they have done by unsafely and inadequately maintaining our highway system in California.

I have driven all over the western states since I've been retired the last 3 years and there is no state that has worse conditions of roadways than California. The highway and freeway surface conditions are absolutely unacceptable. All we do in CA is pay the highest vehicle registration and license fees in the Nation, we pay the highest per gallon highway taxes for our fuels, both gasoline and diesel and we have to live with a highway infrastructure system that is antiquated, outdated, unsafe and underserved for the motoring public.

I was born 70 years ago and raised in California. It used to be the Golden State years ago. The Democrats in political positions have single handedly ruined this State. People such as Governor Newsom have literally taken the quality of life away from us. He has let Caltrans flounder and allowed our highway system here in America be destroyed. I lived in the Bay Area for 40 years and it took 50 years for Caltrans to recognize the need for more lanes and to finally add a single lane each way on Highway 238 between 880 and 580 in Castro Valley. This is a fact and it was absolutely unacceptable. 2

The traffic stress levels that have been subjected to the motoring public in California are untold. Caltrans and its managers should be ashamed of themselves to even consider toll lanes on the I-80 corridor from Yolo County to Sacramento County. You all have one mission in life at Caltrans and that is to give yourself wonderful salaries and golden parachute retirements at the cost of the taxpayer and motoring public.

You're living in a fairy tale even attempting to believe in unicorns and think toll lanes and bike lanes are the answer to move traffic. If you think that this

idea to build a toll lane is the answer to improve traffic flow for the betterment of the I-80 corridor, you are still dreaming. It is the exact opposite.

People in NorCal are NOT going to ride bicycles or use public transit on this dream section of the I-80 corridor as you propose. It's just not going to happen. You've already taken your similar pipe dream ideas for toll lanes in the Bay Area and ruined east bay commutes. We had FasTrak lanes on I-680 from Walnut Creek to San Jose and now you have made that lane a toll lane and it is unacceptable and unusable for the vast majority of the traveling public.

People cannot afford it and are not using it. In fact making it a toll lane slowed transit and transportation and commerce down there. It is a total failure by your Department to consider doing more harm to motorists than good at suggesting a toll lane up this way. You already have enough money in your budgets and you can't manage it as it is. I took a trip from Roseville to San Diego recently and the trip was 525 miles one way, basically going down I-5.

I cannot tell you how many miles of this roadway are shot and worn out and also how many miles were under re-construction because the roadways have been poorly built and poorly maintained for years. This is pathetic. Is further disappointing and compounded for us legal citizens and taxpayers to see the poor roadside shoulders and off-ramp areas unmaintained and seeing all of the dead trees and dead plant life that's never/ever trimmed or maintained and cut back as it should be.

Then here you are wanting more money from us to build some fairy tale toll road that's not going to work! It's going to bog us down to take a lane away from us basically with such a dingy idea. Look at the millions of dollars that you project these projects will cost. You never ever hit your budget on these roadways and they never seem to work well once completed. Who cares about a 300 spot parking lot in West Sacramento. We are not convinced that's going to work as it hasn't worked anywhere else.

2 cont'd

All this will do, if anybody were to use it, is to subject their parked cars to be broken into by the criminals because they know they can get away with it and no one will patrol or monitor these lots for safety. So you might as well not even have them built since Ding Dong Newson and his owned Judges would let the criminals loose if they got caught anyhow.

I think you catch my drift. I like so many others in this State are just done with your system of things. Get rid of half of the staff that are just sitting in Caltrans office buildings all up and down the state looking at the internet

instead of working and get those who can and will work out onto projects and get them completed.

If you really want to spend money fairly, how about adding another laner to both North and southbound Highway 65, between Highway 80 in Roseville up to Wheatland. Every city along that corridor from Roseville to Rocklin to Lincoln can build three to four lane arterial streets in their towns in just a matter of a year; so residents can travel smoothly and to have traffic flow within their city limits uncongested. But Caltrans over 50 years cannot add a single lane to this section of Highway 65 freeway. The metering lights are continually on night and day for the on-ramps getting onto this useless bottleneck freeway.

Your department needs a total overhaul and don't sell us with more toll lanes and higher bridge tolls as we're not getting the bang for our buck. I have copied our local assemblyman and congressman as they need to get tough with your department and have you start performing and improving the infrastructure of this States highways and freeways and be done with this toll road nonsense.

2
cont'd

Toll roads are a complete failure already in the state of Illinois. All you'll do is take the toll revenue money and put it toward more Caltrans employees and fatten your paychecks and retirements and that is absolutely and fundamentally unacceptable with the legal citizens in this State.

Am I candid? Absolutely, because everything I said here is the truth. So no more nonsense toll lanes and let's build freeways with the best building material products possible and get these highways and freeways widened to accommodate the traffic for safe travels that should be mandatory to move our commerce and economy in CA. Feel free to contact me if you have any questions or comments but I already know that is highly unlikely.

Regards,

Jim Ratliff

Response to Comment 1 in 20231114, Jim Ratliff

This comment expresses the commenter's opposition to the proposed project and to toll lanes. This preference is noted. The adequacy of the EIR/EA is not addressed. No changes to the Draft EIR/EA are necessary.

Response to Comment 2 in 20231114, Jim Ratliff

This comment expresses the commenter's opinion on the existing transportation infrastructure in California, the feasibility of active transportation and transit modes in the project limits, and the opposition to toll lanes. These opinions and preferences are noted. The adequacy of the EIR/EA is not addressed. No changes to the Draft EIR/EA are necessary.

20231114, Hannah Taube

From: HLTaube
To: Yolo80Corridor@DOT
Subject: Yolo Corridor - Resident Comment
Date: Tuesday, November 14, 2023 6:08:43 PM

EXTERNAL EMAIL. Links/attachments may not be safe.

Hi there,

I was wondering if there will be any kind of public hearing about this. I really don't want any tolls in Sacramento, and I know many people who feel the same way. Please let me know the best way to make our opinions known. Thank you! 1

Hannah Taube

Response to Comment 1 in 20231114, Hannah Taube

This comment expresses the commenter's opinion on toll lanes in the Sacramento region and the desire to know if there will be any public hearing in the future, and what is the best way to express the commenter's opinion on toll lanes. The environmental review process for the EIR/EA included a review period to gather public responses on the Draft EIR/EA, and multiple public meetings were held for the public to give feedback on the project (see Draft EIR/EA Chapter 4, *Comments and Coordination*, for a list of stakeholder meetings held during this process. This comment does not address the adequacy of the EIR/EA. No changes to the Draft EIR/EA are necessary.

20231115, Uday Bhat

From: udayvbhat@aol.com
To: Yolo80Corridor@DOT
Cc: uday bhat
Subject: Yolo 80 Corridor Improvements Project Inputs
Date: Wednesday, November 15, 2023 11:06:08 AM

EXTERNAL EMAIL. Links/attachments may not be safe.

Hi,

I am a CA resident who pays Federal and State taxes. Our state tax is already very high and state residents are
burdened with high gasoline cost (highest in the nation). Add to this is price inflation stress on citizens. So I am against
building additional lanes in both directions and opening it for toll paying commuters/drivers. 1

Recommend considering below option for solving traffic congestion.

Build Alternative 2: Add a High Occupancy Vehicle (HOV) lane in each direction for use by vehicles with two or more riders (HOV 2+). 2

Thank You,
Uday Bhat

Response to Comment 1 in 20231115, Uday Bhat

This comment expresses the commenter's opposition to toll lanes and to additional travel lanes. This preference is noted. This comment does not address the adequacy of the EIR/EA. No changes to the Draft EIR/EA are necessary.

Response to Comment 2 in 20231115, Uday Bhat

This comment expresses the commenter's preference for Build Alternative 2. This preference is noted. No changes to the Draft EIR/EA are necessary.

20231115, David Edwards

From: David Edwards
To: Yolo80Corridor@DOT
Subject: I 80 corridor project support
Date: Wednesday, November 15, 2023 8:50:11 AM

EXTERNAL EMAIL. Links/attachments may not be safe.

I live in Davis and support the I 80 corridor project 100%. I also think that most tax paying citizens like myself also do. A few local loud mouths complain (about everything) all the time so don't pay attention to them and get it done. PS- a sound wall through the part in Davis would be much appreciated. 1
Thanks, Dave 2

Response to Comment 1 in 20231115, David Edwards

This comment expresses the commenter's support for the proposed project. This preference is noted. No changes to the Draft EIR/EA are necessary.

Response to Comment 2 in 20231115, David Edwards

This comment is a request to add a soundwall in Davis. The methodology used to assess noise abatement, e.g., sound walls, is described in Sections 2.2.8.1 and 2.2.8.4 of the EIR/EA. New noise barriers were considered near 9460 W. Chiles Road and near the La Quinta Inn & Suites, and the effectiveness of existing noise barriers near Olive Drive and Mace Boulevard was assessed. Analysis indicates that existing barriers sufficiently reduce noise at their existing heights. Evaluation of the noise barrier location near Chiles Road determined that the noise barrier could feasibly reduce the noise by 5 decibels (dB) at the possible noise barrier location along eastbound I-80. The noise barrier would not abate traffic noise or meet the 7 dB noise reduction goal due to costs exceeding the allowance. The other location for a new wall was not feasible. Therefore, noise barriers have not been included as part of this project. No changes to the Draft EIR/EA are necessary.

20231115, Robert Halldorson

From: Robert Halldorson
To: Yolo80Corridor@DOT
Subject: Toll Roads
Date: Wednesday, November 15, 2023 1:04:20 PM

EXTERNAL EMAIL. Links/attachments may not be safe.

I drive these freeways every day.I am totally against any tool roads.Just add more lanes and allow everyone to use them.We don't need any more taxes here it's already far to expensive to live. 1

Sent from my iPad

Response to Comment 1 in 20231115, Robert Halldorson

This comment expresses the commenter's opposition to toll roads and preference for additional travel lanes. This preference is noted. Please refer to Master Response B, including the Suggested Alternative: Add a General-Purpose Lane in Each Direction section of that master response for more information on this suggested alternative. No changes to the Draft EIR/EA are necessary.

20231115, David Lee

From: David Lee
To: Yolo80Corridor@DOT
Subject: Propose I-80 tolls
Date: Wednesday, November 15, 2023 8:15:40 PM

EXTERNAL EMAIL. Links/attachments may not be safe.

Pleasr do not implement tolls on the new I-80 corridor. Tolls won't discourage travelers and only increase traffic. I strongly protest as this path of travel is part of my work commute, which is already a heavy financial burden. 1

Sincerely,

Financially Burdened Veteran

Response to Comment 1 in 20231115, David Lee

This comment expresses the commenter's opposition to toll lanes. This preference is noted. This comment does not address the adequacy of the EIR/EA. No changes to the Draft EIR/EA are necessary.

20231115, Tony Manzanetti

From: Tony Manzanetti
To: Yolo80Corridor@DOT
Subject: Comment re: Toll express lanes on Interstate 80 (I-80) and U.S. Highway 50 (US 50) in Yolo and Sacramento counties
Date: Wednesday, November 15, 2023 12:50:41 PM

EXTERNAL EMAIL. Links/attachments may not be safe.

To CalTrans: I drive this section of freeway often and am glad to hear of plans to address the chronic traffic delays along that stretch of road, no matter the time of day or night, with little exception.

I am in favor of the proposed toll express lanes on Interstate 80 (I-80) and U.S. Highway 50 (US 50) in Yolo and Sacramento counties on one condition: The current number of lanes, access, and capacity cannot be reduced or degraded in any way. 1

One reason is that the Interstate 80 (I-80) and U.S. Highway 50 (US 50) stretch is badly in need of more capacity. 2

But the more important reason is, the regressive nature of toll roads. Those that cannot afford the toll should not be, cannot be, economically punished by being forced to travel the Interstate 80 (I-80) and U.S. Highway 50 (US 50) stretch with any less capacity than exists now. 3

As I read the proposal the toll lane will be an added lane, but that is ambiguous throughout the information I read online. The current number of lanes, access, and capacity must remain free to everyone, and the toll lane must be truly in addition to the current existing lanes, access, and capacity. 4

Sincerely,
Tony Manzanetti
(916) 662-4225

Response to Comment 1 in 20231115, Tony Manzanetti

This comment expresses the commenter's support for the proposed toll lanes. This preference is noted. The commenter also expresses the opinion that any toll lane should be a new lane. All toll lane alternatives would be adding a lane, not taking away (converting) an existing lane. No changes to the Draft EIR/EA are necessary.

Response to Comment 2 in 20231115, Tony Manzanetti

This comment expresses the need for more capacity. This preference is noted. No changes to the Draft EIR/EA are necessary.

Response to Comment 3 in 20231115, Tony Manzanetti

This comment expresses equity concerns if all existing lanes are converted. Please refer to Master Response E for more information on equity. No changes to the Draft EIR/EA are necessary.

Response to Comment 4 in 20231115, Tony Manzanetti

This comment expresses the opinion that if a toll lane is added it should be a new lane. All toll lane alternatives would be adding a lane, not taking away (converting) an existing lane. No changes to the Draft EIR/EA are necessary.

20231116, Debra Price

From: Debra Price
To: Yolo80Corridor@DOT
Cc: Bruce Hagel
Subject: No new lanes for this project
Date: Thursday, November 16, 2023 6:34:55 AM

EXTERNAL EMAIL. Links/attachments may not be safe.

1. There have been too many construction projects along the 1 80 corridor in the last few years. The increase in accidents and the confusion for drivers has been immense. Our area can not abide yet another messy instructive project along this corridor. 1

2. Improvements to this corridor SHOULD NOT include a toll lane, or additional lanes. Building more car capacity does not encourage people to use public transit. It does not make bicycle trips across the causeway more pleasant. 2

3. Cal trans should use a light hand on this project, working within the existing footprint of the road. Alternative 7 seems to include some improvements that would ease the flow. 3

4. Cal trans should delay this project for a few years to give Sacramento drivers some relief from construction. Night construction with multiple flashing guidance lights is dangerous for drivers, constant lane realignments causes accidents, noise and dust are dangerous to health. 4

Sent from my iPad

Response to Comment 1 in 20231116, Debra Price

This comment expresses concern for impacts associated during the construction of the project. Construction projects can cause temporary inconveniences to the public, and sometimes stage construction requires traffic lane shifts. However, impacts are lessened due to construction staging. Construction staging is required to remove and replace pavement and improve rideability and safety for motorists. The project proposes to remove and replace a segment of I-80 asphalt pavement through Davis. This comment does not address the adequacy of the EIR/EA. No changes to the Draft EIR/EA are necessary.

Response to Comment 2 in 20231116, Debra Price

This comment expresses the opinion that no additional lanes should be built. This preference is noted. This comment does not address the adequacy of the EIR/EA. No changes to the Draft EIR/EA are necessary.

Response to Comment 3 in 20231116, Debra Price

This comment expresses the commenter's opposition to toll lanes and preference for Alternative 7. This preference is noted. This comment does not address the adequacy of the EIR/EA. No changes to the Draft EIR/EA are necessary.

Response to Comment 4 in 20231116, Debra Price

This comment expresses interest in delaying construction of the project to limit impacts on the public during the construction process. This preference is noted. This comment does not address the adequacy of the EIR/EA. No changes to the Draft EIR/EA are necessary.

20231117, Evan Lyon of TTL Automotive Enterprises

From: Evan Lyon
To: Yolo80Corridor@DOT
Subject: Yolo 80 Toll Project - Comment
Date: Friday, November 17, 2023 12:45:54 PM

EXTERNAL EMAIL. Links/attachments may not be safe.

Hello -

I wanted to express my support for the I80 Toll Lane Project. I am very happy to see Caltrans expanding I80 as it is a serious delay in my commute. I believe this will help facilitate commerce and improve the quality of life for so many commuters and other travels in the Sacramento area. 1

Why not add an additional lane in each direction on top of this expansion plan? 2

Thank you,

Evan Lyon
TTL Automotive Enterprises, INC.
1483 Shore St.
West Sacramento, CA 95691
Cell: (916) 849-8358

Response to Comment 1 in 20231117, Evan Lyon of TTL Automotive Enterprises

This comment expresses the commenter's support for the proposed project. This preference is noted. No changes to the Draft EIR/EA are necessary.

Response to Comment 2 in 20231117, Evan Lyon of TTL Automotive Enterprises

This comment suggests adding two additional lanes in each direction. This suggested alternative would expand the geometric footprint of the facility and require Caltrans to rebuild the Yolo Causeway Bridge as well as require additional right of way which may impact business along the corridor. The costs, environmental impacts, and right of way acquisition impacts make the suggested alternative infeasible. Please refer to Master Response B for additional information on alternatives considered. No changes to the Draft EIR/EA are necessary.

20231117, Jaya Shah

From: javaprakash shah
To: Yolo80Corridor@DOT
Subject: Support for the project.
Date: Friday, November 17, 2023 10:15:17 AM

EXTERNAL EMAIL. Links/attachments may not be safe.

I will support for the project. Thanks. 1
Jaya Shah
Davis, CA

Response to Comment 1 in 20231117, Jaya Shah

This comment expresses the commenter's support for the proposed project. This preference is noted. No changes to the Draft EIR/EA are necessary.

20231118, Ryan Lively

From: Ryan Lively
To: Yolo80Corridor@DOT
Subject: Yolo 80 Corridor Improvements Project
Date: Saturday, November 18, 2023 10:33:41 AM

EXTERNAL EMAIL. Links/attachments may not be safe.

I'm against the project. I vote NO!

When will you people realize these projects are nothing more than liberal money grabs and we the people are tired of it. People that can utilize public transportation do: but they're are a lot of us that can't. There's types of State sponsored backdoor tax projects a literally highway robbery schemes. They severally impact working people's cash flow that otherwise would be spent on an already impacted economy. Using the Bay Area as a model is ignorant stupid thinking, it doesn't work, and anyone in CalTrans that is purporting that it does should be fired! The voters need to wake up and kick out these left wing liberal political hacks that enable organizations like CalTrans to propose ignorant projects such as MORE toll roads. They do not solve the problem. A single person will most likely will still have to use the roads. What does solve the problem is not wasting tax payer money and build more roads with money we pay on fuel taxes. Toll roads are just one more liberal tactic to extract money from working people. Do you State sponsored hacks think the Bay Area is a successful model…NO…ITS NOT…and there have been tolls forever; and I unfortunately have to live in South Bay but will retire back to Sac area where I grew up. Adding another toll road is just another reason for people to move out of this already third world shithole California when they can. CalTrans can take their fake study and burn it, it is a lot of garble all aimed at political agendas at the expense of ordinary person just to steal more money from the working class people. So, in case my stance on this topic isn't clear…NO…I VOTE NO! 1

-Ryan

Response to Comment 1 in 20231118, Ryan Lively

This comment expresses the commenter's opposition to the proposed project and to toll lanes. This preference is noted. No changes to the Draft EIR/EA are necessary.

20231118, Neil Redenbaugh

From: Neil Redenbaugh
To: Yolo80Corridor@DOT
Subject: comments
Date: Saturday, November 18, 2023 10:53:32 AM

EXTERNAL EMAIL. Links/attachments may not be safe.

I know my comments are not worth much, but I'll just say that I love *not* living in the bay area because there are no toll lanes in Davis and Sacramento. I would love it to stay that way.

I appreciate it when we incentivize HOV travelers by giving them a lane to themselves (fewer cars or the freeway because people are driving together is a good thing!), rather than giving rich people who can afford to pay for a special lane the privilege of the toll lane. 1

Sincerely,
Neil Redenbaugh, Yolo County resident

Response to Comment 1 in 20231118, Neil Redenbaugh

This comment expresses the commenter's opposition to toll lanes, and also expressed support for HOV lanes. These preferences are noted. No changes to the Draft EIR/EA are necessary.

20231119, Albert

From: AL P
To: Yolo80Corridor@DOT
Subject: Toll Lanes Proposed for I-80 Causeway Corridor
Date: Sunday, November 19, 2023 10:19:02 PM

EXTERNAL EMAIL. Links/attachments may not be safe.

To whom this may concern,

I am a resident of Natomas. I've been a resident since 2008. I am completely against making toll lanes on the causeway. To make citizens pay to not be in traffic is only again making those who "have" gain access and accessibility to what those who "have not" cannot have. It only creates a greater divide between those with wealth and those who do not. There are other options you can do. You can add a carpool lane, you can create more lanes. If the problem is goods, you can create a truck lane that is just for trucks with goods so they can have easily access to where they are transporting. 1 2

There are plenty of other ways to ease the traffic on the causeway but creating a toll lane on a freeway we are already paying taxes on, that our gas tax is supposed to be going towards and giving a handout to those who have disposable income so they do not have to deal with traffic but those who only have enough money for gas will be stuck to deal with the consequences of not having enough money. 3

In conclusion, please find another way to ease traffic. Creating an unequal distribution of resources based on what you can or can't pay is not just unfair, it's not the American way.

Thank you,
Albert

Response to Comment 1 in 20231119, Albert

This comment expresses the commenter's support for HOV lanes and lack of support for toll lanes These preferences are noted. No changes to the Draft EIR/EA are necessary.

Response to Comment 2 in 20231119, Albert

This comment suggests other alternatives that can be examined such as adding another general-purpose lane or truck lane. The comment also mentions adding an HOV lane, which is already an alternative under consideration. For information on why another general-purpose lane is infeasible please see Master Response B, Suggested Alternative: Add a General-Purpose Lane in Each Direction. The inclusion of a truck lane does not meet the purpose and need of the project because it doesn't provide an option to reduce reliance on single occupancy vehicles and does not promote carpooling. The preference of an HOV lane is noted. No changes to the Draft EIR/EA are necessary.

Response to Comment 3 in 20231119, Albert

This comment expresses the commenter's opposition to creating a toll lane as it favors those with more income and suggests, generally, that there are other ways to ease traffic. Please see Master Response E for equity. The proposed Build Alternatives were designed to promote carpooling and the use of public transportation by improving travel times in the managed lanes. No changes to the Draft EIR/EA are necessary.

20231119, Steve Dennison

From: Steve Dennison
To: Yolo80Corridor@DOT
Subject: Proposed Toll Lanes from Sac to Davis
Date: Sunday, November 19, 2023 9:53:13 PM

EXTERNAL EMAIL. Links/attachments may not be safe.

Absolutely not! 1

Sent from Yahoo Mail for iPhone

Response to Comment 1 in 20231119, Steve Dennison

This comment expresses the commenter's opposition to the proposed project and to toll lanes. This preference is noted. No changes to the Draft EIR/EA are necessary.

20231119, Kevin Hale

From: Kevin Hale
To: Yolo80Corridor@DOT
Subject: Toll Express Lanes
Date: Sunday, November 19, 2023 10:06:00 PM

EXTERNAL EMAIL. Links/attachments may not be safe.

Hello,

I've read your proposal on the toll express lane between Davis and Sacramento.

I'm not a fan and voting a big fat NO.

Thank you for listening.

1

Response to Comment 1 in 20231119, Kevin Hale

This comment expresses the commenter's opposition to the proposed project and to express toll lane alterative specifically. This preference is noted. No changes to the Draft EIR/EA are necessary.

20231119, Polly Harris

From: Polly Harris
To: Yolo80Corridor@DOT
Subject: Clarification of direct connection
Date: Sunday, November 19, 2023 1:48:54 PM

EXTERNAL EMAIL. Links/attachments may not be safe.

Hello,
I am interested in finding out more about what the "I-80 managed lane direct connector" is.
Can you please explain what this means?

1). Build Alternatives 2b, 3b, 4b, 5b, and 6b propose the same geometric footprint, include an I-80 managed lane direct connector (to provide a direct connection of the HOV 2+ managed lane by flying over US-50 at the I-80/US-50 Interchange) but would incorporate different managed lane types (Figure 1.3-2)

1

Cordially,
Polly Harris

Response to Comment 1 in 20231119, Polly Harris

This commenter expressed the need for clarity on what the I-80 managed lane direct “connector" is. This Managed Lanes Direct Connector would be included in all “B” alternatives and would not be present in “A” alternatives. The current design has all traffic at the US 50 and I-80 interchange merging to the outside lanes to use access EB I-80 from EB I-80 and WB I-80 to WB I-80.

For vehicles not using the managed lane, there would be no change for the movements they make today. For vehicles in the managed lane who want to access EB I-80 from EB I-80 or WB I-80 from WB I-80, the “B” alternatives would allow vehicles to stay in the managed lane and access this new direct managed lane connector ramps that would be built in the median. This will reduce the number of vehicles merging at the interchange and reduce the traffic demand for the existing connector ramps.

No changes to the Draft EIR/EA are necessary.

20231119, Faisal Imran

From: Faisal Imran
To: Yolo80Corridor@DOT
Subject: HARD NO
Date: Sunday, November 19, 2023 10:13:22 PM

EXTERNAL EMAIL. Links/attachments may not be safe.

No way should a new toll be added. Add more regular lanes. We do not need more tolls 1
Sent from my iPhone

Response to Comment 1 in 20231119, Faisal Imran

This comment expresses the commenter's opposition to the proposed project and to toll lanes and requests more general-purpose lanes to be built. For information on why another general-purpose lane is infeasible please see Master Response B, Suggested Alternative: Add a General-Purpose Lane in Each Direction. This preference is noted. No changes to the Draft EIR/EA are necessary.

20231119, Darci King

From: darciking@comcast.net
To: Yolo80Corridor@DOT
Subject: Proposed added toll to I-80 & I-5
Date: Sunday, November 19, 2023 9:53:28 PM

EXTERNAL EMAIL. Links/attachments may not be safe.

Hi,

I am 100% against adding toll fees, or any form of payment for our local highways/freeways. 1

Please let me know if there is a petition I need to sign, or another place I need to comment so that my voice is heard.

~Darci

Response to Comment 1 in 20231119, Darci King

This comment expresses the commenter's opposition to toll lanes. This preference is noted. No changes to the Draft EIR/EA are necessary.

20231119, Alicia Llanos

From: Alicia Llanos
To: Yolo80Corridor@DOT
Subject: Toll lanes
Date: Sunday, November 19, 2023 9:53:14 PM

EXTERNAL EMAIL. Links/attachments may not be safe.

Oh hell no!!!! The people don't need anymore expenses to deal with! Everyone is struggling now as it is. Thank you. 1

Alicia Llanos

Response to Comment 1 in 20231119, Alicia Llanos

This comment expresses the commenter's opposition to toll lanes. This preference is noted. No changes to the Draft EIR/EA are necessary.

20231120, Joy Abaya

From: joy abaya
To: Yolo80Corridor@DOT
Subject: Natomas /davis toll lane
Date: Monday, November 20, 2023 7:53:41 AM

EXTERNAL EMAIL. Links/attachments may not be safe.

No to this idea
Thank you,
Joy

1

Response to Comment 1 in 20231120, Joy Abaya

This comment expresses the commenter's opposition to toll lanes. This preference is noted. No changes to the Draft EIR/EA are necessary.

20231120, Susan Baxter

From: Susan Baxter
To: Yolo80Corridor@DOT
Subject: Toll proposed lane
Date: Monday, November 20, 2023 9:46:22 AM

EXTERNAL EMAIL. Links/attachments may not be safe.

Hello:

I have lived in California about sixty years. I see this proposal as a scam and this is why. Cal Trans takes tax dollars (millions of dollars) to add two lanes to our existing freeway. They then charge people to use this lane. Are they paying back the tax dollars they used to open new lanes? No. So they want its to fund the project , then pay to use it?

Upon traveling to areas where paid lanes are… I noticed few cars using this lane. So … tax payers pay the cost then can't or won't budget more if their pocket money to use the privilege of driving on this exclusive club lane. 1

My vote is No! We are taxed to the hilt already and paying more than any other state in gas taxes plus a higher cost of living to boot.

$465.00 million dollars is a lot to ask for , considering it is essentially a gift to Cal Trans that will charge our public to use. Build the lanes to ease the traffic congestion but please do no rape the citizens further financially!

Respectfully

Susan Baxter

Sent from Yahoo Mail for iPhone

Response to Comment 1 in 20231120, Susan Baxter

This commenter expressed opposition to the inclusion of any toll lanes, however they did support the addition of lanes to ease congestion. These preferences are noted. No changes to the Draft EIR/EA are necessary.

20231120, Michael Bloss

From: michael bloss
To: Yolo80Corridor@DOT
Subject: I-80 toll lanes
Date: Monday, November 20, 2023 8:08:36 AM

EXTERNAL EMAIL. Links/attachments may not be safe.

To whom it may concern,

I want to express my opposition to the addition of any toll lanes proposed in the yolo 80 corridor. Any lanes added should be free to use as they have been paid for by the tax payers as all funds provided by a local, state , or federal level ultimately comes from the American tax payer

We are not the Bay Area, so dont try to turn us into the bay with some of their worst characteristics. We don't need a wealthy driver lane, we just need more lanes.

We have the room to expand our roadways for future growth, but let's do it in a way that's reasonable and doesn't put additional financial burden on us.

1

Sincerely, Michael

Response to Comment 1 in 20231120, Susan Baxter

This comment expresses the commenter's opposition to toll lanes and suggests that the lanes that are built should be free to use. Several alternatives including the HOV lane and Transit Lane alternatives fit the commenter's preference. This preference is noted. No changes to the Draft EIR/EA are necessary.

20231120, Kira Garvey

From: Kira Garvey
To: Yolo80Corridor@DOT
Subject: Toll Express Lanes Project
Date: Monday, November 20, 2023 8:06:50 AM

EXTERNAL EMAIL. Links/attachments may not be safe.

Hello,

In regard to the recent proposal for toll express lanes on 80 and 50 - I strongly disagree with this project proposal. A recent post from the Natomas Buzz about the topic of discussion shows an overwhelming negative response to this proposal in the comments section. I would suggest listening to the people of Sacramento's opinion on the matter as they are the ones who know these roads better than anyone. 1

Thank you,
Kira Garvey

Response to Comment 1 in 20231120, Kira Garvey

This comment expresses the commenter's opposition to toll lanes. This preference is noted. No changes to the Draft EIR/EA are necessary.

20231120, Jacob Haueter

From: Jacob Haueter
To: Yolo80Corridor@DOT
Subject: Toll/Express lane
Date: Monday, November 20, 2023 7:51:01 AM

EXTERNAL EMAIL. Links/attachments may not be safe.

My concern with this is where is the other $379 million coming from, how will you monitor this lane when people don't honor the express lanes that already exist, how will traffic be effected during construction, how will this actually be communicated to the public (since the passed hasn't proved very successful), how is this going to help with the congestion in Dixon which is only getting worse? 1 2 3 4

These are only a few at the moment.

Thanks,

Jacob
Sent from my iPhone

Response to Comment 1 in 20231120, Jacob Haueter

This comment requests clarification about where construction funds are coming from. Currently the project is not fully funded, however Caltrans has $83 million dollars for construction from a federal INFRA grant. No changes to the Draft EIR/EA are necessary.

Response to Comment 2 in 20231120, Jacob Haueter

This comment expressed concern about how a potential toll lane would be enforced. This project includes CHP enforcement areas where CHP can monitor vehicles using the lane to ensure vehicles meet the requirements for the lane and are not violating. No changes to the Draft EIR/EA are necessary.

Response to Comment 3 in 20231120, Jacob Haueter

This comment requested more information on how the construction would be implemented and communicated to the public. During construction, Caltrans will try to minimize the impact on traffic. Work will be completed at night (when traffic volumes are lower) as much as possible. Communication to the public will be conducted by sending out news blasts, including messages about construction on the Changeable Message Signs along the freeway and with the use of the project website where the public can get more information. No changes to the Draft EIR/EA are necessary.

Response to Comment 4 in 20231120, Jacob Haueter

This comment requested information on how this project will ease the congestion in Dixon. In the eastbound direction, many of the alternatives reduce the intensity and duration of downstream bottlenecks, which would reduce the congestion in Dixon. In the westbound direction, the study area only goes as far west as the Kidwell Road interchange. No changes to the Draft EIR/EA are necessary.

20231120, Jessica Heiser

From: Jessica Heiser
To: Yolo80Corridor@DOT
Cc: Mike Bloss
Subject: Yolo 80 corridor toll
Date: Monday, November 20, 2023 9:31:15 AM

EXTERNAL EMAIL. Links/attachments may not be safe.

To whom it may concern,

I want to express my opposition to the addition of any toll lanes proposed in the yolo 80 corridor. Any lanes added should be free to use as they have been paid for by the tax payers as all funds provided by a local, state , or federal level ultimately comes from the American tax payer.

We are not the Bay Area, so don't try to turn us into the bay with some of their worst characteristics. We don't need a wealthy driver lane, we just need more lanes.

I travel for work throughout Northern California and spend 30 hours a week on our roads. We have the room and **great need** to expand our roadways for future growth, but let's do it in a way that's reasonable and doesn't put additional financial burden on us.

1

Sincerely,
Jessica

Sent from my iPhone

Response to Comment 1 in 20231120, Jessica Heiser

This comment expresses opposition to toll lanes, and requests that any lanes that are added be free. These preferences are noted. No changes to the Draft EIR/EA are necessary.

20231120, Tameka Island

From: Tameka Island
To: Yolo80Corridor@DOT
Cc: Rosendo Island
Subject: Toll Lanes Proposed from Natomas to Davis
Date: Monday, November 20, 2023 8:41:07 AM

EXTERNAL EMAIL. Links/attachments may not be safe.

To whom it may concern:

As a Natomas resident, I am vehemently OPPOSED to this proposal. There is no justification for adding a toll lane to these two corridors. 1

Thank you,

Tameka Island

Response to Comment 1 in 20231120, Tameka Island

This comment expresses the commenter's opposition to to toll lanes. This preference is noted. No changes to the Draft EIR/EA are necessary.

20231120, Steve Korvink

From: Steve Korvink
To: Yolo80Corridor@DOT
Subject: Installation of Toll Roads on 80/50
Date: Monday, November 20, 2023 7:21:41 AM

EXTERNAL EMAIL. Links/attachments may not be safe.

I do not support this project or the installation of toll roads in the Sacramento region. 1

Cheers,
- Steve

Response to Comment 1 in 20231120, Steve Korvink

This comment expresses the commenter's opposition to the proposed project and to toll lanes. This preference is noted. No changes to the Draft EIR/EA are necessary.

20231120, Carly Maltby

From: carlyetodd@gmail.com
To: Yolo80Corridor@DOT
Subject: Toll proposal
Date: Monday, November 20, 2023 9:09:29 AM

EXTERNAL EMAIL. Links/attachments may not be safe.

I am a resident of Sacramento and have worked in Davis for the last 15 years. When my husband and I were looking for housing, it was evident that living in Davis was unaffordable. I commute to Davis via I-80 each day out of necessity because of the high cost of living and lack of housing in this area, as do the majority of my colleagues. I am concerned that the proposed toll lanes will only further increase the cost of living in this area, without any reasonable commuting alternative. 1

It's no secret that public transit in the Sacramento area is abysmal. The bus and light rail options are very limited and have long wait times, and safety is a major concern. The use of Amtrak from Sacramento to Davis is just too expensive to use on a regular basis. While I understand that the proposal aims to increase carpooling and use of public transit, CalTrans is delusional in thinking this will happen without investing in a proper light rail system around Sacramento and into Davis, as well as increasing security on these systems. All this will do is further increase the cost of living in Sacramento.

There is no viable option for me to get to work without using my vehicle given the current state of the public transit system, and installing tolls is not going to change this. Furthermore, attracting new companies and recruiting talent to this area is going to be even more challenging than it already is. Unless CalTrans is first willing to develop a proper and SAFE light rail system that extends from downtown Sacramento to Davis, Natomas (including the airport), West Sac, East Sac, and beyond, these toll lanes are not a solution to reducing congestion. 2

Please stop making the ability for us to live and thrive in the Sacramento area more difficult. CalTrans priority should be to improve public transportation, not demand more money from us to maintain the status quo.

Carly Maltby

Response to Comment 1 in 20231120, Carly Maltby

The commenter expresses concern the toll lanes alternatives will impact the affordability of living in Davis. There are several other alternatives which propose HOV lanes and Transit Only lanes that may ease this concern. No changes to the Draft EIR/EA are necessary.

Response to Comment 2 in 20231120, Carly Maltby

This comment expresses the commenter's opposition to toll lanes and suggests that Caltrans' priority should be to invest in public transit. The preference for not adding toll lanes is noted. Caltrans will be investing in public transit with this project, which will improve headways for transit to improve service for new and existing users, No changes to the Draft EIR/EA are necessary.

20231120, Elizabeth Marin

From: Elizabeth Marin
To: Yolo80Corridor@DOT
Subject: TOLL LANE PROPOSAL
Date: Monday, November 20, 2023 4:18:00 PM

EXTERNAL EMAIL. Links/attachments may not be safe.

NO.

We need a better public transit system and our roads fixed. We do not need toll lanes. This is not the bay area! 1

Response to Comment 1 in 20231120, Elizabeth Marin

This comment expresses the commenter's opposition to toll lanes and emphasizes the need for public transit and road rehabilitation. These preferences are noted. No changes to the Draft EIR/EA are necessary.

20231120, mrsingh01

From: mrsingh01
To: Yolo80Corridor@DOT
Subject: Yolo corridor
Date: Monday, November 20, 2023 7:59:53 AM

EXTERNAL EMAIL. Links/attachments may not be safe.

This is absurd. What about the normal astronomical tax dollars the citizens already pay here in California for "Busted Daily Roads"! Our main street roads are busted up causing californians damages to their vehicles yearly and no one does anything about that when our hard earned Tax dollars already have been deducted. Now this! This is a joke! You didn't ask the citizens if they wanted this and now you decide without their permission than tax them for it! Absolutely Ludacris. You want add more lanes at the taxpayers expense and then charge them more on top to use them?? That's absurd. Where are all.our tax dollars going that we have already paid? I don't see any improvements anywhere. 1

Sent from my Verizon, Samsung Galaxy smartphone

Response to Comment 1 in 20231120, mrsingh01

This comment expresses the commenter's opposition to the proposed project and toll lanes. The commenter also suggests that there are no projects/improvements being made. Within Sacramento there are several major projects under construction including: Yolo 80 rehab project, I-5 auxiliary lane project, and the US 50 HOV lane project. The preference to not include toll lanes is noted. No changes to the Draft EIR/EA are necessary.

20231120, Arleen Powers

From: Arleen Powers
To: Yolo80Corridor@DOT
Date: Monday, November 20, 2023 2:02:27 PM

EXTERNAL EMAIL. Links/attachments may not be safe.

No 1

Sent from my iPhone

Response to Comment 1 in 20231120, Arleen Powers

This comment expresses the commenter's opposition to the proposed project. This preference is noted. No changes to the Draft EIR/EA are necessary.

20231120, Javpreet Singh

From: Javpreet Singh
To: Yolo80Corridor@DOT
Subject: Robbery
Date: Monday, November 20, 2023 9:22:25 AM

EXTERNAL EMAIL. Links/attachments may not be safe.

The fact that you as representatives of the public would continue to push these "express" lanes instead of actually providing the public with adequate public transit options is a robbery in broad daylight. Charging people in the hopes that they will carpool or use a non-existent public transportation system is ridiculous. People have jobs and responsibilities that require driving because using public transit would cause people to spend double the amount of time in route. You are effectively robbing the very people who elected you to represent their best interests. If that was your goal then you should throw a party and celebrate because you have achieved that goal and then some. 1

Response to Comment 1 in 20231120, Jaypreet Singh

This comment expresses the commenter's opposition to the proposed project. This preference is noted. Further, the commenter expresses interest in expanding public transit options, which is what the project proposes with the VMT mitigation plan, as discussed in Master Response A. No changes to the Draft EIR/EA are necessary.

20231121, Pamela Davis

From: padavis@winfirst.com
To: Yolo80Corridor@DOT
Subject: oll express lanes
Date: Tuesday, November 21, 2023 12:09:35 PM

EXTERNAL EMAIL. Links/attachments may not be safe.

I vote no as the traffic back up would be absolutely and extremely atrocious, abominable, dreadful, painful, terrible, unspeakable, dire, dreaded, fearful, fearsome, frightening, horrendous, horrific, nasty, frightful, tremendous. And would cause drivers to become extremely angry at the wasted time and slow down, especially with existing slow-downs just with so many cars on the freeways now. 1

Pamela Davis
855 Turnstone Dr
Sacramento CA 95834
padavis@winfirst.com

Response to Comment 1 in 20231121, Pamela Davis

This comment expresses the commenter's opposition to the proposed project. This preference is noted. No changes to the Draft EIR/EA are necessary.

20231121, Joseph Fleskes

From: Joseph Fleskes
To: Yolo80Corridor@DOT
Subject: Car-pool lanes, NOT Toll lanes please
Date: Tuesday, November 21, 2023 4:45:02 AM

EXTERNAL EMAIL. Links/attachments may not be safe.

Dear Caltrans/DOT:
I am strongly against adding I-80 toll lanes in the Davis and Sacramento region. Adding car pool lanes instead would accomplish the same transit goals without financially punishing middle class and poor commuters and other travelers. 1
Respectively,
Joseph Fleskes

Sent from my iPhone

Response to Comment 1 in 20231121, Joseph Fleskes

This comment expresses the commenter's opposition to toll lanes and support for HOV lanes. These preferences are noted. No changes to the Draft EIR/EA are necessary.

20231121, Jerry Jewell

From: info@skulltronix.com
To: Yolo80Corridor@DOT
Subject: Toll lanes
Date: Tuesday, November 21, 2023 7:34:35 AM

EXTERNAL EMAIL. Links/attachments may not be safe.

Your proposed toll lanes will increase traffic delays and fuel expenses for the poor who cannot afford the tolls. 1

Jerry Jewell
916 600 2295

Response to Comment 1 in 20231121, Jerry Jewell

This commenter suggested that the toll lane alternatives would increase congestion leading to increased fuel consumption and costs. The completed traffic analysis showed that alternatives 3A, 3B, 4A, 4B, 5A and 5B (HOT/Express toll lane alternatives) would all improve travel times and reliability across general-purpose lanes and the priced lanes compared to the no build, improving operations, and decreasing fuel consumption for all users. No changes to the Draft EIR/EA are necessary.

20231122, Christina Parker

From: Christina Parker
To: Yolo80Corridor@DOT
Subject: Adding Bike Lanes on I-80?
Date: Wednesday, November 22, 2023 11:32:16 AM

EXTERNAL EMAIL. Links/attachments may not be safe.

Hi there,

I've read through the EIR and am a little unclear if this project proposes to add bike/pedestrian lanes to I-80 in Sacramento county from West Sacramento across the river to Natomas. The general information on the draft EIR says "between PMs 0.00 and 1.36 in Sacramento County" but it's unclear to me if that is all of what is labeled as "Segment 2" or only part of it. 1

Also, if there will be pedestrian/bike infrastructure added there, are you working with the City of Sacramento or North Natomas Jibe to connect that lane to other Class 1 bicycle lanes (not Class II or III) so there is a safe way for local non-Bay Area commuters to get to work between Natomas and West Sacramento? 2

Thank you,

Christina
Natomas Resident/West Sacramento Employee

Response to Comment 1 in 20231122, Christina Parker

This comment requests clarification on the bike/pedestrian facilities included in the project. This project does not propose to add bicycle lane improvements across the Sacramento River on I-80 nor on US 50. Please refer to Master Response F for more details on the proposed pedestrian and bicycle facilities. No changes to the Draft EIR/EA are necessary.

Response to Comment 2 in 20231122, Christina Parker

This comment requests clarification on whether Caltrans is working with local partners to ensure a safer bicycle system is included specifically from Natomas to West Sacramento. While there is no bicycle and pedestrian facility, Caltrans is and will continue to work with our local partners and advocates to ensure that when bicycle and pedestrian facilities are included in or near the State Highway System that they are safe and user friendly. No changes to the Draft EIR/EA are necessary.

20231122, Barbara Zeller

From: Barbara Zeller
To: Yolo80Corridor@DOT
Subject: Tolls
Date: Wednesday, November 22, 2023 2:37:19 PM

EXTERNAL EMAIL. Links/attachments may not be safe.

I am opposed to a lane designated for a single use.
It does not help low income persons when another toll is added to the freeway.
It slows general traffic because one lane is for those who can afford or choose to afford to pay for a specific lane. 1

Plan for the future by adding a BART or similar system to the extra lane! 2

Stop using union labor for the projects - the taxpayer cost would decrease. 3

Barbara Zeller

Response to Comment 1 in 20231122, Barbara Zeller

This comment expresses the commenters' opposition to toll lanes because of the suggested negative impact on equity and traffic conditions. The completed traffic analysis showed that alternatives 3A, 3B, 4A, 4B, 5A and 5B (HOT/Express toll lane alternatives) would all improve travel times and reliability across general-purpose lanes and the priced lanes compared to the no build, improving operations. Please refer to Master Response F on Equity for an in-depth response on the equity concern. No changes to the Draft EIR/EA are necessary.

Response to Comment 2 in 20231122, Barbara Zeller

This comment suggests that Caltrans should plan for the future by including rail/train service in place of the managed lane. While this option could help move more people and be a great supplement to the project, it would not meet the purpose and need of the project because it's not improving freight throughput or solving existing or forecasted future traffic operational deficiencies. No changes to the Draft EIR/EA are necessary.

Response to Comment 3 in 20231122, Barbara Zeller

The commenter suggests not using union labor would lower costs. The comment does not discuss the adequacy of the EIR/EA. No changes to the Draft EIR/EA are necessary.

20231125, Joel Mandel

From: Joel Mandel
To: Yolo80Corridor@DOT
Subject: Hwy 80 expansion project
Date: Saturday, November 25, 2023 5:07:57 PM

EXTERNAL EMAIL. Links/attachments may not be safe.

Dear YOLO 80 Corridor
My strong personal preference is that one new lane be constructed in each direction with no high occupancy lilies and ne additional fees charged. This will speed everyone's journey ands no one will be excluded due to poverty. 1
Sincerely yours
Joel Mandel

Response to Comment 1 in 20231125, Joel Mandel

This comment suggests that a lane open to all vehicles (a general-purpose lane) should be constructed instead of the proposed managed lane. Please refer to Master Response B, Suggested Alternative: Add a General-Purpose Lane in Each Direction for more information on why ’this’ isn’t a viable alternative. No changes to the Draft EIR/EA are necessary.

20231127, Kevin Lee

From: Kevin Lee
To: Yolo80Corridor@DOT; Kevin Lee
Subject: Yolo80Corridor feedback - no new lanes
Date: Monday, November 27, 2023 11:31:04 AM

EXTERNAL EMAIL. Links/attachments may not be safe.

I'm a long time Davis resident and have driven on California roads for 3 decades. I also live near I-80 and have seen the impact of the traffic jams first hand.

I am against adding more lanes to roads in general. They help in the short run but ultimately leads to more distributed cities and increases road usage. I favor increasing efficiency and conservation. Given the options, I choose option 7b. 1

- Build Alternative 7b: Repurpose the current number one general-purpose lane for use by vehicles with two or more riders (HOV 2+); no new lanes would be constructed. Build an I-80 managed lane direct connector.

Thanks
Ki Lee

Response to Comment 1 in 20231127, Kevin Lee

This comment expresses the commenter's support for alternative 7B. The Commenter's preference is noted. No changes to the Draft EIR/EA are necessary.

20231127, Ravi Narayanan

From: Narayanan, Ravi
To: Yolo80Corridor@DOT
Subject: Public Meeting
Date: Monday, November 27, 2023 1:00:30 PM

EXTERNAL EMAIL. Links/attachments may not be safe.

Hello,

Would you kindly reconfirm that there is a scheduled public meeting for the Yolo 80 project in the City of West Sac tomorrow, and reconfirm the venue location and timing? 1

Thanks,

Ravi Narayanan, PE, TE, PMP
Senior Engineering Project Manager

HDR
2365 Iron Point Road, #300
Folsom, CA 95630
D 916.986.5025 M 916.293.1291
ravi.narayanan@hdrinc.com

hdrinc.com/follow-us

Response to Comment 1 in 20231127, Ravi Narayanan

The commenter asks for reconfirmation for the City of Sacramento meeting the following day and for reconfirmation of the venue and timing. The comment does not discuss the adequacy of the EIR/EA. No changes to the Draft EIR/EA are necessary.

20231128, Heather Baugh

From: heatherebaugh34@gmail.com
To: Yolo80Corridor@DOT
Subject: Toll road and parking lot in Yolo
Date: Tuesday, November 28, 2023 7:20:53 AM

EXTERNAL EMAIL. Links/attachments may not be safe.

Hello, I am a resident of West Sacramento and I want to flag two important equity issues and encourage you NOT to add toll lanes in our area. First, toll lanes cause disparity where people with money can afford the convenience of unimpeded travel, and those without suffer further congestion. This might benefit Bay Area travelers using the corridor for Tahoe, but it harms those of us who live here and use it regularly to access life needs. The fiction that people will take transit or bike is one created by a state desperate for climate reducing measures, but West Sac's layout is not conducive of these modes and so people will drive and will face disparate congestion despite these laudable policy aspirations. A park and ride would be a further eye sore here and is not what our town needs. We need green space and parks, not parking lots that will quickly become magnets for homeless and crime. I would not leave my care in such a lot given current law enforcer limits here and in Sac. 1

Second, a significant portion of necessary services for West Sac residents, a historically disadvantaged community, are in Davis, Woodland, and Sacramento—and many of us elect to drive to Davis given proximity. For example those with UC Davis or Medicaid insurance must drive to Davis or Sacramento for healthcare as there are no UC Davis clinics here. Similarly, affordable shopping options (of which we face significant limitation here) and major retail are also in Davis, Woodland, and Sacramento. Given our growing numbers West Sacramento simply cannot support the need it faces wit its existing retail. Dentists and other services are the same. West Sacramento remains a commuter hub with extremely poor residents receiving point location care, while the rest must locate/compete for services that are harder to access given the growth and development limitations inherent in this community because of the historic poverty. It's important not to add additional expense to these services. 2

I really encourage you to find other ways to pay for updates to this road. We do NOT want our community to look like the east and South Bay. Driving in those locations is miserable, demoralizing, and unfair. Despite policy arguments such measures encourage transit and commute, we have seen borne out that people must drive in CA, and the congestion and tolls affect their perception of affordability. Whether your consultant argues otherwise is simply not reflective of true experience. We do NOT want our rural areas shaped by this flawed policy view. Please find another way to meet your upgrade goals. 3

Heather Baugh

Sent from my iPhone

Response to Comment 1 in 20231128, Heather Baugh

This comment expresses the commenter's opposition to the proposed project Toll lanes and Mobility Hub, and the potential for equity and safety concerns associated with these improvements. Please see Mater Response F to see more information related to equity. The commenter's preference is noted. No changes to the Draft EIR/EA are necessary

Response to Comment 2 in 20231128, Heather Baugh

This comment refers to the need for West Sacramento residents to drive on Yolo 80 to access retail and health care services and suggests that adding a toll would be a financial burden on residents. If a toll (HOT/Express) lane were to be constructed it would be in addition to the lanes that exist so users would not need to pay a toll if they did not want to. Please refer to Master Response E for more information on equity concerns associated with these alternatives. No changes to the Draft EIR/EA are necessary.

Response to Comment 3 in 20231128, Heather Baugh

This comment requests that Caltrans find other methods to pay for new lanes besides adding a toll lane option. The toll (HOT/Express) lane alternatives are under consideration as potential preferred alternatives because of the traffic operational benefits that they offer, and tolls are not the funding source provided to construct the project. The commenter's opposition to toll lanes is noted. No changes to the Draft EIR/EA are necessary.

20231128, Kevin Cohee

STATE OF CALIFORNIA — DEPARTMENT OF TRANSPORTATION

Date 11/28/23

Yolo 80 Corridor Improvement Project

Name (please print) Kevin Cohee E-mail/Phone# Kevin@dcarrement.com

1243 Oak Bluff Way (Address (home)) Sacramento (City) CA. (State) 95833 (Zip Code)

Authorized Representative (name of organization or agency) _____

Address (business) City State Zip Code

COMMENTS

I agree with ALT 2B HOV w/ Ramp Access 1

Do you have a preferred alternative? _____

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Response to Comment 1 in 20231128, Kevin Cohee

This commenter is in support of alternative 2B. This preference is noted. No changes to the draft EIR/EA are necessary.

20231128, Katherine Dutro

From: Katherine Dutro
To: Yolo80Corridor@DOT
Subject: Comment
Date: Tuesday, November 28, 2023 11:14:59 PM

EXTERNAL EMAIL. Links/attachments may not be safe.

As a commuter to the Bay Area for employment in the last 26 years; I've seen how the traffic congestion has increased on the I80 corridor/yolo causeway.

Although, most congestion has been due to more vehicles, because more people have made residence in the Sacramento area for affordability purposes, that's not the only reason for traffic congestion…

I believe that much of the traffic congestion can be resolved with creating dedicated lanes from both highway 50 & I80, that meet in West Sacramento at the beginning of the causeway, but not blended or merging lanes (similar to how the 780 & southbound 680 freeway currently merge at the beginning of the Benicia bridge, but they each have their own dedicated lanes that lead cars onto the bridge)

Many years ago, someone thought it was a great idea to create a "shared" merging lane for those coming onto the Benicia bridge from both 680 & 780, which caused so much traffic congestion! Finally, someone realized it was better for each 780 & southbound 680 to each have their own dedicated lanes to approach and cross the Benicia bridge, which tremendously improved the traffic congestion in that area. That simple change saved 30-40 minutes from my commute alone!

In my opinion, something similar to the simple changes made with the 680/780 dedicated lanes could do the same on the Yolo causeway… Merging lanes that go from 6 lanes to 3 lanes just cause bottlenecks and doesn't necessarily help traffic flow any better.

1

Also, creating "toll lanes" won't stop single driven cars on the roadway, as there aren't many affordable/reliable sources of transportation for many commuters.

If the State provided more funding for vanpools or employer provided shuttles, similar to what Genentech provides for their employees; these might provide incentives for folks to carpool. Maybe collaborate with Bay Area employers to consider more remote work opportunities for their employees or incentives to open satellite offices in Sacramento… this would bring more business & revenue to Sacramento.

2

Thank you for your consideration of my comments.

Katherine Dutro
Sent from my iPhone

Response to Comment 1 in 20231128, Katherine Dutro

This comment suggests that the traffic congestion on WB I-80 and US 50 could be solved by not merging lanes together west of the I-80/US 50 Interchange. This idea could offer traffic operations benefits, however due to the number of lanes coming together from each freeway and closely spaced ramps, it would be extremely difficult. However, the “B” alternatives would provide a direct connect Managed Lanes ramp from WB 80 to WB 80 at the interchanges so vehicles would be removed from the weave at the I-80/US 50 Interchange, these results from the traffic analysis showed that this was extremely beneficial in helping lessen the existing bottleneck on WB I-80/US 50. No changes to the Draft EIR/EA are necessary.

Response to Comment 2 in 20231128, Katherine Dutro

This comment suggested that toll lanes would not help with carpools and would continue to encourage single occupancy vehicles. All alternatives except the Express toll lane alternatives provide benefits to drivers who carpool and encourage them to do so. Also, the mitigation associated with this project would aid in reducing single occupancy vehicles and in improving transit.

No changes to the Draft EIR/EA are necessary.

20231128, Kenni-Marie Fitzgerald

STATE OF CALIFORNIA — DEPARTMENT OF TRANSPORTATION

Date 11/28/2023

Yolo 80 Corridor Improvement Project

Name (please print) Kenni-marie fitzgerald E-mail/Phone# kmf cheeko@gmail.com

1167 Park Blvd. | W Sacramento | CA | 95691

Address (home) | City | State | Zip Code

Authorized Representative (name of organization or agency) _____

Address (business) | City | State | Zip Code

COMMENTS I have concerns regarding how the traffic over the Engineers Bridge @ Jefferson Blvd. will handle existing traffic Currently there is a backlog on the bridge to Jefferson off ramp from N. I-5 going west on 51/80 / S I-5 going west on 51/80 & 51/80 continuing westbound. This is sometimes up to 10-15 mins. from P street on ramp. And worse during Raincat season; trucks have a hard time merging twice. Also the bottleneck from 51/80 onto the causeway west bound @ West Cap Not sure how not adding a lane helps with congestion. as on any given ~~Day~~ Friday heading eastbound it's known do not go over the causeway between 2-7pm due to traffic.

1

Do you have a preferred alternative? 2B

2

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Response to Comment 1 in 20231128, Kenni-Marie Fitzgerald

This commenter is voicing their concerns about existing traffic conditions on US 50 at Jefferson Boulevard (Engineers Bridge) and at the I-80/US 50 Interchange. In the westbound direction, there is an existing bottleneck that results from the short weave distance between the US 50/I-5 and US 50/Jefferson Blvd interchanges and heavy traffic demand that enters US 50 from I-5 NB and SB. The bottleneck improves with multiple project alternatives but could also be further alleviated with interchange reconfiguration and/or improvements that are not within the scope of this project.

There is also an existing bottleneck in the westbound direction at the start of the Yolo Causeway. This bottleneck is caused by short weave distances between the US 50/I-80 interchange and I-80/West Capitol Ave interchanges as well has high volumes on the I-80 WB to I-80 WB connector, I-80 WB/W Capitol Ave off-ramp, and I-80 WB/Enterprise Blvd slip on-ramp. Various alternatives improve this bottleneck. Additionally, the direct connectors would address some of the catalysts of this bottleneck by allowing vehicles in the managed lane to merge on the left-side of the freeway when they make the I-80 WB to I-80 WB movement, instead of having to make multiple lane changes to access the managed lane at the start of the Causeway.

Multiple project alternatives would improve conditions on the Causeway in the eastbound direction during the peak periods. The Draft EIR/EA evaluates multiple project alternatives that add a managed lane.

No changes to the Draft EIR/EA are necessary.

Response to Comment 2 in 20231128, Kenni-Marie Fitzgerald

This comment is in support of alternative 2B. The commenter’s preference is noted. No changes to the draft EIR/EA are necessary.

