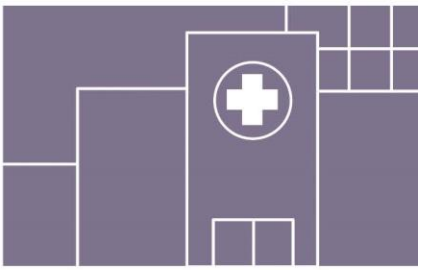
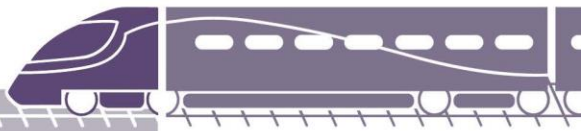
DRAFT ENVIRONMENTAL IMPACT REPORT

Plan BayArea 2040

DRAFT EIR

SCH# 2016052041





METROPOLITAN TRANSPORTATION COMMISSION

Association of Bay Area Governments

APRIL 2017

Association of
Bay Area Governments

METROPOLITAN
TRANSPORTATION
COMMISSION

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NOTICE OF AVAILABILITY and NOTICE OF PUBLIC MEETINGS
Metropolitan Transportation Commission Plan Bay Area (PBA) 2040
Regional Transportation Plan/Sustainable Communities Strategy
Draft Environmental Impact Report

Date: April 14, 2017
To: Interested Agencies, Organizations and Individuals
From: Metropolitan Transportation Commission (MTC)
Comment Period: April 17, 2017 to June 1, 2017 (45 days)

The Draft Environmental Impact Report (Draft EIR) (SCH# 2016052041) for Plan Bay Area (PBA) 2040, the Regional Transportation Plan (RTP)/Sustainable Communities Strategy (SCS) (proposed Plan) for the San Francisco Bay Area is now available for review. Public comment on this document is invited for a 45-day period extending from April 17, 2017 to June 1, 2017. Additional information and public comment meeting dates are provided below.

The proposed Plan is a regional strategy for accommodating household and employment growth projected to occur in Bay Area region through 2040, and a transportation strategy for the region based on expected revenues. The primary objective of the proposed Plan is to achieve mandated reductions of greenhouse (GHG) emissions and to provide adequate housing for the projected 2040 regional population level pursuant to The Sustainable Communities and Climate Protection Act of 2008 (Senate Bill (SB) 375, Statutes of 2008). The proposed Plan sets forth a transportation and land use blueprint for how the Bay Area can address transportation mobility and accessibility needs, regional housing responsibilities, economic conditions and forecasts, environmental concerns, and GHG emissions reduction requirements through the year 2040.

The region includes nine counties (Alameda, Contra Costa, Marin, Napa, San Francisco, San Mateo, Santa Clara, Solano and Sonoma) totaling approximately 4.4 million acres (7,000 square miles). In 2015 the region had 4.01 million jobs, 2.76 million households, and 7.57 million people. The proposed Plan would accommodate projected growth for an additional 688,000 jobs, 666,000 households, and 2,056,000 people by 2040 with a transportation investment strategy of $303 billion. MTC is required under State and Federal law to update the RTP/SCS every four years.

The Draft EIR has been prepared on behalf of MTC and the Association of Bay Area Governments (ABAG) in accordance with the California Environmental Quality Act (CEQA),) to analyze and disclose the potentially adverse significant impacts associated with implementation of the proposed Plan. The Draft EIR identifies the potential for significant effects in the following areas: Transportation, Air Quality, Land Use and Physical Development, Climate Change and Greenhouse Gases, Noise, Biological Resources, Visual Resources, Cultural Resources, Public Utilities and Facilities, Hazards, and Public Services and Recreation.

A Final EIR will be prepared following public review and comment on the Draft EIR. The Final EIR will consist of changes to the Draft EIR and written responses to comments submitted during the comment period on the Draft EIR. MTC and ABAG will consider this information during their deliberations on certification of the Final EIR and adoption of the proposed Plan.

Beginning April 17, 2017, the Draft EIR will be available for public review online at the web link provided below. Interested parties may review the draft on the web site or obtain a free electronic copy by contacting MTC at the contact information provided below. The document also will be available for public review in at least one library in each of the nine member counties (list of locations also available beginning April 17) at the URL listed below:

http://www.planbayarea.org/2040-plan/access-plan

You may submit comments on the Draft EIR during the 45-day review period, which begins April 17, 2017 and ends June 1, 2017. All comments received or postmarked by June 1, 2017 will be accepted as timely. Please refer to Plan Bay Area 2040 RTP/SCS EIR in your comments and direct them to:

MTC Public Information
375 Beale Street, Suite 800
San Francisco, CA, 94105
415. 778.6757 office
415.536.9800 fax
eircomments@mtc.ca.gov

MTC will be conducting three public meetings to receive comments on the Draft EIR during the review period. All interested agencies, organizations, and individuals are welcome to submit comments and/or participate in the public meetings for the Draft EIR. Oral comments will be accepted during these meetings.

May 12, 2017	**Joint MTC Planning Committee with the ABAG Administrative Committee (9:40 am or immediately following the Legislation Committee, whichever occurs later) at Bay Area Metro Center, 375 Beale Street, San Francisco, CA**
May 16, 2017	**MTC Public Meeting (6:00 pm) at Martin Luther King Jr. Library, 150 E. San Fernando Street, Room 225, San Jose, CA**
May 18, 2017	**MTC Public Meeting (6:00 pm) at Vallejo Naval and Historical Museum, Hall of History, 734 Marin Street, Vallejo, CA**

The following statement is required to be included in this notice: Pursuant to CEQA Guidelines Section 15087(c)(6), the nine county Bay Area region contains hazardous waste sites as enumerated under California Government Code Section 65962.5.

Public comment on the *Draft Plan Bay Area 2040* is currently being sought pursuant to a separate notice.

Do you need an interpreter or any other assistance in order to participate? Please call us at 415.778.6757. We require three days' notice in order to provide reasonable accommodation.

為了便於參加，您需要口譯員或其他任何協助嗎？請致電415.778.6757聯絡我們。我們需要提前3天通知才能提供合理的輔助服務。

¿Necesitas un intérprete o cualquier otra asistencia para participar? Comunícate al 415.778.6757. Necesitamos aviso con tres días de anticipación para proporcionar asistencia razonable.

Draft Environmental Impact Report

For the

Plan Bay Area 2040

Regional Transportation Plan (RTP)/

Sustainable Communities Strategy (SCS)

State Clearinghouse Number SCH# 2016052041

PREPARED FOR:

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AND

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April 2017

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Appendices (provided on CD on back cover)

Figures

Tables

ACRONYMS AND ABBREVIATIONS

AAR	Association of American Railroads
AB	Assembly Bill
AB 939 or IWMA	Integrated Waste Management Act of 1989
ABAG	Association of Bay Area Governments
ACWD	Alameda County Water District
AFVs	alternative fuel vehicles
AFY	acre feet of water per year
AHSC	Affordable Housing and Sustainable Communities Program
AIP	Airport Improvement Program
AIRFA	American Indian Religious Freedom Act of 1978
ALUC	airport land use commission
ALUCP	airport land use compatibility plan
ALUP	airport land use plan
APS	alternative planning strategy
ARB	California Air Resources Board
ARPA	Archeological Resources Protection Act of 1979
ASCE	American Society of Civil Engineers
ATCM	Airborne Toxic Control Measure
BAAQMD	Bay Area Air Quality Management District
BARDP	Bay Area Regional Desalination Project
BART	Bay Area Rapid Transit
BARWRP	Bay Area Regional Water Recycling Program
BASMAA	Bay Area Stormwater Management Agencies Association
Bay Plan	San Francisco Bay Plan
Bay Region	San Francisco Bay Hydrologic Region
BCDC	Bay Conservation and Development Commission
BMP	best management practice
BP	Before Present
Btu	British thermal units
CAA	Clean Air Act
CAFE	Corporate Average Fuel Economy
Cal EMA	California Emergency Management Agency
CAL FIRE	California Department of Forestry and Fire Projection
Cal/EPA	California Environmental Protection Agency
CalARP	California Accidental Release Prevention Program
CalRecycle	California Department of Resources Recycling and Recovery

Caltrans	California Department of Transportation
CASQA	California Stormwater Quality Association
CBC	California Building Code
CCC	California Coastal Commission
CCR	California Code of Regulations
CCWD	Contra Costa Water District
CDE	California Department of Education
CDFW	California Department of Fish and Wildlife
CDL	Cropland Data Layer
CEC	California Energy Commission
CEQA	California Environmental Quality Act
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act of 1980
CESA	California Endangered Species Act
CFR	Code of Federal Regulations
CGS	California Geological Survey
CHHSL	California Human Health Screening Level
CHP	California Highway Patrol
CIWMP	Countywide Integrated Waste Management Plan
CLG	Certified Local Government Program
CLN	Conservation Land Network
CMA	congestion management agency
CNDDB	California Natural Diversity Database
CNEL	Community Noise Equivalent Level
CO_2	carbon dioxide
COG	council of governments
CPUC	California Public Utilities Commission
CRHR	California Register of Historic Resources
CTS	California tiger salamander
CVP	Central Valley Project
CZMA	Coastal Zone Management Act
dB	decibel
dBA	A-weighted decibel
DMA2K	Disaster Mitigation Act of 2000
DOT	U.S. Department of Transportation
DOT Act	U.S. Department of Transportation Act
DSOD	Division of Safety of Dams
DTSC	California Department of Toxic Substances Control
DWR	California Department of Water Resources

EACCS	East Alameda County Conservation Strategy
EAP	Energy Action Plan
EBMUD	East Bay Municipal Utility District
ECA	Essential Connectivity Areas
EEJ	Environment, Equity, and Jobs
EIA	U.S. Energy Information Administration
EIR	Environmental Impact Report
EPA	U.S. Environmental Protection Agency
EPAct	Energy Policy Act of 1992
EPCRA	Emergency Planning Community Right-to-Know Act
ESA	Environmental Site Assessment
FAA	Federal Aviation Administration
FAST	Fixing America's Surface Transportation
FEMA	Federal Emergency Management Agency
FHWA	Federal Highway Administration
FMMP	Farmland Mapping and Monitoring Program
FPA	Z'Berg-Nejedly Forest Practices Act
FPPA	Farmland Protection Policy Act
FRA	Federal Rail Administration
FTA	Federal Transit Administration
GHG	greenhouse gas
GIS	geographic information system
GMP	Growth Management Program
GSA	Groundwater Sustainability Agency
GSP	Groundwater Sustainability Plan
GVB	Ground-Borne Vibration
HCD	State Department of Housing and Community Development
HCP/NCCP	Habitat Conservation Plan/Natural Community Conservation Plan
HMTA	Hazardous Materials Transportation Act
HSC	Health and Safety Code
HUD	U.S. Department of Housing and Urban Development
Hz	hertz
I-	Interstate
IBC	International Building Code
IEPR	Integrated Energy Policy Report
IFC	International Fire Code

in/sec	inches/second
LAFCO	local agency formation commission
L_{dn}	Day-Night Average Level
LEA	local enforcement agency
L_{eq}	Equivalent Sound Level
LESA	Land Evaluation and Site Assessment
LID	low impact development
L_{max}	Maximum Sound Level
L_n	Percentile-Exceeded Sound Level
LRA	Local Responsibility Area
LURMP	Land Use and Resource Management Plan
LWCF Act	Land and Water Conservation Fund Act
MM	Modified Mercalli
MMWD	Marin Municipal Water District
MPO	metropolitan planning organization
MS4	municipal separate storm sewer system
MTC	Metropolitan Transportation Commission
MWELO	California Model Water Efficient Landscape Ordinance
NAC	noise abatement criteria
NAGPRA	Native American Graves Protection and Repatriation Act of 1990
NAHC	Native American Heritage Commission
NBA	North Bay Aqueduct
NEHRP	National Earthquake Hazards Reduction Program
NEPA	National Environmental Policy Act of 1969
NFIP	National Flood Insurance Program
NMFS	National Marine Fisheries Service
NOA	naturally occurring asbestos
NOP	Notice of Preparation
NPDES	National Pollutant Discharge Elimination System
NPDWR	National Primary Drinking Water Regulations
NPPA	California Native Plant Protection Act
NRCS	Natural Resources Conservation Service
NRHP	National Register of Historic Places
NWIC	Northwest Information Center
OEHHA	Office of Environmental Health Hazard Assessment
OES	Office of Emergency Services
OPR	Governor's Office of Planning and Research

OSPR	Office of Spill Prevention and Response
PCA	Priority Conservation Area
PDA	Planned Development Area
PEA	Preliminary Endangerment Assessment
PHMSA	Pipeline and Hazardous Materials Safety Administration
PPV	peak particle velocity
PRC	Public Resources Code
Programmatic BO	Programmatic Biological Opinion
PUC	public utility company
RCRA	Resource Conservation and Recovery Act of 1976
RECP	Bay Area Regional Emergency Coordination Plan
RHNA	regional housing needs allocation
RMS	root-mean-square
RPS	renewable portfolio standard
RTP	Regional Transportation Plan
RTPA	regional transportation planning agency
RWQCB	regional water quality control board
RWS	Regional Water System
SAF Plan	State Alternative Fuels Plan
SAFZ	San Andreas Fault Zone
SB	Senate Bill
SBE	State Board of Education
SCEA	Sustainable Communities Environmental Assessment
SCS	Sustainable Communities Strategy
SCVWD	Santa Clara Valley Water District
SCWA	Solano County Water Agency
SDC	Seismic Design Category
SDWA	Safe Drinking Water Act
SEL	single-event noise level
SEMS	Standard Emergency Management System
SFPUC	San Francisco Public Utilities Commission
SGMA	Sustainable Groundwater Management Act
SHPO	State Historic Preservation Officer
SMARA	Surface Mining and Reclamation Act of 1975
SMCWA	Sonoma County Water Agency
SMGB	State Mining and Geology Board
SPL	sound pressure level

SR	State Route
SSO	sanitary sewer overflow
Subtitle D	Resource Recovery and Conservation Act of 1976, Subtitle D
SWAP 2015	State Wildlife Action Plan, 2015 Update
SWMP	stormwater management plan
SWP	State Water Project
SWPPP	stormwater pollution prevention program
SWRCB	State Water Resources Control Board
TCR	tribal cultural resource
THP	Timber Harvest Plan
TMDL	Total Maximum Daily Load
TOD	Transit Oriented Development
TPA	transit priority area
TPP	Transit Priority Project
UCMP	University of California Museum of Paleontology
UGB	Urban Growth Boundaries
USACE	U.S. Army Corps of Engineers
USDA	U.S. Department of Agriculture
USDOT	U.S. Department of Transportation
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
UWMP	urban water management plan
VMT	vehicle miles traveled
WDR	waste discharge requirement
WSA	water supply assessment
Zone 7	Zone 7 Water Agency
µPa	micro-Pascals

EXECUTIVE SUMMARY

INTRODUCTION

This summary is provided in accordance with the State California Environmental Quality Act (CEQA) Guidelines (California Code of Regulations [CCR] Section 15123). As stated in the State CEQA Guidelines (CCR Section 15123[a]), "an environmental impact report (EIR) shall contain a brief summary of the proposed actions and its consequences. The language of the summary should be as clear and simple as reasonably practical." As required by the State CEQA Guidelines, this section includes: (1) a summary description of the proposed project; (2) a synopsis of environmental impacts and recommended mitigation measures; (3) identification of the alternatives evaluated and of the environmentally superior alternative; (4) a discussion of the areas of controversy associated with the project; and (5) issues to be resolved, including the choice among alternatives.

SUMMARY DESCRIPTION OF THE PROJECT

Background

LOCATION

The San Francisco Bay Area region includes nine counties that are aggregated geographically into four subareas: North Bay (Marin, Napa, Solano, and Sonoma Counties); East Bay (Alameda and Contra Costa Counties); South Bay (Santa Clara County); and the West Bay (San Francisco and San Mateo Counties). There are 101 cities spread throughout these nine counties. The total area of the region is approximately 4.4 million acres (7,000 square miles). The region is bordered by Mendocino, Lake, and Yolo counties to the north; Sacramento, San Joaquin, Stanislaus, and Merced counties to the east; San Benito, Monterey, and Santa Cruz to the south; and the Pacific Ocean to the west. In 2015, the region had a population of 7.57 million, which is approximately 20 percent of California's population. Roughly 17 percent of the region's approximately 4.4 million acres was developed in 2010 (California Department of Conservation 2015, Bay Area Open Space Council 2014). The undeveloped area includes open space and agricultural lands as well as water bodies (excluding the San Francisco Bay) and parks. Approximately 29 percent of the region is identified as protected open space (Bay Area Open Space Council 2014).

MTC, ABAG, AND PLAN BAY AREA

MTC is the transportation planning, coordinating, and financing agency for the region. Created by the State Legislature in 1970, MTC functions as both the regional transportation planning agency (RTPA)—a state designation—and, for federal purposes, as the region's metropolitan planning organization (MPO).

ABAG is a joint powers agency formed in 1961 pursuant to California Government Code §§ 6500, et seq., and the council of governments (COG) for the San Francisco Bay Area. ABAG conducts regional population and employment projections and the regional housing needs allocation (RHNA) processes (Government Code Section 65584 et seq.).

Plan Bay Area 2040 is a joint effort by MTC and ABAG, completed in partnership with the Bay Area's other two regional government agencies, the Bay Area Air Quality Management District (BAAQMD), and the Bay Conservation and Development Commission (BCDC). As required by State legislation (Government Code Section 65080 et seq.) and by federal regulation (Title 23 USC Section 134), MTC is responsible for preparing the RTP for the San Francisco Bay Area region. An RTP is a long-range plan that identifies the strategies and investments to maintain, manage, and improve the region's transportation network. The RTP must be updated

every four years. The Sustainable Communities and Climate Protection Act of 2008, commonly known as Senate Bill 375 (SB 375 Steinberg, 2008), requires California's 18 metropolitan planning organizations (including MTC) to develop an SCS as an element of the federally mandated RTP. The SCS demonstrates how the region will meet its greenhouse gas (GHG) reduction targets established by the California Air Resources Board (ARB) through integrated land use, housing and transportation planning. In the Bay Area, MTC and ABAG are jointly responsible for this planning effort.

The 2013 Plan was the first Bay Area RTP that was subject to SB 375, which requires that the SCS be integrated into the MPO's RTP, and projected out through 2040. The proposed Plan is an update to the 2013 Plan and also covers the period through 2040.

The proposed Plan is a long-range plan that specifies the strategies and investments to maintain, manage, and improve the region's transportation network, which includes improvements to bicycle and pedestrian facilities, local streets and roads, public transit systems, and highways. The proposed Plan also calls for focused housing and job growth around high-quality transit corridors, particularly within areas identified by local jurisdictions as Priority Development Areas (PDAs). This land use strategy is anticipated to enhance mobility and economic growth by linking the location of housing and jobs with transit, thus offering a more efficient land use pattern around transit and a greater return on existing and planned transit investments.

Once adopted, Plan Bay Area 2040 will be reviewed by ARB to confirm whether it would, if implemented, achieve the GHG emission reduction target for the region. If the combination of measures in the SCS is determined to be insufficient to achieve the region's target, an alternative planning strategy (APS) to achieve the targets must be prepared.

INTRODUCTION TO THE EIR

PURPOSE OF THIS EIR

This EIR has been prepared in compliance with the CEQA Statutes and Guidelines. In general, the purpose of an EIR is to:

- analyze the potential environmental effects of the adoption and implementation of the Plan;
- inform decision-makers, responsible and trustee agencies, and members of the public as to the range of the environmental impacts of the Plan;
- recommend a set of measures to mitigate significant adverse impacts; and
- analyze a range of reasonable alternatives to the proposed Plan.

The final EIR will include a Mitigation, Monitoring, and Reporting Program that identifies who will be responsible for implementing identified mitigation measures and the required timing for implementation. As the joint lead agencies for preparing this EIR, MTC and ABAG will rely on the EIR analysis of potential environmental effects in their review and consideration of the proposed Plan before approval.

As discussed in Section 1.1.8 "CEQA Streamlining Opportunities," SB 375 provides streamlining benefits for certain transit-oriented projects consistent with an adopted SCS. Pursuant to these provisions of SB 375, this EIR has also been prepared to allow qualifying projects to streamline their environmental review.

EIR SCOPE

This is a program EIR, which is defined in Section 15168 of the CEQA Guidelines as: "[An EIR addressing a] series of actions that can be characterized as one large project and are related either:

> (1) Geographically;
>
> (2) As logical parts in the chain of contemplated actions;
>
> (3) In connection with the issuance of rules, regulations, plans, or other general criteria to govern the conduct of a continuing program; or
>
> (4) As individual activities carried out under the same authorizing statutory or regulatory authority and having generally similar environmental impacts which can be mitigated in similar ways."

A program EIR can be used as the basic, general environmental assessment for an overall program of projects developed over a multi-year planning horizon, and therefore is an appropriate review document for the proposed Plan. A program EIR has several advantages. For example, it provides a basic reference document to avoid unnecessary repetition of facts or analysis in subsequent project-specific assessments. It also allows the lead agency to consider the broad, regional impacts of a program of actions before its adoption and eliminates redundant or contradictory approaches to the consideration of regional and cumulative impacts.

LEVEL OF ANALYSIS

This EIR presents a programmatic assessment of the potential impacts of the proposed Plan, focusing on the entire set of projects and programs contained in the proposed Plan. Individual transportation and development project impacts are not addressed in detail; rather the focus of this EIR is on the entire program of projects, in the aggregate.

A geographic information system (GIS) was used to digitally overlay the projected land use growth footprint (net new acres of potential development) associated with forecasted development and the transportation projects footprint assumed for the transportation projects over resource-related data. Results are presented, where relevant, for the region, for each county, and for the portions of the growth footprint specifically within the TPAs. Where impacts are quantified through modeling or GIS analysis, they are reported at the regional (total), county, and/or transit priority area (TPA) levels in tables and in the text. Information provided by county includes both incorporated and unincorporated areas in the county. To facilitate future CEQA streamlining opportunities for individual projects that qualify as transit priority projects, (see section 1.1.8, CEQA Streamlining Opportunities in Section 1.1, "Introduction"), quantified data in this EIR is reported by TPAs, as available. The portion of the projected land use growth footprint located in PDAs that is outside of a TPA is captured in the County totals. Where useful for the impact analysis, GIS-based results are also reported by PDAs.

The analysis in this EIR does not evaluate subcomponents of the proposed Plan nor does it assess project-specific impacts of individual projects, although it provides environmental analysis and mitigation that is intended to address the range of impacts and mitigation that may be associated with individual projects. This approach does not relieve local jurisdictions of responsibility for determining whether project-specific impacts require additional CEQA analysis; see Section 1.1.7, Future Environmental Review, for more details.

EIR Organization

EXECUTIVE SUMMARY

The Executive Summary outlines the proposed Plan and alternatives and includes a summary of the potentially significant adverse environmental impacts of the proposed Plan, the measures identified to mitigate those impacts, and an overview of whether or not identified measures would mitigate the significant impacts and to

what level. The executive summary also describes the alternatives and their merits as compared to the proposed Plan, identifies the environmentally superior alternative, and describes "areas of known controversy" and "issues to be resolved" as required by CEQA.

SECTION 1.1: INTRODUCTION

Section 1.1, Introduction describes the relationship between the proposed Plan and the EIR, the organization of the EIR, and the basic legal requirements of a program level EIR. It discusses the level of analysis and the alternatives considered as well as how this EIR is related to other environmental documents and the EIR's intended uses.

SECTION 1.2: PROJECT DESCRIPTION

Section 1.2, Project Description introduces the purpose and objectives of the proposed Plan and summarizes other specific descriptive information. This includes a description of the regional location and general setting, project background, an outline of the region's projected population and employment growth rates, a summary of forecasted development patterns through the 2040 planning horizon year, and an overview of proposed transportation projects and programs.

SECTION 2.0 THROUGH 2.14: ENVIRONMENTAL ANALYSIS

Section 2.0 provides an overview of the approach to the environmental analysis. Sections 2.1 through 2.14 describe the existing physical and regulatory settings for each of the environmental issue areas analyzed in the EIR, the potential impacts of the proposed Plan on these environmental issue areas, and measures to mitigate the potential impacts identified. Each issue area is analyzed in a separate section. Each section is organized as follows:

- Environmental Setting,
- Regulatory Setting,
- Significance Criteria,
- Method of Analysis, and
- Impacts and Mitigation Measures.

SECTION 3: ALTERNATIVES AND CEQA-REQUIRED CONCLUSIONS

Section 3.1 includes a description of the alternatives to the proposed Plan. It provides an assessment of the potential of each alternative to achieve the objectives of the proposed Plan while reducing potentially significant adverse environmental impacts. This discussion also includes a comparison summary table of regional environmental impacts associated with the alternatives. As required by CEQA, an environmentally superior alternative is identified.

Section 3.2 includes an assessment of the impacts of the proposed Plan in several subject areas required by CEQA, including:

- significant irreversible environmental changes,
- significant unavoidable impacts,
- growth-inducing impacts,
- cumulative impacts, and
- impacts found to be not significant.

SECTION 4: BIBLIOGRAPHY AND EIR PREPARERS

Section 4.1 includes a bibliography and Section 4.2 includes a list of report authors.

APPENDICES

Appendix A includes the Notice of Preparation (NOP) of this EIR and Appendix B includes the comments received on the NOP and at the scoping meetings and the Scoping Summary Report. Appendices C through E include detailed supporting data on impact analyses for transportation, energy, and climate change and greenhouse gases. Appendix F includes potential adaptation strategies, referenced in Section 2.5, "Climate Change and Greenhouse Gases." Appendices G through M include detailed supporting data on impact analyses for air quality, noise, geology and seismicity, water resources, biological resources, cultural resources, and hazards, respectively.

Project Objectives

The proposed Plan reinforces land use and transportation integration to reduce greenhouse gas emissions per SB 375 and presents a vision of the Bay Area's land use patterns and transportation networks in 2040. The proposed Plan's core strategy is focused growth in existing communities along the existing transportation network. Consistent with this core strategy, the seven goals of the proposed Plan are:

- Climate Protection
- Adequate Housing
- Healthy and Safe Communities
- Open Space and Agricultural Preservation
- Equitable Access
- Economic Vitality
- Transportation System Effectiveness

MTC and ABAG developed 13 performance targets associated with the goals for the proposed Plan (**Table ES-1**). Senate Bill 375 mandates two of these performance targets. These are the primary objectives of the Plan:

- The proposed Plan must address climate change by reducing CO_2 emissions: the regional plan must meet or exceed a seven percent reduction in per-capita emissions from cars and light-duty trucks by 2020 and a 15 percent reduction by 2035 relative to 2005 levels.

- The proposed Plan must house 100 percent of the region's projected growth by income level without displacing low-income residents, and with no increase in in-commuters over the proposed Plan baseline year. As calculated for the proposed Plan pursuant to a settlement agreement entered into with the Building Industry Association (BIA) Bay Area, the Regional Housing Control Total is 820,400.

In addition to these two objectives, MTC and the ABAG Executive Board adopted 11 additional targets. Key goals for Plan Bay Area 2040 included tackling the Bay Area's inequities through improved affordability and lessened displacement risk, ensuring a robust economy and protecting the environment for future generations. These targets reflect MTC and ABAG's commitment to take a more holistic view of the possibilities of integrated regional planning by going beyond the plan's legal requirements.

Table ES-1 Year 2040 Goals and Performance Targets

Goal	Performance Target
Climate Protection	Reduce per-capita CO2 emissions from cars and light-duty trucks by 15%
Adequate Housing	House 100% of the region's projected growth by income level without displacing current low-income residents and with no increase in in-commuters over the Plan baseline year
Healthy and Safe Communities	Reduce adverse health impacts associated with air quality, road safety, and physical inactivity by 10%
Open Space and Agricultural Preservation	Direct all non-agricultural development within the urban footprint (existing urban development and UGBs)
Equitable Access	Decrease the share of lower income residents' household income consumed by housing and transportation (H+T) costs by 10%
	Increase the share of affordable housing in PDAs, TPAs or high-opportunity areas by 15%
	Do not increase the share of low- and moderate-income renter households in PDAs, TPAs, or high-opportunity areas that are at risk of displacement
Economic Vitality	Increase by 20% the share of jobs accessible within 30 minutes by auto or within 45 minutes by transit in congested conditions
	Increase by 38% the number of jobs in predominantly middle-wage industries
	Reduce per-capita delay on the Regional Freight Network by 20%
Transportation System Effectiveness	Increase non-auto mode share by 10%
	Reduce vehicle operations and maintenance costs because of pavement conditions by 100%
	Reduce per-rider transit delay because of aged infrastructure by 100%

Note: The base year for the targets, unless specified under target methodology documentation, is 2005, Additional information is available in MTC Resolution 4204, Revised and associated methodology memoranda.[1] The Adequate Housing target relates to the Regional Housing Control Total per the settlement agreement signed with the Building Industry Association (BIA), which increases the housing forecast by the housing equivalent to in-commute growth.

Project Overview

The proposed Plan provides a strategy for accommodating projected household and employment growth in the Bay Area by 2040 as well as a transportation investment strategy for the region. The proposed Plan details how the Bay Area can achieve several outcomes essential to the success of the region's long-range transportation and land use goals. The proposed Plan:

- Describes where and how the region can accommodate 666,000 new projected households and 668,000 new jobs between 2015 and 2040;
- Details a regional transportation investment strategy given $303 billion in expected revenues from federal, state, regional and local sources over the next 24 years; and
- Complies with SB 375, the state's SCS law, which integrates land use and transportation planning and mandates both a reduction in greenhouse gas emissions from passenger vehicles and the provision of adequate housing for the region's 24-year projected population growth.

The proposed Plan encompasses the entire Bay Area, including the nine counties and the 101 cities that make up the region. The proposed Plan is constrained by expected transportation revenues and expected household and employment growth. The proposed Plan identifies what it would take to accommodate expected growth and improve the quality of life for existing and future residents. The proposed Plan also facilitates subsequent streamlined CEQA analysis pursuant to Senate Bill 375, Senate Bill 743, and other methods described in Section 1.2. The proposed Plan does not change local land use policies; individual jurisdictions retain all local land use authority. The proposed Plan creates a list of transportation projects that are eligible for future funding but does not program funds to specific transportation projects.

SUMMARY OF ALTERNATIVES

ALTERNATIVES

CEQA requires EIRs to evaluate a reasonable range of alternatives to the proposed project that could feasibly attain most of the basic project objectives and that would avoid or substantially lessen any of the significant environmental impacts. In addition, CEQA requires assessment of the likely foreseeable future condition if the proposed project were not implemented; this scenario is called the No Project alternative.

This EIR evaluates the proposed Plan and four alternatives, assuming the same regional forecast control totals, same 2040 horizon year, and full Plan implementation. These alternatives were confirmed by the MTC Planning Committee and ABAG Administrative Committee on December 9, 2016. This EIR also identifies the environmentally superior alternative and documents the relative environmental advantages and disadvantages of the alternatives, as compared to the proposed Plan.

The proposed Plan and four alternatives are briefly described below. A full description of each alternative is provided in Section 3.1.

Alternative 1: No Project Alternative

An EIR must analyze the "no project alternative." (CEQA Guidelines, § 15126.6(e).) The purpose of the no project alternative is to allow a comparison of the environmental impacts of approving the proposed project with the effects of not approving it. The no project alternative must discuss the existing conditions, "as well as what would be reasonably expected to occur in the foreseeable future if the project were not approved, based on current plans and consistent with available infrastructure and community services."

The No Project Alternative represents implementation of the general plans of all nine counties and 101 cities in the Bay Area without influence of a regional plan that integrates transportation, growth, and GHG reduction. No new regional land use plan would be developed and no new SCS policies would be implemented to influence the locations of housing and employment centers in the region. Transportation projects that would occur under the No Project Alternative would be substantially limited compared to the proposed Plan, consisting of five major regional transit, three local transit, and two highway projects from the previous plan that are fully committed with funding and completed environmental review.

Alternative 2: Main Streets Alternative

Alternative 2, the Main Streets Alternative, provides a plan that targets future population and employment growth to the downtowns of every city in the Bay Area to foster a region of moderately-sized, integrated town centers. This alternative comes closest to resembling a traditional suburban pattern, because it would result in increased greenfield development relative to the proposed Plan. To support this alternative's dispersed growth pattern, transportation investment priorities would emphasize highway strategies, including the expansion of high-occupancy toll lanes on all regional highways and highway widenings at key bottlenecks.

Alternative 3: Big Cities Alternative

Alternative 3 concentrates future population and employment growth in the locally-identified PDAs and TPAs within the Bay Area's three largest cities: San Jose, San Francisco, and Oakland. Neighboring cities that are already well-connected to these three cities by transit would see moderate to substantial increases in population and employment growth, particularly in their locally-identified PDAs and high opportunity areas. To support this alternative's big city-focused growth pattern, the transportation infrastructure within and directly serving the region's core would be maintained to a state of good repair, modernized to boost service and improve commutes and capacity, and expanded to meet increased demand. Bicycle and pedestrian infrastructure would be expanded in these cities, including a robust network of bike sharing

Alternative 4: Environment, Equity, and Jobs Alternative

The Environment, Equity, and Jobs (EEJ) Alternative includes strategies to focus more growth in suburban communities than the proposed Plan, in part to reduce risk of displacement in urban areas. In addition, the EEJ Alternative includes more funding for bus operations in suburban areas to serve lower-income residents and reduces funding for highway expansion and efficiency projects with the objective of reducing adverse environmental impacts. This alternative would encourage intensification of land use beyond PDAs to include jobs-rich, high-opportunity TPAs not currently identified as PDAs. This alternative seeks to strengthen public transit by boosting service frequencies in most suburban and urban areas, other than on Muni, BART or Caltrain, and providing free transit passes to youth throughout the region.

SUMMARY OF ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

The analysis emphasizes the impacts of the proposed Plan as a complete program, rather than as detailed analysis of the individual transportation projects and land use strategies included in the proposed Plan. Individual transportation projects and development projects must still independently comply with the requirements of CEQA.

The EIR addresses impacts associated with projected growth and impacts associated with the projected land use and assumed transportation projects. Where a significant or potentially significant impact may occur, mitigation measures are provided. **Table ES-2** summarizes the impact conclusions and recommended mitigation measures identified in this EIR. The impacts are organized by environmental impact issue area in the order in which they appear in Sections 2.1 through 2.14.

Significant unavoidable impacts are those that cannot be mitigated to a less-than-significant level. Sections 2.1 through 2.14 of this EIR identify the following significant unavoidable impacts of the proposed Plan. As stated in Chapter 2, to the extent that an individual project adopts and implements all feasible mitigation measures described for each significant impact, many of the impacts listed below would be reduced to a less-than-significant level. However, MTC/ABAG cannot require local implementing agencies to adopt most of the mitigation measures, and it is ultimately the responsibility of a lead agency to determine and adopt mitigation. Therefore, several impacts have been identified as significant and unavoidable for purposes of this program-level review. Projects taking advantage of CEQA Streamlining provisions of SB 375 (Public Resources Code Sections 21155.1, 21155.2, and 21159.28) must apply the mitigation measures described in this EIR, as necessary and feasible to address site-specific conditions.

ENVIRONMENTALLY SUPERIOR ALTERNATIVE

CEQA Guidelines Section 15126.6 requires that an EIR identify the environmentally superior alternative among the alternatives analyzed. CEQA Guidelines Section 15126.6(d)(2) states that if the environmentally superior alternative is the no project alternative, the EIR shall also identify an environmentally superior alternative from among the other alternatives analyzed. The proposed Plan is included in the consideration of environmentally superior alternatives in EIRs.

The primary objectives of the Plan revolve around accommodating household and job growth forecasts and providing a transportation investment strategy for the region. A substantial level of development is required to accommodate the growth forecasts. Consequently, the majority of impacts of the proposed Plan and alternatives are similar in type and magnitude. Differences in impacts revolve around the location and size of land use growth and transportation footprints, and the ability of feasible policies to influence how development forecasted in the Plan and its alternatives would proceed.

Further, CEQA provides little guidance regarding selection of environmentally superior alternatives. In an instance such as the proposed Plan, where alternatives result in many similar impacts but also would result in tradeoffs (some greater impacts, some lesser impacts than the Plan), judgement is required in determining

how these tradeoffs factor in selection of the environmentally superior alternative. Policy makers who review this EIR and must decide on which alternative to select may differ in their judgement, and this may also be affected by their consideration of the feasibility of alternatives.

Some of the alternatives are relatively similar in terms of type and extent of environmental impact, although there are gradations of differences. In fact, three alternatives, the proposed Plan, the Big Cities, and the EEJ Alternatives result in a similar level of environmental impact, in the aggregate. Each of these alternatives has environmental advantages and disadvantages, when compared to each other. This assessment is based on the relative number of less-than-significant and significant and unavoidable impacts that are reduced or increased under each alternative, as described below.

The Big Cities Alternative would result in the lowest overall level of environmental impacts, although only marginally lower, as compared to all alternatives, and therefore is identified as the environmentally superior alternative. However, this conclusion is based on prioritizing certain types of impacts over others.

In summary, the proposed Plan would result in 40 impacts that would be less than significant or less than significant after mitigation and 38 impacts that would be significant and unavoidable following implementation of mitigation measures or due to uncertainty because MTC/ABAG cannot require local implementing agencies to adopt mitigation measures identified in this EIR. The Big Cities Alternative would have similar less-than-significant impacts for 15 impacts identified under the proposed Plan. The Big Cities Alternative would reduce 21 less-than-significant impacts and increase two less-than-significant impacts compared to the proposed Plan. The Big Cities Alternative would have similar significant and unavoidable impacts for 19 impacts identified under the proposed Plan. The Big Cities Alternative would reduce 18 significant and unavoidable impact and increase three significant and unavoidable impacts compared to the proposed Plan. As discussed in Section 3.1 of this Draft EIR in more detail, the Big Cities Alternative would have the same impacts as the proposed Plan and other alternatives but to a lesser degree overall related to air quality, land use, energy, water resources, visual resources, biological resources, geology and seismicity, and cultural resources. The Big Cities Alternative would result in two new significant and unavoidable impacts compared to the proposed Plan. One new impact would occur because the Big Cities Alternative would result in a significant impact (greater than five percent increase) associated with per-trip non-commute travel time for drive alone and carpool trips, relative to existing conditions. The other new impact would occur because the Big Cities Alternative would result in a significant impact associated with per-capita VMT by causing an 8 percent increase in per-capita congested VMT in Solano County, relative to existing conditions. However, ABAG/MTC, in considering these two impacts, views them in light of shifting views of traffic congestion under CEQA. The Transportation section of this Draft EIR explains that SB 743 (2013) changes the way that public agencies evaluate the transportation impacts of projects under CEQA, recognizing that roadway congestion, while an inconvenience to drivers, is not itself an environmental impact. (See Pub. Resource Code, § 21099, subd. (b)(2) ["automobile delay, as described solely by level of service or similar measures of vehicular capacity or traffic congestion shall not be considered a significant impact on the environment pursuant to [CEQA]"].) This change to CEQA is intended to occur once new guidelines are implemented consistent with this directive; nevertheless, ABAG/MTC, in considering the environmentally superior alternative, believes this legislative directive de-emphasizes the importance of traffic congestion. Therefore, compared comprehensively against the number of impacts that the Big Cities Alternative decreases, the Big Cities Alternative would be the environmentally superior alternative.

The No Project and Main Streets Alternatives would result in a greater number of significant and unavoidable impacts compared to the proposed Plan. The EEJ Alternative would result in the same number of less-than-significant and significant and unavoidable impacts as the proposed Plan. However, examining the EEJ Alternative further, of the 40 less-than-significant impacts, 17 would be similar, 9 would be less, and 14 would be greater than the proposed Plan. Of the 38 significant and unavoidable impacts in the EEJ Alternative, 16 would be similar, six would be less, and 16 would be greater than the proposed Plan. Therefore, overall, the EEJ Alternative would have greater impacts that the proposed Plan, and it would not reduce any of the proposed Plan's significant and unavoidable impacts to a less-than-significant level. Similarly, the Main Streets and No Project Alternatives would have greater impacts than the proposed Plan and would not reduce the

proposed Plan's significant and unavoidable impacts to a less-than-significant level. The Main Streets Alternative would result in two new significant and unavoidable impacts compared to the proposed Plan and would increase five less-than-significant impacts and seven significant and unavoidable impacts compared to the proposed Plan. The No Project Alternative would have greater environmental impacts than the proposed Plan resulting in six additional significant and unavoidable impacts and increasing the largest numbers of less-than-significant (19) and significant and unavoidable impacts (25) compared to the proposed Plan. See the discussion under Environmentally Superior Alternative and Table 3.1-38 in Section 3.1, "Alternatives to the proposed Plan," for additional details regarding the comparison of alternatives.

AREAS OF CONTROVERSY

Section 15123 of the CEQA Guidelines requires that an EIR identify areas of controversy which are known to the Lead Agency, including issues raised by other agencies and the public. Areas of controversy associated with the proposed Plan are made known through comments received during the Notice of Preparation (NOP) process, as well as input solicited during public scoping meetings and an understanding of the community issues in the study area. Some areas of known controversy, including issues raised by some members of the community, related to the proposed Plan and EIR include:

- displacement of low-income populations and implications for VMT;
- affordability, supply, and location of housing near employment centers – i.e., jobs/housing balance;
- relationship between local general plans and regional projections; and
- compliance with the Settlement Agreement with Communities for a Better Environment (CBE) and the Sierra Club and the Settlement Agreement with BIA.

ISSUES TO BE RESOLVED

CEQA Guidelines Section 15123(b)(3) requires that an EIR contain a discussion of issues to be resolved and whether or how to mitigate significant effects. Issues to be resolved include:

- How to address potential impacts from the projected land development pattern that must be mitigated by the local land use authority, given that MTC and ABAG do not have jurisdiction over land use regulations.
- The degree to which MTC and ABAG can provide adequate incentives for implementation of changes to land use policy.
- How best to require mitigation measures that can be enacted by project sponsors and/or implementing agencies in a manner to ensure CEQA streamlining for qualifying projects, per SB 375, can occur.

When adopting the proposed Plan, the MTC Commission and ABAG Board must decide whether specific overriding economic, legal, social, technological or other benefits of the project outweigh the significant environmental impacts that cannot be feasibly avoided or substantially reduced through implementation of feasible mitigation or alternatives. A Statement of Overriding Considerations is required to support such a determination.

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Table ES-2 Summary of Impacts and Mitigation Measures

Impacts	Significance before Mitigation	Mitigation Measures	Significance after Mitigation	
			w/ MM*	w/o MM*
2.1 TRANSPORTATION				
Impact 2.1-1: Implementation of the proposed Plan could result in a significant increase in per-trip travel time for commute travel by any mode over existing conditions. A significant increase in per-trip travel time is defined as greater than 5 percent.	LS	No mitigation is required.	LS	LS
Impact 2.1-2: Implementation of the proposed Plan could result in a significant increase in per-trip travel time for non-commute travel by any mode over existing conditions. A significant increase in per-trip travel time is defined as greater than 5 percent.	LS	No mitigation is required.	LS	LS
Impact 2.1-3: Implementation of the proposed Plan could result in a significant increase in per capita VMT on facilities experiencing level of service (LOS) F compared to existing conditions during AM peak periods, PM peak periods, or during the day as a whole (LOS F defines a condition on roads where traffic volumes exceed capacity, resulting in stop-and-go conditions for extended periods of time). A significant increase in LOS F-impacted per capita VMT is defined as greater than 5 percent.	PS	Implementing agencies and/or project sponsors shall implement the following measures, where feasible and necessary based on project- and site-specific considerations that include, but are not limited to: Mitigation Measure 2.1-3-3(a) MTC, in its role as a funding agency, and implementing agencies shall support the advancement of corridor-level plans and implementation of projects located on severely congested (LOS F) facilities. Mitigation Measure 2.1-3-3(b) Transportation demand management (TDM) strategies shall be incorporated into individual land use and transportation projects and plans, as part of the planning process. Local agencies shall incorporate strategies identified in the Federal Highway Administration's publication: Integrating Demand Management into the Transportation Planning Process: A Desk Reference (August 2012) into the planning process (FHWA 2012). For example, the following strategies may be included to encourage use of transit and non-motorized modes of transportation and reduce vehicle miles traveled on the region's roadways: ◢ include TDM mitigation requirements for new developments; ◢ incorporate supporting infrastructure for non-motorized modes, such as, bike lanes, secure bike parking, sidewalks, and crosswalks; ◢ provide incentives to use alternative modes and reduce driving, such as, universal transit passes, road and parking pricing;	LS-M	SU

*= Significance assuming individual projects adopt and implement the listed mitigation measure, as required for future projects taking advantage of CEQA streamlining provisions of SB 375.

**= Significance assuming some or all of the listed mitigation measure(s) is/are not implemented because MTC/ABAG cannot require local implementing agencies to adopt mitigation measure(s).

LS = Less than significant PS = Potentially significant S = Significant SU = Significant and unavoidable PSU = Potentially significant and unavoidable

Table ES-2 Summary of Impacts and Mitigation Measures

Impacts	Significance before Mitigation	Mitigation Measures	Significance after Mitigation	
			w/ MM*	w/o MM*
		◢ implement parking management programs, such as parking cash-out, priority parking for carpools and vanpools; ◢ develop TDM-specific performance measures to evaluate project-specific and system-wide performance; ◢ incorporate TDM performance measures in the decision-making process for identifying transportation investments; ◢ implement data collection programs for TDM to determine the effectiveness of certain strategies and to measure success over time; and ◢ set aside funding for TDM initiatives. The increase in per capita VMT on facilities experiencing LOS F represents a significant impact compared to existing conditions. To assess whether implementation of these specific mitigation strategies would result in measurable traffic congestion reductions, implementing actions may need to be further refined within the overall parameters of the proposed Plan and matched to local conditions in any subsequent project-level environmental analysis.		
Impact 2.1-4: Implementation of the proposed Plan could result in a significant increase in per capita VMT compared to existing conditions. A significant increase in per capita VMT is defined as greater than 5 percent.	LS	No mitigation is required.	LS	LS
Impact 2.1-5: Implementation of the proposed Plan could result in increased percent utilization of regional transit supply resulting in an exceedance of transit capacity during the AM peak period, PM peak period, or on a daily basis. An exceedance is defined as passenger seat-mile demand for any transit technology being greater than 80 percent of passenger seat-miles supplied by transit operators.	LS	No mitigation is required.	LS	LS
Impact 2.1-6: Implementation of the proposed Plan could cause a disruption to goods movement into or through the Bay Area region.	LS	No mitigation is required.	LS	LS
Impact 2.1-7: Implementation of the proposed Plan could cause a disruption to the ongoing operations of the applicable	PS	Mitigation Measure 2.1-7: Implementing agencies and/or project sponsors shall implement the following measure, where feasible and necessary based on project- and site-specific considerations that include:	LS-M	SU

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Impacts	Significance before Mitigation	Mitigation Measures	Significance after Mitigation	
			w/ MM*	w/o MM*
regional or local area transportation system because of construction activities.		Implementing agencies shall require implementation of best practice strategies regarding construction activities on the transportation system and apply recommended applicable mitigation measures as defined by state and federal agencies. Examples of mitigation measures include, but are not limited to, the following: ◢ prepare a transportation construction plan for all phases of construction; ◢ establish construction phasing/staging schedule and sequence that minimizes impacts of a work zone on traffic by using operationally-sensitive phasing and staging throughout the life of the project; ◢ identify arrival/departure times for trucks and construction workers to avoid peak periods of adjacent street traffic and minimize traffic affects; ◢ identify optimal delivery and haul routes to and from the site to minimize impacts to traffic, transit, pedestrians, and bicyclists; ◢ identify appropriate detour routes for bicycles and pedestrians in areas affected by construction; ◢ coordinate with local transit agencies and provide for relocation of bus stops and ensure adequate wayfinding and signage to notify transit users; ◢ preserve emergency vehicle access; ◢ implement public awareness strategies to educate and reach out to the public, businesses, and the community concerning the project and work zone (e.g., brochures and mailers, press releases/media alerts); ◢ provide a point of contact for residents, employees, property owners, and visitors to obtain construction information, and provide comments and questions; ◢ provide current and/or real-time information to road users regarding the project work zone (e.g., changeable message sign to notify road users of lane and road closures and work activities, temporary conventional signs to guide motorists through the work zone); and ◢ encourage construction workers to use transit, carpool, and other sustainable transportation modes when commuting to and from the site.		

*= Significance assuming individual projects adopt and implement the listed mitigation measure, as required for future projects taking advantage of CEQA streamlining provisions of SB 375.

**= Significance assuming some or all of the listed mitigation measure(s) is/are not implemented because MTC/ABAG cannot require local implementing agencies to adopt mitigation measure(s).

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Table ES-2 Summary of Impacts and Mitigation Measures

Impacts	Significance before Mitigation	Mitigation Measures	Significance after Mitigation	
			w/ MM*	w/o MM*
2.2 AIR QUALITY				
Impact 2.2-1: Implementation of the proposed Plan could conflict with or obstruct implementation of an applicable air quality plan, including: the primary goals, applicable control measures, or implementation of any control measures.	LS	No mitigation is required.	LS	LS
Impact 2.2-2: Implementation of the proposed Plan could result in a substantial net increase in construction-related emissions.	PS	Mitigation Measure 2.2-2: When screening levels are exceeded (see Table 2.2-8 or those most currently updated by BAAQMD), implementing agencies and/or project sponsors shall implement measures, where applicable, feasible, and necessary based on project- and site-specific considerations, that include, but are not limited to the following: Construction Best Practices for Exhaust ◢ The applicant/general contractor for the project shall submit a list of all off-road equipment greater than 25 horsepower (hp) that would be operated for more than 20 hours over the entire duration of project construction, including equipment from subcontractors, to BAAQMD for review and certification. The list shall include all information necessary to ensure the equipment meets the following requirement: ◢ 1) Be zero emissions OR 2) have engines that meet or exceed either EPA or ARB Tier 2 off-road emission standards; and 3) have engines that are retrofitted with an ARB Level 3 Verified Diesel Emissions Control Strategy (VDECS), if one is available for the equipment being used. Equipment with engines that meet Tier 4 Interim or Tier 4 Final emission standards automatically meet this requirement; therefore, a VDECS would not be required. ◢ Idling time of diesel powered construction equipment and trucks shall be limited to no more than two minutes. Clear signage of this idling restriction shall be provided for construction workers at all access points. ◢ All construction equipment shall be maintained and properly tuned in accordance with the manufacturers' specifications. ◢ Portable diesel generators shall be prohibited. Grid power electricity should be used to provide power at construction sites; or propane and natural gas generators may be used when grid power electricity is not feasible. Construction Best Practices for Dust ◢ All exposed surfaces (e.g., parking areas, staging areas, soil piles, graded areas, and unpaved access roads) shall be watered two times per day. For projects over five	LS-M	SU

*= Significance assuming individual projects adopt and implement the listed mitigation measure, as required for future projects taking advantage of CEQA streamlining provisions of SB 375.

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Table ES-2 Summary of Impacts and Mitigation Measures

Impacts	Significance before Mitigation	Mitigation Measures	Significance after Mitigation	
			w/ MM*	w/o MM*
		acres in size, soil moisture should be maintained at a minimum of 12 percent. Moisture content can be verified by lab samples or a moisture probe. ◢ All haul trucks transporting soil, sand, or other loose material off-site shall be covered. ◢ All visible mud or dirt track-out onto adjacent public roads shall be removed using wet power vacuum street sweepers at least once per day. Dry power sweeping should only be performed in conjunction with thorough watering of the subject roads. ◢ All vehicle speeds on unpaved roads and surfaces shall be limited to 15 mph. ◢ All roadway, driveway, and sidewalk paving shall be completed as soon as possible. Building pads shall be paved as soon as possible after grading. ◢ All construction sites shall provide a posted sign visible to the public with the telephone number and person to contact at the Lead Agency regarding dust complaints. The recommended response time for corrective action shall be within 48 hours. BAAQMD's Complaint Line (1-800-334-6367) shall also be included on posted signs to ensure compliance with applicable regulations. ◢ All excavation, grading, and/or demolition activities shall be suspended when average wind speeds exceed 20 mph. ◢ Wind breaks (e.g., trees, fences) shall be installed on the windward side(s) of actively disturbed areas of construction. Wind breaks should have at maximum 50 percent air porosity. ◢ Vegetative ground cover (e.g., fast-germinating native grass seed) shall be planted in disturbed areas as soon as possible and watered appropriately until vegetation is established. ◢ The simultaneous occurrence of excavation, grading, and ground-disturbing construction activities on the same area at any one time shall be limited. Activities shall be phased to reduce the amount of disturbed surfaces at any one time. ◢ All trucks and equipment, including their tires, shall be washed off before leaving the site. ◢ Site accesses to a distance of 100 feet from the paved road shall be treated with a 6- to 12-inch compacted layer of wood chips, mulch, or gravel. ◢ Sandbags or other erosion control measures shall be installed to prevent silt runoff to public roadways from sites with a slope greater than one percent.		

*= Significance assuming individual projects adopt and implement the listed mitigation measure, as required for future projects taking advantage of CEQA streamlining provisions of SB 375.

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Table ES-2 Summary of Impacts and Mitigation Measures

Impacts	Significance before Mitigation	Mitigation Measures	Significance after Mitigation	
			w/ MM*	w/o MM*
		These BMPs are consistent with recommendations in BAAQMD's CEQA guidelines and Planning Healthy Places (BAAQMD 2010b, BAAQMD 2016). Applicable mitigation measures shall be required at the time grading permits are issued.		
Impact 2.2-3: Implementation of the proposed Plan could result in a net increase of emissions of criteria pollutants from on-road mobile and land use sources compared to existing conditions, including emissions of ROG, NO_x, CO, PM_{10}, and $PM_{2.5}$, as the SFBAAB is in non-attainment for ozone, PM_{10}, and $PM_{2.5}$ standards.	PS	Mitigation Measure 2.2-3(a): MTC and ABAG, in partnership with BAAQMD, and implementing agencies, shall use existing air quality and transportation funds and seek additional funds to continue to implement BAAQMD and ARB programs (e.g., Carl Moyer) aimed at retrofits and replacements of trucks and locomotives. Mitigation Measure 2.2-3(b): MTC and ABAG, in partnership with BAAQMD and the Port of Oakland, and other agency partners, shall work together to secure incentive funding to reduce mobile PM emissions from mobile exhaust and entrained PM sources such as tire wear, break wear, and roadway dust. Mitigation Measure 2.2-3(c): MTC and ABAG, in partnership with local air districts, and implementing agencies shall implement Mitigation Measures 2.1-3 (a) and 2.1-3 (b). Mitigation Measure 2.2-3(d): When screening levels are exceeded (see Table 2.2-8 or those most currently updated by BAAQMD), implementing agencies and/or project sponsors shall implement measures, where applicable, feasible, and necessary based on project- and site-specific considerations, that include, but are not limited to the following or are updated by BAAQMD or within CalEEMod.	LS-M	SU
Impact 2.2-4: Implementation of the proposed Plan could cause a cumulative net increase in emissions of toxic air contaminants, including diesel PM, 1,3-butadiene, and benzene, from on-road mobile sources compared to existing conditions.	LS	No mitigation is required.	LS	LS
Impact 2.2-5: Implementation of the proposed Plan could result in a net increase in sensitive receptors located in Transit Priority Areas (TPA) where: (a) TACs or $PM_{2.5}$ concentrations result in cancer risk levels greater than 100 in a million or a concentration of $PM_{2.5}$ greater than 0.8 µg/m_3; or (b) TACs or $PM_{2.5}$ concentrations result in noncompliance with an adopted Community Risk Reduction Plan.	PS	Mitigation Measure 2.2-5(a): When locating sensitive receptors in TAC risk areas, implementing agencies and/or project sponsors shall implement measures, where feasible and necessary based on project- and site-specific considerations that include, but are not limited to the following: ◢ Install, operate and maintain in good working order a central heating, ventilation and air conditioning (HVAC) system or other air intake system in the building, or in each individual unit, that meets or exceeds a minimum efficiency reporting value (MERV) of 13 (MERV-16 for projects located in the West Oakland Specific Plan area) or higher. The HVAC system shall include the following features: Installation of a high	LS-M	SU

*= Significance assuming individual projects adopt and implement the listed mitigation measure, as required for future projects taking advantage of CEQA streamlining provisions of SB 375.

**= Significance assuming some or all of the listed mitigation measure(s) is/are not implemented because MTC/ABAG cannot require local implementing agencies to adopt mitigation measure(s).