20231128, Eric Helseth

STATE OF CALIFORNIA

DEPARTMENT OF TRANSPORTATION

Date 11/28/2023

Yolo 80 Corridor Improvement Project

Name (please print) Eric Helseth E-mail/Phone# eric.helseth@gmail.com

1838 Castro Way Sacramento CA 95818
Address (home) City State Zip Code

Authorized Representative (name of organization or agency) N/A, Private Citizen

Address (business) City State Zip Code

COMMENTS Toll lanes are a form of regressive tax, and should not be considered a "traffic calming" or mitigation method. Adding an HOV lane, keeping the three existing lanes, is the best case scenario. Transit and carpooling/vanpooling will be able to utilize these lanes to free up space for single occupancy vehicles. What was not discussed is how much of toll revenue will be used by transit agencies. The expansion of active transportation infrastructure is welcome and needed, as is the integration with the City of Davis projects. It is important to consider what the goals of this project are, and how each alternative will actually accomplish those goals. 1 2 3 4

Do you have a preferred alternative? 2A. HOV lanes will help alievate the most traffic while avoiding placing a financial burden on those who travel this route every day. 5

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Response to Comment 1 in 20231128, Eric Helseth

This comment expresses the commenter's opposition to the proposed toll lanes. The commenter's preference is noted. No changes to the draft EIR/EA are necessary.

Response to Comment 2 in 20231128, Eric Helseth

This comment is in support of constructing an HOV lane. This preference is noted. No changes to the draft EIR/EA are necessary.

Response to Comment 3 in 20231128, Eric Helseth

This comment requested more information on how much of the toll revenue would go to transit. The excess toll revenue plan is still being determined, currently the Capital Area Regional Tolling Authority (CARTA) is working on completing their AB 194 Tolling Application that will contain an excess revenue expenditure plan. No changes to the Draft EIR/EA are necessary.

Response to Comment 4 in 20231128, Eric Helseth

This comment recommends that Caltrans considers the goals of the project and how each alternative would meet those goals. Caltrans concurs with the statement, the preferred alternative will need to meet the purpose and need of the project to be selected. No changes to the Draft EIR/EA are necessary.

Response to Comment 5 in 20231128, Eric Helseth

This comment expresses the commenter's support for alternative 2A. Their preference is noted. No changes to the Draft EIR/EA are necessary.

20231128, Steve Horne of Silver Lining Trans

STATE OF CALIFORNIA — DEPARTMENT OF TRANSPORTATION

Date 11/28/23

Yolo 80 Corridor Improvement Project

Name (please print) STEVE HORNE E-mail/Phone# SHORNE@SILVERLININGTRANS.COM

5305 18 0406

Address (home) City State Zip Code

Authorized Representative (name of organization or agency) SILVER LINING TRANS

1805 TRIBUTE RD STE G SACRAMENTO 95815

Address (business) City State Zip Code

COMMENTS MEDICAL TRANSPORTATION PROVIDER TRANSPORTING HANDICAPPED PERSONS. IS THERE AN EXEMPTION FROM TOLLS, CAN STATUTES BE ADDED TO CA LAW FOR THIS STATEWIDE 1

OPPOSED TO OPTION 7A & 7B IF A LANE IS NOT ADDED THE IMPACT ON TRAFFIC WILL BE SUBSTANTIAL TO THE NEGATIVE SIDE. 2

DOES IMPACT TO LOW INCOME PERSONS RECEIVE DISCOUNTS OR EXEMPTIONS? 3

Do you have a preferred alternative? OPTION 2-5 OF ADDING LANES 4

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Response to Comment 1 in 20231128, Steve Horne of Silver Lining Trans

This comment requests more information whether emergency vehicles are exempt from tolls. Per California Vehicle Code §§21655.5 states “A motorcycle, a mass transit vehicle, a blood transport vehicle that is clearly and identifiably marked as such on all sides of the vehicle, or a paratransit vehicle that is clearly and identifiably marked on all sides of the vehicle with the name of the paratransit provider may be operated upon those exclusive or preferential use lanes unless specifically prohibited by a traffic control device.” This only applies to HOV lanes and not HOT/Express toll lanes. The Capital Area Regional Tolling Authority (CARTA), who could be the tolling authority, would determine what vehicles are exempt. No changes to the Draft EIR/EA are necessary.

Response to Comment 2 in 20231128, Steve Horne of Silver Lining Trans

This comment expresses the commenter’s opposition to the proposed Build Alternatives 7A and 7B. Commenter’s preference are noted. No changes to the Draft EIR/EA are necessary.

Response to Comment 3 in 20231128, Steve Horne of Silver Lining Trans

This comment requests more information whether or not low-income communities qualify for discounts if a toll (HOT/Express) lane is built. The scope of the discounts or exemptions for low-income communities is not completed, however those who qualify may be given some financial help for either the toll (HOT/Express) lane usage or transit usage, or potentially both. No changes to the Draft EIR/EA are necessary.

Response to Comment 4 in 20231128, Steve Horne of Silver Lining Trans

This comment expresses the commenter’s support for Build Alternatives 2 through 5. This preference is noted. No changes to the draft EIR/EA are necessary.

20231128, Will Leber

From: Will Leber
To: Yolo80Corridor@DOT
Subject: Causeway toll r ok af
Date: Tuesday, November 28, 2023 10:20:17 PM

EXTERNAL EMAIL. Links/attachments may not be safe.

I emphatically oppose your proposal for a causeway toll.
It will penalize poor and working class voters in favor of the rich. We all pay a large tax to enjoy our roads. Do not privatize our freeways. 1
I pay gasoline, income and property taxes to my State.
Sincerely,
Wilfred Leber
975 Hillview Drive
Dixon, CA 95620

Response to Comment 1 in 20231128, Will Leber

This comment expresses the commenter's opposition to toll lanes. This preference is noted. No changes to the Draft EIR/EA are necessary.

20231128, Mike Maulhardt

From: Mike Maulhardt
To: Yolo80Corridor@DOT
Cc: Mike Maulhardt
Subject: Input on Design of the I80/Yolo Causeway Project
Date: Tuesday, November 28, 2023 10:33:52 AM

EXTERNAL EMAIL. Links/attachments may not be safe.

Here are my input in bulletpoint format:

- To minimize the project cost of what appears to be only the first phase of this improvement project, I suggest the following;
  - Start the segregation and channelizing of vehicles well before the Causeway. Start at Kidwell Road in Solano Co., Hwy 113 before the meagre to I80 East, all of the on-ramps in Davis, and eastbound on I80 & Hwy 50 in the West Sac area.
  - Vehicles to segregate by lane should include any vehicle with a 55 MPH speed limit such as buses, semi-trucks with trailer, semis w/out trailers, any other vehicle towing a trailer of any size such as camping trailer or boat trailers, outsized recreational vehicles or delivery trucks. Consider putting any vehicles driven by drivers who will not drive at least 65MPH in the 55MPH lane.
  - Metering lights for all Davis and UCDavis on-ramps, including HWY113 east bound. Activate the metering system based on traffic conditions. A good AI opportunity.
  - Set up a Toll lane for both east and west bound over the causeway for certain times of day and highway conditions.
  - Block the use of navigation apps that could be designed to avoid the Caltrans traffic control scheme. If needed, set up metering lights on Mace or Tremont Road to defeat the Navigation Apps.
  - Improve the off and on ramps for south Richards Blvd for safety and reduce congestion caused by merging.
  - A bikeway should be available. I do not support extravagance on this project. Likewise CalTrans should not get involved with trying to improve AMTRAK on Phase 1!
  - Consider evaluation driver reaction to the east bound climb up the west levee of the Causeway. Drivers currently seem to slow down at this point when their visual perspective changes. A more gradual transition to the climb may be helpful in smoothing traffic flow.
  - Finish the highway construction on the W/X in downtown Sacramento. When will this project ever be completed? Likewise the on and off ramps at the River in West Sac are inefficient and thus dangerous.
  - Eliminate the pot holes caused by concrete roadway and even the grinding done to lane markers.
  - If the Causeway needs to be widened, start with the fill and concrete

1

work ASAP. Widening seems to be essential to give drivers in both directions space to clear the highway for whatever reason. 1 cont.

- Ignore the Luddites who think improvement to I-80 will only bring more traffic. For every reason presented against the planned improvements, I can think of reasons why traffic will not be increased by the planned improvements: Decline in the growth of population, decline in commerce in California due to stifling business by taxes and regulations. Decline in business activity in the Bay Area. Working from home creates more flexible opportunities to travel to the Tahoe area. Irrelevance of the traditional reason for being of the City of Sacramento. 2

Thank you
Michael Maulhardt

•

--
Mike Maulhardt
4213 Dogwood Place
Davis, CA 95618
530-758-3813 home
530-304-4459 cell
mike.maulhardt@gmail.com

Response to Comment 1 in 20231128, Mike Maulhardt

This commenter added several suggestions for the Caltrans team with the goal to limit the project cost for phase 1. A comment-by-comment response is provided for each point below.

- This comment suggests limits for the begin and end of the managed lane, the project will add the managed lane well in advance of the Yolo Causeway, the eastern limits will begin/end at the US 50/I-5 Interchange on US 50 and at West El Camino Avenue on I-80. The western portion begins and ends at the SR 113/ I-80 Interchange on I-80.

- This comment suggests that heavy vehicles have their own lane, this does not meet the purpose and need of the project because it does not increase person throughput or promote carpooling. This comment also mentioned buses as well, the project does include a transit only lane alternative.

- This comment suggest that ramp meters should be added in Davis, ramp metering improvements are being added at the following locations:

    - Southbound SR-113 to I-80 Eastbound
    - Old Davis Rd to I-80 Eastbound
    - Richards Blvd to I-80 Eastbound
    - Mace Blvd loop to I-80 Eastbound (meter HOV Preferential Lane)
    - Mace Blvd Slip to I-80 Eastbound (meter HOV Preferential Lane)
    - Mace Blvd Slip to I-80 Westbound

- This comment suggests a toll lane to be built, there are multiple alternatives that propose a HOT/Express toll lane.

- This commenter requests that Caltrans should block the use of navigation apps to limit diversion. Caltrans is unable to block an app, however improved traffic conditions with the project will limit diversion in Davis.

- This comment requests that Caltrans improve the on and off-ramps to improve safety. There are multiple on-ramp metering improvements, however the off-ramps will have little work done as they are not within the project scope. The City of Davis is leading a project to improve the Richards Boulevard interchange including the off-ramps.

- This comment requests that a bikeway should be added, and that Caltrans should not be funding Amtrak in Phase 1. Please refer to Master Response F for more information on the bike improvements that will be added to this project. Caltrans is funding Amtrak in phase 1, but this is a mitigation for the full project mitigation- this ensures full transparency in the mitigation process.

- This comment suggests that drivers slow down as they reach the causeway. This driver behavior is most likely due to a crest vertical curve on the freeway where the roadway is at a higher elevation downstream, which limits drivers sight distance, causing drivers to naturally drive a little slower.

- This comment requests more information on when the US 50 HOV lane project will be completed and also expresses that the Jefferson on and off-ramps to US 50 are inefficient. The US 50 HOV lane project will be completed in July 2025. The Jefferson on and off-ramps and the interchange are under consideration for upgrades by the City of West Sacramento.

- This comment requests that potholes be filled in. There is a pavement rehabilitation job currently under construction on Yolo 80 to improve the pavement surface.

- This comment suggests construction techniques if the Yolo causeway is to be widened, currently Caltrans has no plans to widen the Yolo 80 causeway bridge.

No changes to the Draft EIR/EA are necessary.

Response to Comment 2 in 20231128, Mike Maulhardt

This comment expresses support for the project and building a managed lane. The commenter's preference is noted. No changes to the Draft EIR/EA are necessary.

20231128, Forrest Pasturel

STATE OF CALIFORNIA — DEPARTMENT OF TRANSPORTATION

Date 11/28/23

Yolo 80 Corridor Improvement Project

Name (please print) Forrest Pasturel E-mail/Phone# forrestpasturel@gmail.com

1620 18th St | Sacramento | CA | 95811

Address (home) | City | State | Zip Code

Authorized Representative (name of organization or agency) Private citizen / resident

Address (business) | City | State | Zip Code

COMMENTS

I appreciate the efforts and studies explored for reducing traffic and VMT along the Yolo Causeway. I would emphasize the need for bus/transit/HOV lanes in order to decrease "induced demand." As a regular Amtrak Capitol Corridor rider, I would really appreciate an increase in round-trips, therefore reducing wait times for trains that so many people rely on. I would also emphasize the need for transit-oriented development in order to increase walkability, biking, and transit ridership in order to reduce emissions. 1 2

Do you have a preferred alternative?

No, but I would argue that a bus/van-only lane would be more effective and efficient at moving people. 3

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Forrest Pasturel

Response to Comment 1 in 20231128, Forrest Pasturel

This comment emphasized the need for a transit/HOV lane along the Yolo causeway and also indicates the commenter's desire for an increase in the amount and frequency of Amtrak trains. The VMT mitigation proposes funding to improve several transportation projects including Capitol Corridor rail service expansion. The commenter's preference for transit/HOV lane is noted. No changes to the Draft EIR/EA are necessary.

Response to Comment 2 in 20231128, Forrest Pasturel

This comment emphasizes the need for transit-oriented development to reduce dependency on personal vehicles and reduce emissions. Caltrans concurs and supports development of transit-oriented higher density development to reduce dependency on personal use vehicles. The comment does not discuss the adequacy of the EIR/EA. No changes to the Draft EIR/EA are necessary.

Response to Comment 3 in 20231128, Forrest Pasturel

This comment notes support for a bus/van-only lane. The commenter's preference is noted. No changes to the Draft EIR/EA are necessary.

20231128, Tiffany Pelkey

STATE OF CALIFORNIA — DEPARTMENT OF TRANSPORTATION

Date 11-28-23

Yolo 80 Corridor Improvement Project

Name (please print) Tiffany Pelkey E-mail/Phone# Tractorgir1866@yahoo.com 9167054454

3901 Lake Rd #37 (Address (home)) W Sac (City) Ca (State) 95691 (Zip Code)

Authorized Representative (name of organization or agency) Resident

Address (business) City State Zip Code

COMMENTS A1 please

I just bought @ W. Capetal n. 80 This would be nonsence for the locals just hopping on to buy Veggies in davis, students I understand change is needed (change is good) 1

No toll: I Live in this area it really clears out fast most of these cars has multi people in them & lanes are needed in my opionion or something like that.

Do you have a preferred alternative? A2 2

SLOW FOR THE CONE ZONE CALTRANS

Completing and signing this document is voluntary. The Department of Transportation may use this information for statistical purposes, to notify you of any future hearings, or to assist in providing you with further information. This document is a public record and may be subject to inspection and copying by other members of the public.

Response to Comment 1 in 20231128, Tiffany Pelkey

This comment expresses the commenter's opposition to toll lanes and preference for A1, which is presumed to be No Build Alternative 1. The commenter also suggests that HOV lanes are needed. These preferences are noted. The comment does not discuss the adequacy of the EIR/EA. No changes to the Draft EIR/EA are necessary.

Response to Comment 2 in 20231128, Tiffany Pelkey

In response to the query in the public meeting comment form, the commenter notes preference for A2, which is presumed to be Build Alternative 2a. This preference is noted. The comment does not discuss the adequacy of the EIR/EA. No changes to the Draft EIR/EA are necessary.

20231128, Aaron Sampson

From: Aaron Sampson
To: Yolo80Corridor@DOT
Subject: Proposed toll lane from Davis to Sacramento.
Date: Tuesday, November 28, 2023 10:47:03 PM

EXTERNAL EMAIL. Links/attachments may not be safe.

Hello,
I think the proposal is a bad idea, and I am against the proposal. Residents in the area are all ready paying high gas taxes, and for some odd misguided reason voters were duped into voting yes for a tax that is supposed to improve the roads and highways. Now you want me a to pay more money to use a road that I have been using. I think not! What happens when you put this toll road in use, how will you keep non toll payers out of the lane? California can barley enforce the rules on the books now. This is the land of the criminals. 1

Sent from Mail for Windows

Response to Comment 1 in 20231128, Aaron Sampson

This commenter opposes adding a toll lane and requests more information on how these lanes will be enforced from violators. The toll (HOT/Express) lanes would be enforced by the addition of CHP enforcement areas where CHP can observe and pull vehicles over who may be violating the requirements of the managed lane. The commenter's preference against toll lanes is noted. The comment does not discuss the adequacy of the EIR/EA. No changes to the Draft EIR/EA are necessary.

20231128, Andrew Woodward

From: A Woodward
To: Yolo80Corridor@DOT
Subject: toll lanes on US 80
Date: Tuesday, November 28, 2023 9:31:19 AM

EXTERNAL EMAIL. Links/attachments may not be safe.

good morning,

Building Toll lanes are not equitable to all. This is another way California is taking funds from hard working Californians and creating a User fee system. This hurts the working class because it is taking funds out of their pockets. Fix the roads and quit trying to take money from people. 1

Andrew Woodward
916 747 0669
95632
Bo Bennett - "Success is not in what you have, but who you are."

Response to Comment 1 in 20231128, Andrew Woodward

This comment opposes toll lanes and expresses equity concerns that could arise because of them. Please Refer to Master Response E for more information on Equity. This commenter's preference is noted. The comment does not discuss the adequacy of the EIR/EA. No changes to the Draft EIR/EA are necessary.

20231129, Rands Calvin

From: RandS Calvin
To: Yolo80Corridor@DOT
Subject: Proposed toll road
Date: Wednesday, November 29, 2023 12:30:42 PM

EXTERNAL EMAIL. Links/attachments may not be safe.

$465 million seems an excessive amount of money for roughly 20 miles of new road. Works out to over $23 million per mile. Californians already pay some of the highest motor vehicle and related fuel taxes. The Causeway itself is less than 4 miles in length, 7 miles if you add both directions. 1

Response to Comment 1 in 20231129, Rands Calvin

This comment expresses the commenter's opinion of the project cost and the state of fuel taxes. The comment does not discuss the adequacy of the EIR/EA. No changes to the Draft EIR/EA are necessary.

20231129, Pat D

From: trekmom99
To: Yolo80Corridor@DOT
Subject: Definition
Date: Wednesday, November 29, 2023 12:28:56 PM

EXTERNAL EMAIL. Links/attachments may not be safe.

What is a I80 managed lane direct connector noted in the options? Thank you. Pat D | 1

Sent from my iPhone

Response to Comment 1 in 20231129, Pat D

This comment asks, “what is a I80 managed lane direct connector.” Build Alternatives 2B through 7B propose a managed Lane Connector ramp. This proposed Managed Lane Connector Ramp would begin from the east of Enterprise Blvd in the median and traverse over the westbound US 50 at the same elevation as the existing eastbound I-80 to eastbound I-80 (EB I-80 to EB I-80) connector structure and re-connect with the median of the I-80 near West Capitol Avenue.

The construction of the Managed Lane Connector Ramp will require widening of the outside of eastbound and westbound I-80, from Enterprise Blvd to the existing EB I-80 to EB I-80 Connector structure. The B Alternatives proposed to realign the existing westbound I-80 off-ramp to West Capitol Avenue within the current right-of-way. Retaining walls will be required at the outside shoulders of the proposed eastbound and westbound I-80 widening.

The comment does not discuss the adequacy of the EIR/EA. No changes to the Draft EIR/EA are necessary.

20231129, Patricia Erigero

From: pce@cal.net
To: Yolo80Corridor@DOT
Subject: Yolo causeway proposed changes comment
Date: Wednesday, November 29, 2023 10:55:54 AM

EXTERNAL EMAIL. Links/attachments may not be safe.

I support options 6a or 6b. Any high occupancy/toll lane is completely unacceptable IF any driver can pay an additional fee and get to use the lane with a sole occupant. That is a regressive tax on those who cannot afford to pay the fee, such as myself, a senior citizen living in Yolo County and relying on access to necessary support from Sacramento, including my own and my husband's regular health care visits, regular pet health care visits to Sacramento (non one in their right mind uses UC Davis School of Vet Med), and other services only available in Sacramento at the quality required. You can not disenfranchise poor and limited income people in favor of rich people. Period. I promise a lawsuit will ensue if you continue with the proposals that allow the rich to pay their way out of traffic. You had better heed the disenfranchised--the era of Cal Trans deciding in favor of the wealthy is over.How about requiring all state and university workers who need to use the causeway, to carpool? I bet that would reduce traffic significantly. 1 2

Patricia Erigero
Yolo County

Response to Comment 1 in 20231129, Patricia Erigero

The commenter expressed support for alternatives 6A and 6B. Commenter's preference is noted. The comment does not discuss the adequacy of the EIR/EA. No changes to the Draft EIR/EA are necessary.

Response to Comment 2 in 20231129, Patricia Erigero

This comment expresses the commenter's opposition to toll lanes as well as suggested that state employees and university students using the causeway should carpool. Carpooling is an effective way to reduce the number of vehicles using the freeway. This project aims to form more carpools with the addition of the managed lane. Commenter's preference is noted. The comment does not discuss the adequacy of the EIR/EA. No changes to the Draft EIR/EA are necessary.

20231129, Matt Foreman

From: Matt Foreman
To: Yolo80Corridor@DOT
Subject: Interstate 80 toll express lane project
Date: Wednesday, November 29, 2023 7:13:54 AM

EXTERNAL EMAIL. Links/attachments may not be safe.

To whom it may concern,
I'm completely opposed to a toll express lane project. I already pay the highest gas taxes in the USA, record DMV fees, and horrific roads in exchange. Tax payers money has been squandered away.

Why would throwing more money at a financial mismanagement of tax payers money solve an infrastructure issue? I have zero trust in the states fiscal stewardship. We need to work with the resources that we currently have and cut worthless programs like the High Speed Rail. 1

We don't have a cash inflow problem we have a spending problem.

Sincerely,
Matt Foreman

Response to Comment 1 in 20231129, Matt Foreman

This commenter expresses opposition to an express toll lane. The commenter's preference is noted. The comment does not discuss the adequacy of the EIR/EA. No changes to the Draft EIR/EA are necessary.

20231129, Jackman Alan

From: Alan Jackman
To: Yolo80Corridor@DOT
Subject: I-80 redesign
Date: Wednesday, November 29, 2023 6:04:41 PM

EXTERNAL EMAIL. Links/attachments may not be safe.

Dear CalTrans

I am writing regarding the proposal to widen and lane-restrict I-80 from Davis to West Sacramento. I believe that there may be much simpler and less expensive steps that might significantly reduce the current congestion. As I'm sure you know, the congestion isn't limited to the Davis to West Sacramento stretch -- there are also problems between Dixon and Davis and those problems contribute to the problems between Davis and West Sacramento. Waze and other mapping apps often direct drivers off of I-80 at Pedrick Rd, returning them to I-80 at either Mace Blvd or the on ramp at the west end of the causeway. This congests to roads leading to the on ramps as well as I-80 at the on ramps were drivers return. I believe that much of this congestion is the result of the current design of I-80 between Dixon and Davis and that traffic flow would be significantly improved by restructuring that section with barricades and re-striping.

Here's my proposal for restructuring eastbound I-80 from Dixon to Davis but a similar strategy could be applied to westbound I-80. I-80 has 3 lanes from Dixon to about 0.8 mi east of the Pedrick Road overpass where it widens to 4 lanes. It remains 4 lanes to just east of the little-used Kidwell Rd interchange where it acquires a 5th lane which disappears at the CA 113 North interchange. I remains 4 lanes until the eastbound on ramp from CA 113 North where it expands to 5 lanes. Then it picks up a 6th lanes at the eastbound on ramp from Old Davis Road. In the next 0.5 miles it loses the 6th lane and then the 5th lane, forcing a rapid merge of the traffic in those lanes into the remaining 4 lanes. In another 0.3 miles, just before the Richards Blvd off ramp, it narrows to 3 lanes which persist into West Sacramento. As anyone who drives this section of I-80 knows, eastbound traffic can flow fairly smoothly through the 3-lane highway in Dixon but will back up as drivers are funneled from the 6-lane road east of the CA 113 North interchange into 3 lanes before reaching the first Davis exit at Richards Blvd.

1

It would certainly be worth trying to eliminate the creation and then removal of lanes between Pedrick Rd and Richards Blvd. Block/re-stripe the right (4th) lane from where it starts about 0.8 mi east of the Pedrick Road overpass to the Kidwell interchange. Lots of barricades and re-striping would be needed at the CA 113 North interchange because the exit is via the 4th and 5th lanes, both of which need to be blocked off. The lightly-used Old Davis Rd off ramp is from the 4th lane which shouldn't pose a big problem. The CA 113 North on ramp should be restricted to one lane for it's entire length and be a normal merge into the 3rd lane. Barricades and/or restriping keep the highway at 3 lanes until the highway again becomes a 3-lane road just before the Richards Blvd exit.

I hope you will consider such a redesign.

Sincerely
Alan Jackman
Davis, CA

Response to Comment 1 in 20231129, Jackman Alan

This comment offers potential geometry changes that the commenter believes will help improve traffic on I-80. The solution the commenter added included extending multiple auxiliary lanes, that currently merge would not meet the purpose and need of the project because the traffic congestion would be moved downstream, most likely not improving person throughput. In addition, the Solano County portion of the project is within the Solano County Metropolitan Transportation Commission (MTC) area and Caltrans District 4. The 2017 Solano County Regional Transportation Plan (RTP) does not include Managed Lanes between the Kidwell Road interchange and the Yolo County line. No Managed lanes will be constructed in Solano County as part this project.

The project alternatives propose constructing an auxiliary lane along eastbound I-80 at the existing terminus of an acceleration lane, from Old Davis Road to Richards Boulevard, which is about half a mile in length. Adding a managed lane and eliminating the lane drop from 4 to 3 lanes will help reduce congestion and improve person throughput along this segment of I-80.

No changes to the Draft EIR/EA are necessary.

20231129, Eugene Novak

From: Eugene Novak
To: Yolo80Corridor@DOT
Subject: Toll lane
Date: Wednesday, November 29, 2023 8:17:16 AM

EXTERNAL EMAIL. Links/attachments may not be safe.

I object to the toll lane. The route should be widened for all users anticipating future traffic through 2050. 1
Sent from my iPad

Response to Comment 1 in 20231129, Eugene Novak

This comment expresses the commenter's opposition to toll lanes. In addition, the commenter asks to add a general-purpose lane instead, please refer to Master Response B, Suggested Alternative: Add a General-purpose Lane for more information on why this potential alternative was not included. This preference is noted. No changes to the Draft EIR/EA are necessary.

20231129, Mike Silveira

From: MIKE SILVEIRA
To: Yolo80Corridor@DOT
Subject: Toll road
Date: Wednesday, November 29, 2023 6:56:57 AM

EXTERNAL EMAIL. Links/attachments may not be safe.

Plain and simple(money grab)At some point in the not to distant future,Gov. Will control all our money and our civilization will cease to exist.History will repeat itself.
Learn how to spend our tax dollars better.Gov. always putting the burden on middle class. 1

Response to Comment 1 in 20231129, Mike Silveira

This comment expresses the commenter's opinion on the use of taxpayer dollars. The comment does not discuss the adequacy of the EIR/EA. No changes to the Draft EIR/EA are necessary.

20231201, Jason Bundy

From: Jason Bundy
To: Yolo80Corridor@DOT
Subject: W. Side Causeway... Rise/Run Issue Discussed?
Date: Friday, December 1, 2023 3:08:33 AM

EXTERNAL EMAIL. Links/attachments may not be safe.

Hello Wizardly I-80 Engineers & Planners!

Q: Has there been a conversation about the **SUDDEN RISE / DROP** on the west end of the causeway… as a MAIN FACTOR for slowdowns there? Hopeful there has been some consciousness about this?

(It's also a general safety concern, the way visibility is limited — ie on eastbound approach drivers cannot readily see what's up ahead or "above" in the way all the lanes suddenly "hop up" to the level of the levee and onto the causeway there… plus, westbound it's a sort of "blind dropoff") 1

Over the past 1-2 decades, it's seemed like an adjustment (rise/run infill extending over say, gradually 3/4 to 1.5 miles) to help eliminate driver uncertainty could really resolve our big backups there.

There's just "that awkward moment" in both directions of uncertainty of what we cannot see which, hopefully is on the radar for improvements?

Thank You Wizards !!!

Jason B

Response to Comment 1 in 20231201, Jason Bundy

This comment is related to the geometric profile at the Yolo causeway. Modifying the roadway profile on the western approach the Yolo Causeway bridge is out of the scope of work for this project. The comment is noted for Caltrans consideration on a future project or study. No changes to the Draft EIR/EA are necessary.

20231205, Laila Penny

From: Laila Penny
To: Yolo80Corridor@DOT
Subject: Public Comment on Widening of I-80
Date: Tuesday, December 5, 2023 5:21:26 PM

EXTERNAL EMAIL. Links/attachments may not be safe.

Good afternoon Yolo County,

I am a resident of Yolo county and I am emailing you to oppose widening I-80. The widening of I-80 would increase not only the supply of freeway space but it would also increase the demand and create even more cars on the freeway, thus more fossil fuels into the environment. 1

If there should be an extra lane, it should be created into a bus lane to increase use of public transit and/or a toll lane, in which the money is used to fund transit. Overall, we need to decrease congestion and fossil fuels, and widening I-80 would bring us a step back from that. 2

Thank you for reading,
--
Laila Penny

Response to Comment 1 in 20231205, Laila Penny

This comment notes the commenter's opposition to widening I-80 and describes increased demand for cars on the freeway and use of fossil fuels. This preference is noted. No changes to the Draft EIR/EA are necessary.

Response to Comment 2 in 20231205, Laila Penny

The commenter expresses support for the transit only alternative or the toll (HOT/Express) lane alternatives where excess revenue funds transit. These preferences are noted. The comment does not discuss the adequac0y of the EIR/EA. No changes to the Draft EIR/EA are necessary.

20231205, Sonja Wooley

From: Sonja Wooley
To: Yolo80Corridor@DOT
Subject: Public Comment on 1-80 Expansion
Date: Tuesday, December 5, 2023 5:13:52 PM

EXTERNAL EMAIL. Links/attachments may not be safe.

Hello,

My name is Sonja Wooley, I am a resident of Davis in Yolo County and Political Affairs Director of the Davis College Democrats. I am writing to oppose the expansion of I-80 because adding more car lanes will only induce more freeway demand in the long run and potentially even increase congestion. Instead Caltrans should convert existing lanes into bus lanes to increase the efficiency of public transportation therefore increasing ridership and decreasing congestion. 1

Thank you,

Sonja

--
Sonja Wooley
University of California, Davis
Political Science and English
Class of 2026

Response to Comment 1 in 20231205, Sonja Wooley

This comment expresses the commenter's opposition to adding any new lanes to the freeway and instead would like to see the existing lanes converted to bus lanes. This would not meet the purpose and need of the project because converting all lanes to transit only lanes would create diversion from the route limiting the overall person throughput, limiting freight movement and creating hardships for those who need to use this route to commute to and from job opportunities. The comment does not discuss the adequacy of the EIR/EA. No changes to the Draft EIR/EA are necessary.

20231206, David Block

From: David Block
To: Yolo80Corridor@DOT
Subject: Yolo 80 Corridor Improvement Project Comments
Date: Wednesday, December 6, 2023 8:26:44 AM

EXTERNAL EMAIL. Links/attachments may not be safe.

Good morning! In advance of next weeks meeting in Davis to discuss the Yolo 80 Corridor Improvement Project, I wanted to share my comments.

Though this is not one of the alternatives (I am not sure why), I believe that there should simply be one lane added both eastbound and westbound; no express/toll lane or HOV lane or bus lane, just an additional lane. In addition, there should actually be two lanes added both westbound and eastbound; poor planning has already caused the traffic issues that currently exist and by the time another lane is added there will probably be even more cars using the corridor and the need for an additional lane. 1

I also believe that the California Highway Patrol really needs to start enforcing the California Vehicle Code, particularly section 21650 which requires drivers to drive in the right lane unless they are passing another vehicle. There are far too many drivers camped out in the middle and left lanes who are impeding the flow of traffic and who are the prime contributors of congestion along the corridor. The right lane often becomes the fast lane and the passing lane and this shouldn't be. 2 In addition, all of the entrance ramp traffic lights should be removed; it is simply not logical to suggest that a driver get up to highway speeds in the short amount of distance they are provided in many cases; this simply creates a dangerous situation on the highway. 3

Thank you for your time!

David M. Block,
Davis

Sent from my iPhone

Response to Comment 1 in 20231206, David Block

This comment expresses the commenter's opposition for the project alternatives, the commenter suggests that adding a general-purpose lane or two in each direction should be considered. Please refer to Master Response B, Suggested Alternative: Add a General-Purpose Lane for more information on why this potential alternative is infeasible. Additionally, the add two general-purpose lane proposal is not feasible because of the reasons stated in Master Response B as well as there are geometric limitations at the Yolo Causeway that prevents two additional lanes from being added. No changes to the Draft EIR/EA are necessary.

Response to Comment 2 in 20231206, David Block

This comment requests that CHP enforce slower drivers only using the right lanes. The comment does not discuss the adequacy of the EIR/EA. No changes to the Draft EIR/EA are necessary.

Response to Comment 3 in 20231206, David Block

This comment suggests that ramp meters should be removed at all on-ramp locations within the project. Ramp meters help improve the flow of the freeway and allow for safer merging maneuvers by breaking up platoons of merging vehicles. Additionally, merging tapers are standard per the Caltrans Highway Design Manual and will allow the driver adequate time and space to make these maneuvers safely. No changes to the Draft EIR/EA are necessary.

20231209, Jerry Jewell

From: info@skulltronix.com
To: Yolo80Corridor@DOT
Subject: Toll lanes
Date: Saturday, December 9, 2023 5:55:32 AM

EXTERNAL EMAIL. Links/attachments may not be safe.

Your proposed toll lanes will increase traffic delays and fuel expenses for the poor who cannot afford the tolls. 1

Jerry Jewell
916 600 2295

Response to Comment 1 in 20231209, Jerry Jewell

This commenter suggests that traffic will become more congested with the toll (HOT/Express) lanes leading to more delays and higher fuel expenses. The traffic analysis completed showed that these alternatives improved traffic operations leading to more reliable travel on the corridor, limiting stop and go traffic which leads to burning more fuel. No changes to the Draft EIR/EA are necessary.

20231211, Betty Berteaux

From: Betty Berteaux
To: Yolo80Corridor@DOT
Subject: comment on 80 corridor
Date: Monday, December 11, 2023 9:14:26 PM

EXTERNAL EMAIL. Links/attachments may not be safe.

In the Enterprise, I've read the coverage of the proposals for the I80 corridor. and would like to make some comments.

The fastrak lanes are a good idea with or without the toll for cars with no passengers. However, I would like to see that lane start in Fairfield and proceed to Sacramento, and the reverse, with no entries or exits. That would ensure that commuter traffic was separate from other sorts of traffic.

Recently I have noted that traffic on Hwy 37 to Marin County and on Hwy 12 into Rio Vista is much improved by the addition of a central barrier preventing cars from passing and thereby preventing many accidents. The traffic proceeds in an orderly fashion although perhaps at a slightly reduced speed. "Proceeds" is the operable word. So my point is that, if there were one lane in either direction between Fairfield and Sacramento for drivers from Vacaville, Winters, Dixon and Davis, those drivers would be able to travel safely and more quickly between those cities without having to fight the commuters. 1

Bottlenecks occur when lanes diminish unless there are no lanes to diminish. Eliminate all instances where 4 or 5 lanes in either direction diminish to three.

I would also suggest that, freight between San Francisco and Truckee be transported by train. I have seen trains with one or two engines pulling 50 to 100 boxcars each about the equivalent of a truckload?] How much less pollution is that and how many trucks off the freeway? It would be a far more efficient mode of transport,

Personally, [I live in Davis], in recent years, I have avoided going to Sacramento unless for a medical appointment. The restaurants, retail stores, event venues, even the museums and galleries have lost my patronage and I know many people who also avoid trips to Sacramento. The traffic is definitely impacting businesses. 2

Something must be done,

Very truly yours, Elizabeth Berteaux , December 11, 2023

Response to Comment 1 in 20231211, Betty Berteaux

This commenter is in support of the HOT/Express lanes alternatives but would like to see the lanes begin in Fairfield. The Solano County portion of the project is within the Solano County Metropolitan Transportation Commission (MTC) area and Caltrans District 4, because of this that scope is not included in the project. The commenter also proposes that there be limited access for the managed lanes with the addition of a concrete barrier, this was analyzed. However, due to geometrical constraints a barrier-separated limited-access managed lane is infeasible at this time. This commenter also expresses the need to limit lane drops, an auxiliary lane will be added from Old Davis Road to Richards Boulevard to eliminate one of the lane drops in this section. No changes to the Draft EIR/EA are necessary.

Response to Comment 2 in 20231211, Betty Berteaux

The commenter provides suggestions regarding use of freight trains between San Francisco and Truckee and the commenter's shopping preferences. Use of trains for freight is beyond the scope of the proposed project. No changes to the Draft EIR/EA are necessary.

20231212, Alan Hirsch (email 1)

From: Alan Hirsch
To: Yolo80Corridor@DOT
Cc: "alan Hirsch"; Bhattal, Gurjeet@DOT; Keaton, Dennis L@DOT
Subject: Comment on Availability of I-80 Yolo DEIR
Date: Tuesday, December 12, 2023 2:35:49 PM
Attachments: image001.png
image002.png
image003.png

EXTERNAL EMAIL. Links/attachments may not be safe.

1. *I note full EIR documents* are not available on the website real time, but "available on request"- but the website does make clear who to request them of, and the website only offer a "comment" email, not one where administrative request can be made.

2. And even the immediately downable part of DEIR a require unwieldy downloading of 26 separate PDF Files.

3. I also note the written copies of DIER were not available in ANY public library per my calls to Librarian and my stopping in until after Tuesday December 6th – They were promised to be available immediately in the Nov 13, 2023 Caltrans press release/notice of availability.

   This mean hard copies were not available to the public the requisite 45 days, and were not available at the time of the Caltrans held its Open house in West Sacramento Senior Center on Tuesday November 28th, effectively negating the quality of public input at that forum.

4. I also request a list of document describing any substance of correction of the DEIR made subsequent to November 13, 2023 and the dates these corrections were made. I note Scott Love Head of Davis Branch Library (in discussion with me Sunday Dec 3 around 4:30 pm) said your agency delivered a hard copy DEIR to Davis Library on or around November 14, then recollected them later to make "corrections" he was told. As noted above, they then never return a copy until week for Dec 6th.

1

I believe this lack of availability of the full and fully corrected document until sometime after November 13, raises question if the legally required 45 day examination period is being complied with. The final EIR should prove out this 45 day period by showing the date corrections to Nov 13th document were made, and when the full, corrected DEIR was made available for examination by the public both on line and in hard copy.

Alan Hirsch
Yolo Mobility

Attached: Record of EIR availability 3 screen shot of web page 12/12/23 at 2:26pm.s

Draft Environmental Document

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- 3.2.3 Air Quality
- 3.2.4 Biological Resources
- 3.2.5 Cultural Resources
- 3.2.6 Energy
- 3.2.7 Geology and Soils
- 3.2.8 Greenhouse Gas Emissions
- 3.2.9 Hazards and Hazardous Materials
- 3.2.10 Hydrology and Water Quality
- 3.2.11 Land Use and Planning
- 3.2.12 Mineral Resources
- 3.2.13 Noise
- 3.2.14 Population and Housing
- 3.2.15 Public Services
- 3.2.16 Recreation
- 3.2.17 Transportation
- 3.2.18 Tribal Cultural Resources
- 3.2.19 Utilities and Service Systems
- 3.2.20 Wildfire
- 3.2.21 Mandatory Findings of Significance
- 3.3 Wildfire
- 3.3.1 Regulatory Setting
- 3.3.2 Affected Environment
- 3.3.3 Environmental Consequences
- 3.3.4 Avoidance, Minimization, and/or Mitigation Measures
- 3.4 Climate Change
- 3.4.1 Regulatory Setting
- 3.4.2 Environmental Setting
- 3.4.3 GHG Inventories

- 3.4.4 Project Analysis
- 3.4.5 CEQA Conclusion
- 3.4.6 Greenhouse Gas Reduction Strategies
- 3.4.7 Adaptation

Chapter 4 Comments and Coordination (PDF)

- 4.1 Public Scoping and Participation
- 4.1.1 Stakeholder Meetings
- 4.1.2 Project Development Team Meetings
- 4.2 Consultation and Coordination with Public Agencies
- 4.2.1 Federal Agencies
- 4.2.2 State Agencies
- 4.2.3 Native American Tribal Consultation
- 4.2.4 Stakeholder-Specific Actions – Equitable Outreach

Chapter 5 List of Preparers (PDF)

Chapter 6 Distribution List (PDF)

Appendices

- Appendix A - Memorandum (PDF)
- Appendix B- Title VI Non-Discrimination Policy Statement (PDF)
- Appendix C - Avoidance, Minimization, and /or Mitigation Measures Summary (PDF)
- Appendix D - List of References (PDF)
- Appendix E - Standard Measures (PDF)
- Appendix F - Abbreviations and Acronyms (PDF)
- Appendix G - Notice of Preparation (PDF)
- Appendix H - List of Technical Studies (PDF)
- Appendix K - State Historic Prevention Officer Determinations Eligibility (PDF)
- Appendix L - Assembly Bill 52 Consultation (PDF)

VMT Mitigation Plan

- VMT Mitigation Plan Executive Summary
- VMT Mitigation Memo Attachment

Circulation Material

- Public Notice of Availability (NOA) (PDF)
- Summary Form (PDF)
- Notice of Completion (NOC) (PDF)
- Notice of Preparation (NOP) (PDF)

Technical Studies, Transportation Analysis Report, and exhibits will be available upon request.

Take the survey!

Public Meetings

City of West Sacramento
Community Center
1075 W. Capitol Ave.
West Sacramento, CA 95691
November 28, 2023 from 5:30 – 7:30 PM
Disclaimer: although the above address is the official Community Center address, please use 1212 Merkley Ave, West Sacramento, CA 95691 in your phor will take you to the correct parking lot, whereas the Capitol Ave address will take you to the incorrect parking area.

City of Davis
Mary L Stephens Davis Branch Library
315 E 14th St.
Davis, CA 95616
December 13, 2023 from 5:30 PM – 7:30 PM

Contact Us

Gurtej Bhattal
Project Manager

Masum A Patwary
Environmental Coordinator

Dennis Keaton
Public Information Officer

Comments:
Yolo80corridor@dot.ca.gov

Response to Comment 1 in 20231212, Alan Hirsch (email 1)

Caltrans submitted the EIR/EA to the State Clearinghouse on November 13th, 2023, through CEQANet. The EIR/EA was published on the same day 11/13/2023. The subject EIR/EA was simultaneously made available on the same day on Caltrans Website. The original end date of the 45-day review period was to end on December 27. Caltrans extended the initial comment period beyond the holidays to January 5th, 2024. Caltrans subsequently extended the public circulation and comment period again to January 12. 2024.

Appendices to the EIR/EA were made available upon request on the Caltrans website. EIR/EA appendices were available for download on the State Clearinghouse website. Additionally, hard copies of the EIR/EA were delivered to the Yolo County Library on December 5, 2023, and the West Sacramento Library on December 6, 2023. The commenter received, hand delivered to his residence, a flash drive containing the EIR/.EA with all appendices, on December 14, 2023, at 6:35 PM, via a Caltrans employee.

Caltrans subject matter experts were made available at the November 28, 2023, West Sacramento Senior Center Open House. Exhibits representing all alternative lane configurations were also on display. The public was advised of the circulation of the EIR/EA and pamphlets were made available on how to access the document. Caltrans also took written public comments from the meeting.

With regard to the commenter’s assertion that an earlier copy of the EIR/EA was delivered to the Davis Library, Caltrans Design staff mistakenly assumed that a project report (PR), which is an internal design document, was required to be made publicly available during environmental document review periods. This is not, nor ever has it been a Caltrans Environmental review process. Caltrans contacted the Davis Library to pull it from public circulation review. No earlier version of the Draft EIR/EA was delivered to any library prior to December 5th.

20231212, Alan Hirsch (email 2)

From: Alan Hirsch
To: Yolo80Corridor@DOT; Bhattal, Gurtej@DOT
Cc: "alan Hirsch"
Subject: Please send me "Technical Studies,
Date: Tuesday, December 12, 2023 2:36:59 PM

EXTERNAL EMAIL. Links/attachments may not be safe.

To Yolo80 project Manager Gurtej Bhattal, Yolo80 DEIR comment line.

Please send me "Technical Studies, Transportation Analysis Report, and exhibits for I-80Yolo DEIR." as note on the Yolo80 project page. https://dot.ca.gov/caltrans-near-me/district-3/d3-projects/d3-i80-corridor-improvements 1

Response to Comment 1 in 20231212, Alan Hirsch (email 2)

The commenter received, hand delivered to his residence, a flash drive containing the EIR/.EA with all appendices, and technical studies on December 14, 2023, at 6:35 PM, via a Caltrans employee. The commenter acknowledged receipt of the flash drive via replying to an email to the project manager.

20231213, Bonnie Berman

STATE OF CALIFORNIA — DEPARTMENT OF TRANSPORTATION

Date 12/13/23

Yolo 80 Corridor Improvement Project

Name (please print) Bonnie Berman E-mail/Phone# bonnieberman@yahoo.com

Davis 95616

Address (home) City State Zip Code

Authorized Representative (name of organization or agency) N/A

Address (business) City State Zip Code

COMMENTS Please include and prioritize public transit to the best of your ability. It provides the most equity among individuals. Works for all ages & abilities, and income levels. The 15 min trips of the Capitol Corridor & Causeway Connection are a start, but these are crucial and should be foundational to the planning of this project. 1

Thank you.

Bonnie

Do you have a preferred alternative?

SLOW FOR THE CONE ZONE CALTRANS

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Response to Comment 1 in 20231213, Bonnie Berman

This comment requests that Caltrans prioritize public transit. All managed lanes alternatives would prioritize transit and most alternatives offer transit a more reliable trip in the managed lane. In addition, mitigation from the project would expand Unitrans, multiple bus services, as well as the mentioned expansion of the Capitol Corridor between Martinez and Sacramento. This preference is noted. No changes to the Draft EIR/EA are necessary.

20231213, Cyle Botelho

STATE OF CALIFORNIA — DEPARTMENT OF TRANSPORTATION

Date 13 Dec 2023

Yolo 80 Corridor Improvement Project

Name (please print) Cyle Botelho E-mail/Phone# Cyle.botelho@gmail.com

2880 Stonecreek Dr. Sacramento CA 95833

Address (home) City State Zip Code

Authorized Representative (name of organization or agency) Self

Address (business) City State Zip Code

COMMENTS

Please show data to compare just adding a GP. lane. 1

Also, I am 100% opposed to toll lanes, as they impact equity and lead to increased poverty which causes harm to the environment. 2

I am 100% opposed to HOV lanes because it make the fast lane dangerous and creates more confusion. 3

Do you have a preferred alternative? Add A GP Lane.

Your data does not factor economic reality which offsets the time and use of roads and service too. 4

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Please call me for more info: 415.936-3020

Response to Comment 1 in 20231213, Cyle Botelho

This comment requests that the addition of a proposed general-purpose lane alternative be compared to the list of project alternatives. The addition of a general-purpose lane would not encourage carpooling, would not promote transit and would not maximize person throughput; therefore, this proposed alternative would not meet the purpose and need of the project. The comment does not discuss the adequacy of the EIR/EA. No changes to the Draft EIR/EA are necessary.

Response to Comment 2 in 20231213, Cyle Botelho

This comment expresses the commenter's opposition to toll lanes and the potential equity concerns associated with them. Please refer to Master Response E for more information about equity concerns associated with HOT/Express toll lanes. No changes to the Draft EIR/EA are necessary.

Response to Comment 3 in 20231213, Cyle Botelho

This comment expresses the commenter's opposition to HOV lanes because their opinion is it makes the fast lane dangerous and confusing. Signage and stripping will be added with all alternatives to ensure there is no confusion about the access requirements of the managed lane. The comment does not discuss the adequacy of the EIR/EA. No changes to the Draft EIR/EA are necessary.

Response to Comment 4 in 20231213, Cyle Botelho

This comment requests that a proposed general-purpose lane alternative be added. Please refer to Master Response B, Suggested Alternative: Add a General-Purpose Lane for more information on why this is infeasible. The comment does not discuss the adequacy of the EIR/EA. No changes to the Draft EIR/EA are necessary.

20231213, Julie Burgal

STATE OF CALIFORNIA

DEPARTMENT OF TRANSPORTATION

Date 12/13/2023

Yolo 80 Corridor Improvement Project

Name (please print) Julie Burgal E-mail/Phone# jjburgal@gmail.com

3731 El Segundo Ave Davis CA 95618

Address (home) City State Zip Code

Authorized Representative (name of organization or agency) _____

Address (business) City State Zip Code

COMMENTS I live very close to I-80 (see address). It is already very loud. ~~###~~ I would like a sound wall put up for our neighborhood since noise levels will further increase ~~#~~ the update. I request a ~~short~~ noise study done for our neighborhood specifically since this row of houses (Chiles Rd between La Vida and Cowell) is unique. Noise levels vary throughout the day and noise levels ~~#~~ analyzed during peak usage and when traffic is flowing freely should be measured. Thanks for considering. 1

Do you have a preferred alternative? _____

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Response to Comment 1 in 20231213, Julie Burgal

The commenter shares their address and states they live near I-80 and would like the project to include installing a sound wall in the neighborhood. The commenter also requests a noise study for their neighborhood, specifically the row of houses (Chilles Rd between La Vida and Cowell), as noise levels vary throughout the day. The noise study evaluates existing and future noise levels at eight locations within this neighborhood. The noise study recognizes the noisiest hour is not necessarily the hour with the peak traffic volumes and evaluates noise levels based on the noisiest hour. The noisiest hour is generally characterized by maximum free-flow traffic volumes at roadway design speeds. In areas where the peak hour traffic is less than the maximum free-flow traffic volumes at roadway design speed, the peak hour traffic volumes are used. The results of the noise study show this area is below the federal noise abatement criteria; therefore, does not qualify for noise abatement.

20231213, Jeff Buscheck

STATE OF CALIFORNIA — DEPARTMENT OF TRANSPORTATION

Date 12/13/23

Yolo 80 Corridor Improvement Project

Name (please print) Jeff Buscheck E-mail/Phone# jbuscheck@ucdavis.edu

2640 Portage Bay East Davis CA 95616

Address (home) City State Zip Code

Authorized Representative (name of organization or agency) Self

Address (business) City State Zip Code

COMMENTS So excited to see this

The UCPRC is happy to help.

As a private citizen I support:

A/7 4/B

Do you have a preferred alternative?

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1

Response to Comment 1 in 20231213, Jeff Buscheck

This comment expresses the commenter's support for the proposed project Alternative 4B. This preference is noted. The comment does not discuss the adequacy of the EIR/EA. No changes to the Draft EIR/EA are necessary.

20231213, John Cooper

STATE OF CALIFORNIA — DEPARTMENT OF TRANSPORTATION

Date _____

Yolo 80 Corridor Improvement Project

Name (please print) John Cooper E-mail/Phone# namrehs196@aol.com

2627 Belmont Dr | Davis | CA | 95618

Address (home) | City | State | Zip Code

Authorized Representative (name of organization or agency) _____

Address (business) | City | State | Zip Code

COMMENTS

Alt 2 I would prefer HOV 2+ Lane; Toll lanes or HOT Alternatives are not equitable Considering I5 and Highway 99 ~~Commuting~~ from Stockton into Sac do NOT have toll lanes- (HOV 2+ in both N/S directions.) 1

Do you have a preferred alternative? — Alt - #2 2

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Response to Comment 1 in 20231213, John Cooper

This commenter supports Project Alternatives 2A & 2B and objects to the HOT/Express toll lane alternatives. These preferences are noted. The comment does not discuss the adequacy of the EIR/EA. No changes to the Draft EIR/EA are necessary.

20231213, Beth Foraker

STATE OF CALIFORNIA — DEPARTMENT OF TRANSPORTATION

Date 12·13·23

Yolo 80 Corridor Improvement Project

Name (please print) Beth Foraker E-mail/Phone# foraker. beth e gmail.com

854 A Street Davis CA 95616

Address (home) City State Zip Code

Authorized Representative (name of organization or agency) _____

Address (business) City State Zip Code

COMMENTS

I urge CalTrans to acknowledge the surge in e-bike usage & to build e-bike considerations into every project. There should be an entire division created within CalTrans around e-bikes. E-bike purchases are surging this year & many people would trade out their car if there were easy, safe, protected e-bike lanes. Thanks for your consideration! ☺ 1

Do you have a preferred alternative? _____

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Response to Comment 1 in 20231213, Beth Foraker

This comment urges Caltrans to acknowledge the surge in e-bike usage and asks that e-bike considerations be added to every project. Please refer to Master Response F for additional information on what improvements are being made to bicycle and pedestrian facilities. The comment does not discuss the adequacy of the EIR/EA. No changes to the Draft EIR/EA are necessary.

20231213, Dr. Kelsey Fortune

STATE OF CALIFORNIA — DEPARTMENT OF TRANSPORTATION

Date 12/13/23

Yolo 80 Corridor Improvement Project

Name (please print) Dr. Kelsey Fortune E-mail/Phone# fortunefordavis@gmail.com

641 Arthur St | Davis | CA | 95616
Address (home) | City | State | Zip Code

Authorized Representative (name of organization or agency) _____

Address (business) | City | State | Zip Code

COMMENTS

Increased Highway capacity will not help with stated goals of the state to decrease car reliance. nor will it decrease congestion in the long run.

1

Do you have a preferred alternative? NO INCREASED CAPACITY add a toll & use funding for active & public Transportation

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Response to Comment 1 in 20231213, Dr. Kelsey Fortune

This comment requests that no capacity be added and that a toll should be added to fund active transportation. The commenter's preferences are noted. The comment does not discuss the adequacy of the EIR/EA. No changes to the Draft EIR/EA are necessary.

20231213, Deborah Gale

STATE OF CALIFORNIA — DEPARTMENT OF TRANSPORTATION

Date 12/13/23

Yolo 80 Corridor Improvement Project

Name (please print) Deborah Gale E-mail/Phone# galed@ARC.Losl05.edu

2028 E 8th St Davis CA 95618

Address (home) City State Zip Code

Authorized Representative (name of organization or agency) _____

Address (business) City State Zip Code

COMMENTS Pay lanes are 2023 Version of 1955 Bus riding: Privileged people sat in front of bus while others forced To ride in back. HOV HUT etc lanes are 2023 Version of 1950s discrimination. 1

Also HOV lanes do not facilitate traffic flow I drive I 80 Davis - Madison Ave at 7AM & 4PM the HOV lane is used infrequently and often by Single occupant drivers drive far above the speed limit. The right lanes are full including many large trucks all changing lanes as entrance & exits occur. HOV lanes cause people unhappy with CHP - who have no control. 2

Do you have a preferred alternative? No privilege lane. Need more lanes due to increased population. Few people can ride rapid Transit from home To work in reasonable time 3

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Response to Comment 1 in 20231213, Deborah Gale

This comment reflects the commenter's opinion on toll, HOT and HOV lanes. Please refer to Master Response E for a detailed response on equity concerns. The comment does not discuss the adequacy of the EIR/EA. No changes to the Draft EIR/EA are necessary.

Response to Comment 2 in 20231213, Deborah Gale

This comment reflects the commenter's opinion that HOV lanes in the Sacramento area are often full of single occupant users and CHP cannot enforce them. CHP enforces the rules and regulations on the state highway system and does enforce HOV lane occupancy compliance. The comment does not discuss the adequacy of the EIR/EA. No changes to the Draft EIR/EA are necessary.

Response to Comment 3 in 20231213, Deborah Gale

This comment requests that a potential alternative that adds a general-purpose lane in each direction be added. Please refer to Master Response B, Suggested Alternative: Add a General-Purpose Lane for a detailed response on why this is not a project alternative. The comment does not discuss the adequacy of the EIR/EA. No changes to the Draft EIR/EA are necessary.

20231213, Glenn Gmoser

STATE OF CALIFORNIA — DEPARTMENT OF TRANSPORTATION

Date

Yolo 80 Corridor Improvement Project

Name (please print) Glenn Gmoser — E-mail/Phone# glengmoser72@gmail.com

Address (home) — City: Davis — State: CA — Zip Code: 95618

Authorized Representative (name of organization or agency) N/A

Address (business) — City — State — Zip Code

COMMENTS

Hopefully design features that can add a little width / wiggle room w/out excessive structure cost or too much wetland impact on Causeway 1

Do you have a preferred alternative? 2A (or B) HOV. - No Telling 2

(+) Additional Transit options 3

SLOW FOR THE CONE ZONE CALTRANS

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Response to Comment 1 in 20231213, Glenn Gmoser

This comment expresses the commenter's desire to widen the Yolo Causeway. Build Alternatives 2–6 propose to add a managed lane eastbound and westbound on the existing Yolo Causeway bridges without widening the bridges. This will result in narrower lanes and inside shoulders, thereby reducing "wiggle" room. The Caltrans Highway Design Manual standard 10-foot shoulders will be added where there are no geometric constraints. The project will save money by not widening the existing Yolo Causeway bridges and reduce environmental impacts to the environmentally rich habitat of the Yolo Causeway floodway. The comment does not discuss the adequacy of the EIR/EA. No changes to the Draft EIR/EA are necessary.

Response to Comment 2 in 20231213, Glenn Gmoser

This comment supports alternatives 2A and 2B. The commenter's preference is noted. The comment does not discuss the adequacy of the EIR/EA. No changes to the Draft EIR/EA are necessary.

Response to Comment 3 in 20231213, Glenn Gmoser

This comment also requested additional transit options with their preferred alternatives 2 and 2B. All managed lanes alternatives would prioritize transit and most alternatives offer transit a more reliable trip in the managed lane; including alternatives 2A and 2B. In addition, mitigation from the project would expand Unitrans, multiple bus services, as well as expand the Capitol Corridor between Martinez and Sacramento. The comment does not discuss the adequacy of the EIR/EA. No changes to the Draft EIR/EA are necessary.