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Impacts	Significance before Mitigation	Mitigation Measures	Significance after Mitigation	
			w/ MM*	w/o MM*
		efficiency filter and/or carbon filter to filter particulates and other chemical matter from entering the building. Either high efficiency particulate air (HEPA) filters or American Society of Heating, Refrigeration, and Air-Conditioning Engineers (ASHRAE) certified 85% supply filters shall be used. ◢ Maintain, repair and/or replace HVAC system on an ongoing and as needed basis or shall prepare an operation and maintenance manual for the HVAC system and the filter. The manual shall include the operating instructions and the maintenance and replacement schedule. This manual shall be included in the Covenants, Conditions and Restrictions (CC&Rs) for residential projects and/or distributed to the building maintenance staff. In addition, the applicant shall prepare a separate homeowners manual. The manual shall contain the operating instructions and the maintenance and replacement schedule for the HVAC system and the filters. ◢ Install passive electrostatic filtering systems with low air velocities (i.e., less than 1 mph). ◢ Individual and common exterior open space and outdoor activity areas proposed as part of individual projects shall be located as far away as possible within the project site boundary, face away major freeways, and shall be shielded from the source (i.e., the roadway) of air pollution by buildings or otherwise buffered to further reduce air pollution for project occupants. ◢ Locate air intakes and design windows to reduce PM exposure (e.g., windows nearest to the roadway do not open). ◢ If sensitive receptors are located near a distribution center, residents shall not be located immediately adjacent to a loading dock or where trucks concentrate to deliver goods. ◢ Sensitive receptors within buildings shall be located in areas upwind of major roadway traffic to reduce exposure to reduce cancer risk levels and exposure to $PM_{2.5}$. ◢ Planting trees and/or vegetation between sensitive receptors and pollution source. Trees that are best suited to trapping PM shall be planted, including one or more of the following species: Pine (*Pinus nigra* var. *maritima*), Cypress (*X Cupressocyparis leylandii*), Hybrid popular (*Populus deltoids X trichocarpa*), California pepper tree (*Schinus molle*) and Redwoods (*Sequoia sempervirens*). ◢ Loading docks shall be required to include electric hookups for visiting trucks.		

*= Significance assuming individual projects adopt and implement the listed mitigation measure, as required for future projects taking advantage of CEQA streamlining provisions of SB 375.

**= Significance assuming some or all of the listed mitigation measure(s) is/are not implemented because MTC/ABAG cannot require local implementing agencies to adopt mitigation measure(s).

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Table ES-2 Summary of Impacts and Mitigation Measures

Impacts	Significance before Mitigation	Mitigation Measures	Significance after Mitigation	
			w/ MM*	w/o MM*
		◢ Idling of heavy duty diesel trucks at these locations shall be prohibited or limited to no more than 2 minutes. ◢ If within the project site, existing and new diesel generators shall meet ARB's Tier 4 emission standards. ◢ Emissions from diesel trucks shall be reduced through establishing truck routes to avoid residential neighborhoods or other land uses serving sensitive populations, such as hospitals, schools, and child care centers. A truck route program, along with truck calming, parking and delivery restrictions, shall be implemented to direct traffic activity at non-permitted sources and large construction projects. These BMPs are consistent with recommendations in BAAQMD's CEQA guidelines and Planning Healthy Places (BAAQMD 2011, BAAQMD 2016).		
Impact 2.2-6: Implementation of the proposed Plan could result in changes in TAC and or $PM_{2.5}$ exposure levels that disproportionally impact minority and low-income populations.	PS	Mitigation Measure 2.2-6(a): MTC/ABAG shall partner with BAAQMD and local lead agencies to develop a program to install air filtration devices in existing residential buildings, and other buildings with sensitive receptors, located near freeways or sources of TACs and $PM_{2.5}$. Mitigation Measure 2.2-6(b): MTC/ABAG shall partner with BAAQMD to develop a program to provide incentives to replace older locomotives and trucks in the region to reduce TACs and $PM_{2.5}$. Mitigation Measure 2.2-6(c); MTC and ABAG, in partnership with local air districts, and implementing agencies shall implement Mitigation Measures 2.1-3 (a) and 2.1-3 (b). Mitigation Measure 2.2-6 (d): Implement measure 2.2-5.	SU	SU
Impact 2.2-7: Implementation of the proposed Plan could result in a substantial emissions of objectionable odors.	LS	No mitigation is required.	LS	LS
2.3 LAND USE AND PHYSICAL DEVELOPMENT				
Impact 2.3-1: Implementation of the proposed Plan could increase the risk of displacement for a substantial number of existing residents, necessitating the construction and preservation of additional affordable housing elsewhere within the region.	PS	Mitigation Measure 2.3-1: Implementing agencies and/or project sponsors shall implement, where feasible and necessary, the mitigation measures described throughout this EIR to address the effects of displacement that could result in the construction of replacement housing, including Mitigation Measures 2.2-2 (air quality); 2.3-2, 2.3-4, and 2.3-5 (land use); 2.5-4 (sea level rise); 2.6-1, 2.6-5, and 2.6-6 (noise); 2.9-1 through 2.9-5 (biological resources); 2.10-1 and 2.10-3 through 2.10-5 (visual resources); 2.11-1 through 2.11-5 (cultural resources); and 2.13-4 (hazards).	LS-M	PSU

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Table ES-2 Summary of Impacts and Mitigation Measures

Impacts	Significance before Mitigation	Mitigation Measures	Significance after Mitigation	
			w/ MM*	w/o MM*
Impact 2.3-2: Implementation of the proposed Plan could physically divide an established community.	PS	Mitigation Measure 2.3-2: Implementing agencies and/or project sponsors shall implement measures, where feasible and necessary based on project-and site-specific considerations that include, but are not limited to: ◢ New transportation projects within urban areas shall be required to incorporate design features such as sidewalks, bike lanes, and bike/pedestrian bridges or tunnels that maintain or improve access and connections within existing communities and to public transit. ◢ Through regional programs such as the One Bay Area Grants (OBAG), MTC/ABAG shall continue to support planning efforts for locally sponsored traffic calming and alternative transportation initiatives, such as paths, trails, overcrossings, bicycle plans, that foster improved neighborhoods and community connections.	LS-M	SU
Impact 2.3-3: Implementation of the proposed Plan could conflict with applicable land use plans, policies, or regulations of an agency with jurisdiction over the project (including, but not limited to the general plans, specific plans, local coastal programs) adopted for the purpose of avoiding or mitigating an environmental effect.	LS	No mitigation is required.	LS	LS
Impact 2.3-4: Implementation of the proposed Plan could directly or indirectly convert substantial amounts of important agricultural lands and open space (Prime Farmland, Unique Farmland, or Farmland of Statewide Importance) or lands under Williamson Act contract to non-agricultural use.	PS	Mitigation Measure 2.3-4: Implementing agencies and/or project sponsors shall implement measures, where feasible and necessary based on project-and site-specific considerations that include, but are not limited to those identified below. ◢ require project relocation or corridor realignment, where feasible, to avoid agricultural land, especially Prime Farmland; ◢ maintain and expand agricultural land protections such as urban growth boundaries; ◢ compensatory mitigation may be achieved in advance of impacts through the purchase or creation of mitigation credits or the implementation of mitigation projects through Regional Advance Mitigation Planning (RAMP), as deemed appropriate by the permitting agencies; ◢ require acquisition of conservation easements on land at least equal in quality and size as mitigation for the loss of agricultural land; and/or ◢ institute new protection of farmland in the project area or elsewhere through the use of long-term restrictions on use, such as 20-year Farmland Security Zone contracts	LS-M	SU

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			w/ MM*	w/o MM*
		(Government Code Section 51296 et seq.) or 10-year Williamson Act contracts (Government Code Section 51200 et seq.).		
Impact 2.3-5: Implementation of the proposed Plan could directly or indirectly result in the loss of forest land, conversion of forest land to non-forest use, or conflict with existing zoning for, or cause rezoning of, forest land, timberland, or timberland zoned Timberland Production.	PS	Mitigation Measure 2.3-5: Implementing agencies and/or project sponsors shall implement measures, where feasible and necessary based on project-and site-specific considerations including but not limited to those identified below. ◢ require project relocation or corridor realignment, where feasible, to avoid forest land; ◢ maintain and expand forest land protections such as urban growth boundaries; ◢ compensatory mitigation may be achieved in advance of impacts through the purchase or creation of mitigation credits or the implementation of mitigation projects through Regional Advance Mitigation Planning (RAMP), as deemed appropriate by the permitting agencies; and/or ◢ require acquisition of conservation easements on land at least equal in quality and size as mitigation for the loss of forest land.	LS-M	SU
2.4 ENERGY				
Impact 2.4-1: Implementation of the proposed Plan could result in wasteful, inefficient, or unnecessary consumption of energy, during project construction or operation, as evidenced by a failure to decrease overall per capita energy consumption or decrease reliance on fossil fuels such as coal, natural gas, and oil.	LS	No mitigation is required.	LS	LS
Impact 2.4-2: Implementation of the proposed Plan could fail to incorporate feasible renewable energy or energy efficiency measures into building design, equipment use, transportation, or other project features, or otherwise fail to increase reliance on renewable energy sources.	LS	No mitigation is required.	LS	LS

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Table ES-2 Summary of Impacts and Mitigation Measures

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			w/ MM*	w/o MM*
2.5 CLIMATE CHANGE AND GREENHOUSE GASES				
Impact 2.5-1: Implementation of the proposed Plan could fail to reduce per capita passenger vehicle and light duty truck CO_2 emissions by seven percent by 2020 and by 15 percent by 2035 as compared to the 2005 baseline, per SB 375.	LS	No mitigation is required.	LS	LS
Impact 2.5-2: Implementation of the proposed Plan could result in a net increase in direct and indirect GHG emissions in 2040 when compared to existing conditions.	LS	No mitigation is required.	LS	LS
Impact 2.5-3: Implementation of the proposed Plan could substantially conflict with the goal of SB 32 to reduce statewide GHG emissions to 40 percent below 1990 levels by 2030.	PS	Mitigation Measure 2.5-3 Consistent with the recommendations in the Draft 2017 Scoping Plan, implementing agencies and/or project sponsors shall implement measures, where feasible and necessary based on project- and site-specific considerations that include, but are not limited to: ◢ MTC and ABAG, in partnership with the BAAQMD, shall work with the counties and cities in the Bay Area to adopt qualified GHG reduction plans (e.g., CAPs). The CAPs can be regional or adopted by individual jurisdictions, so long as they meet the standards of a GHG reduction program as described in CEQA Guidelines Section 15183.5. At the regional level, the cumulative emissions reduction of individual CAPs within the region or a regional CAP should demonstrate an additional Bay Area-wide reduction of 24 $MMTCO_2e$ from land uses and on-road transportation compared with projected 2040 emissions levels already expected to be achieved by the Plan. (This is based on the 2015 Bay Area land use and on-road transportation emissions of 52 $MMTCO_2e$, an interpolated statewide GHG reduction target of 60 percent below 1990 levels by 2040, and a two percent increase in statewide emissions between 1990 and 2015). The CAP(s) should also show a commitment to achieving a downward trajectory in emissions post-2040 to meet statewide goals of reducing GHG emissions by 80 percent below 1990 levels by 2050, per S-03-05. These reductions can be achieved through a combination of programs, including ZNE in new construction, retrofits of existing buildings, incentivizing and development of renewable energy sources that serve both new and existing land uses, and other measures so long as the overall 32 $MMTCO_2e$ reduction (by 2040) can be demonstrated. This target can be adjusted if statewide legislation or regulations would reduce GHG emissions, so long as a trajectory to achieve this target in the Bay Area is maintained.	LS-M	SU

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Table ES-2 Summary of Impacts and Mitigation Measures

Impacts	Significance before Mitigation	Mitigation Measures	Significance after Mitigation	
			w/ MM*	w/o MM*
		Implementation of CAPs in the region would help to reduce both GHG and area source emissions from the land use projects that would be constructed under the Plan, as well as reducing GHG emissions from existing uses. However, this may require installation of renewable energy facilities on houses and businesses, construction of community-serving facilities such as small-scale solar farms, or other actions. These additional facilities, if needed, could require in additional land conversion, resulting in similar environmental impacts associated with land use development described throughout this EIR.		
Impact 2.5-4: Implementation of the proposed Plan could substantially conflict with local plans or policies adopted to reduce emissions of GHGs.	LS	No mitigation is required.	LS	LS
Impact 2.5-5: Implementation of the proposed Plan could result in a net increase in transportation projects within areas projected to be regularly inundated by sea level rise by midcentury.	PS	Implementing agencies and/or project sponsors shall implement measures, where feasible and necessary based on project- and site-specific considerations that include, but are not limited to: Mitigation Measure 2.5-4(a): MTC and ABAG shall continue coordinating with BCDC, in partnership with the Joint Policy Committee and regional agencies and other partners, to conduct vulnerability and risk assessments for the region's transportation infrastructure. These assessments will build upon MTC and BCDC's Adapting to Rising Tides studies focused in several Bay Area counties. Evaluation of regional and project-level vulnerability and risk assessments will assist in the identification of the appropriate adaptation strategies to protect transportation infrastructure and resources, as well as land use development projects, that are likely to be impacted. The Adaptation Strategies (see Appendix F of this Draft EIR) includes a list of potential adaptation strategies that can mitigate the impacts of sea level rise. In most cases, more than one adaptation strategy will be required to protect a given transportation projector land use development project, and the implementation of the adaptation strategy will require coordination with other agencies and stakeholders. As MTC and ABAG conduct vulnerability and risk assessments for the region's transportation infrastructure, the Adaptation Strategies should serve as a guide for selecting adaptation strategies, and should be expanded as additional strategies are identified. Mitigation Measure 2.5-4(b): Implementing agencies and/or project sponsors shall implement measures, where feasible and necessary based on project- and site-specific considerations that include, but are not limited to, coordination with BCDC, Caltrans, local jurisdictions (cities and counties), and other transportation agencies to develop	LS-M	SU

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Impacts	Significance before Mitigation	Mitigation Measures	Significance after Mitigation	
			w/ MM*	w/o MM*
		Transportation Asset Management Plans that consider the potential impacts of sea level rise over the life cycle of threatened assets. Mitigation Measure 2.5-4(c): Implementing agencies shall require project sponsors to incorporate the appropriate adaptation strategy or strategies to reduce the impacts of sea level rise on specific local transportation and land use development projects, where feasible, based on project- and site-specific considerations. Potential adaptation strategies are included in the Adaptation Strategies (see Appendix F of this Draft EIR).		
Impact 2.5-6: Implementation of the proposed Plan could result in an increase in land use development within areas regularly inundated by sea level rise by midcentury.	PS	Implement Mitigation Measures 2.5-4(a) and 2.5-4(b) under Impact 2.5-4.	LS-M	SU
2.6 NOISE				
Impact 2.6-1: Implementation of the proposed Plan could result in exposure of persons to or generation of temporary construction noise levels and/or ground vibration levels in excess of standards established by local jurisdictions or other applicable regulatory agencies.	PS	Mitigation Measure 2.6-1(a): Implementing agencies and/or project sponsors shall implement measures, where feasible and necessary based on project- and site-specific considerations that include, but are not limited to: To reduce construction noise levels, implementing agencies and/or project sponsors shall: ◢ comply with local construction-related noise standards, including restricting construction activities to permitted hours as defined under local jurisdiction regulations (e.g.; Alameda County Code restricts construction noise to between 7:00 am and 7:00 pm on weekdays and between 8:00 am and 5:00 pm on weekend); ◢ properly maintain construction equipment and outfit construction equipment with the best available noise suppression devices (e.g. mufflers, silencers, wraps); ◢ prohibit idling of construction equipment for extended periods of time in the vicinity of sensitive receptors; ◢ locate stationary equipment such as generators, compressors, rock crushers, and cement mixers a minimum of 50 feet from sensitive receptors, but further if possible; ◢ erect temporary construction-noise barriers around the construction site when adjacent occupied sensitive land uses are present within 75 feet; ◢ use noise control blankets on building structures as buildings are erected to reduce noise emission from the site; and ◢ use cushion blocks to dampen impact noise from pile driving.	LS-M	SU

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			w/ MM*	w/o MM*
		Mitigation Measure 2.6-1(b): To reduce construction vibration levels, implementing agencies and/or project sponsors shall comply with the following: ◢ to minimize disturbance of receptors within 550 feet of pile-driving activities, implement "quiet" pile-driving technology (such as pre-drilling of piles and the use of more than one pile driver to shorten the total pile driving duration), where feasible, in consideration of geotechnical and structural requirements and conditions; and ◢ to reduce structural damage, where pile driving is proposed within 50 feet of an older or historic building, engage a qualified geotechnical engineer and qualified historic preservation professional (for designated historic buildings only) and/or structural engineer to conduct a pre-construction assessment of existing subsurface conditions and the structural integrity of nearby (i.e., within 50 feet) historic structures that would be exposed to pile-driving activity. If recommended by the pre-construction assessment, for structures or facilities within 50 feet of pile-driving activities, the project sponsors shall require ground vibration monitoring of nearby historic structures. Such methods and technologies shall be based on the specific conditions at the construction site such as, but not limited to, the pre-construction surveying of potentially affected historic structures and underpinning of foundations of potentially affected structures, as necessary. The pre-construction assessment shall include a monitoring program to detect ground settlement or lateral movement of structures in the vicinity of pile-driving activities and identify corrective measures to be taken should monitored vibration levels indicate the potential for building damage. In the event of unacceptable ground movement with the potential to cause structural damage, all impact work shall cease and corrective measures shall be implemented to minimize the risk to the subject, or adjacent, historic structure.		
Impact 2.6-2: Implementation of the proposed Plan could result in long-term permanent increases in traffic-noise levels that exceed applicable thresholds.	PS	Mitigation Measure 2.6-2: Implementing agencies and/or project sponsors shall implement measures, where feasible and necessary based on project- and site-specific considerations that include, but are not limited to: For all new development that could be located within the 70 dBA CNEL noise contour of a roadway (within 270 feet of the roadway's centerline based on freeways with the greatest volumes in the region), a site-specific noise study shall be conducted by a qualified acoustical engineer or noise specialist, to evaluate noise exposure at new receptors and recommend appropriate measures to reduce noise exposure. To reduce exposure from traffic-noise, lead	LS-M	SU

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Impacts	Significance before Mitigation	Mitigation Measures	Significance after Mitigation	
			w/ MM*	w/o MM*
		agencies and/or project sponsors shall consider mitigation measures including, but not limited to those identified below: ◢ design adjustments to proposed roadway or transit alignments to reduce noise levels in noise sensitive areas (e.g., below-grade roadway alignments can effectively reduce noise levels in nearby areas); ◢ use techniques such as landscaped berms, dense plantings, reduced-noise paving materials, and traffic calming measures in the design of their transportation improvements; ◢ contribute to the insulation of buildings or construction of noise barriers around sensitive receptor properties adjacent to the transportation improvement; ◢ use land use planning measures, such as zoning, restrictions on development, site design, and buffers to ensure that future development is noise compatible with adjacent transportation facilities and land uses; ◢ construct roadways so that they are depressed below-grade of the existing sensitive land uses to create an effective barrier between new roadway lanes, roadways, rail lines, transit centers, park- n-ride lots, and other new noise generating facilities; and ◢ maximize the distance between noise-sensitive land uses and new noise-generating facilities and transportation systems.		
Impact 2.6-3: Implementation of the proposed Plan could result in long-term permanent increases in rail transit noise levels that exceed applicable thresholds.	PS	Mitigation Measure 2.6-3(a): To reduce transit-related noise exposure to existing or proposed development within 50 feet of a rail transit line, implementing agencies and/or project sponsors shall implement measures, where feasible and necessary based on project- and site-specific considerations that include, but are not limited to: When finalizing development project site plans, noise-sensitive outdoor use areas shall be sited as far away from adjacent noise sources as possible and site plans shall be designed to shield noise-sensitive spaces with buildings or noise barriers whenever possible. Mitigation Measure 2.6-3(b): When finalizing development project site plans or transportation project design, sufficient setback between occupied structures and the railroad tracks shall be provided to minimize noise exposure to the extent feasible. Mitigation Measure 2.6-3(c): Prior to project approval, the implementing agency for a transportation project shall ensure that the transportation project sponsor applies the following mitigation measures (or other technologically feasible measures) to achieve a site-	LS-M	SU

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Impacts	Significance before Mitigation	Mitigation Measures	Significance after Mitigation	
			w/ MM*	w/o MM*
		specific exterior noise level of 70 dBA CNEL (or other applicable local noise standard) and interior noise level of 45 dBA CNEL at sensitive land uses, as applicable for transit projects: ◢ use of sound reduction barriers such as landscaped berms and dense plantings, ◢ locate rail extension below grade as feasible, ◢ use of damped wheels on railway cars, ◢ use of vehicle skirts, ◢ use under car acoustically absorptive material, and ◢ install sound insulation treatments for impacted structures.		
Impact 2.6-4: Implementation of the proposed Plan could result in long-term permanent increase in transit-vibration levels that exceed applicable thresholds.	PS	Mitigation Measure 2.6-4(a): To reduce vibration effects from rail operations, implementing agencies and/or project sponsors shall implement measures, where feasible and necessary based on project- and site-specific considerations that include, but are not limited to: When finalizing site plans for a development or transportation project, implementing agencies shall conduct a project-level noise and vibration assessments for new residential or other sensitive land uses to be located within 200 feet of an existing rail line. These studies shall be conducted by a qualified acoustical engineer or noise specialist to determine vibration levels at these projects and recommend feasible mitigation measures (e.g., insulated windows and walls, sound walls or barriers, distance setbacks, or other construction or design measures) that would reduce vibration-noise to an acceptable level. Mitigation Measure 2.6-4(b) Prior to project approval, the implementing agencies shall ensure that project sponsors apply the following mitigation measures to achieve FTA recommended vibration levels of 72 VdB at residential land uses, or other applicable standard, for rail extension projects: ◢ use of high resilience (soft) direct fixation fasteners for embedded track; ◢ install ballast mat, or other approved technology for the purpose of reducing vibration, for ballast and tie track; and ◢ conduct regular rail maintenance including rail grinding, wheel truing to re-contour wheels, providing smooth running surfaces.	LS-M	SU
Impact 2.6-5: Implementation of the proposed Plan could result in general increases in ambient noise and associated exposure of sensitive receptors to new or additional stationary noise sources in excess of standards established in the local	PS	Mitigation Measure 2.6-5: To reduce exposure to new and existing sensitive receptors from non-transportation noise associated with projected development, implementing agencies and/or project sponsors shall implement measures, where feasible and necessary based on project- and site-specific considerations that include, but are not limited to:	LS-M	SU

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			w/ MM*	w/o MM*
general plan or noise ordinance or applicable standards of other agencies.		◢ Local agencies approving land use projects shall require that routine testing and preventive maintenance of emergency electrical generators be conducted during the less sensitive daytime hours (per the applicable local municipal code). Electrical generators or other mechanical equipment shall be equipped with noise control (e.g., muffler) devices in accordance with manufacturers' specifications. ◢ Local agencies approving land use projects shall require that external mechanical equipment, including HVAC units, associated with buildings incorporate features designed to reduce noise to below 70 dBA CNEL or the local applicable noise standard. These features may include, but are not limited to, locating equipment within equipment rooms or enclosures that incorporate noise reduction features, such as acoustical louvers, and exhaust and intake silencers. Equipment enclosures shall be oriented so that major openings (i.e., intake louvers, exhaust) are directed away from nearby noise-sensitive receptors.		
Impact 2.6-6: Implementation of the proposed Plan could result in exposure of people residing or working in the planning area to excessive noise levels where an airport land use plan is adopted or, where such a plan has not been adopted, within two miles of a public airport, public use airport, or private airstrip.	PS	Mitigation Measure 2.6-6: To reduce exposure from airport-related noise, implementing agencies and/or project sponsors shall implement measures, where feasible and necessary based on project- and site-specific considerations that include, but are not limited to: Local lead agencies for all new development proposed to be located within an existing airport influence zone, as defined by the locally adopted airport land use compatibility plan or local general plan, shall require a site-specific noise compatibility. The study shall consider and evaluate existing aircraft noise, based on specific aircraft activity data for the airport in question, and shall include recommendations for site design and building construction to ensure compliance with interior noise levels of 45 dBA CNEL, such that the potential for sleep disturbance is minimized.	LS-M	SU
2.7 GEOLOGY AND SEISMICITY				
Impact 2.7-1: Implementation of the proposed Plan could increase the exposure of people or structures to the risk of property loss, injury, or death involving 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.	LS	No mitigation is required.	LS	LS

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Impact 2.7-2: Implementation of the proposed Plan could increase exposure of people or structures to the risk of property loss, injury, or death involving strong seismic ground shaking.	LS	No mitigation is required.	LS	LS
Impact 2.7–3: Implementation of the proposed Plan could increase exposure of people or structures to the risk of property loss, injury, or death involving seismic-related ground failure, including liquefaction.	LS	No mitigation is required.	LS	LS
Impact 2.7–4: Implementation of the proposed Plan could increase exposure of people or structures to the risk of property loss, injury, or death involving landslides.	LS	No mitigation is required.	LS	LS
Impact 2.7-5: Implementation of the proposed Plan could result in substantial soil erosion or topsoil loss.	LS	No mitigation is required.	LS	LS
Impact 2.7-6: Implementation of the proposed Plan could result in locating development on a geologic unit or soil that is unstable, contains expansive properties, 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.	LS	No mitigation is required.	LS	LS
Impact 2.7-7: Implementation of the proposed Plan could result in the loss of availability of a known mineral resource that would be of value to the region or the residents of the State or a locally-important mineral resources recovery site delineated on a local land use plan.	LS	No mitigation is required.	LS	LS
2.8 WATER RESOURCES				
Impact 2.8-1: Implementation of the proposed Plan could result in violation of water quality standards or waste or stormwater discharge requirements.	LS	No mitigation is required.	LS	LS
Impact 2.8-2: Implementation of the proposed Plan could substantially interfere with or reduce rates of groundwater recharge because of the increased amount of impervious	LS	No mitigation is required.	LS	LS

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			w/ MM*	w/o MM*
surfaces, such that there could be a net deficit in aquifer volume or a lowering of the groundwater table.				
Impact 2.8-3: Implementation of the proposed Plan could increase erosion by altering the existing drainage patterns of a site, contributing to sediment loads of streams and drainage facilities, and thereby affecting water quality.	LS	No mitigation is required.	LS	LS
Impact 2.8-4: Implementation of the proposed Plan could increase non-point pollution of stormwater runoff because of litter, fallout from airborne particulate emissions, or discharges of vehicle residues, including petroleum hydrocarbons and metals, that would impact the quality of receiving waters.	LS	No mitigation is required.	LS	LS
Impact 2.8-5: Implementation of the proposed Plan could increase non-point-source pollution of stormwater runoff from construction sites because of discharges of sediment, chemicals, and wastes to nearby storm drains and creeks.	LS	No mitigation is required.	LS	LS
Impact 2.8-6: Implementation of the proposed Plan could increase rates and amounts of runoff because of additional impervious surfaces, cut-and-fill slopes, or result in alterations to drainage systems that could cause potential flood hazards and effects on water quality.	LS	No mitigation is required.	LS	LS
Impact 2.8-7: Implementation of the proposed Plan could place structures that would impede or redirect flows within a 100-year flood hazard area.	LS	No mitigation is required.	LS	LS
Impact 2.8-8: Implementation of the proposed Plan could expose people to a significant risk of loss, injury, or death involving flooding (including flooding as a result of the failure of a levee or dam), seiche, tsunami, or mudflow.	LS	No mitigation is required.	LS	LS

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			w/ MM*	w/o MM*
2.9 BIOLOGICAL RESOURCES				
Impact 2.9-1a: Implementation of the proposed Plan could have a substantial adverse effect, either directly or through habitat modifications, on species identified as candidate, sensitive, or special-status in local or regional plans, policies, or regulations, or by the California Department of Fish and Wildlife or U.S. Fish and Wildlife Service.	PS	Mitigation Measure 2.9-1(a): Implementing agencies shall require project sponsors to prepare biological resource assessments for specific projects proposed in areas containing, or likely to contain, habitat for special-status plants and wildlife. The assessment shall be conducted by qualified professionals pursuant to adopted protocols and agency guidelines. Where the biological resource assessments establish that mitigation is required to avoid direct and indirect adverse effects on special-status plant and wildlife species, or compensate for unavoidable effects, mitigation shall be developed consistent with the requirements of CEQA, USFWS, CDFW, and local regulations and guidelines, in addition to requirements of any applicable and adopted HCP/NCCP or other applicable plans developed to protect species or habitat. Implementing agencies and/or project sponsors shall implement measures, where feasible and necessary based on project- and site-specific considerations that include, but are not limited to: ◢ In support of CEQA, NEPA, CDFW, and USFWS review and permitting processes for individual proposed Plan projects, pre-project biological surveys shall be conducted as part of the environmental review process to determine the presence and extent of sensitive habitats and/or species in the project vicinity. Surveys shall follow established methods and shall be conducted at times when the subject species is most likely to be identified. In cases where impacts to state- or federally-listed plant or wildlife species are possible, formal protocol-level surveys may be required on a species-by-species basis to determine the local distribution of these species. Coordination with the USFWS and/or CDFW shall be conducted early in the planning process at an informal level for projects that could adversely affect federal or state candidate, proposed, threatened, or endangered species to determine the need for consultation or permitting actions. Projects shall obtain incidental take authorization from the permitting agencies as required before project implementation. ◢ Project designs shall be reconfigured, whenever practicable, to avoid special-status species and sensitive habitats. Projects shall minimize ground disturbances and transportation project footprints near sensitive areas to the extent practicable. ◢ Project activities in the vicinity of sensitive resources shall be completed during the period that best avoids disturbance to plant and wildlife species present to the extent feasible.	LS-M	SU

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Table ES-2 Summary of Impacts and Mitigation Measures

Impacts	Significance before Mitigation	Mitigation Measures	Significance after Mitigation	
			w/ MM*	w/o MM*
		◢ Individual projects shall minimize the use of in-water construction methods in areas that support sensitive aquatic species, especially when listed species could be present. ◢ In the event that equipment needs to operate in any watercourse with flowing or standing water where special-status species may be affected, a qualified biological resource monitor shall be present to alert construction crews to the possible presence of such special-status species. ◢ If project activities involve pile driving or vibratory hammering in or near water, interim hydroacoustic threshold criteria for protected fish species shall be adopted as set forth by the Interagency Fisheries Hydroacoustic Working Group, as well as other avoidance methods to reduce the adverse effects of construction to sensitive fish, piscivorous birds, and marine mammal species. ◢ Construction shall not occur during the breeding season near riparian habitat, freshwater marshlands, and salt marsh habitats that support nesting bird species protected under the Endangered Species Act, Migratory Bird Treaty Act, or California Fish and Game Code (e.g., yellow warbler, tricolored blackbird, Ridgway's rail, etc.). ◢ A qualified biologist shall locate and fence off sensitive resources before construction activities begin and, where required, shall inspect areas to ensure that barrier fencing, stakes, and setback buffers are maintained during construction. ◢ For work sites located adjacent to special-status plant or wildlife populations, a biological resource education program shall be provided for construction crews and contractors (primarily crew and construction foremen) before construction activities begin. ◢ Biological monitoring shall be considered for areas near identified habitat for federal- and state-listed species, and a "no take" approach shall be taken whenever feasible during construction near special-status plant and wildlife species. ◢ Efforts shall be made to minimize the adverse effects of light and noise on listed and sensitive wildlife. ◢ Project activities shall comply with existing local regulations and policies, including applicable HCP/NCCPs, that exceed or reasonably replace any of the above measures protective of special-status species. ◢ Compensatory mitigation for unavoidable loss of habitat or other impacts to special-status species may be achieved in advance of impacts through the purchase or		

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Table ES-2 Summary of Impacts and Mitigation Measures

Impacts	Significance before Mitigation	Mitigation Measures	Significance after Mitigation	
			w/ MM*	w/o MM*
		creation of mitigation credits or the implementation of mitigation projects through Regional Advance Mitigation Planning (RAMP), as deemed appropriate by the permitting agencies.		
Impact 2.9-1b: Implementation of the proposed Plan could have substantial adverse impacts on designated critical habitat for federally listed plant and wildlife species.	PS	Mitigation Measure 2.9-1(b): Implementing agencies and/or project sponsors shall implement measures, where feasible and necessary based on project- and site-specific considerations that include, but are not limited to: ◢ Coordination with the USFWS and/or NMFS shall be conducted early in the environmental review process to determine the need for further mitigation, consultation, or permitting actions. Formal consultation is required for any project with a federal nexus when a species is likely to be adversely affected. ◢ Reconfigure project designs to avoid or minimize adverse effects on protected species within designated critical habitats. ◢ Compliance with existing local regulations and policies, including applicable HCP/NCCPs. ◢ Additionally, implementation of Mitigation Measure 2.9-1(a), above, which includes an initial biological resource assessment and, if necessary, compensatory mitigation for unavoidable loss of habitat or other impacts to special-status species. Compensatory mitigation may be achieved in advance of impacts through the purchase or creation of mitigation credits or the implementation of mitigation projects through Regional Advance Mitigation Planning (RAMP), as deemed appropriate by the permitting agencies.	LS-M	LS-M
Impact 2.9-2: Implementation of the proposed Plan could have a substantial adverse effect on riparian habitat, federally protected wetlands as defined by Section 404 of the Clean Water Act (including but not limited to marsh, vernal pool, coastal), or other sensitive natural communities identified in local or regional plans, policies, or regulations, or by the California Department of Fish and Wildlife or U.S. Fish and Wildlife Service, through direct removal, filling, hydrological interruption, or other means.	PS	Mitigation Measure 2.9-2: Implementing agencies and/or project sponsors shall implement measures, where feasible and necessary based on project- and site-specific considerations that include, but are not limited to: Mitigation measures that shall be considered by implementing agencies and/or project sponsors based on project-and site-specific considerations include, but are not limited to: ◢ Implementing agencies shall require project sponsors to prepare biological resource assessments for specific projects proposed in areas containing, or likely to contain, jurisdictional waters and/or other sensitive or special-status communities. These assessments shall be conducted by qualified professionals in accordance with agency guidelines and standards.	LS-M	SU

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Table ES-2 Summary of Impacts and Mitigation Measures

Impacts	Significance before Mitigation	Mitigation Measures	Significance after Mitigation	
			w/ MM*	w/o MM*
		◢ In keeping with the "no net loss" policy for wetlands and other waters, project designs shall be configured, whenever possible, to avoid wetlands and other waters and avoid disturbances to wetlands and riparian corridors to preserve both the habitat and the overall ecological functions of these areas. Projects shall minimize ground disturbances and transportation project footprints near such areas to the extent practicable. ◢ Where avoidance of jurisdictional waters is not feasible, project sponsors shall minimize fill and the use of in-water construction methods, and place fill only with express permit approval from the appropriate resources agencies (e.g., USACE, RWQCB, CDFW, BCDC, and CCC) and in accordance with applicable existing regulations, such as the Clean Water Act or local stream protection ordinances. ◢ Project sponsors shall arrange for compensatory mitigation in the form of mitigation bank credits, on-site or off-site enhancement of existing waters or wetland creation in accordance with applicable existing regulations and subject to approval by the USACE, RWQCB, CDFW, BCDC, and CCC. If compensatory mitigation is required by the implementing agency, the project sponsor shall develop a restoration and monitoring plan that describes how compensatory mitigation will be achieved, implemented, maintained, and monitored. At a minimum, the restoration and monitoring plan shall include clear goals and objectives, success criteria, specifics on restoration/creation/enhancement (plant palette, soils, irrigation, etc.), specific monitoring periods and reporting guidelines, and a maintenance plan. The following minimum performance standards (or other standards as required by the permitting agencies) shall apply to any wetland compensatory mitigation: ◤ Compensation shall be provided at a minimum 1:1 ratio for restoration and preservation, but shall in all cases be consistent with mitigation ratios set forth in locally applicable plans (e.g., general plans, HCP/NCCPs, etc.), or in project-specific permitting documentation. Compensatory mitigation may be a combination of onsite restoration/creation/enhancement or offsite restoration, preservation, and/or enhancement. Compensatory mitigation may be achieved in advance of impacts through the purchase or creation of mitigation credits or the implementation of mitigation projects through Regional Advance Mitigation Planning (RAMP), as deemed appropriate by the permitting agencies.		

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Table ES-2 Summary of Impacts and Mitigation Measures

Impacts	Significance before Mitigation	Mitigation Measures	Significance after Mitigation	
			w/ MM*	w/o MM*
		◤ In general, any compensatory mitigation shall be monitored for a minimum of five years and will be considered successful when at least 75 percent cover (or other percent cover considered appropriate for the vegetation type) of installed vegetation has become successfully established. ◢ In accordance with CDFW guidelines and other instruments protective of sensitive or special- status natural communities, project sponsors shall avoid and minimize impacts on sensitive natural communities when designing and permitting projects. Where applicable, projects shall conform to the provisions of special area management or restoration plans, such as the Suisun Marsh Protection Plan or the East Contra Costa County HCP, which outline specific measures to protect sensitive vegetation communities. ◢ If any portion of a special-status natural community is permanently removed or temporarily disturbed, the project sponsor shall compensate for the loss. If such mitigation is required by the implementing agency, the project sponsor shall develop a restoration and monitoring plan that describes how compensatory mitigation will be achieved, implemented, maintained, and monitored. At a minimum, the restoration and monitoring plan shall include clear goals and objectives, success criteria, specifics on restoration/creation/ enhancement (plant palette, soils, irrigation, etc.), specific monitoring periods and reporting guidelines, and a maintenance plan. The following minimum performance standards (or other standards as required by the permitting agencies) shall apply to any compensatory mitigation for special-status natural communities: ◤ Compensation shall be provided at a minimum 1:1 ratio for restoration and preservation, but shall in all cases be consistent with mitigation ratios set forth in locally applicable plans (e.g., general plans, HCP/NCCPs, etc.) or in project-specific permitting documentation. Compensatory mitigation may be a combination of onsite restoration/creation/enhancement or offsite restoration, preservation, and/or enhancement. Compensatory mitigation may be achieved in advance of impacts through the purchase or creation of mitigation credits or the implementation of mitigation projects through Regional Advance Mitigation Planning (RAMP), as deemed appropriate by the permitting agencies. ◤ In general, any compensatory mitigation shall be monitored for a minimum of five years and will be considered successful when at least 75 percent cover		

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Table ES-2 Summary of Impacts and Mitigation Measures

Impacts	Significance before Mitigation	Mitigation Measures	Significance after Mitigation	
			w/ MM*	w/o MM*
		(or other percent cover considered appropriate for the vegetation type) of installed vegetation has become successfully established. ◢ Compliance with existing local regulations and policies, including applicable HCP/NCCPs. that exceed or reasonably replace any of the above measures protective of jurisdictional wetlands or special-status natural communities.		
Impact 2.9-3: Implementation of the proposed Plan could interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridor, or impede the use of native wildlife nursery sites.	PS	Mitigation Measure 2.9-3: Implementing agencies shall require project sponsors to prepare detailed analyses for specific projects affecting ECA lands to determine what wildlife species may use these areas and what habitats those species require. Projects that would not affect ECA lands but that are located within or adjacent to open lands, including wildlands and agricultural lands, shall also assess whether or not significant wildlife corridors are present, what wildlife species may use them, and what habitat those species require. The assessment shall be conducted by qualified professionals and according to applicable agency standards. Implementing agencies and/or project sponsors shall implement measures, where feasible and necessary based on project- and site-specific considerations that include, but are not limited to: ◢ constructing wildlife friendly overpasses and culverts; ◢ fencing major transportation corridors in the vicinity of identified wildlife corridors; ◢ using wildlife-friendly fences that allow larger wildlife such as deer to get over, and smaller wildlife to go under; ◢ limiting wildland conversions in identified wildlife corridors; ◢ retaining wildlife-friendly vegetation in and around developments; and ◢ complying with existing local regulations and policies, including applicable HCP/NCCPs, that exceed or reasonably replace any of the above measures to protect wildlife corridors.	LS-M	SU
Impact 2.9-4: Implementation of the proposed Plan could conflict with adopted local conservation policies, such as a tree protection ordinance, or resource protection and conservation plans, such as a Habitat Conservation Plan (HCP), Natural Community Conservation Plan (NCCP), or other adopted local, regional, or state habitat conservation plans.	LS	No mitigation is required.	LS	LS

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Table ES-2 Summary of Impacts and Mitigation Measures

Impacts	Significance before Mitigation	Mitigation Measures	Significance after Mitigation	
			w/ MM*	w/o MM*
Impact 2.9-5: Implementation of the proposed Plan could have the potential to 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; or substantially reduce the number or restrict the range of an endangered, rare, or threatened species.	PS	Mitigation Measure 2.9-5: Implementing agencies and/or project sponsors shall implement mitigation measures, where feasible and necessary based on project-specific and site-specific considerations that include but are not limited to: Implement Mitigation Measures 2.9-1(a), 2.9-1(b), 2.9-2, and 2.9-3.	LS-M	SU
2.10 VISUAL RESOURCES				
Impact 2.10-1: Implementation of the proposed Plan could have a substantial adverse effect on a scenic vista.	PS	Mitigation Measure 2.10-1: Implementing agencies and/or project sponsors shall implement measures where feasible and necessary based on project- and site-specific considerations that include, but are not limited to: ◢ reduce the visibility of construction staging areas by fencing and screening these areas with low contrast materials consistent with the surrounding environment, and by revegetating graded slopes and exposed earth surfaces at the earliest opportunity; ◢ site or design projects to minimize their intrusion into important viewsheds; ◢ use see-through safety barrier designs (e.g. railings rather than walls); ◢ develop interchanges and transit lines at the grade of the surrounding land to limit view blockage; ◢ design landscaping along highway corridors in rural and open space areas to add natural elements and visual interest to soften the hard edged, linear travel experience that would otherwise occur; and ◢ identify, preserve, and enhance scenic vistas to and from hillside areas and other visual resources.	SU	SU
Impact 2.10-2: Implementation of the proposed Plan could substantially damage scenic resources, including but not limited to trees, rock outcroppings, and historical buildings within a state scenic highway.	LS	No mitigation is required.	LS	LS
Impact 2.10-3: Implementation of the proposed Plan could substantially degrade the existing visual character or quality of the site and its surroundings.	PS	Mitigation Measure 2.10-3: Implementing agencies and/or project sponsors shall implement measures where feasible and necessary based on project- and site-specific considerations that include, but are not limited to:	LS-M	SU

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Impacts	Significance before Mitigation	Mitigation Measures	Significance after Mitigation	
			w/ MM*	w/o MM*
		◢ minimize impacts of design through compliance with MTC's Station Area Planning Manual; ◢ require that the scale, massing, and design of new development provide appropriate transitions in building height, bulk, and architectural style that are sensitive to the physical and visual character of surrounding areas; ◢ contour the edges of major cut and fill slopes to provide a finished profile that is appropriate to the surrounding context, using shapes, textures, colors, and scale to minimize contrasts between the project and surrounding areas; and ◢ implementing agencies shall require project sponsors to conduct shadow studies for four-story high (and higher) buildings and roadway facilities to identify and implement development strategies for reducing the impact of shadows on public open space, where feasible. Study considerations shall include, but are not limited to, the placement, massing, and height of structures, surrounding land uses, time of day and seasonal variation, and reflectivity of materials. Study recommendations for reducing shadow impacts shall be incorporated into the project design as feasible based on project- and site-specific considerations.		
Impact 2.10-4: Implementation of the proposed Plan could add a visual element of urban character to an existing rural or open space area or add a modern element to a historic area.	PS	Mitigation Measure 2.10-4: In addition to Mitigation Measure 2.10-3, the following measure would apply to impacts on visual resources in rural or historic areas. Implementing agencies and/or project sponsors shall implement measures where feasible and necessary based on project- and site-specific considerations that include, but are not limited to: ◢ Conduct project-specific review of new development in rural or historic areas to ensure that new development is compatible in scale and character with the surrounding area by: ◤ promoting a transition in scale and architecture character between new buildings and established neighborhoods; and ◤ requiring pedestrian circulation and vehicular routes to be well integrated. ◢ Where sound walls are proposed, require sound wall construction and design methods that account for visual impacts as follows: ◤ use transparent panels to preserve views where sound walls would block views from residences;	LS-M	SU

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Impacts	Significance before Mitigation	Mitigation Measures	Significance after Mitigation	
			w/ MM*	w/o MM*
		◤ use landscaped earth berm or a combination wall and berm to minimize the apparent sound wall height; ◤ construct sound walls of materials whose color and texture complements the surrounding landscape and development; ◤ design sound walls to increase visual interest, reduce apparent height, and be visually compatible with the surrounding area; and ◤ landscape the sound walls with plants that screen the sound wall, preferably with either native vegetation or landscaping that complements the dominant landscaping of surrounding areas.		
Impact 2.10-5: Implementation of the proposed Plan could create a new source of substantial light or glare, which would adversely affect day or nighttime views in the area.	PS	Mitigation Measure 2.10-5: Implementing agencies and/or project sponsors shall implement measures where feasible and necessary based on project- and site-specific considerations that include, but are not limited to: ◢ Design projects to minimize light and glare from lights, buildings, and roadways facilities. ◢ Minimize and control glare from transportation projects through the adoption of project design features that reduce glare. These features include: ◤ planting trees along transportation corridors to reduce glare from the sun; ◤ landscaping off-street parking areas, loading areas, and service areas; and ◤ shielding transportation lighting fixtures to minimize off-site light trespass. ◢ Minimize and control glare from land use and transportation projects through the adoption of project design features that reduce glare. These features include: ◤ limiting the use of reflective materials, such as metal; ◤ using non-reflective material, such as paint, vegetative screening, matte finish coatings, and masonry; ◤ screening parking areas by using vegetation or trees; and ◤ using low-reflective glass. ◢ Impose lighting standards that ensure that minimum safety and security needs are addressed and minimize light trespass and glare associated with land use development. These standards include the following:	LS-M	SU

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Impacts	Significance before Mitigation	Mitigation Measures	Significance after Mitigation	
			w/ MM*	w/o MM*
		◤ minimizing incidental spillover of light onto adjacent private properties and undeveloped open space; ◤ directing luminaries away from habitat and open space areas adjacent to the project site; ◤ installing luminaries that provide good color rendering and natural light qualities; and ◤ minimizing the potential for back scatter into the nighttime sky and for incidental spillover of light onto adjacent private properties and undeveloped open space.		
2.11 CULTURAL RESOURCES				
Impact 2.11-1: The proposed Plan could cause a substantial adverse change in the significance of a historic resource as defined in Guidelines Section 15064.5 or eliminate important examples of major periods of California history.	PS	Mitigation Measure 2.11-1: Implementing agencies and/or project sponsors shall implement measures, where feasible and necessary based on project- and site-specific considerations that include, but are not limited to: ◢ Realign or redesign projects to avoid impacts on known historic resources where possible. ◢ Require a survey and evaluation of structures greater than 45 years in age within the area of potential effect to determine their eligibility for recognition under State, federal, or local historic preservation criteria. The evaluation shall be prepared by an architectural historian, or historical architect meeting the Secretary of the Interior's Standards and Guidelines for Archeology and Historic Preservation, Professional Qualification Standards. The evaluation should comply with CEQA Guidelines section 15064.5(b), and, if federal funding or permits are required, with Section 106 of the National Historic Preservation Act (NHPA) of 1966 (16 U.S.C. § 470 et seq.). Study recommendations shall be implemented. ◢ If avoidance of a significant architectural/built environment resource is not feasible, additional mitigation options include, but are not limited to, specific design plans for historic districts, or plans for alteration or adaptive re-use of a historical resource that follows the Secretary of the Interior's Standards for the Treatment of Historic Properties with Guidelines for Preserving, Rehabilitation, Restoring, and Reconstructing Historic Buildings. ◢ Comply with existing local regulations and policies that exceed or reasonably replace any of the above measures that protect historic resources.	LS-M	SU

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Impacts	Significance before Mitigation	Mitigation Measures	Significance after Mitigation	
			w/ MM*	w/o MM*
Impact 2.11-2: The proposed Plan could cause a substantial adverse change in the significance of a unique archaeological resource as defined in Guidelines Section 15064.5 or eliminate important examples of major periods of California history or prehistory.	PS	Mitigation Measure 2.11-2: Implementing agencies and/or project sponsors shall implement the following measures where feasible and necessary based on project- and site-specific considerations that include, but are not limited to: ◢ Before construction activities, project sponsors shall retain a qualified archaeologist to conduct a record search at the appropriate Information Center to determine whether the project area has been previously surveyed and whether resources were identified. When recommended by the Information Center, project sponsors shall retain a qualified archaeologist to conduct archaeological surveys before construction activities. Project sponsors shall follow recommendations identified in the survey, which may include activities such as subsurface testing, designing and implementing a Worker Environmental Awareness Program, construction monitoring by a qualified archaeologist, avoidance of sites, or preservation in place. ◢ In the event that evidence of any prehistoric or historic-era subsurface archaeological features or deposits are discovered during construction-related earth-moving activities (e.g., ceramic shard, trash scatters, lithic scatters), all ground-disturbing activity in the area of the discovery shall be halted until a qualified archaeologist can assess the significance of the find. If the find is a prehistoric archeological site, the appropriate Native American group shall be notified. If the archaeologist determines that the find does not meet the CRHR standards of significance for cultural resources, construction may proceed. If the archaeologist determines that further information is needed to evaluate significance, a data recovery plan shall be prepared. If the find is determined to be significant by the qualified archaeologist (i.e., because the find is determined to constitute either an historical resource or a unique archaeological resource), the archaeologist shall work with the project applicant to avoid disturbance to the resources, and if complete avoidance is not feasible in light of project design, economics, logistics, and other factors, follow accepted professional standards in recording any find including submittal of the standard DPR Primary Record forms (Form DPR 523) and location information to the appropriate California Historical Resources Information System office for the project area. ◢ Project sponsors shall comply with existing local regulations and policies that exceed or reasonably replace any of the above measures that protect archaeological resources.	LS-M	SU

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Impacts	Significance before Mitigation	Mitigation Measures	Significance after Mitigation	
			w/ MM*	w/o MM*
Impact 2.11-3: The proposed Plan could have the potential to destroy, directly or indirectly, a unique paleontological resource or site or unique geologic feature.	PS	Mitigation Measure 2.11-3: Implementing agencies and/or project sponsors shall implement measures where feasible and necessary based on project- and site-specific considerations that include, but are not limited to: ◢ Before construction activities, project sponsors shall conduct a record search using an appropriate database, such as the UC Berkeley Museum of Paleontology to determine whether the project area has been previously surveyed and whether resources were identified. ◢ If record searches indicate that the project is located in an area likely to contain important paleontological, and/or geological resources, such as sedimentary rocks which have yielded significant terrestrial and other fossils, project sponsors shall retain a qualified paleontologist to train all construction personnel involved with earthmoving activities about the possibility of encountering fossils. The appearance and types of fossils likely to be seen during construction will be described. Construction personnel will be trained about the proper notification procedures should fossils be encountered. ◢ If paleontological resources are discovered during earthmoving activities, the construction crew will be directed to immediately cease work in the vicinity of the find and notify the implementing agencies and/or project sponsors. The project sponsor will retain a qualified paleontologist for identification and salvage of fossils so that construction delays can be minimized. The paleontologist will be responsible for implementing a recovery plan which could include the following: ◤ in the event of discovery, salvage of unearthed fossil remains, typically involving simple excavation of the exposed specimen but possibly also plaster-jacketing of large and/or fragile specimens, or more elaborate quarry excavations of richly fossiliferous deposits; ◤ recovery of stratigraphic and geologic data to provide a context for the recovered fossil remains, typically including description of lithologies of fossil-bearing strata, measurement and description of the overall stratigraphic section, and photographic documentation of the geologic setting; ◤ laboratory preparation (cleaning and repair) of collected fossil remains to a point of curation, generally involving removal of enclosing rock material, stabilization of fragile specimens (using glues and other hardeners), and repair of broken specimens;	LS-M	SU

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			w/ MM*	w/o MM*
		◤ cataloging and identification of prepared fossil remains, typically involving scientific identification of specimens, inventory of specimens, assignment of catalog numbers, and entry of data into an inventory database; ◤ transferal, for storage, of cataloged fossil remains to an appropriate repository, with consent of property owner; ◤ preparation of a final report summarizing the field and laboratory methods used, the stratigraphic units inspected, the types of fossils recovered, and the significance of the curated collection; and ◤ project sponsors shall comply with existing local regulations and policies that exceed or reasonably replace any of the above measures that protect paleontological or geologic resources.		
Impact 2.11-4: The proposed Plan could have the potential to disturb human remains, including those interred outside dedicated cemeteries.	LS	No mitigation is required.	LS	LS
Impact 2.11-5: The proposed Plan could cause a substantial adverse change in the significance of a TCR as defined in PRC Section 21074.	PS	Mitigation Measure 2.11-5: If the implementing agency determines that a project may cause a substantial adverse change to a TCR, and measures are not otherwise identified in the consultation process required under PRC Section 21080.3.2, implementing agencies and/or project sponsors shall implement the following measures where feasible and necessary to address site-specific impacts to avoid or minimize the significant adverse impacts: ◢ Within 14 days of determining that a project application is complete, or to undertake a project, the lead agency must provide formal notification, in writing, to the tribes that have requested notification of proposed projects in the lead agency's jurisdiction. If it wishes to engage in consultation on the project, the tribe must respond to the lead agency within 30 days of receipt of the formal notification. The lead agency must begin the consultation process with the tribes that have requested consultation within 30 days of receiving the request for consultation. Consultation concludes when either: 1) the parties agree to measures to mitigate or avoid a significant effect, if a significant effect exists, on a tribal cultural resource, or 2) a party, acting in good faith and after reasonable effort, concludes that mutual agreement cannot be reached. ◢ Public agencies shall, when feasible, avoid damaging effects to any TCR (PRC Section 21084.3 (a).). If the lead agency determines that a project may cause a	LS-M	SU

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Table ES-2 Summary of Impacts and Mitigation Measures

Impacts	Significance before Mitigation	Mitigation Measures	Significance after Mitigation	
			w/ MM*	w/o MM*
		substantial adverse change to a tribal cultural resource, and measures are not otherwise identified in the consultation process, new provisions in the PRC describe mitigation measures that, if determined by the lead agency to be feasible, may avoid or minimize the significant adverse impacts (PRC Section 21084.3 (b)). Examples include: (1) Avoidance and preservation of the resources in place, including, but not limited to, planning and construction to avoid the resources and protect the cultural and natural context, or planning greenspace, parks, or other open space, to incorporate the resources with culturally appropriate protection and management criteria. (2) Treating the resource with culturally appropriate dignity taking into account the tribal cultural values and meaning of the resource, including, but not limited to, the following: (A) Protecting the cultural character and integrity of the resource (B) Protecting the traditional use of the resource (C) Protecting the confidentiality of the resource. (3) Permanent conservation easements or other interests in real property, with culturally appropriate management criteria for the purposes of preserving or utilizing the resources or places. (4) Protecting the resource.		
2.12 PUBLIC UTILITIES AND FACILITIES				
Impact 2.12-1: Implementation of the proposed Plan could result in insufficient water supplies available to serve development implemented as part of the Plan from existing entitlements and resources.	PS	Mitigation Measure 2.12-1(a): Implementing agencies and/or project sponsors shall implement measures, where feasible and necessary based on project- and site-specific considerations that include, but are not limited to: ◢ For projects that could increase demand for water, project sponsors shall coordinate with the relevant water service provider to ensure that the provider has adequate supplies and infrastructure to accommodate the increase in demand. If the current infrastructure servicing the project site is found to be inadequate, infrastructure improvements shall be identified in each project's CEQA documentation. ◢ Implement water conservation measures which result in reduced demand for potable water. This could include reducing the use of potable water for landscape irrigation (such as through drought-tolerant plantings, water-efficient irrigation	LS-M	SU

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Table ES-2 Summary of Impacts and Mitigation Measures