20231213, Ellen Kolarik

My name is Ellen Kolarik and I have been a resident of Davis for 20 years. I agree that both congestion on I-80 is increasing and secondary congestion on Davis city streets is increasing as drivers use local roads in to try to bypass I-80 congestion. 1

That said, the work by Susan Handy of the National Center for sustainable Transportation has demonstrated that adding a new lane will only reduce congestion for a few years. The reduction in congestion will then induce more drivers to drive and the congestion will return.

Ms. Handy has stated (see letter to the Yolo Transportation District board of Directors printed in the Davis Enterprise article 9/3/23 B3):

"Academic studies have convincingly and conclusively established that increases in highway capacity let to increases in vehicle miles of travel (VMT). The work by my team at the Institute of Transportation Studies at the University of California, Davis shows that traditional methods for evaluating highway widening projects consistently underestimate the increase in VMT that such projects generate thereby over-estimating their benefits with respect to congestion reduction and under-estimating their benefits with respect to congestion reduction and under-estimating their impacts with respect to greenhouse gas emissions and other environmental impacts. Increased emission associated with the increase in VMT swamps any reduction in emission stemming from what will inevitably be a temporary improvement in traffic flow. " 2

Fehr Peers presented a report dated November 16, 2023 regarding VMT mitigation estimates for the CalTrans proposal. The bottom line from this report (p.12. last paragraph) is as follows:

"The potential VMT reduction of the mitigation measures listed in Table 8 would be sufficient to fully offset **only** the alternatives that would convert an existing lane to an HOV-only lane (Alternatives 7 and 15) presuming that SACSIM sensitivity issues noted above do no result in an overestimate of the VMT reduction potential."

Based on Handy's assessment of the scientific literature and the Ferh Peers report, it is clear that adding a lane will not fix congestion and will absolutely increase VMT which is a major driver of climate change and an existential threat to our planet.

The California Air Resources Board proposal for the State to reach net Zero carbon emissions by 2045 was approved last year. Given the increased VMT which would be induced by an additional lane of any kind on I-80, building an additional lane is both counterproductive and inconsistent with our state's blueprint to net zero.

Jeanie Ward-Waller has shared her concerns that CalTrans has been taking steps to circumvent environmental rules by understating environmental impacts and misdirecting funds for road maintenance into projects for road widening. (see article on Highway Expansion Project in Politico 10/3/23 by Debra Kahn). This suggests that CalTrans has an agenda which is inconsistent with our State's environmental laws and its goal to reduce global warming. 2 cont.

If we as a state are to succeed in leading the country to net zero, then every arm of the state including Caltrans needs to be onboard. CalTrans persistence in pushing its agenda for lane expansion is at best indifferent to the goal of net zero and at worst, illegal.

I favor doing nothing and investing public funds into improved transit in the form of increasing the number of bus lines, expanding Amtrak service and/or building light rail from Davis to Sacramento. To encourage the use of public transit, I could also support changing one of the currently existing lanes into an HOV lane. However, with the latter alternative, there must also be a commitment to enforcement of the lane. Given that I have not seen a commitment to HOV lane enforcement elsewhere in California, I lack confidence that mechanisms will be in place for enforcement here. 3

Thank you,

Ellen Kolarik MD

Resident Davis, California

Response to Comment 1 in 20231213, Ellen Kolarik

Commenter indicates traffic on I-80 is worsening, and that traffic in the City of Davis is intensifying because of diversion from I-80. The comment does not discuss the adequacy of the EIR/EA. No changes to the Draft EIR/EA are necessary.

Response to Comment 2 in 20231213, Ellen Kolarik

This comment refers to induced VMT with any of the add a managed lanes alternative, it also states that Caltrans mitigation plan would not fully mitigate induced VMT for the add a managed lane alternatives. See Master Response A for response on VMT mitigation.

An increase in project-level VMT thus does not immediately constitute a significant GHG impact or conflict with statewide GHG reduction policy, as suggested by the commenter. As discussed in Section 3.2.8 Greenhouse Gas Emissions, the emissions modeling performed for the project confirms that while VMT is expected to slightly increase, “GHG emissions for the Build Alternatives would be lower for design year 2049 compared to existing year (see Table”3.4-2)." Therefore, the project directly supports the state’s long-term target of carbon neutrality by 2045, as outlined in the 2022 Scoping Plan and pursuant to Assembly Bill 1279. Please refer to Response to Comment 12 in 20240111, Center for Biological Diversity and Response to Comment 7 in 20240110, California Air Resources Boardfor additional discussion. See also Master Response I.

In addition, that comment also suggests that Caltrans is circumventing environmental rules by misdirecting funds for road maintenance into road widening. Please see Master Response C for a detailed response on project segmenting. No changes to the Draft EIR/EA are necessary.

Response to Comment 3 in 20231213, Ellen Kolarik

This comment supports the No build alternative or the HOV conversion alternative if the lane is enforced. This commenter's preferences are noted. The comment does not discuss the adequacy of the EIR/EA. No changes to the Draft EIR/EA are necessary.

20231213, Ellen Kolarik (meeting)

STATE OF CALIFORNIA — DEPARTMENT OF TRANSPORTATION

Date

Yolo 80 Corridor Improvement Project

Name (please print) Ellen Kolarik E-mail/Phone# PESKOO@SBCGlobal.NET

175 Mariposa Circle | Davis | CA | 95618
Address (home) | City | State | Zip Code

Authorized Representative (name of organization or agency)

Address (business) | City | State | Zip Code

COMMENTS

A mobility hub for Davis would make it easier to take the Yolo Bus to Sacramento. Currently, no defined parking area for the bus. Recommend a site near Mace / 80 Intersection 1

Do you have a preferred alternative?

SLOW FOR THE CONE ZONE
CALTRANS

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Response to Comment 1 in 20231213, Ellen Kolarik (meeting)

This comment stated that it would be nice to have a mobility hub and Davis especially near Mace and I-80. There is an existing Park & Ride just north of the interchange that is accessible to buses and could be utilized in the future for more bus routes. The comment does not discuss the adequacy of the EIR/EA. No changes to the Draft EIR/EA are necessary.

20231213, No name

STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION

Date

Yolo 80 Corridor Improvement Project

Name (please print) E-mail/Phone#

Address (home) City State Zip Code

Authorized Representative (name of organization or agency)

Address (business) City State Zip Code

COMMENTS

The City of Davis logo is wrong. You have the old logo. Also the Yolo-Solano Air Quality Management District logo is wrong. 1

Do you have a preferred alternative? Contact Stephanie Holliday at YSAQMD for their logo & communications@cityofdavis.org for theirs.

SLOW FOR THE CONE ZONE CALTRANS

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Response to Comment 1 in 20231213, No name

This comment is not related to the content of the Draft EIR/EA but rather the logos used during the public meeting and who to contact for correct logos. No changes to the Draft EIR/EA are necessary.

20231213, Lise Smidth

STATE OF CALIFORNIA — DEPARTMENT OF TRANSPORTATION

Date Dec. 13, 2023

Yolo 80 Corridor Improvement Project

Name (please print) Lise Smidth E-mail/Phone#

401 12th St. Davis CA 95616
Address (home) City State Zip Code

Authorized Representative (name of organization or agency)

Address (business) City State Zip Code

COMMENTS Traffic on I-80 and ~~quality~~ noise of air in our Valley has become much worse.
I'm a resident (34 years+) of Davis, since 1989. Adding another lane will only lead to increased traffic, noise, pollution within a few years, unless we opt for a Transit only lane. Vancouver, British Columbia have Transit only lanes (for buses) and you can reliably and time/cost-effectively get to where you work/study/ airport much faster than by car during peak hours. Transit lanes should not be shared with cars/trucks or carpoolers - too hard to monitor. We need to reduce # vehicles on our roads which in the longrun are very expensive to maintain. 1

Do you have a preferred alternative?

7B: "Transit only lane" is the only option I ~~would~~ support. 2

We also need affordable housing so people don't need to commute as much

SLOW FOR THE CONE ZONE
CALTRANS

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Response to Comment 1 in 20231213, Lise Smidth

This comment opposed all alternatives except the transit only alternatives. The commenter's preferences are noted. The comment does not discuss the adequacy of the EIR/EA. No changes to the Draft EIR/EA are necessary.

Response to Comment 2 in 20231213, Lise Smidth

This comment expresses support 4-1224for transit only alternative and also expresses the need for affordable housing, which is unrelated to the EIR/EA. The comment does not discuss the adequacy of the EIR/EA. No changes to the Draft EIR/EA are necessary.

20231213, Albert Soares

STATE OF CALIFORNIA — DEPARTMENT OF TRANSPORTATION

Date 12/13/23

Yolo 80 Corridor Improvement Project

Name (please print) ALBERT SOARES E-mail/Phone# (530) 758-7606

DAVIS — CA — 95618

Address (home) — City — State — Zip Code

Authorized Representative (name of organization or agency) _____

Address (business) — City — State — Zip Code

COMMENTS

(1) I LIKE ALT 2A & ALT 2B WITH THE HOV LANES.

(2) DO NOT AGREE WITH HOT LANES — DOES NOT MAKE SENSE FOR ALL OF US TO PAY TAXES TO BUILD NEW LANES & THEN SUBSIDIZE THE RICH TO PAY A SMALL TOLL TO USE.

(3) ON A PROPOSED 8-LANE FREEWAY, IE 4 LANES IN EACH DIRECTION IT IS UNSAFE TO NOT HAVE A STD 10' SHOULDER ON LEFT.

(4) ALTERNATIVES TO TAKE AWAY A MIXED FLOW (EXISTING) LANE IS A NO-NO — DON'T KNOW WHY THIS IS VIABLE OR FEASIBLE

(5) WHEN THE BYPASS TO HAVE STD LEFT SHOULDERS

Do you have a preferred alternative? ALT 2A

SLOW FOR THE CONE ZONE CALTRANS

DO NOT COMPROMISE SAFETY

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Response to Comment 1 in 20231213, Albert Soares

Commenter supports project Alternatives 2A & 2B. The commenter's preference is noted. The comment does not discuss the adequacy of the EIR/EA. No changes to the Draft EIR/EA are necessary.

Response to Comment 2 in 20231213, Albert Soares

Commenter objects to proposed project HOT/Express lane alternatives. The commenter's objection is noted. The comment does not discuss the adequacy of the EIR/EA. No changes to the Draft EIR/EA are necessary.

Response to Comment 3 in 20231213, Albert Soares

Commenter objects to alternatives 2-6, which will reduce left inside shoulder to less than 10-feet and their opinion is that the reduced shoulder width would be unsafe. The comment does not discuss the adequacy of the EIR/EA. No changes to the Draft EIR/EA are necessary.

Response to Comment 4 in 20231213, Albert Soares

Commented objects to alternatives 7A and 7B, which would take away an existing mixed flow lane. The comment does not discuss the adequacy of the EIR/EA. No changes to the Draft EIR/EA are necessary.

Response to Comment 5 in 20231213, Albert Soares

The commenter proposes to widen the existing Yolo Causeway bridges to add a lane each direction and to make standard shoulder and lane widths. Caltrans structures have determined that the existing structure cannot be widened but would have to be replaced. Replacing the existing Yolo Causeway bridges and the potential environmental impacts and required mitigation are outside the project's scope of work.

No changes to the Draft EIR/EA are necessary.

20231213, Andea Soares

STATE OF CALIFORNIA

DEPARTMENT OF TRANSPORTATION

Date 12/13/2023

Yolo 80 Corridor Improvement Project

Name (please print) Andrea Soares E-mail/Phone# ansoares@ucdavis.edu

5622 GUTHRIE PL DAVIS CA 95618

Address (home) City State Zip Code

Authorized Representative (name of organization or agency) _____

Address (business) City State Zip Code

COMMENTS 2A & 2B are acceptable options. I commute on the causeway daily to UC Davis Medical Center. Removing the shoulder is also a bad alternative because any accidents will congest an additional lane of traffic. The current traffic situation has actually been exacerbated by your construction so that a 15 minute commute has been extended to 90 minutes. Please finish the construction as soon as possible and stop creating problems that are worse than the original issues. No toll, no removing the shoulder, and no conversion of existing lanes to lanes for the rich only. 1

No HOT and no conversion of existing lanes to managed lanes 2

Do you have a preferred alternative? No tolls for commuters please 3

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Response to Comment 1 in 20231213, Andea Soares

The commenter is in support of Build Alternatives 2A & 2B.

The commenter does not want proposed shoulders to be reduced in size and wants the shoulder wide enough to hold a vehicle during an incident.

This commenter has indicated that the current construction project has increased her commute time and wants this construction to be finished soon. 03-4F650: Yolo Pavement Rehabilitation Project: On Yolo 80 PM 4.3/R11.4 and Yolo 50 PM 0.0/2.5. This project proposes to rehabilitate pavement to bring it to a state of long-life pavement and provide other safety benefits such as standard median concrete barrier and additional lighting throughout the project limits. Planned Construction is from July 2023 to May 2026. The comment does not discuss the adequacy of the EIR/EA. No changes to the Draft EIR/EA are necessary.

Response to Comment 2 in 20231213, Andea Soares

This comment notes the commenter's opposition to toll Lane alternatives. The comment does not discuss the adequacy of the EIR/EA. No changes to the Draft EIR/EA are necessary.

Response to Comment 3 in 20231213, Andea Soares

The commenter is opposed to HOT lane alternatives and any tolls on this project. The comment does not discuss the adequacy of the EIR/EA. No changes to the Draft EIR/EA are necessary.

20231213, Katrina Sulton

STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION

Date 12/13/23

Yolo 80 Corridor Improvement Project

Name (please print) Katrina Sutton E-mail/Phone#

West Sac

Address (home) City State Zip Code

Authorized Representative (name of organization or agency)

Address (business) City State Zip Code

COMMENTS please don't add a new lane! 1

but if you have to. HOV/bus with enforcement

Do you have a preferred alternative? more public transit 2

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Response to Comment 1 in 20231213, Katrina Sulton

The commenter first states that they object to alternatives 2-6. Then the commenter states that they support alternatives 2A, 2B, 6A & 6B to add HOV lane or Transit only lane. The commenter's preferences are noted. The comment does not discuss the adequacy of the EIR/EA. No changes to the Draft EIR/EA are necessary.

Response to Comment 2 in 20231213, Katrina Sulton

This comment expresses the commenter's desire for more public transit. The project would expand Unitrans, multiple bus services, as well as expand the Capitol Corridor between Martinez and Sacramento. The comment does not discuss the adequacy of the EIR/EA. No changes to the Draft EIR/EA are necessary.

20231213, Eunice Tjon

STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION

Date 12/13/23

Yolo 80 Corridor Improvement Project

Name (please print) Eunice Tjon E-mail/Phone# eunicetjon@gmail.com

1819 P St #6 Sacramento CA 95811

Address (home) City State Zip Code

Authorized Representative (name of organization or agency) _____

_____

Address (business) City State Zip Code

COMMENTS See attached

Do you have a preferred alternative? _____

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We know congestion and traffic is a problem for drivers and roads in most major cities. Adding a lane and adding a toll will not improve these conditions. The proposal fails to address a lot of concerns and will exacerbate the problem that will be further caused by this effort.

Converting an existing lane into an HOV lane will cause an increase to traffic since single occupancy drivers will be forced to share two lanes instead of three. You'd be moving basically a third of the traffic down to two lanes. Maybe 10% of total drivers are HOV. 1

The state and federal government has been campaigning about reducing the effects of climate change. One of those is "incentivizing" and providing "discounts" to those who meet the goals of carpooling, driving an electric vehicle, using public transportation is kind of a discount in itself. HOV/HOT lane would mostly "benefit" buses and electric vehicles. We will all eventually move to EVs due to the state mandate for new cars being sold after 2035 to be EVs. So by the time we have maybe 50% of drivers using EVs, will the congestion change by any of the proposed alternatives? 2

If a toll is implemented, it will essentially become a long-term scam against the community because the system is in place, paying the toll will become a norm and common complaint, gas and toll prices increase, and people will be grumpy with their EVs in the year 2050.

Who currently owns electric vehicles? There are a lot of owners in the bay area and maybe more in Yolo, Sacramento, El Dorado counties now due to bay area transplants. In contrast, electric vehicles are almost non-existent in low-income communities and Black and Latino communities. 3

This project would hurt many people who will now have to sit in traffic for longer periods of time with rising gas costs, gas taxes on top of a potential toll fee if they want to use the lane. Adding a toll impacts low-income communities who rely on autonomous driving to get to/from places of employment, school, leisure, etc. It's unwelcoming to charge for something that used to be for "free" to the public with the public having paid for it via tax dollars.

This is like widening a water pipe. You'll get more water to flow, but it will flow at the same rate. The more lanes you add, the more people will be motivated to drive under the pretense that traffic has improved. Richmond/SF doesn't even have a shoulder for accidents or drivers to pull on the side of. I've seen the HOT lane being used seldomly when I have driven in the bay and when they are used, it's sometimes used by impatient solo drivers. It may improve conditions for the short term, but long term wise, we will see the same amount of traffic and congestion as we see in cities like on I-80 Richmond/SF and LA. 4

Converting the shoulder to be HOV/LOT lane poses the same issue that exists in Richmond/SF on I-80. If an accident occurs or emergency vehicles need to get through, the amount of traffic would increase.

The only solution that I've seen and experienced that helps with traffic flow are on ramp traffic lights which control how many cars hop on the freeway. I don't see any other good solutions or proposals with any of the build alternatives. 5

Response to Comment 1 in 20231213, Eunice Tjon

The commenter does not support proposed toll lane alternatives. The commenter also does not support converting and existing lane to an HOV lane o (alternatives 7A and 7B). The commenter's preferences are noted. The comment does not discuss the adequacy of the EIR/EA. No change in Draft EIR/EA necessary.

Response to Comment 2 in 20231213, Eunice Tjon

This comment refers to the number of EV that meet HOV requirements now and how they will fill up the managed lanes. The mandate that allows single-occupant electric vehicles to use the HOV lane is set to expire in 2025, well before the opening of this project. While the managed lane would provide benefits to public transit, it would also provide benefits to trucks and passenger vehicles, both in and out of the managed lane. The comment does not discuss the adequacy of the EIR/EA. No changes to the Draft EIR/EA are necessary.

Response to Comment 3 in 20231213, Eunice Tjon

This comment expresses the commenter's concern for charging a toll for something that used to be free. No project alternative would convert a general-purpose lane to a HOT/Express toll lane, all proposed alternatives would toll new lanes. Please refer to Master Response E for a more detailed response on the Equity of toll lanes. The comment does not discuss the adequacy of the EIR/EA. No changes to the Draft EIR/EA are necessary.

Response to Comment 4 in 20231213, Eunice Tjon

This comment notes the commenter's opposition to capacity increasing projects and to reducing shoulder widths. The comment does not discuss the adequacy of the EIR/EA. No changes to the Draft EIR/EA are necessary.

Response to Comment 5 in 20231213, Eunice Tjon

This comment notes the commenter's support for ramp metering. The comment does not discuss the adequacy of the EIR/EA. No change to Draft EIR/EA necessary.

20231213, Ky-An Tran

STATE OF CALIFORNIA — DEPARTMENT OF TRANSPORTATION

Date 12/13/23

Yolo 80 Corridor Improvement Project

Name (please print) Ky-An Tran E-mail/Phone# (916) 947-0545

1000 Berryessa Lane, Unit 221 Davis CA 95616

Address (home) City State Zip Code

Authorized Representative (name of organization or agency)

Address (business) City State Zip Code

COMMENTS

I believe enforcement is one of the biggest problems with managed lanes. Option 5 seems to be the best solution to do that. in order to achieve the results shown 1

Further efforts to coordinate w/ transit agencies should be done to further reduce demand for driving. Extend service times to reduce demand from Davis to Sacramento commuters e.g. students/workers 2

Do you have a preferred alternative? 5A/5B 3

5B is preferred

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Response to Comment 1 in 20231213, Ky-An Tran

Commenter suggests that managed lanes do not work due to lack of CHP enforcement The project will include enforcementforcment areas so they can pull over vehicles that are violating if needed.

Commenter supports Alternatives 5A and 5B. The comment does not discuss the adequacy of the EIR/EA. No change in Draft EIR/EA necessary.

Response to Comment 2 in 20231213, Ky-An Tran

This commenter requests that more be done to improve transit and reduce the need to drive from Davis to Sacramento. The project would expand Unitrans, multiple bus services, as well as expand the Capitol Corridor between Martinez and Sacramento. The comment does not discuss the adequacy of the EIR/EA. No changes to the Draft EIR/EA are necessary.

Response to Comment 3 in 20231213, Ky-An Tran

This comment notes the commenter’s preference for Build Alternatives 5A and 5B. The comment does not discuss the adequacy of the EIR/EA. No changes to the Draft EIR/EA are necessary.

20231214, Chris and Ann Majestic

From: CHRIS & ANN MAJESTIC
To: Yolo80Corridor@DOT
Subject: Hyw 80 Improvement
Date: Thursday, December 14, 2023 2:58:13 PM

EXTERNAL EMAIL. Links/attachments may not be safe.

Hello,

I don't like any of your proposed choices.
The bottleneck happens when 80 goes from 4 lanes to 3 lanes. Can't we just add a 4th lane in each direction? 1
Driving on the freeway shouldn't be so complicated!

Thanks,
Ann Majestic

Sent from my iPhone

Response to Comment 1 in 20231214, Chris & Ann Majestic

This comment expresses the commenter's opposition to all alternatives and proposes the addition of a general-purpose lane in each direction. Please refer to Master Response B, Suggested Alternative: Add a General-Purpose Lane for a detailed response on why this does not meet the purpose and need of the project. The comment does not discuss the adequacy of the EIR/EA. No changes to the Draft EIR/EA are necessary.

20231218, Joel Guzman

From: Joel Guzman
To: Yolo80Corridor@DOT
Subject: Questions about the Yolo 80 Corridor Improvements Project
Date: Monday, December 18, 2023 4:06:11 PM

EXTERNAL EMAIL. Links/attachments may not be safe.

Hello,

My name is Joel Guzman and I am a member of 350 Sacramento, which is a local environmental advocacy group. I have a few questions regarding this project and would like to understand if using the Yolo80corridor.dot.ca.gov e-mail address is the right place to send questions or if there is an alternative method of sending questions about the project. The main project page https://dot.ca.gov/caltrans-near-me/district-3/d3-projects/d3-i80-corridor-improvements has a "**Contact Us**" section where it lists the names and titles of a few people (i.e. Gurtej Bhattal, Project Manager; Masum A Patwary, Environmental Coordinator, Dennis Keaton, Public Information Officer). It then says that you can use Yolo80corridor.dot.ca.gov to send comments but doesn't specify where to send questions. 1

In Draft Environmental Document **Cover Summary (PDF)** I have a few questions regarding *Table S-2 SUMMARY OF CALIFORNIA ENVIRONMENTAL QUALITY ACT (CEQA) IMPACTS.*
The *Energy* and *Greenhouse Gas Emissions* sections specify that all of the alternatives other than *Alternative 1 - No Build* list the impacts as "Less-than-significant impact with mitigation." 2

My questions are:

1. What would the next level of impact be if it were not "less-than-significant"? For example, would it be "moderate impact" or "significant impact"?
2. What criteria are used to determine that the *Energy* and *Greenhouse Gas Emissions* impact for the various alternatives is less-than-significant? **Hypothetically, what criteria would it have taken for the impacts to receive the next higher level of impact?** 3
3. I see that the "less-than-significant" impact description has been applied to a number of other Environmental factors such as Aesthetics, Air Quality, Biological Resources, etc. In general, is what constitutes "less-than-significant" defined somewhere? 4

I have other questions but before taking the time to note them, I wanted to again confirm that sending questions to this e-mail address is the proper mechanism for submitting questions. Thank you for taking the time to review these! 5

Joel Guzman
703-409-2864
350 Sacramento

Response to Comment 1 in 20231218, Joel Guzman

Commenter acknowledges the correct sources and e-locations to submit comments. However, the commenter differentiates comment and questions.

Response to Comment 2 in 20231218, Joel Guzman

The commenter asks for additional information on the impact determinations under CEQA. The determinations are no impact, less than significant impact, or significant impact. Impacts initially found to be significant may be reduced to less than significant with mitigation. If sufficient mitigation is not available to reduce the impact, the impact would be found to be significant and unavoidable.

Response to Comment 3 in 20231218, Joel Guzman

Construction impacts on air quality are evaluated based on compliance with control measures. Caltrans considers projects that do not implement Caltrans Standard Specifications to result in a significant short-term air quality impact. Operational impacts on air quality were assessed based on the project's contribution to regional emissions and potential to contribute to localized emissions hot spots. Caltrans determined "less than significant" air quality impacts as each of the Build alternatives would improve operations, reduce congestion, and increase vehicle occupancy within the travel corridor as compared to the No Build alternative. The Build Alternatives were also found not to contribute to localized emissions hot spots.

Caltrans' criteria for determining GHG emissions significance is whether the project contributes to overall state reduction goals. A project that results in less GHG emissions compared to existing can be considered to have a less than significant impact. Please see Response to Comment 41 in 20240112, City of Davis for additional discussion.

Response to Comment 4 in 20231218, Joel Guzman

Caltrans staff utilizes the best available science and technology to address a project, or project alternative's effect on the environment. The threshold of significance is based upon its contribution to its existing and projected condition. If an impact greater than less than significant is expected from a project's construction and or operation, mitigation measures are added to bring the threshold down to a level of less than significant with mitigation added. The California Environmental Quality Act does permit cities, counties and other jurisdictions to adopt thresholds of significance to their respective CEQA checklists. Caltrans has not adopted these. However, Caltrans does recognize and adhere to all applicable state and federal environmental laws and regulations. In Caltrans' case, when measuring levels of significance, Caltrans relies heavily on the agency responsible for the subject resource, such as the Army Corps of Engineers for wetlands and California Department of Fish Wildlife for bats. Impacts to cultural resources, for example, are under each local applicable Tribe and reviewed by the Office of Historic Preservation. Impacts to a scenic highway (aesthetics) would subject to number visual analyses by landscape architects, the effect communities, and surrounding property owners.

Response to Comment 5 in 20231218, Joel Guzman

See response to Comment 1.

20231219, Nick Bates

From: Nick Bates
To: Yolo80Corridor@DOT
Subject: Public comment on Yolo 80 Corridor Improvements Project
Date: Tuesday, December 19, 2023 1:51:59 PM

EXTERNAL EMAIL. Links/attachments may not be safe.

Dear Caltrans,

I am a resident of Davis and member of the city's bicycling, transportation, and street safety commission. I'm providing my public comment on your Yolo 80 Corridor Improvements Project. These comments are my own and are not specifically endorsed by the city commission on which I serve. 1

1. Despite the noted policy benefits of opting for a toll lane and the stated preference of the YoloTD board for the toll lane option, there was no studied alternative where no additional lane is added to the freeway, but instead an existing general purpose lane is converted to a toll lane (HOT3+ or otherwise). I do not think alternative 7 (converting an existing general purpose lane to an HOV lane) captures these benefits and therefore is sufficient as the only alternative which does not add a traffic lane. 2

2. The following is stated as a need addressed by the project:
- Operational inefficiencies lead to the formation of bottlenecks due to short weaving and merging areas as well as lane drops.

However, despite this, in alternative 7, they do not make the reasonable accommodating step of removing lanes (numerous of which are short lived lanes which only exist for merging traffic) upstream of the existing bottleneck. 3

3. This project admits to increasing VMT (the VMT mitigation is stated to only account for 43% of the overall induced VMT). This runs counter to the goals of other California agencies, including the California Air Resources Board. Additionally, these VMT mitigation projects represent the largest cost/benefit options (the low hanging fruit) available to regional governments for reducing VMT. Therefore, reducing (or mitigating) VMT beyond what is outlined in this project will become even more costly and difficult if one of the VMT increasing alternatives of the project is to move forward. 4

Best,
Nick Bates

Response to Comment 1 in 20231219, Nick Bates

This introductory comment provides background on the commenter. The comment does not discuss the adequacy of the EIR/EA. No changes to the Draft EIR/EA are necessary.

Response to Comment 2 in 20231219, Nick Bates

This commenter states there was no studied alternative where no additional lanes are added and instead existing general-purpose lanes converted to toll lanes. For more information, please see Master Response B on Alternatives Considered. The commenter also expresses their preference for Alternative 7. This preference is noted. No changes to the Draft EIR/EA are necessary.

Response to Comment 3 in 20231219, Nick Bates

This comment suggests that alternative 7 does not include some of the auxiliary lane improvements like the other build alternatives. Alternative 7 contains the same project scope and includes these auxiliary lane improvements, the only differences are that no lane will be added, and the existing general-purpose lane will be converted to an HOV lane. No changes to the Draft EIR/EA are necessary.

Response to Comment 4 in 20231219, Nick Bates

This comment notes challenges for VMT reduction opportunities in the future if the proposed project with a VMT increasing alternative moves forward. Please refer to Master Response A for responses related to VMT and mitigation.

20231224, Chris Higgins

COMMENTS ON YOLO 80 IMPROVEMENT PROJECT

Thank you for soliciting public comments on the Draft Environmental Document for this project.

I am a 50-year resident of Davis who commuted by bicycle to my job in downtown Sacramento between 1977 and 2020. As such, I am aware of the benefits and challenges of cycling along County Road 32A ("32A"), the Yolo Causeway Bike Path, and West Capitol Avenue in West Sacramento. Over the years, I have discussed this route with fellow commuter cyclists and people who considered riding it but chose not to for various reasons. My comments below concern the current route and the proposed modifications to, and effects on, the route by the Yolo 80 Improvement Project. As cyclists, our main goal for this project is to improve bicycle infrastructure in ways that will encourage more people to stop or reduce use of their motor vehicles on this segment of I-80, and instead bicycle to reduce traffic, pollution, and use of fossil fuels. This change can also enhance their physical and mental well-being. 1

County Road 32A

- New Class 1 Bicycle Path
  - The formal definition of this type of path should be stated in the document.
    - See page 1000-3 at https://dot.ca.gov/-/media/dot-media/programs/design/documents/chp1000-a11y.pdf
    - State how the proposed path will conform to this definition.
    - What is the timeline for construction and completion of this path within the overall project?
  - It appears from pages 1-12 and 1-13 that a Class 1 bicycle path will be constructed along 32A from the west end of the Yolo Causeway to just east of the County Road 105 railroad crossing. This work would involve "…widening the shoulders of CR-32A…", which seems to indicate that there would be bicycle paths on both the north and south sides of 32A. The maps in the DED Chapter 1, however, show a new Class 1 bicycle path only on the north side of 32A. Please explicitly state whether there will be only one path on the north side or paths on both the north and south sides. If the latter, the maps should add a green line on the south side of 32A. 2
  - If the path is only on the north side, I assume it will be two-way.
  - How wide will this path(s) be? This widening project is critical and essential because a major reason many people do not like riding between Davis and West Sacramento is the current narrow shoulder on each side of 32A that serves as the bike "route." The shoulders are 3- to 4-feet-wide with no separation from motor vehicles, which include large trucks (e.g., garbage, tractor-trailer) . It is especially worrisome for people riding from Davis to West Sacramento or Sacramento at commute time in the afternoon; cut-through vehicle traffic going east at this time of day to bypass I-80 is constant and extremely heavy.
  - Will there be diagonal warning-striping to separate the bicycle path from the motor-vehicle lane? Another justification for a separated bike path on 32A is that cyclists often encounter motor vehicles driving at high speeds in the opposing traffic lane who are passing slower vehicles by driving in the traffic lane adjacent to the cyclists (passing into on-coming traffic, i.e., cyclists).

- Webster Interchange (off-ramp/on-ramp intersection from I-80 with 32A)
    - Cyclists using the new Class 1 bicycle path that parallels the westbound off-ramp from I-80 will have to cross vehicle traffic here to access or leave this path. Currently, there is only a stop sign for the westbound off-ramp vehicles. Will there be some additional traffic-control features (e.g., signs warning motorists about cyclists) at this intersection? 3
- Class 2 Bicycle Lane(s) east of County Road 105
    - According to the description on page 1-13 there will be 6-foot widened bicycle lanes "on both sides" of 32A, which will extend from the CR 105 railroad crossing to the new Class 1 path to the east along 32A. If the new Class 1 path is only on the north side of 32A, it will require eastbound cyclists using the Class 2 lane segment to cross 32A from the south side to the north side to reach the Class 1 path. Will there be a crossing zone marked for this maneuver with warning signs to alert motorists? 4

Yolo Causeway Bike Path

- The current bicycle path on the Yolo Causeway is the only practical route for cyclists traveling between Davis and West Sacramento. It is essential that this path remain open throughout the life of the Yolo 80 construction project. We support the statement on page 1-12 that the path will remain open, especially considering that the earlier proposed option of constructing a separate bicycle-pedestrian bridge, north of the causeway, has been eliminated. This elimination was based on the cost of construction and maintenance, emergency access, and potential adverse effects on the flora/fauna in the underlying bypass. Another reason for elimination of the bridge option is that the amount of use of this structure by cyclists and pedestrians is not expected to be sufficient, based on a survey of recent usage of the causeway bike path. Consider, however, that if a separate bridge were constructed, it might encourage much larger use than what is seen today on the causeway path. Regarding access to the proposed bridge for maintenance and emergencies, it is unfortunate that a heavy-duty bridge over the slough at the east end of the causeway was demolished many years ago. This bridge was built in the early 1980's to accommodate a paved bicycle path, which was constructed on the floor of the bypass between Levee Road on the west and the east end of the causeway. This path was later removed after only a few years of use and replaced by the current Class 1 path on the causeway. 5
- Besides the concern about vehicle traffic along 32A mentioned above, another major reason that many people do not want to bicycle (commute, recreational) between Davis and West Sacramento is the noise and reduced air quality along the Yolo Causeway (some folks are also bothered by the visual distraction of constant high-speed vehicle traffic). The current barrier that separates cyclists from motor vehicles consists of a concrete base with a chain-link fence on top, which offers little mitigation of noise and reduced air quality. This situation led to the rationale of constructing the separate bicycle-pedestrian bridge north of the causeway. With that idea eliminated, there is a need to explore ideas on how to somehow mitigate these concerns if cyclists are to continue riding on the causeway: 6
    - One idea to possibly reduce noise and visual distraction is to eliminate the chain-link fence and raise the height of the concrete barrier.

- Instead of a higher concrete wall, installation of sheets of plexiglass on top of the current concrete base may be less expensive (?) and easier to replace if damaged by vehicle collisions or flying debris. I do not know about the longevity of this material, however.

As time goes on the issues of noise and air quality should diminish on the causeway as internal-combustion engines are phased out and replaced by electric or fuel-cell vehicles. In the meantime, however, mitigation of these issues should be addressed. 6 cont'd

- The existing pavement on the berm section of the bike path is in poor shape with many cracks and needs replacement. This replacement project would likely require that the path be closed for a short period during this re-surfacing, with no alternative route for cyclists to use during the project. This segment is almost a mile long and I am guessing would need a few to several weeks for re-surfacing. Would cyclists be accommodated in some way to continue riding or would they need to wait to resume riding until the re-surfacing is completed?
- Will the concrete pavement on the two bridge sections of the path be resurfaced in any way?
- Debris (broken glass, wood and metal fragments, etc.) washed from drain tunnels under the concrete barrier along the path is often a problem, particularly during rain storms. It accumulates on the path because it has no means of washing over the edge of the bridges or berm. This debris causes hazards for cyclists ranging from causing flat tires to potential crashes, especially for those cyclists who ride during darkness. Caltrans maintenance crews periodically run a sweeper on the path to remove this debris, and we appreciate that. I understand from discussion with Caltrans staff that there is a plan to increase the size of the drain tunnels. Again, however, movement of debris from the adjacent vehicle lanes through the enlarged tunnels will still impact the bicycle path. Installing new drain tunnels in the outer concrete barriers on the edge of the bridges will only spill the material onto the bypass floor, which is not acceptable. Probably the only realistic way of keeping the debris off the path is to have more frequent sweeper cleaning by Caltrans. 7
- I agree that the Levee Road bike path at the west end of the causeway needs replacement. It has very rough pavement in places.

West Capitol Avenue Path

- This comment concerns the bike path that extends from West Capitol Avenue behind the gas stations and adjacent to the westbound I-80 on-ramp to the Class 1 bike path on the Yolo Causeway bridge deck. The pavement on this path definitely needs re-surfacing, particularly the section adjacent to the westbound on-ramp. 8

Miscellaneous

- Electric bikes and scooters are becoming common as means of transportation. Some models of the former can travel at high speeds, much higher than the average speed of users of regular bicycles. Also, e-bikes are heavy and can be more difficult to stop than regular bicycles when necessary. Finally, e-bikes are often ridden by people inexperienced with such bikes. Where e-bikes and regular bikes share narrow bike paths and lanes there is potential for serious collisions. Correspondingly, it is advisable to post appropriate speed limits for e-bikes on the bicycle 9

infrastructure associated with the Yolo 80 project. Admittedly, however, it will be difficult to enforce these limits. | 9 cont'd

Please thank Caltrans staff for useful discussions I had with them at the December 13th public meeting held in Davis. Also, I would be glad to discuss any of the above comments further with Caltrans staff if desired. | 10

Chris Higgins
Davis

Response to Comment 1 in 20231224, Chris Higgins

This comment is in regard to getting drivers out of their vehicles and using active transportation like bicycles. The Build Alternatives include construction of a pedestrian path/bike lane extension along the westbound I-80 off-ramp to Chiles Rd from the west end of the Yolo Causeway bridge to Chiles Road/CR 32aA, Hot Mix Asphalt paving of the existing pedestrian path/bike lane on each the western approach to the Yolo Causeway (west) bridge to the eastern approach to the Yolo Causeway (east) bridge, and installation of lighting for bike facility and pedestrian facility. Since the project would not physically widen the Causeway bridge, improvements to the bike path are limited to repaving. No changes to the Draft EIR/EA are necessary.

Response to Comment 2 in 20231224, Chris Higgins

The first phase of this project may go to construction as soon as October of 2024 with construction complete October 2027. The goal of the first phase project is to stagger the construction work on the western Yolo Causeway levee bicycle/pedestrian path and the work to construction the proposed bicycle/pedestrian 2-way path along the westbound 80 off-ramp to Chiles Road so that the bicyclists/pedestrians have an alternative route during construction. The repaving of the asphalt paving of the bicycle/pedestrian path east of the Yolo Causeway will most lily be performed at night to limit impacts to bicyclists/pedestrians.

Caltrans continues to support the Yolo County project to widen CR 32A to add bike paths in the outside shoulders, from CR 105 to the existing western Yolo Causeway levee bicycle/pedestrian path. This Yolo County project is in the planning stages.

The proposed bicycle/pedestrian path along the westbound 80 off-ramp to Chiles Road will be separated from motorists with a concrete barrier and fence on top and will be approximately 10 feet wide or 5 feet wide each direction.

Caltrans proposes to use CA MUTCD standard bike path signs and pavement markings at the approaches to the western Yolo Causeway levee bicycle/pedestrian path and the proposed bicycle/pedestrian 2-way path along the westbound 80 off-ramp to Chiles Road. No “diagonal warning- striping" is currently proposed for the phase 1 project.

Current bike path on the Yolo Causeway: The current construction project east of Mace Boulevard on Yolo 80 is the 03-4F650: Yolo Rehabilitation Project and is a separate and unrelated project. The 4F650 project proposes to remove and replace existing concrete pedestrian rail and fencing between the bicycle/pedestrian path and westbound Yolo Causeway traffic lanes and remove and replace Hot Mix Asphalt pavement on the bicycle/ pedestrian path between the Yolo Causeway bridges. The 4F650 project is providing one-way traffic control for the bike path during construction.

No changes to the Draft EIR/EA are necessary.

Response to Comment 3 in 20231224, Chris Higgins

This comment requests more information on how the bike path will cross in front of the WB off-ramp at the intersection of Chiles Road/ County Road 32A and the WB I-80 off-ramp. The construction of the bicycle/pedestrian path along westbound I-80 off-ramp to Chiles Road/CR 32A will allow bicyclists traveling eastbound from the City of Davis to access the Yolo Causeway bridge bicycle/pedestrian path without crossing the Chiles Road/CR 32A traveled way. Bicyclists traveling westbound on the existing Yolo Causeway bridge bicycle/pedestrian path will find that if they travel on the existing western Yolo Causeway levee bike path, they will not have to cross the Chiles Road/CR 32A traveled way to get to the City of Davis.

No changes to the Draft EIR/EA are necessary.

Response to Comment 4 in 20231224, Chris Higgins

See response to comment #2 above.

Response to Comment 5 in 20231224, Chris Higgins

Caltrans determined that the Project Study Report-Project Development Support report (PSR-PDS) Alternative 1A proposal for a separate bike bridge facility along the Yolo Causeway corridor would not be a viable add-on feature due to the low benefit to cost ratio. The bicycle bridge was estimated to cost about $74,500,000, and the current bicycle usage is low, or about 44 total weekday and 109 total weekend bicycle riders (counted in 2021). Environmental analysis revealed several potential impacts on existing wildlife below the Yolo Causeway due to constructing a separate bicycle bridge. Caltrans rejected this alternative due to the anticipated environmental impacts and environmental mitigation required. No changes to the Draft EIR/EA are necessary.

Response to Comment 6 in 20231224, Chris Higgins

This comment offers solutions to help limit the suggested noise and air pollution on the Yolo Causeway. The Yolo 80 Rehabilitation Project 03-4F650, currently under construction, will replace this barrier and fencing. Modifying the barrier and fencing on the Yolo Causeway bike path is out of the scope of the proposed project. No changes to the Draft EIR/EA are necessary.

Response to Comment 7 in 20231224, Chris Higgins

See response to comment #2 above.

The current Yolo Pavement Rehab Project 03-4F650 does not propose any modifications to the concrete bridge deck portion of the existing Yolo Causeway portions of the bicycle/pedestrian path.

The commenter is correct, scuppers or holes at the base of the proposed concrete barrier between the bicycle/pedestrian path and eastbound 80 traffic are proposed on the 4F650 project to allow storm water runoff to drain from the eastbound 80 bridge deck and then to the existing northern bridge rial scuppers. It is unfortunate that sometimes debris washes onto the

bike path along with the storm water. The comment will be passed on to Caltrans maintenance to request an increase in frequency of the sweeper trucks on the bike path. During 4F650 and the Managed Lane project construction periods, maintenance of the bicycle/pedestrian paths will be the construction contractors' responsibility.

No Changes to the Draft EIR/EA are necessary.

Response to Comment 8 in 20231224, Chris Higgins

The ultimate Managed Lane project proposes to provide asphalt overlay on the existing City of West Sacramento bike path behind the West Capital Ave gas station.

No changes to the Draft EIR/EA are necessary.

Response to Comment 9 in 20231224, Chris Higgins

The proposed managed lane project improvements to the bicycle/pedestrian paths will be available for e-bikes. The proposed Mobility Hub will provide an opportunity for e-bicyclists to drop off bikes and transfer to carpools or buses.

This comment provides information on electric bikes and scooters as a form of transportation. The comment does not discuss the adequacy of the EIR/EA. No changes to the Draft EIR/EA are necessary.

Response to Comment 10 in 20231224, Chris Higgins

This conclusory comment includes a thank you to Caltrans' staff who attended the December 13, 2023, public meeting. The comment does not discuss the adequacy of the EIR/EA. No changes to the Draft EIR/EA are necessary.

20231224, Meredyth Reinhard

From: pawsrus1@gmail.com
To: Yolo80Corridor@DOT
Subject: public comment
Date: Sunday, December 24, 2023 12:13:35 PM

EXTERNAL EMAIL. Links/attachments may not be safe.

To Whom This May Concern:

I am vehemently opposed to the plan! 1

There's no argument that we are in a Climate Crisis.

The science is there.

I understand $86 million is available only if you are authorized for construction by September 30, 2024. The clock is ticking. However, just because those dollars are available, does not mean a project that does not address our CLIMATE CRISIS should move forward. 2

According to the SacBee on October 17, 2023, a high level administrator was demoted due to their concerns about the project {with related article on October 13, 2023}.

It's shameful and frightening to know that a government employee who has the knowledge and experience has been pushed aside because they are telling the truth about the project! The employee was courageous to step forward and should be *honored* for their tenacity.

Furthermore, this plan adds to poor public health, a waste of taxpayers monies and will create worse highway conditions. Once it's a done deal, there is no turning back and the damage will be done for future generations. 3

Moreover, in reality, this plan encourages more driving which would not cut down on greenhouse gasses, which is a State of California Goal and a Federal Government Goal. 4

It's a travesty that most policy makers are not forward thinkers when it comes to transportation planning. It looks like these decisions are made with outdated planning goals. We live in different times.

It's imperative that policy makers are looking to our future and not relying on the past. If not, lives are destroyed. 5

Thank you for your time and attention.

Respectfully submitted,

Meredyth Reinhard
Davis, CA - Resident

Response to Comment 1 in 20231224, Meredyth Reinhard

This comment opposes the project. The comment is noted, The comment does not discuss the adequacy of the EIR/EA. No changes to the Draft EIR/EA are necessary.

Response to Comment 2 in 20231224, Meredyth Reinhard

This comment discusses project funding, concerns that the project does not address the climate crisis, and the commenter's views of specific staff at Caltrans. The comment does not discuss the adequacy of the EIR/EA. No changes to the Draft EIR/EA are necessary.

Response to Comment 3 in 20231224, Meredyth Reinhard

This comment is an opinion on public health, resources used to construct the project and that the project will worsen operations (no specific alternatives stated). Please see Master Response H for more information on improved traffic operations with the project. These comments are noted. The comment does not discuss the adequacy of the EIR/EA. No changes to the Draft EIR/EA are necessary.

Response to Comment 4 in 20231224, Meredyth Reinhard

This comment claims that the project encourages more driving and that the project will not cut down on GHG. The project purpose is to encourage carpooling and the use of transit with a more reliable corridor. In addition to the managed lane, other transit improvements will include expanded Unitrans, multiple bus services, as well as the project will expand the Capitol Corridor between Martinez and Sacramento. The assertion that the project will increase GHG emissions is not consistent with the information presented in the EIR/EA. Table 3.2-8 in Section 3.2.8 Greenhouse Gas Emissions shows that GHG emissions for the Build Alternatives would be lower for design year 2049 compared to existing year. Therefore, the project directly supports the state's long-term target of carbon neutrality by 2045, as outlined in the 2022 Scoping Plan and pursuant to Assembly Bill 1279.

Response to Comment 5 in 20231224, Meredyth Reinhard

This comment notes views about transportation planning. The comment does not discuss the adequacy of the EIR/EA. No changes to the Draft EIR/EA are necessary.

20231225, Dan Parfitt

YOL 80 CORRIDOR IMPROVEMENT PROJECT : COMMENTS FROM DAN PARFITT, DAN.PARFITT@ATT.NET

1. The proposal as presented will basically add a 'cheater' lane in each direction, that is no real lanes will be created, just narrowing of existing lanes to create an extra 'narrow' lane. Of course all of the other lanes will become narrower as well. Accidents on the causeway already cause extensive delays. I expect narrower lanes to significantly increase the number of accidents. 1
2. New lanes need to be built outside of the present lanes to increase the net width of the causeway, such as was done in the past to get the 3d lane. 2
3. If CalTrans is going to make 'cheater' car pool lanes in the middle, they should be arranged such that both lanes can run in the same direction and be reversed for morning and evening rush hours, thus providing essentially 5 lanes in one direction at critical times. Chicago uses this for I94. 3
4. I also oppose the development of mass transit only lanes as these are usually underused both in terms of number of busses and riders per bus. Wishes are nice, but if large amounts of money and effort are going to be expendend, lets do something effective. 4
5.

Response to Comment 1 in 20231225, Dan Parfitt

[This commenter offers an opinion that with an additional lane on the Yolo Causeway, the narrower lanes will lead to more incidents. This comment is noted. The comment does not discuss the adequacy of the EIR/EA. No changes to the Draft EIR/EA are necessary.

Response to Comment 2 in 20231225, Dan Parfitt

This comment proposes that the bridges be widened to accommodate the additional lane in each direction. Caltrans structures have determined that the existing structure cannot be widened but would have to be replaced. Replacing the existing Yolo Causeway bridges and the potential environmental impacts and required mitigation are outside the project's scope of work. No changes to the Draft EIR/EA are necessary.

Response to Comment 3 in 20231225, Dan Parfitt

This comment requests that the new lanes should be reversible. This was looked into in the Project Study Report-Project Development Support (PSR-PDS) document. The existing and projected “off-peak" directional split of the total freeway transportation is greater than 35%, with almost equal directional splits in some segments of the project area during the PM peak period. Therefore, based on existing guidance, transportation data, and projected traffic growth, a reversible HOV lane would not be an appropriate alternative to consider for this project. No changes to the Draft EIR/EA are necessary.

Response to Comment 4 in 20231225, Dan Parfitt

This comment expresses opposition for the Transit Only Lane Alternatives. This preference is noted. The comment does not discuss the adequacy of the EIR/EA. No changes to the Draft EIR/EA are necessary.

20231227, Ken Britten

Subject: Comment on DEIR

From: Ken Britten Gmail <khbritten@ucdavis.edu>
Sent: Wednesday, December 27, 2023 1:51 PM
To: Yolo80Corridor@DOT <Yolo80Corridor@dot.ca.gov>
Subject: Comment on DEIR

EXTERNAL EMAIL. Links/attachments may not be safe.

Dear Caltrans,

I serve as At-Large Commissioner on the Yolo County Climate Action Commission, and as Chair of the City of Winters Climate Action Commission, but I write today as a private citizen, albeit a well-informed one.

I strongly believe that the DEIR as written does not contain analysis that allows a sensible judgment of the climate impacts of the various alternatives, and no decision should be made until better modeling is included. Speficially, in the third paragraph on page 3-61, the draft states that the model that was used to estimate GHG emissions did not include induced travel nor vehicle dynamics. Both of these are critical factors, and thus the modeling is at best uninformative but more likely, frankly misleading. Given the ambitious climate goals that the state has declared, this is disappointing. Please use a better model before any decisions are made. 1

Thanks,

Ken Britten
30100 Positas Rd.
Winters, CA 95694

1

Response to Comment 1 in 20231227, Ken Britten

The commenter states in the Draft EIR/EA on page 3-61 modeling of GHG emissions did not include induced or travel dynamics. Please see Master Response I for the GHG model.

20240108, Yolo County Supervisor Jim Provenza

JIM PROVENZA
Yolo County Supervisor
4th District

625 Court Street, Room 204
Woodland, CA 95695-3448
Deputy Supervisor: Sheila Allen
Office (530) 757-5555
Email: sheila.allen@yolocounty.org

District Office:
600 A Street, Suite C
Davis, CA 95616-3648
Office (530) 757-5554
Email: jim.provenza@yolocounty.org

January 8, 2024

Masum A. Patwary
Caltrans Environmental Scientist C, District 3
703 B Street
Marysville, CA 95901

Ref: Comment Letter: Yolo 80 Corridor Improvements Project

Dear Mr. Patwary,

Attached you will find a copy of the comments on the above project by some of my constituents who live in a community of 131 Yolo County homes called "Old Willowbank", located south of, and immediately adjacent to the City of Davis. I appoint members of the community to the Willowbank County Service Area and Community Advisory Committee (WCSA/CAC) which I ask to advise me and the Yolo County Board of Supervisors on matters of importance to the community. 1

The Committee has taken great interest in the proposed Yolo 80 Project because it directly and indirectly affects most residents of the neighborhood on a daily basis. At its November 14, 2023, meeting, the Committee directed the WCSA/CAC Chair and Vice Chair to comment on the Draft Environmental Impact Report (DEIR), signed by Governor Newsom on November 13, 2023.

The WCSA/CAC's comments may be useful to Caltrans as it evaluates the environmental implications of the project. The Committee asserts that congestion that currently occurs daily on the existing three-lane Davis and West Sacramento segments are unacceptable. The WCSA/CAC recommends that Alternative 4b (adding a combined HOV 3+/SOV Toll Lane) is best solution to the problem, relieving and reducing congestion for the foreseeable future with no significant environmental impacts. 2

I would also direct your attention to some "Additional Recommendations for Consideration Now or at a Future Time" which are included in the Committee's comments. Among the four

additional recommendations, perhaps the noise/soundwall recommendation in the Davis segment is the most critical to the WCSA/CAC. 2 cont.

Thank you for the opportunity to provide you with these comments.

Sincerely,

Jim Provenza
Supervisor, District 4
Yolo County Board of Supervisors

January 5, 2024

To: Masum A. Patwary, Caltrans Environmental Scientist C; Caltrans, District 3; 703 B Street; Marysville, CA. 95901

From: Olin Woods, Chair Willowbank County Service Area & Community Advisory Committee (WCSA/CAC) and Arthur Lawyer, Vice Chair WCSA/CAC

Ref: Comments on Draft EIR, Proposed Caltrans' Yolo 80 Corridor Improvements Project

Question: Whether or not to support Caltrans' Proposed Yolo 80 Project and, if the answer is to support, which alternative version?

Recommendation: The WCSA/CAC supports the Caltrans' Proposed Yolo 80 Project and specifically endorses Alternative 4b: Adds a managed lane (combination of High Occupancy Vehicle (HOV) lane and Single Occupant Vehicle (SOV) toll road) in both directions between Kidwell Rd. (near Dixon), through Yolo County, to West El Camino Ave., connecting to I-80 and & I-5 on US-50 in Sacramento. The Project would include managed lane connections to planned or existing managed lanes at all terminus points. Additionally, pedestrian/bicycle facilities, and Intelligent Transportation System (ITS) elements would be incorporated. (See *"Additional Recommendations for Consideration Now or at a Future Time"* below.) 3

Background: Messrs. Woods and Lawyer are residents of the Old Willowbank neighborhood, a Yolo County community of 131 homes south of, and adjacent to, the City of Davis. Due to the time constraints of its members, the WCSA/CAC took action at its November 14, 2023, meeting to direct the Chair and Vice Chair to make comments on the Committee's behalf on the Caltrans' Yolo 80 Corridor Improvement Project. The WCSA/CAC determined that the Old Willowbank neighborhood could be directly affected by the proposed project in a positive way. To reach this conclusion, the Committee held three meetings to evaluate the project, the first in January, 2021; engaged Caltrans planners & engineers in its discussions; and took public comments from from the Old Willowbank residents in attendance at all three sessions. Considering the benefits of the project to Old Willowbank, the Committee felt it was important to go on the record in support of the Yolo 80 Corridor Improvements Project. 4

Old Willowbank residents, along with other South Davis area residents from both Yolo County and the City of Davis, have been particularly affected by congestion on I-80. This is because navigation tools such as Google and Waze have been increasingly directing eastbound drivers to take Midway and Tremont exits, from thence via circuitous navigation ultimately to arrive at Mace Blvd south of Davis for the return to eastbound I-80. Old Willowbank and South Davis area residents are a victim of the I-80 congestion *twice*, at Mace Blvd. and then when they reach congested conditions at the Mace Blvd. on-ramps & I-80 itself. This is a regular afternoon occurrence on Mace Blvd. and has become increasingly worse in the afternoons (initially only on Friday – now on all weekdays). A related problem is cut-through traffic in Old Willowbank, and City of Davis streets where drivers, in order to avoid severe congestion on Mace Blvd., try to

shave minutes off their trip by driving at higher than posted speeds through local neighborhoods.

In order to assure themselves that the writers of these comments were thoroughly briefed on the Proposed Project, they attended both the November 29, 2023, Caltrans Workshop in West Sacramento and the December 13, 2023 Workshop in Davis.

Woods also attended a "Cool Davis" I-80 Freeway "Teach-In" on December 7, 2023, a session which appeared to be an opportunity for speakers who opposed the project, with one exception, to give voice to their objections and to propose alternate solutions. A range of different options were suggested by speakers which went from No Build (leave things exactly as they are) to solving the congestion problem by tolling all lanes on the freeway. There were other options put forward as well, but Woods' impression was that, while most of the speakers were sincere, their suggestions were impractical at the present time. None of the proposals really addressed today's problem, namely, the need to relieve the growing congestion in the Davis and West Sacramento segments of I-80 along with its impact on interregional congestion as well as local traffic. Caltrans was not invited to this session.

4 cont.

Discussion: **1.** A managed lane in the context of the recommended Alternative 4b is defined as a combination a 3-person free HOV lane and an SOV toll lane. **2.** Most of the traffic flowing through Yolo County on I-80/US 50 is interregional not local (i.e., Davis/West Sacramento/Yolo County to and from Sacramento). **3.** I-80/US 50 has only two other three lane segments between Sacramento and the Bay Area, one in eastern Solano County and one in Vallejo, which is scheduled for widening. **4.** Delays on Yolo 80 are not uncommon at all hours of the day, but congestion is worst between 3PM – 7PM through Davis in the eastbound direction with bottlenecks at Richards Blvd. and Mace Blvd.; in the Westbound direction congestion is greatest from 7:30AM-11AM. **5.** Air Quality: the air quality numbers, based on Caltrans' tests, show no significant difference between the existing condition (No Build Alternative) and Alternative 4b for both CO impact and PM 2.5. **6.** Noise: based on the Caltrans and Federal Highways Noise Analysis Protocol for New Highway Construction, the increased noise coming from any of the 12 alternatives are not significant enough to mandate inclusion of sound walls per Federal highway policy. **7.** Alternative 4b (recommended in this comment letter) performs the best in terms of congestion relief and "throughput" (greatest number of persons moving from Point A to Point B in a given period of time) compared to all of the other 12 alternatives being considered by Caltrans. **8.** Funds collected from the tolls have been committed to providing enhanced transit in the corridor and adding service to the Capital Corridor trains between the Sacramento region and the Bay Area.

5

Analysis: **1.** The main advantage of adding a combined HOV 3+/SOV toll lane is that it encourages car & van pooling and that it gives people options. No existing lanes will be taken way, and one new HOV 3+/SOV toll lane will be added. Toll funds will be used to encourage transit, Capital Corridor enhancements, and to address equity issues. Further, if the proposed

4b alternative does not produce the throughput estimated by Caltrans, the number of carpool passengers can be raised or lowered to produce the desired results re. congestion reduction. Likewise, tolls could be lowered or raised, depending on real world results. 5 cont.

2. It is worth noting that Caltrans was the recipient of a significant amount of criticism at the December 7th Cool Davis session for not attempting to control local development and freeway demand by placing limits on the design of its freeways. In the writers' opinion, the problem with laying this assertion at Caltrans' door is that local governments regulate land use, not the California Department of Transportation. Further, except for the 1970's Reagan era establishment of the California Coastal Commission, the Legislature has not shown much interest in land use regulation at the regional or State level. Caltrans' job is to meet current demand and a prudent bit more, but not to spend unnecessary funds on future demand that may or may not develop. Local development in itself is not a bad thing; the thing is to manage development in a way that respects good planning principles, including the planning, construction, and maintenance of appropriate transportation facilities. Those who are interested in this approach can encourage local elected officials to consider developing along the lines of the Blueprint program, as adopted by the cities and counties who are members of the Sacramento Area Council of Governments (SACOG). Other agencies which may be influencial in this regard are the 58 Local Agency Formation Commissions (LAFCo's) in the State. LAFCo decisions, including the Yolo LAFCo's decisions, strive to balance the competing needs in California for efficient services, affordable housing, economic, opportunity, and conservation of natural resources. Public support of LAFCo decisions can be very important in insuring that good government initiatives are implemented. 6

3. The region was successful in obtaining $86 million in 2021 from the Federal Highway Administration, but those funds will expire if construction is not approved by September 31, 2024, so time is of the essence in moving this project forward. The money will go elsewhere if the deadline is not met. 7

Additional Recommendations for Consideration Now or at a Future Time: **1**. A separate Solano/Yolo 80 express lane from the eastbound Midway Off-Ramp to the east end of the Yolo 80 Causeway. 8 **2**. Consideration of enhanced enforcement technology for on-ramps and the HOV 3+/SOV Toll Lane which would allow detection and fining of those drivers who do not meet the requirements of a particular facility. 9 **3**. While the DEIR makes clear that sound walls would likely not trigger the federal mandates for noise-abating walls, the WCSA/CAC believes that the increase in freeway noise since the last time the freeway was expanded in the 1970s is significant and, therefore, consideration of a sound wall for Davis should be seriously considered, independent of the Federal criteria used for the EIR. Our neighborhood is acutely aware of the noise generated by the roadway, particulary at night and early morning time periods. 10 **4**. Lastly, please consider shifting the Causeway bike lane from the north side to the south side of the structure. It is understood that the approaches at both ends could be tricky, but the advantages for the health of the bike riders would be significantly enhanced because the prevailing winds from the south from would take the exhaust fumes away from riders and instead of toward them. Thanks 11

Conclusion: Among the twelve alternatives for reducing congestion on Yolo 80, the WCSA/CAC asserts that Alternative 4b offers the best opportunity by far for realistically addressing the current and future congestion problems on this segment of I-80/US 50. The project is multimodal in scope, including creation of an HOV 3+/Toll Lane, transit enhancements, HOV incentives, on-ramp & queuing improvements, bicycle and pedestrian projects, funding for transit equipment and operations, and additional financial support forfnlCapitol Corridor needs.

12

Response to Comment 1 in 20240108, Yolo County Supervisor Jim Provenza

This introductory comment notes that the comment letter includes comments from members of the "Old Willowbank" community and comments from the Willowbank County Service Area and Community Advisory Committee. Those comments and responses are included below. This comment does not discuss the adequacy of the EIR/EA. No changes to the Draft EIR/EA are necessary.

Response to Comment 2 in 20240108, Yolo County Supervisor Jim Provenza

This comment expresses support for Alternative 4B and states that the current operations of Yolo 80 are unacceptable. The commenter's preference is noted. This comment does not discuss the adequacy of the EIR/EA. No changes to the Draft EIR/EA are necessary.

Response to Comment 3 in 20240108, Yolo County Supervisor Jim Provenza

This comment expresses support for Alternative 4B. The commenter's preference is noted. This comment does not discuss the adequacy of the EIR/EA. No changes to the Draft EIR/EA are necessary.

Response to Comment 4 in 20240108, Yolo County Supervisor Jim Provenza

This comment discussed how "cut-through" traffic trying to circumvent traffic congestion on I-80 is negatively impacting residents. Regarding cut-through traffic, the project aims to reduce cut-through traffic within the City of Davis by providing a more reliable, direct route between Davis and West Sacramento. Encouraging drivers of regional trips to remain on the freeway will leave surface streets available to those making local trips in the modes available to them. Drivers using off-ramps in Davis will be using them to access land uses in Davis, instead of accessing local roads to avoid congestion on I-80.

The comment also discussed the "Cool Davis I-80 freeway Teach In" where residents spoke on the range of alternatives and discussed the need for a practical alternative that helps solve traffic congestion in the area. This comment does not discuss the adequacy of the EIR/EA. No changes to the Draft EIR/EA are necessary.

Response to Comment 5 in 20240108, Yolo County Supervisor Jim Provenza

This comment expresses support for Alternative 4B and contains general discussion about multiple outputs from the study. This comment does not discuss the adequacy of the EIR/EA. No changes to the Draft EIR/EA are necessary.

Response to Comment 6 in 20240108, Yolo County Supervisor Jim Provenza

This comment contains discussion on who is responsible for regulating land use and contains other comments that do not specifically relate to the project. This comment does not discuss the adequacy of the EIR/EA. No changes to the Draft EIR/EA are necessary.

Response to Comment 7 in 20240108, Yolo County Supervisor Jim Provenza

This comment relates to the $86 million in funding received for the project. This project was awarded $86 million from the federal INFRA grant, $83 million of which will go towards construction. This comment does not discuss the adequacy of the EIR/EA. No changes to the Draft EIR/EA are necessary.

Response to Comment 8 in 20240108, Yolo County Supervisor Jim Provenza

This comment was a consideration for the future, which would add an Express Lane from the Midway Road Interchange in Solano County to the end of the Yolo Causeway. This comment does not discuss the adequacy of the EIR/EA. No changes to the Draft EIR/EA are necessary.

Response to Comment 9 in 20240108, Yolo County Supervisor Jim Provenza

This comment relates to adding advanced technology to fine drivers who are violating toll lanes and at on-ramps. Advanced technology (ITS elements) are included in the project, however the technology hasn't been perfected enough to catch all violators, these systems could be added over time as technology improves. This comment does not discuss the adequacy of the EIR/EA. No changes to the Draft EIR/EA are necessary.

Response to Comment 10 in 20240108, Yolo County Supervisor Jim Provenza

Willowbank County Service Area and Community Advisory Committee believes the increase in freeway noise since the 1970s is significant and consideration for a sound wall independent of the Federal criteria used for the EIR/EA should be considered.

The noise study follows FHWA and Caltrans procedures for determining traffic noise impacts. Traffic noise impacts under 23CFR772 are evaluated based on the noise level in the design year as well as the change in noise level between the existing condition and the design year build condition. Caltrans evaluates traffic noise impacts under CEQA based on a comparison of the design year build condition to the existing conditions. Noise levels can fluctuate through the day; however, the noise study focuses on the noisiest hour to determine potential traffic noise impacts.

Response to Comment 11 in 20240108, Yolo County Supervisor Jim Provenza

This comment proposes that Caltrans consider shifting the Causeway bike lane from the North to South side of the structure. The under-construction Yolo 80 Rehabilitation project will be upgrading the barrier and fence in-between the bike lane and traveled way. This Yolo 80 Managed Lanes project does not propose any re-construction of the causeway bike lane and the suggestion to move the bike lane would require the structure to be rebuilt, making this suggestion economically and environmentally infeasible. This comment does not discuss the adequacy of the EIR/EA. No changes to the Draft EIR/EA are necessary.

Response to Comment 12 in 20240108, Yolo County Supervisor Jim Provenza

This closing comments expresses support of Alternative 4B as the ’ommuter's preferred alternative. This comment does not discuss the adequacy of the EIR/EA. No changes to the Draft EIR/EA are necessary.

20240109, Grace Armstrong

From: Grace Armstrong
To: Yolo80Corridor@DOT
Subject: I-80 corridor project
Date: Tuesday, January 9, 2024 1:37:39 PM

EXTERNAL EMAIL. Links/attachments may not be safe.

I am a City of Davis resident and support the widening of the I-80 corridor in our area. 1

As a long-time citizen and homeowner in South Davis, as well as a working commuter to Elk Grove, I have seen a huge increase in traffic on the I-80 corridor over the past several years.

Some of my reasons for supporting the additional lanes:

- During heaviest traffic times of the week commuters are diverting off the I-80 and onto the side streets through Davis (Cowell, Chiles, 2nd Street, etc.), trying to circumvent the bottleneck on our freeway corridor. This is resulting in severe congestion of these areas for Davis resident drivers.
- The stop-and-go traffic congestion on the freeway and our streets is negatively impacting our air quality with increased car emissions. https://www.sciencedirect.com/science/article/abs/pii/S1361920915002163
- Our family is no longer comfortable cycling the Mace-Tremont-UCD county road loop on the southern border of Davis, having experienced the hazard of extremely heavy and fast-moving road traffic in both directions on these narrow roads.

2

For these reasons the current I-80 traffic situation is negatively impacting our quality of life and I support the widening of the freeway with additional lanes.

Thank you,

Grace L. Armstrong
1632 La Paloma Ct.
Davis, CA 95618
(530) 304-2917

Response to Comment 1 in 20240109, Grace Armstrong

This comment notes the commenter's support for the widening of the I-80 corridor. This comment does not discuss the adequacy of the EIR/EA. No changes to the Draft EIR/EA are necessary.

Response to Comment 2 in 20240109, Grace Armstrong

This comment discussed the commenter's observations if heavy traffic leading to diversion through local roads. The commenter also stated the stop and go traffic is leading to increased pollution. And also observed this traffic diversion on to local roads impact their ability to feel safe when biking on the local roads due to heavy "cut"through" traffic. The commenter stated that because of these of these reasons, they support the project. This comment does not discuss the adequacy of the EIR/EA. No changes to the Draft EIR/EA are necessary.

20240110, John Keller

January 10, 2024 (sent by email)

Caltrans D03
703 B Street
Marysville, CA

Dear Project Manager Gurtej Bhattal and staff,

I hear many words about energy conservation and a warming planet but they ring hollow when transportation agencies are willing to spend hundreds of millions to accommodate current, and also encourage future, long-distance commuters as described in the draft environmental document for the Yolo 80 Corridor Improvements Project. I'd guess Toll/HOV supporters will be satisfied with narrowly-true statements about environmental impacts from the project, like page 2-14, "Improving travel times and capacity along I-80 is not expected to stimulate growth into areas where development is not planned…" But such a casual conclusion is at odds with casual observation of dramatic increases in peak and off-peak traffic volumes after the pandemic. Putting numbers on this, Redfin looked around the entire country and found "More homebuyers left the Bay Area than any other metro in July and August." You'll notice in Redfin's chart below, the top destination for SF homebuyers was "Sacramento."

Visions of shorter commutes with electric-car HOV exemptions and easy-to-violate toll lanes will encourage long-distance commutes to the Bay Area. I believe the impact of the Bay Area exodus deserves far more careful study, and should the Project proceed, should be fundamental to the structure of tolls (to discourage long-distance commuting), the prohibition of "clean air" exemptions to vehicle occupancy requirements (to discourage using government-subsided electric cars to avoid tolls), and some sort of vastly improved method of enforcing the managed lanes. 1

Rank	Metro*	Net Outflow, July and August 2022†	Net Outflow, July and August 2021	Local Users Searching Elsewhere, July and August 2022	Local Users Searching Elsewhere, July and August 2021	Top Destination	Top Out-of-State Destination
1	San Francisco, CA	40,432	52,854	24.1%	25.2%	Sacramento, CA	Seattle, WA
2	Los Angeles, CA	34,832	30,754	20.0%	18.1%	San Diego, CA	Las Vegas, NV
3	New York, NY	26,786	25,725	28.7%	27.3%	Philadelphia, PA	Philadelphia, PA
4	Washington, D.C.	20,542	16,405	17.7%	15.1%	Salisbury, MD	Salisbury, MD

https://www.redfin.com/news/august-2022-housing-migration-trends/

Enforcement is costly, under-emphasized, and necessary for desired environmental benefits and public support: 2
The proposed design of the I-80 express lanes is similar to the Bay Area's where MTC reports, "Because of the high rates of violations and degradation, enforcement is critical to the successful operation of both HOV and Express Lane facilities." (*Managed Lanes*

Implementation Plan, Nov 2019). Putting numbers on this, MTC observed average HOV violation rates from 19% - 24% on their whole Bay Area system (1 of 3 users were violators on three of their facilities). Not only is enforcement a difficult problem to solve, costs are recurring and not included in the I-80 project. Predictably-high violation rates suggest that environmental benefits of the proposed I-80 project are substantially overstated. 2 cont.

Traffic Safety opportunities should be embraced:
Although the document points out that collision rates are more dangerous than statewide averages on several project segments and interchanges, I did not find well-defined traffic safety elements in the project proposal. In addition to attempting to solve existing traffic safety problems, this project is an opportunity to reduce the number of people killed and injured on I-80 and I strongly recommend the analysis be clear and detailed about the safety opportunities, the impacts and proposed mitigations during construction and subsequent operations. 3

Other Routes/Communities will be impacted by construction and I-80 operations:
The Yolo Bypass is a dominant geographical constraint on east-west transportation in the region, with Sacramento access via two Interstate causeways. SR 113 is a link between both Interstates — Interstate 5 traffic is affected by conditions on I-80 Causeway. Yet this draft environmental document fails to propose mitigations for project-related* and future impacts on:

- **SR 113**, perhaps upgraded medians and other safety improvements,

- **113 connector to I-5 southbound**, which currently uses local streets in Woodland (Main Street is particularly impacted by SR 113 traffic and on occasion traffic will queue up the off-ramp to the regular SR 113 travel lanes),

- **Interstate 5 congestion**, which worsens on Interstate 5 between SR 113 and I-80 in Sacramento (including fatal collisions when southbound big rigs failed to recognize stopped traffic near Woodland).

**NOTE: pg 2-117 incorrectly implies that I-80 travelers aren't currently using SR 113 to divert to I-5 and without the I-80 project, won't divert for 20+ years).* 4

A Special Flyover for Toll Lanes — Funds should be Spent on Diverse Mitigations:
Much of the project funding is proposed for so-called "Lexus Lanes." The significant funding for a flyover (in Alternatives 2b, 3b, 4b, 5b, 6b and 7b) further tilts project benefits towards higher-income users; instead those funds could be used to mitigate impacts on the City of Woodland and their I-5 connection to jobs in Sacramento. Depending on the configuration, an I-5 project could benefit more diverse users. 5

Thank you for the opportunity to comment on this proposed project. The I-80 Managed Lanes project connects two of California's largest urban areas and facilitates long-distance commuting, especially by higher-income users. The project needs to be improved. 6

Sincerely,

John Charles Keller

John Keller
1411 Cornell Dr.
Davis, CA 95616

Response to Comment 1 in 20240110, John Keller

This comment offered the opinion that commuters to the Bay Area should pay more to use the lane, and that electric vehicles should not get a free pass in the lane. The commenter also expressed concern that the traffic analysis did not closely analyze the shift in Bay Area residents to the Sacramento area. In the traffic analysis, tolls were applied on a segment-basis. So, if a toll-paying vehicle traveled on more segments (i.e., a longer trip), the total amount paid was higher. The mandate that allows clean-air vehicles to travel in managed lanes for free is set to expire in 2025, well before construction of this project. If a priced lane is selected as the preferred alternative, the toll operator will decide if electric vehicles may travel in the managed lane for free, with a discounted toll, or with a full toll. Caltrans is including CHP enforcement areas that would allow officers to verify the number of declared occupants in a vehicle. Please refer to Mater Response A for more details on the travel demand model used.

No changes to the Draft EIR/EA are necessary.

Response to Comment 2 in 20240110, John Keller

This comment suggests that enforcement on HOV/HOT/Express lanes needs to be emphasized and that costs associated with enforcement were not included in the project. The traffic analysis incorporated violations for both the HOV and toll lane alternatives. These violation rates were based on observed violation rates in the Sacramento region.

Caltrans includes CHP enforcement zones, which would allow officers to verify the declared number of occupants in a vehicle. Enforcement once the project is complete is not a project build costs, however if a HOT/Express Lane is built the toll authority will have the facility enforced by CHP.

No changes to the Draft EIR/EA are necessary.

Response to Comment 3 in 20240110, John Keller

The project would include installation of ITS elements consisting of Changeable Message Signs (CMS) and closed-circuit television (CCTV). These elements will be used to notify drivers of traffic events (such as a collision) so they may divert their route or proceed with caution. CCTVs would allow Caltrans and the toll operator to monitor conditions on the freeway and respond in a timely manner to prevent any secondary incidents.

It is expected that alternatives that reduce congestion would, in turn, reduce the rate of congestion-related collisions on the corridor. The project also includes ramp metering, which help break up platoons of vehicles entering the freeway to allow for safer and easier merging. The project also includes auxiliary lanes, which allow vehicles more space and time to speed up or slow down as they enter or exit the freeway.

No changes to the Draft EIR/EA are necessary.

Response to Comment 4 in 20240110, John Keller

This comment suggests that the environmental document fails to propose mitigations for future impacts on SR 113, the SR 113 to I-5 Southbound movement, and I-5 congestion from SR 113 to I-80. Caltrans recognizes that congestion on I-80 results in drivers using circuitous cut-through routes. This is not limited to SR 113 to I-5 as described in the comment; the cut-through routes are also comprised of local facilities through the Cities of Dixon, Davis, and West Sacramento. The project aims to reduce the amount of cut-through traffic on I-80 by reducing congestion during peak periods and providing more capacity for a direct connection between Davis and West Sacramento. It is likely that cut-through traffic would increase for the alternatives that do not address the congestion on the corridor.

No changes to the Draft EIR/EA are necessary.

Response to Comment 5 in 20240110, John Keller

This comment is an opinion in which the commenter believes that instead of constructing the direct managed lanes connector, that money should be used to mitigate impacts to the City of Woodland. This comment is noted. This comment does not discuss the adequacy of the EIR/EA. No changes to the Draft EIR/EA are necessary.

Response to Comment 6 in 20240110, John Keller

This comment thanks Caltrans for giving the commenter the opportunity to comment, and also states that the project needs to be improved. This comment is noted. This comment does not discuss the adequacy of the EIR/EA. No changes to the Draft EIR/EA are necessary.

20240110, Anthony Palmere

January 9, 2024

Masum Patwary
Environmental Scientist
Caltrans District 3
703 B Street,
Marysville, CA 95901

Dear Mr. Patwary:

I am providing comments on the Draft Environmental Document for the Yolo 80 Corridor Improvement Project. I am retired from the public transportation industry, after almost 40 years working in planning and management of transit systems, including over 25 years in California (resume attached). Although I have concerns about many aspects of the project, my particular expertise is related to alternative transportation modes, and my comments will focus on the project definition (alternatives analyzed) and the VMT mitigation measures.

In the draft document, both the alternatives analyzed and mitigation measures reflected lack of vision and common sense with regard to effective and practical options for improving alternatives that could either mitigate the impacts of the project or perhaps even eliminate the need for it. I understand that the results of the mitigation need to be quantifiable, and that the preparer of the mitigation report, Fehr and Peers, represent the gold standard in transportation modeling. However, given the importance of the mitigation plan to the outcome of the project, I think it is critical that the project include the features that will result in the lowest VMT within the constraints of the funding available. 1

There are three primary alternative modes for travel through the corridor -- train, bus, and bicycle.

For bicycling, the project includes resurfacing the existing bike path on the Causeway along with improvements to the connecting paths on the east and west sides. The possibility of a separate structure across the Yolo Bypass was rejected. However, I could find no mention of improvements to the bike path that would make the ride less unpleasant on the Causeway itself, such as noise and wind protection, which could attract new riders, especially with ebikes, scooters, or other micromobility options. For many potential riders, it is the Causeway itself that is the biggest impediment to riding. Improvements such as noise and wind protection would be difficult to quantify but they would be relatively inexpensive to construct and would likely reduce VMT more than many of the selected measures. Although the travel model may not be sensitive enough to predict the impact of such an improvement, that should not prevent the project from including such an important improvement in either the base project or the mitigation measures. 2

For improved bus service, the concept of "Bus on Shoulder" operation is mentioned only in the section on alternatives rejected (Proposed Project, 1.5.7 Alternative 5, in explaining why the left-most lanes will be difficult for buses entering on the right to be able to use. At the end of the 3

section, it says, "...but possible Part Time Lane Use or Bus on Shoulder options may be studied further in the design phase."

What is noteworthy about this discussion is that the difficulty for buses accessing the transit-only lane also applies to all the managed lane alternatives that remain under consideration. Any bus traveling on I-80 between Mace Boulevard in Davis and Enterprise in West Sacramento during congested conditions would find it difficult to get into the express lane on the far left of the highway and would gain little or no travel time advantage (by the time the bus got into the left-most lane it would need to start merging back to the right to be able to exit). And during non-congested times, the express lane would offer no time savings. Given that difficulty, the best option for buses would be to allow Bus on Shoulder operation during times of congestion. Bus on Shoulder could be implemented under the No Project option to greatly improve transit service attractiveness, by improving both speed and reliability. However, it was not analyzed or mentioned as part of the No Build option, nor was it included as a potential VMT mitigation measure. Note that Bus on Shoulder is discussed extensively for this corridor in the SACOG Davis-Sacramento Transit Alternatives Study (2019). It is unclear why such a promising and relatively low cost approach for improved transit service must wait until the design phase rather than discussed in the environmental document as part of the base project or mitigation measures. 3 cont.

Regarding train service, fare subsidies for bus and train service were combined into a single measure showing relative ineffectiveness. However, it is likely that subsidizing the bus service which is already a low cost (but slow) service is much less effective than subsidizing train service, which is high cost and fast. By combining them into a single measure, the likely high effectiveness of a train subsidy is masked by the likely low effectiveness of a bus subsidy. For the modeling of the changes, the train service fare of $9 for a 12-mile commute is so far out of the bounds for typical transit service price elasticities, that the SACSIM model may not be accurate in estimating the impact of a change of that magnitude. I suggest eliminating the bus fare subsidy and concentrating the fare subsidy on the train service for maximum cost effectiveness. For bus service, it would seem to make more sense to consider providing 30-minute frequency on the 42 line rather than considering 15-minute service and rejecting it as being too costly. 4

In looking for additional mitigation measures to try to close the gap in VMT impacts, the Draft ED includes Microtransit service in Yolo County as reducing VMT by 6.2 million annually (based on the VMT+ model). It is very difficult to believe that such a service could result in a VMT reduction of that magnitude, as most microtransit services operate with low load factors, usually in the 1-2 passenger miles per vehicle mile range (and even lower when vehicle deadheading is taken into consideration). From the brief description, it is not clear if the estimated VMT reduction is net of the added VMT from the microtransit vehicles themselves, but clearly it should be. And, if the calculation is correct and that level of VMT reduction is realistic, it would be very helpful to note where microtransit had achieved such a high level of productivity in the US. 5

The narrative of the VMT mitigation section includes a relative effectiveness measure of "$/VMT reduced" which was used in evaluating which mitigation measures were selected for implementation. This calculation appears to be based on the "Yolo/80 Contribution" divided by the "Annual VMT Reduced". However, the Yolo/80 Contribution is cumulative over a number of years, ranging from as few as 3 years to as many as 20 years. So the $/VMT calculation is not actually calculating $/VMT on a consistent basis across all the mitigation measures. There is no explanation as to why the $/VMT is not calculated on an annual basis or some other way that would allow the measures to be evaluated consistently. It appears that the method used in the analysis could have led to selecting mitigation measures that are not as effective as other mitigation measures that were rejected. The number of years that the project is contributing to each measure appears arbitrary and, by changing that, the "$/VMT Reduced" calculation would go up or down. Please clarify how the calculation is being done and include the rationale for using differing time frames for the cost effectiveness ratio. It may also be helpful to include an additional column showing the "$/VMT Reduced reported on an annual basis", so that all the mitigation measures can be seen on a consistent scale. 6

To summarize my comments, the need to improve alternatives for I-80 Corridor Travel is critical to the success of the project, by mitigating or reducing the impact of induced travel and additional VMT. I believe that the project's negative environmental impacts could be reduced with project features and mitigation measures that focus on the corridor itself, as I've described above (bike path improvements on the Causeway, reduced train fares, improved bus speed and reliability using Bus on Shoulder, and improved frequency of bus service), and that an analysis that more accurately estimates and reports the impact of the various options would support the inclusion of those features. 7

Thank you for the opportunity to comment,



Anthony Palmere

Anthony J. Palmere

1000 Berryessa Ln #312, Davis, CA 95616
(530) 564-9418 ajpalmere@gmail.com

Experience

20017-2020 **Transportation Services – University of California, Davis** **Davis, CA**

Transportation Analyst (post-retirement,part-time): Provided analysis and support for implementation of Transportation Tomorrow initiatives, including unbundled parking pricing, future revenue estimates, and initiation of Causeway Connection electric bus service.

2000-2017 **Unitrans – University of California, Davis** **Davis, CA**

General Manager (2012 – 2017): Responsible for all administrative and operational functions for a 50-bus, 4-million annual passenger, student-operated transit system serving the City and campus. Directed staff of >250 student employees and 16 full-time. Interface with university units, external agencies (incl. Federal Transit Administration), elected officials, and the public. *Assistant General Manager (2000 – 2012):* Responsible for planning, grant management, performance monitoring, capital programming, community relations, marketing, and campus coordination. Oversaw major capital improvements including construction of passenger terminals, shop expansion, acquisition of new fleet, and real-time bus location system. Integrated ridership and bus stop data in GIS and coordinated annual service changes. Responsible for FTA grants, with a significant increase in funding during this time.

1993-2000 **Sacramento Regional Transit District** **Sacramento, CA**

Planning Manager: Directed 11-person department responsible for long- and short-range planning and vehicle/operator scheduling. Long-range projects included light rail corridor studies, capital plans, and environmental review. Service planning projects included productivity monitoring, National Transit Database reporting, bus route and service changes, and cost allocation. Scheduling projects included development of operator sign-ups, service delivery, and public information (timetables, system maps, and web page). Coordinated planning activities with MPO, CIty/County government, as well as state and federal agencies. Conducted presentations and public meetings. Managed departmental budget and contract administration.

1989-1993 **Massachusetts Bay Transportation Authority** **Boston, MA**

Director of Planning: Directed department with staff of 17, responsible for capital and strategic planning for the entire MBTA system, which operated over 1300 vehicles and served over 900,000 daily boardings. Supervised design work and environmental documentation related to capital projects such as rail extensions and maintenance facilities. Oversaw implementation of ADA Key Station Plan and Light Rail System Accessibility. Provided input to MPO activity, including allocation of ISTEA funds and Long-Range Transportation Plan. Conducted numerous policy studies: privatization of bus services and innovative financing of capital facilities.

Manager of Schedules / Operations Planning: Supervised staff of 15 to produce vehicle and operator schedules, statistical summaries, and database interfaces for bus/trolleybus (155 routes), light rail (5 lines), and heavy rail (3 lines). Responsible for design and content of route maps, schedules, and fare information. Estimated and analyzed effects of fare increases and changes in fare structure. Improved assessment of service reliability, including Passenger Waiting Time system, and estimation of current and future rail system ridership and capacity.

1985-1989 **Multisystems, Inc.** **Cambridge, MA**

Manager of Transit Route and Schedule Analysis: Project lead for the installation of HASTUS computerized scheduling and runcutting system at several U.S. transit properties, including the MBTA (Boston), Niagara Frontier Transportation Authority (Buffalo), Metro-North Commuter Railroad (New York), and Metropolitan Area Transit (Omaha). Project manager for consulting studies of service coordination and efficiency improvements, analysis of alternative financing, estimation of service evaluation measures, and development of ongoing service monitoring.

1983-1985 **Metro-North Commuter Railroad** **New York, NY**

Senior Planner: Developed and implemented computerized means of monitoring equipment availability and train ridership. Coordinated market research studies and schedule development for Harlem Line electrification. Administered and analyzed passenger surveys. Developed spreadsheets for estimation of labor costs, efficiency, service quality, and impacts of service and fare change proposals.

1981-1983 **Chicago Transit Authority** **Chicago, IL**

Operations Planner: Estimated ridership and costs of revised bus route network for the extension of rapid transit service in northwest Chicago. Recommended service changes for bus routes as part of a major system-wide program to reduce operating costs. Developed computerized method of ranking route performance. Completed training and served as a bus operator.

1980 **Southern California Rapid Transit District** **Los Angeles, CA**

Planning Intern (Summer): Prepared guidelines for SCRTD compliance with state and federal environmental laws for capital project development.

1978-1979 **Massachusetts Dept. of Environmental Quality Engineering** **Boston, MA**

Intern (Part-time): Analyzed air quality impacts of transportation control measures for Mass. urban areas as part of State Implementation Plan for meeting environmental standards.

Other part-time and summer experience included the development of neighborhood parking plans at the Boston Traffic and Parking Department and analyses for UMTA- sponsored research projects at MIT related to transit costs and financing.

Education

1979-1981 **Harvard Kennedy School of Government** **Cambridge, MA**

Master of Public Policy degree. Specialization in transportation, public management, and public finance. Public Service Education Fellow.

1975-1979 **Massachusetts Institute of Technology** **Cambridge, MA**

Bachelor of Science degree in Civil Engineering. Coursework included graduate-level classes in transportation planning, policy analysis, and marketing. Elected to Tau Beta Pi National Engineering Honorary Society.

Publications

"Service Quality Monitoring for High Frequency Transit Lines," with Nigel Wilson, Tom Grayson, David Nelson, and Carl Cederquist, Transportation Research Record No. 1349, Public Transit: Management, Operations, and Planning and Development, 1992.

"The Use of Graphics in a Computerized Scheduling System," ASCE International Conference on Microcomputers in Transportation, June 1989.

"Development and Application of Bus Route Performance Guidelines for a Large Transit System," with David L. Phillips, APTA Selected Papers on Major Issues Facing Public Transit, Volume III, Productivity, Oct. 1983.

Teaching

Lecturer, UC Davis, ECI262 / TPP289, "Public Transportation Management and Policy" graduate class, Fall 2002, Winter 2005, Fall 2007, Winter 2010.

Instructor, UC Davis Extension, "Introduction to Multimodal Transportation," Fall 2001 and 2002

Member, National Transit Curriculum Advisory Committee, 2011-2012.

Response to Comment 1 in 20240110, Anthony Palmere

This introductory comment provides background on the commenter's expertise and a summary of the focus of the comments that follow. This comment provides the commenter's general opinion on the alternatives analyzed, measures to reduce or avoid impacts and the need for the project to result in the lowest vehicle miles traveled possible. This comment does not specifically discuss the adequacy of the EIR/EA. No changes to the Draft EIR/EA are necessary.

Response to Comment 2 in 20240110, Anthony Palmere

This comment suggests that other bike path improvements should be made across the Yolo causeway to make this a more attractive facility for bikes. Please refer to Master Response F for more information about bicycle facility improvements associated with this project. This comment does not discuss the adequacy of the EIR/EA. No changes to the Draft EIR/EA are necessary.

Response to Comment 3 in 20240110, Anthony Palmere

This comment suggested that Bus on Shoulder (BOS) should be included and should also be part of the no-build option. A BOS analysis was completed to determine the potential operational and geometrical feasibility of implementing BOS. To implement BOS there would need to be signing and striping improvements, shoulder widening and a reconstructed shoulder structural section to allow BOS to be possible where there aren't any geometric constraints. In addition, current best practice states that buses should only drive a maximum of 15 mph faster than the lane next to them and a maximum of 35 mph on the shoulder. Due to geometric limitations in segments where BOS would offer benefits, and the lack of benefits in locations where BOS was geometrically possible, BOS was not considered for the project. No changes to the Draft EIR/EA are necessary.

Response to Comment 4 in 20240110, Anthony Palmere

After further consultation with partner agencies, the mitigation measures labeled "Subsidize Monthly Transit Passes in Yolo County" and "Reduce Transit Fares" are removed from the Final EIR/EA VMT mitigation plan. The mitigation measures labeled "Voluntary Trip Reduction Program in Yolo County" and "Expand Capitol Corridor Frequency between Oakland and Sacramento" encompass bus and train fare subsidies, respectively. Therefore, the effectiveness of each fare subsidy is built into the VMT reduction assumptions for the two remaining measures.

Response to Comment 5 in 20240110, Anthony Palmere

The estimated VMT reduction for the Microtransit expansion in Yolo County is the net of the added VMT from the Microtransit vehicles themselves, as this is the methodology of the TDM+ modeling tool. As mentioned in the VMT Mitigation Memo authored by Fehr and Peers, the methodology and assumptions for this mitigation measure's VMT reduction are taken from CAPCOA strategy T-25 for general transit expansion and derived by calculating the VMT being generated by new transit trips, their lengths, and whether the new riders would have otherwise driven.

While the commenter notes most microtransit services operate with low load factors, usually in the 1-2 passenger miles per vehicle mile range, this service is to expand the microtransit service throughout all of Yolo County, which is considerably more than 1-2 passenger miles.

Response to Comment 6 in 20240110, Anthony Palmere

The comment is correct in that the $/VMT ratio was not consistently taken on an annual basis across each measure. This has been rectified in the Final EIR/EA and the proposed and rejected VMT mitigation measures utilize the $/VMT ratio as one deciding factor between which were proposed and rejected. For further discussion about selection criteria, please refer to Master Response A.

Response to Comment 7 in 20240110, Anthony Palmere

This closing comment summarizes the previously mentioned comments. No changes to the Draft EIR/EA are necessary.

20240111, Edie Marshall

Hello!

My name is Dr. Edie Marshall, and I am a veterinary epidemiologist who has been living in south Davis for 20.5 years. I work for the State of California and commute to my office in downtown Sacramento on a weekly basis, although our office used to be off I-80 at West El Camino. So, I am very familiar with this corridor and its traffic patterns. I feel compelled to provide comments on the proposed I-80 corridor project for a multitude of reasons, not the least because it does and will impact me – and the enjoyment of where I live and work – very deeply. Additionally, I appear to be the kind of person CalTrans is hoping will voluntarily reduce my Vehicle Miles Traveled (VMT) as a result of the VMT Mitigations offered to offset the anticipated increase in VMT as a result of this project.

When I worked off W El Camino, in Natomas, there were no viable transit options to get to and from the office. I drove to the office each day, although I had tried looking for vanpools and other alternatives when starting my State job there. I couldn't find anything viable for my work schedule. So, when we moved our office downtown during the pandemic, in 2021, I figured there would be more options, such as Yolobus Route 44. Unfortunately, RT 44 stopped being run during the pandemic and is no longer being serviced (confirmed online at avl.yctd.org on 12/31/23 and 1/4/24). Therefore, the information on **proposal page 2-115** that says, "**Route 44 provides commuter service between south Davis and downtown Sacramento.** Route 44 has three peak direction trips during each peak period (towards Sacramento in the morning and towards Davis in the afternoon)," is ***outdated and incorrect***. Using the Yolobus Trip Planner (avl.yctd.org) to go from my nearest Yolobus stop to 10th & N Street (a regular Yolobus stop) in Sacramento to arrive by 7:45am on Friday 1/5/204 as I wrote this, would require 1.5-2hrs of travel, including a not-insignificant amount of walking. My car commute at 07:30 that morning took 35 minutes. 1

This above scenario helps to illustrate two major problems with the proposal itself and the proposed 'improvement' alternatives. First: some of the data in the proposal is outdated and does not reflect current realities of our post-pandemic world and the many changes wrought by the pandemic on our living and working lives. For example, **Table 2.1 – 13 Commuting Patterns on page 2-70 displays commuting data from the U.S. Census Bureau in 2019.** As we all know from direct experience, the widespread use and acceptance of teleworking and telecommuting during the pandemic changed many people's commuting patterns and working realities in ways that have persisted beyond the pandemic declaration. This is reflected nationally in **data from the U.S. Census Bureau presented in 2023** (https://www.census.gov/library/stories/2023/07/commuter-adjusted-population.html) and, much more recently and locally, by the **Public Policy Institute of California (PPIC): Statewide Survey of Californians and Their Economic Well-Being** (https://www.ppic.org/publication/ppic-statewide-survey-californians-and-their-economic-well-being-november-2023/). The PPIC data from late 2023, in response to question 38, indicates that 14% of CA survey respondents work remotely all the time and 21% work in a hybrid arrangement (sometimes at an office, sometimes at home). This totals to 35%, or more than one third of respondents, doing some or all of their work from home. These proportions are likely to be significantly different from the 2

answers provided in 2019, when the U.S. Census Bureau commuting data provided in Table 2.1-13 was collected. To assume that projections made from pre-pandemic commuting patterns are still unchanged and equally relevant today, in the post-pandemic world of greater telecommuting, is simply erroneous (see: https://phys.org/news/2023-10-covid-pandemic-substantially-commuting-patterns.html). Thousands of State workers, many who used to commute daily to Sacramento from outlying areas, can attest to this change, as can the businesses downtown struggling from the lack of office worker business. ***Please don't act like nothing has changed about our commutes and traffic patterns since 2019.*** 2 cont.

Second, it is clear that **not all alternatives to the current traffic congestion were seriously considered and thoroughly explored**. For example, why isn't transit, such as ***Yolobus RT 44*** being brought back up to pre-pandemic levels as at least a mitigation effort before we add new lanes and induce new traffic to the I-80 corridor? While commutes in many places improved during and toward the end of the pandemic period – which would not be reflected in the 2019 data provided in the proposal, as stated above - transit ridership decreased for a multitude of reasons (https://www.nytimes.com/interactive/2023/11/06/business/economy/commuting-change-covid.html). ***Why isn't rebuilding and expanding transit ridership a more prominent option?*** The VMT Mitigation Plan indicates in Table 2.1-28 that expanding Yolobus RT 42 would be too costly and infeasible over time. It is also incredibly narrow-minded to look only at expanding a single, existing route and not considering restarting routes, such as Yolobus RT 44, that have been canceled. At one point, RT 44 had enough ridership to justify its existence. Why not try to recapture that again? The VMT-mitigating, proposed expansions of Unitrans and Causeway Connection serve primarily the UC Davis community and are unlikely to have a significant effect on VMT across the Causeway. CalTrans should be looking at larger, more regional transit than Unitrans and the Causeway Connection as a means to meaningfully expand transit ridership. Additionally, aside from the improvements planned at either end of the bike path, it does not appear that any other considerations were given to markedly improving opportunities for bicycling between Davis and Sacramento. Why not? 3

Table 2.1-27 Vehicle Miles Traveled Reducing Measures strangely identifies "Expand Capitol Corridor Frequency between Oakland and Sacramento" as a viable and anticipated VMT mitigation measure. How would CalTrans be able to unequivocally guarantee the additional service would happen? ***Amtrak***, aka the National Railroad Passenger Corporation, ***is a federal entity***. Additionally, ***the tracks are owned by the Union Pacific Railroad***. **CalTrans has no jurisdiction** to require either of these entities to expand the number of service times between Sacramento and Oakland. When my State program provides funding for services to be performed by a third party or subcontractor, we require a written commitment, or sometimes even just a letter of support, by the third party to assure us that the third party agrees to what is being proposed / promised on their behalf. Where is the documentation that Amtrak *and* the Union Pacific Railroad agree with and support a plan, even a proposed one, to expand the Capitol Corridor service to help mitigate induced VMT from the proposed activities? 4

This brings me to another point about **inappropriate data** used and for calculations leading to key results and assumptions in the proposal. The proposal employed the NCST Travel Induced 5

calculator, per page 2-117, when identifying that higher growth is forecast for all alternatives. ***As demonstrated in a notable publication*** (Volker, et al. 2023. Induced vehicle travel in the environmental review process. Transportation Research Record, vol 2674 (7). https://doi.org/10.1177/0361198120923365), ***it is common for calculations of induced travel to greatly underestimate the true volume*** because not all feedback loops are included. Instead, the authors offer an **updated, approved tool for calculating induced travel** – one that was ***not*** applied in the current proposal and which may offer a more realistic estimation of the travel that would be induced by each of the proposed alternatives. Instead of relying on one calculator, **the processes for evaluating induced VMT should apply multiple calculators to get a more robust set of data estimations** and then present – and plan for – the greater range of options. 5 cont.

Additionally, **the methodology described** on page 2-104 for developing the data in **Table 2.1-20 Average Percentage of HOVs by Time Period – Existing Conditions**, e.g. the process of estimating the numbers of HOVs currently using the corridor, **is very deeply flawed**. As noted at the end of the paragraph preceding Table 2.1-20, "The vehicle classification counts were collected on one day only." This point estimate, resulting in a sample size of one day (n=1), does not stand up to scrutiny under any kind of statistical analysis and cannot be considered at all representative of anything, much less 'current' conditions. In epidemiology – my specialty, and other scientific fields, ***this sample size of n=1 would not be acceptable as a representative or meaningful data set***. For an example completely specific and relevant to this stretch of I-80, data collected in the amount and manner described on a Tuesday in summer, when kids are out of school, is likely to be very different – in my 20+ years of experience with this piece of the I-80 corridor - from a Friday during the winter, when many people from the Bay Area are on their way to ski in Tahoe for the weekend. Furthermore, the methodology identifies that, "… the counts were conducted during COVID-19 pandemic, when people were encouraged to work from home and schools were closed…," indicating that this data is, indeed, deeply biased by pandemic conditions. Why is it that other data used in this proposal are not from the height of the COVID-19 pandemic, but this one piece of data is? **The incongruencies of the data**, where some are from pre-pandemic years and others, like Table 2.1-20, are from times of peak pandemic measures, **compounds the problems with the data** used in the assessments leading to the proposal. To be fair, the authors tried to validate the pandemic-era data in Table 2.1-20 in the following manner: "… the observed HOV percentages were compared with similar average percentages measured in 2019 on other Sacramento area freeways with HOV lanes (US 50, SR 99, and I-80 east of the project area) to confirm reasonableness for use in this analysis." Unfortunately, the means by which this validation was attempted (How was 'reasonableness' defined and confirmed?) and the results of that effort (How far off were the data from Table 2.1-20 to these other sources?) are not shared here, so we cannot even begin to estimate how well this pitiful, n=1, full-COVID-precaution data approximates anything close to 'current' or 'normal' conditions. **These data in Table 2.1-20 are very deeply biased and should not be included – nor considered anywhere near sufficient - in the calculations and assessments needed for this proposal.** 6

Furthermore, as a citizen of Davis and commuter on the Causeway to Sacramento, I find the offset measures described in **2.1.10.8 Avoidance, Minimization, and/or Mitigation Measures** to be wholly insufficient to mitigate for the anticipated increase in VMT, much less the vastly larger estimates for induced demand provided by the Volker calculator. To begin with, **more than one of the measures identified in Table 2.1-27 are happening/would happen without the CalTrans project**; therefore, ***the added environmental benefit of linking these outcomes to the CalTrans project is highly questionable*** (other than local agencies receiving funds). For example, Yolo County is already investing in and building micro transit (https://yolobus.com/beeline/). While their services would, no doubt, be able to be at least temporarily expanded through an infusion of project offset money, a) would that expanded service be sustained for the life of the I-80 freeway?, and b) it is not clear that people who own cars would choose to use BeeLine vs driving. As a citizen of Yolo County, my perception of the BeeLine service is that it aims to support mobility for disadvantaged citizens who may not have or drive vehicles. How does that reduce or prevent a meaningful amount of VMT? Unless BeeLine merges with Uber or Lyft, I am not sure that it would make much of an impact on actual VMT. I, personally, would not be likely to use BeeLine if it were offered in my area because I perceive it to be targeted at disadvantaged folks, so I would not selfishly take up the service time when I am privileged enough to have other choices. 7

Another supposed mitigation that will happen even without the CalTrans project money is the overcrossing for the Nishi housing development. While I'm sure the project developers would absolutely *love* having the CA taxpayers pay for their planned overcrossing, thereby greatly increasing their profits, it is unequivocal that **CalTrans should not receive VMT mitigation "credit" for something that is already planned and going to happen in Davis**. CalTrans giving money to the Nishi developers does not magically make car trips happen any less than already would have happened with the Nishi development project as planned, with an overcrossing paid for by the developers. The private development is already planned to encourage car-free travel to campus and downtown Davis; there is no reason CalTrans should receive any credit for something the people of Davis voted on well before the CalTrans offer of supplemental funding. 8

Which brings me to another question: Why is CalTrans so darn focused on Davis and Yolo County as the solution to its VMT mitigation problems? Why is the success that Davis and Yolo County have already achieved, and plan to continue to achieve, something that CalTrans can just buy off? Understandably, we must seem like low-hanging fruit because we are already very progressive about alternative forms of transportation and many of our population are students who already don't use cars as much as many non-students. However, the I-80 problem is people driving from the Bay Area to Tahoe and back, in addition to folks driving between Sacramento and points west. **Davis and Yolo County are not the problem, so why should we shoulder almost all of the mitigation burden to allow these other drivers to have more lanes, pollute our environment, and clog our city streets while trying to skirt traffic?** Although some non-Davis/non-Yolo mitigation measures were considered in Table 2.1-28 Potential VMT Reducing Measures Analyzed and Rejected (Not Reasonable or Feasible), **none of them addressed improved transit to and within Lake Tahoe and surrounds.** Why not have a ski train with Wifi, wine, and other amenities so folks could comfortably take Amtrak to go skiing? Once they get 9

off the train, CalTrans could have supported local microtransit, like Yolo's BeeLine, to get them to their weekend homes and condos. The cost of building housing in West Sacramento ($0.59/VMT) and downtown Sacramento ($1.51/VMT), options which were rejected, are right in line with the costs of the VMT Reducing Measures in Table 2.1-27 (range $0.40 - $3.00/VMT) *AND* would help to solve the State's deep need for additional housing units. Although the Yolo80 project would clearly not be able to fully fund these housing initiatives, I would wager that contributing tens of millions of dollars to support new housing in those areas would get more bang for our civic buck than expanding Unitrans to run every 15 minutes instead of every 30 minutes. 9 cont.

Speaking of which, ***increasing the frequency of Unitrans runs is a ludicrous way to reduce VMT,*** as nearly 100% of the students who are taking Unitrans would not get in a car and drive to campus if the bus continues to run every 30 minutes instead of every 15 minutes. Students who are taking the bus, which I have been, are almost *never* going to drive a car instead of taking the bus because parking is expensive and a pain to find. Taking a car to campus instead of the planned bus trip only happens if one is really late or at risk of missing something important, like an exam. The number of these trips to be offset by the Yolo80 money is miniscule compared to the increased VMT that will occur from the proposed lane expansions. 10

Two other mitigations – Subsidizing Monthly Transit Passes in Yolo County and Reduce Transit Fares – would also not get me out of my car commute to Sacramento. Maybe if Yolobus RT 44 were restored, then I would have a much more reasonable commute using transit. The other options currently available to me would not be worth the much greater travel time, effort, and uncertainty, even if the passes were a little cheaper. 11

Lastly, the proposal fails to consider the impacts of its congestion-reducing alternatives on congestion in areas other than I-80, namely south Davis and other surface streets not governed by CalTrans. The proposal indicates that more on-ramp metering will be applied in the proposed project area, which can be expected to cause more congestion of the surface streets in those areas. While I don't necessarily disagree with this approach, as it at least slows down people who feel entitled to drive like jerks on their way to Lake Tahoe, it exemplifies that CalTrans is only concerned about congestion on its own freeways in this proposal and not with the very significant collateral congestion that occurs from its actions to reduce congestion on freeways. Just like the rest of the proposal, CalTrans is hoping to offset its problems onto other communities in its narrow-minded pursuit of its own goals. **The collateral damage to congestion in Davis and other parts of affected counties should be considered and also mitigated for in any Yolo80 project.** 12

When all you have is a hammer, everything looks like a nail. When all you can do is build freeways, that's what you will do to meet your goals, regardless of any effects that action has on other facets of living in and getting around California. Instead of going ahead with this project as proposed, **the money should be returned to the federal government** and a better, more creative, progressive, and comprehensive plan developed to better facilitate transportation and transit needs in the project area. Since CalTrans has already indicated its clear intention to add 13

lanes on I-80 east of Davis, as obviously evident by the prep work for lane expansion that has already been completed (prior to project approvals?!?), I will give my preferences, in order, for which alternative should be taken:

1. **Give the money back to the federal government** and start over with something new and better than same-old same-old adding lanes; we know adding lanes doesn't work for very long. Give the money back. No project is better than a bad project. This would also be the same as voting for ***Alternative 1 – No Change***.
2. Alternative 6a – add a transit lane.
3. Alternative 4b – add a 3+ HOT lane with connector.

13 cont.

Sincerely,
Edie Marshall, DVM, MPVM, DACVPM

Response to Comment 1 in 20240111, Edie Marshall

This introductory comment provides background on the commenter and provides information regarding the commenter's experience with transit. The commenter also provides information about YoloBus Route 44 and its lack of operation since the onset of the pandemic, noting an error in the EIR/EA. In response, Section 2.1.10.6 (Transit) of the EIR/EA has been revised to remove reference to Route 44. If the transit route is removed from both the No-Build and Build analysis, the comparative traffic analysis between No-Build and alternatives will be similar.

Response to Comment 2 in 20240111, Edie Marshall

Caltrans acknowledges that the COVID-19 pandemic significantly affected travel patterns. However, in the case of the Yolo 80 corridor, traffic volumes and congestion have returned to pre-COVID levels. A qualitative analysis of congestion that compared 2023 conditions to 2019 conditions was included in the Transportation Analysis Report, which informed much of the Draft EIR/EA. No changes to the Draft EIR/EA are necessary.

Response to Comment 3 in 20240111, Edie Marshall

The commenter states not all alternatives were considered and explored. The commenter asks why expanding transit ridership isn't a more prominent option (please see Master Response B for alternatives) and they ask why there wasn't more consideration for improving bicycling between Davis and Sacramento (please see Master Response F). No changes to the Draft EIR/EA are necessary.

Response to Comment 4 in 20240111, Edie Marshall

The commenter refers to Table 2.1-27 "Expand Capitol Corridor Frequency between Oakland and Sacramento" and asks how Caltrans can include this as a VMT measure stating Amtrak and the Union Pacific Railroad are third parties." Each mitigation measure, including expansion of Capitol Corridor, will enter into Cooperative Agreements with each implementing agency. That is the mechanism to ensure mitigation measures will be implemented. No changes to the Draft EIR/EA are necessary.

Response to Comment 5 in 20240111, Edie Marshall

Commenter notes that the referenced article includes a citation to the NCST calculator, developed by "Volke" et al." to estimate induced travel. As stated in the comment, this tool was used in the analysis, to estimate long-term effects of the project on VMT.

As the commenter suggests, the analysis used the NCST Induced Travel Calculator to estimate VMT as well as the SACSIM-19 Travel Demand Model, so multiple methodologies were used to calculate VMT. Caltrans aims to mitigate the greatest VMT estimate, which came from the NCST Induced Travel Calculator.

No changes to the Draft EIR/EA are necessary.

Response to Comment 6 in 20240111, Edie Marshall

The data gathering for this analysis started in 2020, during the COVID-19 Pandemic. Fortunately, historic traffic volumes (i.e., the number of cars on the freeway on an hourly basis) were available via Caltrans Performance Measurement System and Streetlight (big data). However, this data excluded vehicle occupancy observations.

Conducting traffic observations, such as vehicle occupancy observations, is a timely and sometimes dangerous process, as these observations are typically conducted manually in the field. As such, it is customary practice for these studies to conduct observations on one day, so long as the day is representative of typical conditions (i.e., schools are in session, weather is clear, etc.). However, conducting these observations on a “typical day” was not possible due to the Pandemic. Therefore, the next best course of action was to conduct observations and compare the values to historic vehicle occupancy data that was available as a part of Caltrans District 3's regular vehicle occupancy monitoring on its HOV facilities, using engineering judgement for reasonability.

Since the analysis makes best use of the data available at the time of collection, no changes to the Draft EIR/EA are necessary.

Response to Comment 7 in 20240111, Edie Marshall

The commenter states that in Table 2.1-27 in Section 2.1.10 of the Draft EIR/EA, more than one measure would happen without the project, the commenter questions the environmental benefit of linking those outcomes to the project. Please see Master Response A for induced VMT mitigation. No changes to the Draft EIR/EA are necessary.

Response to Comment 8 in 20240111, Edie Marshall

The commenter states CalTrans should not receive VMT mitigation credit for the overcrossing for the Nishi housing development. The Nishi overpass has been removed as a measure for VMT mitigation after further consultation with the partner agencies involved. Rather, Caltrans will contribute to a bike path project that offers VMT reduction. This revision is shown in changes to Measure Measures TRANS-1 in the Final EIR/EA and in the Final VMT mitigation plan. Please refer to Master Response A for responses related to VMT mitigation.

Response to Comment 9 in 20240111, Edie Marshall

The commenter asks why Caltrans is focused on Davis and Yolo County when the I-80 problem includes drivers from the Bay Area to Tahoe. The commenter states some measures were considered in Table 2.1-28 but no measures addressed improving transit to and within Lake Tahoe. This project pertains to I-80 in Yolo County and in Sacramento County and US 50 in Yolo County and Sacramento County. The commenter’s suggestions for project alternatives in different locations are outside the scope of this project. No changes to the Draft EIR/EA are necessary.

Response to Comment 10 in 20240111, Edie Marshall

The commenter states increasing the frequency of Unitrans will not reasonably reduce VMT. Please see Master Response A. No changes to the Draft EIR/EA are necessary.

Response to Comment 11 in 20240111, Edie Marshall

The commenter states unless Yolobus RT 44 was restored he would not be interested in using the mitigation measures Subsidizing Monthly Transit Passes in Yolo County and Reduce Transit Fares. Their preference is noted. No changes to the Draft EIR/EA are necessary.

Response to Comment 12 in 20240111, Edie Marshall

The project aims to provide a more direct route between Davis and West Sacramento to reduce the amount of cut-through traffic that uses local surface streets in Davis (and other cities like Dixon, Woodland, and West Sacramento), thereby reducing the congestion on these surface streets. Ramp metering can enhance these benefits by reducing congestion on the freeway. Reducing cut-through traffic on surface streets will benefit local trips made on the surface streets. No changes to the Draft EIR/EA are necessary.

Response to Comment 13 in 20240111, Edie Marshall

The commenter lists in order his preferences: 1) Alternative 1 – no change, 2) Alternative 6a – add a transit lane, 3) Alternative 4b – add a 3+ HOT lane with connector. Their preferences are noted. No changes to the Draft EIR/EA are necessary.

20240112, Susan Handy, Amy Lee, Jamey Volker

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January 12, 2024

Masum Patwary
Environmental Coordinator
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Dear Mr. Patwary,

Thank you for the opportunity to provide comment on the Draft Environmental Impact Report (DEIR) for the Yolo 80 Corridor Improvement Project (Project). We are transportation scholars who have expertise in transportation planning, infrastructure investment, environmental review and impact analysis, modeling, environmental law, and the transportation policy process. Dr. Handy is a Distinguished Professor of Environmental Science and Policy and Director of the National Center for Sustainable Transportation at the University of California at Davis. She is one of the most widely cited transportation researchers in the nation and was recently selected for the Thomas B. Deen Distinguished Lectureship by the Transportation Research Board. Dr. Lee is a postdoctoral scholar at the University of California, Los Angeles. Dr Volker is an assistant professional researcher with the Institute of Transportation Studies at the University of California, Davis. 1

The views and information expressed in this letter focus on two main points, the alternatives considered and the methods used for impact analysis, and are based on our expertise and work in this field.

The DEIR Fails to Consider a Reasonable Range of Alternatives That Would Actually Reduce Congestion and Vehicle Miles Traveled 2

The California Environmental Quality Act (CEQA) requires that EIRs consider "a range of reasonable alternatives to the project . . . which would feasibly attain most of the basic objectives of the project but would avoid or substantially lessen any of the significant effects of the project."[1] DEIR does not do that. The vast majority of the alternatives would neither meet the basic objectives of the project, nor avoid or substantially lessen the Project's most significant

[1] CEQA Guidelines § 15126.6(a); *Citizens of Goleta Valley v. Board of Supervisors* (1990) 52 Cal.3d 553, 566 (EIRs "must consider a reasonable range of alternatives to the project . . . which [] offer substantial environmental advantages over the project proposal").

impact – inducing additional vehicle travel and exacerbating all of the attendant environmental impacts of driving.

Ten of the 12 project alternatives of the Yolo 80 Corridor Improvement Project (Yolo 80, the project) propose to add about 28.4 highway lane miles with the stated purpose to ease congestion and, as a result, improve overall person throughput, improve freeway operations, support the reliable transport of goods and services, improve modality and travel time reliability, and provide expedited traveler information and monitoring systems.[2] Substantial and robust evidence over many decades and from a variety of contexts shows that expanding highway capacity does not "ease congestion" beyond the short term.[3] Increasing highway capacity induces new vehicle travel and the new vehicle travel causes highway corridors to re-congest, often to similar or equivalent levels within about 5 years after opening day. Thus the project alternatives that add highway lanes do not achieve the stated purpose and needs of the project. The additional vehicle miles traveled (VMT) and resultant congestion rebound increase greenhouse gas emissions, air pollution, noise, water pollution (from runoff and precipitated air pollution), traffic safety risk, and a host of other impacts to the environment and human health. Causing such grave impacts contravenes local, regional, state, and federal policies pertaining to reducing VMT, reducing greenhouse gas emissions, and air quality (e.g., the Clean Air Act). 2 cont.

The DEIR omits project alternatives that could manage congestion effectively, cost efficiently, equitably, with less environmental impact, and over a timeframe longer than 5 or so years. Alternatives that toll the existing lanes without adding new highway capacity would more effectively and efficiently manage congestion and improve operations and travel time reliability, thus better meeting the project's stated purpose and need. Tolling the existing highway capacity also better aligns with the project listed for the I-80 corridor in SACOG's 2020 MTP/SCS, the regional transportation plan, which is described as two tolled lanes in each direction – one tolled lane in each direction would be converted from a general-purpose lane and one tolled lane would be new capacity. A robust set of tolling alternatives should be considered for the Yolo 80 project, including but not limited to all-lane tolling of existing lanes, dynamic congestion pricing of all or some of the existing lanes, and a combination of tolled and bus-only lanes.