Impacts	Significance before Mitigation	Mitigation Measures	Significance after Mitigation	
			w/ MM*	w/o MM*
		systems, the capture and use of rainwater) and the use of water-conserving fixtures (such as dual-flush toilets, waterless urinals, reduced flow faucets). ◢ Coordinate with the water provider to identify an appropriate water consumption budget for the size and type of project, and designing and operating the project accordingly. ◢ For projects located in an area with existing reclaimed water conveyance infrastructure and excess reclaimed water capacity, use reclaimed water for non-potable uses, especially landscape irrigation. For projects in a location planned for future reclaimed water service, projects should install dual plumbing systems in anticipation of future use. Large developments could treat wastewater onsite to tertiary standards and use it for non-potable uses onsite. Mitigation Measure 2.12-1(b) Implementing agencies and/or project sponsors shall require the construction phase of transportation projects to connect to reclaimed water distribution systems for non-potable water needs, when feasible based on project- and site-specific considerations. Mitigation Measure 2.12-1(c) Implementing agencies and/or project sponsors shall require transportation projects with landscaping to use drought-resistant plantings or connect to reclaimed water distribution systems for irrigation and other non-potable water needs when available and feasible based on project- and site-specific considerations.		
Impact 2.12-2: Implementation of the proposed Plan could result in a determination by the wastewater treatment provider which serves or may serve development implemented as part of the Plan that it has inadequate capacity to serve the project's projected demand in addition to the provider's existing commitments.	PS	Mitigation Measure 2.12-2: Implementing agencies and/or project sponsors shall implement mitigations measures, where feasible and necessary based on project- and site-specific considerations that include, but are not limited to: ◢ During the design and CEQA review of individual future projects, implementing agencies and project sponsors shall determine whether sufficient wastewater treatment capacity exists for a proposed project. These CEQA determinations must ensure that the proposed development can be served by its existing or planned treatment capacity. If adequate capacity does not exist, project sponsors shall coordinate with the relevant service provider to ensure that adequate public services and utilities could accommodate the increased demand, and if not, infrastructure improvements for the appropriate public service or utility shall be identified in each project's CEQA documentation. The relevant public service provider or utility shall be	LS-M	LS-M

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Table ES-2 Summary of Impacts and Mitigation Measures

Impacts	Significance before Mitigation	Mitigation Measures	Significance after Mitigation	
			w/ MM*	w/o MM*
		responsible for undertaking project-level review as necessary to provide CEQA clearance for new facilities. ◢ Implementing agencies and/or project sponsors shall also require compliance with Mitigation Measure 2.12(a), and MTC shall require implementation of Mitigation Measures 2.12(b), and/or 2.12(c) listed under Impact 2.12-1, as feasible based on project- and site-specific considerations to reduce water usage and, subsequently, wastewater flows.		
Impact 2.12-3: Implementation of the proposed Plan could require or result in the construction of new stormwater drainage facilities or expansion of existing facilities, the construction of which could cause significant environmental impacts.	PS	Mitigation Measure 2.12-3(a): Implementing agencies and/or project sponsors shall implement measures, where feasible and necessary based on project-and site-specific considerations that include, but are not limited to: ◢ During the design and CEQA review of individual future projects, implementing agencies and project sponsors shall determine whether sufficient stormwater drainage facilities exist for a proposed project. These CEQA determinations must ensure that the proposed development can be served by its existing or planned drainage capacity. If adequate stormwater drainage facilities do not exist, project sponsors shall coordinate with the appropriate utility and service provider to ensure that adequate facilities could accommodate the increased demand, and if not, infrastructure and facility improvements shall be identified in each project's CEQA determination. The relevant public service provider or utility shall be responsible for undertaking project-level review as necessary to provide CEQA clearance for new facilities. ◢ For projects of greater than 1 acre in size, reduce stormwater runoff caused by construction by implementing stormwater control best practices, based on those required for a SWPPP. ◢ Model and implement a stormwater management plan or site design that prevents the post-development peak discharge rate and quantity from exceeding pre-development rates. Mitigation Measure 2.12-3(b) Implementing agencies and/or project sponsors shall implement measures, where feasible and necessary based on project- and site-specific considerations that include, but are not limited to: ◢ Transportation projects shall incorporate stormwater control, retention, and infiltration features, such as detention basins, bioswales, vegetated median strips,	LS-M	SU

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Table ES-2 Summary of Impacts and Mitigation Measures

Impacts	Significance before Mitigation	Mitigation Measures	Significance after Mitigation	
			w/ MM*	w/o MM*
		and permeable paving, early into the design process to ensure that adequate acreage and elevation contours are planned. Mitigation Measure 2.12-3(c) Implementing agencies and/or project sponsors shall implement measures, where feasible and necessary based on project- and site-specific considerations that include, but are not limited to: ◢ Transportation projects implemented by Caltrans or subject to Caltrans review shall adhere to Caltrans' Stormwater Management Plan, which includes best practices to reduce the volume of stormwater runoff and pollutants in the design, construction and maintenance of highway facilities.		
Impact 2.12-4: Implementation of the proposed Plan could require or result in the construction of new or expanded water and wastewater treatment facilities, the construction of which could cause significant environmental effects.	PS	Mitigation Measure 2.12-4: Implementing agencies and/or project sponsors shall implement measures, where feasible and necessary based on project- and site-specific considerations that include, but are not limited to: ◢ For projects that could increase demand on water and wastewater treatment facilities, project sponsors shall coordinate with the relevant service provider to ensure that the existing public services and utilities could accommodate the increase in demand. If the current infrastructure servicing the project site is found to be inadequate, infrastructure improvements for the appropriate public service or utility shall be identified in each project's CEQA documentation. The relevant public service provider or utility shall be responsible for undertaking project-level review as necessary to provide CEQA clearance for new facilities. Further, Mitigation Measures 2.12-1(a), 2.12-1(b), 2.12-1(c), and 2.12-2 would reduce water demand and wastewater generation, and subsequently reduce the need for new or expanded water and wastewater treatment facilities. Mitigation Measures 2.12-3(a), 2.12-3(b), and 2.12-3(c) would also mitigate the impact of additional stormwater runoff from land use and transportation projects on existing wastewater treatment facilities.	LS-M	SU
Impact 2.12-5: The proposed Plan would be served by a landfill with sufficient permitted capacity to accommodate the project's solid waste disposal needs and comply with federal, state, and local statutes and regulations related to solid waste.	PS	Mitigation Measure 2.12-5: Implementing agencies and/or project sponsors shall implement measures, where feasible and necessary based on project- and site-specific considerations that include, but are not limited to: ◢ providing an easily accessible area that is dedicated to the collection and storage of non-hazardous recycling materials	LS-M	SU

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Table ES-2 Summary of Impacts and Mitigation Measures

Impacts	Significance before Mitigation	Mitigation Measures	Significance after Mitigation	
			w/ MM*	w/o MM*
		◢ maintaining or re-using existing building structures and materials during building renovations and redevelopment ◢ using salvaged, refurbished or reused materials, to help divert such items from landfills ◢ for transportation projects, diverting construction waste from landfills, where feasible, through means such as: ◤ the submission and implementation of a construction waste management plan that identifies materials to be diverted from disposal ◤ establishing diversion targets, possibly with different targets for different types and scales of development ◤ helping developments share information on available materials with one another, to aid in the transfer and use of salvaged materials; and ◢ applying the specifications developed by the Construction Materials Recycling Association (CMRA) to assist contractors and developers in diverting materials from construction and demolition projects, where feasible (RMC 2006).		
2.13 HAZARDS				
Impact 2.13-1: Implementation of the proposed Plan could create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials.	LS	No mitigation is required.	LS	LS
Impact 2.13-2: Implementation of the proposed Plan could 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.	LS	No mitigation is required.	LS	LS
Impact 2.13-3: Implementation of the proposed Plan could result in hazardous emissions or handling of hazardous or acutely hazardous materials, substances, or waste within 0.25 mile of an existing or proposed school.	LS	No mitigation is required.	LS	LS

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Table ES-2 Summary of Impacts and Mitigation Measures

Impacts	Significance before Mitigation	Mitigation Measures	Significance after Mitigation	
			w/ MM*	w/o MM*
Impact 2.13-4: Implementation of the proposed Plan could result in projects 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 create a significant hazard to the public or the environment.	PS	Mitigation Measure 2.13-4: Implementing agencies and/or project sponsors shall implement measures, where feasible and necessary based on project- and site-specific considerations that include, but are not limited to: ◢ If the project is located on or near a hazardous materials and/or waste site pursuant to Government Code Section 65962.5, or has the potential for residual hazardous materials and/or waste as a result of location and/or prior uses, the project sponsor shall prepare a Phase I ESA in accordance with the American Society for Testing and Materials' E-1527-05 standard. For work requiring any demolition or renovation, the Phase I ESA shall make recommendations for any hazardous building materials survey work that shall be done. All recommendations included in a Phase I ESA prepared for a site shall be implemented. If a Phase I ESA indicates the presence or likely presence of contamination, the implementing agency shall require a Phase II ESA, and recommendations of the Phase II ESA shall be fully implemented.	LS-M	SU
Impact 2.13-5: Implementation of the proposed Plan could result in a safety hazard for people residing or working in the planning area for projects located within an airport land use plan or, where such a plan has not been adopted, within 2 miles of a public airport or public use airport.	LS	No mitigation is required.	LS	LS
Impact 2.13-6: Implementation of the proposed Plan could result in a safety hazard for people residing or working in the planning area for projects within the vicinity of a private airstrip.	LS	No mitigation is required.	LS	LS
Impact 2.13-7: Implementation of the proposed Plan could impair implementation of, or physically interfere with, an adopted emergency response plan or emergency evacuation plan.	LS	No mitigation is required.	LS	LS
Impact 2.13-8: Implementation of the proposed Plan could expose people or structures to a significant risk of loss, injury, or death involving wildland fires, including where wildlands are adjacent to urbanized areas or where residences are intermixed with wildlands.	LS	No mitigation is required.	LS	LS

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Table ES-2 Summary of Impacts and Mitigation Measures

Impacts	Significance before Mitigation	Mitigation Measures	Significance after Mitigation	
			w/ MM*	w/o MM*
2.14 PUBLIC SERVICES AND RECREATION				
Impact 2.14-1: Implementation of the proposed Plan could result in the need for new or modified facilities, the construction of which causes significant environmental impacts, in order to maintain acceptable service ratios, response times or other performance objectives for schools, police protection, fire protection, emergency medical, and other public facilities.	PS	Mitigation Measure 2.14-1: Implementing agencies and/or project sponsors shall implement measures, where feasible and necessary based on project- and site-specific considerations that include but are not limited to: ◢ Prior to approval of new development projects, local agencies shall ensure that adequate public services, and related infrastructure and utilities, will be available to meet or satisfy levels identified in the applicable local general plan or service master plan, through compliance with existing local policies related to minimum levels of service for schools, police protection, fire protection, medical emergency services, and other government services (e.g., libraries, prisons, social services). Compliance may include requiring projects to either provide the additional services required to meet service levels, or pay fees towards the project's fair share portion of the required services pursuant to adopted fee programs and State law.	LS-M	SU
Impact 2.14-2: Implementation of the proposed Plan could result in the need for new or modified facilities, the construction of which causes significant environmental impacts; or may result in significant increase in use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated.	LS	No mitigation is required.	LS	LS

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1.1 INTRODUCTION

This program Environmental Impact Report (EIR) has been prepared on behalf of the Metropolitan Transportation Commission (MTC) and the Association of Bay Area Governments (ABAG) in accordance with the California Environmental Quality Act (CEQA). This EIR analyzes the potentially significant impacts of the adoption and implementation of the proposed Plan Bay Area 2040 (proposed Plan), which is the update to Plan Bay Area, the 2013 Regional Transportation Plan (RTP) and the Sustainable Communities Strategy (SCS) for the San Francisco Bay Area.

1.1.1 MTC, ABAG, and Plan Bay Area

MTC is the transportation planning, coordinating, and financing agency for the nine-county San Francisco Bay Area region (which includes Alameda, Contra Costa, Marin, Napa, San Francisco, San Mateo, Santa Clara, Solano, and Sonoma Counties). Created by the State Legislature in 1970, MTC functions as both the regional transportation planning agency (RTPA)—a state designation—and, for federal purposes, as the region's metropolitan planning organization (MPO).

ABAG is a joint powers agency formed in 1961 pursuant to California Government Code §§ 6500, et seq., and the council of governments (COG) for the San Francisco Bay Area. ABAG conducts regional population and employment projections and the regional housing needs allocation (RHNA) processes (Government Code Section 65584 et seq.).

Plan Bay Area 2040 is a joint effort by MTC and ABAG, completed in partnership with the Bay Area's other two regional government agencies, the Bay Area Air Quality Management District (BAAQMD), and the Bay Conservation and Development Commission (BCDC). As required by State legislation (Government Code Section 65080 et seq.) and by federal regulation (Title 23 USC Section 134), MTC is responsible for preparing the RTP for the San Francisco Bay Area region. An RTP is a long-range plan that identifies the strategies and investments to maintain, manage, and improve the region's transportation network. The RTP must be updated every four years. The Sustainable Communities and Climate Protection Act of 2008, commonly known as Senate Bill 375 (SB 375 Steinberg, 2008), requires California's 18 metropolitan planning organizations (including MTC) to develop an SCS an element of the federally mandated RTP. The SCS demonstrates how the region will meet its greenhouse gas (GHG) reduction targets established by the California Air Resources Board (ARB) through integrated land use, housing and transportation planning. In the Bay Area, MTC and ABAG are jointly responsible for this planning effort.

The 2013 Plan was the first Bay Area RTP that was subject to SB 375, which requires that the SCS be integrated into the MPO's RTP, and projected out through 2040. The proposed Plan is an update to the 2013 Plan and also covers the period through 2040.

The proposed Plan is a long-range plan that specifies the strategies and investments to maintain, manage, and improve the region's transportation network, which includes improvements to bicycle and pedestrian facilities, local streets and roads, public transit systems, and highways. The proposed Plan also calls for focused housing and job growth around high-quality transit corridors, particularly within areas identified by local jurisdictions as Priority Development Areas (PDAs). This land use strategy is anticipated to enhance mobility and economic growth by linking the location of housing and jobs with transit, thus offering a more efficient land use pattern around transit and a greater return on existing and planned transit investments.

Once adopted, Plan Bay Area 2040 will be reviewed by ARB to confirm whether it would, if implemented, achieve the GHG emission reduction target for the region. If the combination of measures in the SCS is determined to be insufficient to achieve the region's target, an alternative planning strategy (APS) to achieve the targets must be prepared.

1.1.2 Purpose of this EIR

This EIR has been prepared in compliance with the CEQA Statutes and Guidelines. In general, the purpose of an EIR is to:

- analyze the potential environmental effects of the adoption and implementation of the Plan;
- inform decision-makers, responsible and trustee agencies, and members of the public as to the range of the environmental impacts of the Plan;
- recommend a set of measures to mitigate significant adverse impacts; and
- analyze a range of reasonable alternatives to the proposed Plan.

The final EIR will include a Mitigation, Monitoring, and Reporting Program that identifies who will be responsible for implementing identified mitigation measures and the required timing for implementation. As the joint lead agencies for preparing this EIR, MTC and ABAG will rely on the EIR analysis of potential environmental effects in their review and consideration of the proposed Plan prior to approval.

As discussed in further detail below in Section 1.1.8, "CEQA Streamlining Opportunities," SB 375 provides streamlining benefits for certain transit-oriented projects consistent with an adopted SCS. Pursuant to these provisions of SB 375, this EIR has also been prepared to allow qualifying projects to streamline their environmental review.

1.1.3 Notice of Preparation and Public Scoping

CEQA requires an early and open process for determining the scope of issues that should be addressed in the EIR. The Notice of Preparation (NOP) provides formal notification to all federal, state, regional, and local agencies involved with funding or approval of the project, and to other interested organizations and members of the public, that an EIR will be prepared for the project. The NOP is intended to encourage interagency communication concerning the proposed action and to provide sufficient background information about the proposed action so that agencies, organizations, and individuals can respond with specific comments and questions on the scope and content of the EIR. A copy of the NOP is provided in Appendix A; the written comments received during the 30-day NOP period are provided in Appendix B. The NOP and comments on the NOP are also available on the project website: www.planbayarea.org.

MTC and ABAG initiated the scoping process on May 16, 2016, through issuance of the NOP. As required by CEQA, MTC and ABAG sent a copy of the NOP to the State Clearinghouse within the California Office of Planning and Research and to the county clerks in each of the nine Bay Area counties. The NOP was also posted on the Plan Bay Area website (www.planbayarea.org). State and federal resource agencies, the Bay Area Partnership (which is comprised of representatives of congestion management agencies, transit operators, public works directors, and other state and federal governmental agencies) and interested individuals and organizations were also sent either copies of the NOP via certified mail, or were notified of the availability of the NOP by postcard via the federal postal service, or email if no mailing address was provided.

SCOPING MEETINGS

Three regional public scoping meetings were held to solicit agency and public comments on the EIR:

> Thursday, May 26, 2016, 11 a.m. to 1 p.m., Dr. Martin Luther King Jr. Library, One Washington Square, Room 225 San Jose, California

Tuesday, May 31, 2016, 6:30 p.m. to 8:30 p.m., Metro Center Auditorium, 101 8th Street, Oakland, California

Thursday, June 2, 2016, 11 a.m. to 1 p.m., Finley Community Center, 2060 W. College Avenue, Santa Rosa, California

The NOP and public scoping meetings also help to meet the federal requirements for public involvement in the development of the RTP, as specified in 23 U.S.C. 134(i), MAP-21 and the FAST Act. In particular, through the NOP and scoping process, resource agencies, public agencies, Tribal governments, transportation providers, and the public had an opportunity to provide early input on environmental issues and concerns that could be addressed as part of the environmental assessment for the proposed Plan.

In addition, SB 375 requires that regional agencies provide opportunities for input by local officials and the public into the development of the SCS and the alternative planning strategy, if one is prepared. Participation requirements include regional target workshops and development of an SCS public participation plan. Additional information about the comprehensive public involvement process for the proposed Plan is available at: www.planbayarea.org and is described in Section 1.2.4, Plan Update Process, in Section 1.2, "Project Description," of this EIR.

1.1.4 EIR Scope

PROGRAM EIR

This is a program EIR, which is defined in Section 15168 of the CEQA Guidelines as: "[An EIR addressing a] series of actions that can be characterized as one large project and are related either:

(1) Geographically;

(2) As logical parts in the chain of contemplated actions;

(3) In connection with the issuance of rules, regulations, plans, or other general criteria to govern the conduct of a continuing program; or

(4) As individual activities carried out under the same authorizing statutory or regulatory authority and having generally similar environmental impacts which can be mitigated in similar ways."

A program EIR can be used as the basic, general environmental assessment for an overall program of projects developed over a multi-year planning horizon, and therefore is an appropriate review document for the proposed Plan. A program EIR has several advantages. For example, it provides a basic reference document to avoid unnecessary repetition of facts or analysis in subsequent project-specific assessments. It also allows the lead agency to consider the broad, regional impacts of a program of actions before its adoption and eliminates redundant or contradictory approaches to the consideration of regional and cumulative impacts.

LEVEL OF ANALYSIS

This EIR presents a programmatic assessment of the potential impacts of the proposed Plan, focusing on the entire set of projects and programs contained in the proposed Plan. Individual transportation and development project impacts are not addressed in detail; rather the focus of this EIR is on the entire program of projects, in the aggregate. Impacts are described from a regional and local perspective, as applicable. Where appropriate, this EIR also provides a county-by-county assessment that considers transit priority area (TPA) boundaries (see Section 1.1.8, CEQA Streamlining Opportunities for why this is important).

A geographic information system (GIS) was used to digitally overlay the projected land use growth footprint (net new acres of potential development) associated with forecasted development and the transportation projects footprint assumed for the transportation projects over resource-related data. Results are presented, where relevant, for the region, for each county, and for the portions of the growth footprint specifically within the TPAs. Where impacts are quantified through modeling or GIS analysis, they are reported at the regional, county, and/or TPA levels in tables and in the text. Information provided by county includes both incorporated and unincorporated areas in the county. In order to facilitate future CEQA streamlining opportunities for individual projects that qualify as transit priority projects, (see Section 1.1.8, CEQA Streamlining Opportunities, below), quantified data in this EIR is reported by TPAs, as available. The portion of the projected land use growth footprint located in PDAs that is outside of a TPA is captured in the County totals. Where useful for the impact analysis, GIS-based results are also reported by PDAs (see Section 2.7, "Geology and Soils").

The analysis in this EIR does not evaluate subcomponents of the proposed Plan nor does it assess project-specific impacts of individual projects, although it provides environmental analysis and mitigation that is intended to address the range of impacts and mitigation that may be associated with individual projects. This approach does not relieve local jurisdictions of responsibility for determining whether project-specific impacts require additional CEQA analysis; see Section 1.1.7, Future Environmental Review, below for more details.

1.1.5 EIR Organization

EXECUTIVE SUMMARY

The Executive Summary outlines the proposed Plan and alternatives and includes a summary of the potentially significant adverse environmental impacts of the proposed Plan, the measures identified to mitigate those impacts, and an overview of whether or not identified measures would mitigate the significant impacts and to what level. The executive summary also describes the alternatives and their merits as compared to the proposed Plan, identifies the environmentally superior alternative, and describes "areas of known controversy" and "issues to be resolved" as required by CEQA.

SECTION 1.1: INTRODUCTION

Section 1.1, Introduction describes the relationship between the proposed Plan and the EIR, the organization of the EIR, and the basic legal requirements of a program level EIR. It discusses the level of analysis and the alternatives considered as well as how this EIR is related to other environmental documents and the EIR's intended uses.

SECTION 1.2: PROJECT DESCRIPTION

Section 1.2, Project Description introduces the purpose and objectives of the proposed Plan and summarizes other specific descriptive information. This includes a description of the regional location and general setting, project background, an outline of the region's projected population and employment growth rates, a summary of forecasted development patterns through the 2040 planning horizon year, and an overview of proposed transportation projects and programs.

SECTIONS 2.0 THROUGH 2.14: ENVIRONMENTAL ANALYSIS

Section 2.0 provides an overview of the approach to the environmental analysis. Section 2.1 through 2.14 describes the existing physical and regulatory settings for each of the environmental issue areas analyzed in the EIR, the potential impacts of the proposed Plan on these environmental issue areas, and measures to mitigate the potential impacts identified. Each issue area is analyzed in a separate section. Each section is organized as follows:

- Environmental Setting,

- Regulatory Setting,
- Significance Criteria,
- Method of Analysis, and
- Impacts and Mitigation Measures.

SECTION 3: ALTERNATIVES AND CEQA-REQUIRED CONCLUSIONS

Section 3.1 includes a description of the alternatives to the proposed Plan. It provides an assessment of the potential of each alternative to achieve the objectives of the proposed Plan while reducing potentially significant adverse environmental impacts. This discussion also includes a comparison summary table of regional environmental impacts associated with the alternatives. As required by CEQA, an environmentally superior alternative is identified.

Section 3.2 includes an assessment of the impacts of the proposed Plan in several subject areas required by CEQA, including:

- significant irreversible environmental changes,
- significant unavoidable impacts,
- growth-inducing impacts,
- cumulative impacts; and
- impacts found to be not significant.

SECTION 4: BIBLIOGRAPHY AND EIR PREPARERS

Section 4.1 includes a bibliography and Section 4.2 includes a list of report authors.

APPENDICES

Appendix A includes the NOP of this EIR and Appendix B includes the comments received on the NOP and at the scoping meetings and the Scoping Summary Report. Appendices C through E include detailed supporting data on impact analyses for transportation, energy, and climate change and greenhouse gases. Appendix F includes potential adaptation strategies, referenced in Section 2.5, "Climate Change and Greenhouse Gases." Appendices G through M include detailed supporting data on impact analyses for air quality, noise, geology and seismicity, water resources, biological resources, cultural resources, and hazards, respectively.

1.1.6 EIR Approach

TIMEFRAME

The analysis in this EIR generally assumes 2015 as the base year (existing conditions). The EIR uses data from this year or the year closest to 2015, based on the degree information is available from across the region. However, for the analysis of greenhouse gas emissions in Section 2.5, 2005 is the assumed base year pursuant to the CARB targets developed for the region under SB 375. The proposed Plan has a horizon year of 2040 and therefore covers a 24-year planning period. Projects and programs identified in the Plan are assumed to be fully implemented by 2040.

ALTERNATIVES

CEQA requires EIRs to evaluate a reasonable range of alternatives to the proposed project that could feasibly attain most of the basic project objectives and that would avoid or substantially lessen any of the significant environmental impacts. In addition, CEQA requires assessment of the likely foreseeable future condition if the proposed project were not implemented; this scenario is called the No Project alternative.

This EIR evaluates the proposed Plan and four alternatives assuming the 2040 horizon year and full implementation. These alternatives were confirmed by the MTC Planning Committee and ABAG Administrative Committee on December 9, 2016. This EIR also identifies the environmentally superior alternative and documents the relative environmental advantages and disadvantages of the alternatives, as compared to the proposed Plan.

The proposed Plan and four alternatives are briefly described below. A full description of each alternative is provided in Section 3.1.

Alternative 1: No Project Alternative

An EIR must analyze the "no project alternative." (CEQA Guidelines, § 15126.6(e).) The purpose of the no project alternative is to allow a comparison of the environmental impacts of approving the proposed project with the effects of not approving it. The no project alternative must discuss the existing conditions, "as well as what would be reasonably expected to occur in the foreseeable future if the project were not approved, based on current plans and consistent with available infrastructure and community services."

The No Project Alternative represents implementation of the general plans of all nine counties and 101 cities in the Bay Area without influence of a regional plan that integrates transportation, growth, and GHG reduction. No new regional land use plan would be developed and no new SCS policies would be implemented to influence the locations of housing and employment centers in the region. Transportation projects that would occur under the No Project Alternative would be substantially limited compared to the proposed Plan, consisting of five major regional transit, three local transit, and two highway projects that are fully committed with funding and completed environmental review.

Alternative 2: Main Streets Alternative

Alternative 2, the Main Streets Alternative, provides a plan that targets future population and employment growth to the downtowns of every city in the Bay Area to foster a region of moderately-sized, integrated town centers. This alternative comes closest to resembling a traditional suburban pattern, because it would result in increased greenfield development relative to the proposed Plan. To support this alternative's dispersed growth pattern, transportation investment priorities would emphasize highway strategies, including the expansion of high-occupancy toll lanes on all regional highways and highway widening at key bottlenecks.

Alternative 3: Big Cities Alternative

Alternative 3 concentrates future population and employment growth in the locally-identified PDAs and TPAs within the Bay Area's three largest cities: San Jose, San Francisco, and Oakland. Neighboring cities that are already well-connected to these three cities by transit would see moderate to substantial increases in population and employment growth, particularly in their locally-identified PDAs and high opportunity areas. To support this alternative's big city-focused growth pattern, the transportation infrastructure within and directly serving the region's core would be maintained to a state of good repair, modernized to boost service and improve commutes and capacity, and expanded to meet increased demand. Bicycle and pedestrian infrastructure would be expanded in these cities, including a robust network of bike sharing

Alternative 4: Environment, Equity, and Jobs Alternative

The Environment, Equity, and Jobs (EEJ) Alternative includes strategies to focus more growth in suburban communities than the proposed Plan, in part to reduce risk of displacement in urban areas. In addition, the EEJ Alternative includes more funding for bus operations in suburban areas to serve lower-income residents and reduces funding for highway expansion and efficiency projects with the objective of reducing adverse environmental impacts. This alternative would encourage intensification of land use beyond PDAs to include jobs-rich, high-opportunity TPAs not currently identified as PDAs. This alternative seeks to strengthen public transit by boosting service frequencies in most suburban and urban areas, other than on Muni, BART or Caltrain, and providing free transit passes to youth throughout the region.

CUMULATIVE IMPACT ASSUMPTIONS

Section 15130 of the CEQA Guidelines requires that an EIR evaluate potential environmental impacts that are individually limited but cumulatively significant. CEQA defines cumulative impacts as "two or more individual effects which, when considered together, are considerable or which compound or increase other environmental impacts" (CEQA Guidelines § 15355). "'Cumulatively considerable' means that 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" (CEQA Guidelines § 15065(a)(3)). This means that cumulative impacts can result from individually minor but collectively significant projects taking place over a period of time.

The proposed Plan, which includes region-wide transportation projects and projected land use development patterns in the Bay Area to accommodate projected regional growth through 2040, is a cumulative plan by definition. As such, the environmental analysis included in each issue area of this EIR is a cumulative analysis compliant with the requirements of CEQA and the CEQA Guidelines. Furthermore, this EIR contains analysis of cumulative impacts that extend beyond the region, for identified CEQA impact areas. This discussion is included in Section 3.2, which addresses other CEQA-required considerations.

INTENDED USES OF THE EIR

The CEQA Guidelines (Section 15124(d)) require EIRs to identify the agencies that are expected to use the EIR in their decision-making, and the approvals for which the EIR will be used. This EIR will inform MTC and ABAG, in addition to other responsible agencies, persons, and the general public, of the potential environmental effects of the proposed Plan and the identified alternatives. MTC and ABAG will use the EIR for the purposes of review and approval of the proposed Plan.

The lead agencies for projects analyzed in this program EIR may use it as the basis for cumulative analysis of specific project impacts, together with the projected growth in the region. Cities and counties may use information in this EIR in their future housing elements. Bay Area congestion management agencies (CMAs) may incorporate information provided in this EIR into future county transportation plans such as congestion management programs, countywide transportation plans, or county bike and pedestrian plans. Other agencies expected to use the EIR include: Caltrans, transportation authorities, transit providers in the region (such as Muni, BART, AC Transit, SamTrans, Caltrain, SolTrans, WestCAT, ACE, Water Emergency Transit Authority, etc.), the Bay Conservation and Development Commission, the Bay Area Air Quality Management District, and cities and counties.

Mitigation measures described in this EIR may be incorporated into project-level environmental impact analyses by project sponsors or local agencies as appropriate to mitigate identified project-level impacts.

This EIR is also intended to help activate the CEQA streamlining benefits of SB 375 for local jurisdictions and private development, described in the "SB 375 CEQA Streamlining" section below.

1.1.7 Future Environmental Review

As a program EIR, the preparation of this document does not relieve the sponsors of the projects addressed in the proposed Plan of the responsibility for complying with the requirements of CEQA and/or NEPA (for projects requiring federal funding or approvals). As appropriate, individual projects may be required to prepare a project-level analysis to fulfill CEQA and/or NEPA requirements. The lead agency responsible for reviewing these projects shall determine the level of review needed, and the scope of that analysis will depend on the specifics of the particular project. These projects may, however, use the discussion of impacts in this program EIR as a basis of their assessment of these regional or cumulative impacts. These projects may also be eligible for CEQA streamlining under SB 375, as explained further below.

This program EIR is a first-tier document that addresses the environmental impacts that may affect the nine-county Bay Area as a result of adoption and implementation of Plan Bay Area. As such, future programs or projects may "tier off" this programmatic EIR, as stipulated in CEQA and associated legislation. Tiering refers to the coverage of general environmental analysis in broad program-level EIRs, with subsequent focused environmental documents for individual projects that implement the program. If the potential environmental effects of consistent subsequent actions are adequately addressed by a certified programmatic EIR, additional environmental analysis may be unnecessary. This finding can be substantiated using an initial study that evaluates whether the environmental effects of the subsequent project have already been adequately covered.

1.1.8 CEQA Streamlining Opportunities

If Plan Bay Area 2040 is adopted and the program EIR is certified by MTC and ABAG, the California Air Resources Board must then confirm that the Plan, if implemented, would achieve the greenhouse gas emission reduction targets required by AB 32 and SB 375. Upon making this determination, a number of streamlining benefits may become available to lead agencies that carry out or approve future projects contemplated by the Plan.

For a lead agency to take advantage of many of the potential streamlining benefits associated with the SCS, the lead agency must comply with all feasible and applicable mitigation measures included in this EIR, to the extent necessary, to substantially lessen or avoid the potentially significant impacts of the project. Where a future project, as mitigated by the lead agency, will not result in a potentially significant impact identified in this EIR, the lead agency is not required to adopt the mitigation measures set forth in this EIR and/or other relevant project-level EIRs to take advantage of the CEQA streamlining benefits discussed below.

STREAMLINING UNDER SB 375

SB 375 provides streamlining benefits for Transit Priority Projects (TPP). A TPP is a project that meets all of the criteria summarized below. For the purposes of this EIR, geographic areas that meet the TPP requirements are referred to as Transit Priority Areas (TPAs).

- consistent with the general land use designation, density, building intensity, and applicable policies specified for the project area in the SCS;
- located within half a mile of a major transit stop or high-quality transit corridor;
- comprised of at least 50 percent residential use based on total building square footage, or as little as 26 percent residential use if the project has a floor area ratio of not less than 0.75; and
- built out with a minimum of 20 dwelling units per acre (PRC § 21155).

One of three potential streamlining benefits may apply to a TPP pursuant to SB 375, as described below and in **Table 1.1-1**.

First, TPPs that meet a detailed list of criteria set forth in PRC Section 21155.1 are statutorily exempt from CEQA. Due to the extensive list of criteria that must be met to achieve this exemption, the exemption may only be available in limited circumstances.

Second, a TPP that does not qualify for the statutory exemption may be eligible to comply with CEQA using a Sustainable Communities Environmental Assessment (SCEA). An SCEA is similar to a streamlined negative declaration or mitigated negative declaration that requires a 30-day public review period (rather than the otherwise available 20-day public review period). An SCEA is available for a TPP that does not result in any potentially significant environmental impacts after mitigation and that has incorporated all feasible mitigation

measures, performance standards, or criteria set forth in the prior applicable EIRs including the EIR for the RTP/SCS. An SCEA is not required to discuss (1) growth inducing impacts, or (2) any project specific or cumulative impacts from cars and light-duty truck trips generated by the project on global warming or the regional transportation network (PRC Sections 21155.2 (b)(1), 21159.28 (a)). And, unlike a negative declaration or mitigated negative declaration, a lead agency's decision to approve a TPP based on an SCEA is reviewed, if challenged, by a court under the substantial evidence standard (PRC Section 21155.2(b)(7)).

Third, a TPP that will result in one or more potentially significant impacts after mitigation may be reviewed using a tiered TPP EIR as established by PRC Section 21155.2(c). A tiered TPP EIR is only required to address the significant or potentially significant effects of the TPP on the environment and is not required to include a discussion of (1) growth inducing impacts, (2) any project specific or cumulative impacts from cars and light-duty truck trips generated by the project on global warming or the regional transportation network, (3) cumulative effects that have been adequately addressed and mitigated in prior applicable certified EIRs, (4) off-site alternatives, or (5) a reduced density alternative to address effects of car and light truck trips generated by the TPP (PRC Sections 21155.2 (c), 21159.28(a) and (b)).

In addition to the benefits provided for TPPs, SB 375 provides streamlining benefits for residential or mixed-use residential projects, as defined in PRC Section 21159.28(d), that are consistent with the use designation, density, building intensity, and applicable policies specified for the project area in the SCS. Projects eligible for streamlining must incorporate mitigation measures required by an applicable prior environmental document, such as this EIR if it is certified by MTC and ABAG. EIRs for qualifying residential or mixed-use residential projects are not required to include a discussion of (1) growth inducing impacts, (2) any project specific or cumulative impacts from cars and light-duty truck trips generated by the project on global warming or the regional transportation network, or (3) a reduced density alternative to address effects of car and light truck trips generated by the project (PRC Section 21159.28 (a)-(b)).

SB 375 Streamlining Requirements

Table 1.1-1 lists the prerequisites and qualifications for Residential/Mixed-Use Residential, TPPs, and Sustainable Communities projects and the corresponding CEQA streamlining benefits under SB 375. Projects that use the SB 375 CEQA streamlining benefits would still need to obtain discretionary permits or other approvals from the lead agency and the local jurisdiction, in accordance with local codes and procedures, including any agreements related to zoning, design review, use permits, and other local code requirements. Other development projects that do not fall into any of these categories could still use this EIR for other CEQA tiering benefits – see the following section on "Other Tiering Opportunities."

Table 1.1-1 SB 375 Requirements for CEQA Streamlining Related to an SCS

Project Designation	Mixed Use Residential Project	Transit Priority Project	Sustainable Communities Project
Prerequisites	◢ MPO adopts an SCS or APS that can achieve region's GHG emissions reduction target ◢ ARB accepts the SCS or APS ◢ Proposed project is a residential or residential mixed-use project consistent with the general use designation, density, building intensity, and applicable policies specified for the project area in the SCS or APS ◢ Project has incorporated applicable mitigation measures or performance standards required by a prior environmental document ◢ Regardless of any CEQA streamlining or exemption benefits that a project receives from the SB 375 CEQA provisions, the lead agency must consider the merits of the project before moving forward with project approvals in accordance with local codes and procedures		
Qualifications	◢ At least 75% of total building square footage for residential use	◢ At least 50% of total building square footage for residential use OR ◢ If 26%-50% of total building square footage is nonresidential, a minimum FAR of 0.75	◢ Everything for Transit Priority Project PLUS: ◢ Served by existing utilities ◢ Applicant pays all applicable fees ◢ Does not contain wetlands or riparian areas

Table 1.1-1 SB 375 Requirements for CEQA Streamlining Related to an SCS

Project Designation	Mixed Use Residential Project	Transit Priority Project	Sustainable Communities Project
		◢ Minimum net density of 20 du/acre ◢ Within 0.5 miles of major transit stop or high-quality transit corridor included in the RTP	◢ Does not have significant value as a wildlife habitat and does not harm any protected species ◢ Not on the Cortese List ◢ No risks from hazardous substances ◢ No impacts to historic resources ◢ No wildfire, seismic, flood, public health risk ◢ Not on developed open space ◢ Buildings are 15% more energy-efficient than Title 24 ◢ Landscaping uses 25% less water than average households ◢ Site is no more than eight acres ◢ No more than 200 housing units ◢ No net loss of affordable housing within project area ◢ No building greater than 75,000 square feet ◢ Does not conflict with nearby industrial uses ◢ Meets minimum affordable housing requirements as prescribed in SB 375 OR in- ◢ lieu fee paid OR 5 acres of open space per 1,000 residents provided
Streamlining Benefits	Environmental documents are **not** required to reference, describe or discuss: ◢ Growth-inducing impacts ◢ Impacts from car and light-duty truck trips on global warming or ◢ the regional transportation network ◢ A reduced-density alternative to project (EIRs only)	The Lead Agency may determine whether to pursue a Sustainable Communities Environmental Assessment (SCEA) or a Limited Environmental Review SCEA: ◢ Lead agency only prepares an initial study which identifies all significant impacts, except for growth-inducing impacts and impacts from car and ◢ light-duty truck trips on ◢ global warming or the regional transportation network ◢ Cumulative effects identified and mitigated for in previous applicable EIR's shall NOT be treated as cumulatively considerable for the project ◢ Shall contain mitigation measures to avoid or mitigate to a level of insignificance all significant effects identified ◢ 30 day public comment period ◢ May be approved after the lead agency conducts a public hearing, reviews comments received, and finds that all potentially significant effects have been identified, analyzed, and mitigated to a level of insignificance	*Exempt from CEQA* Lead agency may file a Notice of Exemption upon project approval

Table 1.1-1 SB 375 Requirements for CEQA Streamlining Related to an SCS

Project Designation	Mixed Use Residential Project	Transit Priority Project	Sustainable Communities Project
		◢ The fee to appeal a planning commission decision to the decision-making body shall not exceed $500 ◢ Deferential review standard – the burden of proof for legal challenge is on the petitioner/plaintiff ◢ Limited Analysis EIR ◢ First two bullets of SCEA plus the EIR does not need to analyze off-site alternatives to the project	

STREAMLINING UNDER SB 226

In 2011, the legislature enacted SB 226 to establish additional streamlining benefits applicable to infill projects that are consistent with the requirements set forth in CEQA Guidelines section 15183.3 (PRC Sections 21094.5 (c), 21094.5.5). Residential, commercial and retail, public office buildings, transit stations, and schools are eligible for this streamlining provided they meet the following requirements: (1) are located in an urban area on a site that has been previously developed or adjoins existing qualified urban uses on at least 75 percent of the site's perimeter; (2) satisfy the performance standards provided in Appendix M of the CEQA Guidelines; and, (3) are consistent with the general use designation, density, building intensity, and applicable policies specified for the project area in either a sustainable communities strategy or an alternative planning strategy, with some exceptions. For these projects, an "Infill EIR" is only required to analyze effects on the environment that are specific to the project or to the project site and were not addressed as significant effects in a prior planning level EIR unless new information shows the effects will be more significant than described in the prior EIR (PRC Section 21094.5 (a)(1)). Moreover, an Infill EIR is not required to consider potentially significant environmental effects of the project that may be reduced to a less-than-significant level by applying uniformly applicable development policies or standards adopted by the city, county, or the lead agency (PRC Section 21094.5 (a)(2)). The Infill EIR is not required to discuss (1) alternative locations, project densities, and building intensities, or (2) growth inducing impacts.

Unlike the CEQA streamlining benefits established by SB 375, the benefits created by SB 226 may apply to non-residential projects including qualifying commercial, retail, transit station, school, or public office building projects (CEQA Guidelines, Section 15183.3 (f)(1)).

STREAMLINING UNDER SB 743

SB 743 (2013) (PRC Section 21099 and 2155.4) created an exemption from CEQA for certain projects that are consistent with a Specific Plan. (See Public Resources Code Section 21155.4.) A Specific Plan is a local plan that contains specific policies and development regulations for a defined area such as a downtown core or along a transit corridor. The exemption applies if a project meets all of the following criteria:

1. It is a residential, employment center, or mixed use project;

2. It is located within a transit priority area;

3. The project is consistent with a specific plan for which an environmental impact report was certified; and

4. It is consistent with an adopted SCS or alternative planning strategy.

The exemption cannot be applied if the project would cause new or worse significant environmental impacts compared to what was analyzed in the environmental impact report for the specific plan. In that case, supplemental environmental review must be prepared.

SB 743 also specifies that aesthetic and parking impacts of residential, mixed-use residential, or employment center uses on infill sites within a TPA shall not be considered significant effects on the environment. (See Public Resources Code Section 21099(d).)

OTHER TIERING OPPORTUNITIES

Finally, for all other types of projects proposed to be carried out or approved by a lead agency within the region, the lead agency may utilize this EIR for the purposes of other allowed CEQA tiering (PRC Sections 21068.5, 21093-21094, CEQA Guidelines 15152, 15385). Tiering is the process by which general matters and environmental effects in an EIR prepared for a policy, plan, program or ordinance are relied upon by a narrower second-tier or site-specific EIR (PRC Section 21068.5). Moreover, by tiering from this EIR (if certified by MTC and ABAG), a later tiered EIR would not be required to examine effects that (1) were mitigated or avoided in this EIR, (2) were examined at a sufficient level of detail in this EIR to enable those effects to be mitigated or avoided by site specific revisions, the imposition of conditions, or by other means in connection with the approval of the later project, or (3) constitute cumulative effects and were adequately addressed in this EIR (PRC Section 21094).

1.2 PROJECT DESCRIPTION

1.2.1 Introduction

The proposed project is the 2017 update to the Regional Transportation Plan (RTP) for the San Francisco Bay Area (Bay Area or region) as well as the region's Sustainable Communities Strategy (SCS), entitled Plan Bay Area 2040, and referred to herein as the proposed Plan. The proposed Plan contains two components: 1) a regional strategy for accommodating household and employment growth projected to occur the Bay Area by 2040; and 2) a transportation strategy for the region based on expected revenues. The proposed Plan was developed to achieve targets for greenhouse (GHG) emissions reductions, consistent with the Sustainable Communities and Climate Protection Act of 2008 (Senate Bill [SB} 375), lawsuit settlement agreements, and other regional goals.

An RTP, also sometimes referred to as a Metropolitan Transportation Plan or Long-Range Transportation Plan, is the mechanism used in California by both Metropolitan Planning Organizations (MPOs) and Regional Transportation Planning Agencies (RTPAs) to conduct long-range (minimum 20-year) planning for the maintenance, modernization, and expansion of the region's multimodal transportation system. The SCS is a growth strategy for the region which, in combination with transportation policies and programs, strives to achieve State GHG reduction targets.

The proposed Plan document identifies the plan purpose and goals, tracks trends and evaluates project performance, details financial assumptions and expenditures, profiles key transportation investments, and sets forth land use and transportation strategies that the region could pursue over the plan horizon. See the Draft Plan Bay Area 2040 and supplementary reports document for full details, or visit the Plan Bay Area website for general information. These can be found at:

- http://2040.planbayarea.org,
- http://2040.planbayarea.org/reports, and
- http://www.planbayarea.org

This section describes the regional setting, growth forecasts and regulatory framework that provide the context for the proposed Plan. This background information is followed by a description of the proposed Plan, including the Plan purpose and objectives, key components, growth strategy, implementation strategy, and proposed programs (see section 1.2.4, below).

1.2.2 Regional Location and General Setting

REGION

The San Francisco Bay Area region includes nine counties that may be aggregated geographically into four subareas: North Bay (Marin, Napa, Solano, and Sonoma counties); East Bay (Alameda and Contra Costa counties); South Bay (Santa Clara County); and the West Bay (San Francisco and San Mateo counties). There are 101 cities spread throughout these nine counties. The total area of the region is approximately 4.4 million acres (7,000 square miles). The region is bordered by Mendocino, Lake, and Yolo counties to the north; Sacramento, San Joaquin, Stanislaus, and Merced counties to the east; San Benito, Monterey, and Santa Cruz to the south; and the Pacific Ocean to the west. In 2015, the region had a population of 7.57 million, which is approximately 20 percent of California's population. Roughly 18 percent of the region's approximately 4.4 million acres was developed in 2010 (California Department of Conservation 2015, Bay Area Open Space Council 2014). The undeveloped area includes open space and agricultural lands as well as water bodies (excluding the San Francisco Bay) and parks. Approximately 29 percent of the region is identified as protected open space (Bay Area Open Space Council 2014). **Figure 1.2-1** illustrates the regional location of the Bay Area. More information about the physical settings is provided by environmental issue area in the settings sections throughout Chapter 2 of this EIR.

Figure 1.2-1
Regional Location

Map Data Sources: Metropolitan Transportation Commission (MTC), 2016; Tom Tom North America, 2015.

COUNTIES

A brief summary of the region by subarea and county is provided below:

North Bay Counties

Marin County covers an area of approximately 518 square miles, containing 11 incorporated cities: Belvedere, Corte Madera, Fairfax, Larkspur, Mill Valley, Novato, Ross, San Anselmo, San Rafael, Sausalito, and Tiburon); and 8 unincorporated communities. San Rafael is the city with the highest population level in the county, with approximately 58,000 people. Overall, the county has approximately 252,000 residents.

Napa County covers an area of approximately 789 square miles, and contains a population of approximately 140,000 people. There are five incorporated cities within Napa County: American Canyon, Calistoga, Napa, St. Helena, and Yountville; the city with the highest population level is Napa where approximately 80,000 people reside. Napa County also contains 20 unincorporated communities.

Solano County is home to approximately 413,000 people, over an area of 906 square miles. There are seven incorporated cities in Solano County: Benicia, Dixon, Fairfield, Rio Vista, Suisun City, Vacaville, and Vallejo; and 8 unincorporated communities. Of these incorporated cities, Vallejo has the highest population with approximately 116,000 people.

Sonoma County has a population of approximately 484,000 people, and covers an area of approximately 1,768 square miles. There are nine incorporated cities within Sonoma County: Cloverdale, Cotati, Healdsburg, Petaluma, Rohnert Park, Santa Rosa, Sebastopol, Sonoma, and Windsor, and over 25 unincorporated communities. Of these cities, Santa Rosa has the highest population, with approximately 168,000 residents.

East Bay Counties

Alameda County is home to over 1.5 million people living in 14 incorporated cities as well as in six unincorporated communities and rural areas. Total land area measures approximately 813 square miles. Incorporated cities include Alameda, Albany, Berkeley, Dublin, Emeryville, Fremont, Hayward, Livermore, Newark, Oakland, Piedmont, Pleasanton, San Leandro, and Union City. The City of Oakland has the highest population among the incorporated cities, with approximately 400,000 people. Oakland is the third most populated jurisdiction in the region.

Contra Costa County has a population of more than 1,000,000 residents. This county contains 19 incorporated cities (Antioch, Brentwood, Calyton, Concord, Danville, El Cerrito, Hercules, Lafayette, Martinez, Moraga, Oakley, Orinda, Pinole, Pittsburg, Pleasant Hill, Richmond, San Pablo, San Ramon, and Walnut Creek) and many established communities in the unincorporated area. The city with the highest population level is Concord with approximately 125,000 people. Contra Costa County covers an area of approximately 804 square miles.

South Bay Counties

Santa Clara County is home to approximately 1,782,000 people, and covers approximately 1,302 square miles. Thirteen incorporated cities are located within Santa Clara County: Campbell, Cupertino, Gilroy, Los Altos, Milpitas, Monte Sereno, Morgan Hill, Mountain View, Palo Alta, San Jose, Santa Clara, Saratoga, and Sunnyvale; and two incorporated towns: Los Gatos and Los Altos Hills. Of the incorporated cities and towns, the highest population is located in San Jose where over 1,000,000 people reside. The City of San Jose is the most populated jurisdiction in the Bay Area region.

West Bay Counties

San Francisco County and the City of San Francisco cover the same physical area, covering approximately 48 square miles. Approximately 865,000 people reside within the City and County of San Francisco. San Francisco is the second most populated City in the Bay Area region.

San Mateo County covers approximately 744 square miles and is home to approximately 718,000 people. The county includes 16 incorporated cities: Belmont, Brisbane, Burlingame, Daly City, East Palo Alto, Foster City, Half Moon Bay, Menlo Park, Millbrae, Pacifica, Portola Valley, Redwood City, San Bruno, San Carlos, San Mateo, and South San Francisco and eight unincorporated communities. Of the incorporated cities, Daly City has the highest population level of approximately 100,000 people.

1.2.3 Project Background

The proposed Plan was developed according to State and Federal requirements for RTPs and SCSs. The following discussion provides an overview of the responsible planning agencies, ABAG and MTC, and the Federal and State requirements associated with preparation of an RTP and SCS.

AGENCIES

The Metropolitan Transportation Commission (MTC) is the transportation planning, financing, and coordinating agency for the nine-county San Francisco Bay Area. It covers the same geographic area as the Association of Bay Area Governments (ABAG). MTC is the federally designated Metropolitan Planning Organization (MPO) and the state-designated Regional Transportation Planning Agency (RTPA) for the region. MTC is responsible for preparing and updating the Regional Transportation Plan (RTP) every four years. MTC was formed in 1970 and functions under state and federal law as the regional transportation planning agency (RTPA) and metropolitan planning organization (MPO) with a focus on transportation planning, distribution of federal transportation funding, and air quality conformity. ABAG is a joint powers agency formed in 1961 pursuant to state law and serves as the Council of Governments (COG) for the region. As required by state law, ABAG updates the Regional Housing Need Allocation (RHNA) every eight years and allocates specific housing targets to individual cities and counties. ABAG focuses on regional land use, housing, environmental quality, and economic development.

FEDERAL AND STATE REQUIREMENTS

Metropolitan Planning General Requirements

Under the FAST (Fixing America's Surface Transportation [Public Law 114-94]) Act and MAP-21 (Moving Ahead for Progress in the 21st Century Act [Public Law 112-141]), the U.S. Department of Transportation (USDOT) requires that metropolitan planning organizations, such as MTC, prepare long-range RTPs and update them every four years if they are in areas designated as "nonattainment" or "maintenance" for federal air quality standards. Prior to enactment of MAP-21, the primary federal requirements regarding RTPs were included in the metropolitan transportation planning rules—Title 23 CFR Part 450 and 49 CFR Part 613. The FAST Act and MAP-21 make a number of changes to the statutes that underpin these regulations. Key federal requirements for long range plans include the following:

- RTPs must be developed through an open and inclusive process that ensures public input; seeks out and considers the needs of those traditionally under served by existing transportation systems; and consults with resource agencies to ensure potential problems are discovered early in the RTP planning process;
- RTPs must be developed for a period of not less than 20 years into the future; RTPs must reflect the most recent assumptions for population, travel, land use, congestion, employment, and economic activity;
- RTPs must have a financially constrained element, transportation revenue assumptions must be reasonable, and the long range financial estimate must take into account construction-related inflation costs;
- RTPs must include a description of the performance measures and performance targets used in assessing the performance of the transportation system;

- RTPs must include a system performance report evaluating the condition and performance of the system with respect to performance targets adopted by the state that detail progress over time;
- RTPs may include multiple scenarios for consideration and evaluation relative to the state performance targets as well as locally-developed measures.
- RTPs must conform to the applicable federal air quality plan, called the State Implementation Plan (SIP), for ozone and other pollutants for which an area is not in attainment (MTC, 2016b);[1] and
- RTPs must consider planning factors and strategies in the local context (California Transportation Commission, 2010).[2]

Regional Transportation Plan Requirements

An RTP outlines the region's goals and strategies for meeting current and future mobility needs, providing a foundation for transportation planning and funding decisions by local, regional, and state officials that are ultimately aimed at achieving a coordinated and balanced transportation system. In addition, an RTP identifies the region's transportation needs, sets forth actions, programs, and a plan of projects to address the needs consistent with adopted regional strategies and goals, and documents the financial resources needed to implement the RTP. The process for development of the RTP takes into account all modes of transportation and is accompanied by a continuing, cooperative, and comprehensive planning approach that is also performance driven and outcome-based, consistent with the provisions of MAP-21 and the FAST Act.

The RTP must also comply with Section 65080 of the California Government Code. The state requirements largely mirror the federal requirements and require each transportation planning agency in urban areas to adopt and submit an updated RTP to the California Transportation Commission (CTC) and the California Department of Transportation (Caltrans) every four years. To ensure a degree of statewide consistency in the development of RTPs, the CTC, pursuant to Government Code Section 14522, adopted RTP Guidelines. The RTP Guidelines include a requirement for program-level performance measures, which include objective criteria that reflect the goals and objectives of the RTP. The RTP Guidelines are intended to assist MPOs and RTPAs with development of their RTPs to be consistent with federal and state planning requirements. An RTP is used to guide the development of the Federal Transportation Improvement Program (FTIP), a federally mandated four-year program of all regionally important surface transportation projects and all projects that will receive federal funding, as well as other transportation programming documents and plans. The 2017 RTP Guidelines were adopted on January 18, 2017; however, the proposed Plan follows the 2010 RTP Guidelines because those were the approved guidelines at the time development of the proposed Plan began.

The 2010 RTP guidelines identify four elements that should be included in an RTP/SCS:

1. **Policy Element** that describes the transportation issues in the region, identifies and quantifies regional needs, and describes the desired short-range and long-range transportation goals, and objectives and policy statements.
2. **Sustainable Communities Strategy (SCS)** that identifies a forecasted development pattern that, when integrated with the transportation network, and other transportation measures and policies, will reduce regional GHG emissions from automobiles and light trucks, if there is a feasible way to do so.
3. **Action Element** that describes the programs and actions necessary to implement the plan and assigns implementation responsibilities

[1] See MTC's web page, http://www.mtc.ca.gov, for more information about the Air Quality Conformity Task Force meetings and materials related to the federal conformity analysis.

[2] For more details on the planning factors, see California Transportation Commission, Regional Transportation Guidelines, 2010.

4. **Financial Element** that summarizes the cost of plan implementation constrained by a realistic projection of available revenues

The RTP guidelines contain the RTP Checklist, which establishes a minimum standard for developing the RTP.

Sustainable Communities Strategy Requirements

Pursuant to the Sustainable Communities and Climate Protection Act of 2008 (Senate Bill (SB) 375), the SCS is a required component of the RTP. SB 375 directs the California Air Resources Board to set regional targets for reducing GHG emissions. The law establishes a "bottom up" approach to ensure that cities and counties are involved in the development of regional plans to achieve those targets. SB 375 requires that an MPO prepare and adopt an SCS that sets forth a forecasted regional development pattern that reduces GHG emissions associated with the land use and transportation network, measures, and policies. SB 375 is part of California's overall strategy to reach GHG emissions reduction goals as set forth by Assembly Bill (AB) 32, Senate Bill (SB) 32, and Executive Orders S-03-05 and B-30-15. According to Section 65080(b)(2)(B) of the California Government Code (CGC), the SCS must:

- identify existing land uses;
- identify areas to house long-term population growth;
- identify areas to accommodate an eight-year projection of regional housing needs;
- identify transportation needs and the planned transportation network,
- consider resource areas and farmland;
- consider state housing goals and objectives;
- set forth an integrated forecasted development pattern and transportation network that will reduce GHG emissions; and
- comply with federal Clean Air Act requirements for developing an RTP.