The VMT Impact Analysis Is Fundamentally Flawed

The DEIR's VMT analysis is deeply flawed and inaccurately captures the transportation and environmental impacts of the project.

For one, while the DEIR is justified in using the National Center for Sustainable Transportation's Induced Travel Calculator (NCST Calculator) to estimate the Project's induced VMT for its transportation impact analysis,[4] it is not justified in excluding freight travel from its induced VMT estimates when determining the significance of the Project's transportation impacts. Interstate 80 is a major freight corridor for the region, state, and indeed the country, and a stated 3

[2] DEIR Summary, page 2

[3] Volker & Handy. 2022. Updating the Induced Travel Calculator. National Center for Sustainable Transportation. Available here: https://escholarship.org/content/qt1hh9b9mf/qt1hh9b9mf.pdf?t=rjc9wx.

[4] The NCST Calculator, developed by the authors of this comment letter, is based on the best available empirical induced travel studies and has also been vetted by external reviewers. See: Volker & Handy. 2022. Updating the Induced Travel Calculator. National Center for Sustainable Transportation. Available here: https://escholarship.org/content/qt1hh9b9mf/qt1hh9b9mf.pdf?t=rjc9wx.

purpose of the Yolo 80 project is to "support the reliable transport of goods and services." The Yolo 80 project can be reasonably assumed to increase freight VMT. Diesel engines in freight trucks emit high rates of fine particulate matter and nitrogen oxide, a precursor to ozone, which have deleterious human health impacts and for which the Yolo-Solano and Sacramento air basins are out of attainment with the Environmental Protection Agency's air quality standards. Yet the DEIR excludes freight VMT from its induced VMT analysis. 3 cont.

Another related deficiency is that the DEIR inconsistently estimates and incorporates induced freight VMT across its analyses for different environmental impacts. It assumes a smaller estimate of induced freight VMT when estimating the Project's impacts on air quality, energy, greenhouse gases, and noise. It assumes a greater magnitude of induced freight VMT when estimating impacts to transportation, though it then subtracts them from the analysis. This creates internal inconsistency within the DEIR and leads to environmental impacts being inaccurately underestimated. This violates CEQA.[5] 4

Finally, while the DEIR acknowledges on page 2-117 that the SACSIM19 model fails to meet the standard set in Caltrans' own Transportation Analysis Framework (TAF) for estimates of the increase in VMT generated by an expansion in highway capacity, it nonetheless relies on the SACSIM model to forecast congestion. But if the SACSIM model does not provide an accurate estimate of the increase in VMT, it cannot provide accurate forecasts of congestion levels and for that reason it overstates the benefits of the "build" alternatives relative to the "no-build" alternative with respect to "improved vehicular operational conditions that would result in reduced vehicular delays and congestion."[6] In general, Travel demand forecasting models like the SACSIM model used in the DEIR analysis of congestion do not adequately account for the induced travel effect for a variety of reasons.[7][8] (Volker, et al. 2020; Deakin 2020). Such models omit the effects of travel times on several components of travel demand, including the frequency of trip making and the choice of destinations, as well as the effect of travel times on residential and business location choices and on land development. For example, SACSIM19 uses with static traffic assignment, rather than dynamic traffic assignment, to quantify the VMT impacts of the project. Evidence shows that static traffic assignment fails to accurately capture the effects of the project on travel behavior and thus VMT.[9] In short, modeling the project with static traffic assignment leads to the conclusion that the project would result in a reduction in VMT compared to the no project alternative. Dynamic traffic assignment, on the other hand, better reflects observed travel behavior where people adjust their departure times to leave before or wait out congested periods on highways. Dynamic traffic assignment is also widely used in practice and 5

[5] *Berkeley Keep Jets over the Bay Committee v. Board of Port Commissioners* (2001) 91 Cal.App.4th 1344, 1356-1367.
[6] DEIR, page 3-41.
[7] Volker, Lee, & Handy. 2020. "Induced Vehicle Travel in the Environmental Review Process." Transportation Research Record, 2674(7), 468-479. Available here: https://journals.sagepub.com/doi/abs/10.1177/0361198120923365
[8] Deakin. 2020. Calculating and Forecasting Induced Vehicle Miles of Travel Resulting from Highway Projects: Findigns and Recommendations from an Expert Panel. Caltrans. Available at: https://dot.ca.gov/-/media/dot-media/programs/transportation-planning/documents/sb-743/2020-09-21-sb-743-expert-panel-rpt-fnl-a11y.pdf
[9] Marshall. 2018. "Forecasting the impossible: The status quo of estimating traffic flows with static traffic assignment and the future of dynamic traffic assignment." Research in Transportation Business and Management. 29, p. 85-92. Available here: https://www.sciencedirect.com/science/article/pii/S2210539517301232.

was a method recommended to Caltrans District 3 in the early phases of project-level analysis.[10] Because SACSIM does not adequately account for the induced travel effect, the analysis of air quality impacts, greenhouse gas emissions, energy, and noise are also fundamentally flawed. 5 cont.

Sincerely,

Dr. Susan Handy Dr. Amy E. Lee Dr. Jamey Volker

[10] Lee. 2023. *The Policy and Politics of Highway Expansion*. Dissertation. Available here: https://escholarship.org/uc/item/13x3n8zr. Quote from page 279.

Response to Comment 1 in 20240112, Dr. Susan Handy, Dr. Amy Lee, Dr. Jamey Volker

This introductory comment provides background on the expertise of the commenters. This comment does not discuss the adequacy of the EIR/EA. No changes to the Draft EIR/EA are necessary.

Response to Comment 2 in 20240112, Dr. Susan Handy, Dr. Amy Lee, Dr. Jamey Volker

The commenters state the Draft EIR/EA does not provide enough reasonable alternatives as is required by CEQA and that the Draft EIR/EA omits project alternatives. CEQA Guidelines § 15126.6(a) state "An EIR need not consider every conceivable alternative to a project. Rather it must consider a reasonable range of potentially feasible alternatives that will foster informed decision making and public participation." The commenters also state adding highway lanes does not achieve the purpose and the need of the project as it will increase congestion over time. For more on the creation of project alternatives please see Master Response B. The commentors suggest tolling existing lanes without adding more lanes and asks for more tolling alternatives such as: all-lane tolling of existing lanes, dynamic congestion pricing of existing lanes, and combination of tolled and bus only lanes. Please see Master Response E for pricing all lanes. No changes to the Draft EIR/EA are necessary.

Response to Comment 3 in 20240112, Dr. Susan Handy, Dr. Amy Lee, Dr. Jamey Volker

The commenters support the Draft EIR/EA using the NCST Calculator to estimate the project's induced VMT but object to the exclusion of freight travel from VMT estimates. Please refer to Master Response A. No changes to the Draft EIR/EA are necessary.

Response to Comment 4 in 20240112, Dr. Susan Handy, Dr. Amy Lee, Dr. Jamey Volker

The commenter incorrectly states that Caltrans must use the same modeling assumptions for all CEQA impact analyses. CEQA requires environmental analyses reflect a "good faith effort at full disclosure" (CEQA Guidelines, § 15151). Specific to GHG emissions quantification, CEQA provides lead agencies flexibility in the selection of appropriate analytical methods, so long as those methods are supported by substantial evidence (CEQA Guidelines, § 15064.4, subd. (a).). As discussed in Master Response A, the NCST estimates and the exclusion of truck VMT from those estimates were limited to induced VMT impact analysis and mitigation targets, which are consistent with Caltrans TAF and OPR guidance. For other resource analyses, the SACSIM19 activity-based travel demand model VMT (including truck VMT) was used to assess the project's environmental impacts as the NCST tool does not provide the level of detail required for the environmental impact analysis. Please refer to Master Responses A, D, and I for additional information related to modeling methodologies. No changes to the Draft EIR/EA are necessary.

Response to Comment 5 in 20240112, Dr. Susan Handy, Dr. Amy Lee, Dr. Jamey Volker

Please refer to the response to 20240110 California Air Resources Board Comment 3 for responses related to modeling methodology. No changes to the Draft EIR/EA are necessary.

20240112, Alan Hirsch (email 1)

From: Alan Hirsch
To: Yolo80Corridor@DOT
Subject: FW: Date for Yolo I80 Causeway Multi-model project alternatives?
Date: Friday, January 12, 2024 5:03:32 PM
Attachments: image001.png

EXTERNAL EMAIL. Links/attachments may not be safe.

Evidence to add to my DEIR letter

From: Avila, Jess S@DOT <jess.avila@dot.ca.gov>
Sent: Wednesday, October 23, 2019 8:29 AM
To: AHirsch <ahirsch@neighborhoodselect.org>; 'Dan Carson' <DCarson@cityofdavis.org>
Cc: 'Lucas Frerichs' <lucasf@cityofdavis.org>; Dan Carson <DCarson@cityofdavis.org>; Keaton, Dennis L@DOT <dennis.keaton@dot.ca.gov>
Subject: RE: Date for Yolo I80 Causeway Multi-model project alternatives?

1. I inadvertently left out the planned meeting date of November 21st
2. Please make your document request through the online California Public Records Act request (clink on link below).
    a. https://caltrans.mycusthelp.com/WEBAPP/_rs/(S(2g1qirptyycqnlbjwvy35ig1))/supporthome.aspx
3. YCTD is our partner on public transit. Caltrans has a traffic operations consultant under contract who will be performing the analysis that includes public transit.

Jess Avila, PE, PMP
D3 Project Manager
Cell (530) 682-8488
Office (530) 741-4533

From: AHirsch <ahirsch@neighborhoodselect.org>
Sent: Tuesday, October 22, 2019 3:56 PM
To: 'Dan Carson' <DCarson@cityofdavis.org>; Avila, Jess S@DOT <jess.avila@dot.ca.gov>
Cc: 'Lucas Frerichs' <lucasf@cityofdavis.org>; Dan Carson <DCarson@cityofdavis.org>
Subject: Date for Yolo I80 Causeway Multi-model project alternatives?

1, What is date for Davis Open housw?
2. I appreciate as much documentation as you can provide per my request.
If you've started the EIR, there must be quite a bit. i.e. public outreach to date summary, alternatives under consideration etc. .
3. Appreciate answer to questions in #3 below, thanks.
I am concerns that you including a robust transit alternative study including BRT features.
I will be at the Mayor commission on Sustainability tomorrow in West Sac to comment on this project as part of mode shift we need to lower our carbon footprint I'll tell them "Greta Sent me".
Alan

From: Dan Carson <DCarson@cityofdavis.org>
Sent: Tuesday, October 22, 2019 1:29 PM
To: Avila, Jess S@DOT <jess.avila@dot.ca.gov>
Cc: AHirsch <ahirsch@neighborhoodselect.org>; Lucas Frerichs <lucasf@cityofdavis.org>; office@ecosaracmento.net; Chris Granger <cgranger@dcn.org>; City Council Members

1

<CityCouncilMembers@cityofdavis.org>; Brohman, Larry B@DOT <larry.brohman@dot.ca.gov>; Tan, Johny@DOT <johny.tan@dot.ca.gov>
Subject: Re: Yolo I80 Causeway Multi-model project alternatives?
What's the date?
Dan Carson
Councilmember, City of Davis
dcarson@cityofdavis.org
(530) 400-1447
23 Russell Boulevard, Suite 1
Davis, CA 95616



On Oct 22, 2019, at 1:27 PM, Avila, Jess S@DOT <jess.avila@dot.ca.gov> wrote:
CAUTION: **External email. Please verify sender before opening attachments or clicking on links.**
Alan,
We are planning an open house in Davis to inform the public about the project in question.
The open house is planned from 6:30 pm – 7:30 pm at 315 E 14th Street, Davis, CA 95616 in the Blanchard Room. We have not sent out notices about this meeting to the general public so you are the first one getting this information. Look forward to seeing you at this open house and hope your questions are answered at that time.
Thank you,
Jess Avila, PE, PMP
D3 Project Manager
Cell (530) 682-8488
Office (530) 741-4533

From: Tan, Johny@DOT
Sent: Tuesday, October 22, 2019 12:59 PM
To: AHirsch <ahirsch@neighborhoodselect.org>
Cc: 'Lucas Frerichs' <lucasf@cityofdavis.org>; office@ecosaracmento.net; Chris Granger <cgranger@dcn.org>; citycouncilmembers@cityofdavis.org; Brohman, Larry B@DOT <larry.brohman@dot.ca.gov>; Avila, Jess S@DOT <jess.avila@dot.ca.gov>
Subject: RE: Yolo I80 Causeway Multi-model project alternatives?
Hi Alan,
Please contact project manager Jess Avila. I cc'd Jess in this email.
Thanks
JOHNY TAN, P.E.
Project Manager
Caltrans – District 3
Office – (530) 741-5120
Mobile – (916) 396-9494

From: AHirsch <ahirsch@neighborhoodselect.org>
Sent: Tuesday, October 22, 2019 12:20 PM

1 cont.

To: Tan, Johny@DOT <johny.tan@dot.ca.gov>
Cc: 'Lucas Frerichs' <lucasf@cityofdavis.org>; office@ecosaracmento.net; Chris Granger <cgranger@dcn.org>; citycouncilmembers@cityofdavis.org; Brohman, Larry B@DOT <larry.brohman@dot.ca.gov>
Subject: RE: Yolo I80 Causeway Multi-model project alternatives?
RE: Yolo Causeway Multi-model Project (Causeway widening & transit alternative)
I write you to ask for information on this project.
This project has significant impact on Davis City Council's work on traffic impact of Aggie Research Center
...and our city and region's ability to address climate change. 1/3 of all carbon emissions is transportation, mostly SOV cars.
I note with concern your public information DOES NOT list the alternatives under study. Why not?
https://dot.ca.gov/caltrans-near-me/district-3/d3-projects/d3-yolo-80-multi-modal-corridor-improvement

1. **Can you please provide background information on**
   - I-80 alternative being studied
   - What alternative we considered and not being studied?
   - Likely a) steps and time frame, and b) opportunities for public engagement between now**'1/1/22; Project Approval & Environmental Document**
   - Parameters (VMT, Carbon impact, etc) you are using to score/rate each alternative.

2. **I also would like a copy of final document summarizing public input and engagement to this date**, input that framed the EIR/EIS/Alternatives you seem to have started.

and a link to any other public documents.

3. **I also would like to know**
   - Who is our liaison as Yolobus & Capitol Corridor and what are their involvement in studying Transit Alternatives?
   - Have your engage anyone with expertise in BRT to study those alternative?

4. **Please add me to your list of interested parties on this potential freeway widening project for noticing on this project.**

Thanks,
Alan Hirsch
CC: Lucas Frerichs, SACOG Vice Chair.
I note this Is my 2nd email and I left a 3rd phone call requesting information but you can consider this an informal records request as this point.
I write you as
   - Sacog tells me they not information on this on its website and You have not provide into to county Yolo Sups in their packet when you presented to them a few months back

From: AHirsch <ahirsch@neighborhoodselect.org>

1 cont.

Sent: Thursday, September 12, 2019 1:37 PM
To: 'johny.tan@dot.ca.gov' <johny.tan@dot.ca.gov>
Subject: Yolo I80 Causeway Multi-model project alternatives?
This project has an impact on city proposed addition of an industrial park.
Can you share with me a link and/or a descript of alternatives analysis being studied in the EIR?
Alan Hirsch

1
cont.

Response to Comment 1 in 20240112, Alan Hirsch (email 1)

This comment contains previous email correspondence (2019) which are not related to the current EIR/EA. No changes to the Draft EIR/EA are necessary.

20240112, Alan Hirsch (email 2)

From: Alan Hirsch <ahirsch@dcn.org>
Sent: Friday, January 12, 2024 5:32 PM
To: Yolo80Corridor@DOT <Yolo80Corridor@dot.ca.gov>
Cc: Keaton, Dennis L@DOT <dennis.keaton@dot.ca.gov>
Subject: DEIR input 2- attach to my DEIR comment

EXTERNAL EMAIL. Links/attachments may not be safe.

Add to my DEIR comment

The current project website does not show a time when DEIR input ends at 1/12
.https://dot.ca.gov/caltrans-near-me/district-3/d3-projects/d3-i80-corridor-improvements

It is convention in schools like UC Davis that you have until midnight to turn in your homework.

ONLY If bother read down page and choose among one of the last of 20? or so downloadable PDF for or Noticed of availability,
If you download this correct PDF, and then you read down it-- at bottom line (try this on a cell phone) it says deadline is Jan 5th with a time- at 5pm.

The revised date with TIME is not shown anywhere else n in any doc the website.

ALSO: How would a member of the public who read a DEIR hardcopy at library know input date had been moved to January 12?? At 5pm?

Attached is screen shot of Yolo80 project page (aka I-80 corridor improvements) showing form noticing updated due date without time of 5pm.

1

1

dot.ca.gov/caltrans-near-me/district-3/d3-projects/d3-i80-corridor-improvements

Daily Kos | Google Maps | Letter: Caltrans to n... | EV charger unveiled... | Public Records Req... | Whitepage | Omsoft | Digby | Google

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Caltrans Travel Work with Caltrans P

Schedule



Draft Environmental Document (DED) for Public Review: November 13, 2023

Public Circulation Comment Period End: January 12, 2024

Final Environmental Document and Clearance Complete: Spring 2024

Design Complete: Summer 2024

Construction Start: Fall 2024

No TIME!

Draft Environmental Document

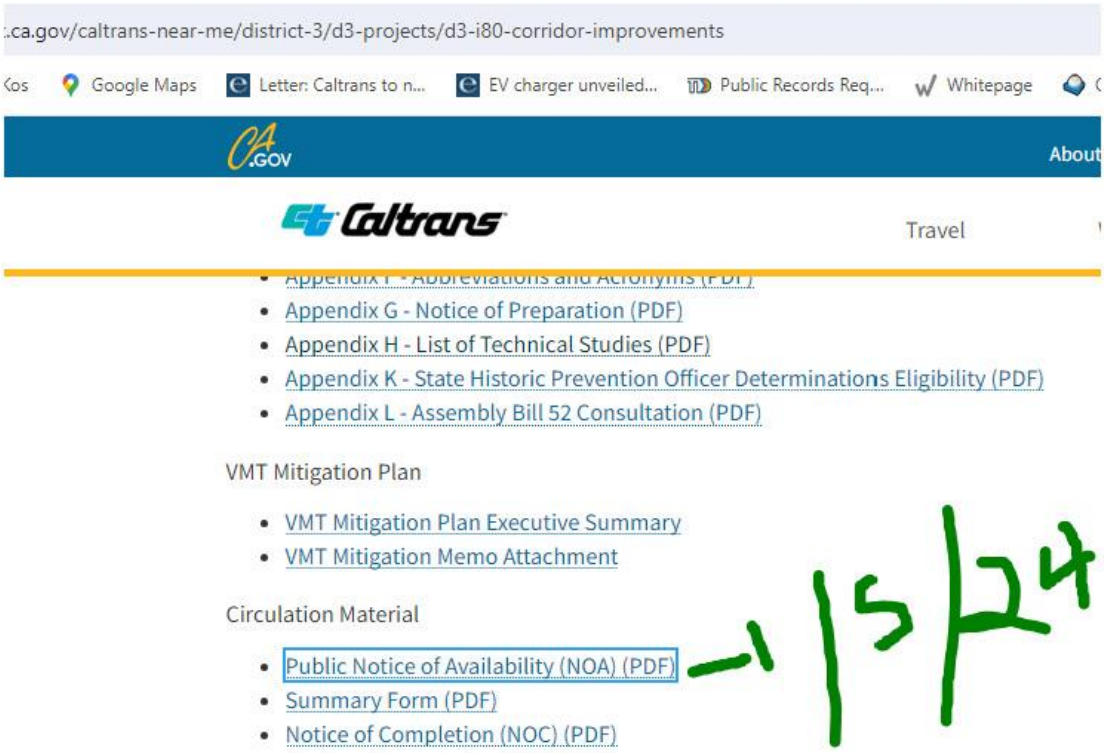
Accessibility Assistance: *Caltrans makes every attempt to ensure our documents are accessible. Due to variances betweer which are not accessible. Where documents cannot be made accessible, we are committed to providing alternative access contact us at (916) 654-2852 (and/or a division contact) or visit https://dot.ca.gov/request-ada-compliant-documents.*

Cover Summary (PDF) Table of Contents (PDF)

Chapter 1 Proposed Project (PDF)

- 1.1 Introduction
- 1.1.1 Project Background
- 1.2 Purpose and Need
- 1.2.1 Purpose
- 1.2.2 Need
- 1.2.3 Independent Utility and Logical Termini
- 1.3 Project Description
- 1.3.1 Project Alternatives

2


.ca.gov/caltrans-near-me/district-3/d3-projects/d3-i80-corridor-improvements
Kos
Google Maps
Letter: Caltrans to n...
EV charger unveiled...
Public Records Req...
Whitepage
CA.GOV
About
Caltrans
Travel
Appendix G - Notice of Preparation (PDF)
Appendix H - List of Technical Studies (PDF)
Appendix K - State Historic Prevention Officer Determinations Eligibility (PDF)
Appendix L - Assembly Bill 52 Consultation (PDF)
VMT Mitigation Plan
VMT Mitigation Plan Executive Summary
VMT Mitigation Memo Attachment
Circulation Material
Public Notice of Availability (NOA) (PDF)
Summary Form (PDF)
Notice of Completion (NOC) (PDF)
Notice of Preparation (NOP) (PDF)
1/5/24
Technical Studies, Transportation Analysis Report, and exhibits will be available upon req
Take the survey!
Public Meetings
City of West Sacramento
Community Center
1075 W. Capitol Ave.
West Sacramento, CA 95691
November 28, 2023 from 5:30 – 7:30 PM
Disclaimer: although the above address is the official Community Center address, please
will take you to the correct parking lot, whereas the Capitol Ave address will take you to t
City of Davis
Mary L Stephens Davis Branch Library
315 E 14th St.
Davis, CA 95616
December 13, 2023 from 5:30 PM – 7:30 PM

From: Alan Hirsch <ahirsch@dcn.org>
Sent: Friday, January 12, 2024 4:53 PM
To: 'Yolo80corridor@dot.ca.gov' <Yolo80corridor@dot.ca.gov>
Subject: I-80 DEIR comment letter R1 Alan Hirsch

Response to Comment 1 in 20240112, Alan Hirsch (email 2)

Caltrans staff members informed both libraries (West Sacramento's Arthur F. Turner Community Library and the Mary L. Stephens Davis Branch Library in Davis) regarding the time extension via phone calls and the Caltrans Public Information Officer advertised notices in local newspapers on December 22, 2023, with details of the time extension. No changes to the Draft EIR/EA are necessary.

20240112, Alan Hirsch

Alan Hirsch
1711 Redwood Lane
Davis CA 95616
ahirsch@neighborhoodselect.org

January 12, 2024

Masum A Patwary
Environmental Scientist C
California Department of Transportation
District 3 703 B Street
Marysville, CA 95901
Dear Dr. Patwary:

RE: PUBLIC COMMENT FOR YOLO 80 CORRIDOR MANAGED LANES
aka I80 YOLO IMPROVEMENTS
aka I80Yolo WIDENING PROJECT

This letter provides detailed comments on the Yolo80 Draft Environmental Impact Report (DEIR).

I am long-time transit activist. I worked with Caltrans as a member of the Citizen Advisory Committee of the Peninsula Rail Joint Power Board. Our Group received a award for f advocacy from the MTC. I reorganized and resurrected Peninsula Rail 2000, Inc, a group that saved Caltrain service from being abandoned by SP in the 1980's. Under my leadership the group received a MTC award. The group continues now nearly 40 year later, renamed Friends of Caltrain. . I attended one year of classes at UC Berkeley school of regional planning as an auditing student, I have an MBA and was a licensed CPA. Served on the Alternatives Analysis Citizen Advisory task force for DNA light rail line to the Sacramento Airport study. I was involved as social equity advocate on SACOG first blueprint. I have been a board member of ECOS and TRAC.

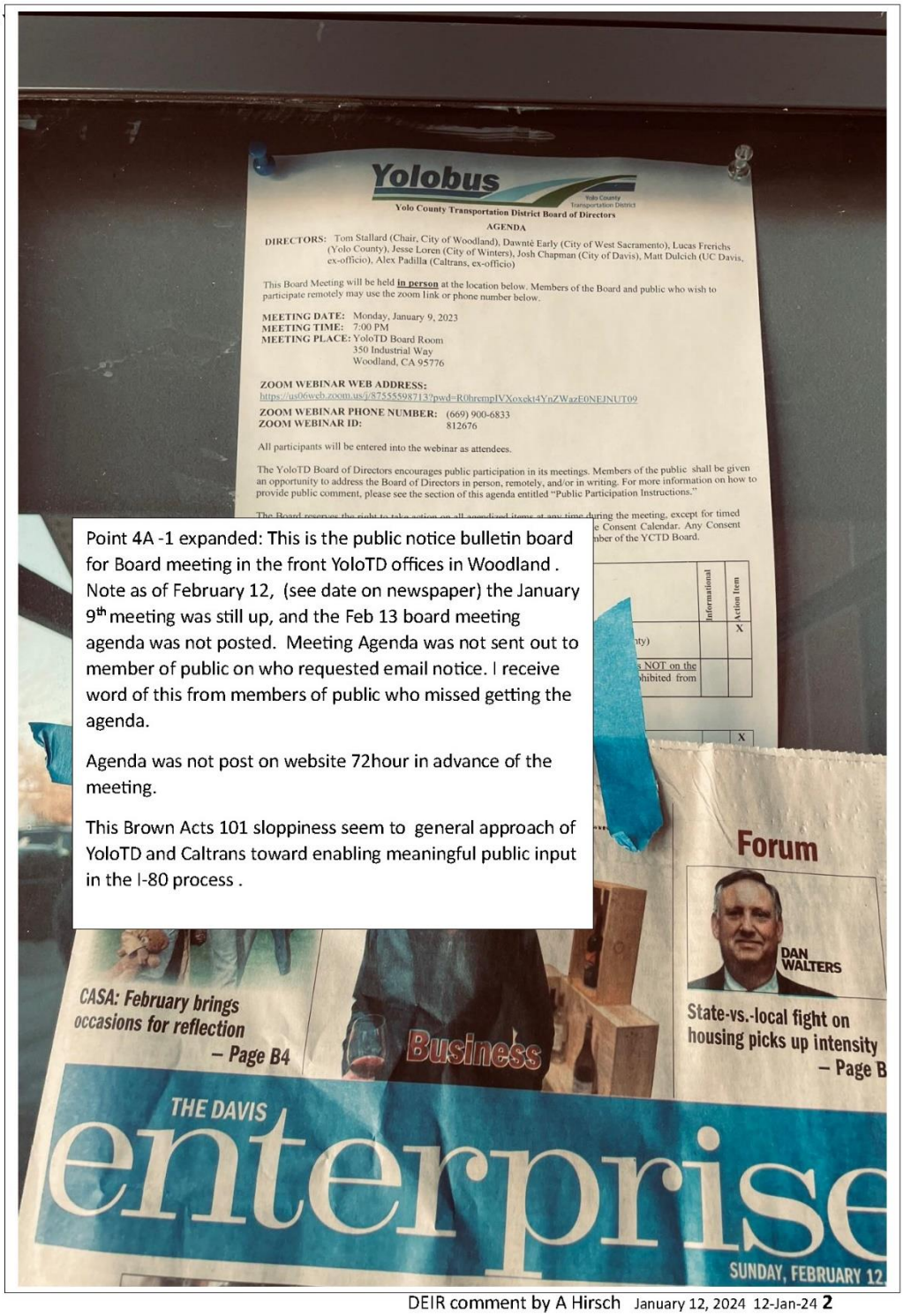
I am a leader of a local group, YoloMobility that has been attending and commenting on the I-80 projects for the last 5 years. I have attended nearly every Public Yolobus/YoloTD board meeting, I have spoken to every Climate Commission in the four city and for county of Yolo County I multiple times, as well as to their transportation Commission. I have learned had not been done by Caltrans or YoloTD as outreach even though I urged it as part of community involvement. 1

I was one of organizer of the I-80 teach Davis that had top end academic speak balance by YoloTD executive Director Autumn Bernstein. I have published a email newsletter called "I-80 News" as well as numerous Letter to editor and oped in the Davis Vanguard, Davisite, Davis Enterprise, Woodland Daily Democrat, Winters Express. Sac Bee and

I am sorry for the many typo Even with speed and grammar check they do not fully compensate for my dyslexia

Thank you for considering point 1 to 1-106 attached, This is a hard but regionally groundbreaking project. I hope this helps us get it right.

Alan Hirsch



Point 4A -1 expanded: This is the public notice bulletin board for Board meeting in the front YoloTD offices in Woodland . Note as of February 12, (see date on newspaper) the January 9th meeting was still up, and the Feb 13 board meeting agenda was not posted. Meeting Agenda was not sent out to member of public on who requested email notice. I receive word of this from members of public who missed getting the agenda.

Agenda was not post on website 72hour in advance of the meeting.

This Brown Acts 101 sloppiness seem to general approach of YoloTD and Caltrans toward enabling meaningful public input in the I-80 process .

2

DEIR comment by A Hirsch January 12, 2024 12-Jan-24 **2**

1) I note the Caltrans open houses on alternatives never suggest that Non-car widening alternative were possible alternatives, like improvement in Capitol corridor rail line, or establishment of corridor length BRT lane or system to use the anticipated Managed lane system on the full I-80 corridor. Caltrans restrictive framing of the problem already headed it to piecemeal approach. No where in discussion was this linked with finding or process for the multimodal study for the full corridor, Caltrans I-80 CMCP. YoloTD board and city policy makers have never briefed on the CMCP during the process or its results. 3

2) During that time, I suggested studying transit only alternatives for I-80 project be included in the EIR analysis. These ideas seem to fall on deaf early prematurely in the behind closed door Caltrans decisions, likely as INFRA grant was restrict to only HOV lanes due to behind the scene lobbying of congress. I suggested at a number of Caltrans open house the idea of bus queue jump lanes or buses running on the shoulder, which seem to have been lost.

3) I also have watch YoloTD in it guidance and negotiation to influence of Caltrans on this project, which is considerable as they receive the starter INFRA grant. I have watch YoloTD board repeatedly violate the Brown Act open meeting act in spirit, if not in fact thus not sharing with the public of I-*80* process and thus not allowing opportunity for timely public input, Yolo TD has also delay release of public documents involved with the DEIR Mitigation Plan development.

4) Instead, of erring on the side of openness and transparency and public participation the have use the narrowest reading of the Brown to limited visibly for their acts.

Examples of the YoloTD board violation of spirit, if not the letter, of the Brown Open Meeting Act , thus limiting public involvement in lead up to DEIR release.

A. Holding unnoticed public meeting (i.e.2/13/2023, regular meeting)- nor posted agenda out it office or send out agenda by email s 72 hours). It was on the regular time so I attended and got the agenda on the day of meeting by request it as I know who to ask on the YoloTD but other members of the public were disadvantaged. I shared this with Executive Director Bernstein so as I did not want to embarrass newish clerk of board. Yet the next meeting February the zoom link was incorrectly published in the agenda. 4

B. YoloTD staff make it difficult to take public input- and when is given it seems to down a memory hole. Board minute do not reflect even the subject of public comment, and written comment received are not contemporaneously (as required under Brown) shared or even historically made available as visible record of meeting. They are made available if you ask, but you need to know who ask to obtain them. Board refused public the right to show PowerPoint picture, even if sent to staff in advance, during the Covid zoom meeting period. Website show no place to send information to the board like PowerPoint slide; This is buried in page 3 or 4 of the agenda, of you know to download agenda- (at PDF to your phone) and look at it.. Caltrans has shared hardcopy graphs to board that were not share with public as they ran out of copies on one occasion in early 2021. Copies were never sent after the meeting. For a long period staff did not share their presentation slide in advance of meeting- they are still not in agenda packet; I think I am unique in getting them a few hour I advance of Meeting. Staff continue to rely on sending Executive Director report mailed separately, possibly to a different mailing list than agenda packet. It is not included in agenda packet, minutes or historically available on YoloTD website. It not even clear on website how an outsider can to subscribe to get

notice for meetings, The website only has customer service email and phone to the bus rider information call center under "contact us". "Contact us" link on bottom of page does not go to email). Even when you find board and CAC page it has no email to contact them.
Its an insider game to keep informed and participate as I do.

C. Caltrans is even worse for keeping me informed of I-80 progress, as even though I have been involved for years. I did not get on their contact list for Yoloi80 new and until I contacted Assemblywoman Ceclia Aguiar Curry's Office. Dennis Keaton the PIO finally called me back. I have asked to receive press notice by email but I believe I still have been added to the list as I requested. I publish the I80 News.

D. Even today there is exist no email on the YoloTD website where member of the community can contact board member or Board of Citizens Advisory Board on pages listing their names. , just a generic "public comment@yoloTd.org. " You only discover this is buried in the agenda packet.- Even this did not exist until January 2022 (you wrote to the board secretary Kathy Sousa). There was not webpage or much of any sign of the existence of the FTA required Citizen Advisory Board until early 2023 Sometimes the CAC agenda still are not shared publicly in advance of their meetings by email (e.g. Nov 2023). When the finally put up a CAC webpage for over 1 year they used a stock picture of a Sikh, a East Asians, Hispanics, Blacks as well as whites that totally misrepresent the actual diversity of the CAC which I believe is still all white. They changed it when I complained. The webpage offers no way for a citizen to contact them to give input. The chair of that committee has refuse to allow member of public to show power points, and the agenda for years in past restricted their members to just a 2 minute public comments. The YoloTD website currently not currently share YoloBus/YoloTD CAC agenda or minutes on it agenda webpage. **This group was not asked for input on the DEIR.** 4 cont.

E. Not putting the correct zoom address in the meeting agenda for the March 13, 2023 meeting. This was noticed to be my Anthony Palmere who called me at that meeting to report this. ED Autumn Bernstein was made aware this during the meeting .

F. Hold a series of unnoticed or and contemporaneously undisclosed board meetings in Spring/Summer of 2022 when board for undisclosed reasons forced it previous executive director Terry Basset to retire, financially commit to hiring a headhunter, and then hired Autumn Berstein to replace him, Yolobus CAC meeting for November 2023 was not legally notice by Email. The never report out of the close meeting any action or lack there off.

G. I have complained repeatly about the likely illegal ad hoc closed-door meeting of a sequence of I-80 ad hoc policy committees since 2022 that have effective hidden the process form the public. .(example: see public 7/17/23 YoloTD meeting video time stamp ~25:00) . The Board and its attorneys have claim to in can meet unnoticed/close door under "ad hoc" rules. It is long obvious I-80 is a topic of "Continuing subject matter Jurisdiction" due to the $85.9 Mil INFRA grant that would take years to use, yet my complains have fallen in deaf ear despite clear direction from Attorney General meeting on continuing subject matters need to be open (see Report to State Assembly- Opinion by Attorney General Daniel Lungren/ of June 10 1966 No 95-614) 5

H. YoloTD board formed its first an ad hoc YoloTD policy committee in fall of 2021. This was obviously of a subject matter to last over a year due to length of I-80 process. This close door group determining DEIR alternative to negotiate with Caltrans to add to the DEIR with no visibility to public or sharing of information. The alternative in EIR were negotiated by YoloTD with Caltrans and not disclose to public until they were included

in the MOU of October 2022. This was negotiated and written by the questionable ad hoc and not shared with public until 96(?) hours before the October 2023 meeting. There was no public visibility even that negotiations were going on for many months, not disclosure of the process and so there was no request or chance for public input as part of the process of selecting alternatives negotiated between YoloTD and Caltrans to be incorporated into the MOU between the two agencies, signed Oct 10, 2022, https://yolotd.org/wp-content/uploads/2022/11/2022-10-10_YCTD-BoardAgenda.pdf

I. The decision to renegotiate with FHWA to modify the INFRA grant so it would be use for Manage lane not just HOV was not discussed and nor voted on an open YoloTD board meeting but presented as a given- a policy decisions made behind closed door in ad hocs. There is no way of know if circular behind the scene consultation with more than a quorum of the YoloTD Board was enabled by YoloTD staff- but the lack of public briefing on action of the ad hoc committee is suspicious give that 3 YoloTD board member- a quorum - of the YoloTD board have I-80 run through their district and would want to know what was going on. 5 cont.

.

J. In late fall of 2022, after 12 month the general I-80 ad hoc was disbanded base on my public comment that ad hoc had been meeting for 12 months, and a new ad hoc was formed to discuss, supposedly only "toll policy" issues. It is hard to prove what goes on verbally behind closed doors at this meeting was only "toll policy committee" as I have been told there are no minute when I did public record request for meeting in spring of 2023, I was told by Brian Abanatt when I made public record request in May 2023 they could not provide me some slide as they involved real estate development in West Sacramento. Discussing the DEIR Mitigation plan is clearly not a Toll Policy issues nd thus should have been done in public It is incredible the Toll Policy Committee did not talk about any other part of the I 80 plan or staff share wth them information on other aspect of the I-80 project, or staff did not share any other I-80 information the two member and Josh Chapman who district in Davis the freeway run. I did hear Autumn Bernstein state to the full board that the ad hoc toll committee should engage in discuss of the shortfall of funding of I-80 following failure of CTC to fund it (video YoloTD website: https://youtu.be/O7odnLgxuF4) Even subject matter of tolling policy the alleged restrict on the current ad hoc from it very inception was clearly one of "Continuing subject matter Jurisdiction" as toll policy issue we expect to to continue in 2024 or later until a region tolling authority was formed with the help of SACOG.. YoloTD applied for and received a grant from SACOG to toll policy study that extends in 2024. Clearly spirit, if not the letter of public participation and visible is broke by YoloTD Board use of serial ad hoc to hold is substantive policy discussions behind closed doors.

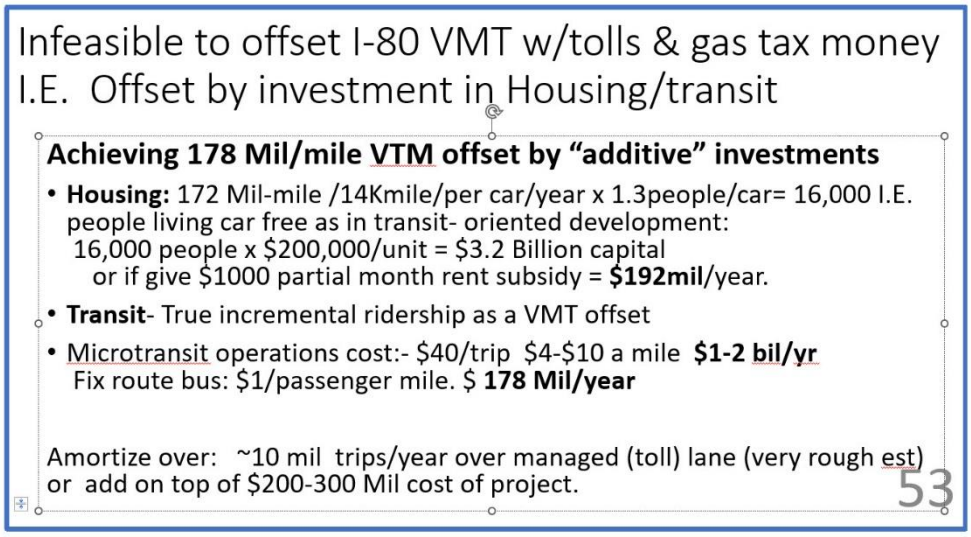
K. Refuse to do a timely release document in response to a public record request to YoloTD. This was for information about the DEIR Mitigation Plan being negotiated by Caltrans and YoloTD with the City of Davis in advance of the June 6 city council meeting. The reason given in the email for the delay/denial I receive from Brian Abbanat was they were 'drafts" part of the DEIR, and I could only get a final when DEIR was out June 30 2023 as was planned at the time. I argue the document on involved Davis role I the mitigation were no draft if they were use as policy to ask for Davis Council to take action, but I had no legal mean to pursue this. However, when the DEIR was not released June 30, they release the document to me anyway, showing me their excuse- -can't release them until DEIR was final and out- was not valid. 6

L. More sloppiness that discourages public input: YoloTD board public comment line did not acknowledge you were calling into the right number for months. The message you go when you called in was the generic "You have reached VIA IP office..."... See My Public Comment at June 12, 2023 (video time stamp ~15:00) I note there other failing in public input process that systematically has discourage and restrict public input to process at a time when YoloTD was negotiating with Caltrans for DEIR alternatives. Video Link of YoloTD board page for 6/12/23: https://youtu.be/RMpHfbNC2PM 7

M. Communicated to Public the DEIR outcome was effectively decided and public input will make no difference in outcome. Brian Abbanat YoloTD's director of planning made a presentation at the Breathe California policy committee May 24 2023.-a group of environmentalist for focus on transportation. Abbanat state to group that regardless of DEIR finding, and even if as he expected the VMT would be unmitigable, but Caltrans would make a finding of "overriding concern" and widen the freeway for cars anyway. This mean he has made a person assessment Caltrans was already decided to reject alternates 6 the transit only alternative- 6 month before the DEIR was release. 8

5. Systematic Hiding of Reality of Project from Public during scoping and alternative selection period to prematurely sell "managed lanes" and take transit off the table. Below are back of envelope calculation I made in May of 2023 in a power point presentation It shows VMT mitigation/by offsets/banking were fiscally unattainable from start. Brian Abbanat- planning director of YoloTD confirm he knew this based on comment he made at presentation he made at May 24 Breathe California meeting. (see that group's meeting minutes).

6. Thought YoloTD reference NCST studies induced demand, and even occasionally SB743, they never the presented scale and mitigation needed to offset of this in numerous presentation to the community advocating for it and offered Manage Lane/HOT lane as a solution for the project, offering managed lane as a panacea. They never shared a managed lane solution, per Caltrans policy have the same GHG/VMT impact as general purpose lane. They hid that the other 3 lane would regress to the same congestion as currently due to Induce Demand and only the toll lane users were buying out. In there presentation they typically compare travel time with Manage lane vs Baseline, and never shared travel time in 3 other non-Managed lanes based on preliminary Caltrans model runs. they also failed to explain those travels times were based on a model (sacsim2019?) that did not reflect Induced Demand factor, thus overstated the delay I the base line condition and overstate the benefit of the widening in the out year.. This was YoloTD advocacy for over a year before the DEIR was released when Bernstein had access to Caltrans model and the administrative draft of the DEIR and knew this was the case. YoloTD and local Caltrans district never acknowledge- their acceptance of accuracy of NCST model or managed lanes, which I and UCD ITS easily did (see 5/11/2023 Davis BTSSC meeting video on city website https://www.cityofdavis.org/city-hall/commissions-and-committees/bicycling-transportation-and-street-safety-commission/meeting-videos) of a as massive 178M -VMT/year to be mitigated in any presentation. This acknowledgement only came out when the DEIR was released. I note the failure to disclose these facts, and failure to release public record before June 6, 2023, city council meeting on partnering with a plans is part of ongoing confounding the public process in service of advocacy of auto-widening/managed lane solution. 9



9 cont.

6B. Failure to include Transit Option. The premature selling of manage lane option by neglecting to share GHG/VMT mitigation challenge, lead to ear marking INFRA money of on highway widening. It is now argued DEIR finding be damned, only highway widening alternative can be chosen by decision maker. This circular logic undermined the legitimacy of DEIR process as part of a fair comparison of alternative. Its supports YoloTD failure to advocate for more robust corridor wide transit alternative in the DEIR in Oct 2022 MOU.

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7. Data presentation
Many of the data are express as percentage of base line and do not reveal absolute numbers in body of report. This hides true absolute impacts. Caltrans has policy to discourage using percentages as it downplays induced demand impacts. This policy directive is just about VMT/induce demand but should be applied to all number, like energy, that are affected by VMT/induced demand. See: Caltrans: "Use of Percentages in Assessing Induced VMT" https://dot.ca.gov/programs/esta/sb-743/resources/percentages 10

8. Mitigation effectiveness overstated to public and policy makers by 50% due to use incorrect denominator not exposure in use of percentage. This effect public process for the DEIR outreach. The mitigation plan chart in Draft Mitigation Plan Oct 20, 2023 DEIR appendix, and repeated in body of DEIR, it shows a plan for 57 Mil VMT mitigation and claims it mitigate 43% of the induced demand (page 5). it does not show the denominator- Caltrans in calculating "43%" only against the automobile induced demand (128m VMT) ,and totally ignore truck induce demand. When compare against the full induced demand to be mitigated (from NCST model) i.e.is used as denominator (180M), the real mitigation level is only 30%. Thus, Caltrans overstated the top end amount of effectiveness of its mitigation plan by 50%. THIS IS HIGHLY SIGNIFICANT error that may have affected YoloTD acceptance of DEIR (at 12/11/23 meeting) and any input receive from public on alternatives selection nit this correction is made., 11

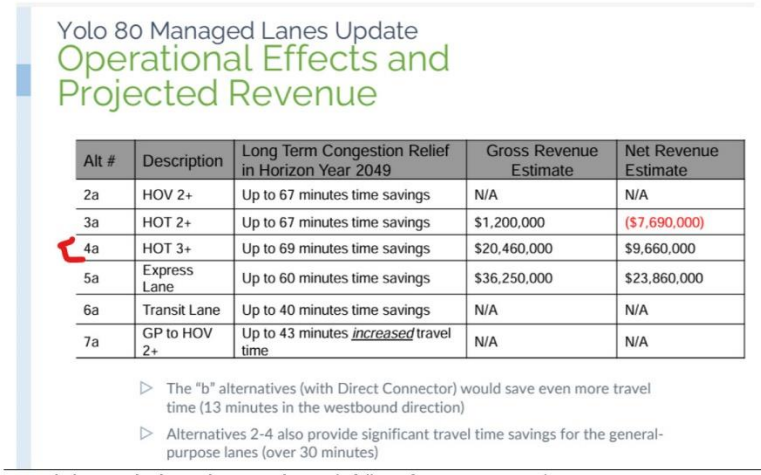
9. Describe Project with phasing and milestone for Monitoring and mitigation.
DEIR fails to fully describe and model the project which including its funding by phase, construction time frame and impact of each one--This includes phasing of revenue generation and roll out of mitigation to mitigate 57milion VMT year. The monitoring compliance to EIR plan need milestone to see if the on track. And we need to monitor if cost per VMT is on track to see if additional funding needed. Currently the DEIR make ungrounded claim all construction will end in 2029, but in fact this is just phase I ($86 Mil), less 20% of a possible $465 million project. 12

10; Describe impact and mitigation plan if project only partly built. The CTC has been scrutinizing projects for funding based on VMT (see rejection of I-15 managed lanes in Riverside for funding,(see Streetblog: Managed Lane Expansion Project Not Approved by California Transportation Commission December 14, 2023 https://cal.streetsblog.org/2023/12/14/highway-expansion-project-notapproved-by-california-transportation-commission) Given there is no certainty the entire project will be fund quickly, if at all, the DEIR should describe VMT, traffic, safety, GHG, toll revenue to fund mitigation plan and another other impact for phase I and other phase to determine impact if it is only partly build, or only partly build for 5 to 10 years.. 13

11. Monitoring and mitigation accountably and contingency plan
Who is accountable and what will be consequence/fall back plan if revenue for mitigation, or cost effective of vmt mitigations strategies are not attained? With out this fall back we could end up in situation of HOV lane failure and resulting air quality degradation inconsistent with DEIR. . The HOV 99 sac to elk grove failed due to hi incident of violation with no monitor, and no public agency/elected body accountable empowered to address/take additional mitigation actions. 14

12. Lack of Sustainable funding plan for Mitigation.
The mitigation plan in Draft Mitigation Plan Oct 20, 2023 appendix calls for $50 Million in annual funding. Even if the "best" tooling option is chosen, (5) this means a shortfall of $27 to $40 Million A YEAR into perpetuity. (alternative 4 or 5). (see table below from YoloTD board meeting 12/11 slide 20) 15

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Yolo 80 Managed Lanes Update

Operational Effects and Projected Revenue

Alt #	Description	Long Term Congestion Relief in Horizon Year 2049	Gross Revenue Estimate	Net Revenue Estimate
2a	HOV 2+	Up to 67 minutes time savings	N/A	N/A
3a	HOT 2+	Up to 67 minutes time savings	$1,200,000	($7,690,000)
4a	HOT 3+	Up to 69 minutes time savings	$20,460,000	$9,660,000
5a	Express Lane	Up to 60 minutes time savings	$36,250,000	$23,860,000
6a	Transit Lane	Up to 40 minutes time savings	N/A	N/A
7a	GP to HOV 2+	Up to 43 minutes *increased* travel time	N/A	N/A

- The "b" alternatives (with Direct Connector) would save even more travel time (13 minutes in the westbound direction)
- Alternatives 2-4 also provide significant travel time savings for the general-purpose lanes (over 30 minutes)

15 cont.

13. Missing transit Alternatives. Need to study full I-80 from Carquinez and even Martinez to Sacramento or even to Tahoe – the full corridor length to explore viable Transit Alternatives, not just transit improvements restricted to so called Yolo County corridor This is not a corridor with any logical end on the West (Kidwell road and the Dixon/Solano Greenbelt Is not an end point). Instead it is a bottleneck created by Caltrans due to piecemealing process and decision to widen I-80, Highways 12 west to Napa, and fix bottle necks other bottleneck to the West. There should be at least two alternatives, or a combination of them studied a) upgrade of Cap Corridor Rail. and b) implementation of BRT system with local connector using the managed/express lanes already plan or in I-80. .As noted, these were suggested by me at open house during alternative scooping but seems to have been dropped. This article discussed links to Caltrans I-80 CMCP primary document where it suggests upgrading Cap corridor service to 110mph is 15x more cost effective - if alternative are studied on a corridor wide basis, not piecemealed. https://www.davisvanguard.org/2023/10/guest-commentary-caltrans-own-charts-show-expanded-transit-more-effective-than-road-widening-to-speed-travel/

16

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14. DEIR Failed to study robust transit alternative to widening- even after Davis Council asked for it at it June 6th 2023 meeting and the DIER release was delayed 5 months. Over 90% of travel over Causeway begins or end in Solano county or the Bay Area, yet the one transit alternative studied only improve bus service between Mace Ave in Davis and Sacramento-(there is virtually no bus servie Mace to Kidwell) And alternative evaluates cost/benefit adding bus lanes where there is not bus service on freeway (Mace Rd to Dixon) and unsurprising it pencil out poorly .

15. Missing transit Alternative Capitol corridor upgrade from I-80 cmcp.
Caltrans I-80 CMCP (draft of 1/2022 Caltrans I-80 CMCP Page 103 table 5.13) show that upgrading capitol corridor rail service to 100 mph and 30 minute service (and other improvements) was 15 times more cost effective than the freeway widening plan for I-80 corridor- This is Caltrans calculation and methodology. Caltrans piecemealed 30/ 60/ large and smaller project along I-80 from Carquinez Bridge east adding capacity with comparing this entire bundle to cap corridor or BRT transit alternative. By doing Yolo80 last Caltrans created the bottleneck at causeway. This can be seen comparing traffic eastbound "out of solano in r "I80 East CMCP "(Solano county only study) with the throughput of Causeway in 3 counties/district 3 & 4 joint "I-80 CMCP". 16 cont.

As describe elsewhere in this letter with other citations adding transit service in corridor as a mitigation is not effective due to induced demand offset of any driver taken off the road. (see Gilles Duranton and Matthew Turner 2011.)

This -piecemeal-CEQA review of the multiple project in the Ii-80-corridor-seems to violate CEQA see Vanguard : **Guest Commentary: Caltrans' Own Charts Show Expanded Transit More Effective than Road Widening to Speed Travel** https://www.davisvanguard.org/2023/10/guest-commentary-caltrans-own-charts-show-expanded-transit-more-effective-than-road-widening-to-speed-travel/ 17
Also: REFERENCE: Davisite: "Did Caltrans Piece-Meal Plan for I-80 corridor violate CEQA, ignore Davis impacts?" SEE https://www.davisite.org/2023

16. Land Use Impact and pressure on Dixon & Greenbelt of auto widening ignored.
If Caltrans travel time is to be believed, it will take over 1hr to travel from Dixon to 50/80 split if the freeway is not widen...but a time saving of 2/3of that if it is. ¼ of commuter (or much fewer alt 4 HOT3+ -free is chosen) travel time average 1 hour no one will want to live in Dixon and commuter to Sacramento, or live in Vacaville and work at UCD. So "fixing" this would make this commute to remain viable and make a dramatic difference in development in greenfield development of housing in Solano County 18

17. **Failure of any alternative to consider adding a train station in Dixon, or dramatic expansion of bus service on I-80 to east of Yolo count as alternative, not a mitigation**. Adding this bus service in I-80 corridor is not a mitigation due to induced demand offset of any car taken off the road will be refilled by other driver. **As describe adding transit service in corridor as a mitigation is not effective due to induced demand offset of any driver taken off the road. (see Gilles Duranton and Matthew Turner 2011.)**

18. Growth Pattern includes speed of growth- which will change if freeway is widened.
It feel like Caltrans assume growth pattern are only about zoning and not about speed at which the already zoned land is built out. The DEIR acknowledges the acceleration of growth from the project but summarily say project "won't affect patterns of growth". 19

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19. Remove the bottleneck for cars and we will get more and faster greenfield development in Yolo and Solano County.
The Dixon/Vacaville greenbelt in Solano county was designed to separate the Bay Area from Sac Region, and Causeway is logical bottleneck to avoid changing growth patterns, so the two regions don't sprawl together. The bottleneck also creates an opportunity to put interregional travel on rail or buses...which can be exploited, like the bay bridge bottleneck has been to encourage mode shift to transit for inter-regional trips. BART ridership success- and livability of City of SF, is due to Bay Bridge bottleneck. 20

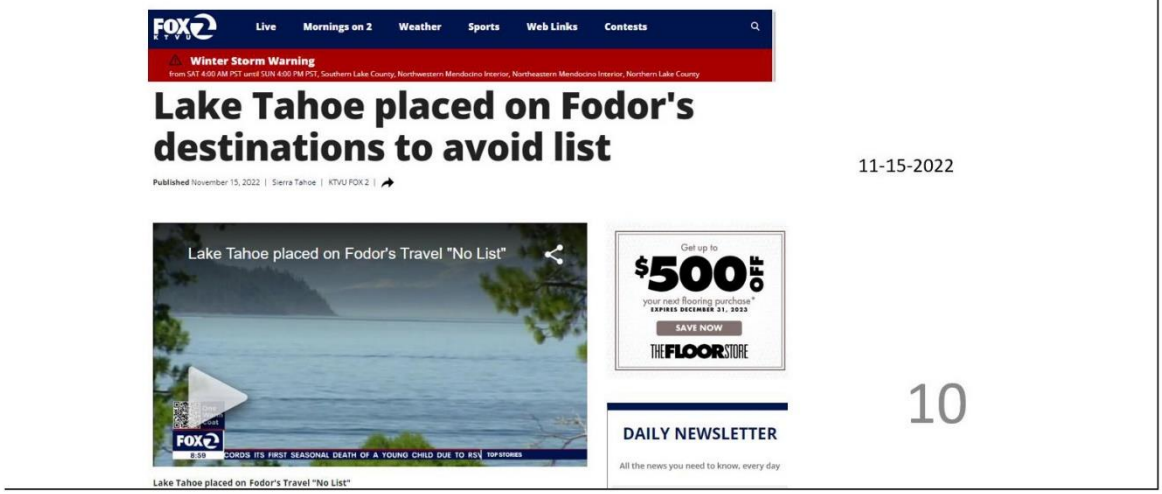
20. Negative Community Impact by dilution on political support for a better transit of richest can opt out of congestion.
Adding the toll lanes allows the richest to opt out of congestion....like private school voucher, this takes political pressure off fixing schools the as most rishes, and therefore powerful in society opt out -- no wonder business community favor the I-80 managed lanes. This is real community impact...the transit system become something only the poor use as rich as afford to pay toll. This needs to be analyzed in a Metro-wide way as part of SACOG master managed lane network plan , and not piecemealed. 21

22. Piecemealing and defining a bottleneck as a corridor (aka an unnatural corridor) project description lead to failure to discuss how HOT3+ free alternative seem to uniquely incentivies Tahoe Traveler over others:
22A. Due to lack of description of Tahoe vs other trip in the Origin Destination study YoloTD prematurely choose on 12/11/23 Alternative 4 HOT3+ to allow 3+ in vehicle to drive free-(and claim save 23 minutes over other lanes per Caltrans) This seems to favor (and induce more) recreational Tahoe travel over other travelers. There is little no obvious thru put benefit for this choice and mayu actually lead more congestion on I-80 and 50 far to east in the 2 lane section in the Sierra. : Caltrans model of for Draft CMCP I-80 study on table 9.3 show have 3- free policy in HOT lane has less 3% difference in carpooling behavior vs the no build. And it is highly unlike people will decide to carpool to Reno/Truckee/Tahoe to save a $5-10 toll. This bias to favor long distract traveler suggest the generic Induced Demand number from NCST calculator used in DEIR are also likely understated.
22B This giving away capacity also raises toll for local county resident vying for now reduced capacity in the Managed lanes. This bias and toll impact of 3+ free is not discuss in comparison of alternatives.
22C Tahoe is already considered over crowded so we should be analyzing effect of removing bottle neck to add for travel there for commuter/and esp 3+ recreational travel from Bay Area 22

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23; Due to piecemealing, transit alternative from Sac and Bay Area to Tahoe Region (on 50 & 80) were never consider; Amtrak provide the only public transit regular service, and you cannot put ski or Mountain Bikes in luggage aboard the train to Truckee. And some ski are too long for carry on luggage about bus and train on bus and train; Colorado has figured out and promoted ski trains out of Denver. Again, adding this service as a mitigation for winding is not mitigation due to induce demand effect as noted elsewhere **(see Gilles Duranton and Matthew Turner 2011.)**

More VMT= GHG= Death Wish for Tahoe Snow



23

11-15-2022

10

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24. Social Inequity and Toll estimate are not disclosed - Managed lane capacity is auctioned off- to balance of supply and demand, There is no disclosured of what the tolls will be, or a determination who benefit from different toll-free user policy (3+ plus free seems to favor more affluent Tahoe travleers). I means other will pay more as a result of this policy of giving away lane capacity to some other group. With 21% of Yolo county under the poverty level we have extreme disparity of income that make social equity important. 24

25. Counting on Honor system for 3 free in managed Lane set itS up for inequity or even failure.
A) This has not been disclose in comparison of alt 4 vs 5
B) Has high level of violation been modeled and toll level impact other been disclosed?
Counting on "honor system" on Fasttrak Flex set up incentive for rampant violation, just when freeway is most congested. Loophole of for violation is obvious. For example, many 2-passenger vehicle will claim to be 3 as existence of a back seat passenger is unseeable due to legality of 100% tinting of back side window allowed, and even minimal enforcement of 30% tinting in front- and only a $25 fine if tinting in front is violated. --- Enforce of tinting is reduced as police are now discourage from traffic stops to enforce -minor offenses like this . There is an increased incentive for POC to tint window to discourage "driving while black" stop now much talked about. In addition, just having child seats in back can be mistaken for a child and count incorrectly legit 3 in a car even without tinting. Violations are not a victimless crime : this effects toll level set for law abiding drivers as well for revenue to mitigation. ALSO, there is no method to do periodic monitoring of rate 3+violations visually unlike 2+ violator and as not able to use traffic stop on shoulder-less causeways. And no way to do manual surveillance as there are no Ped overcrossing for over 10 miles from Mace to Harbor of even in North Natomas. If no means of monitoring violation rate, no way to assure this 3+ free policy is working and managed lanes could over time fail to work as mode shift incentive, just as lack of HOV easy enforceable/infrequent CHP enforcement has lead to slow increase In-violation (over 40% on HOV lane on 99 from sac to elk grove, destroying the legimacy of Model use to justify them during DEIR process 25
C) What is legally required monitoring process to identify number of 3+ violation rate over time D) who is accountable to fund do this and what is the monitoring interval E) What is legally required consequences step wise, if lane continue to fail to reduce violation rate to a predetermined level.