As stated above, ABAG, the COG for the Bay Area, generally focuses on regional land use, housing, environmental quality, and economic development. MTC functions under state and federal law as the RTPA and MPO and generally focuses on transportation planning, distribution of federal transportation funding, and air quality conformity. SB 375 recognizes the bifurcated roles of each agency. Under CGC section 65080(b)(2)(C) ABAG is responsible for the portions of the SCS that address housing policy:

- identify the general location of uses, residential densities, and building intensities within the region;
- identify areas within the region sufficient to house all the population of the region, including all economic segments of the population, over the course of the planning period of the regional transportation plan taking into account net migration into the region, population growth, household formation and employment growth;
- identify areas within the region sufficient to house an eight-year projection of the regional housing need for the region pursuant to Section 65584;
- gather and consider the best practically available scientific information regarding resource areas and farmland in the region as defined in subdivisions (a) and (b) of Section 65080.01; and
- consider the state housing goals specified in Sections 65580 and 65581.

MTC is responsible for the portions of the SCS addressing transportation:

- identify a transportation network to service the transportation needs of the region; and
- allow the regional transportation plan to comply with Section 176 of the federal Clean Air Act (42 U.S.C. Sec. 7506).

Both agencies are jointly responsible for the following:

- set forth a forecasted development pattern for the region, which, when integrated with the transportation network, and other transportation measures and policies, will reduce the greenhouse gas emissions from automobiles and light trucks to achieve, if there is a feasible way to do so, the greenhouse gas emission reduction targets approved by the state board.

SB 375 requires the designated transportation planning agency (MTC) to "prepare and adopt" both the RTP and the SCS (CGC Section 65080 (a), (b)(2)(B), and (b)(2)(H).

2013 PLAN LAWSUIT AND SETTLEMENT AGREEMENTS

Shortly after its adoption in July 2013, four lawsuits were filed challenging adoption of Plan Bay Area and certification of its EIR. The suits, based on CEQA and other California laws, were filed in August and October, 2013. Two of the four suits were settled out of court. Of the remaining two lawsuits, one has been fully litigated with a final trial court judgment in favor of MTC and ABAG, affirmed by the court of appeal. The final lawsuit remains pending on appeal, following a trial court ruling in favor of MTC and ABAG:

- In February 2014, MTC and ABAG agreed to settle with the Building Industry Association (BIA) of the Bay Area. More detail on the components of this settlement agreement and the agencies' compliance with its terms appears in **Table 1.2-1**.
- In June 2014, MTC and ABAG agreed to settle with the Sierra Club and Communities for a Better Environment (CBE). More detail on the components of the settlement agreement and the agencies' compliance with its terms appears in **Table 1.2-2**.
- In August 2014, a suit filed by Bay Area Citizens, represented by Pacific Legal Foundation, failed in Alameda Superior Court. The judge upheld adoption of the Plan and certification of the EIR. Bay Area Citizens appealed, and following briefing and oral argument, the court of appeal affirmed the trial court ruling in favor of MTC and ABAG. There are no further proceedings in this case.
- In February, 2015, a suit filed by the Post Sustainability Institute failed in Alameda Superior Court. The judge upheld approval of the Plan and denied declaratory and injunctive relief. The Post Sustainability Institute has appealed and the parties are awaiting a hearing before the court of appeal.

Table 1.2-1 BIA Settlement Agreement Components and Compliance Information

Agreement Paragraph	Agency Obligation	Timing	Where Addressed	Compliance
6a.	**Regional Housing Control Total and Forecasted Development Pattern.** The SCS shall set forth a forth a forecasted development pattern for the region that includes the Regional Housing Control Total, which shall have no increase in in-commuters over the baseline year for the SCS.	Regional Housing Control Total must be determined and disclosed prior to issuance of an NOP for the SCS/RTP EIR, or if no EIR is prepared, then at least six months before a draft SCS is released for public review.	The Agencies shall use the adopted methodology for determining the RHCT in the final Plan Bay Area **SCS.**	Yes, ABAG adopted the RHCT on February 1, 2016 and it was used to develop the forecasted development pattern in the SCS. The regional housing control total was determined to be 820,400 (2010-2040). For more discussion on the RHCT see discussion of planning assumptions below

Table 1.2-1 BIA Settlement Agreement Components and Compliance Information

Agreement Paragraph	Agency Obligation	Timing	Where Addressed	Compliance
6b.	**Validation.** The Agencies shall implement robust monitoring of regional development patterns, at a minimum tracking building permit issuance, number of units in PDAs, and type of residential development.	Monitoring would be done prior to release of the SCS.	The results shall inform each update of the Plan Bay Area **SCS**.	Yes, ABAG has tracked residential permitting activity in PDA/Non-PDA areas, and made this data available on its website, http://abag.ca.gov/planning/housing/datasets.html#tracking. In addition, MTC is tracking housing growth through its Vital Signs regional monitoring initiative, http://www.vitalsigns.mtc.ca.gov/housing-growth.
6c.	**Feasibility Analysis**. The Agencies shall prepare an update to the PDA Feasibility Analysis to include analysis of local land use policies, market demand, financial feasibility, site related issues, financing, and infrastructure needs.	The update shall be published prior to issuance of an NOP for the SCS/RTP EIR, or if no EIR is prepared, then at least six months before a draft SCS is released for public review.	The results of the analysis shall inform each update of the Plan Bay Area **SCS**.	Yes, MTC and ABAG prepared an update to the PDA feasibility analysis prior to the development of the Plan, available at: http://planbayarea.org/sites/default/files/pdf/PDA_Assessment_Update_Final.pdf.
6d.	**Assumptions and Disclosure**. The Agencies shall disclose and accept public comments on the key assumptions and descriptors to be used in preparation of each SCS update.	Key assumptions shall be disclosed prior to preparation of a document comparable to the Initial Vision Scenario setting forth development scenarios, or if no such document is prepared, assumptions shall be disclosed at least six months prior to public release of a draft SCS. Key descriptors shall be disclosed with release of the SCS.	Appropriate assumptions and descriptors are to be used in preparation of the final Plan Bay Area **SCS.**	Yes, ABAG consulted with a technical advisory committee in the initial stages of design and before selection of the first draft forecast. The projections process was also presented in workshop and conference settings ABAG and MTC held public workshops on scenario development in October 2015. As the scenarios became more refined, modeling assumptions were shared at standing committees and working groups until their public review in Spring 2016. The Draft Preferred Scenario was released August 31, 2016, including land use modeling assumptions influencing the land use pattern. Likewise, the Final Preferred Scenario including modeling assumptions were released and presented in November 2016 prior to adoption of the Final Preferred Scenario. The Draft Plan was released on March 31, 2017.

Table 1.2-2 CBE Settlement Agreement Components and Compliance Information

Agreement Paragraph	Agency Obligation	Timing	Where Addressed	Compliance
5a.	Greenhouse Gas Analysis. The analysis of direct and indirect total on-road transportation GHG emission over the planning period must include disclosure of the total amount of emissions, with and without reductions achieved from state -wide reduction programs under AB 32 (Scoping Plan, Pavley, LCFS).	The analysis must be prepared in time to be included in the Plan Bay Area EIR.	The Plan Bay Area EIR shall include a clear and transparent analysis of the GHG associated with the updated Plan, including land use-related emissions, and a separate showing of on-road transportation emissions.	Yes, this analysis is provided in Chapter 2.5, "Climate Change and Greenhouse Gasses" of this Draft EIR (see Impact 2.5-1).
5b.	Analysis of Impacts of Express Lanes. Where made available for public review by Bay Area Infrastructure Financing Authority and Caltrans, the Agencies shall provide a summary of the results of any technical reports analyzing greenhouse gas emissions and VMT impacts of express lane conversions on Interstates 680 and 880, as well as the use of express lanes by low-income populations, and analyses prepared by Caltrans in conjunction with other responsible agencies for other express lane projects, such as those planned for 101 and 580.	Reports prepared following April 8, 2014 shall be prepared and provided prior to the release of the NOP of the next draft EIR for any update of Plan Bay Area and no later than ninety (90) days after the technical reports have been made available by Caltrans and its partners.	The results of the technical analyses on greenhouse gas emissions and VMT effects prepared for express lane projects described in Paragraph 5(b) shall inform the environmental analysis of the Plan Bay Area EIR. (5.b.i.). The results of the technical analysis of use of new express lanes by low-income populations described in Paragraph 5(b) shall inform the environmental analysis included in any Plan Bay Area EIR. (5.b.iii.).	Yes, the required summaries are posted on http://www.planbayarea.org/2040-plan/quick-facts/legal-settlements/legal-documents. The results of the technical analyses of GHG and VMT informed the EIR analysis and are discussed in Section 2.1, "Transportation" and 2.5, "Climate Change and Greenhouse Gases," of this Draft EIR. The results of the technical analyses of use of new express lanes by low-income populations informed the EIR analysis.
5b.	Analysis of Impacts of Express Lanes. The Agencies shall disclose the effects of financing the construction of express lanes by using toll bridge revenues, and shall disclose the effect of such financing on the current uses of toll bridge revenues.	Disclosures regarding the effects of financing shall be made thirty (30) days prior to the release of the NOP of the next draft EIR for any update of Plan Bay Area.	The agreement includes no requirement for incorporation of the required disclosure in the Plan Bay Area SCS or EIR.	Yes, MTC has made the required disclosures available on its website, http://www.planbayarea.org/2040-plan/quick-facts/legal-settlements/legal-documents.
5b.ii.	Effects on Interregional Car and Light Truck Travel. An analysis of the extent to which the construction of new express lanes will facilitate additional interregional car and light truck travel must be prepared.	Prior to completion of the EIR for Plan Bay Area.	The analysis shall inform the environmental analysis included in any EIR prepared for an update of Plan Bay Area.	Yes, MTC has prepared an analysis dated March 1, 2017, the results of which are discussed in Section 2.1 "Transportation" of this Draft EIR.
5c.	Analysis of PDA Performance. The Agencies shall update the PDA Feasibility Analysis in consultation with stakeholders, and shall include analysis of local land use policies, market demand, financial feasibility, site related issues, financing,	Any update to the Feasibility Analysis shall be published prior to issuance of an NOP for the EIR prepared for the updated Plan Bay Area.	The results of the analysis shall inform each update of Plan Bay Area to which this Agreement applies.	Yes, the Agencies prepared an analysis of all of the required factors, to the extent information was made available by local agencies, for each PDA and have made it available on the MTC website,

Table 1.2-2 CBE Settlement Agreement Components and Compliance Information

Agreement Paragraph	Agency Obligation	Timing	Where Addressed	Compliance
	infrastructure needs, current transit availability, readiness for development, environmental factors, housing and jobs information, and public health and environmental information for each PDA, to the extent local jurisdictions have provided the necessary information.			http://www.planbayarea.org/2040-plan/quick-facts/legal-settlements/legal-documents.
5d.	Analysis of Freight Movement. The Agencies shall create a Regional Freight New Technologies Task Force that will study and recommend freight strategies and projects that advance zero-emission and near zero-emission freight movement in a Freight Emissions Reduction Action Plan	Prior to release of the 2017 RTP.	The Freight Emissions Reduction Action Plan shall be included in the 2017 RTP.	Yes, a task force was formed September 2015 to study zero and near-zero emissions truck and rail strategies to develop the Freight Emissions Reduction Action Plan released October 2016. The task force consisted of public and private partners and industry advocates. The Freight Emissions Reduction Action Plan is provided as a Supplemental Report attached to the proposed Plan.
5e.	Healthy Infill Guidelines. The Agencies shall partner with BAAQMD to make the "Planning Healthy Places" healthy infill guidelines available to the public. These guidelines will include policies and best practice measures for local agencies to implement and ways to address air quality-related health impacts. The Agencies shall partner with BAAQMD to encourage local jurisdictions to develop Community Risk Reduction Plans as a proactive approach for communities to achieve the greatest reductions in emissions and exposure to toxic air contaminants and particulates.	Agencies to assist BAAQMD in making the guidelines available to the public prior to the release of the NOP of the next Plan Bay Area Draft EIR.	The Plan Bay Area update shall consider, and to the extent applicable, use the Healthy Infill Guidelines, as well as the data, maps and any related analysis, information, and identified mitigations from the Healthy Infill Guidelines in the update Plan Bay Area The Agencies shall consider the data, maps and any related analysis from the Healthy Infill Guidelines in the update to the Plan Bay Area Draft EIR.	Yes, the Planning Healthy Places guidelines were issued by BAAQMD on May 20, 2016 and are discussed in Section 2.2 "Air Quality" of this Draft EIR (see discussion of toxic air contaminants under Section 2.2.1, "Environmental Setting," and Impact 2.2-5).

PLAN UPDATE PROCESS

The most recent RTP/SCS for the Bay Area region—Plan Bay Area—was adopted in 2013. State law requires that it be updated every four years. As the Bay Area's first RTP to include an SCS, the 2013 plan promoted more compact, mixed-use residential and commercial neighborhoods near transit. The proposed Plan—Plan Bay Area 2040—is a limited and focused update that builds upon the growth pattern and strategies developed in the original Plan Bay Area but with updated planning assumptions that incorporate key economic, demographic and financial trends from the last four years.

The process to develop the proposed Plan began in February 2015 with the approval of the Public Participation Plan for Plan Bay Area 2040. Development of the proposed Plan was based on federal and state requirements,

input from local jurisdictions and other stakeholders, and accepted analytic and forecasting methods. The Public Participation Plan for Plan Bay Area 2040 summarizes five components for development of the Plan:

- **Policy Element**: The policy element establishes goals and a performance framework for outcomes the region desires to achieve. The goals and policies for the proposed Plan were based on the 2013 Plan. Performance targets provide a framework to evaluate land use scenarios and transportation investments and policies.

- **Regional Forecasts**: Regional forecasts consist of regional jobs, housing, and population forecasts and an estimate of total transportation funding available for at least 20 years.

- **Project Performance**: The project performance component identifies potential transportation projects; evaluates those projects to determine their cost-effectiveness and contribution toward achieving the Plan's adopted performance targets; provides information on what is needed to operate and maintain the region's transportation network; and, considers the effects of the transportation projects on the region's low-income and minority populations.

- **Scenario Analysis**: With the goals and targets clearly identified, MTC and ABAG formulated possible scenarios consisting of combinations of land use patterns and transportation investments. Scenarios are evaluated based on their ability to achieve the performance targets. This evaluation and public feedback is used to develop the preferred scenario (i.e., proposed Plan). A brief summary of each scenario follows, and more information can be found in Section 3.1:

  - **Main Streets:** locates population and employment growth in the downtowns of every city in the Bay Area. Transportation investments focus on an expansion of express lanes and highway widenings.

  - **Connected Neighborhoods:** locates population and employment growth in medium-sized cities with increased access to the region's major rail services – BART and Caltrain. Transportation investments are focused on modernizing and expanding our current transportation infrastructure.

  - **Big Cities:** concentrates population and employment growth in the Bay Area's three largest cities: San Jose, San Francisco and Oakland. The transportation infrastructure serving the region's core is modernized and expanded.

- **Plan Development: EIR and Plan:** A programmatic EIR (this document), equity analysis, and air quality conformity analysis are used by decision makers and stakeholders to comment on the Plan and inform the policy discussions and public dialogue leading to the Final Plan. Consideration of adoption of the Final Plan is anticipated to occur in summer 2017.

Public Outreach

The Public Participation Plan for the proposed Plan was developed to ensure that the public would have ample opportunities for early and continuing participation in critical transportation projects, plans and decisions, and to provide public access to key decisions. The planning process also included a series of workshops and an interactive website to engage and gather input from residents throughout the region. MTC's public involvement procedures for the Plan incorporated the following goals:

1. **Promote a transparent process:** MTC and ABAG should make every effort to make the often-complex planning process transparent so that the public has early and continuing opportunities to help shape policies and inform decisions.

2. **Encourage broad participation:** The process should include the greatest number of people possible from throughout the region and reflect the diverse Bay Area population, regardless of individuals' language, personal mobility or ability to attend a meeting, subject to available budget and resources.

3. **Engage for impact:** The feedback received through this Public Participation Plan should be analyzed and provided to policy makers in a timely manner to inform their decisions. Interested participants should be informed of actions by MTC and ABAG at key milestones throughout the planning process.

4. **Build knowledge:** This program is an opportunity for MTC and ABAG to inform a wide range of people about transportation and land-use issues in the Bay Area. Each step of the process should include an educational element to set context and promote increased understanding of the plan and relevant topics.

Highlights from Plan Bay Area 2040's public participation process through 2016 include nearly 120 public meetings, plus 18 open houses (two in each of the nine Bay Area counties); partnerships with five community organizations working in low-income communities and communities of color; detailed project website with extensive online information; numerous meetings with local elected officials, planning directors, and transportation officials; a summit with Native American tribal leaders, a housing forum; and a telephone poll of some 2,040 Bay Area residents. Additional public engagement opportunities beginning in spring 2017 will inform adoption of Plan Bay Area 2040, anticipated to be considered in summer 2017.

In spring of 2015, ABAG and MTC held a series of nine open houses across the Bay Area. These open houses were consistent with the adopted public participation plan and introduced the proposed Plan update process, key milestones and issues under consideration. Participants were invited to review the linkages between the regional plan and local transportation and land use priorities, and provide comments and prioritize regional goals and the performance framework for the plan.

In spring 2016, ABAG and MTC held the second series of nine open houses across the Bay Area. Participants helped prioritize transportation investments and evaluate various scenarios of development patterns in the Bay Area through 2040. Each open house featured multiple stations where participants were able to view displays and offer comments on ways to maintain the Bay Area's transportation networks; house projected population growth; preserve open space; meet state mandates for reducing GHG emissions from cars and light trucks; improve public health; and, achieve other regional goals.

MTC also contracted with five community-based organizations (CBOs) working in low-income communities and communities of color to hear planning priorities from their residents. The CBOs, selected through a competitive process, used the Build a Better Bay Area online quiz to engage residents on the three alternative plan scenarios. MTC and ABAG also collaborated with the National Indian Justice Center in conducting a Tribal Summit in Santa Rosa with leaders from five Native American Tribes.

Additional documentation on public outreach activities is found at: http://2040.planbayarea.org/reports. Additional general information on Plan development is found at: http://www.planbayarea.org.

Planning Assumptions

Planning assumptions related to development of the proposed Plan included economic, demographic, and financial considerations. These assumptions are described in detail below.

Economic and Demographic

The Bay Area economy has grown substantially over the four years since adoption of Plan Bay Area in 2013, attracting thousands of new people and jobs. As a result, ABAG adopted a revised regional growth forecast in February 2016. By 2040, the region is projected to grow to 4.7 million jobs and a population of 9.6 million. This estimate anticipates an increase in households to 3.4 million by 2040. Forecasted employment, population, and households are provided below in **Table 1.2-3**.

Table 1.2-3 Forecasted Employment, Population and Households

	2015	2040	Change 2015-40	2015-2040 (%)
Total Employment	4,010,000	4,698,000	688,000	17%
Population	7,571,000	9,628,000	2,056,000	27%
Households	2,760,000	3,427,000	666,000	24%

Source: data provide by MTC in 2017

To meet the BIA settlement mandate (see discussion of 2013 Plan lawsuits and settlement agreements, above) that the "Regional Housing Control Total … shall have no increase in in-commuters", additional new households were added to the regional total. ABAG's regional forecast assumed that the Bay Area will add about 53,000 more jobs than workers over the forecast period (2010 to 2040). To meet the BIA settlement mandate, ABAG calculated the number of households (37,600) to accommodate the 53,000 workers, then calculated the number of housing units (households plus a vacancy rate) associated with these households. The additional housing units resulting from this analysis were added to the regional totals, resulting in a revised Regional Housing Control Total compliant with the settlement agreement. In this way, the in-commuter households gained throughout the region during the forecast period were distributed by the model in the same manner as other new households. MTC determined that the Regional Housing Control Total for 2010 – 2040 is 820,400.

Financial

MTC worked with partner agencies and used financial models to estimate how much revenue will be available for transportation purposes over the Plan horizon (2017 -2040). Like other metropolitan regions, the Bay Area receives transportation funding from multiple federal, state, regional, and local sources. As shown in **Table 1.2-4** below, the total forecast for the proposed Plan is $303 billion, estimated in year of expenditure dollars. Approximately two-thirds of forecasted revenues are from regional and local sources such as transit fares, dedicated sales tax programs, and bridge tolls. Making up the remainder of the total are state and federal revenues (mainly derived from fuel taxes) and "anticipated" revenues (unspecified revenues from various sources that can reasonably be expected to become available within the plan horizon).

Table 1.2-4 Forecasted Transportation Revenue Envelope

	$ billions
Federal	$29
State	$48
Regional	$44
Local	$168
Anticipated	$14
Total	$303

Source: data provide by MTC in 2017

MTC worked with local jurisdictions, transit operators, and the California Department of Transportation (Caltrans) to develop cost estimates for operating and maintaining the Bay Area's transit system, local street and road network, the state highway system, and local and regional bridges. The costs to operate and maintain the highway system also reflect a growing need to maintain the hardware required for traffic management projects like ramp meters and dynamic signs. As shown in **Table 1.2-5** below, to reach a state of good repair – meaning that roads are maintained at their optimum levels, transit assets are replaced at the end of their useful lives and existing service levels for public transit are maintained – the Bay Area will need to spend an estimated total of $252 billion over the Plan horizon (2017-2040).

Table 1.2-5 Costs to Operate and Maintain Existing System (in Billions)

	Cost to Maintain Existing Asset Condition	Cost to Achieve Ideal Asset Condition
Local Streets and Roads	$43	$49
State Highways[1]	$20	$20
Local Bridges[1]	$2	$2
Regional Bridges[1]	$14	$14
Transit Capital	$29	$47
Transit Operating[2]	$120	$120
Total	$228	$252

[1] Costs associated with maintaining existing conditions is not available for highways and bridges.

[2] Transit operating costs are only for maintaining existing conditions.

Source: data provide by MTC in 2017

MODELING

The California Transportation Commission's (CTC) 2010 RTP Guidelines recommend that the largest metropolitan areas should build formal microeconomic land use models to analyze and evaluate proposed changes in land use, economic, and transportation systems. MTC uses Bay Area UrbanSim and Travel Model One as an integrated model framework to evaluate the relationship of transportation and land use. This allows for analysis of how transportation projects affect the surrounding land use pattern, as well as how changes to household and employment locations affect transportation demand, and ultimately affect GHG emissions.

As required under SB 375, as a part of each Plan update cycle, MTC must submit to ARB, a description of the technical methodology proposed for use in estimating GHG emissions resulting from implementation of the proposed Plan. The initial methodology, submitted June 23, 2016, was reviewed by ARB staff. Subsequent to ARB staff's review, consultation between MTC and ARB staff led to a revised technical methodology submitted on April 12, 2017.

Bay Area UrbanSim

Bay Area UrbanSim, MTC's regional land use forecasting model, incorporates baseline zoning for approximately 2 million individual land parcels across the Bay Area, as well as available information on other land use policies (e.g., fees, incentives, growth boundaries) and current regional and local economic and real estate market trends. Bay Area UrbanSim relies upon the forecasted economic and demographic regional control totals as model inputs. Bay Area UrbanSim builds upon the methodology used in prior plans. For instance, in prior plans, the methodology combined a land use allocation process based on observed historic growth patterns with jurisdictional expectations described in local plans. For the proposed Plan, Bay Area UrbanSim also incorporates baseline zoning and other land use policies, the most recent PDA assessment, and household, business, and developer choice models. MTC uses Bay Area UrbanSim to test the effects that different regional strategies (e.g., allowable zoned residential density could be increased) could have on affecting the location of housing and employment growth. Bay Area UrbanSim accomplishes this by conducting a pro forma analysis for each parcel in the region that is viable for potential development, meaning that it calculates the profitability of new development or redevelopment on that parcel given market demands and trends. The parcel-level simulations were aggregated to generate land use data at the Traffic Analysis Zone (TAZ)-, PDA-, city-, and county-level. Additional documentation on Bay Area UrbanSim is found at, http://2040.planbayarea.org/sites/default/files/2017-03/Land_Use_Modeling_DPBA2040_Supplemental%20Report_3-2017_0.pdf.

Travel Model One

The MTC travel demand model, Travel Model One, is a regional activity-based travel model for the Bay Area. This model is comprised of a set of individual models that perform different functions, leading to projections of future Bay Area travel. Travel Model One produced all of the key outputs used in assessing the significance of transportation impacts, including outputs such as vehicle miles traveled, vehicle hours of delay, and accessibility, as well as other outputs such as volume to capacity ratios and level of service. For modeling and planning, the Bay Area was divided into 1,454 TAZs. Various transportation investment packages (known as scenarios) were analyzed using this model. To analyze the proposed Plan, the proposed transportation projects (listed in Section 1.2 and Appendix C) were implemented in the model on top of the region's existing transportation infrastructure. By coding these improvements into the model framework, it is possible to forecast the impacts of each alternative on regional travel patterns. Additional documentation on Travel Model One is found at, http://2040.planbayarea.org/sites/default/files/2017-03/Travel_Modeling_PBA2040_Supplemental%20Report_3-2017.pdfg.

1.2.4 Project Objectives

The proposed Plan reinforces land use and transportation integration per SB 375 and presents a vision of the Bay Area's land use patterns and transportation networks in 2040. The proposed Plan's core strategy is focused growth in existing communities along the existing transportation network. Consistent with this core strategy, the seven goals of the proposed Plan are:

- Climate Protection
- Adequate Housing
- Healthy and Safe Communities
- Open Space and Agricultural Preservation
- Equitable Access
- Economic Vitality
- Transportation System Effectiveness

MTC and ABAG developed 13 performance targets associated with the goals for the proposed Plan (**Table 1.2-6**). Senate Bill 375 mandates two of these performance targets. These are the primary objectives of the Plan:

- The proposed Plan must address climate change by reducing CO_2 emissions pursuant to targets established in consultation with CARB: the regional plan must meet or exceed a seven percent reduction in per-capita emissions from cars and light-duty trucks by 2020 and a 15 percent reduction by 2035 relative to 2005 levels.

- The proposed Plan must house 100 percent of the region's projected growth by income level without displacing low-income residents, and with no increase in in-commuters over the proposed Plan baseline year. As calculated for the proposed Plan pursuant to the agreement with the Building Industry Association (BIA) Bay Area, the Regional Housing Control total is 820,400.

In addition to these two objectives, MTC and ABAG adopted 11 additional targets. Key goals for Plan Bay Area 2040 included tackling the Bay Area's inequities through improved affordability and lessened displacement risk, ensuring a robust economy and protecting the environment for future generations. These targets reflect MTC and ABAG's commitment to take a more holistic view of the possibilities of integrated regional planning by going beyond the plan's legal requirements.

Table 1.2-6 Year 2040 Goals and Performance Targets

Goal	Performance Target
Climate Protection	Reduce per-capita CO2 emissions from cars and light-duty trucks by 15%
Adequate Housing	House 100% of the region's projected growth by income level without displacing current low-income residents and with no increase in in-commuters over the Plan baseline year
Healthy and Safe Communities	Reduce adverse health impacts associated with air quality, road safety, and physical inactivity by 10%
Open Space and Agricultural Preservation	Direct all non-agricultural development within the urban footprint (existing urban development and UGBs)
Equitable Access	Decrease the share of lower income residents' household income consumed by housing and transportation (H+T) costs share for lower-income households by 10%
	Increase the share of affordable housing in PDAs, TPAs or high-opportunity areas by 15%
	Do not increase the share of low- and moderate-income renter households in PDAs, TPAs, or high-opportunity areas that are at risk of displacement
Economic Vitality	Increase by 20% the share of jobs accessible within 30 minutes by auto or within 45 minutes by transit in congested conditions
	Increase by 38% the number of jobs in predominantly middle-wage industries
	Reduce per-capita delay on the Regional Freight Network by 20%
Transportation System Effectiveness	Increase non-auto mode share by 10%
	Reduce vehicle operations and maintenance costs due to pavement conditions by 100%
	Reduce per-rider transit delay due to aged infrastructure by 100%

Note: The base year for the targets, unless specified under target methodology documentation, is 2005, Additional information is available in MTC Resolution 4204, Revised and associated methodology memoranda.[1] The Adequate Housing target relates to the Regional Housing Control Total per the settlement agreement signed with BIA, which increases the housing forecast by the housing equivalent to in-commute growth.

1.2.5 Proposed Plan

The proposed Plan provides a strategy for accommodating projected household and employment growth in the nine-county Bay Area by 2040 as well as a transportation investment strategy for the region. The proposed Plan details how the Bay Area can achieve several outcomes essential to the success of the region's long-range transportation and land use goals. The proposed Plan:

- Describes where and how the region can accommodate 666,000 new projected households and 668,000 new jobs between 2015 and 2040;
- Details a regional transportation investment strategy given $303 billion in expected revenues from federal, state, regional and local sources over the next 24 years; and
- Complies with SB 375, the state's SCS law, which integrates land use and transportation planning and mandates both a reduction in greenhouse gas emissions from passenger vehicles and the provision of adequate housing for the region's 24-year projected population growth.

The proposed Plan encompasses the entire Bay Area, including the nine counties and the 101 cities that make up the region. The proposed Plan is constrained by expected transportation revenues and expected household and employment growth. The proposed Plan identifies what it would take to accommodate expected growth and improve the quality of life for existing and future residents. The proposed Plan also facilitates subsequent streamlined CEQA analysis pursuant to Senate Bill 375; Senate Bill 743; and other methods described in Section 1.2. The proposed Plan does not change local land use policies; individual jurisdictions retain all local land use authority. The proposed Plan creates a list of transportation projects that are eligible for future funding but does not program funds to specific transportation projects.

PLAN BAY AREA 2040 DOCUMENT FRAMEWORK

The *Plan Bay Area 2040* document provides an updated long-range RTP and SCS for the Bay Area. The document discusses how the Bay Area could grow over the next 24 years (to year 2040) and identifies transportation and land use strategies to enable a more sustainable, equitable, and economically vibrant future. The document consists of a limited and focused update to the region's previous integrated transportation and land use plan, adopted in 2013. The document is organized into five chapters, which are listed and briefly summarized as follows.

- The Bay Area Today: This chapter provides an overview of the existing housing conditions in the Bay Area and congestion and capacity challenges associated with the transportation system.

- What is Plan Bay Area 2040?: This chapter provides an overview of the purpose of the proposed Plan, public participation processes, and goals and targets of the proposed Plan.

- Forecasting the Future: This chapter provides an overview of the primary "inputs" to Plan Bay Area 2040: specifically, 24-year regional household, employment and transportation revenue forecasts.

- Strategies and Performance: This chapter describes land use and transportation scenarios that distributed the total amount of expected growth across the region. These scenarios were evaluated against adopted performance targets (described in Chapter 2) to measure how well they address regional goals including climate protection, transportation system effectiveness, economic vitality and equitable access.

- Action Plan: This chapter identifies action items for MTC, ABAG, and other stakeholders to make meaningful progress on Plan Bay Area 2040's performance targets. In particular, the Action Plan focuses on those areas where Plan Bay Area 2040 is moving off trajectory: housing and transportation affordability, displacement risk, access to jobs and roadway maintenance.

- In addition to the subject Environmental Impact Report, the plan also includes the following Supplemental Reports which are available for review at http://2040.planbayarea.org :

    - Air Quality Conformity & Consistency Report
    - Equity Analysis Report
    - Resilience Report
    - Land Use Modeling Report
    - Regional Forecasting Report
    - Statutorily-Required Plan Maps
    - Glossary
    - Native American Tribal Consultation Report
    - Performance Report
    - Public Engagement Program Report
    - Financial Assumptions Report
    - Investment Strategy Report
    - Project List
    - Roads, Bridges, and Highways Needs Assessment Report
    - Transit Needs Assessment Report
    - Travel Modeling Report

GEOGRAPHIC CONTEXT OF THE PLAN

The proposed Plan addresses the Bay Area, as a region. However, consideration of the plan requires an understanding of several more localized geographies: Priority Development Area (PDAs), Priority Conservation Areas (PCAs), and Transit Priority Areas (TPAs). These geographic concepts are described in more detail below.

PDAs and PCAs

The proposed Plan largely reflects the foundation and regional growth pattern established in the original Plan Bay Area. The proposed Plan's core strategy is "focused growth" in existing communities along the existing transportation network. This strategy helps to achieve key regional economic, environmental and equity goals: it builds upon existing community characteristics, efficiently leverages existing infrastructure, and mitigates impacts on areas with less development. Key to implementing the "Focused Growth" strategy are Priority Development Areas (PDAs) and Priority Conservation Areas (PCAs), which are recommended by local governments and, ultimately, approved by ABAG:

- Priority Development Areas (PDAs) - The proposed Plan focuses growth and development in nearly 188 PDAs. PDAs are specific geographic areas that meet the following criteria: 1) within an existing community; 2) within walking distance of frequent transit service; 3) designated for more housing in a locally adopted plan or identified by a local government for future planning and potential growth; and 4) nominated through a resolution adopted by a City Council or County Board of Supervisors. Staff recommendations are presented to ABAG's Regional Planning Committee for approval and then to ABAG's Executive Board for regional adoption.

- Priority Conservation Areas (PCAs) - PCAs are open spaces that provide agricultural, natural resource, scenic, recreational, and/or ecological values and ecosystem functions. These areas are identified through consensus by local jurisdictions and park/open space districts as lands in need of protection due to pressure from urban development or other factors. PCAs are categorized into four designations: Natural Landscapes, Agricultural Lands, Urban Greening and Regional Recreation. There are 165 PCAs identified in the region.

PCAs and PDAs complement one another by promoting compact development in established communities with high-quality transportation access, while placing less development pressure on the region's vast and varied open spaces and agricultural lands.

TPAs

Approval of an adopted SCS by the California Air Resources Board allows for CEQA streamlining benefits for transit priority projects (TPP). Please see Section 1.1.8 for more information regarding CEQA streamlining opportunities. A TPP is defined by statute, based on consistency with the following requirements:

- consistent with the general land use designation, density, building intensity, and applicable policies specified for the project area in the SCS;

- located within half a mile of a major transit stop or high-quality transit corridor;

- comprised of at least 50 percent residential use based on total building square footage, or as little as 26 percent residential use if the project has a floor area ratio of not less than 0.75; and

- built out with a minimum of 20 dwelling units per acre (PRC § 21155).

For the purposes of this EIR, geographic areas eligible to meet the TPP requirements are referred to as Transit Priority Areas (TPAs).

Relationship between PDAs, PCAs, and TPAs

As discussed above, PCAs and PDAs complement one another by promoting compact development in established communities with high-quality transportation access, while placing less development pressure on the region's vast and varied open spaces and agricultural lands. The major difference between TPAs and PDAs is how they are designated. As discussed above, a PDA is identified by a local agency for adoption by ABAG, while a TPA is defined by statutes based on the series of requirements described above. Both PDAs and TPAs are similar in that they focus on access to transit service and are appropriately planned for growth.

Within the Bay Area, TPAs and PDAs cover approximately 175,300 and 114,000 acres, respectively. Approximately 68,700 acres of land is designated as both a PDA and TPA. **Figure 1.2-2** shows designated TPAs, PDAs, and PCAs in the Region. **Table 1.2-7** shows county-by-county total acreage of PDAs and TPAs, and the extent to which they do and do not overlap.

Table 1.2-7 Distribution of PDAs and TPAs by County

	Total Land (acres)	Designated TPA (acres)	Designated PDA (acres)	Designated both TPA & PDA (acres)	Designated TPA but not PDA (acres)	Designated PDA but not TPA (acres)	Designated neither TPA nor PDA (acres)
Alameda	470,600	48,200	33,600	22,400	25,800	11,200	411,200
Contra Costa	459,600	11,800	16,000	4,500	7,300	11,500	436,300
Marin	331,700	4,400	1,000	650	3,700	370	327,000
Napa	483,700	–	950	–	–	950	482,800
San Francisco	29,700	28,500	13,200	13,000	15,500	230	980
San Mateo	287,400	21,900	9,400	7,700	14,200	1,700	263,800
Santa Clara	817,500	53,900	25,100	18,300	35,600	6,800	756,800
Solano	529,300	2,500	6,500	500	2,100	6,100	520,700
Sonoma	1,009,000	4,000	8,200	1,600	2,300	6,500	999,000
Regional Total	4,419,000	175,300	114,000	68,700	106,600	45,300	4,199,000

Notes: Numbers less than 1 are shown as "<1" Whole numbers have been rounded (between 0 and 10 to the nearest whole number, between 11 and 999 to the nearest 10, between 1,000 and 1,000,000 to the nearest 100, above 1,000,000 to the nearest 1,000). Figures may not sum due to independent rounding.

Source: Data compiled by MTC in 2017

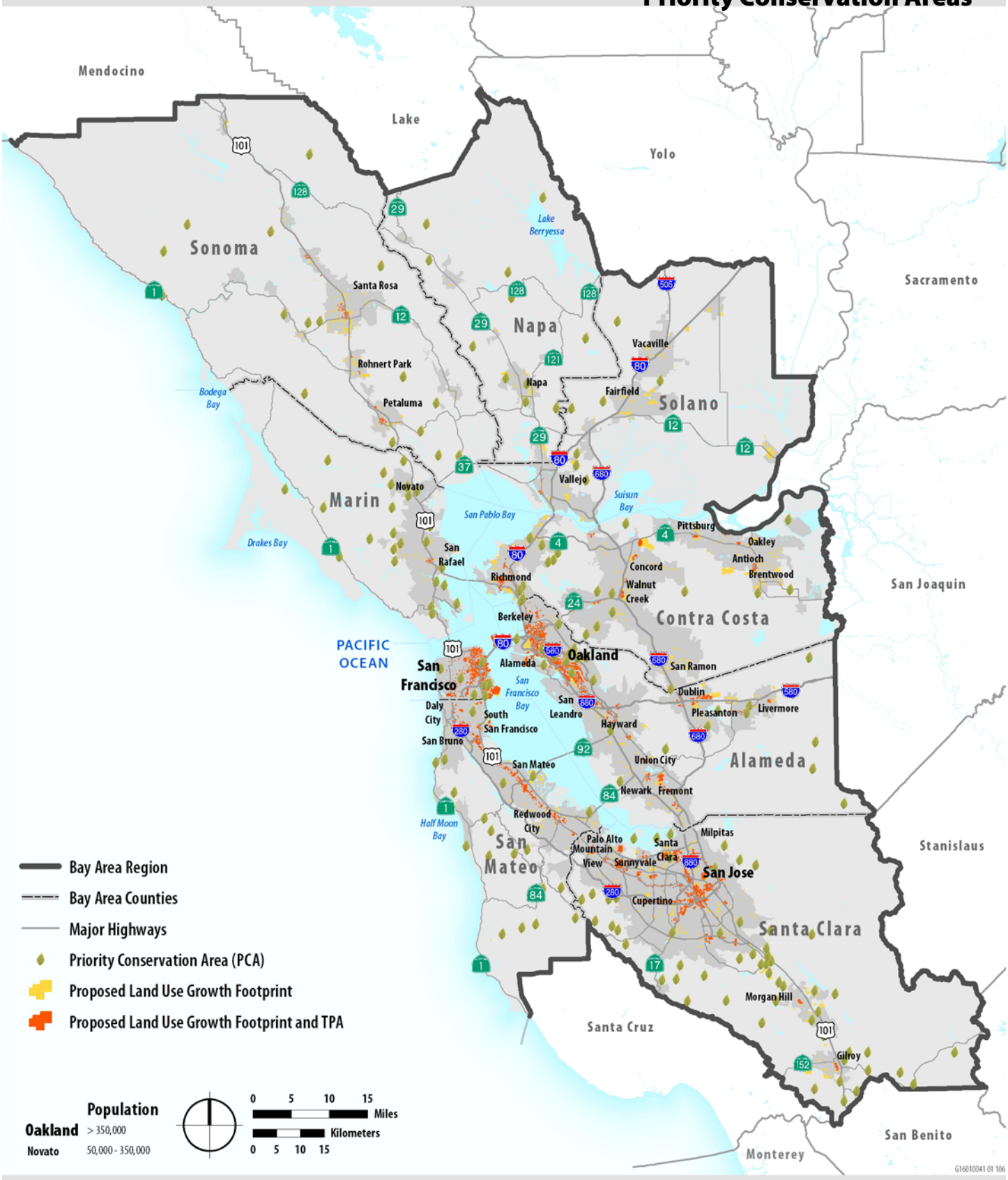
DEVELOPMENT OF THE PROPOSED PLAN: STRATEGIES AND PERFORMANCE CONSIDERATIONS

The land use forecast is a product of the regional housing control total, baseline zoning and other land use policies, the PDA and PCA framework, the most recent PDA assessment, and regional land use strategies. Based upon the performance assessment of proposed transportation projects and the scenarios, and in response to feedback from the Commission, ABAG Executive Board, the public and many different stakeholder organizations, MTC and ABAG developed and adopted a Final Preferred Scenario. This scenario provides both a regional pattern of household and employment growth by the year 2040 and a corresponding transportation investment strategy. This regional pattern and transportation investment strategy is the proposed Plan. Strategies and performance considerations that were used to develop the proposed Plan are described below.

Focused Growth

As stated above, the proposed Plan largely reflects the foundation and regional growth pattern established in the original (2013) Plan Bay Area. The proposed Plan's core strategy is "focused growth" in existing communities along the existing transportation network. This strategy is intended to achieve key regional economic, environmental and equity goals. Designation of PDAs and PCAs helps to promote compact development in established communities with high-quality transportation access, and reduce pressure on development in open spaces and agricultural lands.

Figure 1.2-2
Transit Priority Areas, Priority Development Areas, and Priority Conservation Areas



Map Data Sources: Metropolitan Transportation Commission (MTC), 2016 and 2017; Tom Tom North America, 2015.

Land Use Strategies

MTC and ABAG's Priority Development Area (PDA) Assessment - 2015 Update looked at PDAs "readiness" to accommodate residential units forecasted in *Plan Bay Area*. The assessment found the 80 percent of *Plan Bay Area's* growth forecast could be achieved in PDAs with policy actions, such as refining local land use policies and zoning. As a result of the findings, MTC and ABAG modeled a range of policy strategies in the proposed Plan to increase development potential in PDAs and influence the overall regional growth pattern, as outlined in the list below. These policies can help motivate land use and support the success of a focused-growth strategy in the locally identified PDAs that already contain much of the Bay Area's existing development:

- assign higher densities than currently allowed by cities to select PDAs;
- keep current urban growth boundaries in place;
- assume for-profit housing developments make 10 percent of units deed-restricted for in cities with PDAs;
- reduce the cost of building in PDAs and TPAs through eased parking minimums and (in TPAs) streamlined environmental clearance;
- assume subsidies stimulate housing and commercial development within PDAs; and
- assess commercial development fee based on VMT to improve jobs-housing ratio and to fund affordable housing in PDAs.

These measures are not prescriptive--local jurisdictions maintain general plan and land use control-- and there are many potential public policy options that could help the Bay Area attain its adopted targets. These strategies are simply illustrations of what it would take to accommodate future growth within existing communities, while striving toward the region's 2040 economic, environmental and equity goals. Working with jurisdictions as appropriate to implement these or other similar policies will be key to achieving the land use goals of the proposed Plan. The PDA Assessment – 2015 Update is available at: http://mtc.ca.gov/sites/ default/ files/PDA%20Assessment%20Update%20Final.pdf.

Local Control

The region's cities and counties retain local land use authority and local jurisdictions will continue to determine where future development occurs. The proposed Plan is supported through implementation efforts such as neighborhood-level planning grants for PDAs and local technical assistance. The proposed Plan does not mandate any changes to local zoning rules, general plans or processes for reviewing projects; nor is the plan an enforceable direct or indirect cap on development locations or targets in the region. As is the case across California, the Bay Area's cities, towns and counties maintain control of all decisions to adopt plans and to permit or deny development projects.

The proposed Plan also does not establish new state-mandated Regional Housing Needs Allocation (RHNA) numbers for any jurisdiction. RHNA operates on an eight-year cycle, with the next iteration due in 2021, which is the next update to the RTP/SCS. Because RHNA numbers were not at stake this cycle, MTC and ABAG have characterized this update to the Bay Area's long-range plan as limited and focused.

OVERVIEW OF LAND USE GROWTH FOOTPRINT

The land use forecasting methodology discussed above was used to develop the household and employment growth pattern. That is, new growth or redevelopment is aimed to be located within PDAs, while avoiding PCAs. Overall, the regional pattern of households and employment in 2040 is not substantially different from the pattern observed in 2015. The proposed Plan concentrates both household and employment growth in the three cities of San Jose, San Francisco and Oakland, and the east and west Bayside corridors along the region's core transit network. This pattern results in increased densities of households and jobs within San

Jose, San Francisco, and Oakland, as well as areas near US 101 in the Peninsula and portions of State Route 580 and US 80 in the East Bay.

Forecasted Land Use Changes

As described above, the proposed Plan contains a forecast of where projected housing and employment would occur through 2040. This forecast assumes that underdeveloped areas would be redeveloped or the undeveloped land (not in PCAs) would be developed. Areas forecasted for redevelopment or new development, under the proposed Plan are referred to as the land use growth footprint. As shown in **Table 1.2-8**, the land use growth footprint cover 18,700 acres of land in the Bay Area. Within that area 7,400, or approximately 40 percent of the land use growth footprint would be located in TPAs. Approximately half of the land use growth footprint would be located within PDAs. Growth would be the greatest in Santa Clara County, followed by Contra Costa, Alameda, Solano, San Francisco, San Mateo, and Sonoma counties. The land use growth footprint would be relatively small in Marin and Napa counties. **Figure 1.2-3** shows the land use growth footprint within and outside of TPAs.

Table 1.2-8 Land Use Growth Footprint within TPAs and PDAs

	Total Land (acres)	Designated TPA (acres)	Designated PDA (acres)	Designated both TPA & PDA (acres)	Designated TPA but not PDA (acres)	Designated PDA but not TPA (acres)	Designated neither TPA nor PDA (acres)
Alameda	3,700	2,000	2,600	1,800	130	730	1,000
Contra Costa	4,100	600	2,100	480	120	1,600	1,800
Marin	210	50	20	20	30	3	160
Napa	460	-	50	-	-	50	410
San Francisco	1,500	1,400	1,400	1,400	30	30	-
San Mateo	1,400	700	590	530	170	60	620
Santa Clara	4,700	2,500	2,400	1,900	630	510	1,700
Solano	1,600	20	120	20	1	110	1,500
Sonoma	1,100	140	630	100	40	540	460
Total Land use growth footprint	18,700	7,400	9,900	6,200	1,200	3,700	7,700
Percent of Land use growth footprint	>1 %	40%	53%	33%	6%	20%	41%

Notes:

1 Numbers less than 1 are shown as "<1"

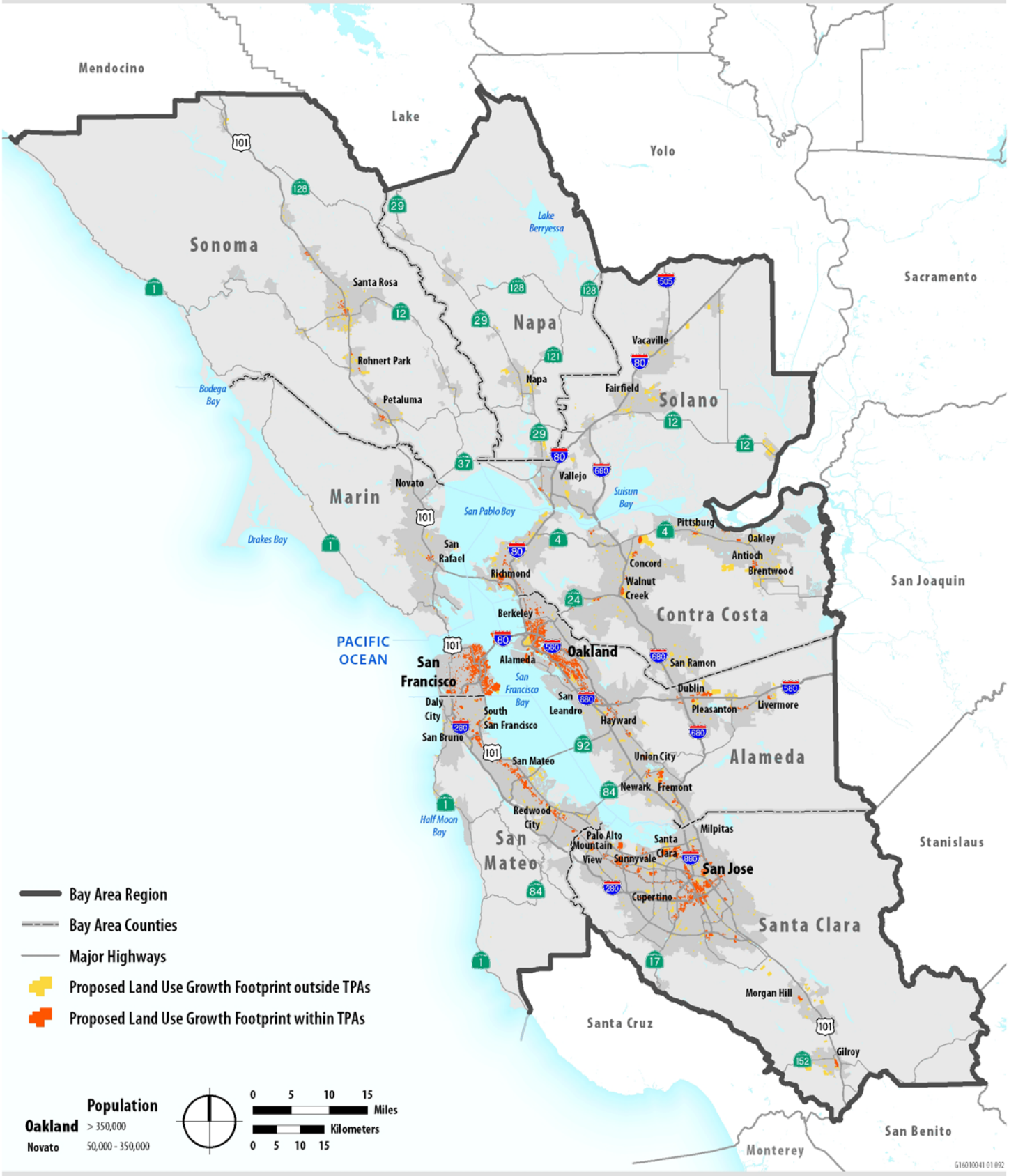
2 Whole numbers have been rounded (between 0 and 10 to the nearest whole number, between 11 and 999 to the nearest 10, between 1,000 and 1,000,000 to the nearest 100, above 1,000,000 to the nearest 1,000).

3 Figures may not sum due to independent rounding.

4 Totals may not add up as expected due to rounding.

Source: Compiled by MTC in 2017

Figure 1.2-3
Proposed Land Use Growth Footprint and Transit Priority Areas (TPAs)



Map Data Sources: Metropolitan Transportation Commission (MTC), 2016; Tom Tom North America, 2015.

The land use growth footprint is located primarily within areas that are currently developed. New development (i.e., construction on land not designated as urban/built up land according to FMMP) is forecasted to occur on approximately 6,600 acres. That is, of the 18,700 acres of land associated with the land use growth footprint, approximately 35 percent would be located on land that is not currently developed. As shown in **Table 1.2-9**, this would primarily occur in Contra Costa, Solano, Santa Clara, and Alameda counties. **Figure 1.2-4** shows where lands would be converted to urban uses from non-urban uses.

Table 1.2-9 Acreages of Urbanized Land by County, Region, and TPA

County	Land Acres	2015 Urban Acres[1]	2015 Percent Urban	Increase in Urban Acres within Land Use Growth Footprint[2, 3, 4]		2040 Urban Acres[2,3,4]	2040 Percent Urban
Alameda	470,600	146,900	31%	County Total	1,040	147,900	31%
				Within TPAs	260	147,200	31%
Contra Costa	459,600	153,100	33%	County Total	2,500	155,600	34%
				Within TPAs	270	153,400	33%
Marin	331,700	41,800	13%	County Total	40	41,800	13%
				Within TPAs	4	41,800	13%
Napa	483,700	24,000	5%	County Total	350	24,400	5%
				Within TPAs	–	24,000	5%
San Francisco	29,700	23,900	80%	County Total-	140	24,000	81%
				Within TPAs	140	24,100	81%
San Mateo	287,400	72,500	25%	County Total	190	72,700	25%
				Within TPAs	70	72,600	25%
Santa Clara	817,500	189,200	23%	County Total	1,000	190,200	23%
				Within TPAs	80	189,300	23%
Solano	529,300	60,300	11%	County Total	1,100	61,400	12%
				Within TPAs	1	60,300	11%
Sonoma	1,009,000	75,000	7%	County Total	220	75,200	7%
				Within TPAs	1	74,000	7%
Regional Total [5]	**4,419,000**	**787,000**	**18%**	**County Total**	**6,580**	**793,600**	**18%**
				Within TPAs	**830**	**787,800**	**18%**

Note:

[1] Based on Urban and Built Up Land from the Farmland Mapping and Monitoring Program 2012-2014. This source was used because it was determined to be the be proxy for urbanized areas in the region.

[2] Future urbanized footprint is based on modeled growth footprint.

[3] TPA acreages are a subset of County acreages.

[4] Numbers less than 1 are shown as "<1"; Whole numbers have been rounded (between 0 and 10 to the nearest whole number, between 11 and 999 to the nearest 10, between 1,000 and 1,000,000 to the nearest 100, above 1,000,000 to the nearest 1,000).

[5] Figures may not sum due to independent rounding.

Source: DOC 2015

The forecasted distribution of housing is provided in **Table 1.2-10**. As shown, increased households would be primarily located in Santa Clara, Alameda, San Francisco, and Contra Costa counties. **Figure 1.2-5** shows how household density would change through 2040.

Table 1.2-10 2015 – 2040 Households by County

County	Year 2015	% in TPA	Proposed Plan Year 2040	% in TPA	Change in households
Alameda	585,000	52%	734,000	56%	149,000
Contra Costa	387,000	13%	475,000	15%	89,000
Marin	107,000	10%	112,000	10%	5,000
Napa	49,000	0%	55,000	0%	6,000
San Francisco	389,000	99%	484,000	100%	95,000
San Mateo	271,000	40%	318,000	44%	47,000
Santa Clara	649,000	39%	861,000	46%	212,000
Solano	141,000	5%	169,000	5%	28,000
Sonoma	183,000	7%	219,000	7%	36,000
Bay Area	2,760,000	41%	3,427,000	45%	666,000

The distribution of jobs under the land use growth footprint, by county and TPA is shown in **Table 1.2-11**. Similar to the proposed distribution of households, job growth would be primarily located in Santa Clara, Alameda, San Francisco, and Contra Costa counties. **Figure 1.2-6** shows how job density would change through 2040.

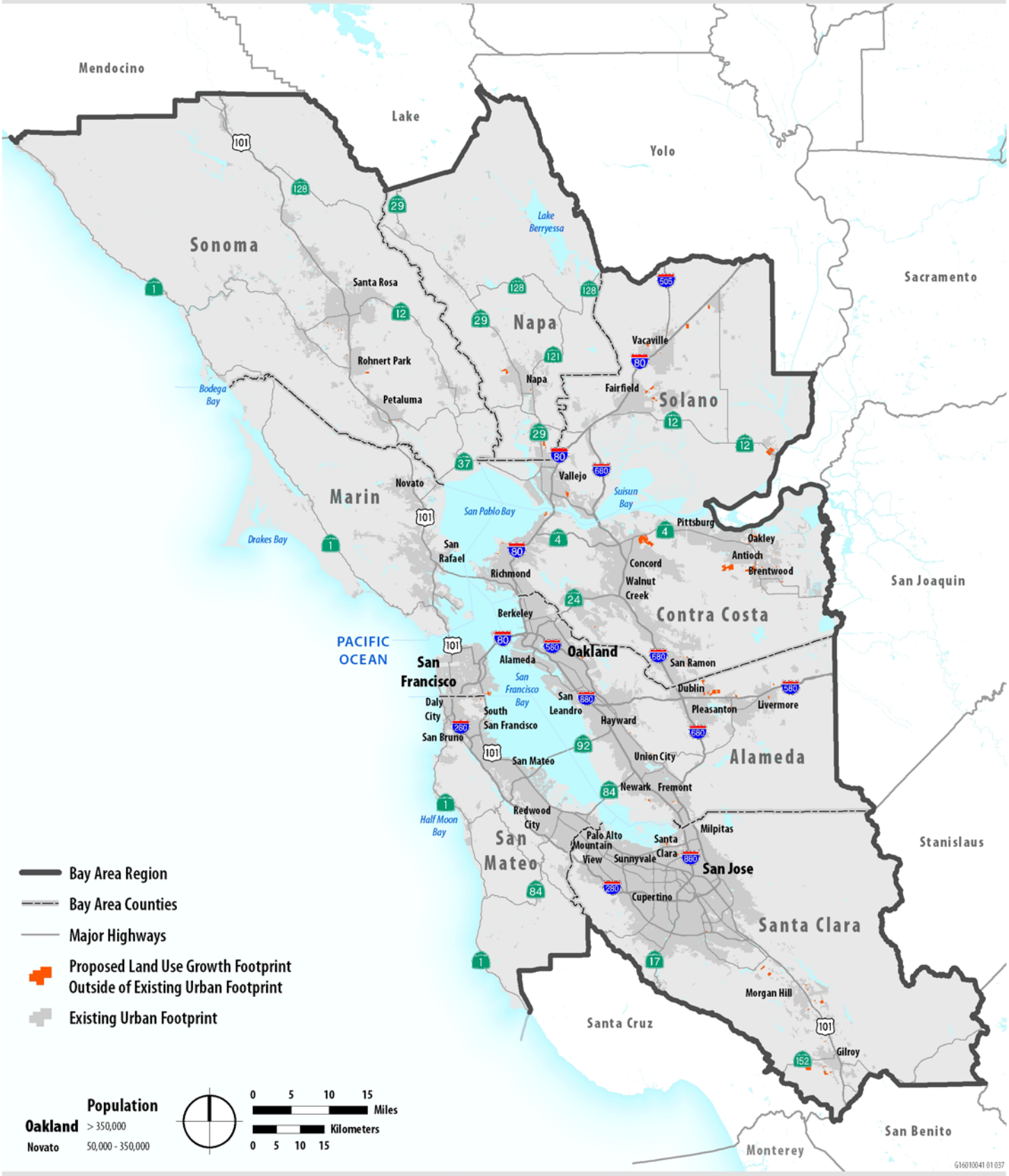
Table 1.2-11 2015 – 2040 Jobs by County

	Year 2015	% in TPA	Proposed Plan Year 2040	% in TPA	Change in jobs
Alameda	829,000	57%	953,000	56%	124,000
Contra Costa	408,000	21%	498,000	19%	90,000
Marin	133,000	31%	135,000	30%	2,000
Napa	70,000	0%	83,000	0%	13,000
San Francisco	746,000	100%	872,000	100%	126,000
San Mateo	396,000	41%	472,000	42%	76,000
Santa Clara	1,068,000	52%	1,290,000	53%	222,000
Solano	137,000	10%	151,000	9%	14,000
Sonoma	223,000	11%	244,000	11%	21,000
Region	4,010,000	52%	4,698,000	53%	688,000

Transportation System

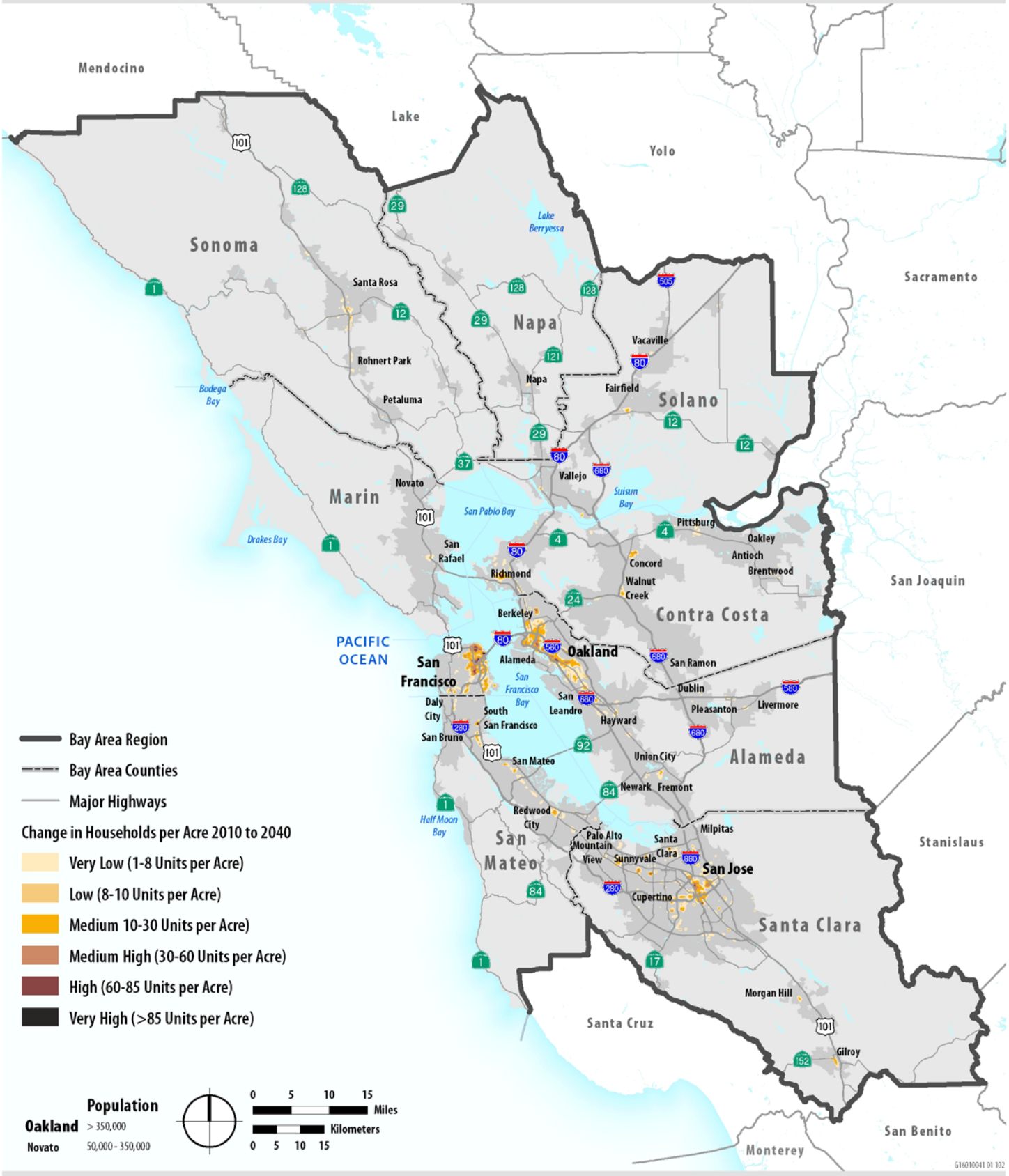
The draft transportation investment strategy for the proposed Plan largely continues the overall priorities from the previous (2013) plan – an emphasis on "fix it first," supporting focused growth, and achieving greenhouse gas targets. Development of the draft investment strategy required several important activities – an estimation of funding needs, a forecast of transportation revenues, the prioritization of major projects, and a comparison of trade- offs between funding maintenance, modernization, and expansion projects. Strategies related to the proposed Plan consist of: operate and maintain, modernize, and expand, and are summarized as follows.

Figure 1.2-4
Urbanized Land in 2040



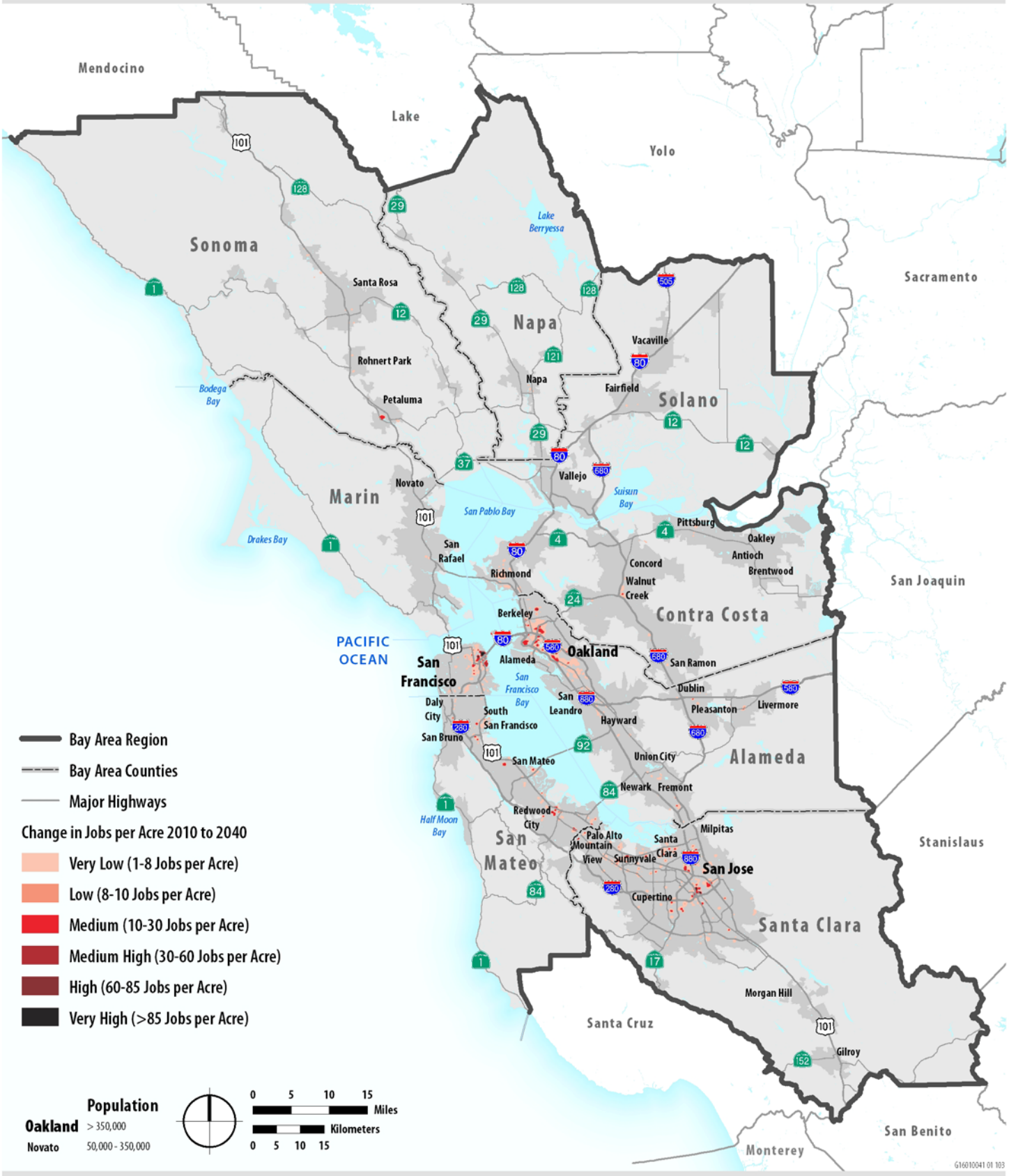
Map Data Sources: Farmland Malling & Monitoring Program (FMMP), Department of Conservation, State of California, 2012-2014; Metropolitan Transportation Commission (MTC), 2016; Tom Tom North America, 2015.

Figure 1.2-5
Change in Households per Acre through 2040



Map Data Sources: Metropolitan Transportation Commission (MTC), 2016; Tom Tom North America, 2015.

Figure 1.2-6
Change in Jobs per Acre through 2040



Map Data Sources: Metropolitan Transportation Commission (MTC), 2016; Tom Tom North America, 2015.

Operate and Maintain

The proposed Plan directs a majority of funding to maintain the assets and infrastructure of the existing transportation system. The proposed Plan fully funds transit operating needs for existing transit services while also funding the majority of remaining high-priority transit capital needs (mostly replacing vehicles and fixed guideway infrastructure such as rail tracks and power systems). When evaluated for cost-effectiveness and support for the Plan's performance targets, maintaining transit capital assets was one of the Bay Area's highest performing investments, exhibiting high cost-effectiveness relative to most other transit expansion and highway projects. For this reason, this Plan directs almost 30 percent of discretionary funding to paying down the region's transit maintenance backlog. Despite this investment, a need of almost $15 billion remains, most of which is needed to replace non-vehicle assets for BART and Muni.

The next largest regional discretionary investment is for operations and maintenance of the Bay Area's local streets and roads. Between committed sources and future sources such as a potential regional gas tax, the proposed Plan directs over $35 billion for local streets and roads, which prioritizes operations expenses and costs to improve pavement condition. This still leaves a gap of almost $8 billion to maintain existing pavement as well as non-pavement assets like signals, storm drains and sidewalks. Consequently, the regional pavement condition index, a measure of the quality of pavement on a scale from 0 (failed) to 100 (brand-new), decreases from 66 in 2015 to 62 in 2040. Funding for maintenance on state highways and bridges is included in the proposed Plan mostly as committed funding since MTC does not influence where this money is spent. The proposed Plan assumes a two-dollar toll increase on all state-owned bridges, with $1 added in 2019 and another $1 added in 2024. Some of this future discretionary funding would be used for additional maintenance to the Bay Area's bridges. Included in cost projections for operating and maintaining the Bay Area's existing transportation system is a reserve for future cost increases, financing costs, and debt service.

Modernize

The Bay Area's transportation infrastructure, mostly built in the 20th century, will require substantial upgrading to handle travel volumes and travel needs. Modernization is critical to expand capacity on crowded BART lines, improve speeds on heavily used bus lines, add safe bicycle facilities on busy roads, install new technologies to smooth traffic flow, and redesign interchanges to handle greater traffic volumes. the proposed Plan invests 16 percent of total revenue and 26 percent of discretionary revenue in this category, which includes cost-effective projects such as San Francisco's two congestion road pricing projects and bus rapid transit (BRT) lines. This Plan also directs funding for pilot projects related to the evolving technology landscape for transportation, which could increase efficiency and safety across the region's freeways and arterials. These pilot projects include testing vehicle-to-vehicle and vehicle-to-infrastructure technology.

Expand

Approximately 10 percent of funding is directed toward a set of transit extensions and roadway expansions. The BART extension to San Jose and Santa Clara, as well as the Caltrain Downtown San Francisco Extension, for example, will provide new rail links to the hearts of the Bay Area's two largest cities. These projects are top regional priorities for Federal New Starts [link] funding over the next five years. This category also includes Santa Clara Valley Transportation Agency's (VTA) next set of light rail extensions planned for the Capitol Expressway and Vasona lines, SMART extensions to Larkspur and Windsor, and a $640 million reserve for future New Starts priorities.

The largest transit expansion project in this category is the Bay Area segment of California High-Speed Rail, with a price tag of over $8 billion for the Bay Area alone. Also in this category are select roadway expansions along highways and arterials throughout the region, the largest being new express lanes along U.S. 101 from San Francisco to Morgan Hill in the South Bay. This project is expected to reduce congestion and to increase commuters' choices along several of the most congested freeway segments in the Bay Area. This strategy includes projects that extend fixed-guideway rail service or add lanes to roadways. Extending Caltrain to downtown San Francisco and BART into Silicon Valley, as well as implementing express lanes on US-101 in San Mateo and Santa Clara counties, are major investments in this category.

The proposed transportation investment strategy combines county and regional priorities, as well as funding assumptions for each project. These three strategy types and funding levels are shown in **Table 1.2-12**.

Table 1.2-12 2040 Proposed Investment Strategy (in billions per year of expenditure dollars)

Strategy	Investment by Fund Source		
	Local/Committed	Regional Discretionary	Total Plan Investment
Operate and Maintain	$175	$48	$223
Modernize	$31	$19	$50
Expand	$23	$8	$30
Regional Total	$229	$74	$303

Investments in different strategies and categories of the transportation system contributes to changes to the transportation system capacity. As shown in **Table 1.2-13**, the proposed Plan would result in increased roadway lane miles and daily transit seat miles.

Table 1.2-13 Transportation System Capacity (2015-2040)

	2015	2040 Plan	Change (2015 to 2040 Plan)	
			Numerical	Percent
Freeway Lane-Miles	5,660	6,120	460	+8%
Expressway Lane-Miles	1,070	1,130	60	+6%
Arterial Lane-Miles	8,630	8,700	70	+1%
Collector Lane-Miles	5,480	5,520	40	+1%
Total Roadway Lane-Miles	20,840	21,470	630	+3%
Daily[1] Local Bus Seat-Miles	13,600,000	16,300,000	2,700,000	+20%
Daily Express Bus Seat-Miles	3,057,000	3,534,000	476,000	+16%
Daily Light Rail Seat-Miles	3,299,000	4,485,000	1,185,000	+36%
Daily Heavy Rail Seat-Miles	18,440,000	27,488,000	9,048,000	+49%
Daily Commuter Rail Seat-Miles	7,057,000	9,594,000	2,537,000	+36%
Daily Ferry Seat-Miles	1,973,000	2,496,000	523,000	+27%
Total Daily Transit Seat-Miles	47,427,000	63,897,000	16,470,000	+35%

Notes:

Whole numbers have been rounded. Figures may not sum due to independent rounding.

[1] Daily metrics are measured for a typical weekday.

Source: Metropolitan Transportation Commission Travel Demand Forecasts 2017

Not all projects included in the transportation projects list would be expected to require earthmoving activities and/or have a footprint associated with implementation of a specific project. Projects that are included in the transportation project footprint are associated with modernization and expansion strategies. The overall footprint associated with transportation projects is approximately 24,900 acres. Affected acreages and the number of projects associated with strategy and project categories are provided in **Table 1.2-14.** These categories consist of:

Arterial: An arterial road is a high-capacity urban road. The primary function of an arterial is to deliver traffic from collector roads to freeways or expressways, and between urban centers. Arterial projects include widening of existing roadways and interchange improvements.

Highway: A highway is defined as either an interstate or state route. Highway projects include widening of existing roadways and interchange improvements

Local Transit: Local transit system typically operated within one jurisdiction. Local transit projects include improvements to San Francisco's Municipal Transportation Agency (MUNI), Santa Clara Valley Transportation Authority (VTA), and other bus systems.

Regional Transit: Regional transit systems operate over several jurisdictions. Regional transit projects include improvements to ferry systems, Bay Area Rapid Transit (BART), and Caltrain.

Road Pricing: Road pricing projects create a system of tolls to be paid per individual driver. Road pricing projects generally include tollways and installation of related features, such as striping and signs.

See **Figures 1.2-7** through **1.2-11**. As depicted, projects are clustered in Santa Clara County around the densely populated areas of the City of Santa Clara, downtown San Jose, and Milpitas; in central and western Alameda County; and in San Francisco. There are also numerous projects along the US 101 corridor in Sonoma and Marin Counties, along the I-80 corridor in Solano County, and along the Highway 4 corridor in Contra Costa County.

Table 1.2-14 Transportation Project Number and Acreage by Type and Investment Strategy

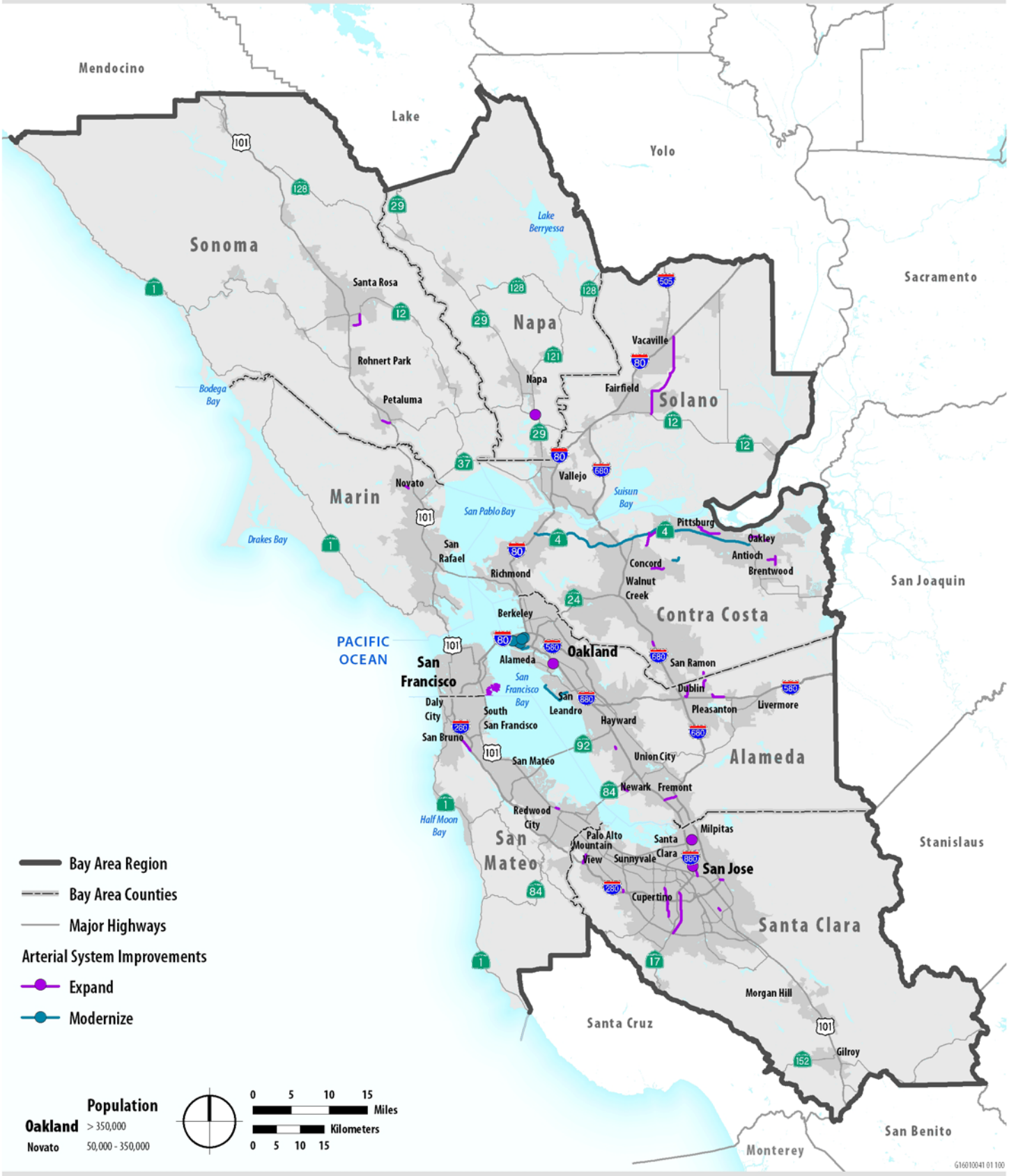
Type	Investment Strategy	Number of projects	Acreage
Arterial	Expand	34	1,800
	Modernize	9	690
Highway	Expand	13	560
	Modernize	85	3,300
Local Transit	Expand	5	120
	Modernize	25	3,700
Regional Transit	Expand	8	3,200
	Modernize	29	7,700
Road Pricing	Expand	12	3,600
	Modernize	18	150
Total		234	24,900

Notes: Whole numbers have been rounded (between 0 and 10 to the nearest whole number, between 11 and 999 to the nearest 10, between 1,000 and 100,000 to the nearest 100). Figures may not sum due to independent rounding.

Climate Initiatives Program

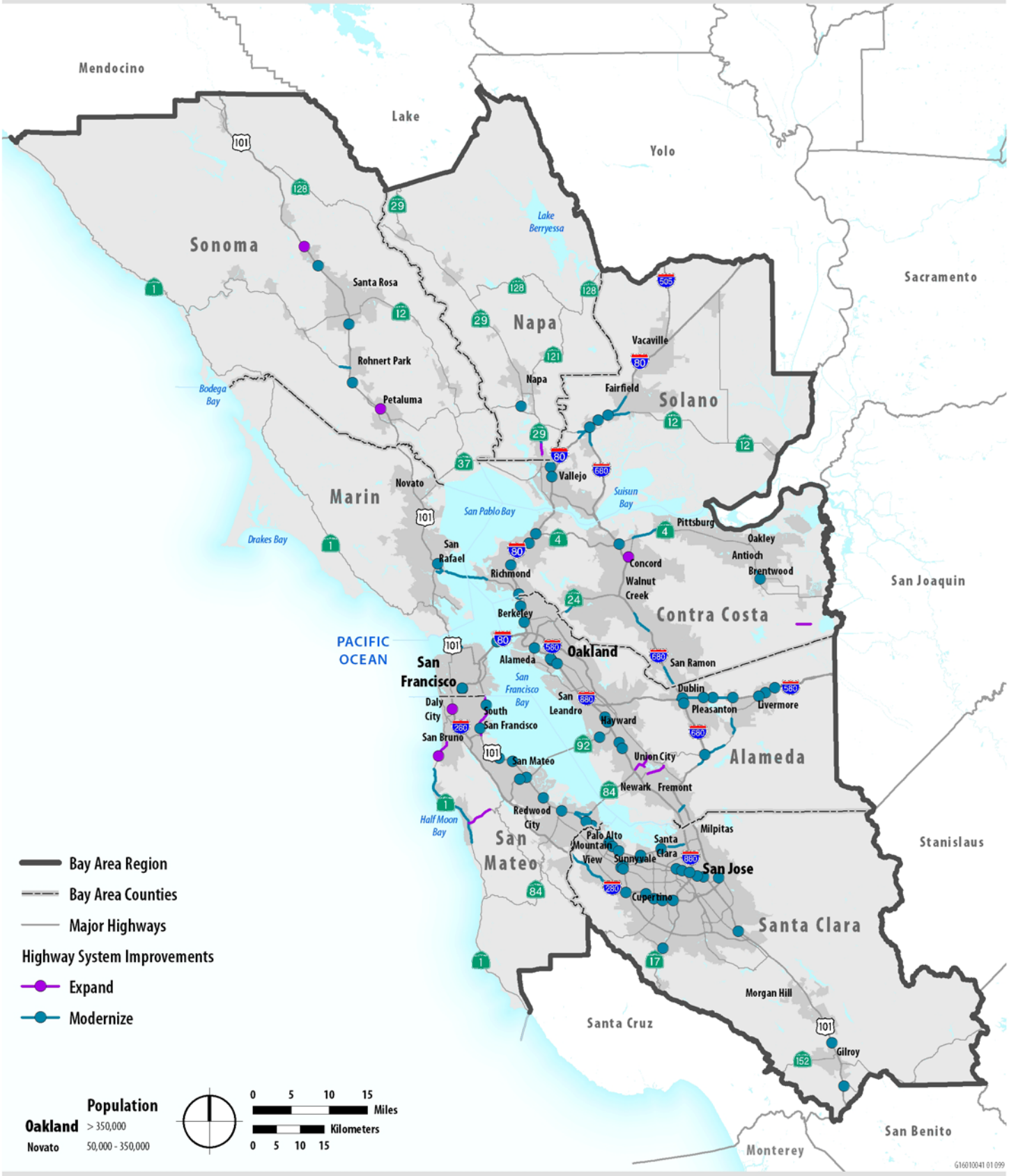
The proposed Plan includes the Climate Initiatives Program, which has been developed to reduce per capita GHG emission. The majority of the strategies included and approved in the 2013 Plan are also included in the proposed Plan. Two strategies have been added: Targeted Transportation Alternatives and Trip Caps. These programs help to meet GHG targets under SB 375, and include programs such as commuter benefits, regional electric vehicle charging stations, incentives to purchase low emissions vehicles, and car sharing.

Figure 1.2-7
Arterial System Improvements



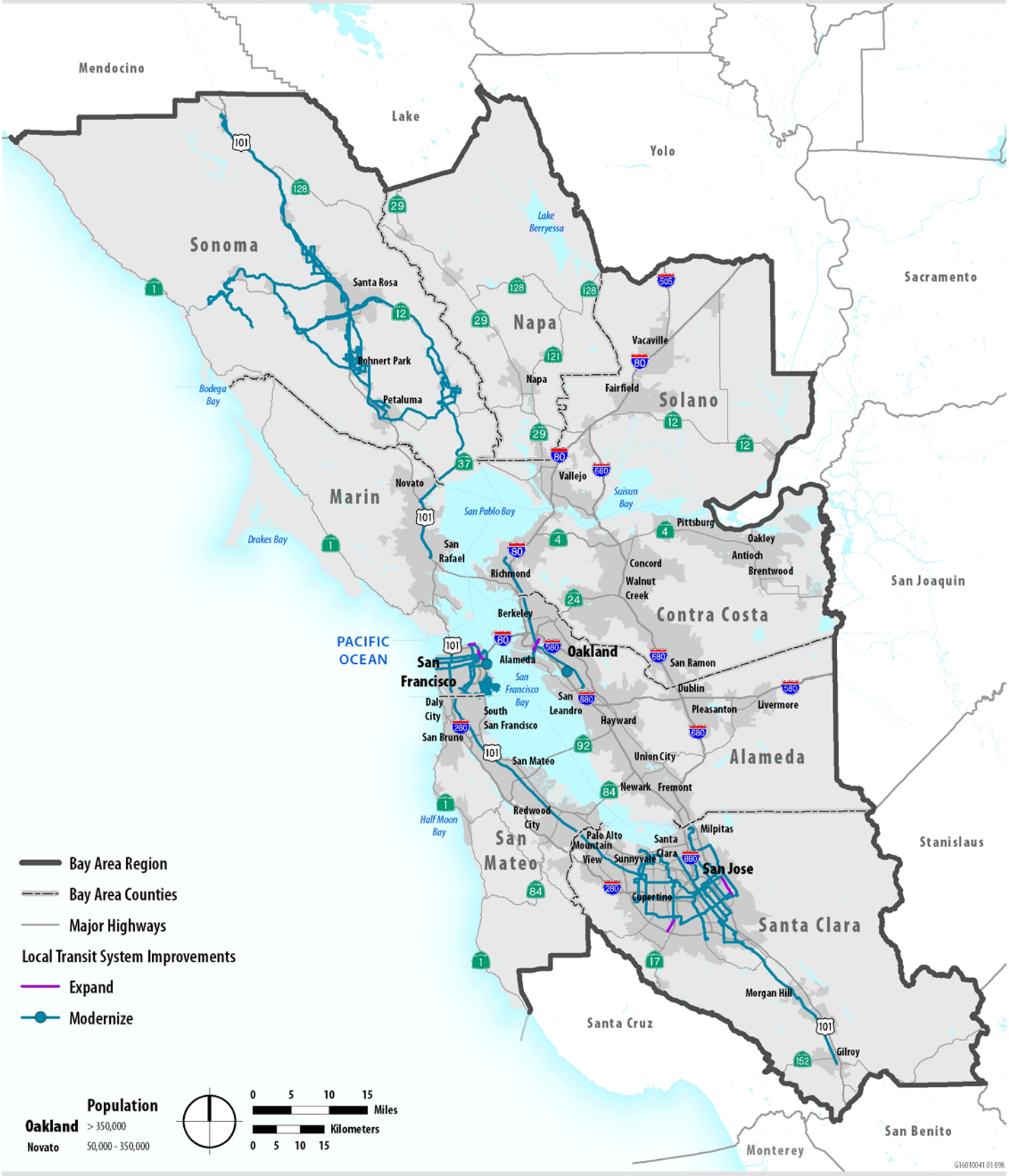
Map Data Sources: Metropolitan Transportation Commission (MTC), 2016, 2017; Tom Tom North America, 2015.

Figure 1.2-8
Highway System Improvements



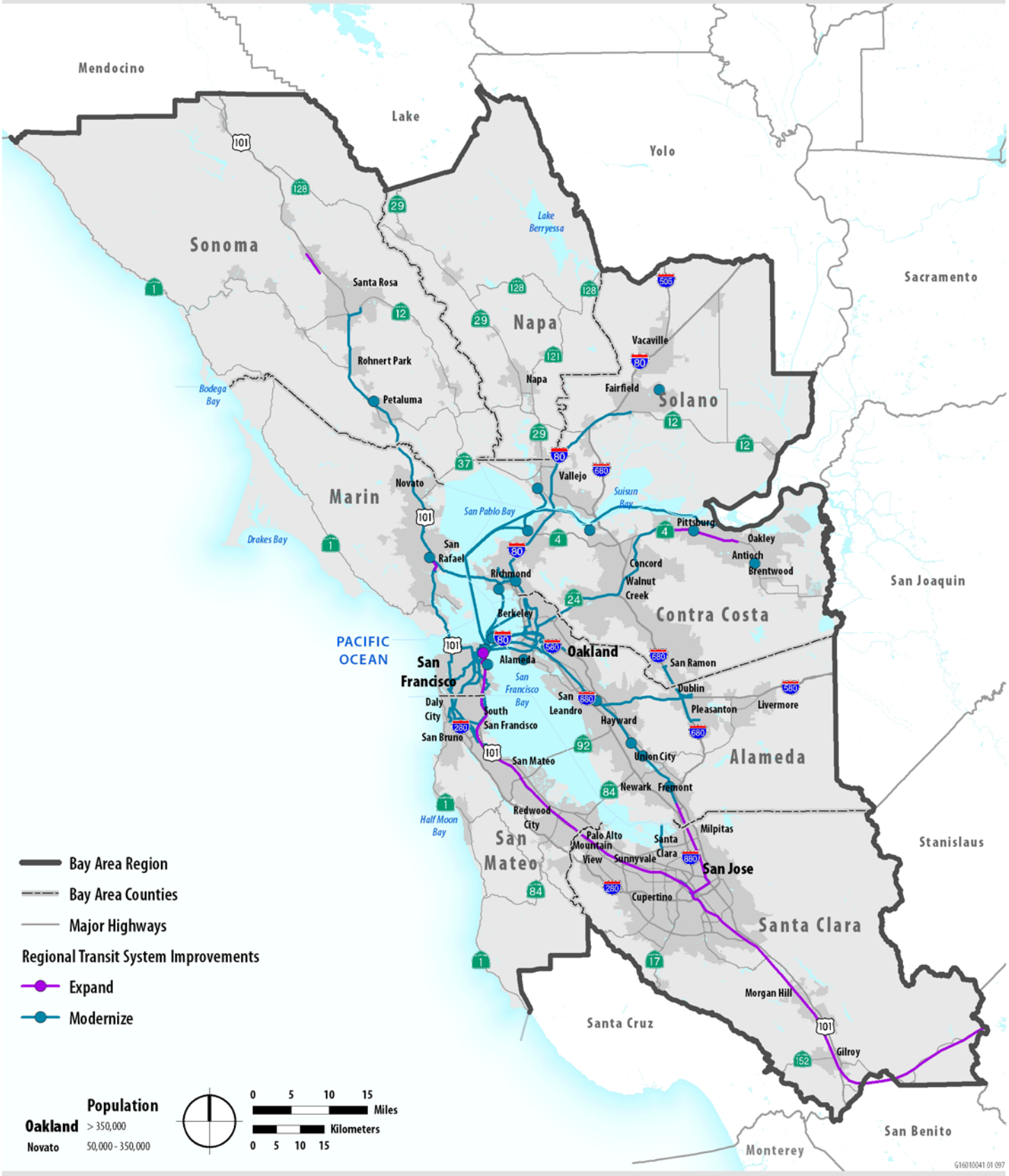
Map Data Sources: Metropolitan Transportation Commission (MTC), 2016, 2017; Tom Tom North America, 2015.

Figure 1.2-9
Local Transit System Improvements



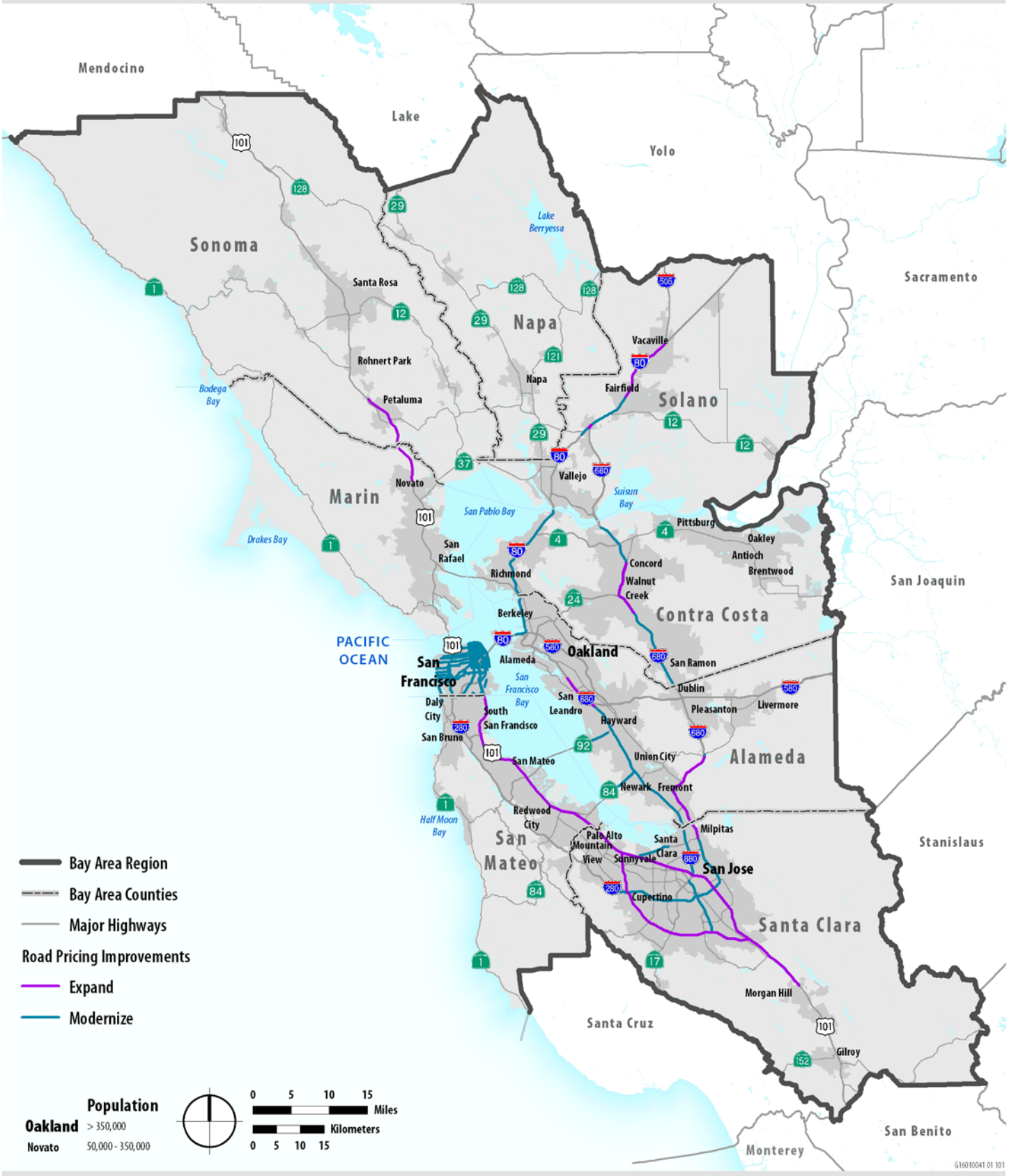
Map Data Sources: Metropolitan Transportation Commission (MTC), 2016, 2017; Tom Tom North America, 2015.

Figure 1.2-10
Regional Transit System Improvements



Map Data Sources: Metropolitan Transportation Commission (MTC), 2016, 2017; Tom Tom North America, 2015.

Figure 1.2-11
Road Pricing Improvements



Map Data Sources: Metropolitan Transportation Commission (MTC), 2016, 2017; Tom Tom North America, 2015.

1.2.6 Process for Adoption and Implementation

ACTIONS TO ADOPT AND IMPLEMENT

MTC and ABAG are the Lead Agencies for approval of proposed Plan and the associated environmental review (this EIR). They will determine whether to certify this EIR as adequate under CEQA, and will consider adoption of the proposed Plan. The proposed Plan requires a conformity determination under the federal Clean Air Act section 176(c). The Federal Highway Administration and the Federal Transit Administration make the final determination of conformity determination Implementation.

Once adopted by MTC and ABAG, 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. If the combination of measures in the SCS would not meet the regional targets, the MPO must prepare a separate “alternative planning strategy" (APS) to meet the targets. The APS is not a part of the RTP.

This program EIR is a first-tier document that addresses the environmental impacts that may affect the nine-county Bay Area as a result of adoption and implementation of Plan Bay Area. As such, future programs or projects may “tier” from this programmatic EIR, as stipulated in CEQA. Tiering refers to the coverage of general environmental analysis in broad program-level EIRs, with subsequent focused environmental documents for individual projects that implement the program. If the potential environmental effects of consistent subsequent actions are adequately addressed by a certified programmatic EIR, additional environmental analysis may be unnecessary. This finding can be substantiated using an initial study that evaluates whether the environmental effects of the subsequent project have already been adequately covered.

The lead agencies for projects analyzed in this program EIR may use it as the basis for cumulative analysis of specific project impacts, together with the projected growth in the region. Cities and counties may use information in this EIR in their future housing elements. Bay Area congestion management agencies may incorporate information provided in this EIR into future county transportation plans such as congestion management programs, countywide transportation plans, or county bike and pedestrian plans. Other agencies expected to use the EIR include: Caltrans, transportation authorities, transit providers in the region (such as Muni, BART, AC Transit, SamTrans, Caltrain, SolTrans, WestCAT, ACE, Water Emergency Transit Authority, etc.), the Bay Conservation and Development Commission, the Bay Area Air Quality Management District, and cities and counties.

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2.0 APPROACH TO ANALYSIS

2.0.1 Introduction

Chapters 2.1 through 2.14 of the EIR contain the settings and analyses of environmental impacts of the proposed Plan, organized by issue area. Within each issue area, the environmental setting (both physical and regulatory) is described, significance criteria are presented, analysis methodology is described, and impact analysis is provided. For each potentially significant impact, mitigation measures are identified where feasible. The impacts of the project alternatives are presented and compared in Chapter 3.1.

2.0.2 General Methodology and Assumptions

PLAN TIMEFRAME

In order to assess the environmental impacts of the proposed Plan, it is necessary to make assumptions about future environmental conditions at the time it is fully implemented. Based on when the NOP was released, the baseline year for existing conditions for the analysis is generally 2015. The horizon year for the proposed Plan is 2040. For comparisons where 2015 data are not available, the closest available year is used. An exception to this appears in Section 2.5, "Climate Change and Greenhouse Gases," which includes a 2005 baseline to satisfy statutory requirements of Senate Bill 375 for benchmarking the year used for comparison to requisite GHG reduction targets.

This analysis does not consider phasing of improvements or interim stages of the proposed Plan between 2015 and 2040, because the required 4-year update cycle of the RTP/SCS results in regular, short-term adjustments to the Plan. The one exception to this approach appears in Section 2.5, "Climate Change and Greenhouse Gases," which includes an examination of impacts in 2020, 2030, 2035, 2040, and 2050 as compared to a 2005 baseline to satisfy requirements of Senate Bill 375, the Global Warming Solutions Act of 2006 (Assembly Bill 32 [2006], Senate Bill 32 [2016]), and Executive Orders B 30-15 and EO-05-03 among other requirements.

LEVEL OF DETAIL

As a program-level EIR that addresses the entire nine-county, 101-city region, impacts of individual land use and transportation projects are not addressed in detail; the focus of this analysis is on addressing the impacts of implementation of the Plan as a whole. The analysis considers the impacts of the RTP/SCS in terms of the transportation project footprints and the land use growth footprint, respectively. The impact discussions generally address the effects of the proposed Plan at three levels of geography: 1) at the regional level which examines impacts on the Bay Area as a whole; 2) at the county-level which examines impacts within each county; and 3) at the Transit Priority Areas (TPAs) level which addresses impacts within TPAs.. The portion of the projected land use growth footprint located in PDAs that is outside of a TPA is captured in the County totals. Where useful for the impact analysis, GIS-based results are also reported by PDAs. The analysis is intended to assist area-wide issue identification as it relates to regional transportation and land use planning and to provide a basis for streamlined project-level environmental analysis for projects implemented under the proposed Plan.

QUANTITATIVE ANALYSIS

A geographic information system (GIS) analysis was used to digitally overlay the projected growth footprint (net new acres over existing) associated with forecasted development (i.e., the land use growth footprint) and assumed transportation projects (i.e., transportation projects footprint) over resource-related data. The land

use growth footprint represents all parcels of land that are forecasted to be affected by the proposed Plan's forecasted growth in households and commercial space. The actual footprints and other design details of most proposed transportation projects are not known because the projects are in the early stages of planning. Transportation project footprints were calculated using a range of buffers depending on the project types. Not all projects included in the transportation projects list would be expected to require earthmoving activities and/or have a footprint associated with implementation of a specific project. Projects that are included in the transportation project footprint are associated with modernization and expansion strategies. Buffers range from 75 to 100 feet for linear projects (e.g., road and rail extensions), and 150 to 500 feet for point projects (e.g., interchanges, transit centers). Because of the buffer assumptions, the area of potential effects tends to be overstated when considering transportation projects. In addition, some transportation project buffers overlap where projects are located within close proximity of each other or where alignments coincide. The transportation projects acreage reported in this EIR reflects the footprint of each project, and does not discount these areas of overlap. Based on GIS analysis, the overlap of individual projects within the overall transportation projects footprint is approximately 3,900 acres, which is 16 percent of the total transportation projects footprint (24,900 acres). While multiple transportation project alignments may overlap, construction timelines are unlikely to occur during the same timeframe; thus, counting the same area of impact for more than one project is reasonable.

In addition, portions of land use growth footprint and transportation projects footprint overlap due to imprecise areas of potential effects associated with transportation projects (i.e., buffers). This portion of overlap is approximately 1,800 acres of land, which represents approximately 10 percent of the total land use growth footprint and 7 percent of the transportation projects footprint. To provide a more accurate interpretation of the potential environmental impacts, the acreages of the land use growth footprint and transportation projects footprint are not summed and instead are presented independently throughout the analysis.

2.0.3 Types of Impacts

In compliance with CEQA Guidelines, the following general types of environmental impacts are considered, where appropriate:

- **Direct or primary impacts**, which are caused by the proposed Plan and occur at the same time and place as the proposed Plan.

- **Indirect or secondary impacts**, which are caused by the proposed Plan and are later in time or farther removed in distance, but are still reasonably foreseeable. Indirect or secondary impacts may include growth-inducing impacts and other impacts related to induced changes in the pattern of land use, population density, or growth rate, and related impacts on air and water and other natural systems, including ecosystems. Indirect or secondary impacts may also include cumulative impacts.

- **Short-term impacts**, which are those of a limited duration, such as the impacts that would occur during the construction phase of projects.

- **Long-term impacts**, which are those of greater duration, including those that would endure for the life of the proposed Plan and beyond, such as operational impacts.

- **Significant and unavoidable impacts**, which are impacts that cannot be mitigated to a level that is less than significant.

- **Irreversible environmental changes**, which may include current or future irretrievable commitments of non-renewable resources, or growth-inducing impacts that commit future generations to similar irretrievable commitments of resources. Irreversible change can also result from risks of accidents and injury associated with the proposed Plan.

- **Cumulative impacts,** which are potential environmental impacts that are individually limited but cumulatively significant. CEQA defines cumulative impacts as "two or more individual effects which, when considered together, are considerable or which compound or increase other environmental impacts" (CEQA Guidelines § 15355). "'Cumulatively considerable' means that 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" (CEQA Guidelines § 15065(a)(3)). This means that cumulative impacts can result from individually minor but collectively significant projects taking place over a period of time.

  The proposed Plan, which includes region-wide transportation projects and land use development patterns in the Bay Area to accommodate projected regional growth through 2040, is a cumulative plan by definition. As such, the environmental analysis included in each issue area of this EIR is a cumulative analysis compliant with the requirements of CEQA and the CEQA Guidelines. Additionally, this EIR contains analysis of cumulative impacts that extend beyond the region, for identified CEQA impact areas. This discussion is included in Section 3, which addresses Alternatives and CEQA Required Conclusions.

IMPACT SIGNIFICANCE

For each issue area, criteria of significance are established, based on the 2013 Plan Bay Area EIR, CEQA Guidelines Appendix G, and professional judgement. Impacts are individually numbered within each issue area. For each impact, impacts are identified as follows:

Less Than Significant (LS) – The impact would cause no substantial adverse change in the baseline conditions, or there may be some associated impact, however it is insignificant or acceptable as defined by the applicable significance criterion. Therefore, no mitigation measures are required.

Potentially Significant (PS) – Based on described conditions, it is not possible to predict with acceptable certainty whether the impact will be acceptable or significant as defined by the applicable significance criterion. Impacts falling in this category are treated as "significant".

Significant (S) – A significant effect is defined as a substantial, or potentially substantial, adverse physical change in the environment (Public Resources Code Section 21068). The CEQA Guidelines direct that this determination be made by the decision-making body, and that it be based on scientific and factual data, to the extent possible.

The CEQA Guidelines state that an "ironclad" definition of significant effect is not possible because the significance of an activity may vary with the setting. Significant impacts may be mitigated to less-than-significant levels through implementation of identified mitigation measures. The effectiveness of the recommended mitigation measures is assessed and the residual impact after mitigation is identified. The impacts after mitigation are classified as follows:

- **Significant and Unavoidable (SU):** Cannot be feasibly mitigated to a level that is less than significant
- **Less than Significant with Mitigation (LS-M):** Can be feasibly mitigated to a level that is less than significant

2.0.4 Mitigation

Mitigation is proposed, where feasible, to reduce potentially significant environmental impacts. For some impacts, mitigation measures are commitments by MTC and ABAG. For other impacts, MTC and ABAG do not have regulatory or approval authority over the project. In those cases, MTC and ABAG identify specific mitigation measures for application by the lead agency. In order to rely on this EIR to streamline environmental review for an individual project, the lead agency must require the applicable mitigation measures as a part of the project-level environmental review. These commitments would obligate project sponsors to implement measures that would minimize or eliminate significant impacts pursuant to CEQA. The project sponsor or lead

agency would be responsible for ensuring adherence to the mitigation measures during construction and operation of the project.

Throughout the impact analysis, it is noted where projects utilizing the CEQA Streamlining provisions of SB 375 (Public Resources Code sections 21155.1, 21155.2, and 21159.28) must apply the mitigation measures, as feasible, to address site-specific conditions. MTC/ABAG cannot require local implementing agencies to adopt mitigation measures: it is ultimately the responsibility of a lead agency to adopt mitigation. Therefore, this EIR makes a distinction in characterizing impact significance after mitigation to reflect whether MTC is able to assume implementation of identified mitigation measures because it has the authority to impose the measures.

Where regulatory requirements (i.e., for hazards or water resources) or permitting requirements exist (i.e., for biological resources), it is assumed that compliance with these regulations would occur because they are required by law and binding on responsible agencies and project sponsors. After reasonably assuming their implementation, this analysis considers whether additional measures are required to reduce impacts to a less-than-significant level or if regulatory and permitting requirements adequately address potential impacts.

2.1 TRANSPORTATION

This section describes the current transportation conditions and examines the effects of the changes in projected land use and transportation projects included in the proposed Plan on transportation conditions in 2040. The study area consists of the existing and proposed elements of the transportation system for the nine-county Bay Area, including highways, local roads, rail, bus and ferry transit, bicycle and pedestrian facilities, and airports and seaports. This section evaluates the impacts related to transportation such as changes in travel times, accessibility to jobs, traffic congestion, vehicle miles traveled per capita, and transit utilization that may result from the implementation of the proposed Plan.

Comments received in response to the Notice of Preparation concerning the transportation analysis addressed the following topics: impacts to public access to coastal areas, parks, and recreation facilities (see Section 2.1, "Public Services and Recreation"); the level of detail of impact analysis, specifically geographic extent and time periods of analysis (see Section 2.0 "Approach to Analysis"); the regulatory framework and implications of Senate Bill 743 (see 2.1.2 "Regulatory Setting" below); and interregional travel, the High Occupancy Vehicle and Express Lane Network, California High Speed Rail, and Regional Transportation Demand Management strategies (addressed in this section under 2.1.1 "Environmental Setting" and 2.1.3 "Impact Analysis"). Information, data, and observations related to these comments are included throughout this Draft EIR, as noted and where relevant.

2.1.1 Environmental Setting

EXISTING REGIONAL TRANSPORTATION CONDITIONS (2015)

The Bay Area features a robust transportation network, allowing for multimodal access across the region. The transportation system includes interstate and state highways, local arterial roadways, local streets and roads, public transit systems, bicycle and pedestrian facilities, seaports, and airports. When combined, these facilities allow for the movement of people and goods throughout the region. The various elements of the Bay Area transportation system are described below.

Roadway Network: The Bay Area currently contains over 1,300 directional miles of limited-access highways, which include both interstates and state highways. These facilities provide access to major employment centers and to destinations outside of the Bay Area. In addition to providing mobility for automobiles, these facilities also support express bus services and freight movement. The major limited-access highways in the Bay Area are listed in **Table 2.1-1**. In addition, the Bay Area has over 33,000 directional miles[1] of arterials and local streets, providing access to communities, and accommodating on-street parking and loading activities. Together, these roadway facilities accommodate nearly 158 million vehicle miles each weekday. The road network also serves over 600,000 vehicles that travel into or out of the region from adjacent areas. Over half of these interregional travelers use two regional gateways: Interstate 80 connecting Solano County and Yolo County, and Interstate 580 and Interstate 205 connecting Alameda County and San Joaquin County (Vital Signs website, MTC 2016). **Figure 2.1-1** depicts the major roadway facilities in the Bay Area.

[1] Note that directional miles are defined as miles of roadway in a single direction. For example, a one-mile-long, bidirectional segment of roadway would be two directional miles of roadway.

Table 2.1-1 Major Limited-Access Highways in the Bay Area

Route	Highway Limits[1]		Bay Area Counties Served[2]
Interstate 80	San Francisco	Teaneck, NJ	SF, ALA, CC, NAP, SOL
Interstate 280	San Francisco	San José	SF, SM, SCL
Interstate 380	San Bruno	South San Francisco	SM
Interstate 580	San Rafael	Tracy	MRN, CC, ALA
Interstate 680	Fairfield	San José	SOL, CC, ALA, SCL
Interstate 780	Vallejo	Benicia	SOL
Interstate 880	Oakland	San José	ALA, SCL
Interstate 980	Oakland	Oakland	ALA
Interstate 238	San Leandro	Castro Valley	ALA
Interstate 505	Dunnigan	Vacaville	SOL
U.S. Route 101	Olympia, WA	Los Angeles	SON, MRN, SF, SM, SCL
State Route 1	Leggett	Dana Point	SON, MRN, SF, SM
State Route 4	Hercules	Markleeville	CC
State Route 12	Sebastopol	San Andreas	SON, NAP, SOL
State Route 17	San José	Santa Cruz	SCL
State Route 24	Oakland	Walnut Creek	ALA, CC
State Route 29	Upper Lake	Vallejo	NAP, SOL
State Route 37	Novato	Vallejo	MRN, SON, NAP, SOL
State Route 85	Mountain View	San José	SCL
State Route 87	San José	San José	SCL
State Route 92	Half Moon Bay	Hayward	SM, ALA
State Route 160	Sacramento	Antioch	SOL, CC
State Route 237	Mountain View	Milpitas	SCL
State Route 242	Concord	Concord	CC

Notes:

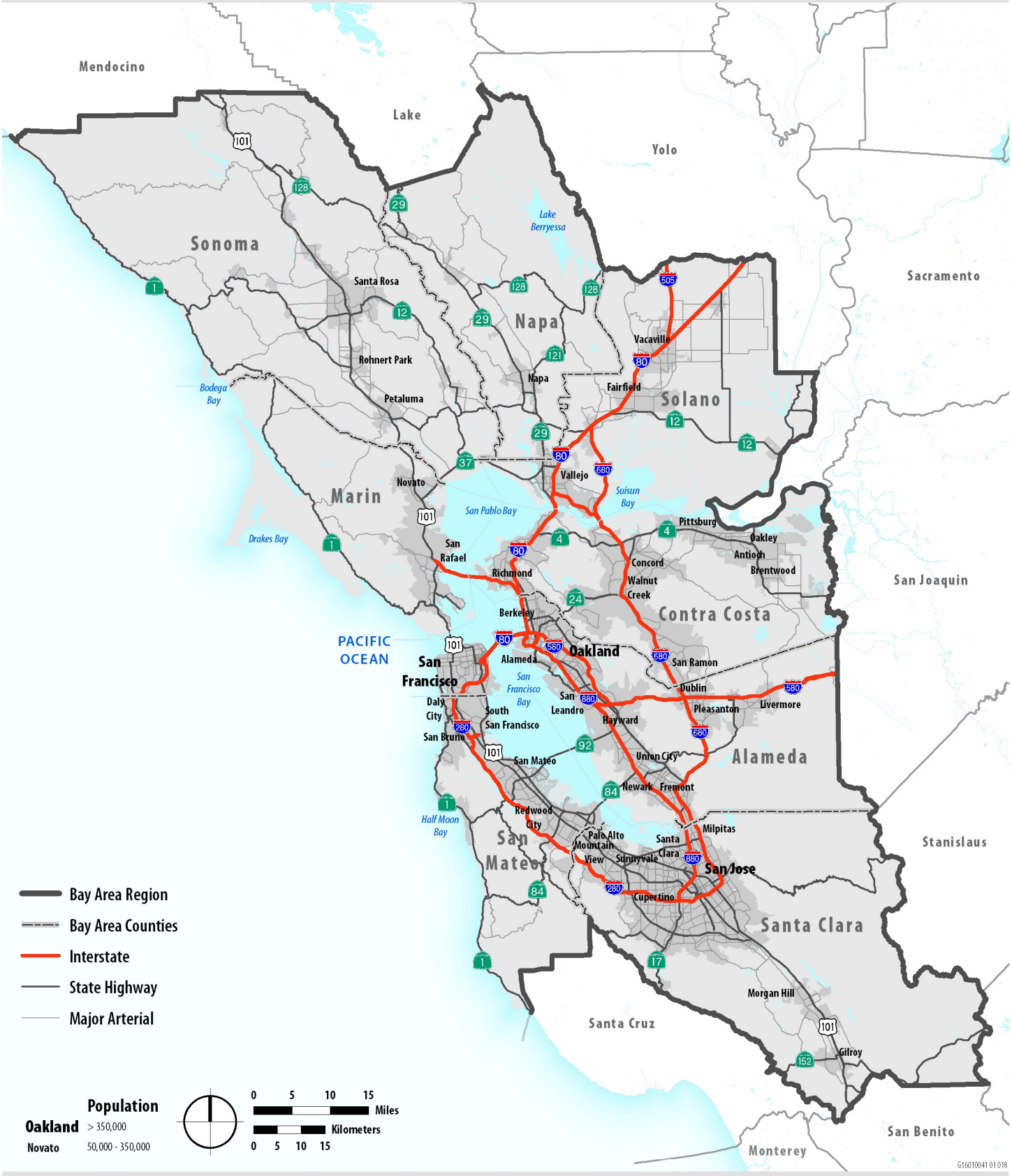
[1] Reflects the overall route limits, rather than the limits of the limited-access segment.