C. Carpool lane to 99 have failed to lack of monitoring and mitigation plan: HOT3+ are likely to suffer same fait at Tahoe Times. A recent Caltrans study showed that over 40% of users of 2+ Carpool lanes on Highway 99 between Sacramento and Elk Grove are single occupancy vehicles and a less formal study showed 43% violated on I-80 HOV to Roseville. How will CHP offices enforce and stop violator by visually distinguishing legal toll paying single occupancy cars from those illegally claiming to be HOV 3+ in short 4 minutes crossing of the causeway, especially when there is no shoulder CHP vehicle to pull out to observe traffic and there will be no barrier to cars weaving in and out of toll lanes? Using License plate for enforcement Fastrak-less lane usage is problematic due their often being obscured by bike and rack on rear bumper unreadable plates due to paint deterioration, Describe your plan and cost to implement. See Point 31 in this letter. References: https://insidesacramento.com/carpool-lanes-and-your-cheating-heart/ and https://dot.ca.gov/caltrans-near-me/district-3/d3-news/d3-news-release-22-143 -:~:text=Recent%20Caltrans%20traffic%20counts%20report,Federal%20Highway%20Administration%20(FHWA).

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26. Energy
In appendix H document "Environmental Impact Evaluation—Energy" analysis reports dated 4/15/23 and 8/28/23 I obtain from Caltrans on a thumb drive. These are not on the state CEQA clearing house or Caltrans district 3 project website. A) It is not clear which ones are applicable in final EIR. B) both do seem to use the 180Mil VMT induced number from VMT report. but it does not correctly report Energy use increment for alternative 2, 3, 4 and 5. C) They also do not account for energy use in TDM mitigations programs where 57 million auto VMT is shifted to additional bus service and 10-15 MPG Microtransit buses. If all these VMT are transfer bus, it equivalent of operating massive increase in the bus fleet- 2- 4 times the size of today Yolo. What is it energy footprint- even as it shift to EV. 26

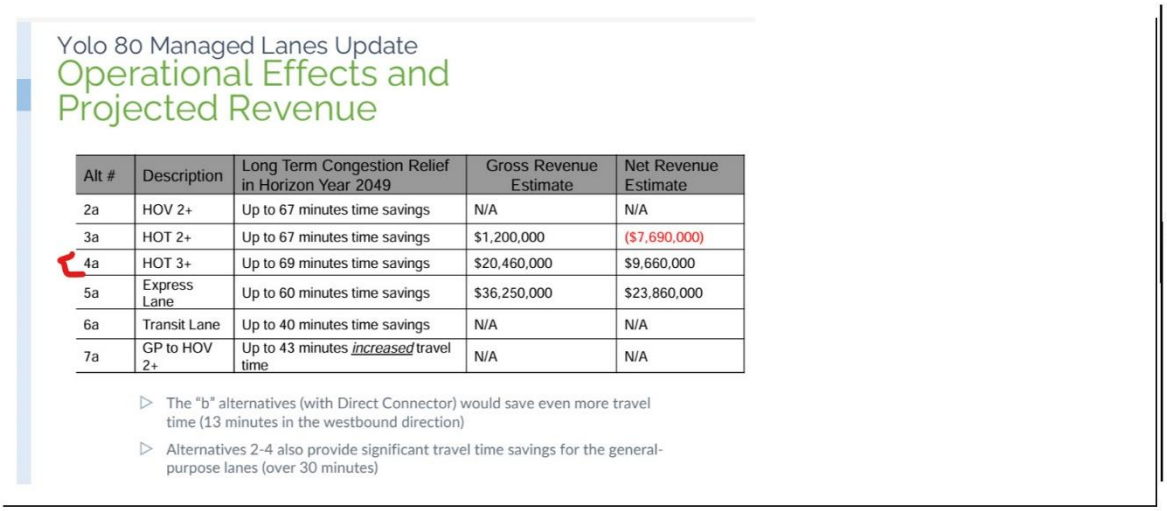
27. The mitigation fee assume adding fixed bus & Microtransit service is only operating cost, not any capitol The VMT increment if turned into passenger mile make it look like Yolo bus will have a 3-5x large fleet,and require a large new facility.These millions of dollar are not included in Mitigation plan. It is also does not seem included in Unitrans estimate of cost per VMT. If it is, it is not revealed in any document. Show Your Work. 27

28. Public Process- It was Premature for YoloTD board to choose an alternative at its December 11 meeting a)before input from Davis Council. b) before Draft EIR as noted elsewhere in this and other comment letter -especially failure to include induce demand effects in travel congestion, the alleged benefit of the project. c) Made this decision 30 days before announced end of public to which they are accountable. This send a signal any future public participation in EIR process is meaningless. 28

29. DEIR does not disclose ,that carpool incentive make no difference in behavior and adding incentive in other Caltrans studies show is ineffective in increasing lane efficiency..
The Caltrans I-80 CMCP show at most 2% change in vehicle occupancy comparing existing (no HOV) to Hov2+, HOT2+ and HOT 3+ in it modeling. for every segment of I-80 east of Carquinez bridge, including segment that match those of this project. i.e. the model here shows no behavior change due to incentivizing car pooling. Does this match the modeling for this project that shows great difference in congestion for different car pooling incentive. This is not revealed in DEIR analysis of alternative. Source: Caltrans I- 80 CMCP draft of 1/22 table 5.3" Vehicle occupancy by segment by Alternative" page 97.see Vanguard: https://www.davisvanguard.org/2023/10/guest-commentary-caltrans-own-charts-show-expanded-transit-more-effective-than-road-widening-to-speed-travel/ 29

30. No disclosure 3 free in alternative 4 vs others . There is a dramatic effect on toll revenue if allow 3+ free vs 100% play managed lanes (alt 4 and 5), this is money available to partly sustain a mitigation plan. Slides presented at the YoloTd board meeting December 11. 2023, assumably using Caltrans modeling show a net $14,200,000 revenue difference 4 vs 5. (copy of slide 20- form 12/11/23 YoloTd board meeting attached). Has this been disclosed and factored in the mitigation plan? 30

31.No disclosure in DEIR of how $9 million for Tolling System implied in Slide 20 from YoloTD 12/11 meeting. How will be used and basis for this number to affirm is an adequate forecast and not over optimistic, Because of greater enforcement issues on alt 3& 4 vs 5 (due to 2+& 3+ free) the cost of operating under the-HOT3+should be higher. See point 25 in this letter on enforcement issues Show you work. . 31



Yolo 80 Managed Lanes Update

Operational Effects and Projected Revenue

Alt #	Description	Long Term Congestion Relief in Horizon Year 2049	Gross Revenue Estimate	Net Revenue Estimate
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7a	GP to HOV 2+	Up to 43 minutes *increased* travel time	N/A	N/A

- The "b" alternatives (with Direct Connector) would save even more travel time (13 minutes in the westbound direction)
- Alternatives 2-4 also provide significant travel time savings for the general-purpose lanes (over 30 minutes)

31 cont.

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[1] **32; Caltrans research shows "Carpool only" Lanes or a policy of "Toll Free for carpoolers" makes no difference in encouraging more carpooling behavior, thus has no little public benefit in facilitating more "efficient" use of the road capacity.** This is not reflected anywhere in tables. Caltrans's ***I-80 Comprehensive Multimodal Plan (***I-80 CMCP draft Jan. 2022) indicates that giving toll free passage for carpools in toll lanes makes a trivial difference in travel behavior. Looking at Chapter 5.7, Table 5.3 "Vehicle Occupancy by Alternative" you can compare Caltrans forecast of number people per car (amount of carpooling) in different widening scenarios i.e., if carpool lanes are added or not, or if carpoolers get a discount in a new "managed" toll lane. Compare numbers between carpool free scenarios ("no build" & "existing") vs widen the freeway ("build") scenarios 1, 2 & 3 (aka HOV 2+, HOT 2+ and HOT3+- aka 2-person carpool, 2 or 3 person carpools drive free in a toll "HOT" lane) Caltrans estimates often zero or **at most 3% more carpooling** by advantaging carpooling. This is consistent with other's research. Caltrans policy also notes HOV lanes do not mitigate climate impact of induced traffic i.e., GHG increase but encourage more driving. ("HOV Lanes & VMT" link: https://dot.ca.gov/programs/esta/sb-743/resources/hov-lanes)
NOTE I reference draft of 1/2022 as the 1/2023 find CMCP was not posted publicly until May 30, 2023 on the CMCP project webpage (per internet wayback machine)on that project website and I have not update my reference

32

This raises social equity concerns considering people who go to Tahoe travel in larger groups already as their behavior won't change if they save $5 or even $20 in tolls. DEIR and YoloTD staff has offered no public reason why they suggest we privilege this class 3+, mostly likely discretionary recreational travelers on the new lane on the Causeway vs over other users who must pay tolls to get to avoid congestion home from work on Friday nights because good public transit is lacking. One can also note the removing congestion for these groups drivers removes public pressure to fix lack of travel alternative to the Tahoe area that might reduce VMT: travelers can still not put oversized skis or mountain bikes aboard existing Amtrak trains to Truckee due to length restrictions, while Denver, Colorado has added additional ski trains service to its mountain resorts (Winter Park Express**).**

In addition, enforcing carpooling requirement is problematic as it cannot be automated to verify extra passengers, especially with three plus rule and increasing number of tinted windows.

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40. Literature indicates adding Roadway capacity decrease Transit use- Has this been modeled and factored in VMT to mitigation..and has the effectiveness of just adding buses to the road to increase transit ridership?.
Increased speed and capacity of freeway will be incentive to reduce transit use - and reduce walking that is part to of a transit trip.. While this may be offset by mitigation programs like free fare and increase bus and rail frequency & reliability of bus in manage lane, this should offset by increased speed and travel time for 25% drivers in Manage lanes, so they are less likely to use transit. Who we allow to use lane free also effect pool of people who might be persuaded to use transit. This need to be modeled.
See. All below comments are from Victoria Transportation Policy Institute lit survey document (VTPI) 6/30/23 titled "Generated Traffic and Induced Travel Implications for Transport Planning https://www.vtpi.org/gentraf.pdf
On VTPI PAGE 5:. Roadway expansion impacts tend to include: ·First order. Reduced congestion delay, increased traffic speeds.· Second order. Changes in time, route, destination and mode.· Third order. Land use changes. More dispersed, automobile-oriented development.· Fourth order. Overall increase in automobile dependency. Degraded walking and cycling conditions (due to wider roads and increased traffic volumes), **reduced public transit service(due to reduced demand and associated scale economies, sometimes called the Downs-Thomson paradox**), and social stigma associated with alternative modes, (cite: Robert B. Noland and Christopher S. Hanson (2013) page 75 , "How Does Induced Travel Affect Sustainable Transport Policy,"
Also see: Transportation Beyond Oil: Policy Choices for a Multimodal Future, (John Renne and Billy Fields, eds), Island Press (www.islandpress.com),.
VTPI PAGE 7: Duranton and Turner (2008) found that in U.S. urban regions, vehicle travel increases proportionately to highway capacity due to four effects: increased driving by current residents, an inflow of new residents, and more transport intensive production activity. They conclude that, without congestion pricing, increasing road or public transit supply is unlikely to relieve congestion, and current roadway supply exceeds optimums.
VTPI: PAGE 11: Duranton and Turner (2008) found that in U.S. urban regions, vehicle travel increases proportionately to highway capacity due to four effects: increased driving by current residents, an inflow of new residents, and more transport intensive production activity. They conclude that, without congestion pricing, increasing road or public transit supply is unlikely to relieve congestion, and current roadway supply exceeds optimums. 33

41. If more road capacity is detriment impact on transit ridership - Has the higher cost/rider been factored in?
Induced demand Increase auto travel reduces efficiency of mass transit due reducing its economy of scale. The cost for is this estimated at 15c-30c /VMT is estimate cost of this shift away from transit agency. This is impact that should discussed and mitigated- This effect of widening implies a need to increase payment to transit agencies as cost adding capacity to road vs no-build or transit alternatives and be used in calculation of for finding of Overriding concern. It should be modeled for each phase and especially in out years And particularly if there is missing corridor wide transit alternative(s) is added. (cost impact numbers from page 15 table in Victoria Transportation Policy Institute's "Generated Travel and Induced Demand" 6/30/23) 34

42. Encouraging driving over transit mean project (induce demand) violates multiple local policy to increase transit use generally in the DEIR.
There needs to be an analysis that time saving of manage lanes for transit use over weighs the increase attractiveness of driving of added capacity. This analysis should address not just rush hour but non-rush hour time when traffic and can buses are free flowing in GP lanes for no-build alternative as base line., and address the fact traffic with always be free flowing for 25% of the population who access the managed lanes, who now have permanent have an incentive to drive. Please show your work and assumption in this tradeoff 35

43. VMT mitigation plan assume small Yolo County Population will mitigation travel that come from all over the Region comes up with 57 VMT less driving - this seem not credible: A) provide number to quantify mode shift percentage B) Give some example where this has been accomplished without constructing rail infrastructure with its hi capital cost- not funded in plan.
Caltrans plan suggestion they can mitigation 57 Mil VMT of the 180 mil VMT/year induced demand just with Yolo County program, i.e. by getting between ten to twenty thousand of Yolo County residents to magically begin taking the bus on their daily errant and commuter or use expanded Microtransit service even as they- especially in the short term- reduce congestion on I-80 and incentives more driving. Considering 0ver 90% of travel on causeway is from outside the Yolo County- - so a most 14,000 trips are from Yolo County users of the freeway. 1/3 of the would have shift to transit to mitigate the increase traffic from the Induced Demand from other counties. The adult population of Yolo County- from Winters and Dunnigan to Davis and West Sacramento is 180K Solano 351K, Sacramento 1.199K .
Even if one do not accept the number, please present a verification of mode shift implied if 57 VMT mitigation is shift from Driving to Transit and active mode to verify the DEIR plan is possible – what number/percentage of travel in Yolo County will shift modes . 36

44. Mitigation Plan calls for Davis and Yolo Giving up on Zero Carbon Goal: Discuss community impact of this value decision in light of climate plans no in effect. Should Davis and other in Yolo county be turned into a carbon offset project by Caltrans? Does Caltrans really believe tens of thousands of Yolo County resident are willing to give up convenience and conform of driving in air-conditioned cars base on TDM and more buses....so Solano/Bay Area resident can drive more on I-80? This take the moral imperative out of transit use and make it merely transactional. This has community inpacts. 37

45. Illogical alternative rating vs others :No build alternative 1 with no induced demand VMT per NCST model is rated worst for creating VMT than others?
Table 2-1-25 (page 2-121) Alternatives Comparison and many other place the DEIR downgrade the no build alternative 1 without any basis. The no build create NO increase in VMT per table 2.1.26 p(g 2.122) yet this table rates it 5, the worst of the 8 alternative on the table? This also appear on table 2.2.3.4 where no build, with lost VMT, has higher fuel consumption.
45B. Entire summary chart needs to be review and correct for such bias note above. Each rating should be linked to part of DEIR to disclose quantitative and qualitative basis for ranking. To show your work so conclusions can be verified. 38

DEIR comment by A Hirsch January 12, 2024 12-Jan-24 **18**

47. . Mitigation Plan for Microtransit measure: The estimate of VMT reduction/mitigation tactic of increasing Microtransit as VMT reduction is not a grounded.

A) microtransit only reduces VMT if a) there are larger group rides that b) rider would others not be biking/waling/carpools/joint Lyft rides otherwise c) the new rider much not cannibalize existing fix route bus service. This is especially problematic with Davis with a intense transit network provide by Unitrans.Show you work how you derive VMT reduction per Microtransit trip, aka cost per VMT.

B) Potential for Ridership. Microtransit can cannibalize the more VMT efficient fix use route riders thus actually reduce their efficiency---and increase overall VMT. APTA has expressed concern about this https://www.apta.com/wp-content/uploads/PT_081919_Microtransit-in-depth_reprint-002.pdf Davis has an dense and well used bus system compared to West Sacramento so the small difference (20% in table 2) in Microtransit VMT reduction between Davis and West Sac mikes little sense.

C) The mitigation memo seems to indicate it bases it calculation on rule of thumb from CAPCOA put provide no link to source document. That a 25% increase transit (measured in miles driven or hour) means a 0.29% reduction in VMT, this rule seems to treat an increase in Microtransit hour or miles that same that for VMT reduction as similar 25% increase in fix route transit. Is this True? In fact Microtransit is much less efficient than fix route in passenger mile/hour service. source: Fehr-& Peer memo on VMT mitigation estimate, and cover page dated 11-16-23 (inner pages dated 5-14-23 https://dot.ca.gov/-/media/dot-media/district-3/documents/i80yoloproject/vmt_mitigation_memo_attachment-05-14-23.pdf) This memo for I-80 indicate it does not fully buy into the CAPCOA rule of thumb: "As noted above, Duranton and Turner did not find that expanding transit would reduce VMT. Fehr and Pearce cite this article with weblink: Duranton, G., & M. A. Turner (2011). 39

D) The 25% increase in rule assume some sort of base line service I can vary greatly, for example Davis has a great transit service compared to West Sac so wh at25% mean is dramatically different in cost and impact. Contra wise Davis has no Microtransit. So what does 25% increase mean? This is dramatic impact on cost/trip and cost/effectives.

E) IN ADDITION COST per mile mitigation in cost of DEIR mitigation is just plain wrong on Microtransit. Per testimony by YoloTD staff at board meetings on the Woodland BeeLine Microtransit service, they are estimating the net subsidy per intercity trip of Microtransit will be the $35-40 each/trip. This is in line with cost/passenger mile in FTA transit operator profiles in "NTD Transit Agency Profiles" data base: For "demand response service "in 2022: SacRT is $10.83 a mile, Butte Co t $9.82/mile Solano Transit $17.49/mile. Trips are multiple miles. And this is just operating cost, excluding cost of vehicle.

YET you put Mitigation of $1.20/miles mile seems is not based on any actual data reference here.. Show your work when you correct.

F) The DEIR mitigation VMT reduction plan do not disclose the base or what percentage increase in fixed route/Microtransit is anticipated to use the 25% increaser yield 0.29% decrease VMT. Absolute service percent increase In plan seems compared to current spending on Microtransit, but don't disclose it. Seeing as no Microtransit service Davis now, how do you figure a percentage to use the capcoa rule of thumb? Show your work.

Is capcoa rule scalable is seems large (100% increase vs 25% in CAPCO rule of thumb) might not have same linear effect on VMT Show your work.

G) There is no Microtransit in Davis currently, how do you calculate using the CAPCOA rule of thumb of 25% increase=0.29% VMT decrease when you have a base line of zero? Show our work.

H) What agency guarantees VMT effectiveness – and funds needed- predicted in mitigation plan?

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50. Literature says there is no VMT reduction benefit of Shifting Car traveler on I-80 across the causeway to cross causeway buses or capitol corridor rail due to Induced demand: new drivers will fill up the "hole" cause the now missing driver using transit. THIS MEANS: New rider on: Bus 42 and other Davis to Sac (or adding a Davis to Dixon/Vacaville) bus line, as most of Capitol Corridor Rail ridership riders that ride across causeway should NOT be counted as mitigation measures for VMT for VMT across the causeway; THIS IS SIGNIFANT.

Any Yolo county resident who drives on the causeway that shift to transit create addition capacity for others to drive on the causeway...which by rule of induced demand will be used. Thus programs to increase travel on 42 bus or the Causeway connector should not be counted as mitigation.
REFERENCES: SEE **Does Building Transit Reduce Traffic Congestion?** https://www.strongtowns.org/journal/2020/1/7/does-building-transit-reduce-traffic-congestion, "Whatever slack is left from people abandoning their cars for transit is eventually taken up by new drivers, enticed by any empty capacity on the roads. There are a ton of good reasons to invest in transit, but the key is to frame it as an alternative way of getting around that has benefits in its own right, not as something that will help drivers. "
What's Up With That: Building Bigger Roads Actually Makes Traffic Worse https://www.wired.com/2014/06/wuwt-traffic-induced-demand/ Also see: UCLA ITS article: https://www.its.ucla.edu/news/for-the-press/traffic-congestion/ extract: " Cities have tried for decades to reduce congestion by adding new freeway lanes and **expanding rail transit systems**. These efforts do not work, because they mistakenly assume that the current amount of traffic on our roads represents the total amount of traffic possible — essentially, that everyone who would like to be driving on a busy road already is.Were this the case, then pulling a driver off the 405 freeway at 6 p.m. on an average weekday, and putting them on a train instead, would free up some road space and let all other vehicles move faster. Adding another lane to the freeway would have the same effect "

The Fundamental Law of Road Congestion: Evidence from US Cities Gilles Duranton and Matthew Turner 2011
https://www.aeaweb.org/articles?id=10.1257/aer.101.6.2616 From Duranton's abstract:"... We conclude that increased provision of roads or public transit is unlikely to relieve congestion." (JEL R41, R48) NET: You can't uncongested I-80 (reduce VMT on induced on the causeway) by adding transit in corridor- buses on road or more rail service. Congestion reaches a natural equilibrium.

40

51. TDM measure for mitigation assume shift to new modes paralleling the a congested corridor will not effect a VMT reduction for that congested corridors. If the mode shift is for travel in I-80 this is not true; Thus TDM cost effective should be reduce appropriately as many of their program may get a mode shift but not reduce VMT. This is paradoxical but true. See references in Point 50 and Gilles Duranton and Matthew Turner 2011.

41

52.Provide Evidence that 57Mil VMT/year mitigation possible with non-causeway travel of Yolo County resident See point 50;. Ff 42 bus/causeway/additions to capitol corridor etc can not be counted in TDM program, Are their enough other non-I80 paralleling transit service to generate 57Mil VMT reductions? **Gilles Duranton and Matthew Turner 2011.**

42

DEIR comment by A Hirsch January 12, 2024 12-Jan-24 **20**

53. Projection of Effectiveness of adding service and, Basis of Cost Estimate for providing VMT Mitigation transit service, i.e. alternate modes is not documented

The mitigation plan described in Yolo80 Managed Lane- Draft VMT mitigation plan- Oct 20, 2023 (file name "VMT Mitigation plan executive summary") is not at all a description of its methods of obtain it estimate of ridership and cost of new service per trip: so they cannot be verified.

There is also no evidence how it will be sustainably funded into perpetuity- toll from the managed lanes is inadequate (slide 20- 12/11/23 YoloTD board meeting

A) transit cost/mile based on operating cost/VMT do not include capital costs. Esp for rail service that is needed for a mode shift of this magnitude.

B) The capitol corridor cost/VMT exclude capital new trainsets, nor does cost of increase adding bus service include capitol cost.

C) TDM programs VMT shift is 3x the Yolobus ridership in passenger mile in 2022 (https://www.transit.dot.gov/ntd/transit-agency-profiles/yolo-county-transportation-district). While not all TDM shift will be to Yolobus, a large number will...likely at least doubling YoloTD ridership. While there are some economies of scale, the farebox recover is only 12% so cost subsidizing the additional bus service should be figure in to TDM costs. Yolobus subsidy is $1.15/passenger mile(2022) much higher than the 0.40/mile set aside for TDM VMT reduction.

D) The "Draft VMT mitigation plan" dated Oct 20, 2023, is just a table. Which does not explanation where cost figure come from. It is also misleading; it confuses annual sustaining operating cost per VMT with one time cost like $5m subsidy for NISHI development.

E) even if you accept the cost/VMT, If you extend, for each VMT reduction measure the VMT/yr times $/VMT for you come up with $50 Million/yr not $55m.

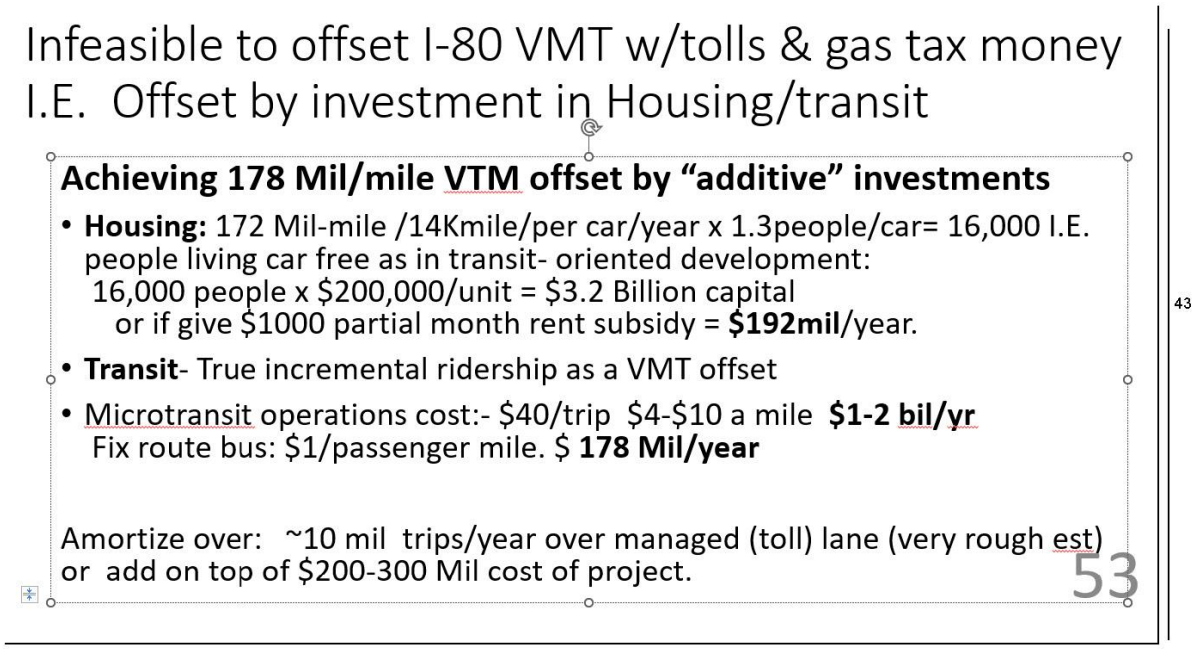
F) The NET toll revenue estimate fall below this for all alternatives. Alternative 4 was chosen by YoloTD board would only provide net $9.6 mil/year and board state they want to use some of that revenue for "social equity". Even Alt 5 the 100% managed lane option #5 would only generate $23 mil/year vs $50million the Mitigation plan required, which as state elsewhere, is likely under stated real cost of this level of VMT mitigation by tens of millions annual.

G) The discussion about VMT mitigation take passenger mile estimates on 3 cap corridor trains and increase 2x The source of all number and 2x increase need to be explained

H) Show our work and sources.

42 cont.

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55. Will Funding Mitigation Program With future grants will hinder Availability for grants for other program in Yolo County to grow transit beyond mitigation level to reduce the county Carbon Footprint?/GHG
The assumption expressed at Yolo TD board meeting 12/11 by Caltrans in response to question by UCD board member Matt Dulcich (meeting video 1;15 to 1:20-link at YoloTD website) was I-80 mitigation effort going forward after the initial $55m from Caltrans plan, will in large part funded by grants from assumably CTC and Feds. There is a set amount of grants, and over time generally apportioned by population. If YoloTD applies for grant to sustain the mitigation plan it can't also get additional grants for other transit improvement to make real net reduction in VMT/GHG. There is opportunity cost to dedicate- in advance future grant money to I-80 mitigation. -The DEIR does not discuss this impact. 44

57. Transfer Payment are not Social Equity. But Social Equity Subsidies for I-80 traveler cannot counted as Mitigation
The stated goal of YoloTD board is to use some of net toll revenue for "social equity". Any of toll revenue used to subsidize/discount ride over the causeway, can no be counted in any VMT mitigation effort (see point 50. Note subsidize of tolls for poor setup for highway 101 in San Mateo county is often mentioned by Exec Director Autumn Bernstein.) However, It is not social equity if you toll one set of poor people crossing the causeway then give the money to other poor not using the causeway- that is a transfer payment. But as mention above in point 50, , if you subsidize ridership on Cap Corridor rail, route 42 or Causeway Connector that can't be used to decrease VMT for mitigation due to induced demand effect.. **Gilles Duranton and Matthew Turner 2011.** 45

60. Policy conclusions are wrong: Auto travel reduced
DEIR make uncorroborated statements adding Managed lanes for that creates 180 Million additional VMT is "partial consistent" or fully consistent with these existing local VMT/climate policies to reduce VMT/auto travel. DEIR pages 2-20 to 2-30). There are no number showing how much increase transit is supported by the project as compare with how much increase driving (VMT) it creates. The minor increase in transit users in managed lanes is likely grossly outweighed by auto travel induced demand from project. If you disagree, show your work. 46

61 Policy conclusions are wrong VMT reduction.
DEIR Claim falsely the road widening that creates 180 Million mile more VMT as "Partly consistent" with general plan policy CI3.3 "minimize increase in GHG", "Minimize increases in VMT", and most absurdly, "minimize long distance commute trips. If you disagree, show your work "

62 Policy conclusions are wrong. There is no coordinate or increase Solano bus service envisions.
Maintain project is fully consistent Sac City Policy CI-13 to work provide cross jurisdictional mobility when improve transit from Solano County (Soltan's bus) & the bay area, where 90% Causeway traveler have origin and Destinations. 47

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63. Policy conclusions are wrong. Widening will accelerate sprawl growth west of Yolo/Sacramento over infill.
The idea that widening the freeway won' t change growth pattern is not based on experience. The changes are long run they occurs new area, with cheap ag land (vs more expensive infill) become commutable, development occur there. The DEIR states it expects no change/no impact on land development pattern, but it contradicts this in the body text by acknowledge it expect current development pattern will "accelerate". Which means land zoned for housing commercial development will be consume and new land will then be rezoned from ag. The literature confirms this longer-term impact
Literature Examples: Victoria Transportation Policy Institute Generate traffic and induced demand (June 2023 https://www.vtpi.org/gentraf.pdf) s PAGE 13) "Urban economists have long realized that transportation can have a major impact on land use development patterns, and in many situations improved accessibility can stimulate development location and type. Different types of transportation improvements tend to cause different types of land use development patters: highway improvements tend to encourage lower-density, automobile-oriented development at the urban fringe, while transit improvements tend to encourage higher-density, multi-modal, urban redevelopment, although the exact types of impacts vary depending on specific conditions and the type of transportation improvement simplemented (Rodier, Abraham, Johnston and Hunt 2001; Boarnet and Chalermpong 2002). ""... Even in relatively slow-growth regions with modest congestion problems, highway expansions increase suburban development by 15-25%. These effects are likely to be much greater in large cities with significant congestion, where peak-period traffic congestion limits commute trip distances, and increased roadway capacity would significantly improve automobile access to urban fringe locations."
Fring area for this project include largely undeveloped Yolo County which is closer to DT Sacramento than the low density sprawl development east of DT Sac iin south and foothills, that have benefit of also being closer to San Francisco. The hi growth rate of Dixon and Winters reflect this I-80 is growth inducing. 48

64. Policy Inconsistency: It will not reduce dependence on Fossil Fuel
Claim it is a project that add 180,000 VMT is "partly consistent" Yolo County policy CI-4.5 to "reduce dependence on for fossil fuels" Its VMT offset project does not reduce VMT, only hopes to encourage some small percent of Yolo county resident from road by getting them into bus, train and micro-transit...to allow (and environmentally justify) more car travel to and thru Solano and Bay Area. to make this statement this comparison needs to be quantified. the shift to EV should not be counted in project effect on fossil fuel use. 49

65. Policy Inconsistency: It will not reduce VMT
DEIR Claim consistency with Sac City policy CI-42 to reduce vehicle travel demand even though adding lanes and its induced demand effect increase vehicle travel If you disagree, show you work. 50

66. DEIR incorrectly frame mitigations of negative impacts as environmental improvements. For example, is acknowledges projects will add 180 Million of more miles of travel but claims the freeway is "partly consistent" with Yolo County policy CI-4.5 to "reduce dependence on for fossil fuels" Its VMT offset does not reduce the total VMT by gas cars, it only hopes to reduces the degradation- which is still occurring. Another example: DEIR claim a wider freeway will be a contributor to UCD overall policy goal to reduction in carbon footprint (DEIR page 2-23). 51

66. Public Outreach/Policy Consistency:
A)Failed to reconcile this project with state, county or city climate plans, that calls for zero carbon future and a reduction of VMT.
B) Caltrans has never meet with any of the 5 local climate commissions in Yolo county to discuss the project and take input, discuss alternatives.. . 52

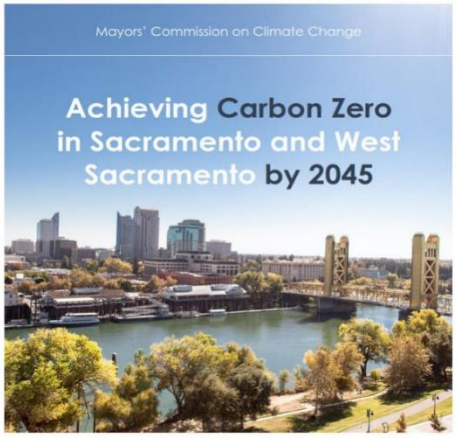
67. Community Impact:
This project will undermine moral integrity of Davis and West Sacramento resident moral commitment to "going green" by turning their "green" actions into "carbon offset" for other to drive more, Voluntary effort to use transit or bicycle to reduce GHG (VMT) become just another transactional carbon offset so Solano and Bay Area residents can drive more. It will is also an abandonment of stated goal of zero carbon for cities as the have to go below zero as they have taken on mitigating I80 GHG. How can a decision like this be done with consulting those involved with climate adaption efforts in these cities.
John Oliver episode show up how Offset (mitigations) are gamed. Who is will police the system of gaming does not happen with Mitigation funds.

West Sac Carbon Zero Plan: reduce VMT driving

30% all Trips shift to Walk Bike -Transit by 2030 (pg 26)

Caltrans Contradiction:

Adding up to 33% car capacity to freeway will encourage increased driving



https://www.cityofwestsacramento.org/government/departments/community-development/planning-division/climate-action-plan

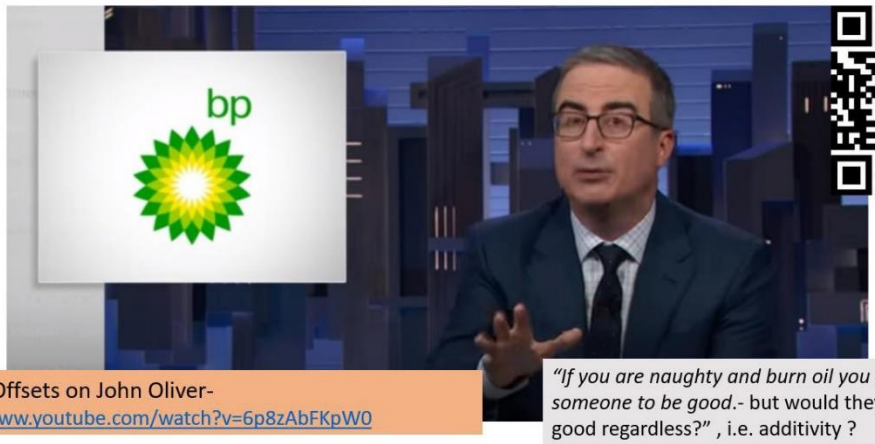
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53

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How Carbon Offset/ VMT banking is gamed

John Oliver's episode on false "additivity"



52

Carbon Offsets on John Oliver- https://www.youtube.com/watch?v=6p8zAbFKpW0

"If you are naughty and burn oil you can pay someone to be good.- but would they have been good regardless?" , i.e. additivity ?

53 cont.

DEIR comment by A Hirsch **January 12, 2024 12-Jan-24** **26**

69. Lack Full and Timely Public Disclosure DEIR. 45 day exposure of Hardcopy lacking.:
All of Appendix H reports on bio, energy community impact, water, drainage, etc. are still not on the state clearing house as of January 2, and nor on the project web page on at Library. Entire EIR missing form Library until week of December 6th) These documents can only be obtained if you notice is mssing and who to ask. There is are email of who to on Caltrans project , just a "comment "email. How can someone who visit the Library to look at the DEIR try to look up impacts on bat or owls or their community in hard copy, know something is missing in the hard copy? The report should be recirculated with due to missing documents. " I am told by the Head Davis Librarian they got a hard copy in early in November then it was retrieve as inaccurate. it is not clear when the DEIR was frozen. 54

70. Caltrans failed to provide copy of DIER for examination at their two DEIR open house. The only material was **story board-** their handpicked extract of the project benefit... and no detail how it made conclusion on the environment impact. reviewing the method is the point of DEIR review. The prominent display of information on travel time for different alternatives was a distraction, they are legally irrelevant in DEIR process under SB743 and are a distraction. As is the YoloTD survey. No oral input was facilitate ad the open house, There were not sign of multilingual input or multilingual material at the open house. **These open houses should be discounted as source of DEIR relevant input.** 55

71. Barrier to access to DEIR document even if you had a computer and far internet connection
Caltrans has change and update PDF format and how document are mixed and marched on it project website. However, originally there were 26 files that needed downloading to obtain the full DEIR...and have request list to link to download another 39PDF to obtain appendix H. Now the arrangement of files have changed even though appendix H is still only available by request This can be confirmed using the "internet wayback machine. 56

The Fehr and Peer "VMT Mitigation Estimates" memo I download has a cover page dated Nov 16, 3 day after the DEIR release. Is this different or the same as one on the CEQANET clearing house?

72. Policy Inconsistency- Public involvement: 57
Claims project is consistent Yolo County public involvement policy M1.4 when project outreach does not list any Caltrans meeting with any city or county climate policy or transportation commission. see other notes on failure to provide timely hardcopy of document

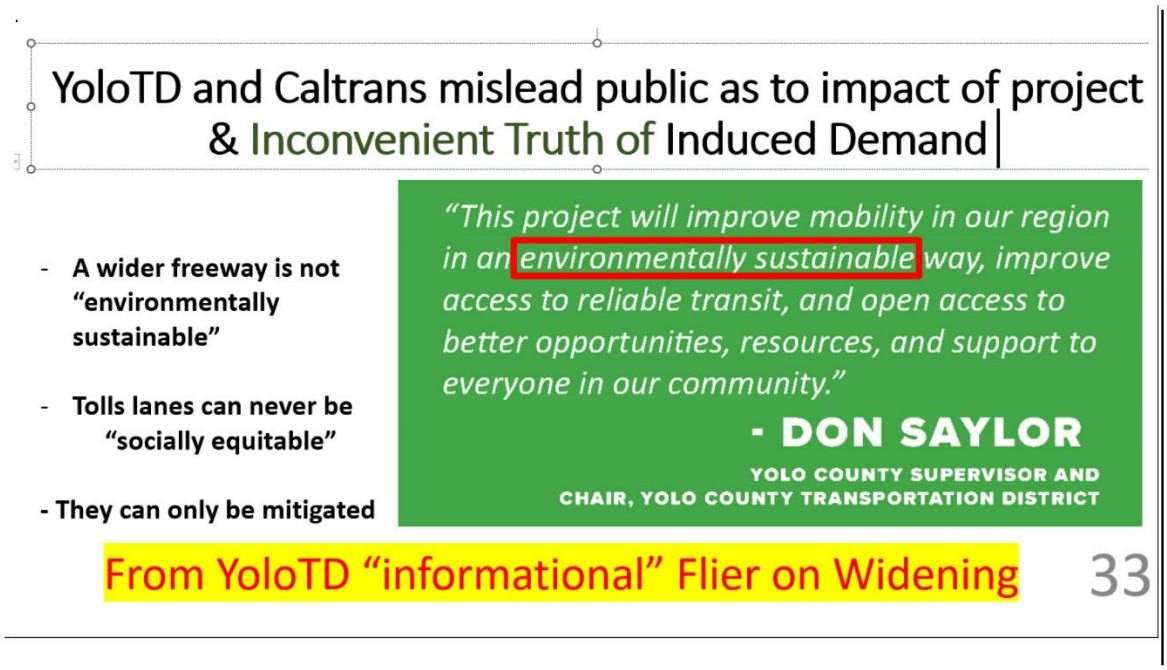
73. No made DEIR available Disadvantage community- especially Community Impact Analysis appendix Not available for those lacking fast internet beyond cell phone
Davis and West Sacramento library did not have hard copy core part of DEIR until first week of December, South Davis library – nearer disadvantaged communities south of 80, still not have a even core part of DEIR. All three still don't have the full EIR with the appendix H technical reports, on which the "no impact" conclusions are based. The all important Community Impact Analysis is in appendix H is missing all libraries. And even If you assume folk and request and get missing appendix H file (on their cell phone- 10 plus PDF Doc to download), the last few day of comment period should be discounted among the 45 as take 2 day for someone to request, get a response and download. Thus the DEIR not available for people needing a hard copy and not able to print out the over 1000 page document for the required 45 days, and should be recirculated. 58

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80. Public Process by Caltrans/YoloTD distracted from relevant input at this stage of CEQA process, so these outreach activities should be disregarded. Travel times are irrelevant in EIR analysis but Caltrans and YoloTD distract from appropriate public input at (Caltrans West Sac and Davis open house) by emphasizing these and NOT disclosing relevant DEIR detail like VMT, GHG, Noise or Energy or other factors on which basis of No Impact was concluded (missing -on request only appendix H documents) 59

81. DEIR outreach process, show an insincere effort to Get DEI- relevant input
The YoloTD on-line survey, pushed by Caltrans and YoloTD on TV, website and open was a distraction from relevant input. Note the failure of Caltrans to disclose at Caltrans open houses the 180 Million VMT (~72,000 tons GHG) was not clearly for readers, just as the failure of their travel time modeling to reflect this induced demand Thus the survey results were both wrong in regard to preferred alternative, as well irrelevant to DEIR review process. Survey assume DEIR is a political/voting where popularity is relevant. It assumed responder had both full access (including appendix H) and read the DEIR so they can make an informed choice. These are all wrong. With all data but only the selective data Caltrans presents, this survey should be excluded from EIR and the entire process. Survey also starts from assumption DEIR methods and results are accurate, which is incorrect.
A responsible agency would explain the DEIR process and inform the public what input is relevant. This is how other State agency do this;. See DWR's Tips for Commenting on an Environmental Impact Report https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/Delta-Conveyance/Public-Information/DCP_EIR_Tips-for-Commenting_July-2022.pdf Please recirculate the DEIR with an appropriate public engagement process.. 60

82. YoloTD claiming in it pre-EIR release that the road build alternatives were sustainable were made without grounding and likely know to be outright lies as NCST -was likely run by YoloTD by that time. The distracted and deceive public and discourage their involvement. Elected official in California are explicit forbidden from preannouncing their position on matter coming before the as signal under the Brown act and corrupts their quasi-judicial role.(see side with extract from YoloTD promotional flier of May 2022 with quote by YoloTD chair Don Saylor 61



61 cont.

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Words Matters= They prejudice the outcome
How can you frame a "widening" as an
"**Improvement**" before even finish EIR?
Not Science Based.



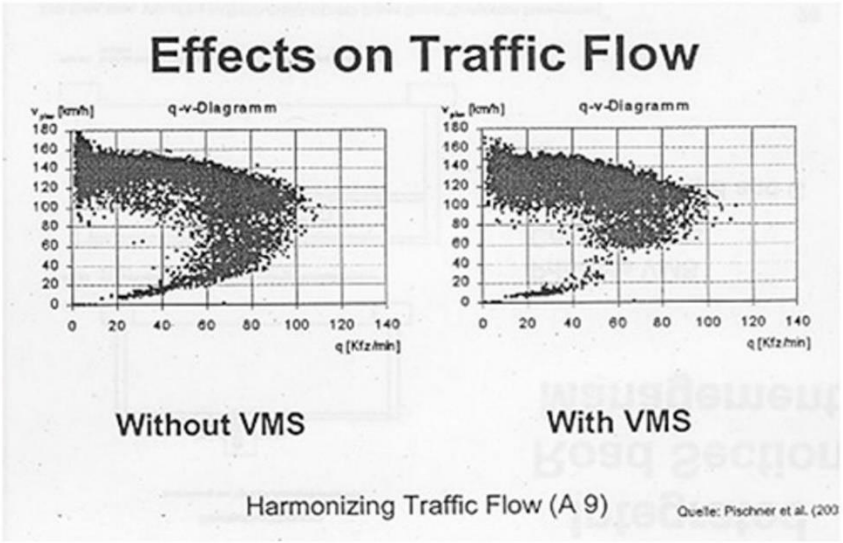
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cont.

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83. The DEIR has not described what sweet spot of Speed vs Revenue it will manage. They can maximize revenue to pay for mitigation, ,Maximize speed or maximize thru-put. How is model I—80 is important; I personally by a planner for BART to- SFO the used low fare assumption for ridership forecast then a high fare for revenue forecast so the projected "penciled" as cost- effect to pass FTA review. Later SamTrans bus service had to raise fare to raise money to subside BART's operation. This is not an unfamiliar story (re: writing of Prof Marty Wachs UCB-ITS) Consistency of assumption should be clearly stated in how toll operation balances between revenueand number of vehicles in DEIR.

Efficient Use of Highway Capacity: Summary Report to Congress

https://ops.fhwa.dot.gov/publications/fhwahop10023/chap4.htm



62

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85. Caltrans & District 3 staff and YoloTD failure to disclose for years NCST model induced forecast (over 180 million VMT miles) even as it minimize mitigatoun need and broadcast questionable traffic congestion forecasts from a model that does not include the effect of induced demand. 63

86. Caltrans failed to provide copy of DIER for examinate at their open house. The only material was their handpicked extract of the project benefit...not its environment impact. The information on travel time improvement is a distraction, they are legally irrelevant in DEIR process under SB743. 64

87. Ask the DEIR plan to be recirculated for public input and corrections so environmental cost/benefit for alternative can be accurately compared. Note the failure of Caltrans to disclose at Caltrans open houses i) the 180 Million VMT (~72,000 tons GHG) increase buried in appendix of in DEIR for all auto widening alternatives- i) disclose directly the failure of their travel time modeling to reflect this induced demand. 65

88. Spending $465 Million to widening the freeway is only a short-term fix-for congestion. This is universally acknowledged by Caltrans HQ policy, transportation experts worldwide including UCD and the courts. Yolo county has obtained less than 1/5 of money to do the project, ($86M) and it is unlikely they will get the missing amount due to growing opposition at local and state level. 66

90. As traffic congestion on remaining 3 GP lanes return, collision rates are likely to return to current rate. Thus any collision saving benefit in out years of project should be eliminated. 67

91. Collision rate go up during construction. With a project description that includes phasing and time frame for construction,, colisoin rate cost/benefit can not be analyzed.

92. Fails to discuss safety impact of removing center shoulder permanently, or safety impact of no shoulder during years of construction. 68

DEIR comment by A Hirsch January 12, 2024 12-Jan-24 **32**

93. Effect of ramp metering, local street backup, and cut thru traffic
Traffic Modeling PROBLEM No description of effect of adding more ramp metering on overflow onto local roads in Davis when Caltrans added metering ramp at Chile road x bypass and Mace in Davis this traffic spilled over on local street and cause massive social upheaval and controversy in community. The petition to "end the mace mess" began the same month Caltrans turned on the metering ramps. Even though many in community blamed this on narrowing Mace for bike patr, the problem occurred a rush hour due to back up on free and "waz" app directing traffic along Tremont then north on Mace, then backing up on Mace just south of I-80. See the discussion in Davis BTSSC draft minutes included in 1/9/24 Davis Council Agenda Item 8 Staff report on I-80 DEIR-page 23.

94. Fails to study impact of different widenings & setting /design of ramps and metering ramps on cut thru traffic on Mace or the "Mace Mess", which is an important part to community impact analysis. People complained they could not get out of their neighborhood or get their children to school at public hearing, covered in Davis Vanguard (davisvanguard.org- article and comment added to them) and in letter to editor and OpEd In the Davis Enterprise (DavisEnteprise.com) Google Davis "Mace Mess" It was one of key goal of project YoloTD board set this as goal in 2022/05 statement and at their meeting of 2021/12. **Also** BTSSC draft minutes included in 1/9/24 Davis Council Agenda Item 8 Staff report on I-80 DEIR-page 23. 69

95 Alternative should have included lengthening ramps to hold longer queues of traffic there instead of on Mace Blvd.

96. No HOV enforcement aspect of project described or modeled. HOV lanes are practically unenforceable- as show by even after two decades of building and operating HOV lane Caltrans mastered automatic detection of 2nd passenger, much less 3. Caltrans admits at least 25% user of HOV lanes are single occupancy cars only about 00.02% of HOV (48K HOV ticket in 2021 vs uses get a ticket- less than 1 in 5000. CHP low enforce due to factors like are a)pressure to avoid false traffic stops b) Yolo80 widenings plan to center eliminate shoulders on causeway safe enough to observe and later do traffic stops c) Widespread use of window tinting (100% backout allow for back window) 70

97. Social Inequity. - Managed lane capacity is auctioned off- to balance of supply and demand, There is no estimate of what the tolls will be, or a determination who benefit from different toll-free user and who will pay more as a result of this policy of giving away lane capacity. 71

98. HOV/HOT Operations and enforcement (especially of 3 free policy) is not described as require by CEQA. Automating or manual car occupancy detection is not technologically or physically unenforceable as no center pull out are envisioned next to toll lane so CHP officers can observe and pull over violators. **Lack of pull out at specified distance in design violate Caltrans design standard for toll/HOV Managed lane facilities.** 72

99.: No discussion how HOV violators using the managed raise the tolls for other Users- effects accuracy of revenue forecast modeling. . This is why toll lane are moral hazard not workable, particularly for 3+ ride free: Caltrans has told Sac Bee cheating is rampant in 2+ HOV lanes (25% or more of the cars do not have 2 passengers) as there is no automated the process of accurately enough confirming 2+ passengers in vehicle. The DEIR does not describe how it will enforce the even harder to monitor 3+ ride free rule. which is especially problematic give you can legally 100% tint back and back-side widows-and it unseeable into car at night .It is notable over tinting a front window beyond 70% only incurs a $25 fine as does use of sun visor to occlude observation. Does Caltrans expect CHP to increase car stops? 73

DEIR comment by A Hirsch January 12, 2024 12-Jan-24 **34**

PROBLEM E piecemealing. These problems need to address for entire region for entire network of managed lanes planed by SACOG. 74

DEIR comment by A Hirsch January 12, 2024 12-Jan-24 **35**

103. The traffic model used (SacSim) failure to include induced demand effect over states the congestion in the no build and transit alternatives giving an inaccurate baseline to compare other build alternative.

Without human behavior factored in (induced demand it assumes travel speed between Dixon and 50-80 split are reduce to less than 10 miles an hours. In fact if you google "the worst freeway in California" and check their travel speed at peak rush hour on google maps, you come up with they average 16-20 miles an hour. This seem to be the congestion equilibrium for 6-12-mile-long congested freeway. And the model output just fails the smell test- anyone would choose to regularly travel in their car for at 11 mph for 73 minute (no build) or less 4 mph for 193 minutes to get from Dixon/Kidwell road to 58/80 split. This assume driver are zoomies that won' t make other travel choices- mode, time, trip. The result of these travel model are clearly not valid and should not be use to choose alternatives or uses as base line for cost/benefit analysis for a statement of overriding Interest. MODEL RESULTS HIGHLIGHT MISSING ALTERNATIVE This forecast comparing also assume that a real full corridor transit alternative would not have been built in 20 years if corridor faced this much congestion. The result of this chart demonstrates the inappropriateness of include full corridor transit alternatives (BRT in bus only lanes, BRT to local bus transfer stops like on 101 in Marin) in the EIR (vs the short truncated on studied). And the result of piecemealing the many widenings/capacities increase that would have shown the advantage of transit like the I80 CMCP did when they compared cost effective of upgrading capitol corridor to the cost of the freeway widening. 75

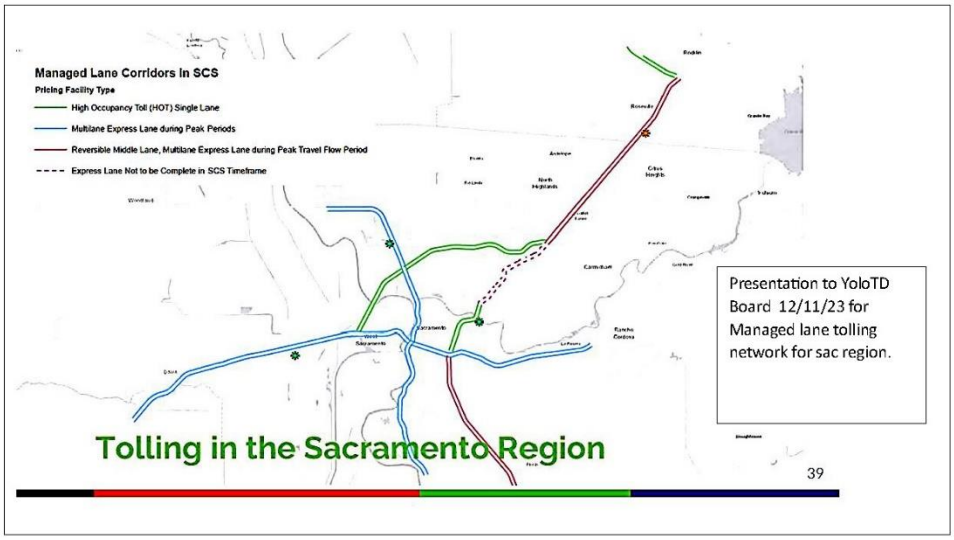
DEIR comment by A Hirsch January 12, 2024 12-Jan-24 **36**

104. The use of antiquated traffic model that fails to included Induced demand overstates benefit of widening, so should not be use to generate an economic case of overriding benefit (time saving) to offset the GHG/VMT impact vs other alternatives. Victoria Transportation Policy Institute June 2023 in paper :Generated traffic and induced Demand PAGE 19: Failing to account for the full impacts of generated and induced travel tends to exaggerate the benefits of highway capacity expansion and undervalue alternatives such as transit improvements and pricing reforms (Romilly 2004). Some newer project evaluation models, such as the FHWA's SMITE and STEAM sketch plan programs, incorporate generated traffic effects including the Rule of Half and some externalities (FHWA 1998; Wang, Zhong and Hunt 2019). 76

105. The DEIR does not model and show the impact of increase in Traffic facilitated by 25% peak flow and over all 25% increase in DT Sacramento. Current the causeway limiting thru put on 80 causeway now limit traffic into DT Sacrament (50 x I-5 area). This project would increase thru put of car by 25% at rush hour is likely actually increase traffic congestion, harm air quality in DT Sacramento, particularly at rush hour when demand 25% more vehicles flowing E or W on 50. Travel time change as a result should be models travel losses their may offset any travel time improvement from Dixon to I-80 split. See Victoria transportation Policy Institute June 2023: Generating Traffic and Induced travel PAGE 14 " In some conditions adding (road) capacity actually increases congestion by concentrating traffic on a few links in the network and by reducing travel alternatives, such as public transit (Arnott and Small 1994). This should be analyzed and effect on entire network discussed. 77

DEIR comment by A Hirsch January 12, 2024 12-Jan-24 **37**

106. Project Description is inaccurate -it is Piecemealing: This is project is one a series of freeway project/managed lane for the Sacramento region they have synergistic effect they should be model and reviewed together, particular plan for I-5 that is in process. Policy set for one segment (HOT 3plus free) will effect other parts of the future Network, They should be studied together a comprehensive EIR>



77 cont.

Peacemealing cmcp I-80 shows upgrading cap corroder is 15x most cost effective.