[2] County abbreviations used: ALA (Alameda), CC (Contra Costa), Marin (MRN), NAP (Napa), San Francisco (SF), San Mateo (SM), Santa Clara (SCL), Solano (SOL), and SON (Sonoma).

Public Transit Systems: The Bay Area includes over 11,500 transit route miles of service including heavy rail (BART), light rail (Muni Metro and VTA Light Rail), commuter rail (Caltrain and ACE), diesel and electric buses, cable cars, and ferries. This public transit system accommodates a total of almost 1.7 million passengers a day, with about 43 percent of daily passengers (724,000) on Muni, about 26 percent of daily passengers (434,000) on BART, 11 percent (180,000) on AC Transit, and 9 percent (146,000) on VTA (Table 2.1-2). **Figure 2.1-2** shows the areas served by each of the Bay Area transit operators. A list of the public transit operators and average weekday ridership is shown in **Table 2.1-2**.

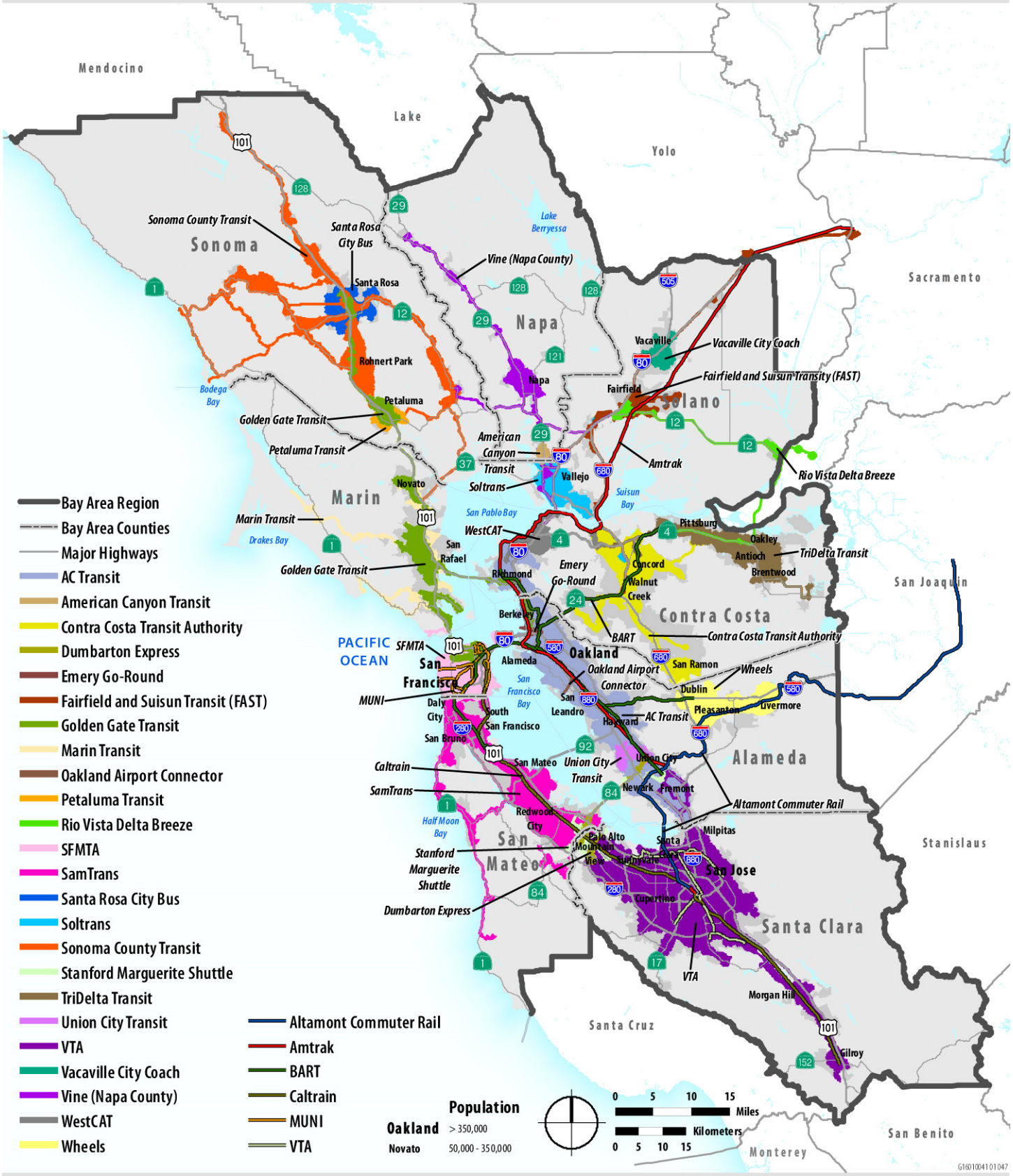
Amtrak provides long-distance passenger rail services to the Bay Area via the Capitol Corridor, San Joaquin, Coast Starlight, and California Zephyr lines, connecting the region to the Central Valley, Southern California, the Pacific Northwest, and the Midwest.

Figure 2.1-1
Major Road Facilities



Map Data Sources: Metropolitan Transportation Commission (MTC), 2016; Tom Tom North America, 2015.

Figure 2.1-2
Transit Lines & Areas Served by Transit (Existing Baseline – Year 2015)



Map Data Sources: Metropolitan Transportation Commission (MTC), 2016; Tom Tom North America, 2015.

California High-Speed Rail service is planned to begin revenue operations during the timeframe of the proposed Plan. As currently planned, by 2029, the system will run from San Francisco to the Los Angeles basin in under three hours. The system will eventually extend to Sacramento and San Diego, totaling 800 miles with up to 24 stations. Within the Bay Area region, the High-Speed Rail stations will provide development opportunities in the existing downtown cores of San Francisco, Millbrae, San Jose, and Gilroy.

Table 2.1-2 Public Transit Operators in the Bay Area

Transit System	Mode	Average Weekday Ridership[1]	Bay Area Counties Served
Muni	Local/express bus Light rail Cable car/streetcar/trolley	724,000	MRN, **SF**, SM
BART	Heavy rail	434,000	**ALA, CC, SF, SM**
AC Transit	Local/transbay bus	180,000	**ALA, CC**, SCL, SF, SM
VTA	Local/express bus Light rail	146,000	ALA, **SCL**, SM
SamTrans	Local/express bus	44,000	SCL, SF, **SM**
Caltrain	Commuter rail	60,800	**SCL, SF, SM**
Golden Gate Transit/ Marin Transit	Local/express bus Ferry	23,000	CC, **MRN**, SF, **SON**
County Connection	Local/express bus	12,000	ALA, **CC**
Santa Rosa CityBus	Local bus	8,000	**SON**
Tri Delta Transit	Local/express bus	10,000	**CC**
LAVTA Wheels	Local/express bus	6,000	**ALA**, CC
Sonoma County Transit	Local/express bus	4,000	**SON**
SolTrans	Local/express bus	5,000	CC, **SOL**
WestCAT	Local bus Express/transbay bus	5,000	**CC**, SF
WETA[2]	Ferry	7,000	**ALA, SF, SM, SOL**
ACE	Commuter rail	4,800	**ALA, SCL**
Union City Transit	Local bus	1,000	**ALA**
VINE	Local/express bus	3,000	**NAP**, SOL
Vacaville City Coach	Local bus	2,000	**SOL**
FAST	Local/express bus	1,000	CC, **SOL**
Petaluma Transit	Local bus	1,000	**SON**
Rio Vista Delta Breeze	Local/express bus	< 1,000	CC, **SOL**
Pleasanton Paratransit	Local bus	< 1,000	**CC**
Dixon Readi-Ride	Local bus	< 1,000	**SOL**

Note: Primary counties served by operator are marked in **bold**.

[1] Reflects unaudited FY 2014-2015 ridership data; rounded to the nearest 1,000 daily riders.
[2] Includes ferry services: Alameda/Oakland Ferry; Harbor Bay Ferry; South San Francisco Ferry; and, Vallejo Ferry.

Source: Statistical Summary of Transit Operators, MTC 2016

Private Transit: In addition to public transit systems and operators, private transit options have been increasing in the Bay Area. Private transit services include: privately operated commuter shuttles (e.g. Apple, Google), publicly accessible private shuttles (e.g., Emery Go-Round, Chariot), and transportation network companies (TNCs) (e.g., Lyft and Uber).

Emerging Transportation Technology: Emerging transportation technologies may have an important influence on regional and national transportation systems in the coming years. Transportation innovations include the following: on-demand ridesharing; bike-sharing; connected and autonomous vehicles; mobility aggregation applications that provide users with one source for mobility services (e.g., Moovel and RideScout); coordinated and adaptive traffic signals; active traffic management, which provides the ability to dynamically manage traffic through use of strategies such as adaptive ramp metering and adaptive traffic signal control; and unmanned aircraft systems. These and other emerging technologies have the potential to transform mobility choices and alter the transportation landscape. Many of these technologies are already being deployed or tested in the Bay Area. For example, the Contra Costa Transportation Authority leads and facilitates a collaborative partnership at the GoMentum Station in Concord, the largest test facility for Connected and Autonomous Vehicles. The effect these technologies will have on the transportation system is uncertain and will be shaped by regulations and policies surrounding their use.

Bicycle and Pedestrian Facilities: The Bay Area has an extensive system of pedestrian facilities including multi-use paths, sidewalks, crosswalks, walkways, stairs, and ramps. Other pedestrian facilities include pedestrian signals, pedestrian refuge islands and medians, and curb extensions.

In addition to pedestrian facilities, the Bay Area has a bikeway network consisting of four classes of bikeways, defined in the California Highway Design Manual (California Department of Transportation, updated July 2016), as follows:

- Class I Bikeway (Bike Path): completely separated right-of-way for exclusive use of bicycles and pedestrians,
- Class II Bikeway (Bike Lane): dedicated lane for bicycle travel on a street or highway,
- Class III Bikeway (Bike Route): shared lane for bicycle travel on a street or highway, and
- Class IV Bikeway (Cycle Track): separated or protected lane for bicycle travel on a street or highway.

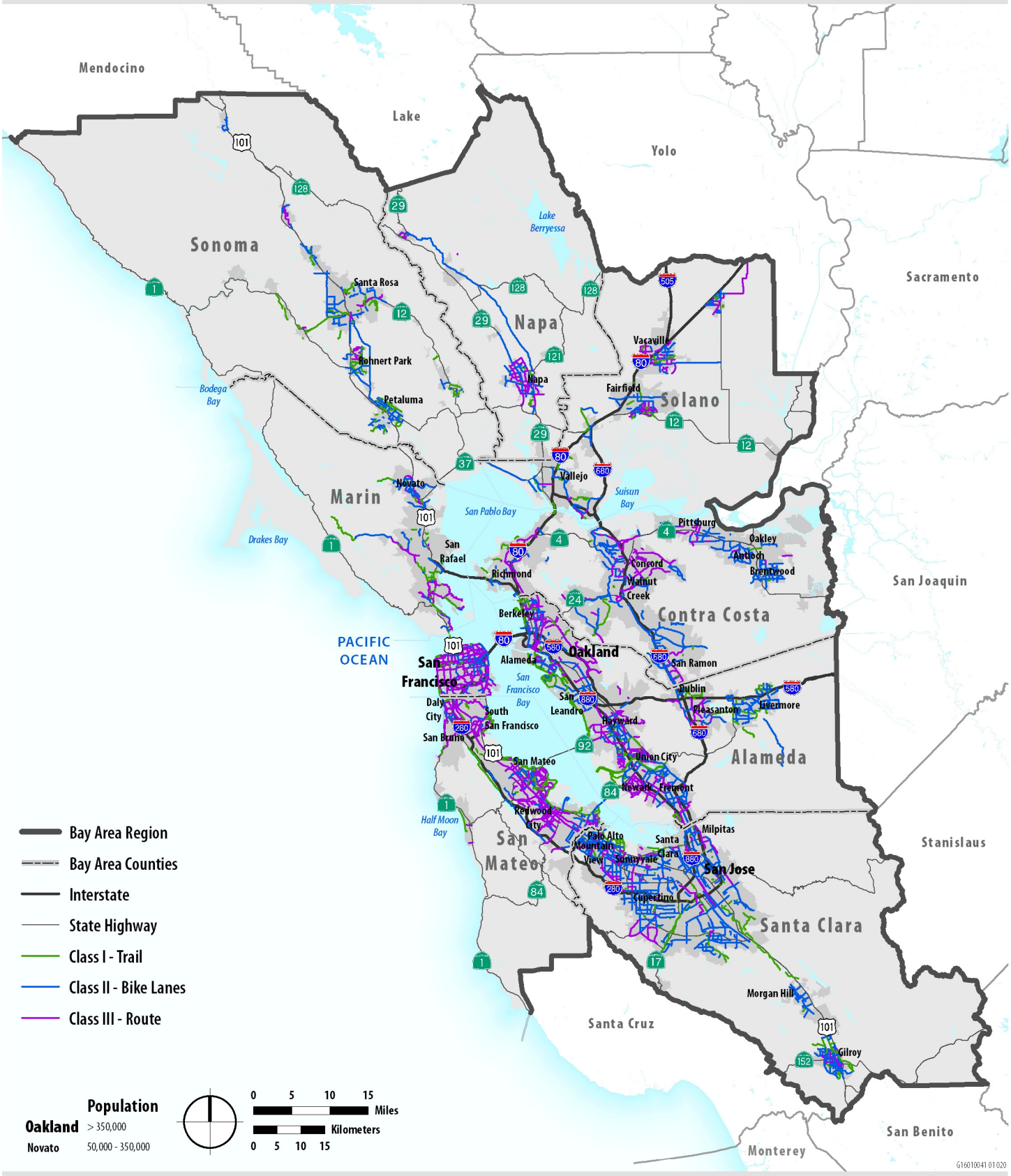
Under the California Highway Design Manual definitions, the Bay Area has over 700 miles of Class I facilities, over 2,000 miles of Class II facilities, and over 1,300 miles of Class III facilities. The length of completed Class IV facilities in the Bay Area is uncertain, though many are in planning, design, and under construction. **Figure 2.1-3** shows the location of the various bikeways through the Bay Area.

Seaports and Airports: The Bay Area is served by five seaports, which provide the opportunity for intermodal transfers to trucks and railcars. The Port of Oakland, the largest of the five, is the third largest U.S. seaport on the West Coast (after the Ports of Los Angeles and Long Beach). Other seaports include the Port of San Francisco, the Port of Richmond, the Port of Benicia, and the Port of Redwood City. These seaports are supported by freight railroad services operated by Union Pacific and Burlington Northern Santa Fe.

The Bay Area is also served by three international airports: San Francisco International Airport, Oakland International Airport, and Norman Y. Mineta San José International Airport. Each of these airports provides mobility for people and freight nationally and internationally. The region is also served by one smaller airport with limited commercial service, Charles M. Schulz Sonoma County Airport, as well as numerous smaller general aviation airports.

Goods Movement: Goods movement supports global supply chains and regional industries that trade in international, domestic, and local markets. The types of goods moved, how the goods are moved, and where they are moved between, is a function of the regional economic activity and what transportation options are available. The movement of goods in the Bay Area region involves intermodal systems of air cargo, maritime, rail, and roadways. Efficient goods movement requires access and connectivity to logistics centers and terminals to ensure movement onto and off the network. The regional goods movement infrastructure includes the country's fifth-largest container port (Port of Oakland), two of the most active air cargo airports (San Francisco International Airport and Oakland International Airport), major rail lines and terminals operated by Union Pacific and Burlington Northern Santa Fe Railway, and highways that carry high volumes of trucks (MTC 2016c).

Figure 2.1-3
Bicycle Facilities



Map Data Sources: Metropolitan Transportation Commission (MTC), 2016; Tom Tom North America, 2015.

Caltrans District 4 led the *San Francisco Bay Area Freight Mobility Study* in 2014, which provides detailed information regarding the region's multimodal goods movement system. The Alameda County Transportation Commission developed a long-range *Countywide Goods Movement Plan* (January 2016) and MTC has produced the *San Francisco Goods Movement Plan* (February 2016). Additionally, pursuant to the settlement agreement with CBE, MTC formed the Regional Freight New Technologies Task Force in September 2015 and studied freight strategies to develop the *Freight Emissions Reduction Action Plan,* which is in MTC's RTP supplemental reports available at http://2040.planbayarea.org/reports.

TRANSPORTATION PERFORMANCE MEASURES

Regional conditions for a number of performance measures form the basis for the transportation impact analysis presented in this EIR. These measures include daily vehicle miles traveled (VMT) and VMT per capita, roadway congestion and delay, mode share, and transit utilization. These performance measures are described and summarized in more detail in this section. The existing conditions analysis in this EIR refers to conditions modeled in the baseline year 2015. MTC utilized its regional travel demand model (*Travel Model One*) to compare the proposed Plan Bay Area for 2040 conditions to the 2015 baseline conditions.

Regional Travel Patterns: The Bay Area transportation system includes infrastructure supporting travel by numerous modes and routes for the movement of people and goods. **Table 2.1-3** provides some key metrics regarding Bay Area travel behavior in 2015 based on the simulation results from the travel model.

Table 2.1-3 Modeled Bay Area Travel Behavior (2015)

Daily[1] Transit Boardings	2,279,000
Daily[1] Vehicle Trips[2]	21,227,800
Daily[1] Vehicle Miles of Travel (VMT)[2]	158,406,800
Daily[1] Vehicle Miles of Travel per Capita[3]	20.9
Daily[1] Vehicle Hours of Recurring Delay	353,200
Daily[1] Vehicle Hours of Recurring Delay (Freeways)	222,800
Daily[1] Vehicle Hours of Recurring Delay (Expressways and Arterials)	99,200
Daily[1] Vehicle Hours of Recurring Delay (Other Facilities)	31,300
Daily[1] Vehicle Hours of Non-Recurrent Delay[4]	144,900
Total Daily Vehicle Hours of Delay (Recurring + Non-Recurrent)	498,100
Typical Weekday Personal Trips	**25,889,800**

Notes:

[1] Daily metrics are measured for a typical weekday.

[2] Only reflects interzonal trips (assigned directly to the highway network); includes intraregional, interregional, and commercial vehicle trips, and trips to and from the airport and high-speed rail.

[3] Total daily VMT is calculated using *Travel Model One*; therefore, to calculate per-capita VMT, it is essential to use simulated population levels to ensure consistency. Simulated population may be slightly different than overall population forecasts for Plan Bay Area EIR alternatives because of slight variability in modeling tools. Further clarification on this issue can be found in the Plan Bay Area Supplemental Reports.

[4] Only includes non-recurrent delay on freeway facilities.

Source: Metropolitan Transportation Commission Travel Demand Forecasts 2015

Vehicle Miles Traveled

The basic measure of the amount of vehicle travel generated is vehicle miles traveled (VMT). One vehicle traveling one mile constitutes one vehicle mile, regardless of its size or the number of passengers. Vehicle miles traveled is a term used throughout this EIR and refers to the number of vehicle miles traveled within the region (or a specified geographic area) during a typical weekday and includes VMT for all trip types (commute, shopping, social/recreational, school, goods movement). VMT reflects the mileage accrued within the region and not necessarily all VMT created by the residents of the region (for example, it would not include the VMT generated by a Bay Area resident driving in Los Angeles). A portion of the regional VMT can be accrued by

through (or interregional) trips. VMT is a common measure of roadway use and economic activity and has a strong correlation with congestion.

An area's per capita (or per person) VMT is the total VMT divided by the population of that area and is a measure of the average vehicle miles each person travels on a typical weekday. Per capita VMT tends to increase as a result of greater overall economic activity in the region, higher levels of per-household automobile ownership, and a jobs-housing imbalance that contributes to longer average commute distances. Daily VMT and per capita VMT by county are shown in **Table 2.1-4**. According to these MTC travel model outputs, San Francisco represents 12.2 percent of the total Bay Area population and generates only 5.5 percent of the vehicle miles traveled within the Bay Area region. People in San Francisco traveled about half as many vehicle miles (9.5 VMT per capita) compared to the Bay Area region overall (20.9 VMT per capita) in 2015. Overall, cars, buses, and commercial vehicles travel about 158 million miles a day on Bay Area roads. About 542,700 of these vehicle miles traveled (<1 percent) on Bay Area roads are attributed to adjacent counties.

Table 2.1-4 Modeled Average Daily VMT and VMT per Capita by County (2015)

County of Residence	Daily[1] Vehicle Miles Traveled (VMT)[2]	Population[3]	Daily Vehicle Miles of Travel per Capita[4]
Alameda	38,343,700	1,630,800	23.5
Contra Costa	22,212,100	1,075,500	20.7
Marin	6,453,600	255,700	25.2
Napa	2,838,400	137,600	20.6
San Francisco	8,734,100	920,000	9.5
San Mateo	16,429,700	759,500	21.6
Santa Clara	40,657,200	1,900,000	21.4
Solano	12,328,200	410,200	30.1
Sonoma	9,867,100	481,200	20.5
Adjacent Counties	542,700	N\A[5]	N\A[5]
Regional Total	**158,406,800**	**7,570,500**	**20.9**

Notes:

[1] Daily metrics are measured for a typical weekday.

[2] Only reflects interzonal trips (assigned directly to the highway network); includes intraregional, interregional, and commercial vehicle trips, and trips to and from the airport and high-speed rail.

[3] Simulated population may be slightly different than overall population forecasts for Plan Bay Area EIR alternatives because of slight variability in modeling tools. Further clarification on this issue can be found in the Plan Bay Area Supplemental Reports.

[4] Total daily VMT is calculated using *Travel Model One*; therefore, to calculate per-capita VMT, it is essential to use simulated population levels to ensure consistency.

[5] N\A indicates data not available.

Source: Metropolitan Transportation Commission Travel Demand Forecasts 2015

Roadway Congestion and Delay

According to observed data reported on MTC's Vital Signs website, the top 10 most congested corridors make up about 40 percent of regional freeway congestion. Over 75 percent of congested delay on the freeway network occurs in Alameda, Contra Costa, and Santa Clara counties. Delay is the time difference between travel under congested conditions and travel at the posted speed limit. Congested delay on freeways occurs when speeds drop below 35 miles per hour. When speeds fall below this threshold, the freeway corridor begins to operate inefficiently as its capacity is reduced. Recurrent delay arises from temporal variations in demand, the manner in which the facility is operated (including presence of ramp meters and high-occupancy vehicle or express lanes), and the roadway lane configuration (including location and design of on- and off-ramps, merge, diverge, and weave segments). Non-recurrent delay is caused by collisions, vehicle breakdowns, and

other non-regular events (such as inclement weather and debris). The magnitude of non-recurrent delay depends on the nature of the incident: a vehicle collision is likely to cause more delay than a vehicle pulled over on the shoulder. Level of service (LOS) is a qualitative measure that describes the operating performance of transportation facilities. LOS is an indicator of traffic flow from the perspective of a motorist based on factors such as speed, travel time, freedom to maneuver, volume, and capacity. It is defined on a scale from LOS A (least congested conditions) to LOS F (most congested conditions).

Mode Share and Daily Trips

Of the trips made by Bay Area residents, the MTC travel model estimates that 33 percent are for work, 13 percent for college or school, and 13 percent for shopping, as shown below in Table 2.1-5. The average one-way commute distance for the region is about 13 miles, as shown in Table 2.1-6. San Francisco residents have the shortest average one-way commute distance (6.4 miles), while Napa County residents have the longest average one-way commute distance (18.2 miles). Four counties of the region (San Francisco, San Mateo, and Santa Clara) have commute distances less than the regional average, while the remaining five counties (Alameda, Contra Costa, Solano, Napa, Sonoma, and Marin) have commute distances greater than the regional average.

Table 2.1-5 Modeled Typical Weekday Daily Person Trips by Purpose (2015)

Purpose	Trips[1]	Percent of Total
Commute to Work	8,467,500	33%
Commute to College	585,100	2%
Commute to School	2,711,800	11%
At Work	1,865,000	7%
Eating Out	1,110,700	4%
Pick-up and Drop-off	2,286,600	9%
Shopping	3,357,900	13%
Social	822,600	3%
Other	4,682,500	18%
Regional Total	**25,889,700**	**100%**

Note: Daily metrics are measured for a typical weekday.

[1] Only reflects intraregional personal trips.

Source: Metropolitan Transportation Commission Travel Demand Forecasts 2015

Table 2.1-6 Modeled Average One-Way Commute Distance (in Miles) by County (2015)

County of Residence	Commute Distance (miles)
Alameda	13.3
Contra Costa	17.4
Marin	15.1
Napa	18.2
San Francisco	6.4
San Mateo	12.2
Santa Clara	10.6
Solano	20.2
Sonoma	14.9
Regional Total	**12.8**

Source: Metropolitan Transportation Commission Travel Demand Forecasts 2015

Travel Trends: Transportation Modes, Travel Time to Work, and Commute Patterns

According to the U.S. Census Bureau data, Bay Area residents use a range of transportation modes to get to their workplaces, as shown below in Table 2.1-7. While approximately two in three Bay Area residents drive alone to get to work on a typical day, 12 percent of residents rely on public transit and 6 percent either walk or bike to work.

Table 2.1-7 Bay Area Resident Workers Categorized by Means of Transportation to Work (1990-2015)

Year	1990 Number (Percent of Total)	2000 Number (Percent of Total)	2010 Number (Percent of Total)	2015 Number (Percent of Total)
Drive Alone	2,105,000 (68%)	2,248,000 (68%)	2,243,000 (68%)	2,413,500 (65%)
Carpool	400,000 (13%)	427,000 (13%)	354,000 (11%)	374,200 (10%)
Transit	294,000 (10%)	321,000 (10%)	333,000 (10%)	447,100 (12%)
Walk	112,000 (4%)	106,000 (3%)	112,000 (3%)	69,100 (2%)
Bike	32,000 (1%)	36,000 (1%)	50,000 (2%)	135,200 (4%)
Other	37,000 (1%)	36,000 (1%)	35,000 (1%)	34,100 (1%)
Work at Home	105,000 (3%)	133,000 (4%)	194,000 (6%)	210,700 (6%)
Total Workers	**3,086,000 (100%)**	**3,306,000 (100%)**	**3,321,000 (100%)**	**3,683,900 (100%)**

Source: U.S. Census Bureau 1990 and 2000, American Community Survey 2010 and 2015

Over the past quarter century, the share of workers driving alone to work has been fairly constant at the regional level, remaining at around 68 percent between 1990 and 2010, with a recent decrease of three percentage points to 65 percent in 2015. Over the past five years, driving to work has become less popular to residents in some cities such as Berkeley, decreasing 18 percentage points, from 56 percent in 2010 to 34 percent in 2015. Carpooling has decreased in popularity in the Bay Area over the past decade compared to other commute options, declining from 13 percent in 1990 to 10 percent in 2015. Transit mode share has increased by two percentage points, from 10 percent to 12 percent, over the past 25 years, while bicycling to work and working from home have doubled from 1 percent to 2 percent and from 3 percent to 6 percent, respectively.

Variability in mode shares exists between Bay Area counties, as shown below in Table 2.1-8. In contrast to other counties, where four in five commuters rely on the automobile, less than half of San Francisco commuters use auto-based transportation (35 percent drive along and 7 percent carpool). This leads to significantly higher mode shares for walking, biking, and transit. In addition to San Francisco, four other counties have transit mode shares of 10 percent or higher —Alameda, San Mateo, Contra Costa, and Marin. Higher transit mode shares in these locations is partly explained by their proximity to San Francisco job centers—strong transit connections to/from that county provide a competitive alternative to driving (given the high cost of parking and significant congestion in San Francisco that makes auto travel less desirable).

While the average travel time to work increased in most counties between 1990 and 2015, it has declined in Sonoma County since 2000 as shown in Table 2.1-9. The average one-way commute duration for the Bay Area increased by 9 percent between 2010 and 2015, from 27.4 minutes in 2010 to 30.2 minutes in 2015. After experiencing the most significant reduction in commute times between 2000 and 2010, Marin County experienced an increase in commute times between 2010 and 2015, increasing from 28 minutes to about 32 minutes. Contra Costa residents experience the longest average commute times of about 37 minutes.

Table 2.1-8 Bay Area Resident Commute Mode Shares by County (2015)

Mode	Drive Alone	Carpool	Transit	Walk	Bike	Other	Work at Home
Alameda County	63%	9%	15%	3%	2%	2%	6%
Contra Costa County	68%	12%	10%	2%	0%	2%	6%
Marin County	63%	9%	11%	4%	2%	1%	10%
Napa County	78%	9%	2%	5%	1%	1%	5%
San Francisco County	35%	7%	35%	10%	4%	3%	6%
San Mateo County	68%	10%	11%	3%	1%	1%	5%
Santa Clara County	76%	10%	4%	2%	2%	1%	5%
Solano County	78%	13%	3%	1%	1%	1%	4%
Sonoma County	74%	12%	2%	4%	1%	1%	7%
Regional Total	**65%**	**10%**	**12%**	**4%**	**2%**	**1%**	**6%**

Source: U.S. Census Bureau American Community Survey 2015

Table 2.1-9 Average Travel Time to Work (1990 – 2015)

County of Residence	One-Way Trip Duration (minutes)						
	1990	2000	2010	2015	Change 1990-2010	Change 2000-2010	Change 2010-2015
Alameda	25.8	30.8	27.4	32.9	+6%	-11%	+17%
Contra Costa	29.3	34.4	32.5	37.4	+11%	-6%	+13%
Marin	28.4	32.3	28.0	31.6	-1%	-13%	+11%
Napa	21.4	24.3	24.3	24.7	+14%	0%	+2%
San Francisco	26.9	30.7	30.3	33.9	+13%	-1%	+11%
San Mateo	24.0	27.0	24.5	27.8	+2%	-9%	+12%
Santa Clara	23.3	26.1	24.3	28.0	+4%	-7%	+13%
Solano	28.2	31.8	28.6	30.9	+1%	-10%	+7%
Sonoma	24.1	26.8	25.8	24.5	+7%	-4%	-5%
Regional Total	**25.6**	**29.4**	**27.4**	**30.2**	**+7%**	**-7%**	**+9%**

Source: U.S. Census Bureau 1990 and 2000, American Community Survey 2010 and 2015

A high proportion of Bay Area residents continue to commute outside their county of residence to jobs in other counties. Table 2.1-10 shows the number of workers who live and work in the same county as well as the number of residents who commuted to other counties for work from 1990 to 2015. In 1990, approximately 26 percent of the region's workers commuted outside their resident county for work. This share has remained constant at 28 percent since 2000. At the county level, Sonoma and San Francisco counties all saw a slight reduction in the percentage of resident workers commuting elsewhere between 2010 and 2015. The other counties saw an increasing number of resident workers working outside their counties. The decentralization of regional job centers offers a partial explanation for this trend.

Table 2.1-10 Bay Area Resident Workers Commute Patterns by County (1990 – 2015)

	Live and Work in Same County				Live Here, Work Elsewhere				Percent (%) Resident Workers Commuting Out			
County	1990	2000	2010	2015	1990	2000	2010	2015	1990	2000	2010	2015
Alameda	446,000	454,000	460,244	478,386	187,000	225,000	218,090	280,788	30	33	32	37
Contra Costa	240,000	255,000	276,776	294,293	161,000	187,000	186,956	229,458	40	42	40	44
Marin	73,000	79,000	73,769	81,348	52,000	48,000	43,256	46,655	41	38	37	36
Napa	38,000	44,000	48,248	52,590	13,000	13,000	13,062	15,357	25	23	21	23
San Francisco	307,000	322,000	334,383	372,016	75,000	97,000	103,431	125,117	20	23	24	25
San Mateo	202,000	206,000	213,589	228,778	145,000	148,000	139,095	163,727	42	42	39	42
Santa Clara	710,000	728,000	703,011	812,370	86,000	101,000	109,663	122,429	11	12	13	13
Solano	97,000	99,000	111,490	115,450	61,000	75,000	67,141	75,845	39	43	38	40
Sonoma	156,000	184,000	182,501	210,882	35,000	41,000	36,514	33,573	18	18	17	14
Regional Total	**2,270,000**	**2,371,000**	**2,404,011**	**2,646,113**	**815,000**	**935,000**	**917,208**	**1,092,949**	**26**	**28**	**28**	**29**

Source: U.S. Census 1990 and 2000, American Community Survey 2010 and 2015

While two-thirds of Bay Area residents work in the county they live in (MTC Vital Signs Website), there is also a certain amount of commuting into the Bay Area from counties outside of the region that occurs. As of the 2010 Census, there were an estimated 116,000 workers (about 3.4 percent of employees) who commuted into the Bay Area (U.S. Census Bureau American Community Survey, Five-Year Estimates, 2006-2010). In part, the existing in-commute can be explained by the significant difference in the median housing costs of the counties of origin for the commuters and the Bay Area counties in which they work. For example, some workers in the Bay Area currently commute into the region from San Joaquin County where the median housing price of single-family homes between 2015 and 2016 was $297,000, compared to $765,000 in the Bay Area region, or about 40 percent of the Bay Area price (California Association of Realtors 2016).

With an improved ratio of jobs-to-housing within the Bay Area, the existing in-commute could be reduced. However, commuters that travel to the Bay Area for work may live outside of the Bay Area for reasons other than the reduced cost of housing. Thus, even if sufficient housing opportunities were provided for all workers in the Bay Area, some level of commuting into the region would still be expected.

Transit Utilization

Transit utilization is a proxy for measuring transit crowding by analyzing the passenger seat-miles required by forecasted transit patrons as a percentage of total passenger seat-miles provided by transit operators (i.e. the percentage of seats on transit vehicles filled with passengers). Utilization levels greater than 80 percent reflect conditions where passengers either would have difficulty finding a seat or would have to stand during all or part of their ride.

2.1.2 Regulatory Setting

FEDERAL REGULATIONS

Fixing America's Surface Transportation Act

Since Moving Ahead for Progress in the 21st Century (MAP-21), a longer term 5-year federal funding bill, Fixing America's Surface Transportation (FAST) Act was signed into law in December 2015 and the FHWA is currently finalizing rules for implementation. The FAST Act authorizes $305 billion through fiscal year 2020 for highways, highway and motor vehicle safety, public transportation, rail, and research and technology programs, and provides a dedicated source of federal dollars for freight projects for the first time. The FAST Act expands the scope of consideration of the metropolitan planning process to include—consideration of intercity transportation (including intercity buses, intercity bus facilities, and commuter vanpool providers); improving transportation system resiliency and reliability; reducing (or mitigating) the stormwater impacts of surface transportation; and enhancing travel and tourism. In addition, it newly requires strategies to reduce the vulnerability of existing transportation infrastructure to natural disasters.

Metropolitan Planning General Requirements

Under the FAST Act/MAP-21, the U.S. Department of Transportation requires that metropolitan planning organizations, such as MTC, prepare long-range transportation plans (RTPs) and update them every four years if they are in areas designated as "nonattainment" or "maintenance" for federal air quality standards. Before enactment of MAP-21, the primary federal requirements regarding RTPs were included in the metropolitan transportation planning rules—Title 23 CFR Part 450 and 49 CFR Part 613. The FAST Act/MAP-21 makes a number of changes to the statutes that underpin these regulations. Key federal requirements for long range plans include the following:

- RTPs must be developed through an open and inclusive process that ensures public input; seeks out and considers the needs of those traditionally under served by existing transportation systems; and consults with resource agencies to ensure potential problems are discovered early in the RTP planning process;

- RTPs must be developed for a period of not less than 20 years into the future; RTPs must reflect the most recent assumptions for population, travel, land use, congestion, employment, and economic activity;

- RTPs must have a financially constrained element, transportation revenue assumptions must be reasonable, and the long range financial estimate must take into account construction-related inflation costs;
- RTPs must include a description of the performance measures and performance targets used in assessing the performance of the transportation system;
- RTPs must include a system performance report evaluating the condition and performance of the system with respect to performance targets adopted by the state that detail progress over time;
- RTPs may include multiple scenarios for consideration and evaluation relative to the state performance targets as well as locally-developed measures.
- RTPs must conform to the applicable federal air quality plan, called the State Implementation Plan (SIP), for ozone and other pollutants for which an area is not in attainment (MTC 2016b);[2] and
- RTPs must consider planning factors and strategies in the local context (California Transportation Commission 2010).[3]

STATE REGULATIONS

California Transportation Commission Regional Transportation Plan Guidelines

California law relating to the development of the RTPs is primarily reflected in Government Code Section 65080. Pursuant to Government Code section 65080(d), MPOs, such as MTC, that are located in nonattainment and monitoring areas must update their RTPs at least every four years. If the current RTP is determined to be adequate such that an update is not warranted, the MPO may re-adopt the current RTP.

The 2017 RTP Guidelines (California Transportation Commission 2017) adopted on January 18, 2017, specify that the requirements outlined in the document apply to all RTP updates begun following adoption. Therefore, these guidelines do not apply to the proposed Plan, which was already underway at the time of adoption.

The 2010 RTP Guidelines (California Transportation Commission 2010) require that an RTP address three distinct elements—a policy element, an action element, and a financial element. In addition, when applicable, RTPs shall be consistent with federal planning and programming requirements and shall conform to the RTP Guidelines adopted by the California Transportation Commission (CTC). The CTC cannot program projects that are not identified in the RTP.

Under Government Code Section 14522, the CTC is authorized to prepare guidelines to assist in the preparation of RTPs. The CTC's RTP guidelines suggest that projections used in the development of an RTP should be based upon available data (such as from the Bureau of the Census), use acceptable forecasting methodologies, and be consistent with the Department of Finance baseline projections for the region. The guidelines further state that the RTP should identify and discuss any differences between the agency projections and those of the Department of Finance.

The most recent completed and applicable update to the RTP guidelines was published in 2010, and includes provisions for complying with Senate Bill 375 (see below), as well as guidelines for regional travel demand modeling. The regional travel demand model guidelines are "scaled" to different sizes of MPO's. MTC is included in the "E" grouping of the MPO's serving the largest populations in the state according to the 2010 RTP Guidelines, and the Category 4 grouping of MPO's according to the 2017 RTP Guidelines (California Transportation Commission 2017). The guidelines for regional travel demand modeling are the most ambitious for the "E" and "Category 4" groupings, and include (among many other things):

[2] See MTC's web page, http://www.mtc.ca.gov, for more information about the Air Quality Conformity Task Force meetings and materials related to the federal conformity analysis.

[3] For more details on the planning factors, see California Transportation Commission, Regional Transportation Guidelines, 2010.

- guidelines and standards for validation and sensitivity testing of the model,
- transition to an activity-based demand model,
- participate in peer review every 10 years, and
- build a microeconomic land use model as soon as is practical.

MTC has relied on an activity-based travel demand model (*Travel Model One*) and a microeconomic land use model (*Bay Area UrbanSim*) for the development of this EIR. The aforementioned CTC guidelines and standards for model validation and sensitivity testing are being followed.

Senate Bill 375

The Sustainable Communities and Climate Protection Act of 2008 (Chapter 728, Statues of 2008) (SB 375) has diversified the areas of study from past RTPs to include land use impacts and climate change issues. Specifically, SB 375 requires MPOs to prepare a Sustainable Communities Strategy (SCS) that demonstrates how the region will meet its greenhouse gas (GHG) reduction targets through integrated land use, housing and transportation planning. The SCS must identify a transportation network that is integrated with the forecasted development pattern for the Plan area and will reduce GHG emissions from automobiles and light trucks in accordance with targets set by the California Air Resources Board. See Section 2.5, "Climate Change," for a more in-depth discussion of SB 375 and its implications for the proposed Plan.

Plan Bay Area was the previous RTP/SCS adopted by MTC in 2013. The proposed Plan builds upon this effort by strengthening the region's commitment to "Fix It First" (a longstanding MTC policy to prioritize discretionary funding for maintenance and operations of the region's existing transportation assets). Under SB 375, some development and transportation projects assumed as a part of the proposed Plan may be eligible to use a streamlined version of the environmental review process. Among other criteria, these projects must be consistent with the land use designation, density, intensity, and policies of Plan Bay Area, and fall within the identified criteria for development and transportation projects.

Senate Bill 226

The CEQA Streamlining for Infill Projects (SB 226) sets forth a streamlined review process for infill projects and includes performance standards that will be used to determine an infill project's eligibility for streamlined review. The purpose of SB 226 and updated CEQA Guideline Section 15183.3 is to streamline the environmental review process by "limiting the topics subject to review at the project level where the effects of infill development have been addressed in a planning level decision or by uniformly applicable development policies." Residential, commercial and retail, public office buildings, transit stations, and schools are eligible for this streamlining provided they meet the following requirements: (1) are located in an urban area on a site that has been previously developed or adjoins existing qualified urban uses on at least 75 percent of the site's perimeter; (2) satisfy the performance standards provided in Appendix M [of CEQA]; and, (3) are consistent with the general use designation, density, building intensity, and applicable policies specified for the project area in either a sustainable communities strategy or an alternative planning strategy, with some exceptions.

Under SB 226, some development and transportation projects assumed as a part of the proposed Plan may be eligible to use a streamlined version of the environmental review process. Among other criteria, these projects must be consistent with the land use designation, density, intensity, and policies of Plan Bay Area, and fall within the identified criteria for development and transportation projects.

Senate Bill 743

SB 743 (2013) changes the way that public agencies evaluate the transportation impacts of projects under CEQA, recognizing that roadway congestion, while an inconvenience to drivers, is not itself an environmental impact. (See Pub. Resource Code, § 21099, subd. (b)(2) ["automobile delay, as described solely by level of service or similar measures of vehicular capacity or traffic congestion shall not be considered a significant impact on the environment pursuant to [CEQA]"].)

In its current form, SB 743 provides opportunities to streamline CEQA for qualifying urban infill development near major transit stops in metropolitan regions statewide. A transit-oriented infill project can be exempt from

CEQA if consistent with a specific plan for which an EIR was prepared, and also consistent with the use, intensity, and policies of an SCS or Alternative Planning Strategy (APS) that is certified by the Air Resources Board as meeting its greenhouse gas reduction targets. A city or county may designate an "infill opportunity zone" by resolution if it is consistent with the general plan and any applicable specific plan, and is a transit priority area within the adopted SCS or APS. This infill opportunity zone is then exempt from level of service standards in the congestion management plan.

In August 2014, the Governor's Office of Planning and Research (OPR) circulated its draft changes to the CEQA guidelines implementing SB 743 for public comment. Revised draft guidelines were released on January 20, 2016. In addition to new exemptions for projects that are consistent with specific plans, the draft SB 743 guidelines replace congestion based metrics, such as auto delay and level of service, with Vehicle Miles Traveled as the basis for determining significant impacts, unless OPR's guidelines provide specific exceptions. Furthermore, under the bill parking impacts are no longer considered significant impacts on the environment for select development projects within infill areas with nearby frequent transit service. The intention of the new guidelines is to 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 emissions.

These revisions to the CEQA Guidelines are currently in draft form and have not yet been adopted. While OPR proposes to prohibit use of congestion based metrics as a CEQA threshold of significance, agencies would not be precluded from using these metrics, such as vehicle delay, when applying local general plan policies, conditions of approval, or other planning requirements.

Senate Bill 1128

Senate Bill 1128 authorizes MTC and BAAQMD (the Bay Area Air Quality Management District) to jointly continue the Bay Area Commuter Benefits Program, which requires Bay Area employers with 50 or more full-time employees in the Bay Area to offer commute benefits. The Bay Area Commuter Benefits Program includes items such as pre-tax contributions towards public transit passes or commute shuttle services.

Assembly Bill 1358

Assembly Bill 1358, also known as the Complete Streets Bill, amended the California Government Code Section 65302 to require that all major revisions to a city or county's Circulation Element include provisions for accommodations of all roadway users, including bicyclists and pedestrians.

California Bicycle Transportation Act

The California Bicycle Transportation Act (1994) requires all cities and counties to have an adopted bicycle master plan to apply for Bicycle Transportation Account funding source.

REGIONAL AND LOCAL REGULATIONS

Congestion Management Agency Transportation Plans

Each of the nine Bay Area counties has a congestion management agency (CMA) designated to manage traffic congestion through implementation of multimodal transportation projects. These agencies work with MTC to advance road, bicycle, pedestrian, and transit projects in line with regional objectives. In addition, many CMAs develop county transportation plans that should be consistent with the Regional Transportation Plan adopted by MTC. MTC has developed guidelines to be used in the preparation of countywide transportation plans. MTC published the *Guidelines for Countywide Transportation Plans* in September 2014. The intent of the guidelines is to inform the relationship between countywide transportation plans and the RTP/SCS, assist implementation of SB 375 and MAP-21/FAST, and identify appropriate content to include in the development of countywide transportation plans. Many of the CMAs are currently in the process of updating their countywide plans. The most recent countywide transportation plans are listed below.

- Alameda County Transportation Commission: *2016 Alameda Countywide Transportation Plan* (adopted in May 2016),
- Contra Costa Transportation Authority: *2014 Countywide Comprehensive Transportation Plan* (pending adoption after review and approval of recirculated Draft Program Subsequent Environmental Impact Report),
- Transportation Authority of Marin: *Moving Forward A 25-Year Transportation Vision for Marin County* (update in progress),
- Napa Valley Transportation Authority: *Vision 2040 Moving Napa Forward,*
- San Francisco County Transportation Authority: *San Francisco Transportation Plan 2040* (update in progress, anticipated completion in 2017),
- City/County Association of Governments of San Mateo County: *San Mateo Countywide Transportation Plan 2040* (draft released in 2016),
- Santa Clara Valley Transportation Authority: *Valley Transportation Plan 2040* (adopted October 2014),
- Solano Transportation Authority: *2040 Solano Transportation Plan* (draft released in November 2016), and
- Sonoma County Transportation Authority: *Draft Comprehensive Transportation Plan: Moving Forward 2040* (draft released in September 2016).

City and County General Plans

State law requires cities and counties to adopt general plans, which must include a transportation element. The transportation element describes the acceptable operating standards, levels of service, classifications, and transportation related goals of a given city or county; it is typically a multimodal section that addresses roads, public transit, bicycle facilities, and pedestrian facilities. This EIR does not examine consistency with the general plans of jurisdictions within the Bay Area; rather, it addresses issues of overall system performance from a regional perspective.

City and County Modal Plans

City- and county-wide bicycle and pedestrian master plans, active transportation plans, freight/goods movement plan, and other mode-specific plans serve as policy documents to guide the development and maintenance of the transportation network, support facilities, and non-infrastructure programs. These plans describe the acceptable operating standards, levels of service, facility classifications, and mode-specific goals and policies of a given city or county. This EIR does not explicitly identify localized traffic issues that might be the focus of a city- or county-wide modal plan; rather, it addresses issues of overall system performance from a regional perspective.

Airport Land Use Commissions and Airport Land Use Compatibility Plans

Airport Land Use Commissions (ALUCs) are charged with providing for compatible land use planning in the vicinity of each existing and new public use airport within their jurisdiction. The statutes governing ALUCs are set forth in Division 9, Part 1, Chapter 4, Article 3.5, Sections 21670 – 21679.5 of the California Public Utilities Code. One of the primary responsibilities of an ALUC is the preparation and adoption of an Airport Land Use Compatibility Plan.

Airport land use compatibility is the reconciliation of how land development and airports function together. The concept of compatibility has been defined as: "Airport compatible land uses are defined as those uses that can coexist with a nearby airport without either constraining the safe and efficient operation of the airport or exposing people living or working nearby to unacceptable levels of noise or (safety) hazards. Incompatible development near an airport can lead to a politically contentious relationship between an airport and the

communities around it, resulting in complaints and demands for restrictions on airport operations, ultimately threatening the airport's ability to operate efficiently and serve its function in the local economy. The desired outcome of airport land use compatibility planning is to "minimize the public's exposure to excessive noise and safety hazards" while providing for the "orderly expansion of airports" (Section 21670(a)(2)).

2.1.3 Impact Analysis

SIGNIFICANCE CRITERIA

The following significance criteria are based on CEQA Guidelines Appendix G, as well as the thresholds used in the EIR for the 2013 Plan Bay Area, and professional judgment. Under these criteria, implementation of the proposed Plan would have a potentially significant adverse impact if it would result in:

Criterion 1: A significant increase in per-trip travel time for commute travel by any mode over existing conditions. A significant increase in per-trip travel time is defined as greater than 5 percent.

Criterion 2: A significant increase in per-trip travel time for non-commute travel by any mode over existing conditions. A significant increase in per-trip travel time is defined as greater than 5 percent.

Criterion 3: A significant increase in per capita VMT on facilities experiencing level of service (LOS) F compared to existing conditions during AM peak periods, PM peak periods, or on a daily basis (LOS F defines a condition on roads where traffic substantially exceeds capacity, resulting in stop-and-go conditions for extended periods of time). A significant increase in LOS F-impacted per capita VMT is defined as greater than 5 percent.

Criterion 4: A significant increase in per capita VMT compared to existing conditions. A significant increase in per capita VMT is defined as greater than 5 percent.

Criterion 5: An increased percent utilization of regional transit supply resulting in an exceedance of transit capacity during the AM peak period, PM peak period, or on a daily basis. An exceedance is defined as passenger seat-mile demand for any transit technology being greater than 80 percent of passenger seat-miles supplied by transit operators.

Criterion 6: Cause a disruption to goods movement into or through the Bay Area region.

Criterion 7: Cause a disruption to the ongoing operations of the applicable regional or local area transportation system because of construction activities.

Criteria 1 through 5 encompass measures that address appropriate standards for roads or highways, as well as other modes. A review of city and county thresholds of significance was conducted to assess whether or not the established 5 percent threshold aligns with current practice. This review indicates that multiple jurisdictions (i.e., Berkeley and West Sacramento as well as jurisdictions in other states) utilize a threshold of a 5 percent increase in volume-to-capacity for facilities (roadways and intersections) operating at unacceptable LOS (i.e., LOS F) as the basis for identifying significant impacts.

METHOD OF ANALYSIS

The EIR analysis was based on transportation and land use forecasts developed using the MTC travel demand forecasting model, known as Travel Model One, with the land use forecasting model, known as Bay Area UrbanSim. The integrated model produced the key outputs used in assessing the significance of transportation impacts, such as VMT, vehicle hours of delay (VHD), and accessibility, as well as other outputs such as volume to capacity ratios and level of service, and transit utilization.

The analysis assesses the potential impacts to the transportation environment that could result from implementation of the proposed Plan at the regional level. For each potential impact identified, implementation of the proposed Plan is analyzed at the regional and county level. Existing conditions in the proposed Plan refers to the baseline year 2015 conditions, because it is the year for which comprehensive land use, demographic, traffic volumes, and VMT data are available for the Bay Area region. The modeling and forecasting accounts for factors influencing travel in the region, including:

- demographic factors – age, income, household size, number of workers;
- population and employment forecasts;
- land use and development patterns – density, intensity, mix of uses, distance to transit;
- transportation costs – gas prices and transit fares;
- travel characteristics of adjacent regions – including the amount and extent of external, or interregional, and through travel;
- geographic features and topography – such as rivers, mountains, and valleys;
- the impacts analysis considers the roadway, transit, bicycle, pedestrian, aviation, and goods movement components of the regional transportation system. Quantitative analysis focuses on the following performance measures derived from the forecasting results of MTCs travel demand model: Commute and non-commute travel time;
- VMT per capita and VMT per capita on congested (LOS F) facilities; and
- transit utilization.

In addition to these quantitative measures, a qualitative evaluation of pedestrian and bicycle network connectivity and performance, goods movement, and construction activity associated with projects included in the proposed Plan.

The *Travel Modeling Report*, released in March 2017, provides detail regarding the modeling assumptions and outputs for the proposed Plan. This report provides further information on modeling methodologies, as well as data summary tables for key horizon years. This supplemental report can be obtained on the Plan Bay Area 2040 website at www.2040.planbayarea.org/reports.

YEAR 2040 CONDITIONS UNDER THE PROPOSED PLAN

To assess potential impacts, this analysis compares existing transportation conditions with the future conditions under the proposed Plan in terms of projected trips, projected travel modes and vehicle travel, and proposed transportation supply. These transportation indicators, model inputs and/or outputs that are not depicted in the impact analysis tables, facilitate understanding of the analyses and conclusions. They are provided to illuminate some of the underlying causes of the transportation impacts forecasted.

As the proposed Plan incorporates demographic forecasts, land use patterns, and transportation investments, the combined effects of these elements are analyzed. Regional population and job growth are the most significant drivers of transportation trends and impacts over the lifespan of the proposed Plan; more Bay Area residents and employees lead to greater demand for all forms of transportation. Apart from these demographic trends, the proposed Plan's inclusion of substantial transit capacity increases, coupled with minimal expansion of the highway system, leads to a slight shift from automobile travel to public transit and non-motorized modes.

Demographic Trends

The proposed Plan relies on regional population and employment forecasts developed by ABAG; these forecasts form the basis for analyzing transportation impacts of the proposed Plan. The projections indicate that the region's population is expected to grow by 27 percent over the next 25 years, while the region's employment is forecasted to increase by 17 percent over the same time period. Although auto ownership per household is expected to decline by 2 percent, the total number of automobiles in the region would increase as a result of this household growth, as reflected in **Table 2.1-11**.

Table 2.1-11 Bay Area Demographic Forecasts (2015-2040)

Demographics	2015	2040 Plan	Change (2015 to 2040 Plan)	
			Numerical	Percent
Total Population[1]	7,571,300	9,627,500	2,056,200	+27%
Total Jobs	4,010,100	4,698,400	688,200	+17%
Employed Residents	4,027,000	4,663,900	636,900	+16%
Total Households	2,760,500	3,426,700	666,200	+24%
Share of Households with Zero Autos	10%	11%	+1%	+10%
Share of Households with One Auto	33%	34%	+1%	+3%
Share of Households with Multiple Autos	57%	55%	-2%	-4%
Average Number of Vehicles by Household	1.74	1.70	-0.04	-2%

Note:

[1] Population statistics reflect the total Bay Area population able to travel on the region's transport network; it does not include immobile, involuntary populations such as prison inmates.

Sources: Association of Bay Area Governments 2016; Metropolitan Transportation Commission Travel Demand Forecasts 2015

The expected level of population and job growth leads to a greater number of commute and non-commute trips in the coming decades. The proposed Plan is designed to address this expected growth in travel demand through transportation infrastructure projects and land use strategies.

Proposed Expansion to Transportation System Capacity

As discussed in Section 1.2, "Project Description," the transportation system projects in the proposed Plan are separated into three main categories of: (1) modernization; (2) expansion; and, (3) operations and maintenance of the existing transportation system. Regional roadway and transit system capacity increases resulting from implementation of the proposed Plan are shown in **Table 2.1-12**.

Expansion to transportation system capacity includes transit expansion and express lane and roadway expansion, as follows.

- Transit Expansion. The proposed Plan includes a set of major transit capital projects, including but not limited to, California High Speed Rail, BART Silicon Valley and Berryessa Extensions, SMART Downtown San Rafael to Larkspur Rail Extension, and Caltrain/High Speed Rail Downtown San Francisco Extension. These transit investments were identified as a result of a performance assessment process and align closely with the proposed land use patterns emphasizing focused growth in the region's locally-identified Priority Development Areas and in Transit Priority Areas (TPAs).

- Express Lane and Roadway Expansion. The proposed Plan also includes a limited amount of funding for targeted roadway capacity increases, including bottleneck relief at congested interchanges and the development of an express lane network. Projects include but are not limited to: Santa Clara County Express Lanes, US 101 Express Lanes Whipple Avenue to Cochrane Road, Hunters Point Shipyard and Candlestick Point Phase 1, I-680 Express Lanes northbound from SR-84 to SR-237, and I-880 to Mission Boulevard East-West Connector.

Table 2.1-12 Transportation System Capacity (2015-2040)

Facility Type	2015	2040 Plan	Change (2015 to 2040 Plan)	
			Numerical	Percent
Freeway Lane-Miles	5,660	6,120	460	+8%
Expressway Lane-Miles	1,070	1,130	60	+6%
Arterial Lane-Miles	8,630	8,700	70	+1%
Collector Lane-Miles	5,480	5,520	40	+1%
Total Roadway Lane-Miles	**20,840**	**21,470**	**630**	**+3%**
Daily[1] Local Bus Seat-Miles	13,600,000	16,300,000	2,700,000	+20%
Daily Express Bus Seat-Miles	3,057,000	3,534,000	476,000	+16%
Daily Light Rail Seat-Miles	3,299,000	4,485,000	1,185,000	+36%
Daily Heavy Rail Seat-Miles	18,440,000	27,488,000	9,048,000	+49%
Daily Commuter Rail Seat-Miles	7,057,000	9,594,000	2,537,000	+36%
Daily Ferry Seat-Miles	1,973,000	2,496,000	523,000	+27%
Total Daily Transit Seat-Miles	**47,427,000**	**63,897,000**	**16,470,000**	**+35%**

Notes:

[1] Daily metrics are measured for a typical weekday.

Figures may not sum because of independent rounding.

Source: Metropolitan Transportation Commission Travel Demand Forecasts 2015

Projects that expand transportation system capacity would have the greatest effect on travel behavior and are considered in detail in this EIR analysis. System efficiency programs (other than the Freeway Performance Initiative and Managed Lanes Implementation Plan that directly impacts freeway and arterial operations) tend to affect travel behavior in subtle and localized ways that are generally difficult to assess in a regional analysis. As part of the Freeway Performance Initiative, a range of "smart" roadway projects are planned for I-880 between San Jose and Oakland, I-80 in Alameda and Contra Costa counties, and U.S. 101 in San Mateo County. Projects include activating metering lights on freeway on-ramps, improving incident detection and response, enhancing operations and traffic signal coordination, and closing gaps in the region's carpool lane network.

The transportation forecasts specifically include projected growth in interregional traffic passing through the boundaries of the Bay Area. The Plan does not include any roadway capacity increases at these boundaries. The analysis summarized in the *Effect of MTC Express Lanes on Interregional Travel* (Cambridge Systems 2017), which evaluated the potential effects of new express lanes on interregional traffic, indicated that the targeted roadway capacity increases and roadway management strategies within the Bay Area may result in a minimal increase in interregional traffic. The study analyzed traffic volumes at each major Bay Area interregional gateway (state highways only), including: I-80 Yolo County, I-580 Altamont Pass, US-101 Gilroy, SR 17 Santa Cruz (among others). The modeling results indicated that the implementation of new express lanes would result in a 0.2 percent increase in regional VMT from increased interregional trips, which can be attributed to better accessibility resulting from travel time savings on express lanes.

Roadway Network: The region's existing roadway network is composed of about 20,900 lane-miles, with 32 percent of those miles on freeways and expressways and 68 percent of those miles on arterials and collectors (Figure 2.1-1 from earlier in this section illustrates the major existing Bay Area roadway facilities). Compared to existing conditions, the proposed Plan would add about 3 percent to the total roadway lane-miles. Roadway system capacity increases by county are shown in Table 2.1-13.

Table 2.1-13 Roadway Transportation System Capacity by County (2015-2040)

Facility Type	County	Year 2015	Year 2040, Proposed Plan	Change (2015 to 2040 Plan)	
				Numerical	Percent
Freeway Lane-Miles	Alameda	1,320	1,390	70	+5%
	Contra Costa	820	910	90	+11%
	Marin	310	320	10	+3%
	Napa	60	60	0	0%
	San Francisco	210	210	0	0%
	San Mateo	720	760	40	+6%
	Santa Clara	1,310	1,490	180	+14%
	Solano	570	620	50	+9%
	Sonoma	340	360	20	+6%
	Regional Total	**5,660**	**6,120**	**460**	**+8%**
Expressway Lane-Miles	Alameda	100	110	10	+10%
	Contra Costa	110	130	20	+18%
	Marin	0	0	0	0%
	Napa	80	80	0	0%
	San Francisco	10	10	0	0%
	San Mateo	70	70	0	0%
	Santa Clara	560	550	-10	-2%
	Solano	110	150	40	+36%
	Sonoma	30	30	0	0%
	Regional Total	**1,070**	**1,130**	**60**	**+6%**
Major Arterial Lane-Miles	Alameda	1,700	1,740	40	+2%
	Contra Costa	1,320	1,360	40	+3%
	Marin	230	230	0	0%
	Napa	190	190	0	0%
	San Francisco	710	710	0	0%
	San Mateo	690	700	10	+1%
	Santa Clara	2,410	2,400	-10	0%
	Solano	630	630	0	0%
	Sonoma	750	760	10	+1%
	Regional Total	**8,630**	**8,700**	**70**	**+1%**
Other Lane-Miles	Alameda	960	970	10	+1%
	Contra Costa	810	830	20	+2%
	Marin	420	420	0	0%
	Napa	380	380	0	0%
	San Francisco	420	420	0	0%
	San Mateo	650	650	0	0%
	Santa Clara	980	990	10	+1%
	Solano	250	250	0	0%
	Sonoma	600	610	10	+2%
	Regional Total	**5,480**	**5,520**	**40**	**+1%**

Table 2.1-13 Roadway Transportation System Capacity by County (2015-2040)

Facility Type	County	Year 2015	Year 2040, Proposed Plan	Change (2015 to 2040 Plan)	
				Numerical	Percent
Total Lane-Miles	Alameda	4,080	4,210	130	+3%
	Contra Costa	3,060	3,230	170	+6%
	Marin	960	970	10	+1%
	Napa	710	710	0	0%
	San Francisco	1,350	1,350	0	0%
	San Mateo	2,130	2,180	50	+2%
	Santa Clara	5,260	5,430	170	+3%
	Solano	1,560	1,650	90	+6%
	Sonoma	1,720	1,760	40	+2%
	Regional Total	**20,840**	**21,470**	**630**	**+3%**

Notes:

[1] Daily metrics are measured for a typical weekday.

[2] The model accounts for some roadway expansion in adjacent counties. Adjacent counties make up 7 freeway lane-miles and 3 major arterial lane-miles.

Figures may not sum because of independent rounding.

Source: Metropolitan Transportation Commission Travel Demand Forecasts 2015

As shown in Table 2.1-13, there would be an overall increase of about 170 lane-miles in Contra Costa and Santa Clara counties, representing a 6 percent and 3 percent increase, respectively. The majority of this roadway expansion would occur on the freeway system. A major component of the proposed roadway capacity increases are Bay Area Express Lanes, which would develop a 550-mile network of express lanes on the state highway system operated by the California Department of Transportation (Caltrans). Express Lanes (or high-occupancy/toll or HOT lanes) are already open on I-580 in Dublin, Pleasanton, and Livermore, I-680 southbound from Pleasanton to Milpitas, and on SR 237 between Milpitas and San Jose. MTC will operate 270 miles of the 550-mile network, including 150 miles which would be converted from existing carpool lanes to Express Lanes and 120 miles of new Express Lanes on many of the region's most congested freeway corridors. The next projects are: I-680 between Walnut Creek and San Ramon, scheduled to open in summer 2017; I-880 in Alameda County; I-680 between Walnut Creek and Martinez; and I-80 in Solano County. Highway widening projects, including capacity enhancements to I-880 and SR-84 in Alameda County, Routes 1 and 92 in San Mateo County, and the Petaluma Crosstown Connector and Rainier Interchange in Sonoma County, are responsible for the remainder of the freeway capacity increases. There would be no increase in roadway lane-miles within the City and County of San Francisco.

Public Transit Systems: Transit seat-miles, a measure of transit capacity, are the miles that transit vehicles travel multiplied by the number of seats in each vehicle. The existing transit network (2015 conditions) consists of three dominant modes: heavy rail (e.g., BART with 39 percent of seat-miles), local bus (29 percent of seat-miles), and commuter rail (e.g., Caltrain with 15 percent of seat-miles). Daily transit seat-miles would increase by 35 percent from existing conditions because of the transit expansion and frequency improvement projects included in the proposed Plan. The largest increases in seat-miles in the proposed Plan would be for heavy rail transit which would add 9,047,950 seat-miles from 2015 conditions (a 49 percent increase) and for commuter rail transit which would add 2,537,186 seat-miles from 2015 conditions (a 36 percent increase). These specific increases are primarily the result of projects such as BART Silicon Valley and Berryessa Extensions, East County Rail Extension (eBART) Phase 1, SMART, and Caltrain Electrification/Frequency Improvements and Transbay Transit Center/Downtown Extension. Additionally, the increase in ferry seat-miles is the result of WETA ferry service expansion, WETA North Bay and Central Bay ferry service enhancements, construction of an Albany/Berkeley ferry terminal, GGBHTD ferry service expansion, and the addition of privately run ferry service in Contra Costa County.

Bicycle and Pedestrian Network: A goal of the proposed Plan is to enhance the region's bicycle and pedestrian network and promote growth and land use that maximize the potential for shorter trips, which are more likely to be made by non-motorized modes. In an effort to support this goal, the proposed Plan contains a number of bicycle and pedestrian projects generally designed to expand, enhance, and increase the connectivity and comfort of the existing network and complements this with supportive land use investments. Multimodal and bicycle and pedestrian projects identified in the proposed Plan include but are not limited to, funding for countywide multimodal streetscape and bicycle and pedestrian programs, the San Francisco Bay Trail projects, Bayshore Station planning and design, Coliseum City Transit Hub, and funding for environmental documentation for the San Francisco-Oakland Bay Bridge West Span Bicycle, Pedestrian, and Maintenance Path.

Regional Travel Patterns

When comparing year 2040 conditions under the proposed Plan to existing conditions, daily vehicle trips would increase by 23 percent and daily transit use would increase by 41 percent. Note that the increases in total regional travel activity are primarily because of projected regional growth in population, jobs, and workers; investments in transportation infrastructure would have a relatively minor effect on changes in total regional travel activity.

Table 2.1-14 displays vehicle hours of delay by facility type (i.e., freeways, expressways, arterials) and the breakdown of recurrent and non-recurrent delay. Overall, total vehicle hours of delay are forecasted to increase through year 2040 under the proposed Plan. Freeways would experience a larger increase in recurrent vehicle hours of delay relative to expressways and arterials (45 percent increase compared to a 27 percent increase). Non-recurrent delay on freeways would increase by 30 percent over existing conditions assuming implementation of the proposed Plan.

Table 2.1-14 Bay Area Travel Behavior (2015-2040)

	2015	2040 Plan	Change (2015 to 2040 Plan)	
			Numerical	Percent
Daily[1] Transit Boardings	2,279,000	3,208,900	929,900	+41%
Daily[1] Vehicle Trips[2]	21,227,800	26,018,900	4,791,100	+23%
Daily[1] Vehicle Miles of Travel (VMT)[2]	158,406,800	191,528,600	33,121,800	+21%
Daily[1] Vehicle Miles of Travel per Capita[3]	20.9	20.0	-0.1	-4%
Daily[1] Vehicle Hours of Recurring Delay	353,200	531,100	177,900	+50%
Daily[1] Vehicle Hours of Recurring Delay (Freeways)	222,800	323,400	100,600	+45%
Daily[1] Vehicle Hours of Recurring Delay (Expressways and Arterials)	99,200	126,400	27,200	+27%
Daily[1] Vehicle Hours of Recurring Delay (Other Facilities)	31,300	81,300	50,000	+160%
Daily[1] Vehicle Hours of Non-Recurrent Delay[4]	144,900	188,000	43,100	+30%
Total Daily Vehicle Hours of Delay (Recurring + Non-Recurrent)	**498,100**	**719,100**	**221,000**	**+44%**

Notes:

[1] Daily metrics are measured for a typical weekday and rounded to the nearest 100.

[2] Only reflects interzonal trips (assigned directly to the highway network); includes intraregional, interregional, and commercial vehicle trips, and trips to and from the airport and future high-speed rail stations.

[3] Total daily VMT is calculated using *Travel Model One*; therefore, to calculate per-capita VMT, it is essential to use simulated population levels to ensure consistency. Simulated population may be slightly different than overall population forecasts for Plan Bay Area EIR alternatives because of slight variability in modeling tools. Further clarification on this issue is found in the Plan Bay Area EIR technical appendices.

[4] Only includes non-recurrent delay on freeway facilities.

Figures may not sum because of independent rounding.

Source: Metropolitan Transportation Commission Travel Demand Forecasts 2015

Daily Trips by Mode

Growth in households and employment leads to a greater number of trips in the region. As a result of the demographic forecasts, the total number of trips made by residents of the Plan area (known as person trips) is expected to increase over the projected buildout of the proposed Plan. As shown in **Table 2.1-15**, the total number of person-trips in the region would increase from 25.9 million daily person trips in 2015 to 31.9 million under 2040 conditions with the proposed Plan.

Table 2.1-15 Typical Weekday Daily Person Trips, by Mode (2015-2040)

Purpose	2015		2040 Plan	
	Trips	% of Total	Trips	% of Total
Drive Alone	12,310,000	47.6%	14,880,100	46.6%
Carpool	8,917,700	34.4%	11,138,800	34.9%
Transit	1,660,900	6.4%	2,208,500	6.9%
Walk	2,695,600	10.4%	3,320,700	10.4%
Bike	305,500	1.2%	359,100	1.1%
Total Trips[1]	**25,889,700**	**100%**	**31,907,200**	**100%**

Note: [1] Excludes commercial and interregional trips.
Figures may not sum because of independent rounding.
Source: Metropolitan Transportation Commission Travel Demand Forecasts 2015

When combined with proposed Plan transportation infrastructure investments, the proposed changes in the regional land use pattern have the potential to shift individuals' travel mode choice decisions. **Table 2.1-14** also identifies the share of regional travel activity in year 2040 relying on single-occupant vehicles, carpooling, public transit, walking, and bicycling to reach daily destinations. While the year 2040's shares of the various travel modes remain relatively similar to year 2015 conditions, a slight increase in transit and carpool modes is evident. Transit mode share would increase from 6.4 percent to 6.9 percent by 2040 as a result of the proposed Plan, while carpooling would increase from 34.4 percent to 34.9 percent by 2040.

IMPACTS AND MITIGATION MEASURES

Impacts of the Plan on the transportation network are generally regional in nature and, as such, are evaluated first at the regional level. Where a potentially significant impact is identified, a more detailed county-level analysis is conducted. Localized impacts are expected to vary depending on the proximity to local and regional transportation projects, as well as land use changes on the neighborhood level. All impacts in this section necessarily consider the combination of demographic, land use, and transportation impacts and are by definition cumulative.

Impact 2.1-1: Implementation of the proposed Plan could result in a significant increase in per-trip travel time for commute travel by any mode over existing conditions. A significant increase in per-trip travel time is defined as greater than 5 percent.

Impacts of Changes in Projected Land Use and Transportation Projects

Projected changes in per-trip commute travel time from 2015 to 2040 are the result of several factors, including transportation network projects, more focused growth patterns shifting a greater share of the population into the urban core, and greater demand for travel as a result of higher levels of population and employment. Travel time is the product of travel speed and trip length. Although commute travel times shown in **Table 2.1-15** are similar for walk trips and auto trips, people driving are traveling at higher and more variable rates of speed and covering greater distances, whereas people walking are traveling at a relatively constant

speed and shorter distances. Commute trips currently account for 33 percent of the total weekday daily person trips (**Table 2.1-5**) and the average commute distance for all modes is 12.8 miles (**Table 2.1-5**). Commute mode share presented in **Table 2.1-8**, shows about 66 percent of Bay Area residents drive alone to work, 10 percent carpool, 12 percent take transit, 6 percent work from home, 4 percent walk, 2 percent bike, and 1 percent take another mode (e.g., taxi or motorcycle). Compared to existing conditions, overall average projected commute travel times are expected to increase by 1 percent under the proposed Plan, as shown in **Table 2.1-16**. However, this slight increase is considered less than significant (a 5 percent increase is considered significant).

Table 2.1-16 Per-Trip Commute Travel Time, by Mode (2015-2040)

Mode	2015	2040 Plan	Change (2015 to 2040 Plan)	
			Numerical	Percent
Drive Alone	19.6	19.9	0.3	+2%
Carpool	21.8	22.0	0.2	+1%
Transit	38.9	38.1	-0.8	-2%
Walk	21.5	21.2	-0.3	-1%
Bike	13.4	13.4	0.0	0%
All Modes	**22.3**	**22.6**	**0.3**	**+1%**

Note: Travel times are shown in minutes.
Source: Metropolitan Transportation Commission Travel Demand Forecasts 2015

No individual travel mode would experience a significant impact on commute travel time as a result of the proposed Plan. However, transit and walk modes are expected to experience small travel time reductions, while auto modes (drive alone and carpool) are forecasted to be minimally impacted by slightly greater travel times. This result is primarily because of mode shift expected from the proposed Plan. As more individuals decide to rely on modes with longer average travel times (such as transit), the average commute travel time for the region tends to increase. While the mode shift can lead to a congestion reduction benefit that reduces average travel times for some drive alone and carpool trips, it may lengthen the commutes of a relatively small number of travelers. Decreased travel times for transit and walk commutes are also a result of the proposed Plan's land use strategy, which places a high priority on moving jobs and households closer together and closer to transit. This leads to shorter average distances between home and employment and correlates with reduced walk and transit commute travel times. This impact is considered **less than significant (LS)**. No mitigation is required.

Mitigation Measures

None required.

Impact 2.1-2: Implementation of the proposed Plan could result in a significant increase in per-trip travel time for non-commute travel by any mode over existing conditions. A significant increase in per-trip travel time is defined as greater than 5 percent.

Impacts of Changes in Projected Land Use and Transportation Projects

The forecasted effects of the proposed Plan on non-commute travel times are similar to the commute travel patterns under year 2040 Plan conditions. Changes to per-trip non-commute travel times would increase by 3 percent over existing conditions, as shown in **Table 2.1-17** (a 5 percent increase is considered significant).

Per-trip non-commute travel time improvements are forecasted for transit, while travel time increases are forecasted for all other modes except walking, which is not forecast to change. Non-commute trips account

for 67 percent of the total weekday daily person trips (**Table 2.1-4**), and include school trips, shopping trips, and trips made for social or recreational purposes. Changes in travel times are the result of the proposed Plan's land use strategy, which places a priority on transit oriented development and reflect changes in trip length and travel speed. Impacts of the proposed Plan on per-trip non-commute travel times are **less than significant (LS)**. No mitigation is required.

Table 2.1-17 Per-Trip Non-Commute Travel Time, by Mode (2015-2040)

Mode	2015	2040 Plan	Change (2015 to 2040 Plan)	
			Numerical	Percent
Drive Alone	11.5	11.9	0.4	+3%
Carpool	11.1	11.4	0.3	+3%
Transit	33.9	33.2	-0.7	-2%
Walk	17.9	17.9	0	0%
Bike	10.8	11.0	0.2	+2%
All Modes	**12.9**	**13.3**	**0.4**	**+3%**

Note: Travel times are shown in minutes.
Source: Metropolitan Transportation Commission Travel Demand Forecasts 2015

Mitigation Measures

None required.

Impact 2.1-3: Implementation of the proposed Plan could result in a significant increase in per capita VMT on facilities experiencing level of service (LOS) F compared to existing conditions during AM peak periods, PM peak periods, or during the day as a whole (LOS F defines a condition on roads where traffic volumes exceed capacity, resulting in stop-and-go conditions for extended periods of time). A significant increase in LOS F-impacted per capita VMT is defined as greater than 5 percent.

Impacts of Changes in Projected Land Use and Transportation Projects

The EIR evaluates the change in the amount of per capita automobile travel on road facilities (i.e., freeways, expressways and arterials, and other roadways) experiencing the worst level of service (LOS) and the hours of congestion experienced by motorists. Major roadway facilities are shown in **Figure 2.1-1**. The analysis is conducted on a regional and county-level basis.

Table 2.1-18 and **Table 2.1-19** display per capita vehicle miles of travel (VMT) by time period (AM peak period, PM peak period, and daily) and by LOS for the region and each county, respectively. LOS is a qualitative rating scale that describes how well a transportation facility performs from the traveler's perspective on a range from A (least congested) to F (most congested). For the purposes of this analysis, LOS is defined as traffic density based on the volume to capacity (V/C) ratio for roadway facilities.

Table 2.1-18 Regional Per-Capita Daily Vehicle Miles of Travel by Level of Service (2015-2040)

LOS[1] (V/C Ratio)	2015	2040 Plan	Change (2015 to 2040 Plan)	
			Numerical	Percent
AM Peak Period (6 AM to 10 AM)				
A-C (< 0.75)	3.48	3.09	-0.39	-11%
D-E (0.75-1.00)	1.32	1.3	-0.02	-2%
F (> 1.00)	0.23	0.22	-0.01	-4%
Total	**5.01**	**4.60**	**-0.41**	**-8%**
PM Peak Period (3 PM to 7 PM)				
A-C (< 0.75)	3.85	3.31	-0.54	-14%
D-E (0.75-1.00)	1.43	1.65	+0.22	+15%
F (> 1.00)	0.15	0.22	+0.07	+47%
Total	**5.43**	**5.18**	**-0.25**	**-5%**
Daily				
A-C (< 0.75)	15.85	14.52	-1.33	-8%
D-E (0.75-1.00)	3.02	3.46	+0.44	+15%
F (> 1.00)	0.38	0.44	+0.06	+16%
Total	**19.25**	**18.42**	**-0.83**	**-4%**

Note: [1] LOS (level of service) measures traffic density with a range of A to F. LOS A-C reflect free-flow conditions with minimal delay. LOS D-E reflect somewhat congested conditions with some possible delays. LOS F reflects very congested conditions with significant volumes greater than roadway capacity, leading to significant delays.

Source: Metropolitan Transportation Commission Travel Demand Forecasts 2015

Table 2.1-19 Per-Capita Daily Vehicle Miles of Travel by Level of Service by County (2015-2040)

LOS[1] (V/C Ratio)	County	2015	2040 Plan	Change (2015 to 2040 Plan)	
				Numerical	Percent
AM Peak Period (6 AM to 10 AM)					
A-C (< 0.75)	Alameda	0.79	0.63	-0.16	-20%
	Contra Costa	0.43	0.42	-0.01	-2%
	Marin	0.13	0.12	-0.01	-8%
	Napa	0.09	0.07	-0.02	-22%
	San Francisco	0.18	0.14	-0.04	-22%
	San Mateo	0.43	0.38	-0.05	-12%
	Santa Clara	0.88	0.87	-0.01	-1%
	Solano	0.29	0.25	-0.04	-14%
	Sonoma	0.24	0.20	-0.04	-17%
	Adjacent Counties	0.02	0.01	-0.01	-50%
	Regional Total	**3.48**	**3.09**	**-0.39**	**-11%**
D-E (0.75-1.00)	Alameda	0.36	0.44	+0.08	+22%
	Contra Costa	0.25	0.21	-0.04	-16%
	Marin	0.07	0.04	-0.03	-43%
	Napa	0.01	0.01	0.00	0%
	San Francisco	0.06	0.06	0.00	0%
	San Mateo	0.11	0.10	-0.01	-9%
	Santa Clara	0.31	0.27	-0.04	-13%
	Solano	0.09	0.11	+0.02	+22%
	Sonoma	0.06	0.06	0.00	0%
	Adjacent Counties	0.00	0.00	0.00	0%
	Regional Total	**1.32**	**1.30**	**-0.02**	**-2%**

Table 2.1-19 Per-Capita Daily Vehicle Miles of Travel by Level of Service by County (2015-2040)

LOS[1] (V/C Ratio)	County	2015	2040 Plan	Change (2015 to 2040 Plan)	
				Numerical	Percent
F (> 1.00)	Alameda	0.08	0.08	0.00	0%
	Contra Costa	0.05	0.04	+0.01	-20%
	Marin	0.01	0.02	+0.01	+100%
	Napa	0.00	0.00	0.00	0%
	San Francisco	0.02	0.02	0.00	0%
	San Mateo	0.01	0.01	0.00	0%
	Santa Clara	0.04	0.03	-0.01	-25%
	Solano	0.01	0.01	0.00	0%
	Sonoma	0.01	0.01	0.00	0%
	Adjacent Counties	0.00	0.00	0.00	0%
	Regional Total	**0.23**	**0.22**	**-0.01**	**-4%**
Total		**5.01**	**4.60**	**-0.41**	**-8%**
PM Peak Period (3 PM to 7 PM)					
A-C (< 0.75)	Alameda	0.84	0.64	-0.20	-24%
	Contra Costa	0.50	0.49	-0.01	-2%
	Marin	0.16	0.12	-0.04	-25%
	Napa	0.08	0.07	-0.01	-13%
	San Francisco	0.21	0.14	-0.07	-33%
	San Mateo	0.46	0.40	-0.06	-13%
	Santa Clara	0.97	0.93	-0.04	-4%
	Solano	0.36	0.28	-0.08	-22%
	Sonoma	0.25	0.22	-0.03	-12%
	Adjacent Counties	0.02	0.02	0.00	0%
	Regional Total	**3.85**	**3.31**	**-0.54**	**-14%**
D-E (0.75-1.00)	Alameda	0.42	0.55	+0.13	+31%
	Contra Costa	0.24	0.21	-0.03	-13%
	Marin	0.06	0.07	+0.01	+17%
	Napa	0.01	0.01	0.00	0%
	San Francisco	0.06	0.10	+0.04	+67%
	San Mateo	0.12	0.12	0.00	0%
	Santa Clara	0.40	0.41	+0.01	+2%
	Solano	0.05	0.11	+0.06	+120%
	Sonoma	0.07	0.07	0.00	0%
	Adjacent Counties	0.00	0.00	0.00	0%
	Regional Total	**1.43**	**1.65**	**+0.22**	**+15%**
F (> 1.00)	Alameda	0.05	0.08	+0.03	+60%
	Contra Costa	0.02	0.03	+0.01	+50%
	Marin	0.00	0.00	0.00	0%
	Napa	0.00	0.00	0.00	0%
	San Francisco	0.02	0.05	+0.03	+150%
	San Mateo	0.01	0.01	0.00	0%
	Santa Clara	0.03	0.03	0.00	0%
	Solano	0.01	0.01	0.00	0%
	Sonoma	0.01	0.01	0.00	0%
	Adjacent Counties	0.00	0.00	0.00	0%
	Regional Total	**0.15**	**0.22**	**+0.07**	**+47%**
Total		**5.43**	**5.18**	**-0.25**	**-5%**
Daily					
A-C (< 0.75)	Alameda	3.75	3.25	-0.50	-13%
	Contra Costa	2.10	2.04	-0.06	-3%
	Marin	0.63	0.55	-0.08	-13%

Table 2.1-19 Per-Capita Daily Vehicle Miles of Travel by Level of Service by County (2015-2040)

LOS[1] (V/C Ratio)	County	2015	2040 Plan	Change (2015 to 2040 Plan)	
				Numerical	Percent
	Napa	0.31	0.28	-0.03	-10%
	San Francisco	0.87	0.69	-0.18	-21%
	San Mateo	1.74	1.59	-0.15	-9%
	Santa Clara	4.02	3.92	-0.10	-2%
	Solano	1.37	1.23	-0.14	-10%
	Sonoma	1.00	0.90	-0.10	-10%
	Adjacent Counties	0.06	0.07	+0.01	+17%
	Regional Total	**15.85**	**14.52**	**-1.33**	**-8%**
D-E (0.75-1.00)	Alameda	0.85	1.16	0.31	+36%
	Contra Costa	0.50	0.44	-0.06	-12%
	Marin	0.13	0.12	-0.01	-8%
	Napa	0.02	0.02	0.00	0%
	San Francisco	0.17	0.27	+0.10	+59%
	San Mateo	0.25	0.24	-0.01	-4%
	Santa Clara	0.82	0.81	-0.01	-1%
	Solano	0.14	0.24	+0.10	+71%
	Sonoma	0.13	0.15	+0.02	+15%
	Adjacent Counties	0.01	0.01	0.00	0%
	Regional Total	**3.02**	**3.46**	**+0.44**	**+15%**
F (> 1.00)	Alameda	0.13	0.17	+0.04	+31%
	Contra Costa	0.07	0.07	0.00	0%
	Marin	0.02	0.02	0.00	0%
	Napa	0.00	0.00	0.00	0%
	San Francisco	0.04	0.07	+0.03	+75%
	San Mateo	0.01	0.02	+0.01	+100%
	Santa Clara	0.07	0.06	-0.01	-14%
	Solano	0.02	0.01	-0.01	-50%
	Sonoma	0.02	0.02	0.00	0%
	Adjacent Counties	0.00	0.00	0.00	0%
	Regional Total	**0.38**	**0.44**	**0.06**	**+16%**
Total		**19.25**	**18.42**	**-0.83**	**-4%**

Notes: [1] LOS measures traffic density with a range of A to F. LOS A-C reflect free-flow conditions with minimal delay. LOS D-E reflect somewhat congested conditions with some possible delays. LOS F reflects very congested conditions with significant volumes greater than roadway capacity, leading to significant delays.

Source: Metropolitan Transportation Commission Travel Demand Forecasts 2015

Regional Analysis: Under the proposed Plan, per capita VMT on severely congested facilities (LOS F) would increase compared to existing conditions. Congested per capita VMT would decrease by 0.02 mile, from 0.27 to 0.25 (or -7 percent), during the AM peak period. Congested per capita VMT would increase by 0.07 mile, from 0.15 to 0.22 (or 47 percent), during the PM peak period, and by 0.06 mile from 0.38 to 0.44 (or 16 percent), for the day as a whole. These roadway traffic service levels reflect the impact of total VMT growth exceeding the growth of roadway capacity on a regional level.

County-Level Analysis: Under the proposed Plan, the increase in per capita VMT on severely congested facilities (LOS F) would be limited to a subset of Bay Area counties and time periods, including: Marin County during the weekday AM peak period; Alameda County, Contra Costa County, and San Francisco County during the weekday PM peak period; and, Alameda County, San Francisco County, and San Mateo County on a daily basis. The increase in per capita VMT on severely congested facilities (LOS F) would increase significantly (by more than 5 percent) in each of these counties during the specified time periods. These roadway traffic service levels reflect the impact of total VMT growth exceeding the growth of roadway capacity on a county level.

The proposed Plan would minimize congestion through a number of regional policies and investment strategies, including:

- Implementation of transit capacity increases along fixed guideways to provide congestion-immune alternatives to freeway and arterial corridors (including projects such as BART Metro, BART Silicon Valley Extension to San José and Santa Clara, T-Third Central Subway, Van Ness Avenue Bus Rapid Transit, Geary Boulevard Bus Rapid Transit, Geneva-Harney Bus Rapid Transit, San Pablo Bus Rapid Transit, and East Bay Bus Rapid Transit);

- Expansion of the Freeway Performance Initiative to go beyond existing freeway ramp meters to focus heavily on signal coordination along congested arterials;

- The projected land use pattern, which would emphasize focused growth in Transit Priority Areas and shorten commute distances by bringing jobs and housing closer together; and continued funding of the OneBayArea Grant (OBAG) program to accelerate development initiatives in Priority Development Areas and Transit Priority Areas through infrastructure projects.

These regional policies and investment strategies have not yet been finalized and implementation cannot be certain at this time. Despite inclusion of these transportation and land use strategies in the proposed Plan, a **potentially significant (PS)** impact related to the increase in per capita VMT on facilities already experiencing LOS F would remain. Mitigation Measures 2.1-3-3(a) and 2.1-3(b) are described below.

Mitigation Measures

Implementing agencies and/or project sponsors shall implement the following measures, where feasible and necessary based on project- and site-specific considerations that include, but are not limited to:

2.1-3-3(a) MTC, in its role as a funding agency, and implementing agencies shall support the advancement of corridor-level plans and implementation of projects located on severely congested (LOS F) facilities.

2.1-3-3(b) Transportation demand management (TDM) strategies shall be incorporated into individual land use and transportation projects and plans, as part of the planning process. Local agencies shall incorporate strategies identified in the Federal Highway Administration's publication: *Integrating Demand Management into the Transportation Planning Process: A Desk Reference* (August 2012) into the planning process (FHWA 2012). For example, the following strategies may be included to encourage use of transit and non-motorized modes of transportation and reduce vehicle miles traveled on the region's roadways:

- include TDM mitigation requirements for new developments;

- incorporate supporting infrastructure for non-motorized modes, such as, bike lanes, secure bike parking, sidewalks, and crosswalks;

- provide incentives to use alternative modes and reduce driving, such as, universal transit passes, road and parking pricing;

- implement parking management programs, such as parking cash-out, priority parking for carpools and vanpools;

- develop TDM-specific performance measures to evaluate project-specific and system-wide performance;

- incorporate TDM performance measures in the decision-making process for identifying transportation investments;

- implement data collection programs for TDM to determine the effectiveness of certain strategies and to measure success over time; and

- set aside funding for TDM initiatives.

The increase in per capita VMT on facilities experiencing LOS F represents a significant impact compared to existing conditions. To assess whether implementation of these specific mitigation strategies would result in measurable traffic congestion reductions, implementing actions may need to be further refined within the overall parameters of the proposed Plan and matched to local conditions in any subsequent project-level environmental analysis.

Significance after Mitigation

To the extent that an individual project adopts and implements all feasible mitigation measures described above, the impact would be less than significant (LS-M).

Projects taking advantage of CEQA Streamlining provisions of SB 375 (PRC Sections 21155.1, 21155.2, and 21159.28) must apply the mitigation measure described above to address site-specific conditions. The implementing agency would ensure that transportation demand management measures are incorporated into projects to the extent feasible. Implementation of the mitigation measure at a project-level would encourage sustainable modes of transportation and reduce the potential for the proposed Plan to increase VMT on congested facilities. However, MTC/ABAG cannot require local implementing agencies to adopt the above mitigation measures, and it is ultimately the responsibility of a lead agency to determine and adopt mitigation. Therefore, this impact remains **significant and unavoidable (SU)** for purposes of this program-level review.

Impact 2.1-4: Implementation of the proposed Plan could result in a significant increase in per capita VMT compared to existing conditions. A significant increase in per capita VMT is defined as greater than 5 percent.

Impacts of Changes in Projected Land Use and Transportation Projects

As shown in **Table 2.1-20**, projected per capita VMT for the region would decrease by 2 percent, from 21.5 miles to 21.0 miles by year 2040, representing a decrease of 0.5 mile per person per day. Per capita VMT would be reduced in six of the nine Bay Area counties and would increase in three counties: Marin County (4 percent increase or 1.1 mile per person), Napa County (2 percent increase or 0.4 mile per person), and Solano County (1 percent increase or 0.4 mile per person).

Table 2.1-20 Daily Vehicle Miles of Travel Per Capita (2015-2040)

Vehicle Miles Traveled	County	2015	2040 Plan	Change (2015 to 2040 Plan)	
				Numerical	Percent
Daily[1] Vehicle Miles of Travel (VMT)[2]	Alameda	38,343,700	46,927,300	8,583,600	+22%
	Contra Costa	22,212,100	26,892,800	4,680,700	+21%
	Marin	6,453,600	7,182,600	729,000	+11%
	Napa	2,838,400	3,303,900	465,500	+16%
	San Francisco	8,734,100	10,527,400	1,793,300	+21%
	San Mateo	16,429,700	19,138,100	2,708,400	+16%
	Santa Clara	40,657,200	50,081,100	9,423,900	+23%
	Solano	12,328,200	15,114,500	2,786,300	+23%
	Sonoma	9,867,100	11,609,800	1,742,700	+18%
	Regional Total	**157,864,200**	**190,777,700**	**32,913,500**	**+21%**
Daily[1] Vehicle Miles of Travel[2] per Capita[3]	Alameda	23.5	22.5	-1.0	-4%
	Contra Costa	20.7	19.7	-1.0	-5%
	Marin	25.2	26.3	+1.1	+4%
	Napa	20.6	21.0	+0.4	+2%
	San Francisco	9.5	9.0	-0.5	-5%
	San Mateo	21.6	21.1	-0.5	-2%

Table 2.1-20 Daily Vehicle Miles of Travel Per Capita (2015-2040)

Vehicle Miles Traveled	County	2015	2040 Plan	Change (2015 to 2040 Plan)	
				Numerical	Percent
	Santa Clara	21.4	19.9	-1.5	-7%
	Solano	30.1	30.5	+0.4	+1%
	Sonoma	20.5	19.6	-0.9	-4%
	Regional Total	**21.5**	**21.0**	**-0.5**	**-2%**

Notes: Figures may not sum because of independent rounding.

[1] Daily metrics are measured for a typical weekday.

[2] Only reflects interzonal trips (assigned directly to the highway network); includes intraregional, interregional, and commercial vehicle trips, and trips to and from the airport and future high-speed rail stations.

[3] Total daily VMT is calculated using *Travel Model One*; therefore, to calculate per-capita VMT, it is essential to use simulated population levels to ensure consistency. Simulated population may be slightly different than overall population forecasts for Plan Bay Area EIR alternatives because of slight variability in modeling tools. Further clarification on this issue can be found in the Plan Bay Area EIR technical appendices.

Source: Metropolitan Transportation Commission Travel Demand Forecasts 2015

The overall reduction in per-capita VMT under the proposed Plan would be a result of the projected changes in land use and transportation projects that lead to an increased proportion of non-workers and retirees (who drive fewer miles per day compared to the general population) in future years. Although the shift to sustainable modes is only a few percentage points' difference compared to year 2015 baseline conditions (shown in **Table 2.1-15**), daily VMT per capita would be reduced under the proposed Plan as a result of a reduction in the number of per capita vehicle trips in the region. Furthermore, the proposed Plan would locate travel origins and destinations closer together, reducing the distance required to reach employment, retail, and service hubs. Because regional per capita vehicle miles traveled would decrease as a result of the proposed Plan and there would not be a significant increase (greater than 5 percent) in per capita vehicle miles traveled at the county level, this impact would be **less than significant (LS)**. No mitigation is required.

Mitigation Measures

None required.

Impact 2.1-5: Implementation of the proposed Plan could result in increased percent utilization of regional transit supply resulting in an exceedance of transit capacity during the AM peak period, PM peak period, or on a daily basis. An exceedance is defined as passenger seat-mile demand for any transit technology being greater than 80 percent of passenger seat-miles supplied by transit operators.

Impacts of Changes in Projected Land Use and Transportation Projects

Higher levels of transit ridership forecasted for year 2040 would lead to greater ridership levels for all public transit modes. The proposed Plan includes major investments that create new transit lines or boost frequencies on existing lines, to ensure that transit capacity would rise at similar rates as transit demand.

The capacity of transit is determined by both flexible elements such as routes and schedules, as well as fixed elements such as the BART Transbay tube. The specific future loadings and utilization on individual transit lines can, in most cases, be adjusted in response to demand through longer term adjustments to routes and schedules. It is therefore appropriate for this EIR to examine the regional and system-wide impacts of the proposed Plan's transportation investments and projected development. Localized impacts on transit utilization levels would vary depending on neighborhood level changes in land use (both jobs and residents), as well as the magnitude of transit frequency or capacity increases on a given transit line. In addition, the integrated model used to evaluate the proposed Plan emphasizes evaluation of regional and corridor travel patterns and is not calibrated for localized route-by-route transit analyses. Localized operational capacity issues would be addressed when considering individual transportation or development projects.

As shown in **Table 2.1-21**, in the AM peak period (when demand for transit is greatest), there would be a slight reduction in utilization of total transit capacity (transit demand divided by transit supply) from 41 percent in year 2015 to 40 percent in year 2040. Capacity utilization would be higher than these averages for specific transit lines serving high density locations such as downtown San Francisco. However, the Plan would improve utilization on several of these highly-used services, in particular heavy rail (BART) where utilization would be reduced from 60 percent to 49 percent of capacity. Capacity increases would also reduce utilization on light rail and express bus modes. The modes where utilization is projected to increase (local bus, ferry, commuter rail) tend to have more residual capacity or flexibility (in the case of local bus) to adjust routes and schedules over the long-term planning period.

Table 2.1-21 Utilization of Public Transit Systems, By Mode (2015-2040)

Mode	2015 Percent Utilization[1]	2040 Plan Percent Utilization[1]
AM Peak Period (6 AM to 10 AM)		
Local bus	36%	42%
Light rail[2]	57%	55%
Ferry	36%	49%
Express bus	51%	37%
Heavy rail[3]	60%	49%
Commuter rail[4]	7%	15%
All modes	**41%**	**40%**
PM Peak Period (3 PM to 7 PM)		
Local bus	34%	42%
Light rail[2]	56%	55%
Ferry	24%	30%
Express bus	49%	39%
Heavy rail[3]	46%	40%
Commuter rail[4]	6%	12%
All modes	**35%**	**36%**
Daily		
Local bus	26%	33%
Light rail[2]	44%	41%
Ferry	17%	24%
Express bus	41%	31%
Heavy rail[3]	37%	33%
Commuter rail[4]	5%	12%
All modes	**29%**	**30%**

Notes:

[1] Percent utilization measures the passenger seat-miles required by forecasted transit patrons as a percentage of total passenger seat-miles provided by transit operators (i.e. the percentage of seats on transit vehicles filled with passengers). Utilization levels greater than 80 percent reflect conditions where passengers either would have difficulty finding a seat or would have to stand during all or part of their ride.

[2] Reflects utilization of Muni Metro and VTA light rail systems.

[3] Reflects utilization of BART heavy rail system.

[4] Reflects utilization of Caltrain, SMART, Capitol Corridor, and ACE commuter rail systems.

Source: Metropolitan Transportation Commission Travel Demand Forecasts 2015

In the PM peak period, total utilization would increase from 35 percent in year 2015 to 36 percent in year 2040. On a daily basis, transit utilization would increase from 29 percent in year 2015 to 30 percent in year 2040.

The passenger experience is relatively comparable over a range of transit loading utilization levels as long as a passenger is able to easily locate a seat. Therefore, capacity constraints become an issue only if utilization levels exceed 80 percent, meaning that it is difficult or impossible for a passenger to find a seat (and therefore the passenger must stand during the journey).

Regional transit utilization levels for all public transit modes, during both peak periods and for the day as a whole, would remain below 80 percent. Therefore, year 2040 regional transit capacity would have a **less than significant impact (LS)** on system performance.

Mitigation Measures

None required

Impact 2.1-6: Implementation of the proposed Plan could cause a disruption to goods movement into or through the Bay Area region.

Impacts of Changes in Projected Land Use and Transportation Projects

The proposed Plan contains various projects that would modernize and expand the regional transportation network and are designed to help accommodate goods movement. These projects were developed in response to existing deficiencies and anticipated future needs given projected changes in land use and transportation demand in the region. The proposed Plan includes projects to improve goods movement, including but not limited to: 7th Street Grade Separation (East and West), Oakland Army Base Transportation Infrastructure Improvements, Goods Movement Technology Program, Alviso Wetlands Doubletrack, the Goods Movement Technology Program, and a number of other highway projects that would benefit both passenger vehicles and trucks (MTC 2016c). The proposed Plan would not cause significant disruption of goods movement into or through the Bay Area region. Therefore, this impact would be **less than significant (LS)**.

Mitigation Measures

None required

Impact 2.1-7: Implementation of the proposed Plan could cause a disruption to the ongoing operations of the applicable regional or local area transportation system because of construction activities.

Impacts of Changes in Projected Land Use and Transportation Projects

The projected changes in land use and transportation projects in the proposed Plan would require construction activity for individual projects during implementation of the proposed Plan. Although construction activities would be short term, intermittent, and geographically dispersed, construction activities associated with implementing the projected land use growth and transportation projects could interfere with normal operations of the transportation system. The specific construction activities associated with projects under the proposed Plan would be finalized at the time individual projects are proposed. However, transportation-related impacts could occur from travel lane closures, detours, and/or congestion resulting from increased truck traffic on local roads as construction vehicles and workers travel to and from project sites. Therefore, a potentially significant (PS) impact related to construction activities would occur. Mitigation Measures 2.1-7 is described below.

Mitigation Measures

Implementing agencies and/or project sponsors shall implement the following measure, where feasible and necessary based on project- and site-specific considerations that include:

2.1-7 Implementing agencies shall require implementation of best practice strategies regarding construction activities on the transportation system and apply recommended applicable mitigation measures as defined by state and federal agencies. Examples of mitigation measures include, but are not limited to, the following:

- prepare a transportation construction plan for all phases of construction;
- establish construction phasing/staging schedule and sequence that minimizes impacts of a work zone on traffic by using operationally-sensitive phasing and staging throughout the life of the project;
- identify arrival/departure times for trucks and construction workers to avoid peak periods of adjacent street traffic and minimize traffic affects;
- identify optimal delivery and haul routes to and from the site to minimize impacts to traffic, transit, pedestrians, and bicyclists;
- identify appropriate detour routes for bicycles and pedestrians in areas affected by construction;
- coordinate with local transit agencies and provide for relocation of bus stops and ensure adequate wayfinding and signage to notify transit users;
- preserve emergency vehicle access;
- implement public awareness strategies to educate and reach out to the public, businesses, and the community concerning the project and work zone (e.g., brochures and mailers, press releases/media alerts);
- provide a point of contact for residents, employees, property owners, and visitors to obtain construction information, and provide comments and questions;
- provide current and/or real-time information to road users regarding the project work zone (e.g., changeable message sign to notify road users of lane and road closures and work activities, temporary conventional signs to guide motorists through the work zone); and
- encourage construction workers to use transit, carpool, and other sustainable transportation modes when commuting to and from the site.

Significance after Mitigation

To the extent that an individual project adopts and implements all feasible mitigation measures described above, the impact would be less than significant (LS-M) because it would require, as part of the planning, design, and engineering for future projects, that the implementing agency implement measures to minimize overall disruptions and ensure that overall circulation in a project area is maintained to the extent possible, with particular focus on ensuring transit, pedestrian, and bicycle connectivity. Implementation of the mitigation measure at a project-level would reduce the impacts from construction activities on the transportation system and traffic.

Projects taking advantage of CEQA Streamlining provisions of SB 375 (PRC sections 21155.1, 21155.2, and 21159.28) must apply the mitigation measures described above to address site-specific conditions. However, MTC/ABAG cannot require local implementing agencies to adopt the above mitigation measures, and it is ultimately the responsibility of a lead agency to determine and adopt mitigation. Therefore, this impact remains **significant and unavoidable (SU)** for purposes of this program-level review.

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2.2 AIR QUALITY

This section evaluates the regional air quality impacts of implementing the proposed Plan. The analysis focuses on the following criteria pollutants: (1) ground-level ozone precursor emissions, for which the Bay Area is currently designated as a non-attainment area under the national and state standards, (2) particulate matter (PM) emissions, for which the Bay Area is currently designated as non-attainment under the national and state standards; and (3) carbon monoxide emissions, for which the Bay Area is designated as attainment under the national and state standards. It also evaluates criteria pollutants and Toxic Air Contaminants (TACs) from construction activity and local and regional emissions of TACs and fine particulate matter ($PM_{2.5}$).

This EIR examines these at a regional level. However, for TACs and $PM_{2.5}$ a localized analysis is provided to identify potential public health impacts from locating new sensitive receptors within Transit Priority Areas (TPAs).

The related issues of greenhouse gas emissions and potential climate change effects are addressed separately in Section 2.5, "Climate Change and Greenhouse Gases" of this EIR.

Comments received in response to the Notice of Preparation expressed concerns about the air quality impacts associated with economic displacement and jobs-housing balance, and that the air quality benefits of the Caltrain's Peninsula Corridor Electrification Project and proposed fleet expansion be analyzed. Additionally, multiple comments addressed a desire to include ambitious goals for reduction in automobile travel in the Bay Area and to focus on achieving regional emission reduction targets.

2.2.1 Environmental Setting

PHYSICAL SETTING

Air quality is affected by the rate, amount, and location of pollutant emissions, and the associated meteorological conditions that influence pollutant movement and dispersal. Atmospheric conditions, including wind speed, wind direction, and air temperature, in combination with local surface topography (i.e., geographic features such as mountains and valleys), determine the effect of air pollutant emissions on local and regional air quality.

Climate, Meteorology, and Topography

The Bay Area region has a Mediterranean climate characterized by wet winters and dry summers. Rainfall totals can vary widely over a short distance, with windward coastal mountain areas receiving over 40 inches of rain, while leeward areas receive about 15 inches. During rainy periods, horizontal and vertical air movement ensures rapid pollutant dispersal. Rain also washes out particulate and other pollutants.

Normally, air temperatures decrease with increasing elevations. Sometimes this normal pattern is inverted, with warmer air aloft, and cool air trapped near the earth's surface. This phenomenon occurs in all seasons. In summer, especially when wind speeds are very low, a strong inversion will trap air emissions and high levels of ozone smog can occur. In winter, a strong inversion can trap emissions of particulate and carbon monoxide near the surface, resulting in unhealthful air quality.

The Bay Area topography is complex, consisting of coastal mountain ranges, inland valleys, and bays, which distort normal wind flow patterns. The Pacific Ocean bounds the area to the west with warmer inland valleys to the south and east. The only major break in California's Coast Range occurs at San Francisco Bay. The gap on the western side is called the Golden Gate, and on the eastern side, it is called the Carquinez Strait. These gaps allow air to pass between the Central Valley and the Pacific Ocean. The general region lies in the semi-permanent high-pressure zone of the eastern Pacific, resulting in a mild climate tempered by cool sea breezes

with light average wind speeds. The usually mild climatological pattern is interrupted occasionally by periods of extremely hot weather, winter storms, and offshore winds.

Regional wind patterns vary from season to season. During the summer, winds flowing from the northwest are drawn inland through the Golden Gate and over the lower portions of the San Francisco Peninsula. Wind speeds may be strong locally in areas where air is channeled through a narrow opening, such as the Carquinez Strait, Golden Gate or the San Bruno Gap. In the winter, the region frequently experiences stormy conditions with moderate to strong winds, as well as periods of stagnation with very light winds. Winter stagnation episodes are characterized by nighttime drainage flows in coastal valleys. Drainage refers to the reversal of the usual daytime air-flow patterns; air moves from the Central Valley toward the coast.

Wind tends to move from areas of high-pressure to areas of low-pressure. In warmer months, this means that air currents move on-shore from the Pacific Ocean to inland areas. Pacific Ocean air receives emissions from numerous sources (anthropogenic and biogenic) as it comes onshore and will carry these pollutants to areas many miles away. Mountains and valleys often affect on-shore winds. This means that a wind pattern that started as northwesterly will often swing 90 degrees or more when it encounters topographic features.

The climatological pollution potential of an area is largely dependent on winds, atmospheric stability, solar radiation, and terrain. The combination of low wind speeds and a strong inversion produces the greatest concentration of air pollutants. On days without inversions, or on days of winds averaging over 15 miles per hour (mph), smog potential is greatly reduced. Because of wind patterns, and, to a lesser degree, the geographic location of emission sources, high ozone levels usually occur in inland valleys, such as the Livermore area. High particulate matter levels can occur in areas of intense motor vehicle use, such as freeways and ports and in most valley areas where residential wood smoke and other pollutants are trapped by inversions and stagnant air.

Existing Air Quality and Attainment Status Summary

The federal Clean Air Act requires the U.S. Environmental Protection Agency (EPA) to set National Ambient Air Quality Standards (NAAQS) (40 CFR part 50) for six pollutants considered harmful to public health and the environment. These six pollutants are ground-level ozone (O_3), carbon monoxide (CO), nitrogen dioxide (NO_2), sulfur dioxide (SO_2), particulate matter (PM), and lead (Pb). EPA calls these pollutants "criteria" air pollutants because it regulates them by developing human health-based and/or environmentally-based criteria (science-based guidelines) for setting permissible levels.

Under amendments to the federal Clean Air Act, EPA has classified air basins or portions thereof, as either "attainment" or "nonattainment" for each criteria pollutant, based on whether or not the national standards have been achieved. The California Clean Air Act, patterned after the federal Clean Air Act, also designates areas as "attainment" or "nonattainment" for State standards. Thus, California has two sets of attainment/nonattainment designations: one with respect to national standards and one with respect to State standards.

Table 2.2-1 identifies the ambient air quality standards and attainment status for all criteria pollutants. The Bay Area is currently designated as a nonattainment area for State and federal ozone standards, the federal 24 hour $PM_{2.5}$ standard, and State PM_{10} standards. Based on the nonattainment status of these pollutants, this analysis is focused on ground-level ozone, particulate matter, and carbon monoxide. Table 2.2-2 presents a ten-year Bay Area air quality summary for days over the national and California standards for ozone, carbon monoxide, and particulate matter. Each of these criteria pollutants is discussed in more detail in the following pages.

Table 2.2-1 Bay Area Ambient Air Quality Standards and Attainment Status as of 2017

Pollutant	Averaging Time	California Standard[1]	Attainment Status for California Standard	Federal Primary Standard[2,3]	Attainment Status for Federal Standard	Major Pollutant Sources
Ozone	8 hour	0.070 ppm	Non-Attainment[9]	0.070 ppm	Non-Attainment[4]	Motor vehicles, other mobile sources, combustion, industrial, and commercial processes
	1 hour	0.09 ppm	Non-Attainment	—	—[5]	
Carbon Monoxide (CO)	8 hour	9.0 ppm	Attainment	9 ppm	Attainment[6]	Internal combustion engines, primarily gasoline-powered motor vehicles
	1 hour	20 ppm	Attainment	35 ppm	Attainment	
Nitrogen Dioxide (NO_2)	1 hour	0.18 ppm	Attainment	0.100 ppm[11]	—[11]	Emissions from cars, trucks, and buses
	Annual Arithmetic Mean	0.030 ppm	—	0.053 ppm	Attainment	
Sulfur Dioxide (SO_2)[12]	24 Hour	0.04 ppm	Attainment	0.14 ppm	—[12]	Fossil fuel combustion at power plants and other industrial facilities, and burning of high sulfur containing fuels by locomotives, large ships, and non-road equipment
	1 Hour	0.25 ppm	Attainment	0.075 ppm	—[12]	
	Annual Arithmetic Mean	—	—	0.030 ppm	—[12]	
Particulate Matter (PM_{10})	24 Hour	50 µg/m^3	Non-Attainment	150 µg/m^3	Unclassified	Dust- and fume-producing industrial and agricultural operations, combustion, atmospheric photochemical reactions, and natural activities (e.g., wind-raised dust and ocean sprays)
	Annual Arithmetic Mean	20 µg/m^3	Non-Attainment[7]	—	—	
Particulate Matter – Fine ($PM_{2.5}$)	24 Hour	—	—	35 µg/m^3 [15]	Non-Attainment	
	Annual Arithmetic Mean	12 µg/m^3	Non-Attainment[7,10]	12 µg/m^3 [15]	Unclassified/ Attainment	
Lead[13]	30-day Average	1.5 µg/m^3	—	—	Attainment	Fuels in on-road motor vehicles and industrial sources
	Calendar Quarter	—	—	1.5 µg/m^3	Attainment	
	Rolling 3 Month Average[14]	—	—	0.15 µg/m^3	—[14]	
Visibility Reducing Particles (VRP)	8 hour (10:00 to 18:00 PST)	—[8]	—	No National Standards		Same as particulate matter sources
Sulfates	24 hour	25 µg/m^3	Attainment			Combustion of petroleum fuels that contain sulfur
Hydrogen Sulfide	1 hour	0.03 ppm	Unclassified			Natural gas and anaerobic decomposition (e.g., sewer gas, wastewater treatment plants)
Vinyl Chloride	24 hour	0.010 ppm	No information available			Plastics manufacturing, landfills, wastewater treatment plants, and hazardous waste sites

Notes: PPM=parts per million; mg/m^3=milligrams per cubic meter; and µg/m^3=micrograms per cubic meter, NAAQS = National Ambient Air Quality Standards, VRP = visibility reducing particles

1 California standards for ozone, carbon monoxide (except Lake Tahoe), sulfur dioxide (1-hour and 24-hour), nitrogen dioxide, suspended particulate matter - PM_{10}, and visibility reducing particles are values that are not to be exceeded. The standards for sulfates, Lake Tahoe carbon monoxide, lead, hydrogen sulfide, and vinyl chloride are not to be equaled or exceeded. If the standard is for a 1-hour, 8-hour or 24-hour average (i.e., all standards except for lead and the PM_{10} annual standard), then some measurements may be excluded. In particular, measurements are excluded that ARB determines would occur less than once per year on the average. The Lake Tahoe CO standard is 6.0 ppm, a level one-half the national standard and two-thirds the state standard.