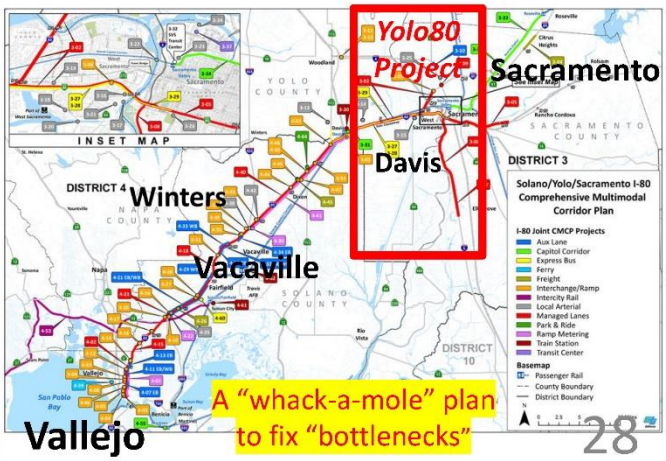
DEIR comment by A Hirsch January 12, 2024 12-Jan-24 **38**

I-80Yolo is part of Caltrans Larger Corridor Plan

Facts hidden in Plan

per I- 80 CMCP

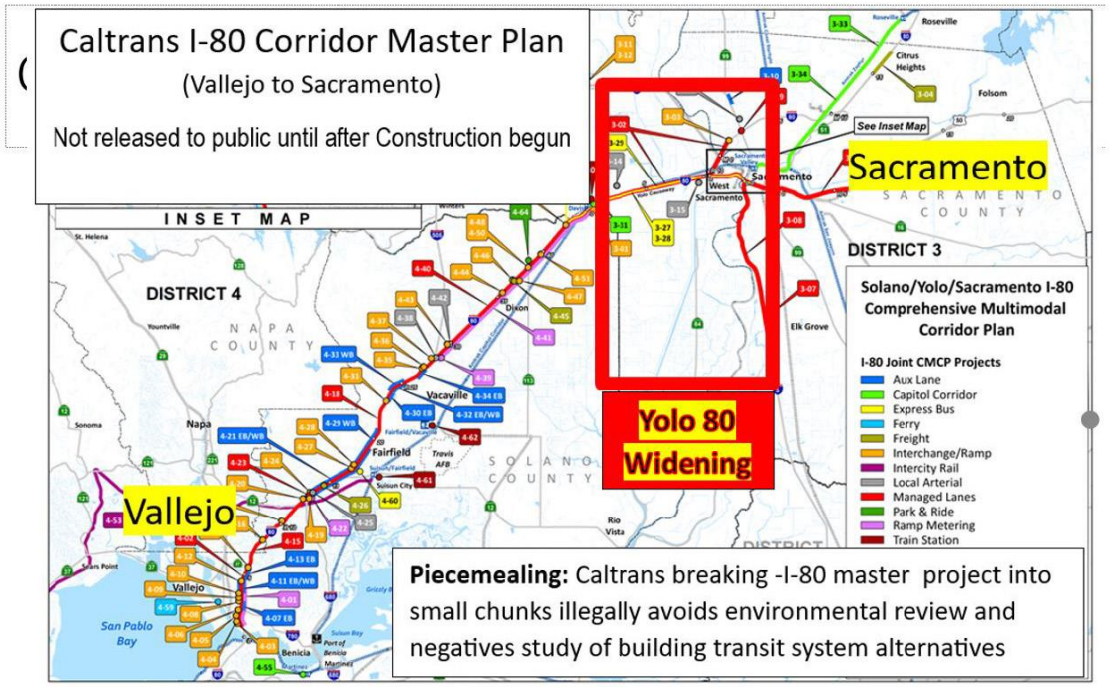
- ✓ In all scenarios Causeway remains the #1 bottleneck- even with widening:
- ✓ New Causeway lanes if HOV would be congested day 1*
- ✓ Most cost-effective = Upgrading cap corridor rail to 110 mph,
- ✓ No Regional bus service on I-80 considered.
- ✓ No EIR as done- piecemealed



Source: I80 CMCP draft of 1/22 on STA.ca.gov website. * per YoloTD staff 3/2/23

77 cont.

DEIR comment by A Hirsch January 12, 2024 12-Jan-24 **39**



77 cont.

DEIR comment by A Hirsch January 12, 2024 12-Jan-24 40

Capital Corridor Rail Service Inadequate but upgrades not an I-80 EIR alternative



- **Infrequent**
- **Slow** buses faster Bay Area
- **Expensive - $18 Davis to Sac (RT)**
- **Neglected**: Sac Rail station moved 1/5 mile further DT (2012)
- **Inconvenient**: Few stations: 2 in Solano County, 1 in Sac county.

78

23

DEIR comment by A Hirsch January 12, 2024 12-Jan-24 41

Response to Comment 1 in 20240112, Alan Hirsch

The introductory comment describes the commenter's expertise and background in transportation project advocacy and associated training. This comment does not discuss the adequacy of the EIR/EA. No changes to the Draft EIR/EA are necessary.

Response to Comment 2 in 20240112, Alan Hirsch

The commenter submitted a screenshot of notices and schedules of a Yolo TD meeting. This comment does not discuss the adequacy of the EIR/EA. No changes to the Draft EIR/EA are necessary.

Response to Comment 3 in 20240112, Alan Hirsch

The commenter discusses "non-car widening alternatives" and transit alternatives. The Draft EIR/EA evaluates two non-widening alternatives: Alternative 1 No Build and Build Alternative 7, which converts an existing general-purpose lane to an HOV lane (though there are some lane miles added in this alternative). Section 1.5 of the Draft EIR/EA discusses alternatives that were considered but eliminated during earlier project phases. Rejected Alternative 5 restricted managed lane use to transit vehicles but was determined not viable due to merging requirements. A bus-on-shoulder component was considered but rejected during the Project Initiation Document phase because of non-support from California Highway Patrol, as use of shoulder for bus-on-shoulder would confuse motorists and reduce available areas for vehicles to park in an emergency. Expansion of Capitol Corridor and other VMT reducing measures are listed in Mitigation Measure TRANS-1 in the EIR/EA.

Please see Master Response B regarding alternatives. No changes to the Draft EIR/EA are necessary.

Response to Comment 4 in 20240112, Alan Hirsch

The commenter describes agency public meeting processes, personnel, and occurrences outside the scope of this environmental document. This comment does not discuss the adequacy of the EIR/EA. No changes to the Draft EIR/EA are necessary.

Response to Comment 5 in 20240112, Alan Hirsch

The commenter describes ad hoc committees and various other non-Caltrans meetings outside the scope of this environmental document. This comment does not discuss the adequacy of the EIR/EA. No changes to the Draft EIR/EA are necessary.

Response to Comment 6 in 20240112, Alan Hirsch

The commenter is recounting a public records request for a draft document from YoloTD. This comment does not discuss the adequacy of the EIR/EA. No changes to the Draft EIR/EA are necessary.

Response to Comment 7 in 20240112, Alan Hirsch

The commenter is recounting being given a wrong call-in number to a Yolo TD Public meeting. This comment does not discuss the adequacy of the EIR/EA. No changes to the Draft EIR/EA are necessary.

Response to Comment 8 in 20240112, Alan Hirsch

The commenter is expressing an opinion and/or assumptions regarding communication prior to the circulation of the draft environmental document. This comment does not discuss the adequacy of the EIR/EA. No changes to the Draft EIR/EA are necessary.

Response to Comment 9 in 20240112, Alan Hirsch

For more information on induced VMT and VMT mitigation, please refer to Master Response A. For more information on SACSIM's use in this analysis, please refer to Master Response D. No changes to the Draft EIR/EA are necessary.

Response to Comment 10 in 20240112, Alan Hirsch

Comparison to the baseline scenario is sometimes appropriately expressed as percentages to show the amount of benefit or drawback an alternative can provide. No changes to the Draft EIR/EA are necessary.

Response to Comment 11 in 20240112, Alan Hirsch

Please refer to Master Response A for more information on VMT mitigation. No changes to the Draft EIR/EA are necessary.

As mentioned in the Fehr and Peers VMT memo that was made available on the project website, induced VMT related to truck traffic was removed from the total induced demand. This is due to the Caltrans Office of Planning and Research's (OPR) determination that CEQA Guidelines Section 15064.3 refers to automobile traffic as the variable to consider for induced demand. Since the NCST tool does not adjust for an induced truck reduction to mirror OPR guidance, a 29% truck reduction factor from the total induced demand is applied (per https://dot.ca.gov/programs/esta/sb-743/resources/ncst-truck-adjustment). Further, YoloTD, as a project partner agency, was aware of the induced demand when making their recommendation to circulate the Draft EIR/EA.

Response to Comment 12 in 20240112, Alan Hirsch

Funding is not within the scope of the Draft EIR/EA. No changes to the Draft EIR/EA are necessary.

While the notion of continuous tracking of VMT impact versus mitigation is admirable, this is not feasible, as there are numerous transportation and land use projects in the region that affect VMT. So, there is no way to isolate the effects of the project and effects of the mitigation

measures. Further, setting up such a monitoring plan is outside of the scope of environmental analysis. No changes to the Draft EIR/EA are necessary.

Response to Comment 13 in 20240112, Alan Hirsch

The Draft EIR/EA analyzes the impacts of the ultimate build of the project. It is not yet known with certainty if or how construction phasing would occur. Therefore, no changes to the Draft EIR/EA are necessary.

Response to Comment 14 in 20240112, Alan Hirsch

The commenter asks which agency is responsible if the VMT mitigation measures fail to mitigate VMT. Mitigation is ultimately the responsibility of the lead agency (Caltrans). Compliance will be governed by future coop agreements with Caltrans, its agency partners.

Response to Comment 15 in 20240112, Alan Hirsch

The commenter shares revenue estimates not included in the Draft EIR/EA. The comment suggests that the funding for VMT mitigation would not be covered by the net tolling revenue projections. Caltrans concurs that tolling revenue will not fully mitigate the project's VMT impact. See Mitigation Plan and Statement of Overriding Considerations in this Final Enviromental Document. No changes to the Draft EIR/EA are necessary.

Response to Comment 16 in 20240112, Alan Hirsch

This project pertains to I-80 in Yolo County and in Sacramento County and US 50 in Yolo County and Sacramento County. The commenter's suggestions for project alternatives are outside the scope of this project. No changes to the Draft EIR/EA are necessary.

Response to Comment 17 in 20240112, Alan Hirsch

Please refer to Master Response C. No changes to the Draft EIR/EA are necessary.

Response to Comment 18 in 20240112, Alan Hirsch

Many trips on this corridor are commuter trips, and many are regional trips made for work, recreation, freight, and a variety of other purposes. Our models account for home-based and non-home-based trips. Please see Master Response D for more information on the travel demand modeling techniques used in this analysis. These travel times were estimated using extensive microsimulation modeling, which is best practice for freeway projects with a lot of congestion. These models were calibrated to existing conditions, and then used with future year forecasts to analyze the effects of the project.

Many of the mitigation measures pertaining to VMT involve expansion of transit services. These mitigation measures were screened based on a variety of criteria, including cost and effectiveness.

No changes are necessary to the Draft EIR/EA.

Response to Comment 19 in 20240112, Alan Hirsch

Regarding the growth assessment in the EIR/EA, please see the response to Comment 11 in 20240108, Sierra Club Yolano Group. No changes to the Draft EIR/EA are necessary.

Response to Comment 20 in 20240112, Alan Hirsch

This suggestion is not in line with the purpose and need of this project. No changes to the Draft EIR/EA are necessary.

Response to Comment 21 in 20240112, Alan Hirsch

Please refer to Master Response E. No changes to the Draft EIR/EA are necessary. Transit vehicles would have free access to the managed lane, regardless of the occupancy requirements to use the lane.

Response to Comment 22 in 20240112, Alan Hirsch

Commenter is suggesting that YoloTD has a preferred alternative (Alternative 4), but this is not relevant to the Draft EIR/EA. No changes are necessary to the Draft EIR/EA.

Response to Comment 23 in 20240112, Alan Hirsch

The limits of this project are I-80 in Yolo and Sacramento Counties and US 50 in Yolo and Sacramento Counties. Commenters suggestions include areas outside of project limits and scope. No changes to the Draft EIR/EA are necessary.

Response to Comment 24 in 20240112, Alan Hirsch

Please see master Response E.

Response to Comment 25 in 20240112, Alan Hirsch

This comment raises the issue of enforcement of the use of toll and HOV lanes, provides information on violations of lane use, and asks about the plan for enforcement. This comment does not address the adequacy of the EIR/EA. Traffic modeling does include assumptions for violations of lane use. No changes to the Draft EIR/EA are necessary.

Response to Comment 26 in 20240112, Alan Hirsch

The commenter states Energy analysis reports listed in Appendix H were not on the State Clearinghouse Website or on the Caltrans website. Technical studies listed in Appendix H to the Draft EIR/EA were made available upon request as indicated on the Caltrans website. The commenter also states it is not clear which study is applicable in the Final EIR/EA and states the Energy increment for Alternative 2-5 is incorrect reporting. All listed studies are applicable to the Final EIR/EA. Please refer to Master Response I for energy analysis.

Response to Comment 27 in 20240112, Alan Hirsch

Transit service expansion as part of VMT mitigation was the result of rigorous outreach, partnership, and coordination with each partner agency. The coordination led to the assumptions included in the VMT mitigation measures. One assumption made for each transit service expansion was that the financial contribution would not be for capital expenditures, but rather for operational expenses to aid in the additional proposed services.

Response to Comment 28 in 20240112, Alan Hirsch

The commenter suggests that a preferred alternative was unilaterally chosen by YoloTD prior to the circulation of the Draft EIR/EA. Caltrans as a lead agency chooses the preferred alternative. No changes required in the EIR/EA.

Response to Comment 29 in 20240112, Alan Hirsch

This information was not needed for the analysis for the Draft EIR/EA. One of the intentions of constructing an HOV or HOT lane would be to promote carpooling. No changes are necessary for the Draft EIR/EA.

Response to Comment 30 in 20240112, Alan Hirsch

The commenter is inquiring about revenue estimates being factored into mitigation planning. This is beyond the scope of the Draft EIR/EA. No changes are necessary to the Draft EIR/EA.

Response to Comment 31 in 20240112, Alan Hirsch

The commenter is discussing projected revenue discussed on slides from a YoloTD meeting. This analysis was not a part of the Draft EIR/EA. No changes to the Draft EIR/EA are necessary.

Response to Comment 32 in 20240112, Alan Hirsch

The commenter is summarizing findings from the I-80 CMCP analysis. No changes to the Draft EIR/EA are necessary.

Response to Comment 33 in 20240112, Alan Hirsch

The travel forecasting and modeling techniques used in the analysis conform to existing standards, guidance, policies, and best practices. No changes to the Draft EIR/EA are necessary.

Response to Comment 34 in 20240112, Alan Hirsch

The travel forecasting and modeling techniques used in the analysis conform to existing standards, guidance, policies, and best practices. No changes to the Draft EIR/EA are necessary.

Response to Comment 35 in 20240112, Alan Hirsch

This is beyond the scope of the analysis for the Draft EIR/EA. No changes to the Draft EIR/EA are necessary.

Response to Comment 36 in 20240112, Alan Hirsch

Please refer to Master Response A for information on VMT mitigation. No changes to the Draft EIR/EA are necessary.

Response to Comment 37 in 20240112, Alan Hirsch

The aim of many of the VMT mitigation measures that are slated for the City of Davis and Yolo County are to provide those residents with more options for travel. No changes to the Draft EIR/EA are necessary.

Response to Comment 38 in 20240112, Alan Hirsch

The project aims to provide a more direct route between Davis and West Sacramento to reduce the amount of cut-through traffic that diverts to circuitous routes through Cities of Dixon, Davis, Woodland, and West Sacramento.

The alternatives' scoring table is based on the values analyzed in the Transportation Analysis Report (TAR). This report is referenced in the Draft EIR/EA in Sections 2.1.10 Affected Environment and 3.2.17 Transportation and listed as a technical study in the Draft EIR/EA Appendix H. The TAR was available upon request and given to the commenter on December 14, 2023 (see Comment 21 in 20231212, Alan Hirsch (email 2)). Scoring is not arbitrary; there were ranges of values assigned to the scores for each metric. No changes to the Draft EIR/EA are necessary.

Response to Comment 39 in 20240112, Alan Hirsch

In contrast to the commenter’s discussion surrounding the Microtransit expansion, the assumptions built into this specific mitigation measure are expanding the service in Yolo County by 25%, from existing conditions, by adding more flexible bus routes with increased frequency and longer service hours. The VMT reduction is anticipated to occur from residents, workers, and visitors to the area using the new service as a substitute to driving. Therefore, the VMT reduction was derived by calculating the VMT being generated by trips that start or end within the new service area.

Response to Comment 40 in 20240112, Alan Hirsch

Methods for calculating VMT reduction for each mitigation measure utilized industry-standard guidance and implementation tools, such as CAPCOA and NCST. No changes to the Draft EIR/EA are necessary.

Response to Comment 41 in 20240112, Alan Hirsch

The TDM measure, or Voluntary Trip Reduction Program (VTRP), contains built in assumptions that allow the VMT reduction calculation to utilize CAPCOA guidance. Such assumptions are community-based travel planning, ridesharing, transit pass subsidies, and pay-per-mile auto insurance. CAPCOA strategy T-5 estimates a 4% reduction in home-based work trips when employees participate in the voluntary trip reduction program. The VTRP would expand the program to cover the 80 percent not currently enrolled in the program.

Response to Comment 42 in 20240112, Alan Hirsch

The commenter is continuing to question the VMT mitigation calculations, citing a separate document (VMT Mitigation Executive Summary) and slides presented at a YoloTD meeting. Methods for calculating the VMT of mitigation measures are and will continue to be best practice and industry standard. No changes to the Draft EIR/EA are necessary.

Response to Comment 43 in 20240112, Alan Hirsch

The commenter is presenting slides from the YoloTD meeting. No changes to the Draft EIR/EA are necessary.

Response to Comment 44 in 20240112, Alan Hirsch

The commenter is discussing the ability for Yolo County to apply for grants for transit projects that go beyond mitigation measures, as discussed in a YoloTD meeting. No changes to the Draft EIR/EA are necessary.

Response to Comment 45 in 20240112, Alan Hirsch

Decisions of how the net revenue from the toll lane alternatives would be used are up to the toll operator. No changes to the Draft EIR/EA are necessary.

Response to Comment 46 in 20240112, Alan Hirsch

Policy CI-3.3 reads: CEQA review for subsequent projects will analyze project traffic and circulation impacts using both the Yolo County General Plan policies and Caltrans policies as applicable. A. Consider the following objectives, following consultation with Caltrans, when making decisions to expand or modify the State highway system in Yolo County: 1. Minimize impacts to the environment. 2. Minimize increases in GHGs and air pollutants. 3. Minimize increases in VMT. 4. Minimize long-distance commute trips. 5. Fully utilize existing capacity while maintaining stable flows and speeds. 6. Provide facilities for all users including pedestrians, bicyclists, carpool users, and transit riders. The commenter notes that the proposed project is “not consistent” with the policy goals to minimize increases in GHGs and air pollutants and minimize increases in VMT, as disclosed in the Draft EIR/EA. However, the proposed project is “consistent” with minimizing impacts to the environment, and providing facilities for all users including pedestrians, bicyclists, carpool users, and transit riders. Therefore, the proposed project is “partially consistent” and no change to the Draft EIR/EA is necessary.

Policy M-1.3: Reduce Vehicle Miles Traveled reads, *"The City shall endeavor to reduce VMT and dependence on fossil fuels by continuing to develop a comprehensive multi-modal transportation system and compact, mixed-use development that includes more transit, bicycle, and pedestrian routes.*". The Build Alternatives would increase VMT, as disclosed in the Draft EIR/EA, which is not consistent with the policy goal to reduce vehicle miles traveled. However, the project would also improve bicycle and pedestrian facilities within the project corridor. For this reason, the Build Alternatives were determined to be "partially consistent" with this policy.

No changes to the Draft EIR/EA are necessary.

Response to Comment 47 in 20240112, Alan Hirsch

Policy CI-13 reads that the City of Sacramento will collaborate with regional transportation planning agencies and neighboring jurisdictions to provide cross-jurisdictional mobility. The Draft EIR/EA indicates that the proposed project would promote multi-modal transportation options and improve traffic operations in the I-80/US 50 corridor. Improved travel times also would improve public transit operations. Therefore, the proposed project is "consistent" with policy CI-13 and no change to the Draft EIR/EA is necessary.

The Project's alternatives were developed by Caltrans and its partners. In 2018, Caltrans established a steering committee for the project that included local stakeholders, such as the Cities of Davis and West Sacramento, Yolo County, Sacramento Area Council of Governments (SACOG), Yolo Transportation District (YoloTD), University of California (UC) Davis, Bicycle Coalition, etc. The steering committee held over 14 public meetings within the Cities of Davis, Sacramento, and West Sacramento to discuss the project and receive input from the community.

Additionally, the Project Development Team (PDT) conducted meetings that provided the forum for coordination, issue resolution, and information feedback between Caltrans, Sacramento Council of Governments, West Sacramento, Davis, Yolo County, UC Davis, and YoloTD. PDT meetings occurred monthly, starting on October 3, 2017, and continued well into the remainder of the environmental and project approval process, ending in Spring of 2024. Table 4-2.1, Chapter 4, Final EIR/EA captures notable meetings from 2023-24. Given the project's 6-year development period, about 60 PDT meetings were conducted with participation from Agency partners.

Response to Comment 48 in 20240112, Alan Hirsch

The Draft EIR/EA acknowledges that the Build Alternatives would influence the pace of planned growth in the region by improving travel times and capacity along I-80. Development into agricultural areas in Solano and Yolo Counties is limited by long-term agricultural preserves, Williamson Act contracts, floodplain conditions, and local land use policies which control regional land use changes. For example, agricultural lands west of the City of Davis are identified as an "Agricultural Reserve" by Solano County, indicating an area that experiences high development pressure, but where Solano County encourages voluntary conservation easements to promote the viability of agricultural operations. Similarly, agricultural lands east of the City of Davis include areas protected as wildlife preserves or floodway unsuitable for

development. Both Yolo and Solano Counties maintain a strong focus on protecting agricultural and open space resources and directing growth into existing incorporated cities and towns. The Draft EIR/EA recognizes the Build Alternatives effects on growth pressure and changes in the rate of growth and finds that local land use policies will govern the location of growth, including the potential for regional long-term conversion of agricultural lands.

Response to Comment 49 in 20240112, Alan Hirsch

Yolo County Policy CI-4.5 states "*Reduce dependence upon fossil fuels through: Reduction of vehicle trips and VMT by requiring compact, infill and mixed-use development; Use of alternatives to the drive-alone automobile, including walking, bicycling, and public transit; and Promotion of ride sharing and car sharing programs.*" The commenter is correct that the Build Alternatives would increase VMT, as disclosed in the Draft EIR/EA, which is not consistent with the policy goal to reduce VMT. However, the project would also incentivize increased vehicle occupancy and/or transit use, which could promote the use of alternatives to the drive-alone automobile and improve bicycle and pedestrian facilities within the project corridor. For this reason, the Build Alternatives were determined to be "partially consistent" with this policy. No change to Table 2.1-1 is necessary.

Response to Comment 50 in 20240112, Alan Hirsch

Policy CI-42 reads that the City of Sacramento will *collaborate with other agencies to develop measures to provide for more efficient traffic flow, reduce vehicular travel demand and meet air quality goals*. The Draft EIR/EA finds that the proposed project would improve traffic operations and future emissions will generally decrease as older vehicles are replaced by newer vehicles with more stringent emissions and fuel economy standards. Therefore, the proposed project is "consistent" with the policy and no change to the Draft EIR/EA is necessary.

Response to Comment 51 in 20240112, Alan Hirsch

Please see responses to 20240112 Alan Hirsch Comment 46, 20240112 Alan Hirsch Comment 47, and 20240112 Alan Hirsch Comment 49.

Response to Comment 52 in 20240112, Alan Hirsch

The commenter points out that Caltrans never met with the five Yolo County climate commissioners. The Project's alternatives were developed by Caltrans and its partners. In 2018, Caltrans established a steering committee for the project that included local stakeholders, such as the Cities of Davis and West Sacramento, Yolo County, Sacramento Area Council of Governments (SACOG), Yolo Transportation District (YoloTD), University of California (UC) Davis, Bicycle Coalition, etc. The steering committee held over 14 public meetings within the Cities of Davis, Sacramento, and West Sacramento to discuss the project and receive input from the community.

Additionally, the Project Development Team (PDT) conducted meetings that provided the forum for coordination, issue resolution, and information feedback between Caltrans, Sacramento Council of Governments, West Sacramento, Davis, Yolo County, UC Davis, and YoloTD. PDT

meetings occurred monthly, starting on October 3, 2017, and continued well into the remainder of the environmental and project approval process, ending in Spring of 2024. Table 4-2.1, Chapter 4, Final EIR/EA captures notable meetings from 2023-24. Given the project's 6-year development period, about 60 PDT meetings were conducted with participation from Agency partners.

No changes to the Draft EIR/EA are necessary.

Response to Comment 53 in 20240112, Alan Hirsch

The commenter is stating that the project undermines the moral integrity of Davis and West Sacramento's commitment to "go green," citing the Achieving Carbon Zero in Sacramento and West Sacramento by 2045 report by Mayrs' Commission on Climate Change and an episode of Last Week Tonight. The Draft EIR/EA discussed GHG impacts in Section 3.2.8 Greenhouse Gas Emissions. Emissions modeling performed for the project confirms that GHG emissions for the Build Alternatives would be lower for design year 2049 compared to existing year (see Table 3.4-2). Therefore, the project directly supports local and statewide efforts to achieve carbon neutrality. The project is also included in the SACOG MTP/SCS 2020. By helping to provide a continuous managed lane system, the project, combined with other in-progress and proposed managed lane projects, would provide reliable travel times, and help contribute to the completion of the regional transportation network envisioned in the SACOG MTP/SCS. No changes to the Draft EIR/EA are necessary.

Response to Comment 54 in 20240112, Alan Hirsch

Caltrans submitted the EIR/EA to the State Clearinghouse on November 13, 2023, through CEQANet. The EIR/EA was published on the same day 11/13/2023. The subject EIR/EA was simultaneously made available on the same day on Caltrans Website. The original end date of the 45-day review period was to end on December 27. Caltrans extended the initial comment period beyond the holidays to January 5, 2024. Caltrans subsequently extended the public circulation and comment period again to January 12, 2024.

Appendices to the EIR/EA were made available upon request on the Caltrans website. EIR/EA appendices were available for download on the State Clearinghouse website. Additionally, hard copies of the EIR/EA were delivered to the Yolo County Library on December 5, 2023, and the West Sacramento Library on December 6, 2023.

The commenter's list of unavailable appendices and studies were delivered upon request to the commenter by Caltrans.

Response to Comment 55 in 20240112, Alan Hirsch

The public meetings held for the Draft EIR/EA provided information about the project and project benefits. Attendees were encouraged to talk to staff and submit comments, in writing, for the public record. There is no requirement to provide the EIR/EA at public meetings. No changes to the Draft EIR/EA are necessary.

Response to Comment 56 in 20240112, Alan Hirsch

Hard copies of the EIR/EA were delivered to the Yolo County Library on December 5, 2023, and the West Sacramento Library on December 6, 2023. Changes to the VMT Mitigation Memo will be incorporated into the FEIR.

Response to Comment 57 in 20240112, Alan Hirsch

City of West Sacramento Policy M-1.4 reads *"Public Involvement. The City shall continue to involve the public, especially those traditionally underserved by transportation services, and seek public input on transportation issues, projects, and processes from the early stage of the planning process."* Caltrans undertook public outreach to provide opportunities for public involvement throughout the planning and environmental review process. These efforts have included meetings, online resources, mailings, and press releases regarding the proposed project, as well as public outreach for related projects and regional transportation programs. Please refer to Draft EIR/EA Chapter 4 for a summary of these efforts. Caltrans outreach efforts are consistent with the City of West Sacramento's public involvement policy.

Response to Comment 58 in 20240112, Alan Hirsch

The original end date of the 45-day review period was to end on December 27. Caltrans extended the initial comment period beyond the holidays to January 5, 2024. Caltrans subsequently extended the public circulation and comment period again to January 12, 2024.

Appendices to the EIR/EA were made available upon request on the Caltrans website. EIR/EA appendices were available for download on the State Clearinghouse website. Additionally, hard copies of the EIR/EA were delivered to the Yolo County Library on December 5, 2023, and the West Sacramento Library on December 6, 2023.

The commenter's list of unavailable appendices and studies were delivered upon request to the commenter by Caltrans.

Response to Comment 59 in 20240112, Alan Hirsch

VMT was presented at the public meetings for the Draft EIR/EA, in contrast to what the commenter is suggesting. Travel times were also presented, as the metric was used in the analysis for the Draft EIR/EA, amongst others. Travel time is a metric that is easiest for the general public to understand, unlike other metrics used in the analysis. No changes to the Draft EIR/EA are necessary.

Response to Comment 60 in 20240112, Alan Hirsch

The commenter mentions a survey administered by YoloTD. No changes to the Draft EIR/EA are necessary.

Response to Comment 61 in 20240112, Alan Hirsch

The commenter is refuting claims made by YoloTD representatives. No changes to the Draft EIR/EA are necessary.

Response to Comment 62 in 20240112, Alan Hirsch

This comment questions how Caltrans will manage the lane if a HOT/Express toll lane is built; specifically, will it be managed to maximize revenue or maximize operations and what the sweet spot is. The FHWA requires Caltrans to ensure that all managed lanes are operating at or above 45 mph for 90% of the time. The lane would be managed to ensure that it is maximizing operations while staying at or above 45 mph. No changes to the Draft EIR/EA are necessary.

Response to Comment 63 in 20240112, Alan Hirsch

Caltrans disclosed the induced VMT amount on the project website upon Draft EIR/EA circulation, and at the two public meetings held in West Sacramento (11/28/23) and Davis (12/13/23).

Response to Comment 64 in 20240112, Alan Hirsch

Please see response to Comment 55 in 20240112, Alan Hirsch above.

Response to Comment 65 in 20240112, Alan Hirsch

As there are no changes needed from the Draft EIR/EA environmental analyses or impacts, the Draft EIR/EA will not be recirculated for public input. Regarding the disclosure of induced VMT, Caltrans disclosed the induced VMT amount on the project website upon Draft EIR/EA circulation, and at the two public meetings held in West Sacramento (11/28/23) and Davis (12/13/23).

Response to Comment 66 in 20240112, Alan Hirsch

This comment offers the opinion that Caltrans will not be able to get the funds to complete the whole project. No changes to the Draft EIR/EA are necessary.

Response to Comment 67 in 20240112, Alan Hirsch

This comment suggests that collision rates will increase on the existing GP lanes as time goes by so the safety benefit should be removed. The collisions reduced is a project benefit based on the scope of work. The congestion is reduced compared to the no build, as a result congestion related collisions would be lowered with congestion reducing project alternatives. In the event that future safety needs are identified over time, Caltrans will conduct safety evaluations and apply any interim or long-term safety measures as appropriate.

The comment also states collision rates will go up during construction and because the project is phased safety benefits can’t be used for the project. The staging concepts and traffic handling are designed in a way to minimize collisions and safety impacts, with reduced speeds required

by law in all construction sites. The phasing of the project has no bearing on safety benefits or collision reduction. The scope of work in a phased approach and in the ultimate build will provide safety benefits. No changes to the Draft EIR/EA are necessary.

Response to Comment 68 in 20240112, Alan Hirsch

The commenter states Caltrans failed to discuss safety impacts of removing the shoulder permanently or the safety impact of no shoulder during years of construction. The commenter incorrectly states that the inside shoulder would be permanently removed, it will be narrowed in some locations like the Yolo Causeway. In addition, the build alternatives make several improvements which will lead to increased safety outcomes, including adding ramp meters, auxiliary lanes, ITS elements that improve incident response time, improved concrete median barrier, and added CCTVs and changeable message signs. Ramp meters will facilitate safer and easier merging and can reduce collisions by 14%, while auxiliary lanes improve weaving conflicts and can reduce collisions by 21%. ITS elements like CCTVs and CMSs assist in incident monitoring, identification, verification, and provide important traveler information, all of which help reduce incident response and clearance time while reducing secondary collisions.

During construction the staging concepts and traffic handling are designed in a way to minimize collisions and safety impacts, with reduced speeds required by law in all construction sites. No changes to the Draft EIR/EA are necessary.

Response to Comment 69 in 20240112, Alan Hirsch

This comment was in regard to the addition of ramp metering, it also suggested that ramp meter storage should be lengthened specifically at Mace Boulevard to hold more vehicles on the ramp itself. The ramp meters will hold more traffic and will have more restrictive rates when congestion is worse, many project alternatives will improve congestion on I-80 which will lead to less restrictive meter rates (less queueing on local roads) and will keep vehicles on I-80 instead of “cutting through” local roads in Davis. The ramp meters were designed to maximize storage and limit potential for local street queueing. No changes to the Draft EIR/EA are necessary.

Response to Comment 70 in 20240112, Alan Hirsch

The commenter states there is no HOV enforcement described in the project or modeled. The project did include violators in the modeling to match more closely what would be expected when the managed lane is in use. CHP enforcement areas will be included in the project, CHP is also able to use “roving enforcement” as a way to enforce the lane and the freeway as a whole. No changes to the Draft EIR/EA are necessary.

Response to Comment 71 in 20240112, Alan Hirsch

This comment states that there is no determination of who will benefit from the toll lanes. All vehicles on the freeway will benefit from any of the HOT/Express toll lane alternatives. All of these alternatives reduce congestion across all lanes, while the managed lane will have the most benefit and all lanes will experience more reliable travel. The toll-free vehicles will be those who meet any minimum occupancy requirements. For further information on equity and toll

lanes please see Master Response E: Equity of toll lanes. No changes to the Draft EIR/EA are necessary.

Response to Comment 72 in 20240112, Alan Hirsch

This comment refers to HOV/HOT lane enforcement. As stated in comment-response 70, CHP enforcement areas will be included in the project, and CHP can enforce via roving enforcement. The toll collection system will be electronic, which is an industry standard and preferred, CHP can enforce this because of specific design features at CHP enforcement areas. No changes to the Draft EIR/EA are necessary.

Response to Comment 73 in 20240112, Alan Hirsch

This comment states there is no discussion on how HOT violators impact tolls for other users. As stated in comment-response 70 violators were included in the traffic analysis. Violators would impact available capacity in the HOT lane, which was reflected in results from the traffic analysis. No changes to the Draft EIR/EA are necessary.

Response to Comment 74 in 20240112, Alan Hirsch

This comment is in regard to piecemealing. Please see Master Response C for an in-depth response to segmenting. No changes to the Draft EIR/EA are necessary.

Response to Comment 75 in 20240112, Alan Hirsch

This comment states the SacSim failed to include induced demand effect and overstates the congestion in the no build alternative which gives an inaccurate baseline to compare alternatives Please see Master Response D: Transportation Modeling Methodology for an in-depth response on modeling techniques used. The commenter also states that the results demonstrate the inappropriateness of full corridor transit alternatives like BRT, the commenter is not asking for this alternative specifically but questioning the modeling assumptions. Please see Master Response A and D for more information on the Transportation Modeling methodology and modeling techniques used.

This comment also states that piecemealing caused the results of the study to not match the benefits that the I-80 CMCP showed in terms of improving the Capitol Corridor. Please refer to Master Response C for inquiries about segmentation, please also refer to Master Response B: Alternatives Considered; Suggested Alternative: Improve Rail Service or Local Mass Transit on why this suggested alternative is not considered viable. No changes to the Draft EIR/EA are necessary.

Response to Comment 76 in 20240112, Alan Hirsch

This comment states that the traffic modeling used is antiquated and fails to include induced demand. Please see Master Response D: Transportation Modeling Methodology for a more detailed response. No changes to the Draft EIR/EA are necessary.

Response to Comment 77 in 20240112, Alan Hirsch

This comment states that the Draft EIR/EA does not model the increase in traffic associated with 25% increase in peak flow. This commenter incorrectly states the increase volumes associated with the build alternatives, section 2.1.10 of the Draft EIR/EA points the reader to the TAR for traffic volume information, please see section 7 of the TAR for 2049 volume data. Master Response D: Transportation Modeling Methodology provides more information on how the model accounts for induced demand. No changes to the Draft EIR/EA are necessary.

This comment also discussed piecemealing. Please see Master Response C for an in-depth response to segmenting. No changes to the Draft EIR/EA are necessary.

Response to Comment 78 in 20240112, Alan Hirsch

This comment states the capital corridor rail service is inadequate, but upgrades are not an alternative in the EIR. Please see Master Response B: Alternatives Considered; Suggested Alternative: Improve Rail Service or Local Mass Transit for more information on why this would not be a viable alternative. No changes to the Draft EIR/EA are necessary.

20240112, John Johnson

MEMO

To: Masum A Patwary, Environmental Scientist C,California Department of Transportation, District 3

From: John Johnston, PhD, PE (CA 27981), Professor (emeritus) of Civil Engineering, California State University Sacramento

Re: Comments on the I-80 Expansion DEIR

Please accept and consider the following comments on the I-80 DEIR. I have grouped them into several categories, which I hope is to your convenience.

General

1. Project Description and Setting.

The relationship between this project and its role in the I-80 Comprehensive Multimodal Corridor Plan (CMCP) needs to be described. The goals are to assure the public that this project is consistent with the recommendations in the CMCP, that it is a necessary part of the CMCP, and that the mitigation measures and strategies proposed in the CMCP are adequately considered in the design of this project. 1

2. Environmentally Superior Alternative.

My understanding is that CEQA requires that the environmentally superior alternative be identified, and if it is not the preferred alternative, justifications should be included for why the preferred alternative is chosen over the environmentally superior one. These considerations do not appear to be in the DEIR. 2

3. Additional Combination Alternative

Sometimes a potentially favorable alternative that was not in the original list emerges in the course of environmental assessment. It became apparent during discussions at the Davis City Council meeting (1/9/24) that there are advantages to combining features of Alternatives 6 and 7, and I ask that an additional alternative be analyzed for the FEIR. Specifically, this new alternative would involve (1) constructing a new transit-only lane, (2) converting one of the existing lanes into a managed lane, and (3) managing both lanes in an adaptive manner. The transit-only lane is attractive for encouraging greater use of transit. In analyzing its potential use, the concept of "transit" should be broad. In addition to Yolobus, this lane could be used by Amtrak Thruway, Flixbus, Capital Connection, other point-to-point private routes (think Google-bus and medical transit), future extensions of Solano Express, and state-registered 12-seat commuter vans. An additional benefit of a transit-only lane is its ability to serve as emergency vehicle access. With the center shoulder removed in parts of the causeway, there is a 3

1

concern that congestion could delay ambulances trying to get to Sacramento hospitals or fire trucks trying to get to accidents on the causeway itself. Having a transit lane to accommodate these vehicles would reduce some safety concerns. In addition to a physical transit lane, a revenue source is needed to promote bus systems and mitigate VMT. Converting an existing lane to a toll lane could be that source. Managing both lanes in an adaptive manner can present advantages in congestion control. Adaptive management means the lane assignments can change with time. For instance, in the early years of the project when bus systems are relatively small, the transit-only lane might be opened to cars in non-commute hours or weekends without hindering bus headways. Later, when bus use is more common, the transit only lane could be reserved to buses for longer times. Likewise, the converted lane might start out as HOT2+, but convert to HOT3+ or express as deemed appropriate for the levels of traffic and congestion. Having the ability to manage two lanes enables many opportunities for future optimization of traffic flow. The important thing is to build the two-lane management infrastructure at the beginning, which is why I am recommending that this alternative be added to the list. 3 cont.

VMT and GHG Comments

4. GHG estimates (Sec 3.4.4.2)

   a. Typographical and grammatical errors in the first paragraph make it difficult to understand. In Table 3.4-2, an entry under Alt 7a has an asterisk but there is no corresponding note. The title of that table is "Modeled Annual Carbon Dioxide Equivalent (CO2e) Emissions and Vehicle Miles Traveled, by Alternative" but there are no vehicle miles entries in the table. 4

   b. In Section 3.4.4.2, it is stated that EMFAC does not account for induced travel. Consequently, the GHG estimates in Table 3.4-2 may be underestimated by an unknown but not negligible amount. As noted above, most alternatives result in about 12% greater VMT, which is similar to or greater than the projected percentage reductions in GHG. Consequently, including the induced traffic in the GHG calculation may change the project impact from one of reducing GHG to one of increasing GHG. In addition, since different alternatives have different effects on induced traffic, ignoring this factor hides some differences between alternatives (e.g., Alternative 6 has no induced traffic). Because of this potential qualitative change in impact, GHG emissions should be recalculated to include the induced VMT. 5

   c. In Table 3.4-2, GHG estimates fall between 2029 and 2049 while traffic increases. This is an anti-intuitive result that should be checked. In Section 3.2.6, there is statement that changes in the fleet composition will result in lower emissions. Reading the online material for EMFAC, it is not clear whether such changes are included in the model. To improve the credibility of this unexpected result (i.e., the dropping GHG values), some 6

additional explanation would be helpful, including a breakdown of the fleet by vehicle type and VMT currently, in 2029, and in 2049. 6 cont.

5. Environmental Significance of GHG emissions

a. The DEIR argues that there is no applicable threshold of significance for GHGs, and that the project does not violate any policies (Sec 3.4.4). However, the numerous state laws and executive orders (some of which are described in Sec 3.4.1.2) would seem to constitute state "policy" on this issue. These executive orders, etc. clearly express the intent of the state government as expressed over multiple administrations and legislatures (e.g., AB1279). In addition, as noted in Section 3.2.6, SACOG has a regional reduction target of 19% for passenger vehicle GHG emissions per person from 2005 levels. How the project meets these policies needs to be justified. the project needs to be justified. The project's very modest decreases in GHG in 2029 and 2049 contrast sharply with state goals of a 40% reduction (below 1990 levels) by 2030 and 85% reduction by 2050 (2022 Scoping Plan, ARB) and SACOG's goal. The significant inconsistency between the project impacts and state goals should be highlighted for decision-makers and the public. Decision-makers should be properly informed that this particular project will not advance the state toward its stated climate goals. 7

b. In a similar vein, in Section 3.4.6.1, the DEIR cites a Governor's Office of Planning and Research report (2015) that identified a 50% reduction in petroleum use in cars and trucks by 2030 as a "key state goal" for reducing greenhouse gas emissions. Depending on the alternative, gasoline use by vehicles ranges from -13 to +11% in 2029 and -21 to +0.4% in 2049. Here again, the inconsistency between the project impacts and the state goals should be highlighted for decision-makers and the public. 8

<u>VMT Reduction Measures</u>

6. Trip reduction plan methodology and double counting.

As noted in the VMT mitigation memo, subsidizing transit passes and/or eliminating fares may be part of a voluntary trip reduction plan. If they are, then at least some VMT reductions attributed to the three proposed actions (Voluntary Trip Reduction Program in Yolo County, Subsidize Monthly Transit Passes in Yolo County, and Reduce Transit Fares) may be double-counted. The methodology for estimating the VMT reduction due to a voluntary trip reduction plan needs to be described better. It seems that such a plan is not well enough defined at this time to know whether or not transit fare changes are included. Consequently, one wonders whether a five significant figure estimate of VMT reductions can be justified or relied upon. These three measures should be examined more closely and the VMT reductions revised accordingly to account for overlap. 9

7. Expansion of Yolobus Route 42.

The cost estimate associated with this measure should be reexamined for accuracy. This measure was rejected because of costs, which were estimated to be $16M/yr. In contrast, the expansion of the Causeway Connection was estimated to cost less than $1M/yr. Although the 42 route is longer than the Causeway Connection, it is not apparent why expanding two 42 routes should cost 16 times more than the one Causeway Connection. Is there a possible calculation error? If it turns out that the numbers are correct, consider expanding other bus routes (e.g. 43, 43R, 230) instead of discarding YoloBus expansion completely. (See comment on promoting regional transit service.) 10

8. Promoting regional transit service

There are other opportunities for promoting regional transit that don't seem to have been examined for the DEIR and which may be cost effective. I ask that further exploration of this topic be made in the FEIR. Commuters travel I-80 from Dixon to Davis and Dixon to Sacramento. Consider extending Solano Express service to Sacramento and improving frequencies, especially between Dixon and Davis. Adding a Capitol Corridor train stop in Dixon would be another means of mitigating VMT. The Yolobus 42 routes are very long to provide coverage across a spread-out county. Consider funding shorter but more direct and frequent routes such as between Woodland and Davis or between West Sacramento and Sacramento. As part of its climate planning, UC Davis is examining different ways to reduce commuter GHG emissions. UCD, the biggest employer in Davis, draws commuters along I-80 from both east and west and from Dixon and Woodland. Collaborative opportunities to reduce this VMT don't seems to have been considered in the DEIR, but should. The West Sacramento streetcar was considered and rejected because of cost, but bus service on the same route may have merit. Expanding Woodland, Dixon, and internal West Sacramento transit might have little effect on I-80 VMT directly, but they would mitigate GHG emissions from induced traffic on I-80. 11

9. Nishi project overpass

In the VMT mitigation plan, Caltrans proposes to contribute $5M to the Nishi overpass and in return, take credit for 14M VMT reduction due to the Nishi project when it is built. This is a disproportionate credit for the investment proposed. The Caltrans contribution is only 2.5% of the total project cost (250Kper unit x 700 units + 18M for the overpass). That contribution is not very large, and its presence/absence is not critical to a go/no go decision on project construction. Accordingly, Caltrans should claim only a proportionate share of the VMT reduction. If that is done, the cost changes to about $13.7/VMT ($5M/0.025*14.6M VMT). Given that, the financial feasibility of this measure in relation to others should be reexamined. Other measures should be considered that would definitely (as opposed to possibly) result in VMT reductions were they to receive the same monetary contribution (i.e., $5M). 12

10. Parking price increases. 13

The proposed measure to increase parking costs was rejected because there were no plans immediately on hand. It is not reasonable to assume that such plans will not be developed in the future. For example, charging for downtown parking is a current feature of the Davis Downtown Plan. UCD has a robust parking fee structure already in place that could be modified in short order. The VMT reduction estimate from this mitigation measure is immense - multiple times larger than others. Because of this potential, this measure should be reconsidered, even if only a part of the full scope can be achieved in the short run. 13 cont.

11. Criteria for deciding whether the VMT reduction package is adequate.

The proposed VMT reduction package covers only 43% of the induced automobile VMT. What is not explained is why the total induced VMT (car plus trucks) is not used as the basis for comparison. The fraction of induced VMT mitigated would be smaller if all vehicles were counted.

Neither is there an explanation of why 43% is considered adequate. In a regulatory environment in which the long-term state (and city) goal is to reduce VMT below its current level, it could be argued that 100% of the induced traffic should be mitigated so as to not make the current situation worse. 14

The decision to proposed only 43% induced VMT mitigation appears to be arbitrary. While it is stated in the document that the available mitigation funds total roughly 14-15% of the project's capital costs, no regulatory authority is cited governing the size of this investment or the kinds of projects proposed. Is cost the deciding criterion? Are there legal restrictions on the kinds of projects that can be included in a VMT mitigation package? Another possible criterion for deciding to mitigate only 43% of the induced VMT is that project impacts are reduced to insignificant levels at that point. If so, that needs to be justified.

Miscellaneous Davis-Specific Issues

12. Consistency with local plans (Sec 2.1.2.1).

The 2023 Davis Climate Action and Adaptation Plan was not included in the analysis of consistency with local plans. The 2007 Davis General Plan was considered, but the CAAP is the latest and current thinking on GHG issues, including transportation which accounts for over 70% of the city's GHG emissions. The CAAP has 3 climate actions relevant to the project – expand public transit (TR6), Transportation Demand Management (TR9) and strengthen regional transit (TR7). The CAAP should be added to Table 2.1-1 and the text revised to include appropriate discussion. 15

13. Davis and county cut-through traffic impacts

Davis "cut-through" traffic (i.e., drivers seeking to avoid congestion by cutting through town or taking longer routes on county roads) was not addressed. This is currently a significant problem, particularly in South Davis, and the effects of the project should be examined. It might be expected that in the short term cut-through traffic will decrease, but because of induced traffic re-introducing a certain level of 16

congestion on I-80, the cut-through traffic may return (or be worse) in the long term. It also isn't clear whether different alternatives will have different impacts on cut-through traffic. These issues need to be discussed clearly. Citizens may assume that this project, billed as a congestion-relieving effort, will solve the problem completely and permanently. If it is not, the public and decision-makers need to know. 16 cont.

Response to Comment 1 in 20240112, John Johnston

The CMCP is a long-range planning document that analyzes projects at a corridor level, separate from an Environmental Impact Report (EIR). In contrast to an EIR that focuses on a specific project, a CMCP focuses on a group of projects along a corridor. The CMCP is a planning level document that can be considered and used as part of project EIRs as needed.

Response to Comment 2 in 20240112, John Johnston

Declaring a preferred alternative in the Draft EIR/EA is not a CEQA requirement but is allowed for projects that choose to include it in the document. No changes to the Draft EIR/EA are necessary.

Response to Comment 3 in 20240112, John Johnston

In addition to Master Response B, the combination of Alternatives 6 and 7 would not yield results that would achieve the project's purpose and need. Alternatives 2-5 are already inclusive of transit buses to utilize the managed lane, therefore the addition of a transit-only lane and conversion of an existing general-purpose lane to a toll lane would not meet the project's purpose and need per reasoning provided in Master Response B.

Response to Comment 4 in 20240112, John Johnston

The Final EIR/EA has been revised in response to this comment. Specifically, the first paragraph under Section 3.4.4.2, Quantitative Analysis, was revised to address grammatical errors and succinctly summarize the results of Table 3.4-2. The title of Table 3.4-2 was revised to remove reference to the inclusion of VMT data, which is not provided in the table, as noted by the commenter. The asterisk was also deleted.

Response to Comment 5 in 20240112, John Johnston

The commenter incorrectly states that the GHG analysis does not account for induced VMT. As discussed in Master Response D, the SACSIM19 model was used to conduct travel demand modeling. SACSIM19 accounts for any changes in departure time and related VMT effects resulting from implementation of the project and future transportation investments in the six-county SACOG region. Thus, the VMT used to support the GHG analysis is not underestimated and was developed using travel forecasting and modeling techniques conforming to existing standards, guidance, policies, and best practices. See also Master Response A for additional discussion on VMT calculations.

With respect to the CT-EMFAC model, the commenter is correct that CT-EMFAC does not account for induced VMT. However, CT-EMFAC is not a travel demand model and was not used to model VMT changes. CT-EMFAC is an emissions quantification tool. As discussed in Section 3.4.4.2, GHG emissions were modeled using CT-EMFAC and the specific traffic data and conditions provided by the Caltrans District 3.

Response to Comment 6 in 20240112, John Johnston

The comment requests additional documentation on the underlying assumptions of the CT-EMAFC model. CT-EMFAC incorporates emission factors from EMFAC. The EMFAC emissions model is developed and used by CARB to assess emissions from on-road vehicles for regulatory compliance and long-range planning. EMFAC incorporates all the most recently adopted on-road mobile source regulations. These regulations will reduce the emissions intensity of vehicles, including those using the transportation improvements proposed by the project. The commenter is referred to the EMFAC modeling platform for more information on underlying assumptions of the tool (https://arb.ca.gov/emfac/). The CT-EMFAC outputs for the project analysis are also provided in Appendix G to the Air Quality Report. These outputs include the future year emission factors and modeled fleet mix.

Response to Comment 7 in 20240112, John Johnston

While executive orders constitute the State of California's policies towards GHG reduction over time, this project is not the sole contributor to increasing or decreasing emissions. Therefore, the policies in place are not violated by the project as the policies do not dictate emission reduction on a project-by-project basis. Moreover, as shown in Table 3.4-2, modeling performed for the project confirms that GHG emissions for the Build Alternatives would be lower for design year 2049 compared to existing year. Therefore, the project directly supports local and statewide efforts to achieve carbon neutrality. As such, no changes are necessary for the Draft EIR/EA. Please refer to Response to Comment 41 in 20240112, City of Davis for more information relating to compliance with state GHG emissions reduction goals

Response to Comment 8 in 20240112, John Johnston

Please see Response to Comment 7 in 20240112, John Johnston. State policies do not dictate energy reduction on a project-by-project basis. Consistent with state and local renewable energy and energy efficiency plans is evaluated in Section 3.2.6, Energy. As noted in this section, energy consumption during project construction would be temporary and minimized to the maximum extent practicable. During operation of the project, newer and more fuel-efficient vehicles and electric vehicles would enter the fleet, resulting in an overall lower potential for an increase in energy consumption due to vehicle traffic. Moreover, by helping to provide a continuous managed lane system, the project, combined with other in-progress and proposed managed lane projects, would provide reliable travel times, and help contribute to the completion of the regional transportation network envisioned in the SACOG MTP/SCS. Thus, the project would not conflict with a state or local plan for renewable energy or energy efficiency.

Response to Comment 9 in 20240112, John Johnston

In addition to Master Response A, this comment will be taken into consideration for the Final EIR/EA. The VMT reduction will not be double counted, as the commenter suggests.

Response to Comment 10 in 20240112, John Johnson

In addition to Master Response A, this comment will be taken into consideration for the Final EIR/EA. The Route 42 annual costs to implement the program have been re-evaluated and this measure is included in the final VMT mitigation plan.

Response to Comment 11 in 20240112, John Johnston

Extending transit services were subject to discussions and agreements between each agency in the Draft EIR/EA VMT mitigation plan. Extending the Solano Express service from Dixon to Sacramento would require the addition of a new service that Solano Express may not have extension plans for.

The Microtransit in Yolo County mitigation measure is intended to serve as additional frequency for shorter and more direct routes within all of Yolo County. This measure will be implemented by Yolobus.

Providing financial contributions to VMT reducing measures as part of the VMT mitigation plan must meet a certain dollar-to-VMT reduction benefit, ruling out the possibility of expanding internal transit services within Woodland, Dixon, or West Sacramento that don't offer the I-80 corridor with VMT benefits.

Therefore, no changes are necessary for the Draft EIR/EA.

Response to Comment 12 in 20240112, John Johnston

In the Draft EIR/EA, the Nishi overcrossing was part of the VMT mitigation plan, but as a direct $5M contribution for zero VMT credit. The note at the bottom of the table in the VMT Executive Summary describes the reasoning for providing the financial contribution but claiming zero VMT credit. This has since been updated after further consultation with the partner agencies involved, and the overcrossing will no longer be invested in. Rather, a bike path project will be invested in that offers VMT reduction.

Response to Comment 13 in 20240112, John Johnston

To comply with CEQA law, mitigation measures must be feasibly actionable and implementable within the project construction timeframe. Including a VMT measure that is not included in a local agency plan, but may one day be included, is not feasibly actionable or implementable.

The comment regarding a Downtown Davis plan for increasing parking was not a measure that was identified by the City of Davis when Caltrans solicited for feasibly actionable and implementable VMT measures. Hence, only the UC Davis and Downtown Sacramento parking increases were considered and rejected.

Response to Comment 14 in 20240112, John Johnston

The commenter asks for an explanation why the proposed VMT reduction package only covers 43% of the induced automobile VMT. In addition to Master Response A, the upfront payment of

the VMT mitigation plan (total of $55M) is the amount that will mitigate for 43% of the induced VMT (per Draft EIR/EA), regardless of selected alternative. Future potential toll revenue, if a toll lane is the selected alternative, would continue to provide ongoing mitigation beyond the proposed 43%.

Response to Comment 15 in 20240112, John Johnston

The comment requests Section 2.1.2, Consistency with Regional, and Local Plans and Programs, of the EIR/EA be revised to include the Davis 2020-2040 Climate Action & Adaptation Plan (CAAP). Caltrans is not required to include the CAAP in the EIR/EA analysis due to the timing of the Davis CAAP adoption (April 2023) and preparation of the project NOP (October 2022). See Response to Comment 6 in 20240112, City of Davis for additional discussion.

Response to Comment 16 in 20240112, John Johnston

The commenter suggested that the EIR/EA include a specific analysis on “cut-through” traffic in the City of Davis.

This was addressed in a separate analysis but is outside the scope of the analysis of the Draft EIR/EA. The analysis found that conditions at local interchanges often used as a part of typical cut-through routes improve with the add-a-lane alternative of the project on an overall basis.

The project aims to reduce cut-through traffic within the City of Davis by providing a more reliable, direct route between Davis and West Sacramento. Encouraging drivers of regional trips to remain on the freeway will leave surface streets available to those making local trips in the modes available to them. Drivers using off-ramps in Davis will be using them to access land uses in Davis, instead of accessing local roads to avoid congestion on I-80. No changes to the Draft EIR/EA are necessary.

20240112, Catherine Keller

From: Catherine Keller <catherinekeller13@gmail.com>
Sent: Friday, January 12, 2024 4:19 PM
To: Yolo80Corridor@DOT
Subject: Comments on I-80 carpool/toll lanes DEIR

Dear Caltrans I-80 project team,

I see that your project will cost many millions and construction will last for years. I live a short way from the project, north on the 113 freeway, and I sigh heavily when I contemplate the impacts of construction congestion on a thousand days of my travel. Logically I could try to avoid the mess and use I-5 to get to Sacramento, but that is already less than reliable because of congestion. Travel will be a challenge and I am depending on your expertise to develop workable alternatives. 1

Noise impacts, however, won't be restricted to my travel times — already I hear the I-80 and 113 traffic whenever I'm outside or have my windows open. It's unpleasant to hear the drone and thump-thump of big rigs and their trailers, the acceleration of motorcycles, and the too-frequent sound of loud cars as they come off 80 and zoom towards Woodland. Fortunately 80 is congested now and slow-moving cars don't make much noise.

But your project will have construction noise (hopefully not night construction!). And there will be the noise of cars and trucks using the 113 to avoid project impacts on the I-80 Causeway (people already jam up when Caltrans turns on the sign telling drivers that chains are required over the summit). 2

Years later when you're finished with construction, our neighborhood will be left with faster-moving, noisier cars on I-80; more of them than now because there are more freeway lanes!

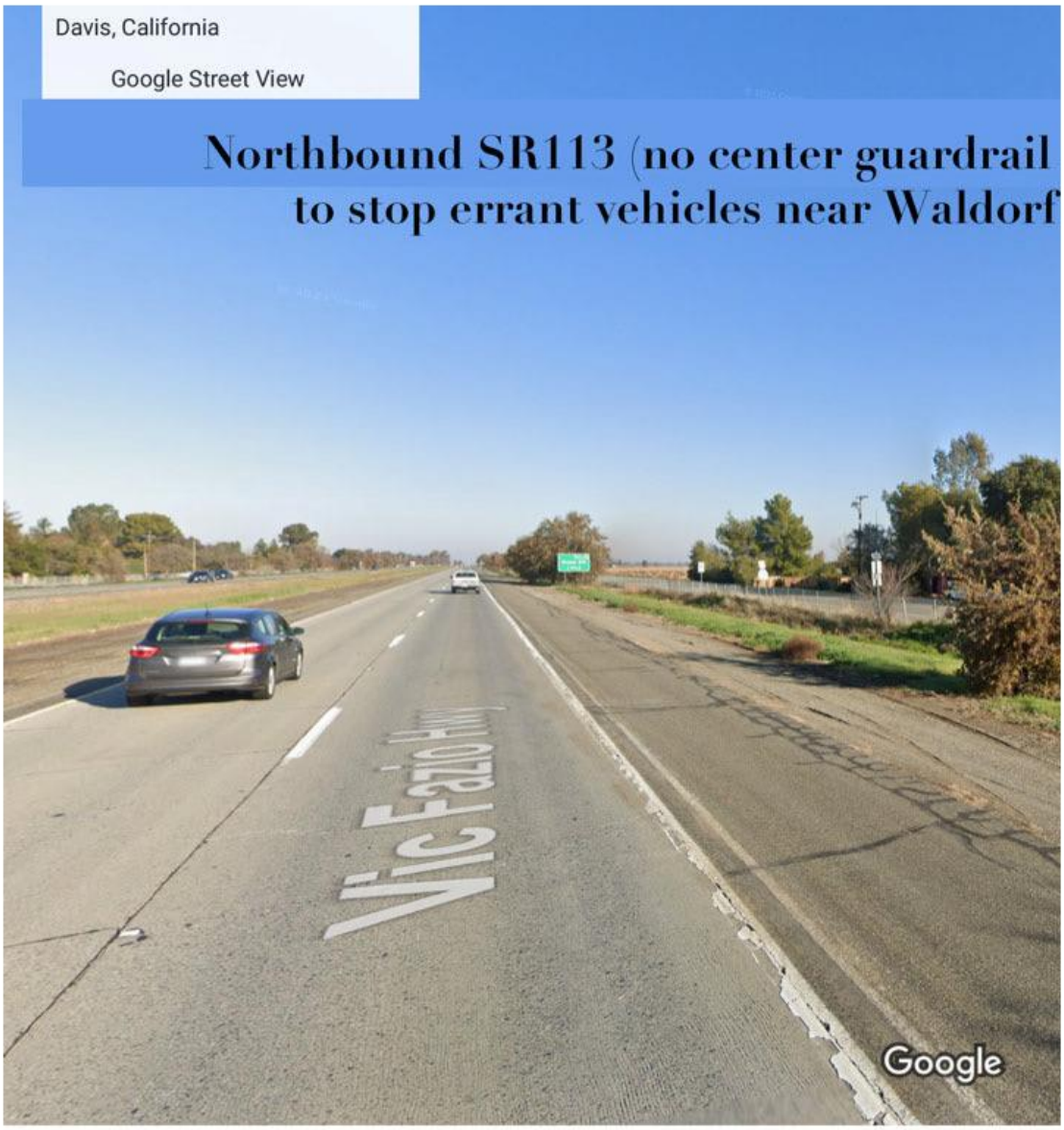
Sound carries up the 113 to two elementary schools, a church, and unprotected neighbors who don't have a sound wall. No one I've talked to has reassured me that your project includes sound walls for Davis. Can you please add these to the project to help offset the short and long-term burden of a project which primarily benefits drivers from other communities?

Also, just north of Covell Blvd, the 113 rises to eye level with a smallish right-hand shoulder area. There is nearby housing, a school, golf course, etc. — the Waldorf elementary school, for example, is immediately adjacent to the county road bordering Caltrans property. One of your nearby signs was replaced last year after an errant driver clipped it. With the expected increase in highway users, would you please add more protection for these kids from other errant drivers? This could be trees with substantial trunks (adds beauty) or more conventional solutions. 3

Thank you for reading my comments.

Catherine Keller
Davis, CA

1


Davis, California
Google Street View
Northbound SR113 (no center guardrail
to stop errant vehicles near Waldorf
Vic Fazio Hwy
Google

2

Response to Comment 1 in 20240112, Catherine Keller

The commenter raises concerns over a few years of construction congestion. As one of the standard measures incorporated into the project (Draft EIR/EA Appendix E), a transportation management plan (TMP) would be developed by Caltrans consistent with Caltrans standard procedures to reduce the effects of construction on local and regional traffic and travel patterns. Section 2.1.10.7 discusses the effects of project construction on traffic. The contractor would be required to schedule and conduct work to avoid unnecessary inconvenience to the public and to maintain access to community facilities, including bicycle and pedestrian facilities, within the work zone (Standard Measures TT-1 and TT-2 in Draft EIR/EA Appendix E). A TMP would plan construction in sections, with no more than one lane closed at a time and no successive ramp closures. The contractor would implement a planned public outreach program to keep area residents, businesses, community facilities, emergency service providers, and transit operators informed of the project construction schedule as part of the TMP. The TMP would include elements such as traffic controls to minimize speeds/congestion and other measures to maintain access during the construction period. The adequacy of the Draft EIR/EA is not addressed in the comment. No changes to the Draft EIR/EA are necessary.

Response to Comment 2 in 20240112, Catherine Keller

The commenter notes that the project would cause construction noise, including noise from changes in travel patterns during construction. The assessment of changes in noise during construction is discussed in Section 2.2.8.3 of the EIR/EA. The project also includes several standard measures that would be implemented to reduce construction noise and manage traffic during construction activities (see Draft EIR/EA Appendix E).

The commenter also notes the need for sound walls in Davis. Please see the response to Comment 2 in 20231115, David Edwards, which describes where the assessment of sound walls can be found in the EIR/EA and briefly summarizes the results.

No changes to the Draft EIR/EA are necessary.

Response to Comment 3 in 20240112, Catherine Keller

The commenter states concern that the increase in drivers in the area may cause increases in errant drivers and asks for protection for adjacent properties near Covell Boulevard and State Route 113.

The specific location the commenter refers to is outside the project limits, however Caltrans mission statement is to “Provide a safe and reliable transportation network that serves all people and the environment.” This extends to Caltrans Right of Way, where safety measures are implemented to prevent collisions.

20240112, Sarah Kolarik

From: Sarah Kolarik
To: Yolo80Corridor@DOT
Subject: Comments on the DEIR for the Interstate 80 Toll Express Lanes Project
Date: Friday, January 12, 2024 5:53:23 PM

EXTERNAL EMAIL. Links/attachments may not be safe.

Good evening,

As a current resident of Sacramento -- with family and friends in Davis -- I have driven the I-80 route countless times. With my vested interest in the broader sustainability and quality of life in the Sacramento region, I am submitting my comments on the Draft Environmental Impact Report for the Yolo 80 Corridor Improvements Project. 1

I have a two key questions:

- **Why does it look like the construction to add new lanes in this section is already taking place, even before the EIR has been finalized and while Caltrans is only in the public outreach phase?** Even the name of the website where the comment process is highlighted -- Caltrans Seeks Comment on Interstate 80 Toll Express Lanes Project -- suggests that the alternative for the project has already been selected, and this outreach process is just meant to check the box rather than shape the outcome of the project. It brings up questions about whether the CEQA process is being properly followed. 2
- **Why is Caltrans considering any project alternatives that increase VMT (a result of induced demand due to the increased capacity) given that Caltrans is supposed to work toward meeting California's climate and air quality goals?** Increasing VMT works against all of the State of California's goals to reduce GHG emissions and to improve air quality. 3

Additional comments:

- It seems like an outright lie to say that the impacts of the project on climate change, including air quality and GHG emissions, will be "less than significant" after implementation of the mitigation measures.
  - The VMT analysis clearly demonstrates that all alternatives that add a new lane will increase VMT, and that the proposed mitigation measures will not offset the VMT. 4
  - The proposed mitigation measures would not be fully funded through this project and have no clear documentation to show that the necessary plans, agreements or full funding is in place to actually achieve the GHG emissions reductions that Caltrans is claiming will mitigate the project impacts.
  - VMT calculations exclude commercial driving from calculations of induced VMT demand, even though the near-term decreases in travel time will certainly induce commercial driving that will have a negative impact to air quality and GHG emissions. 5
  - Ultimately, freeway capacity increases will not "fix" congestion because of the induced demand - after the incredible cost, delays and inconveniences caused by the construction, in a few years after construction is completed, the traffic congestion will be just as bad as before. 6
- It is misleading and inaccurate to say that there will be a reduction of GHG emissions through this project, since that is only due to the fact that the model includes electric vehicles. Again, the VMT analysis clearly demonstrates that all alternatives that add a 7

new lane will increase VMT. Converting an existing lane to a bus-only lane is the only option that Caltrans can legitimately say will reduce GHG emissions. | 7 cont.

Best,
--
Sarah Kolarik
kolarik.sarah@gmail.com
(530) 304-1977

Response to Comment 1 in 20240112, Sarah Kolarik

This introductory comment acknowledges the congestion on I-80. No changes to the Draft EIR/EA are necessary.

Response to Comment 2 in 20240112, Sarah Kolarik

Caltrans does not select an alternative until the public outreach phase has been completed and all comments have been addressed and public feedback has been taken into account, as per the CEQA process. As for the name of the project “Interstate 80 Toll Express Lanes Project”, these names are given to differentiate the different projects that may be occurring on the entire Interstate 80 Corridor. Caltrans has many projects that are or may be occurring on the highway and even within the same limits as this project. For more information on construction already taking place on I-80 see Master Response C.

Response to Comment 3 in 20240112, Sarah Kolarik

In addition to Master Responses A and B, Caltrans studies many different alternatives. After the public outreach process and after receiving public feedback and comments, Caltrans takes into account the feedback that the public provided before making a decision on the best alternative that would meet the purpose and need of the project.

Response to Comment 4 in 20240112, Sarah Kolarik

The comment expresses concern with the air quality and GHG conclusions given the project increase in VMT. The comment also asserts that the VMT mitigation is not funded and lacks documentation. Caltrans determined “less than significant” air quality impacts for all project alternatives as each of the Build alternatives would improve operations, reduce congestion, and increase vehicle occupancy within the travel corridor as compared to the No Build alternative. Caltrans determined “less than significant” GHG impacts for all project alternatives on the basis of emissions modeling performed, which confirms that while VMT is expected to slightly increase, GHG emissions for the Build Alternatives would be lower for design year 2049 compared to existing year. The impact conclusions reached for air quality and GHG emissions do not rely on implementation of VMT mitigation. Thus, the findings are less than significant prior to mitigation. Implementation of VMT mitigation will achieve additional emission reductions beyond those presented in the EIR/EA.

With respect to VMT mitigation, the proposed VMT mitigation measures are fully enforceable and will be legally binding through the execution of Cooperative Agreements with each partner agency receiving financial contributions. The Cooperative Agreements will be executed only upon receipt of sufficient funding. For more information on VMT mitigation, refer to Master Response A.

Response to Comment 5 in 20240112, Sarah Kolarik

The commenter states that VMT calculations exclude commercial driving from the calculations of induced VMT demand. Please refer to Master Response A.

Response to Comment 6 in 20240112, Sarah Kolarik

The commenter states that increasing freeway capacity with not fix congestion because of induced demand.

The congestion is currently caused by multiple factors, including high traffic volumes, short weaving and merging areas, lane drops, limited sight distances, and incomplete bus and carpool lanes, ramp metering, and auxiliary lane networks. The Yolo 80 Corridor Improvements Project aims to remediate these deficiencies which help improve congestion issues in the long term.

Please refer to Master Response A. No changes to the Draft EIR/EA are necessary.

Response to Comment 7 in 20240112, Sarah Kolarik

The commenter asserts the GHG analysis is misleading because it accounts for future vehicle efficiencies and technologies that will reduce the carbon intensity of the statewide transportation sector. GHG emissions were quantified using CT-EMFAC2021 emission model, which incorporates emission factors from EMFAC. EMFAC incorporates all the most recently adopted on-road mobile source regulations. These regulations will reduce the emissions intensity of vehicles, including those using the transportation improvements proposed by the project. Excluding the impact of state regulations on vehicle emissions would thus mischaracterize future emissions generated by the project. It would also be inconsistent with modeling prepared by CARB and local MPOs to support the state's GHG inventory and regional transportation plans. Refer to Response to Comment 12 in 20240111, Center for Biological Diversity for additional discussion.

The project's GHG reductions, while modest, are in line with the overall trend of decreasing emissions. As discussed in Section 3.2.8 Greenhouse Gas Emissions, "GHG emissions for the Build Alternatives would be lower for design year 2049 compared to existing year (see Table 3.4-2)." Please refer to Master Response I for the GHG analysis method.

The commenter proposes to convert a lane to a bus-only lane and asserts that this option will reduce GHG emissions but provides no supporting evidence or calculation. No changes to the Draft EIR/EA are necessary.

20240112, City of Davis Councilmember Bapu Vaitla

Bapu Vaitla
23 Russell Blvd
Davis CA 95616

January 12, 2023

Masum Patwary
Environmental Scientist
Caltrans District 3
703 B Street, Marysville, CA 95901
Yolo80Corridor@dot.ca.gov

RE: PUBLIC COMMENT FOR YOLO 80 CORRIDOR IMPROVEMENTS PROJECT

Dear Mr. Patwary:

My name is Bapu Vaitla, an elected member of the Davis, California City Council. I am writing with respect to the Yolo 80 Corridor Improvements Project. The views expressed in this letter are my own, and do not represent the City of Davis or my colleagues on the City Council. Davis is one of the jurisdictions most affected by the proposed project.

I have four major comments:

1. **With respect to Build Alternatives 2 through 5, the project does not mitigate VMT to the extent feasible. Incorporate some of the previously analyzed (and rejected) ideas listed in the Draft VMT Mitigation Plan.**

2. **Please add and analyze the environmental impacts of a Build Alternative that converts the six existing general-purpose lanes to toll lanes.**

3. **With respect to Build Alternative 6, deepen the analysis to consider projected VMT impacts of expanding transit service supply.**

4. **Please drop all "b" Alternatives—1b, 2b, 3b, 4b, 5b, 6b, 7b—from consideration; they do not meet CEQA's standard of "environmentally superior alternatives."**

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This letter expands on each of these comments, as well as provides additional comments.

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Comment 1: With respect to Build Alternatives 2 through 5, the project does not mitigate VMT to the extent feasible. Incorporate some of the previously analyzed (and rejected) ideas listed in the Draft VMT Mitigation Plan.

2

Build Alternatives 2-5 would induce nearly 500,000 vehicle miles traveled (VMT) daily, or between 181-188 million annually. The associated greenhouse gas emissions would undermine the ability of the City of Davis and Yolo County to attain our climate action goals, with

1

consequent severe impacts on public and environmental health. To put the induced VMT figure in context, analysis conducted by Fehr + Peers in 2021 suggests that in 2016 the annual weekday VMT of the City of Davis inside the SACOG region was about 1.1 million VMT. Thus the VMT induced by Build Alternatives 1-5 equals about 44% of the City of Davis's entire weekday driving total.

In addition, Caltrans' VMT calculations are likely to be under-estimates, given that they are generated using a regional travel demand model instead of the more widely accepted NCST induced demand calculator. The NCST calculator estimates that Build Alternatives 2-5 would induce 233.8 million VMT annually, around 25% more than Caltrans' own estimates. This is without considering other issues, e.g., the challenge of enforcing HOV lanes and HOT lanes that allow free usage for minimum two-person occupancy vehicles, as Build Alternatives 3 and 4, respectively, propose. In any case, Caltrans plans to mitigate only 43% of VMT as calculated using the travel demand model (Table 2.1-27). If the NCST estimate is used instead, this figure drops to 24%.

In addition, accurately estimating environmental impacts such as air quality, greenhouse gases, noise, water pollution, etc. requires using the *overall* amount of induced VMT —that is, VMT of both commercial and passenger vehicles, instead of passenger vehicle VMT only, which is the approach utilized in most of the DEIR. Note also that different measurement methods in different sections of an EIR would be internally inconsistent and not permitted by the CEQA guidelines.

2 cont.

Very importantly, funding constraints call into question whether even the set of proposed mitigation actions will be carried out. Caltrans is only committing to finance 12.5% of the twenty-year cost of voluntary trip reduction, for example, and the DEIR states that the "full implementation of these VMT-reducing measures is outside the regulatory authority of Caltrans." Thus achieving the 57.1 million VMT mitigation goal depends on 87.5% of funding coming from other unidentified and uncommitted sources.

Build Alternatives 2-5 would make it impossible for the City of Davis, Yolo County, and the Sacramento Region to meaningfully contribute to the State of California's target to attain carbon neutrality by 2045 (p. 3-53), especially given that 37% of California's emissions come from the transportation sector (p. 3-56). In fact, Build Alternatives 2-5 would hinder progress towards the state target and do not represent environmentally superior alternatives to the proposed project, which is a primary purpose of including such alternatives within the EIR.

For these reasons, with respect to Build Alternatives 2-5, the project does not mitigate the VMT impacts to the extent feasible. The current mitigation plan defers the formulation of required and feasible mitigation measures to some future time, in clear violation of Section 15126.4 of the CEQA Guidelines. To comply with CEQA, the mitigation plan must substantially increase the quantity of VMT mitigated, reconsidering the measures previously analyzed and rejected (Draft VMT Mitigation Plan, Table 2). No explanation is given as to why these measures were rejected. The inclusion of these measures could potentially reduce transportation impacts to "less than significant," as opposed to the current determination of "significant but unavoidable" (Summary-27).

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Comment 2: Please add and analyze the environmental impacts of a Build Alternative that converts the six existing general-purpose lanes to toll lanes.

Converting existing general-purpose lanes to toll lanes would have a strong effect on the project achieving its purpose and need around reducing congestion and travel time reliability. It would also be the least expensive option, require no new capacity, and would manage congestion more effectively over a much longer timeframe than any of the current Build Alternatives.

In addition, toll revenue is a strong determinant of Caltrans's ability to carry out VMT mitigation measures. The currently proposed plan mitigates only 43% of VMT—a likely overestimate of mitigation, as noted in Comment 1—at a cost of $55 million to Caltrans. Additionally, this $55 million only represents 12.5% of the total budget to attain even the current mitigation target, let alone the much higher levels of mitigation needed.

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The DEIR already notes that expanding Capitol Corridor frequency, micro-transit in Yolo County, subsidies for monthly transit passes, reduction of transit fares, expansion of Causeway Connection Route 138, and expansion of Unitrans will all be "supplemented with future toll revenue" (Table 2.1-27), but no details are provided. This statement does suggest an acknowledgement that toll revenue is closely tied to the net environmental impact of the project, and even the overall feasibility of the current proposed (and inadequate) VMT mitigation measures. In addition, critically, assessing the impacts of tolling authority on additional lanes would help formulate financially workable strategies to implement Alternative 6 at higher levels of transit service.

In short, analysis of the impacts of a project alternative that converts all or some of the currently existing six general purpose lanes to toll lanes is critical to understanding how congestion can be managed more effectively and more efficiently in this project, as well as how induced VMT can be minimized and a steady revenue stream to finance mitigation efforts might be generated.

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Comment 3: With respect to Build Alternative 6, deepen the analysis to consider VMT impacts under the assumption of <u>expanded transit supply</u>.

Build Alternative 6 is analyzed under the assumption that transit service will be provided at <u>existing</u> levels (summarized on p. 2-115); p. 2-119, for example, states that "transit service was not assumed to change among the analysis years." Existing levels of transit service are admittedly too low to justify dedicating an additional lane solely for transit. However, planning and constructing an additional transit-only lane would almost certainly stimulate additional transit investments by the Sacramento Region, Yolo County, and various other jurisdictions in the area before Opening Year 2029. Levels of transit service would increase, with potential major impacts on reducing VMT.

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In fact, the induced VMT in Alternative 6 could reasonably be expected to be *negative* as motor vehicle use shifts to transit. The Fehr + Peers memorandum on VMT mitigation initially disputes this, basing its argument on Duranton and Turner (2011). However, this same study also states that "the most defensible estimate" of elasticity of highway VKT [VMT] to lane kilometers [miles] is 1.03. The authors conclude: "We take this as a confirmation of the "fundamental law of highway congestion" suggested by Downs (1962), where the extension of interstate highways is met with a proportional increase in traffic for US MSAs" (Duranton and Turner 2011, p. 2645). In other words, the paper concludes that freeway widening does *not* relieve congestion. While the research literature taken as a whole does indicate that the effect of transit supply on VMT is dependent on many contextual factors, many sources *do* point to a negative relationship between transit supply and VMT.

Literature notwithstanding, the DEIR states in various locations that VMT cannot be estimated for Alternative 6 (e.g., p. 2-117, 2-122). This is highly problematic, as induced VMT is indeed the "metric most appropriate for determining a transportation project's impact" (p. 2-116). Without a VMT estimate for Alternatives 6a and 6b, a fair comparison of impacts is not possible. Conclusions that suggest Alternatives 6a and 6b would perform similarly to Alternatives 1-5 (e.g., Summary-27 and the measures in Table 2.1-25) must be interpreted in view of this incomplete analysis.

Additionally, despite initially citing the Duranton and Turner (2011) conclusion above, the Fehrs + Peers memorandum goes on to utilize the CAPCOA argument that "a 25 percent increase in transit service mileage or hours will result in a 0.29 percent reduction in passenger vehicle VMT within the area affected by the expanded transit service" (memo, p. 4) to estimate the annual VMT reduction associated with various proposed mitigation measures. But if this elasticity is good enough to use for VMT mitigation calculations, why is it not used in estimating VMT reduction for Build Alternative 6, under various scenarios of transit service expansion? This is an internal inconsistency and not permitted by CEQA; two different methods are used in two different sections of the EIR.

More realistic scenarios that incorporate higher supply in the proposed transit-only lane may alter the DEIR's conclusions on Build Alternative 6. For example, the "Inconsistent" finding of Build Alternatives 6a and 6b with respect to Policy 6.3 (p. 2-21) may instead be "Consistent," and the 3.2.17(b) finding of "Significant and Avoidable Impact" (p. 3-41) may change to "Less than Significant." The overall point is that, with the assumption of greater transit supply, the amount of induced VMT would be much lower for Build Alternative 6 compared to other Build Alternatives.

Caltrans might then focus their (lower level of required) mitigation investments to expand transit supply, providing funds to the providers of bus and rail transit on the corridor—Amtrak, Fairfield/Suisun Transit, Solano Express Bus, Yolobus, Unitrans, Sacramento Regional Transit, and Greyhound Bus—as well as improving bicycle and pedestrian accessibility. Of special importance would be augmenting Capitol Corridor services between Oakland and Sacramento; the DEIR (p. 2-13) states that 3 additional roundtrips of this route reduce VMT by 12.6 million.

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4 cont.

Comment 4: Please drop all "b" Alternatives—2b, 3b, 4b, 5b, 6b, 7b—from consideration; they do not meet CEQA's standard of "environmentally superior alternatives."

All "b" Alternatives, which add managed lane direct connectors, have greater impacts on VMT (Table 2.1-26) and fuel consumption (Table 2.2-33), and thus greenhouse gas emissions. In fact, the "b" options completely wipe out the benefits of projected fuel efficiency gains (driven by EPA regulations, p. 3-51), and fuel consumption *increases* in Opening Year 2029 as compared to the Existing and No Build scenarios. Even at Horizon Year 2049, fuel consumption for "b" Alternatives are only slightly below the Existing and No Build Scenarios. The same is true for greenhouse gas emissions (Table 3.4-2). In addition, the "b" Alternatives increase the construction timeframe considerably. Build Alternative 2b, for example, is estimated to take 14 months (289 construction days) longer than Build Alternatives 2a. The greater construction timeframe results in more energy consumption, in addition to hindering traffic flow. 5

In short, the "b" Alternatives do not represent environmentally superior alternatives, as required by CEQA, and should be excluded from the analysis.

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Additional comments

a) The proposed VMT mitigation measures that appear in Table 2.1-27 and in the "VMT Mitigation Plan" do not appear in Appendix C ("Avoidance, Minimization, and/or Mitigation Measures Summary") or Appendix E ("Standard Measures"). Please explain the reason for this omission. 6

b) In the revised EIR, please study Part Time Lane Use solely for transit vehicles and/or Bus on Shoulder options for Build Alternatives 2-5. 7

c) Given the estimated 181-188 million VMT induced by Build Alternatives 2-5, the finding for Policy M-1.3 ("Reduced Vehicles Miles Traveled") should be "Inconsistent," not "Partially Consistent." 8

d) Please provide detailed reasons for rejecting the VMT-reducing measures in Table 2.1-28. Specifically, please provide reasons for rejecting funding for building 1,000 housing units in Downtown Davis, especially given the relatively low ($0.27/VMT) cost. 9

e) Build Alternatives 6a and 6b are stated to have the "same" environmental impacts as Build Alternatives 1-5 in the summary on p. 2-74; however, given the much lower VMT of Build Alternatives 6a and 6b, environmental impacts—VMT itself, greenhouse gas emissions, and particulate matter, among others—should be much lower than Build Alternatives 1-5. 10

f) Note that Project ID D-2 listed on page 1-27, the University Mall Redevelopment Project, will no longer contain residential units. 11

g) Given the incomplete funding for transit-related VMT mitigation strategies, Build Alternatives 2-5 should be "Partially Consistent" instead of "Consistent" for "Enhance 12

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Transit Service" (p. 2-22), as stated for Policy CI-2.3 (p.2-23) and Policy M-4.2 (p.2-27). 12 cont.

h) Build Alternatives 6a and 6b will reduce congestion for transit services, allowing an increase in the number of trips possible in a given time frame. This would have much stronger benefits for environmental justice communities than the other Build Alternatives. This should be stated on p. 2-84. 13

i) Please provide a detailed description of viable options for providing rebates and/or exemptions for low-income populations, as stated in AMM EJ-1 on p. 2-85, including procedures for identifying qualifying individuals. 14

j) Please provide projected contour tables for weekday speeds (as on p. 2-107 and 2-108), corridor travel times (Table 2.1-21), and operational summaries (Table 2.1-23) for each Build Alternative, for both Opening Year 2029 and Horizon Year 2049. Descriptive summaries are given on pages 2-118 and 2-119, but comparative tables would be useful. 15

k) Please provide a description for how qualitative assessment of the Build Alternatives relates to the quantitative scores (1-5) given in Table 2.1-25. Please justify the weighting of each performance measure equally in constructing the average score. 16

l) With respect to 3.2.6(b) under CEQA (p. 3-22), the DEIR states "less-than-significant" impact. The Build Alternatives result in either an increase or a "nominal decrease" in energy consumption and GHGs (Table 3.4-2), which deviates greatly from the regional reduction target of 19% reduction in passenger vehicle GHG emissions per person by 2035, from 2005 levels. In addition, the use of the regional travel demand model rather than the NCST calculator means that VMT, and thus energy consumption and GHGs, is greatly underestimated. These impacts merit a "significant impact" finding for Build Alternatives 2-5. 17

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Overall, there is no evidence for freeway widening as a long-term solution for congestion (see sources in footnote 1). While freeway widening for non-transit purposes may relieve congestion in the short-term, such an approach comes at great cost in terms of public funds, environmental damage, and public health. A more effective strategy for sustainable improvements in traffic flow would be tolling, as well as the expansion of public transit with accompanying zoning reform that allows people to live near where they work. Pursuing expanded transit access, as in Build Alternative 6, would help incentivize higher-density, transit-linked development on the Bay Area to Sacramento corridor, including in my jurisdiction of Davis. 18

Finally, if Caltrans does not pursue Build Alternative 6 for the project, please select the No Build Alternative. Doing nothing for the present time while developing a more comprehensive vision for increasing transit use on the corridor is a better option than widening the freeway to accommodate more non-transit motor vehicles. 19

Thank you for your consideration. Sincerely,

Bapu Vaitla
Councilmember, City of Davis

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Response to Comment 1 in 20240112, Bapu Vaitla

This introductory comment provides a summary of the four major comments described further in the letter. The response to these comments are included in the responses below. No changes to the Draft EIR/EA are necessary.

Response to Comment 2 in 20240112, Bapu Vaitla

The commenter states Build Alternatives 2, 3, 4, 5 does not mitigate VMT to the extent feasible, that the VMT calculations are likely to be under-estimated as they are using regional travel demand model instead of NCST induced demand calculator. For these comments please refer to Master Response A. Additionally, the commenter notes different VMT measurement methods of passenger vehicle and commercial/passenger vehicles are not internally inconsistent in the Draft EIR/EA and not permitted by CEQA guidelines. The commenter also states the mitigation plan is in violation of CEQA Section 15126.4

Please refer to Master Response A. The NCST estimates and the exclusion of truck VMT from those estimates were limited to induced VMT impact analysis and mitigation targets; consistent with TAF and OPR guidance. The 19-29 % induced VMT attributable to trucks is applicable when using the induced VMT elasticity of 1, as per the research supporting the NCST tool (Duranton & Turner, 2011)

SACSIM activity-based model VMT (including truck VMT) was used to assess the project's environmental impacts since the NCST tool does not provide the level of detail required for the environmental impact analysis. While TAF dictates the use of the NCST tool to assess transportation VMT impacts, it is not intended to supersede guidance for analysis under CEQA of other resources (such as air quality or noise).

Caltrans has proposed reasonable and feasible mitigation measures that comply with the CEQA guidelines.

Response to Comment 3 in 20240112, Bapu Vaitla

The commenter recommends an alternative that converts the six existing general-purpose lanes to toll lanes. Please see Master Response E for pricing of all lanes.

Response to Comment 4 in 20240112, Bapu Vaitla

The commenter asks for more analysis of Alternative 6 under the assumption of expanded transit supply instead of the assumption of existing levels as presented in the Draft EIR/EA. The commenter states without a VMT estimate for Alternative 6 a fair comparison of impacts is not possible. For these comments refer to Master Response D. The commenter also states that two different methods of measuring VMT is used in two different sections of the Draft/EA which is not permitted by CEQA.

The use of the NCST Induced VMT tool (calculator) is consistent with the Transportation Analysis under CEQA (TAC) and the Transportation Analysis Framework (TAF), as referenced in the Draft EIR/EA (Section 2.1.10, *Traffic and Transportation*). The TAC and TAF documents

are the product of a collaborative effort among State government partners, including the Governor's Office of Planning and Research (OPR), the California State Transportation Agency, and the California Air Resources Board.

Again, the NCST estimates and the exclusion of truck VMT from those estimates were limited to induced VMT impact analysis and mitigation targets; consistent with TAF and OPR guidance. The 19-29 % induced VMT attributable to trucks is applicable when using the induced VMT elasticity of 1, as per the research supporting the NCST tool (Duranton & Turner, 2011)

SACSIM activity-based model VMT (including truck VMT) was used to assess the project's environmental impacts since the NCST tool does not provide the level of detail required for the environmental impact analysis. While TAF dictates the use of the NCST tool to assess transportation VMT impacts, it is not intended to supersede guidance for analysis under CEQA of other resources (such as air quality or noise).

Response to Comment 5 in 20240112, Bapu Vaitla

In addition to the text provided in Master Response B, the "b" alternatives help the project achieve its purpose and need, which is in part to ease congestion and improve overall freight and person throughput.

Response to Comment 6 in 20240112, Bapu Vaitla

This comment will be taken into consideration for the Final EIR/EA.

Response to Comment 7 in 20240112, Bapu Vaitla

Part time lane use or bus-on-shoulder options were analyzed as part of Alternative 5 of the Project Initiation Document. It was rejected due to California Highway Patrol not supporting bus-on-shoulder or part-time use of the shoulder as it may confuse motorists, reduce available areas for vehicles to park in an emergency, and restrict emergency vehicle access to a collision site.

Response to Comment 8 in 20240112, Bapu Vaitla

The policy reads "*Policy M-1.3: Reduce Vehicle Miles Traveled. The City shall endeavor to reduce VMT and dependence on fossil fuels by continuing to develop a comprehensive multi-modal transportation system and compact, mixed-use development that includes more transit, bicycle, and pedestrian routes.*". The commenter is correct that the Build Alternatives would increase VMT, as disclosed in the Draft EIR/EA, which is not consistent with the policy goal to reduce vehicle miles traveled. However, the project would also improve bicycle and pedestrian facilities within the project corridor. For this reason, the Build Alternatives were determined to be "partially consistent" with this policy. No change to Table 2.1-1 is necessary.

Response to Comment 9 in 20240112, Bapu Vaitla

The commenter asks for detailed reasons why VMT measure in EIR/EA Table 2.1-28 was rejected (funding for building 1,000 housing units in Downtown Davis). Although the housing components provide significant VMT reduction based on calculations, housing mitigation

measures were rejected during the Draft EIR/EA process due to the project's relatively low financial contribution that was proposed in the Draft EIR/EA VMT Mitigation Plan Executive Summary (dated October 20, 2023). It is infeasible for the project to claim full VMT reduction credit when proposing a relatively low financial contribution to housing projects that are estimated in the hundreds-of-millions to billions dollar range to fully construct. This is also referenced in Table 2 of the VMT Mitigation Plan Executive Summary available on the project website: https://dot.ca.gov/caltrans-near-me/district-3/d3-projects/d3-i80-corridor-improvements

Response to Comment 10 in 20240112, Bapu Vaitla

The commenter states Alternative 6 should have a much lower environmental impact than Alternatives 1-5. The commenter states Alternative 6 should have a much lower environmental impact than Alternatives 1-5. Alternative 6 was eliminated from further discussion because it would have a bigger environmental footprint and require extensive right-of-way acquisition. This alternative would require replacing or widening all the bridges throughout the I-80 and US-50 Corridor. It is anticipated that there would be merging and weaving issues for traffic merging onto and out of the two managed lanes. This alternative was rejected due to the extensive right-of-way and environmental impacts. (§1.5.8 Alternative 6 FEIR/EA)

Response to Comment 11 in 20240112, Bapu Vaitla

The commenter states that the Project ID D-2 listed on page 1-27, the University Mall Redevelopment Project, will no longer contain residential units. The word "residential" has been removed.

Response to Comment 12 in 20240112, Bapu Vaitla

The policy reads, "*Enhance Transit Service: Preserve and enhance transit service; continue to prioritize and improve transit access to the core campus area; consider improvements to the Hutchison Drive corridor for Unitrans buses and for safely mixing buses, bikes, and pedestrians."* The traffic analysis for Build Alternatives 2 through 5 shows that transit service would benefit from the travel time improvements; refer to Draft EIR/EA Section 2.1.10.7. Therefore, Build Alternatives would indirectly enhance transit service and the policy finding of "consistent" would not change. No change to Table 2.1-1 is necessary.

Response to Comment 13 in 20240112, Bapu Vaitla

The environmental justice analysis in the Draft EIR/EA (see Section 2.1.7) concludes that Build Alternatives 6A and 6B would improve traffic flow and movement for transit services on I-80/US 50 within the project limits, which would benefit a wide range of communities, including those defined as environmental justice communities. No change to the Draft EIR/EA is necessary.

Response to Comment 14 in 20240112, Bapu Vaitla

The commenter requests a description of options for providing rebates and/or exemptions for low-income populations, as stated in AMM EJ-1 of the Draft EIR/EA.

As stated in the Draft EIR/EA (Appendix C) Avoidance and Minimization Measure EJ-1 will be implemented with the project. Please refer to Response to Comment 13 in 20240112, City of Davis. The mitigation measures labeled “Voluntary Trip Reduction Program in Yolo County” and “Expand Capitol Corridor Frequency between Oakland and Sacramento” encompass bus and train fare subsidies, respectively. The Draft EIR/EA’s VMT Mitigation Memo contains details of these measures and is available on the project website: https://dot.ca.gov/caltrans-near-me/district-3/d3-projects/d3-i80-corridor-improvements.

As part of mitigation measures TRANS-1, Caltrans would contribute to the Voluntary Trip Reduction Program, which would help fund the current approved program implemented by Yolo Commute, the Yolo County transportation management association. As indicated in Table 2.1-27 of the Draft EIR/EA, the program includes features such as community-based travel planning, ridesharing, transit pass subsidies, and pay-per-mile auto insurance. Yolo County would not be the implementing agency for this program, as Yolo Commute is the implementing agency for the Voluntary Trip Reduction Program. However, Yolo Commute coordinates with all its local stakeholders and constituents when performing outreach and implementing the program.

Response to Comment 15 in 20240112, Bapu Vaitla

The requested data is included in the Transportation Analysis Report (TAR) prepared for the project, as summarized in Draft EIR/EA Section 2.1.10, *Traffic and Transportation*, and Section 3.2.17, *Transportation*. The TAR is available on the project website: https://dot.ca.gov/caltrans-near-me/district-3/d3-projects/d3-i80-corridor-improvements. This data is sufficient to make environmental and traffic conclusions. No change to the Draft EIR/EA is necessary.

Response to Comment 16 in 20240112, Bapu Vaitla

Page 2-121 and 2-122 of the Draft EIR/EA provide qualitative descriptions relating to the scores provided in Table 2.1-25. No changes to the Draft EIR/EA are necessary.

Response to Comment 17 in 20240112, Bapu Vaitla

No single project is expected to achieve the same percent reduction as the goals stated in various policies. Caltrans’ criteria for determining significance of GHG emissions is whether or not the project *contributes* to overall state reduction goals. A project that results in less GHG emissions compared to existing can be considered to have a less than significant impact. The project’s GHG reductions, while modest, are in line with the overall trend of decreasing emissions. As discussed in Section 3.2.8 Greenhouse Gas Emissions, “GHG emissions for the Build Alternatives would be lower for design year 2049 compared to existing year (see Table 3.4-2)." The VMT estimates used for the GHG analysis are not underestimated, as claimed by the commenter. The estimates were developed using travel forecasting and modeling techniques conforming to existing standards, guidance, policies, and best practices. Please refer to Master Response A for information related to VMT calculations and Master Response I for information related to air quality and GHG analysis methods.

Response to Comment 18 in 20240112, Bapu Vaitla

The commenter states tolling instead of freeway widening would be a more sustainable choice along with increases in public transit and zoning reform. Their preference for Alternative 6 is noted. Please refer to Master Response B for information on alternatives. No changes to the Draft EIR/EA are necessary.

Response to Comment 19 in 20240112, Bapu Vaitla

This comment reiterates the commenter's preference for Build Alternative 6 and indicates preference for the No Build over the other alternatives considered. The commenter's preference is noted. This comment does not discuss the adequacy of the EIR/EA. No changes to the Draft EIR/EA are necessary.

20240112, Rekha Vaitla

From: Rekha V
To: Yolo80Corridor@DOT
Subject: Interstate 80 Toll/Express Lanes Project Comment
Date: Friday, January 12, 2024 7:24:35 PM

EXTERNAL EMAIL. Links/attachments may not be safe.

Hello,

My name is Rekha Vaitla. I'm a resident of Davis, CA and I'm writing to express my concern about the DEIR and request that a revised EIR be provided.

The project aims to decrease congestion but numerous studies show that an extra lane would only induce additional demand and result in congestion anyway. This would create an uptick in emissions corresponding with increased VMT. The negative environmental impact would undermine progress in meeting the climate goals of the state and the city of Davis. 1

The revised EIR needs to incorporate the changes proposed by the Davis Community Action Network in their comment letter including:

- For the build alternatives, the percentage of VMT mitigated is too low. The revised EIR must substantially increase the percentage of VMT mitigated. 2
- Build Alternative 6 should be analyzed more deeply and include projected VMT impacts of expanding transit service supply. 3
- For all build alternatives, please analyze the environmental impacts of providing tolling authority to the Sacramento Area Council of Governments (SACOG) on the existing six lanes in the revised EIR. 4
- Please drop all "b" Alternatives—1b, 2b, 3b, 4b, 5b, 6b, 7b—from consideration; they do not meet CEQA's standard of "environmentally superior alternatives." 5

Kind Regards,
Rekha Vaitla

Response to Comment 1 in 20240112, Rekha Vaitla

The commenter states additional lanes will result in VMT emissions increasing and climate goals of the state not being met. Please refer to Response to Comment 41 in 20240112, City of Davis. Please also refer to Master Response I for more information on impacts on the environment.

Response to Comment 2 in 20240112, Rekha Vaitla

The commenter requested the Draft EIR/EA incorporate the changes proposed by the Davis Community Action Network and that the Draft EIR/EA be recirculated to consider increasing the VMT mitigation. Please refer to Response to Comments in 20240112, Davis Community Action Network. Please refer to Master Response A for more information on induced travel and the adequacy of the proposed VMT mitigation. No changes to the Draft EIR/EA are necessary.

Response to Comment 3 in 20240112, Rekha Vaitla

The commenter requested the Draft EIR/EA be recirculated to analyze more deeply Alternative 6, and the projected VMT impacts of expanding transit service supply. Build Alternative 6 is analyzed with the same methodologies and standards applied to other project alternatives. Please refer to Master Response B for information on alternatives. No changes to the Draft EIR/EA are necessary.

Response to Comment 4 in 20240112, Rekha Vaitla

The commenter requested further analysis on the environmental impacts of tolling the existing six lanes. For more information on tolling all lanes, please refer to Master Response B. The tolling operator of the corridor will be Capital Area Regional Tolling Authority (CARTA), a joint powers authority that includes members from SACOG. However, appointment of a tolling authority is not a part of the environmental process.

No changes to the Draft EIR/EA are necessary.

Response to Comment 5 in 20240112, Rekha Vaitla

The commenter requested dropping all the alternatives and proposes a Managed Lane Connector ramp. Build Alternatives 2B through 7B propose to construct Managed Lane Connector ramps on the I-80/ US 50 interchange which would improve traffic flow and ease merging in the area. The Managed Lane Connector ramp would allow motorists in the managed lane traveling along I-80 to stay in the inside lane and reduce the number lane changes required at the interchange.

No changes to the Draft EIR/EA are necessary.

20240112, Koen Van Rompay

From: Koen K Van Rompay
To: Yolo80Corridor@DOT
Subject: PUBLIC COMMENT FOR YOLO 80 CORRIDOR IMPROVEMENTS PROJECT
Date: Friday, January 12, 2024 3:41:22 PM

EXTERNAL EMAIL. Links/attachments may not be safe.

Dear Sir/Madam,

I like to echo the public comments submitted by Davis City Council member, Bapu Vaitla, as I read his detailed and carefully prepared statements, which I fully agree with. So I hereby like to add extra weight and support to his comments. 1

Thank you,

Koen
Koen Van Rompay, D.V.M. Ph.D.
Unit leader, Infectious Diseases
Full Research Virologist
California National Primate Research Center
University of California
County Road 98 & Hutchison
Davis, CA 95616
USA
Phone +530-752-5281
E-mail: kkvanrompay@ucdavis.edu

Response to Comment 1 in 20240112, Koen Van Rompay

The commenter notes agreement with the comments provided by City of Davis Councilmember Bapu Viatla on January 12, 2024. Please see responses to Councilmember Viatla's comments in the section above (20240112, Bapu Viatla).

Chapter 5 List of Preparers

The primary persons responsible for contributing to, preparing, and reviewing this report are listed in Table 5-1.

Table 5-1. List of Preparers and Reviewers

Name	Role
California Department of Transportation	
Dotrik Wilson	Office Chief, North Region Environmental
Gurtej Bhattal	Senior Transportation Engineer, Project Manager
Dennis Keaton	Public Relation Officer
Christopher Dennis	Senior Engineering Geologist, Paleontology Specialist
Sean Cross	Transportation Engineer, NPDES Coordinator
Alamjit Mangat	Transportation Engineer
Jason Lee	Transportation Engineer, Air Specialist
Ryan Pommerenck	Transportation Engineer, Noise Specialist
Lisa Bright	Cultural Branch Chief (Supervisor)
Catherine Davis	Associate Environmental Planner, Archaeologist
Sonia M. Miller	Associate Environmental Planner, Architectural Historian
Jasdeep Randhawa	Supervising Transportation Engineer
Rebecca Shafer	Transportation Engineer, Freeway Operations
Nicholas Liccardo	Freeway Operations Branch Chief
Trin Campos	Senior Transportation Engineer
Sathish K Prakash	Transportation Engineer, Traffic Forecast
Monika Pedigo	Senior Transportation Engineer
Qi Zhao	Transportation Engineer
Joey Morrison	Transportation Engineer
Aaron Daniels	Acting Bike and Pedestrian SME
Abraham Gebrezgiabhier	Transportation Engineer
Robert Wall	Senior Environmental Scientist, Branch Chief
Gregory Saiyo	Associate Environmental Planner, Biologist
Jennifer Jones	Environmental Planner
Veronica Wilson	Environmental Scientist
Julia Riggins	Landscape Architecture
Sandeep Sandhu	Environmental Scientist
Danielle Ruiz	Environmental Scientist
Masum A Patwary	Environmental Scientist, Coordinator

Chapter 6 Distribution List

The draft environmental document was circulated to the following agencies and government officials.

6.1 Federal Agencies

Department of Defense
1400 Defense Pentagon
Washington, DC 20301-1400

Federal Emergency Management Agency
1111 Broadway, Suite 1200
Oakland, CA 94607-4052

National Marine Fisheries Service
650 Capitol Mall, Suite 5-100
Sacramento, CA 95814

United States Army Corps of Engineers
1325 J Street, Room 1350
Sacramento, CA 95814

United States Fish and Wildlife Service
2800 Cottage Way, Room W-2605
Sacramento, CA 95825

6.2 State Agencies

California Air Resources Board
P.O. Box 2815
Sacramento, CA 95812

California Department of Conservation
801 K Street, MS 24-01
Sacramento, CA 95814

California Department of Fish & Game
Wildlife Region 2
1701 Nimbus Road
Rancho Cordova, CA 95670

California Department of General Services
707 Third St.
West Sacramento, CA 95605

California Department of Parks & Recreation
P.O. Box 942896
Sacramento, CA 94296

California Department of Toxic Substances Control
P.O. Box 806
Sacramento, CA 95812-0806

California Environmental Protection Agency
P.O. Box 2815
Sacramento, CA 95812-2815

California Highway Patrol (Valley Division)
2555 1st Avenue
Sacramento, CA 95818

California Natural Resources Agency
1416 Ninth Street, Suite 1311
Sacramento, CA 95814

California Public Utilities Commission
300 Capitol Mall, Suite 500
Sacramento, CA 95814

California State Lands Commission
100 Howe Avenue, Suite 100 South
Sacramento, CA, 95825

Central Valley Flood Protection Board
3310 El Camino Ave # 170
Sacramento, CA 95821

Central Valley Regional Water Quality Control Board
11020 Sun Center Drive, Suite 200
Rancho Cordova, CA 95670-6114

Delta Protection Commission
2101 Stone Blvd., Suite 240
West Sacramento, CA 95691

State Water Resources Control Board
P.O. Box 100
Sacramento, CA 95812-0100

6.3 Regional and Local Agencies

City of Sacramento, City Clerk
New City Hall
915 I Street
Sacramento, CA 95814

City of West Sacramento
1110 W Capitol Ave
West Sacramento, CA 95691

County of Yolo
625 Court Street
Woodland, CA 95695

Sacramento Area Council of Governments
1415 L Street, Suite 300
Sacramento, CA 95814

Sacramento Area Flood Control Agency
1007 7th Street, 7th Floor
Sacramento, CA 95814

Sacramento County Clerk/Recorder
P.O. Box 839
Sacramento, CA 95812-0839

Sacramento County Department of Airports
6900 Airport Boulevard
Sacramento, CA 95837
https://sacramento.aero/scas/about/general_information

Sacramento County Department of Transportation
827 7th Street, Suite 304
Sacramento, CA 95814

Sacramento County Environmental Management Department
11080 White Rock Rd., Suite 200
Rancho Cordova, CA 95670

Sacramento Historical Society
Mr. Bill George, President
P.O. Box 160065
Sacramento, CA 95816

Sacramento History Museum
Ms. Delta Mello, Executive Director/CEO
101 I Street
Sacramento, CA 95814

Sacramento Metropolitan Air Quality Management District
777 12th Street, Suite 300
Sacramento, CA 95814

Sacramento Regional Transit
P.O. Box 2110
Sacramento, CA 95812

Sacramento Transportation Authority
431 I Street, Suite 106
Sacramento, California 95814

Yolo Basin Foundation
Robin Kulakow, Policy Director
P.O. Box 943
Davis, CA 95617

Yolo County Transportation District
350 Industrial Way
Woodland, CA 95776

Yuba-Sutter Transit
2100 B Street
Marysville CA 95901

6.4 Neighborhood Associations, Organizations, Other

Alkali And Mansion Flats Historic
Neighborhood Association
1326 E Street
Sacramento, CA 95814

Arden Fair Administration
Attn: Patrick Burke
1689 Arden Way, Suite 1167
Sacramento, CA 95814

Ben Ali Community Association
1725 Frienza Avenue
Sacramento, CA 95815

Beverly Way Neighborhood Association
1833 Beverly Way
Sacramento, CA 95818

Boulevard Park Neighborhood Association
PO Box 163179
Sacramento, CA 95816

Breathe California Sacramento Region
909 12th Street
Sacramento CA 95814
breathesacramento@gmail.com

California Black Chamber of Commerce
Attn: Aubrey Stone- President and CEO
1600 Sacramento Inn Way #232
Sacramento, CA 95815

California Trucking Association
4148 E Commerce Way
Sacramento, CA 95834

Capitol Area Development Authority
1522 14th Street
Sacramento, CA 95814

Capitol Area R Street Association
1309 Kondos Ave
Sacramento, CA 95814

Capitol Corridor Joint Powers Authority
Attn: James R. Allison- Manager of Planning
300 Lakeside Drive, 14th Floor
East Oakland, CA 94612

Capitol Mansions District Preservation
1311 22nd Street
Sacramento, CA 95816

Central City Neighborhoods Alliance
P.O. Box 162555
Sacramento, CA 95816

College Plaza Neighborhood Association
2283 11th Ave, Suite 100
Sacramento, CA 95818

Crocker Art Museum
216 O Street
Sacramento CA 95814
cam@crockerart.org

Del Paso Boulevard Partnership
1219 Del Paso Boulevard
Sacramento, CA 95815
Del Paso Heights Community Association
3729 Kern Street
Sacramento, CA 95838

Downtown Sacramento Partnership
980 9th Street, Suite 400
Sacramento, CA 95814

East Sac Give Back
4064 McKinley Blvd 15
Sacramento, CA 95819

East Sacramento Improvement Association
P.O. Box 19147
Sacramento, CA 95819

East Sacramento Preservation
P. O. Box 191763
Sacramento, CA 95816

Environmental Council of Sacramento
P.O. Box 1526
Sacramento, CA 95812
https://www.ecosacramento.net/contact-us/

Environmental Council of Sacramento
P.O. Box 1526
Sacramento, CA 95812

Gardenland Northgate Neighborhood Association
c/o Stanford Settlement
450 West El Camino Ave.
Sacramento, CA 9583

Greater Broadway Partnership Business Improvement District
PO Box 188182
Sacramento, CA 95818

Hagginwood Community Association
PO Box 13654
Sacramento, CA 95853

Land Park Community Association
PO Box 188285
Sacramento, CA 95814

Little Pocket Neighborhood Association
1030 Piedmont Dr.
Sacramento, CA 95822

Marshall School New Era Park Neighborhood Association
615 27th St,
Sacramento, CA 95816

Midtown Business Association
1722 J Street, Suite 19
Sacramento, CA 95814

Midtown Neighborhood Association
PO Box 162555
Sacramento, CA 95816

Natomas Community Association
3511 Del Paso Road, Ste 160, POB #405
Sacramento, CA 95835

Neighbors In Action
440 Las Palmas Avenue
Sacramento, CA 95815

Newton Booth Neighborhood Association
PO Box 188876
Sacramento, CA 95818

North Natomas Jibe/North Natomas Transportation Management Association
1918 Del Paso Rd, Ste 100
Sacramento, CA 95834

North Sacramento Chamber of Commerce
P.O. Box 15468
Sacramento, CA 95851

Old North Sacramento/Dixianne Community Association
795 Dixianne Avenue
Sacramento, CA 95815

Old Sacramento Business Association
1014 2nd Street, Suite 200
Sacramento, CA 95814

Paratransit, Inc.
P.O. Box 231100
Sacramento, CA 95823

Pocket Greenhaven Riverfront Association
372 Florin Road #167
Sacramento CA 95831
pocket_greenhaven_SRA@email.com

Point West Transportation Management Authority
1689 Arden Way, #1167B
Sacramento, CA 95835

Preservation Sacramento
PO Box 162140
Sacramento, CA 95816

R Street Sacramento Partnership
PO Box 162337
Sacramento, CA 95816

Richmond Grove Neighborhood Association
1723 V Street
Sacramento, CA 95818

River Park Neighborhood Association
PO Box 19866
Sacramento, CA 95819

River-City-Commons
12006 Foundation Place Suite #310
Gold River, CA 95630

Robla Park Community Association
P.O. Box 340232
Sacramento, CA 95834

Sacramento Area Bicycle Advocates
909 12th Street, Suite 116
Sacramento, CA 95814

Sacramento Food Bank & Social Services
3333 Third Avenue
Sacramento CA 95817
mflood@sacramentofoodbank.org

Sacramento Hispanic Chambers of Commerce
400 Capitol Mall, 9th Floor
Sacramento, CA 95814

Sacramento Loaves & Fishes
1351 North C Street
Sacramento CA 95811
info@sacloaves.org

Sacramento Metropolitan Chamber of Commerce
One Capitol Mall, Ste. 300
Sacramento, CA 95814
Sacramento Asian Pacific Chamber of Commerce
P.O. Box 5387
Sacramento, CA 95817

Sacramento Riverfront Association
372 Florin Road, #167
Sacramento, CA 95831

Sacramento Transportation Management Association
Attn: Marilyn Bryant- Executive Director
PO Box 19520
Sacramento, CA 95819-0520

Sonora Springs Neighborhood Watch
1845 Alice Way
Sacramento, CA 95834

South Natomas Improvement Association
1500 West El Camino Avenue #730
Sacramento, CA 95833
community@southnatomas.info

South Natomas Transportation Management Association
2030 W El Camino Ave #275
Sacramento, CA 95833

South Natomas Transportation Management Association
2030 W El Camino Ave #275
Sacramento, CA 95833

Southside Park Neighborhood Association
PO Box 1421
Sacramento, CA 95812

Strawberry Manor Neighborhood Association
181 Graves Avenue
Sacramento, CA 95838

The River District
P. O. Box 630
Sacramento, CA 95812

Upper Land Park Neighbors
PO Box 188043
Sacramento, CA 95818

Walk Sacramento
909 12th St #203
Sacramento, CA 95814

Washington Park Neighborhood Improvement Group
1700 F Street, Apt E
Sacramento, CA 95811

Woodlake Neighborhood Association
P.O. Box 13016
Sacramento, CA 95813

Woodlake Neighbors Creating Transparency
P O Box 15564
Sacramento, CA 95852

6.5 Federal Elected Officials

U.S. Representative Doris Matsui
7th Congressional District
Robert T. Matsui U.S. Courthouse
501 I Street, Suite 12-600
Sacramento, CA 95814

U.S. Senator Alex Padilla
B03 Russell Senate Office Building
Washington, DC 20510

U.S. Senator Dianne Feinstein
One Post Street, Suite 2450
San Francisco, CA 94104

6.6 State Elected Officials

Assembly Member Kevin McCarty
P.O. Box 942849
Sacramento, CA 94249

Senator Angelique Ashby, for District 8
1021 O Street, Suite 7320
Sacramento, CA 95814

6.7 Sacramento County Elected Officials

Supervisor Pat Hume - District 5
700 H Street, Suite 2450
Sacramento, CA 95814

Supervisor Rich Desmond- District 3
700 H Street, Suite 2450
Sacramento, CA 95814

Supervisor Patrick Kennedy- District 2
700 H St, Suite 2450
Sacramento, CA 95814

Supervisor Sue Frost- District 4
700 H Street, Suite 2450
Sacramento, CA 95814

Supervisor Phil Serna- District 1
700 H Street, Suite 2450
Sacramento, CA 95814

6.8 City of Sacramento

Council Karina Talamantes
District 3
915 I Street, 5th Floor
Sacramento, CA 95814

Councilmember Sean Loloee
District 2
915 I Street, 5th Floor
Sacramento, CA 95814

Councilmember Katie Valenzuela
District 4
915 I Street, 5th Floor
Sacramento, CA 95814

Mayor Darrell Steinberg
City Hall
915 I Street, 5th Floor
Sacramento, CA 95814

Councilmember Lisa Kaplan
District 1
915 I Street, 5th Floor
Sacramento, CA 95814

6.9 Tribes

Buena Vista Rancheria
Ms. Rhonda Morningstar Pope, Chairperson
1418 20th Street, Suite 200
Sacramento, CA 95811

Colfax-Todd's Valley Consolidated Tribe
Mr. Clyde Prout III, Chairperson
P.O. Box 4884
Auburn, CA 95604

Ione Band of Miwok Indians
Ms. Sara Dutschke Setchwaelo, Chairperson
P.O. Box 699
Plymouth, CA 95669

Nashville-El Dorado Miwok
Mr. Cosme Valdez, Chairperson
P.O. Box 580986
Elk Grove, CA 95758

Shingle Springs Band of Miwok Indians
Ms. Regina Cuellar, Chairperson
P.O. Box 1340
Shingle Springs, CA 95862

T'si Akim Maidu
Mr. Grayson Coney, Cultural Director
P.O. Box 510
Browns Valley, CA 95918

United Auburn Indian Community of the Auburn Rancheria
Mr. Gene Whitehouse, Chairperson
10720 Indian Hill Road
Auburn, CA 95603

Wilton Rancheria
Mr. Raymond Hitchcock, Chairperson
9728 Kent Street
Elk Grove, CA 95624

Yocha Dehe Wintun Nation
Mr. Anthony Roberts, Chairperson
P.O. Box 18
Brooks, CA 95606