2 National standards shown are the "primary standards" designed to protect public health. National standards other than for ozone, particulates and those based on annual averages are not to be exceeded more than once a year. The 1-hour ozone standard is attained if, during the most recent three-year period, the average number of days per year with maximum hourly concentrations above the standard is equal to or less than one. The 8-hour ozone standard is attained when the 3-year average of the 4th highest daily concentrations is 0.070 ppm (70 ppb) or less. The 24-hour PM_{10} standard is attained when the 3-year average of the 99th percentile of monitored concentrations is less than 150 µg/m^3. The 24-hour $PM_{2.5}$ standard is attained when the 3-year average of 98th percentiles is less than 35 µg/m^3.
Except for the national particulate standards, annual standards are met if the annual average falls below the standard at every site. The national annual particulate

Table 2.2-1 Bay Area Ambient Air Quality Standards and Attainment Status as of 2017

standard for PM_{10} is met if the 3-year average falls below the standard at every site. The annual $PM_{2.5}$ standard is met if the 3-year average of annual averages spatially-averaged across officially designed clusters of sites falls below the standard.

3 National air quality standards are set by EPA at levels determined to be protective of public health with an adequate margin of safety.

4 On October 1, 2015, the national 8-hour ozone primary and secondary standards were lowered from 0.075 to 0.070 ppm. An area will meet the standard if the fourth-highest maximum daily 8-hour ozone concentration per year, averaged over three years, is equal to or less than 0.070 ppm. EPA will make recommendations on attainment designations by October 1, 2016, and issue final designations October 1, 2017. Nonattainment areas will have until 2020 to late 2037 to meet the health standard, with attainment dates varying based on the ozone level in the area.

5 The national 1-hour ozone standard was revoked by EPA on June 15, 2005.

6 In April 1998, the Bay Area was redesignated to attainment for the national 8-hour carbon monoxide standard.

7 In June 2002, ARB established new annual standards for $PM_{2.5}$ and PM_{10}.

8 Statewide VRP Standard (except Lake Tahoe Air Basin): Particles in sufficient amount to produce an extinction coefficient of 0.23 per kilometer when the relative humidity is less than 70 percent. This standard is intended to limit the frequency and severity of visibility impairment because of regional haze and is equivalent to a 10-mile nominal visual range.

9 The 8-hour CA ozone standard was approved by ARB on April 28, 2005 and became effective on May 17, 2006.

10 On January 9, 2013, EPA issued a final rule to determine that the Bay Area attains the 24-hour PM2.5 national standard. This EPA rule suspends key SIP requirements as long as monitoring data continues to show that the Bay Area attains the standard. Despite this EPA action, the Bay Area will continue to be designated as "non-attainment" for the national 24-hour $PM_{2.5}$ standard until such time as the Air District submits a "redesignation request" and a "maintenance plan" to EPA, and EPA approves the proposed redesignation.

11 To attain this standard, the 3-year average of the 98th percentile of the daily maximum 1-hour average at each monitor within an area must not exceed 0.100ppm (effective January 22, 2010). EPA expects to make a designation for the Bay Area by the end of 2017.

12 On June 2, 2010, EPA established a new 1-hour SO_2 standard, effective August 23, 2010, which is based on the 3-year average of the annual 99th percentile of 1-hour daily maximum concentrations. The existing 0.030 ppm annual and 0.14 ppm 24-hour SO_2 NAAQS however must continue to be used until one year following U.S. EPA initial designations of the new 1-hour SO_2 NAAQS. EPA expects to make designation for the Bay Area by the end of 2017.

13 ARB has identified lead and vinyl chloride as 'toxic air contaminants' with no threshold level of exposure below which there are no adverse health effects determined.

14 National lead standard, rolling 3-month average: final rule signed October 15, 2008. Final designations effective December 31, 2011.

15 In December 2012, EPA strengthened the annual $PM_{2.5}$ NAAQS from 15.0 to 12.0 micrograms per cubic meter ($\mu g/m^3$). In December 2014, EPA issued final area designations for the 2012 primary annual $PM_{2.5}$ NAAQS. Areas designated "unclassifiable/attainment" must continue to take steps to prevent their air quality from deteriorating to unhealthy levels. The effective date of this standard is April 15, 2015.

Source: BAAQMD 2017a

Table 2.2-2 Ten-Year Bay Area Air Quality Summary (2006-2015)

Days Over Standard for Ozone, Carbon Monoxide and Particulate Matter (PM)												
Year	Ozone			CO			PM_{10}		$PM_{2.5}$	NO_2		SO_2
	1-Hr	8-Hr		1-Hr	8-Hr		24-Hr		24-Hr[2]	1-Hr		24-Hr
	Cal	Nat[1]	Cal	Nat	Cal	Nat/Cal	Nat	Cal	Nat	Nat	Cal	Nat/Cal
2006	18	20	22	0	0	0	0	15	10	0	0	0
2007	4	8	9	0	0	0	0	4	14	0	0	0
2008	9	19	20	0	0	0	0	5	12	0	0	0
2009	11	11	13	0	0	0	0	1	11	0	0	0
2010	8	11	11	0	0	0	0	2	6	0	0	0
2011	5	9	10	0	0	0	0	3	8	0	0	0
2012	3	8	8	0	0	0	0	2	3	1	0	0
2013	3	3	3	0	0	0	0	6	13	0	0	0
2014	3	9	10	0	0	0	0	2	3	0	0	0
2015	7	12	12	0	0	0	0	1	9	1	0	0

Notes: Nat = National, Cal =California

[1] In October 2015, the U.S. EPA implemented a new 8-hour ozone standard of 70 ppb. Exceedances are based on this standard (note that national and state numbers can differ because of data-handling conventions).

Source: BAAQMD 2015a

Ozone

Ozone is a reactive pollutant, which is not emitted directly into the atmosphere, but is a secondary air pollutant produced in the atmosphere through a complex series of photochemical reactions involving reactive organic gases (ROG) and oxides of nitrogen (NO_X). ROG and NO_X are known as precursor compounds of ozone. Mobile sources (e.g., motor vehicle exhaust) and area sources (e.g., industrial emissions, gasoline vapors, architectural coatings, various consumer products, and chemical solvents) are some of the main sources of ROG and NO_X that contribute to the formation of ozone. Ozone is a regional air pollutant because it is formed downwind of sources of ROG and NO_X under the influence of wind and sunlight. During summertime (particularly on hot, sunny days with little or no wind), ozone levels are at their highest.

Short-term exposure to elevated concentrations of ozone is linked to such health effects as eye irritation and breathing difficulties. Repeated exposure to ozone can make people more susceptible to respiratory infections and aggravate pre-existing respiratory diseases. Long-term exposures to ozone can cause more serious respiratory illnesses. Ozone also damages trees and other natural vegetation, reduces agricultural productivity, and causes deterioration of building materials, surface coatings, rubber, plastic products and textiles.

Tables 2.2-3 and 2.2-4 show exceedances of the State one-hour ozone standard and national eight-hour ozone standard, respectively. The number of days the region experiences unhealthy ozone levels has fallen overall. This improvement is because of the California Air Resources Board (ARB) regulations affecting motor vehicle emissions and Bay Area Air Quality Management District (BAAQMD) regulations to reduce emissions from industrial and commercial sources.

Table 2.2-3 Days Exceeding the California 1-Hour Ozone Standard (1998-2015)

Stations by Sub-Region	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Northern																		
Benicia	–	–	–	–	–	–	–	–	–	0	2	–	–	–	–	–	–	–
Napa	3	4	0	1	1	2	0	0	1	0	1	1	1	0	0	0	0	0
San Rafael	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Santa Rosa	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
Vallejo	3	4	0	0	1	2	1	0	0	0	1	2	0	0	0	0	0	0
Central																		
Hayward	4	4	1	2	0	3	0	0	2	0	1	4	–	0	0	0	1	2
Oakland	0	0	0	0	0	0	0	0	–	–	0	0	1	0	0	0	0	0
Oakland-West	–	–	–	–	–	–	–	–	–	–	–	–	–	0	0	0	0	0
Redwood City	0	0	0	1	0	1	1	0	0	0	0	0	2	0	0	0	0	0
San Francisco	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
San Leandro	2	3	1	0	1	2	1	1	0	0	0	–	–	–	–	–	–	–
Richmond/San Pablo	0	1	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0
Eastern																		
Bethel Island	10	5	1	3	5	0	1	0	9	0	4	2	3	0	1	0	0	0
Concord	13	8	2	6	5	5	1	1	8	1	3	2	2	2	0	0	1	0
Fairfield	9	9	1	3	4	0	1	0	3	0	2	2	1	0	0	0	0	0
Livermore	21	14	7	9	10	10	5	6	13	2	5	8	3	3	2	3	0	1
Pittsburg	4	2	1	2	4	0	0	0	3	1	1	–	–	–	–	–	–	–
San Ramon	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	0	0	1

Table 2.2-3 Days Exceeding the California 1-Hour Ozone Standard (1998-2015)

Stations by Sub-Region	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Southern																		
Fremont	7	3	2	3	3	4	0	1	4	0	1	4	1	–	–	–	–	–
Cupertino	–	–	–	–	–	–	–	–	–	–	–	–	–	0	0	0	–	–
Los Gatos	5	4	0	2	4	7	0	3	7	0	2	3	2	0	0	0	0	1
Mountain View/Sunnyvale	2	7	–	0	0	4	1	1	3	0	0	–	–	–	–	–	–	–
San Jose Central	4	3	0	2	–	4	0	1	5	0	1	0	5	–	–	–	–	–
San Jose East	5	2	1	0	0	2	0	1	–	–	–	–	–	–	–	–	–	–
San Jose	–	–	–	–	–	–	–	–	–	–	–	–	–	1	1	0	0	0
Gilroy	10	3	–	3	6	6	0	0	4	0	1	1	0	0	0	0	0	1
San Martin	15	7	4	7	8	9	0	2	7	1	2	4	2	0	0	0	1	1

Source: BAAQMD 2015a

Table 2.2-4 Days Exceeding the National 8-Hour Ozone Standard (1998-2015)[1]

Stations by Sub-Region	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Northern																		
Benicia	–	–	–	–	–	–	–	–	–	0	–	–	–	–	–	–	–	–
Napa	1	1	0	0	0	0	0	0	0	0	2	1	2	0	0	1	0	0
San Rafael	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Santa Rosa	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Vallejo	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
Central																		
Hayward	0	1	0	1	0	1	0	–	0	0	1	3	–	0	0	0	0	2
Oakland	0	0	0	0	0	0	0	0	–	–	0	0	0	0	0	0	0	2
Oakland-West	–	–	–	–	–	–	–	–	–	–	–	–	–	0	0	0	0	0
Redwood City	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1
San Francisco	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
San Leandro	0	0	0	0	0	0	0	0	0	0	–	–	–	–	–	–	–	–
Richmond/San Pablo	0	0	0	0	0	0	0	0	0	0	0	–	1	0	0	0	0	0
Eastern																		
Bethel Island	5	5	1	2	3	0	0	0	1	0	4	3	4	2	2	0	0	1
Concord	6	6	1	1	3	1	0	0	4	0	6	2	1	2	2	0	2	2
Fairfield	3	4	0	0	0	0	0	0	1	0	1	2	2	1	1	0	0	1
Livermore	10	5	2	2	6	3	0	1	5	1	6	6	3	2	3	1	4	7
Patterson Pass	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	5
Pittsburg	1	1	0	1	2	0	0	0	1	0	1	–	–	–	–	–	–	–
San Ramon	–	–	–	–	–	–	–	–	–	–	–	–	–	–	3	0	3	6

Table 2.2-4 Days Exceeding the National 8-Hour Ozone Standard (1998-2015)[1]

Stations by Sub-Region	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Southern																		
Fremont	0	1	0	0	0	1	0	0	0	0	1	0	1	–	–	–	–	–
Cupertino	–	–	–	–	–	–	–	–	–	–	–	–	–	0	0	1	–	–
Los Gatos	2	1	0	1	2	2	0	1	4	0	2	4	2	0	0	0	1	4
Mountain View/Sunnyvale	0	1	–	0	0	2	0	0	0	0	1	–	–	–	–	–	–	–
San Jose Central	1	0	0	0	–	0	0	0	1	0	2	0	3	–	–	–	–	–
San Jose East	0	0	0	0	0	0	0	0	–	–	–	–	–	–	–	–	–	–
San Jose	–	–	–	–	–	–	–	–	–	–	–	–	–	0	0	1	0	2
Gilroy	4	0	–	2	2	2	0	0	2	0	1	2	5	0	0	0	0	3
San Martin	6	3	1	2	5	4	0	0	5	0	2	5	5	0	1	1	3	4

Note: [1] These values reflect exceedances based on ozone standards at the time.

Source: BAAQMD 2015a

Carbon Monoxide

Carbon monoxide (CO) is an odorless and invisible gas. It is a non-reactive pollutant that is a product of incomplete combustion of gasoline in automobile engines. Carbon monoxide is a localized pollutant, and the highest concentrations are found near the source. Ambient carbon monoxide concentrations generally follow the spatial and temporal distributions of vehicular traffic and are influenced by wind speed and atmospheric mixing. Carbon monoxide concentrations are highest in flat areas on still winter nights when temperature inversions trap the carbon monoxide near the ground. When inhaled at high concentrations, carbon monoxide reduces the oxygen-carrying capacity of the blood, which, in turn, results in reduced oxygen reaching parts of the body.

Most of the Bay Area's CO comes from on-road motor vehicles, although a large amount also comes from burning wood in fireplaces. Over the past 10 years, the Bay Area has not experienced any exceedances of either the national or state CO standard.

Nitrogen Dioxide

NO_2 is a brownish, highly reactive gas that is present in all urban environments. The major human-made sources of NO_2 are combustion devices, such as boilers, gas turbines, and mobile and stationary reciprocating internal combustion engines. Combustion devices emit primarily nitric oxide (NO), which reacts through oxidation in the atmosphere to form NO_2. The combined emissions of NO and NO_2 are referred to as NO_X and are reported as equivalent NO_2. Because NO_2 is formed and depleted by reactions associated with photochemical smog (ozone), the NO_2 concentration in a particular geographical area may not be representative of the local sources of NO_X emissions.

Most of the Bay Area's NO_2 comes from on-road motor vehicles. Over the past 10 years, the Bay Area has had two exceedances of the national NO_2 standard.

Sulfur Dioxide

SO_2 is produced by such stationary sources as coal and oil combustion, steel mills, refineries, and pulp and paper mills as well as by the combustion of fuel containing sulfur. The major adverse health effects associated with SO_2 exposure pertain to the upper respiratory tract. SO_2 is a respiratory irritant with constriction of the bronchioles occurring with inhalation of SO_2 at 5 ppm or more (CDC 1978). On contact with the moist mucous membranes, SO_2 produces sulfurous acid, which is a direct irritant. Concentration rather than duration of the exposure is an important determinant of respiratory effects. Exposure to high SO_2 concentrations may result in edema of the lungs or glottis and respiratory paralysis.

Most of the Bay Area's SO_2 comes from petroleum refineries. Bay Area refineries are the largest source of sulfur oxide (SO_X) emissions, emitting approximately 5,000 tons per year and ranks 350 on the list of top SO_2 emitters in the nation (ARB 2011, ARB 2015a). Despite these major sources, the overall concentration of SO_2 in the region is low. Over the past 10 years, the Bay Area has not experienced any exceedances of either the national or state sulfur dioxide standard.

Particulate Matter

Particulate matter includes dirt, dust, soot, smoke and liquid droplets found in the air. Coarse particulate matter, or PM_{10}, refers to particles less than or equal to 10 microns in diameter (about one-seventh the diameter of a human hair). PM_{10} is primarily composed of large particles from sources such as road dust, residential wood burning, construction/demolition activities, and emissions from on- and off-road engines. Some sources of particulate matter, such as demolition and construction activities, are more local in nature, while others, such as vehicular traffic, have a more regional effect. Fine particulate matter, or $PM_{2.5}$, refers to particles less than or equal to 2.5 microns in diameter, and contains particles formed in the air from primary gaseous emissions. Examples include sulfates formed from SO_2 emissions from power plants and industrial facilities, nitrates formed from NO_X emissions from power plants, automobiles, and other combustion sources, and carbon formed from organic gas emissions from automobiles and industrial facilities.

The Bay Area experiences its highest particulate matter concentrations in the winter, especially during evening and night hours, because of the cool temperatures, low-wind speeds, low inversion layers, and high humidity. Specifically, $PM_{2.5}$ is viewed as a major component of the region's total particulate matter problem because $PM_{2.5}$ accounts for roughly half of PM_{10} annually. On winter days when the PM standards are exceeded, $PM_{2.5}$ from wood-burning at residential land uses are the most likely contributors daily PM emissions (BAAQMD 2012a:89, 135).

Coarse and fine particulate matters are small enough to get into the lungs and can cause numerous health problems, including respiratory conditions such as asthma and bronchitis, and heart and lung disease. People with heart or lung disease, the elderly, and children are at highest risk from exposure to particulate matter.

Lead

Lead is a metal found naturally in the environment as well as in manufactured products and is a potent neurotoxin that can cause increased chances of cancer and non-cancer health effects for adults and children. Lead is known to negatively affect child brain development and function. The major sources of lead emissions have historically been mobile and industrial sources, but can occur in dust created by demolition or deterioration of lead-based paint. Lead-based paint is present on buildings built before EPA's ban on the use of such paint in 1978. EPA also phased out leaded fuels as of December 1995 resulting in an 89 percent decline in lead emissions from mobile sources between 1980 and 2010 (EPA 2016; ARB 2001).

In the Bay Area, aircraft exhaust and manufacturing are the major sources of lead emissions (STI 2008, BAAQMD 2014a). Contact with lead-based paint in older communities and demolition activities are also active health concerns in region (EPA 2017). ARB established Risk Management guidelines in 2001 to identify new, modified, and existing sources of lead in the state to better understand the health risks, control emissions, and reduce exposure to lead (ARB 2001).

Toxic Air Contaminants

The California Health and Safety Code defines TACs as air pollutants that may cause or contribute to an increase in mortality or in serious illness, or that may pose a present or potential hazard to human health. TACs are less pervasive in the urban atmosphere than criteria air pollutants, but are linked to short-term (acute) or long-term (chronic and/or carcinogenic) adverse human health effects. For evaluation purposes, TACs are separated into carcinogens and non-carcinogens based on the nature of the physiological effects associated with exposure to TACs. Carcinogens are assumed to have no safe threshold below which health impacts would not occur. Cancer risk from carcinogens is expressed as excess cancer cases per one million exposed individuals, typically over a lifetime of exposure. Non-carcinogens differ in that there is a safe level in

which it is generally assumed that no negative health impacts would occur. These levels are determined on a pollutant-by-pollutant basis.

There are many different types of TACs with varying degrees of toxicity. TACs may also exist as particulate matter or as vapors or gases. Sources of TACs include industrial processes, commercial operations (e.g., gasoline stations and dry cleaners), and motor vehicle exhaust—particularly diesel-powered vehicles. Compared to other air toxics that ARB has identified and controlled, diesel particulate matter (diesel PM) emissions are estimated to be responsible for about 70 percent of the total ambient air toxics risk statewide (ARB 2000:5).

The three most potent carcinogens come primarily from motor vehicles—diesel PM overall, and 1,3-butadiene and benzene as specific components of diesel PM. Cleaner motor vehicles and fuels are reducing the risks from these three priority toxic air pollutants. The remaining toxic air pollutants, such as hexavalent chromium and perchloroethylene, while not appearing to contribute as much to the overall risks, can present high risks to people living close to a source because of the highly localized concentration of TACs. ARB has control measures for motor vehicles, consumer products, and industrial source programs either already in place, in development, or under evaluation for most TACs.

Health risks from diesel PM are highest in areas of concentrated emissions, such as near ports, rail yards, freeways, or warehouse distribution centers. According to the ARB, diesel engine emissions are responsible for the majority of California's known cancer risk from outdoor air pollutants. Those most vulnerable are children whose lungs are still developing and the elderly who may have other serious health problems. Based on numerous studies, ARB has also stated that diesel PM is a contributing factor for premature death from heart and/or lung diseases. In addition, diesel PM reduces visibility and is a strong absorber of solar radiation that contributes to global warming (ARB 2006, cited in MTC 2013).

According to the ARB, levels of toxic air pollutants have decreased significantly with the adoption of airborne toxic control measures, stringent vehicle standards, requirements for low emission vehicles, and cleaner fuels. Between 1980 and 2009, there was a statewide reduction of 98 percent in lead, and between 1990 and 2009, there was a statewide reduction of 85 percent in benzene, 80 percent in 1,3-butadiene, 75 percent in hexavalent chromium, and 50 percent in diesel PM. The estimated cancer risk from TACs, measured statewide, has been reduced by 60 percent since 1990 (ARB 2009, cited in MTC 2013).

To address community risk from air toxics, BAAQMD initiated the Community Air Risk Evaluation (CARE) program in 2004 to evaluate and reduce health risks associated with exposure to outdoor TACs. The program examines TAC emissions from point sources, area sources and on-road and off-road mobile sources co-located with sensitive populations to help focus mitigation strategies. The BAAQMD allocated over $60 million in fiscal year 2012 to fund diesel emission reduction projects in CARE communities (MTC 2013). Some of the projects funded included replacing or retrofitting on and off road heavy duty trucks; installation of shore side electric power at 11 berths at the Port of Oakland to reduce ship emissions; and replacing a locomotive operating at the rail yard in Richmond. However, elevated air pollutant concentrations remain in some locations, primarily those in close proximity to major air pollution sources, such as freeways and industrial facilities. These locations typically occur in areas where infill development is planned. Infill development such as high density, mixed-use, and transit-oriented development is essential in reducing air pollution and greenhouse gas emissions from on-road vehicles, and is vital for the region overall to help meet its climate protection goals and attain health-based ambient air quality standards. However, locating infill development near major sources of air pollution has been recognized as having the potential to increase local exposure to unhealthy levels of air pollutants. The BAAQMD seeks to promote healthy infill development through *Planning Healthy Places*, a guidance document that provides important air quality and public health information and tools. *Planning Healthy Places*, discussed in more detail below, provides recommended best practices for reducing exposure and emissions from local sources of air pollutants.

Based on annual emissions inventory of TACs prepared through the CARE program, in 2010, a BAAQMD-commission study forecasted TAC emissions from all sources in the Bay Area region (based on a 2005 baseline) to be 84 tons per day for 2015 and 79 tons per day for 2020. The largest single sources of daily

average TAC emissions for 2015 and 2020 were forecast to be on-road mobile sources and solvent evaporation, respectively. On-road mobile sources were forecast for 2015 to account for 26 percent of daily average TAC emissions while solvent evaporation was forecast to account for 26 percent of daily average TAC emissions in 2020. Diesel PM emissions were forecast to constitute approximately 80 percent of cancer toxicity-weighted emissions in 2015 and 74 percent of cancer toxicity-weighted emissions in 2020. The largest single sources of diesel PM in the Bay Area region include the Port of Oakland, refineries, and rail yards (STI 2010).

2.2.2 Regulatory Setting

Air quality is regulated at the federal, state, and regional levels. The following subsection summarizes the applicable air quality regulations and regulatory agencies.

FEDERAL REGULATIONS

Federal Clean Air Act

The federal Clean Air Act (CAA) of 1970, amended in 1977 and 1990 (42 USC 7506(c)), was enacted for the purposes of protecting and enhancing the nation's air resources to benefit public health. In 1971, the CAA required the EPA to set NAAQS to achieve the purposes of Section 109 of the act. The NAAQS require that certain pollutants should not exceed specified levels; areas that exceed the standard for specified pollutants are designated as "nonattainment" areas. In promulgating the NAAQs, the EPA allowed some states the option to develop stricter state standards. Pursuant to this, California adopted its own set of stricter standards under the California Clean Air Act (CCAA) of 1988 (described under State Regulations).

The federal CAA requires states to develop State Implementation Plans (SIPs) that outline how each state will control air pollution under the CAA. A SIP includes the regulations, programs and policies that a state will use to clean up polluted areas. States must hold public hearings and provide opportunities for the public and industries to be involved and comment on the development of each state plan.

1990 Amendments to Clean Air Act

The 1990 Amendments to the CAA included a provision to address air toxics. Under Title III of the CAA, EPA establishes and enforces National Emission Standards for Hazardous Air Pollutants (NESHAPs), which are nationally uniform standards oriented towards controlling particular hazardous air pollutants (HAPs). Section 112(b) of the CAA identifies 189 "Air Toxics" (hazardous air pollutants), directs EPA to identify sources of the 189 pollutants, and establishes a 10-year time period for EPA to issue technology-based emissions standards for each source category. Title III of the CAA provides for a second phase under which EPA is to assess residual risk after the implementation of the first phase of standards and impose new standards, when appropriate, to protect public health.

Federal Transportation Conformity Requirements

Transportation conformity is required under the CAA section 176(c) to ensure that federally supported highway and transportation project activities are consistent with ("conform to") the purpose and requirements of the SIP. Conformity currently applies to areas that are designated nonattainment, and those re-designated to attainment after 1990 ("maintenance areas") for the following transportation-related criteria pollutants: ozone, $PM_{2.5}$ and PM_{10}, CO, and NO_x. Conformity, for the purpose of the SIP, means that transportation activities will not cause new air quality violations, worsen existing violations, or delay timely attainment of the relevant NAAQS. Conformity is demonstrated by showing that the total air pollutant emissions projected for a RTP/SCS are within the emissions limits ("budgets") established by the SIP.

Conformity requires demonstration that transportation control measures (TCMs) in ozone nonattainment areas are implemented in a timely fashion. TCMs are expected to be given funding priority and to be implemented on schedule and, in the case of any delays, any obstacles to implementation have been or are

being overcome. A total of 33 TCMs have been fully implemented since the 1982 Bay Area Air Quality Plan; 12 TCMs were originally listed in the 1982 Bay Area Air Quality Plan, 16 additional TCMs were adopted by MTC in February 1990 in response to a 1990 lawsuit in the federal District Court to bring the region back on the "Reasonable Further Progress" track, and five TCMs were adopted as part of the 2001 1-Hour Ozone Attainment Plan. These TCMs include strategies such as improved transit service and transit coordination, ridesharing services and new carpool lanes, signal timing, freeway incident management, and increased gas taxes and bridge tolls to encourage use of alternatives modes.

MTC must make a determination that the proposed Plan conforms to the SIP and is consistent with the applicable air quality attainment plans. The transportation conformity analysis and findings prepared by MTC for the proposed Plan are addressed in a process separate from the proposed Plan environmental review process, and are included as a Supplemental Report to Plan Bay Area that is available for review at www.planbayarea.org.

STATE REGULATIONS

Mulford-Carrel Act

In 1967, the Legislature passed the Mulford-Carrel Act that established ARB from two Department of Health bureaus operating at that time – the Bureau of Air Sanitation and the Motor Vehicle Pollution Control Board. ARB was formed to work with the public and private sectors to promote and protect public health, welfare, and ecological resources to reduce air pollutants while recognizing and considering the State's economy (ARB 2014a).

California Clean Air Act

The CCAA of 1988 requires nonattainment areas to achieve and maintain the state ambient air quality standards by the earliest practicable date and local air districts to develop plans for attaining the state ozone, carbon monoxide, sulfur dioxide, and nitrogen dioxide standards. The ARB sets the state ambient air quality standards.

Under the CCAA, areas not in compliance with the standard must prepare plans to reduce ozone. Non-compliance with the state ozone standard does not impact the ability to proceed with any transportation plan, program, or project. The first Bay Area Clean Air Plan was adopted in 1991, and updates to the Clean Air Plan have occurred since then, with the most recent adopted version being the *2010 Clean Air Plan*. The *2010 Clean Air Plan* provides "all feasible measures" to reduce ozone in the Bay Area. BAAQMD released the *Draft 2017 Clean Air Plan* for public review in January 2017 and anticipates adoption of the new plan within 2017 (BAAQMD 2010a, 2017b).

Senate Bill 656 (Chapter 738, Statues of 2003)

In 2003, the Legislature enacted Senate Bill (SB) 656 (Chapter 738, Statutes of 2003), codified as Health and Safety Code Section 39614, to reduce public exposure to PM_{10} and $PM_{2.5}$. SB 656 required ARB, in consultation with local air pollution control and air quality management districts (air districts), to develop and adopt, by January 1, 2005, a list of the most readily available, feasible, and cost-effective control measures that could be employed by ARB and the air districts to reduce PM_{10} and $PM_{2.5}$ (collectively referred to as PM). The legislation established a process for achieving near-term reductions in PM throughout California ahead of federally required deadlines for $PM_{2.5}$, and provided new direction on PM reductions in those areas not subject to federal requirements for PM. Measures adopted as part of SB 656 complement and support those required for federal $PM_{2.5}$ attainment plans, as well as for State ozone plans. This ensures continuing focus on PM reduction and progress towards attaining California's more health protective standards. This list of air district control measures was adopted by the ARB on November 18, 2004. ARB also developed a list of State PM control measures for mobile and stationary sources, including measures planned for adoption as part of ARB's Diesel Risk Reduction Plan. The lists are at the following web site: http://www.arb.ca.gov/pm/pmmeasures/pmmeasures.htm.

To comply with SB 656, BAAQMD reviewed the list of 103 potential PM control measures prepared by ARB and developed a Particulate Matter Implementation Schedule (BAAQMD 2005). As a result, the BAAQMD adopted or amended existing rules to reduce particulate matter from internal combustion engines, chain driven commercial broiling, and residential wood burning and expanded its public awareness program.

Toxic Air Contaminant Identification and Control Act of 1983

Under the Toxic Air Contaminant Identification and Control Act of 1983 (Assembly Bill (AB) 1807, Chapter 1047, Statues of 1983), the California Legislature created a two-step identification and risk management program to reduce the risk of health effects from air toxic substances. During the first step (identification), the ARB and the Office of Environmental Health Hazard Assessment (OEHHA) determines if a substance should be formally identified as a toxic air contaminant (TAC) in California. During the second step (risk management), the ARB reviews the emission sources of an identified TAC to determine if any regulatory action is necessary to reduce the risk. The analysis includes a review of controls already in place, the available technologies and associated costs for reducing emissions, and the associated risk. Conducting public outreach is essential during the development of a control plan and any control measure to ensure that the ARB efforts are cost-effective and appropriately balance public health protection and economic growth.

In 1993, AB 1807 was amended to include the identification and control of additional TACs. Specifically, AB 2728 required the ARB to identify the 189 federal hazardous air pollutants as TACs. For substances that were not previously identified under AB 1807, but were subsequently identified under AB 2728, health effects values have been developed (ARB 2014b).

Assembly Bill 2588 Air Toxics "Hot Spots" Information and Assessment Act of 1987

In September 1987, the California Legislature established the Air Toxics "Hot Spots" Information and Assessment Act of 1987, Assembly Bill (AB) 2588 (Health and Safety Code Sections 44300-44394). It requires facilities to report their air toxics emissions, ascertain health risks, and to notify nearby residents of significant risks. In September 1992, the "Hot Spots" Act was amended by Senate Bill 1731 that requires facilities that pose a significant health risk to the community to reduce their risk through a risk management plan.

Diesel Risk Reduction Plan

In August 1998, the ARB identified particulate emissions from diesel-fueled engines (diesel PM) as toxic air contaminants, based on data linking diesel PM emissions to increased risks of lung cancer and respiratory disease. Following the identification process, the ARB was required to determine if there was a need for further control, which led to creation of the Diesel Advisory Committee to assist in the development of a risk management guidance document and risk reduction plan. In September 2000, the ARB adopted the Diesel Risk Reduction Plan, which recommends control measures to reduce the risks associated with diesel PM and achieve a goal of 75 percent diesel PM reduction by 2010 and 85 percent by 2020.

Specific statewide regulations designed to further reduce diesel PM emissions from diesel-fueled engines and vehicles will be evaluated and developed. The goal of these regulations is to make diesel engines as clean as possible by establishing state-of-the-art technology requirements or emission standards to reduce diesel PM emissions.

California Health and Safety Code

Under the California Health and Safety Code, Division 26 (Air Resources), the ARB is authorized to adopt regulations to protect public health and the environment through the reduction of TACs and other air pollutants with adverse health effects. ARB has promulgated several mobile and stationary source airborne toxic control measures (ATCMs) pursuant to this authority. For instance, effective as of July 2003, ARB approved an ATCM that limits school bus idling and idling at or near schools to only when necessary for safety or operational concerns (13 CCR Chapter 10 Section 2480). This ATCM is intended to reduce diesel PM and other TACs and air pollutants from heavy-duty motor vehicle exhaust. It applies to school buses, transit buses, school activity buses, youth buses, general public paratransit vehicles, and other commercial motor vehicles. This ATCM focuses on reducing public exposure to diesel PM and other TACs, particularly for children riding in and playing

near school buses and other commercial motor vehicles, who are disproportionately exposed to pollutants from these sources. In addition, effective February 2005, the ARB approved an ATCM to limit the idling of diesel-fueled commercial motor vehicles with gross vehicular weight ratings of greater than 10,000 pounds, regardless of the state or country in which the vehicle is registered (13 CCR Chapter 10 Section 2485).

REGIONAL AND LOCAL REGULATIONS

Regional Air Districts

The nine-county MTC region encompasses three air basins: the San Francisco Bay Air Basin (SFBAB) in its entirety, portions of the North Coast Air Basin, and portions of the Sacramento Valley Air Basin. Northern Sonoma County is located within the North Coast Air Basin, and eastern Solano County is located within the Sacramento Valley Air Basin (the remaining areas not located within those air basins are located within the San Francisco Bay Air Basin). BAAQMD governs the San Francisco Bay Area Air Basin, the Northern Sonoma County Air Pollution Control District (NSCAPCD) governs the North Coast Air Basin, and the Yolo-Solano Air Quality Management District (YSAQMD) governs the Sacramento Valley Air Basin. The geographic boundaries of these three air basins and air districts are shown in **Figure 2.2-1**. Each air pollution control district is responsible for attaining and maintaining air quality standards and undertakes a variety of activities, including: adopting and enforcing rules and regulations, issuing permits for stationary sources of air pollution, inspecting stationary sources of air pollution, responding to citizen inquiries and complaints, monitoring ambient air quality and meteorological conditions, administering incentives-based programs to reduce motor vehicle emissions, and conducting public education campaigns. In California, air pollution control districts generally follow county boundaries; in the more urban areas, county agencies were merged by State legislation into unified air quality management districts.

Bay Area Air Quality Management District

BAAQMD attains and maintains air quality conditions in the SFBAB through a comprehensive program of planning, regulation, enforcement, technical innovation, and promotion of the understanding of air quality issues. The clean air strategy of BAAQMD includes the preparation of plans and programs for the attainment of ambient-air quality standards, adoption and enforcement of rules and regulations, and issuance of permits for stationary sources. BAAQMD also inspects stationary sources, responds to citizen complaints, monitors ambient air quality and meteorological conditions, and implements other programs and regulations required by the CAA and CCAA.

As mentioned above, BAAQMD adopts rules and regulations. All projects are subject to BAAQMD's rules and regulations in effect at the time of construction. Specific rules applicable to project construction and operation may include, but are not limited to:

- **Regulation 2, Rule 1, General Permit Requirements.** Includes criteria for issuance or denial of permits, exemptions, appeals against decisions of the Air Pollution Control Officer and BAAQMD actions on applications.

- **Regulation 2, Rule 2, New Source Review.** Applies to new or modified sources and contains requirements for Best Available Control Technology and emission offsets. Rule 2 implements federal New Source Review and Prevention of Significant Deterioration requirements.

- **Regulation 6, Rule 1, General Requirements.** Limits the quantity of particulate matter in the atmosphere by controlling emission rates, concentration, visible emissions and opacity.

Figure 2.2-1
Air Basin Boundaries

Map Data Sources: Air Resources Board, California Environmental Protection Agency, 2004; Metropolitan Transportation Commission (MTC), 2016; Tom Tom North America, 2015.

- **Regulation 7, Odorous Substances.** Regulation 7 places general limitations on odorous substances and specific emission limitations on certain odorous compounds. A person (or facility) must meet all limitations of this regulation, but meeting such limitations shall not exempt such person from any other requirements of BAAQMD, state, or national law. The limitations of this regulation shall not be applicable until BAAQMD receives odor complaints from 10 or more complainants within a 90-day period, alleging that a person has caused odors perceived at or beyond the property line of such person and deemed to be objectionable by the complainants in the normal course of their work, travel, or residence. When the limits of this regulation become effective, as a result of citizen complaints described above, the limits shall remain effective until such time as no citizen complaints have been received by BAAQMD for one year. The limits of this Regulation shall become applicable again if BAAQMD receives odor complaints from five or more complainants within a 90-day period. BAAQMD staff investigate and track all odor complaints it receives and make attempts to visit the site and identify the source of the objectionable odor and assist the owner or facility in finding a way to reduce the odor.

- **Regulation 8, Rule 3, Architectural Coatings.** Limits the quantity of volatile organic compounds in architectural coatings supplied, sold, offered for sale, applied, solicited for application, or manufactured for use within BAAQMD.

Northern Sonoma County Air Pollution Control District

NSCAPCD attains and maintains air quality conditions in northern Sonoma County through a comprehensive program of planning, regulation, enforcement, technical innovation, and promotion of the understanding of air quality issues. The clean air strategy of NSCAPCD includes the preparation of plans and programs for the attainment of ambient-air quality standards, adoption and enforcement of rules and regulations, and issuance of permits for stationary sources. NSCAPCD also inspects stationary sources, responds to citizen complaints, monitors ambient air quality and meteorological conditions, and implements other programs and regulations required by the CAA and CCAA.

As mentioned above, NSCAPCD adopts rules and regulations. All projects are subject to NSCAPCD's rules and regulations in effect at the time of construction. Specific rules applicable to project construction and operation may include, but are not limited to:

- **Rule 200, Permit Requirements.** This rules establishes permitting processes (i.e., Authority to Construct, Modify, Replace, Operate or Use) to review new and modified sources of air pollution.

- **Rule 220, New Source Review Standards.** This rule would require any new or modified stationary source that generates emissions that exceed established emissions limits for each pollutant (i.e., ROG, NO_X, SO_X, PM_{10}, CO, and lead) to comply with best available control technology (BACT).

- **Rule 400, General Limitations.** This rule prohibits any source from generating air contaminants or other materials that would cause injury, detriment, nuisance or annoyance to any considerable number of persons or to the public or which endanger the comfort, repose, health or safety of any such persons or the public or which cause or have a natural tendency to cause injury or damage to business or property.

Yolo-Solano Air Quality Management District

YSAQMD attains and maintains air quality conditions in Yolo and Solano Counties through a comprehensive program of planning, regulation, enforcement, technical innovation, and promotion of the understanding of air quality issues. The clean air strategy of YSAQMD includes the preparation of plans and programs for the attainment of ambient-air quality standards, adoption and enforcement of rules and regulations, and issuance of permits for stationary sources. YSAQMD also inspects stationary sources, responds to citizen complaints, monitors ambient air quality and meteorological conditions, and implements other programs and regulations required by the CAA and CCAA.

As mentioned above, YSAQMD adopts rules and regulations. All projects are subject to YSAQMD's rules and regulations in effect at the time of construction. Specific rules applicable to project construction and operation may include, but are not limited to:

- **Rule 2.11, Particulate Matter Concentration.** This rule prohibits any source that would emit dust, fumes, or total suspended particulate matter from generated emissions that would exceed the rule's established emission concentration limit.

- **Rule 2.14, Architectural Coatings.** This rule establishes volatile organic compound (VOC) content limits for all architectural coatings supplied, sold, offered for sale, applied, solicited for application, or manufactured within YSAQMD's jurisdiction.

- **Rule 2.40, Wood Burning Appliances.** This rule prohibits installation of open hearth wood burning fireplaces in any new development (residential or commercial, single or multi-family units. New developments may only use either a pellet-fueled heater, a U.S. EPA Phase II certified wood burning heater or a gas fireplace.

- **Rule 2.37, Natural Gas-Fired Water Heaters and Small Boilers.** This rule establishes NO_X emission limits for natural gas-fired water heaters with a rated heat input capacity less than 1,000,000 British Thermal Units per hour (Btu/hr) manufactured, offered for sale, sold, or installed within YSAQMD's jurisdiction.

- **Rule 3.1, General Permit Requirements.** This rules establishes permitting processes (i.e., Authority to Construct and Permit to Operate) to review new and modified sources of air pollution.

- **Rule 3.4, New Source Review.** This rule would require any new or modified stationary source that generates emissions that exceed established emissions limits for each pollutant (i.e., ROG, NO_X, SO_X, PM_{10}, CO, and lead) to comply with BACT and emissions offset requirements.

- **Rule 3.13, Toxics New Source Review.** This rule requires the installation of best available control technology for toxics at any constructed or reconstructed major source of TACs.

Air Quality Management Plans

Clean Air Plan (Bay Area Air Quality Management District)

The CCAA requires that all local air districts in the state endeavor to achieve and maintain the CAAQS by the earliest practical date. The act specifies that local air districts should focus particular attention on reducing the emissions from transportation and area-wide emission sources, and provides districts with the authority to regulate indirect sources.

For state air quality planning purposes, the Bay Area is classified as a serious non-attainment area for the one-hour ozone standard. The "serious" classification triggers various plan submittal requirements and transportation performance standards. One such requirement is that the Bay Area update the Clean Air Plan every three years to reflect progress in meeting the air quality standards and to incorporate new information regarding the feasibility of control measures and new emission inventory data. The Bay Area's record of progress in implementing previous measures must also be reviewed. Bay Area plans are prepared with the cooperation of the Metropolitan Transportation Commission and the Association of Bay Area Governments. On September 15, 2010, BAAQMD adopted the most recent revision to the Clean Air Plan - the Bay Area 2010 Clean Air Plan (BAAQMD 2010a). The Clean Air Plan serves to:

- update the *Bay Area 2005 Ozone Strategy* in accordance with the requirements of the CCAA to implement "all feasible measures" to reduce ozone;

- consider the impacts of ozone control measures on particulate matter, air toxics, and greenhouse gases in a single, integrated plan;

- review progress in improving air quality in recent years; and

- establish emission control measures to be adopted or implemented in the 2010–2012 timeframe.

An update to the *2010 Clean Air Plan* is currently underway. BAAQMD released the *Draft 2017 Clean Air Plan* in January 2017 (BAAQMD 2017b). Adoption of the 2017 Clean Air Plan is anticipated in 2017, but has not occurred at the time of this analysis. Before adoption of the *Draft 2017 Clean Air Plan,* the *2010 Clean Air Plan* remains the applicable air quality plan for the purposes of this analysis.

Northern Sonoma County Air Pollution Control District

NSCAPCD is in attainment for all criteria air pollutants and does not currently have nor is required to have an air quality management plan.

Yolo-Solano Air Quality Management District

Criteria Air Pollutants

The CCAA requires districts to submit air quality plans for areas that do not meet state standards for ozone, carbon monoxide, sulfur dioxide, nitrogen dioxide and particulate matter. The YSAQMD has attained all standards with the exception of ozone and PM. The District adopted its Air Quality Attainment Plan in February 1992 to identify emissions control measures that would aid the district in attaining the state standards for ozone. YSAQMD relies on Sacramento regional planning efforts to show attainment for the 24-hour $PM_{2.5}$ standard (YSAMQMD 2017).

Toxic Air Contaminants

At the local level, air pollution control or management districts may adopt and enforce ARB's control measures. Under YSAQMD Rule R3-1 ("General Permit Requirements"), Rule R3-4 ("New Source Review"), and Rule R3-8 ("Federal Operating Permits"), all sources that possess the potential to emit TACs are required to obtain permits from the district. Permits may be granted to these operations if they are constructed and operated in accordance with applicable regulations, including new-source review standards (see Rule R3-4 above) and air-toxics control measures. YSAQMD limits emissions and public exposure to TACs through a number of programs. YSAQMD prioritizes the permitting of TAC-emitting stationary sources based on the quantity and toxicity of the TAC emissions and the proximity of the facilities to sensitive receptors.

Sources that require a permit are analyzed by YSAQMD (e.g., health risk assessment) based on their potential to emit toxics. If it is determined that the project will emit toxics in excess of YSAQMD's threshold of significance for TACs (identified below), sources have to implement BACT for TACs to reduce emissions. If a source cannot reduce the risk below the threshold of significance even after BACT has been implemented, YSAQMD will deny the permit required by the source. This helps to prevent new problems and reduces emissions from existing older sources by requiring them to apply new technology when retrofitting with respect to TACs. Although YSAQMD regulates sources that generate TACs, the District does not regulate land uses that may be sited in locations exposed to TACs. The decision on whether to approve projects in TAC-exposed locations is typically the responsibility of the lead agency charged with determining whether to approve a project.

City and County General Plans

The most comprehensive land use planning for the San Francisco Bay Area region is provided by city and county general plans, which local governments are required by State law (California Government Code Section 65300 et seq.) to prepare as a guide for future development. The general plan contains goals and policies concerning topics that are mandated by State law or which the jurisdiction has chosen to include. Required topics are: land use, circulation, housing, conservation, open space, noise, and safety. Other topics that local governments frequently choose to address include: public facilities, parks and recreation, community design, natural resources, healthy communities, energy and sustainability, air quality, and growth management. With the exception of the San Joaquin Valley area, air quality is an optional general plan topic. Jurisdictions may choose to consider air quality as a standalone topic, as part of another mandatory or optional element, or not at all. Local planning policies related to air quality often address: exposure to air pollutants; public health; density; compact development; alternative transportation modes; energy conservation; cleaner-fuel vehicles; emissions reduction; and public education, among other topics.

2.2.3 Impact Analysis

SIGNIFICANCE CRITERIA

The following significance criteria are based on CEQA Guidelines Appendix G, as well as the thresholds used in the EIR for the 2013 Plan Bay Area, guidance from BAAQMD, and professional judgment. Under these criteria, implementation of the proposed Plan would have a potentially significant adverse impact if it would:

Criterion 1: Conflict with or obstruct implementation of an applicable air quality plan, including: the primary goals; applicable control measures; or implementation of any control measures.

Criterion 2: Cause a substantial net increase in construction-related emissions.

Criterion 3: Cause a net increase of emissions of criteria pollutants from on-road mobile and land use sources compared to existing conditions, including emissions of ROG, NO_X, CO, PM_{10}, and $PM_{2.5}$; as the SFBAAB is in non-attainment for ozone, PM_{10}, and $PM_{2.5}$ standards.

Criterion 4: Cause a cumulative net increase in emissions of toxic air contaminants (TACs), particularly diesel PM, 1,3-butadiene, and benzene, from on-road mobile sources compared to existing conditions.

Criterion 5: Result in a net increase in sensitive receptors located in Transit Priority Areas (TPA) where: (a) TACs or fine particulate matter ($PM_{2.5}$) concentrations result in cancer risk levels greater than 100 in a million or a concentration of $PM_{2.5}$ greater than 0.8 µg/m³; or (b) TACs or $PM_{2.5}$ concentrations result in noncompliance with an adopted Community Risk Reduction Plan.

Criterion 6: Result in changes in TAC and or $PM_{2.5}$ exposure levels that disproportionally impact minority and low-income communities.

Criterion 7: Result in emissions of objectionable odor affecting a substantial number of people.

Note that the Northern Sonoma County Air Pollution Control District and YSAQMS do not currently have officially recommended significance thresholds for regional plans. BAAQMD adopted thresholds of significance in 2010, but these thresholds were subject to a series of lawsuits, including whether the thresholds were a project themselves (requiring CEQA evaluation) and whether the thresholds could be used to determine if existing environmental hazards could result in significant impacts to projects exposed to these hazards. None of the lawsuits addressed the merits of the thresholds themselves. As stated on its website, www.baaqmd.gov, the District "is no longer recommending that the Thresholds be used as a generally applicable measure of a project's significant air quality impacts…lead agencies may rely on the Air District's updated CEQA Guidelines (updated May 2012) for assistance in calculation air pollution emissions, obtaining information regarding the health impacts of air pollutants, and identifying potential mitigation measures…" (BAAQMD 2014b). Although these thresholds remain unadopted, they provide the most current evidence upon which to base significance conclusions related to air quality and are used herein as the basis for determining significant impacts, except where otherwise cited. The thresholds recommend a no net increase in criteria air pollutants and precursors and TAC emissions as a significance threshold for the evaluation of regional transportation and air quality plans (BAAQMD 2010b:Table 2-5).

METHOD OF ANALYSIS

Construction-Related Emissions

Construction emissions can vary depending on the level of activity, the specific operations taking place, the equipment being operated, local soil conditions, weather conditions, and other factors. A qualitative analysis of potential local and regional air quality impacts from construction activity associated with proposed Plan investments was conducted. At the program level of analysis, it is not possible to quantify the amount of

emissions expected from implementation of the transportation projects or land use development that would be consistent with the proposed Plan. However, the overall impact on local and regional air quality from any one project or all projects combined would be primarily dependent on the quantity, age, and fuel type of the equipment and the duration of their operation at the construction site or in the region. This analysis identifies the measures, or best management practices (BMPs), that must be implemented for an individual construction project to have less than significant impacts. Thus, should implementing agencies adopt feasible mitigation measures for each construction project resulting from the proposed Plan, impacts associated with construction activity on local and regional air quality would be less than significant.

Operational Emissions

This analysis addresses the effect of land use growth and transportation projects under the proposed Plan on air quality. The changes in land use inventory under 2015 and 2040 conditions projected under the proposed Plan are summarized in Table 2.2-5, below.

Table 2.2-5 Bay Area Land Use Forecasts

County	Single Family Units	Multi Family Residential units (Low/Mid Rise)	Multi Family Residential Units (High Rise)	Office	Retail	Industrial
	Households			Thousand Square Feet		
2015 - Existing						
Alameda	473,800	92,600	40,800	124,200	67,500	207,300
Contra Costa	350,900	39,600	15,300	70,700	47,800	58,400
Marin	93,800	15,600	3,100	27,900	15,000	12,900
Napa	48,900	5,400	1,400	2,600	11,200	22,700
San Francisco	144,300	140,600	110,900	123,500	18,800	34,500
San Mateo	228,500	44,800	7,100	67,900	32,600	65,500
Santa Clara	464,900	117,500	94,500	151,100	114,900	253,900
Solano	138,200	13,600	3,600	14,600	25,100	33,600
Sonoma	195,000	11,900	2,400	47,100	22,800	41,000
Regional Total	**2,138,400**	**481,600**	**240,800**	**629,600**	**355,600**	**729,800**
2040 – Proposed Plan						
Alameda	503,000	175,500	73,300	142,100	62,000	206,500
Contra Costa	392,000	78,600	20,700	79,000	52,600	57,500
Marin	95,900	16,500	3,100	27,700	14,900	12,900
Napa	52,200	5,500	1,400	5,100	11,000	22,600
San Francisco	151,600	177,800	165,800	128,800	26,100	31,000
San Mateo	240,100	68,300	15,900	96,600	31,200	63,700
Santa Clara	485,800	258,500	136,400	205,400	104,300	247,400
Solano	155,700	17,100	3,600	14,900	24,500	33,600
Sonoma	207,400	25,600	2,400	48,000	21,800	38,800
Regional Total	**2,283,800**	**823,400**	**411,700**	**747,600**	**348,300**	**714,100**

Table 2.2-5 Bay Area Land Use Forecasts

County	Single Family Units	Multi Family Residential units (Low/Mid Rise)	Multi Family Residential Units (High Rise)	Office	Retail	Industrial
	Households			Thousand Square Feet		
	Net Change					
Alameda	29,200	82,900	32,600	17,900	-5,500	-800
Contra Costa	41,100	39,000	5,400	8,300	-80	-800
Marin	2,000	900	0	-100	-100	-40
Napa	3,300	100	0	2,400	-100	-10
San Francisco	7,300	37,200	54,900	5,300	7,200	-3,500
San Mateo	11,600	23,500	8,800	28,800	-1,400	-1,700
Santa Clara	20,900	140,900	41,900	54,200	-10,600	-6,500
Solano	17,500	3,500	0	310	-600	-70
Sonoma	12,400	13,700	0	10	-900	-2,300
Regional Total	**145,300**	**341,700**	**143,400**	**118,000**	**-12,300**	**-15,700**

Source: Metropolitan Transportation Commission 2017

Under the proposed Plan, MTC forecasts that TPAs would absorb a majority of the approximately 666,000 new households and 688,000 new jobs expected in the Plan area by 2040. The majority of the housing growth and job growth is expected to occur around the Plan area's transit network (e.g., BART, Caltrain.) in San Francisco, Alameda, San Mateo, and Santa Clara counties. With more limited transit access, the North Bay counties of Marin, Napa, Sonoma, and Solano are expected to take on a much smaller share of regional growth.

The changes in land use travel activity under 2015 and 2040 conditions projected under the proposed Plan are summarized in **Table 2.2-6**, below.

Table 2.2-6 Bay Area Travel Activity Data

	2015	2040	Change 2015 to 2040 Project	
		Project	Numerical	Percent
Vehicles in Use	4,651,300	6,230,200	1,578,900	34%
Daily VMT	161,151,800	195,595,000	34,443,300	21%
Engine Starts	29,080,900	38,509,800	9,429,000	32%
Total Population	**7,570,500**	**9,560,800**	**2,056,200**	**27%**
Total Employment	**4,010,100**	**4,698,400**	**688,200**	**17%**

Notes: VMT = vehicle miles traveled

Source: Metropolitan Transportation Commission 2017

Area-Source Emissions

Area-source emissions were calculated using region-specific inputs and default model assumptions in the California Emissions Estimator Model (CalEEMod) Version 2016.3.1 (CAPCOA 2016a). Area-source emissions consist of ROG, NO_X, PM_{10}, and $PM_{2.5}$ generated by a variety of sources, including natural gas combustion for space and water heating; consumer products, such as cleaning solutions and hair products; and landscaping equipment. With respect to wood-burning activities, as of November 2016, BAAQMD prohibits any wood-burning devices, such as wood-burning fireplaces or stoves, from being installed in new construction under

BAAQMD Regulation 6, Rule 3, Section 6-3-306. Thus, it was assumed that any new construction would not operate wood-burning stoves and any new fireplaces would combust natural gas instead of wood. The percent of new residential units that have fireplaces was based on default CalEEMod assumptions for single and multi-family units for each county. Natural gas emissions from fireplaces are included in the analysis of area-source emissions. Other emissions sources were also calculated using default assumptions within CalEEMod, including natural gas for heating and cooking; consumer products, such as cleaning solutions and hair products; landscaping equipment; and the application of architectural coating as a part of ongoing maintenance of buildings. Emissions from roadway maintenance, such as re-striping and resealing, were not included as they would only occur intermittently every 10 to 15 years.

For this analysis, the changes in land uses between existing conditions (2015, the latest year for which a full dataset is available) and Plan buildout in 2040 were modeled to estimate area-source emissions. This analysis modeled the energy intensity rates (e.g., therms per 1,000 square feet of interior space) for new land uses built between 2015 and 2040 were assumed to meet 2016 Title 24 standards. Although new construction built between 2015 and 2017 would be subject to 2013 Title 24 standards, it was assumed that future standards would exceed 2016 Title 24 standards and the application of 2016 standards to all new construction is a conservative approach. This would result in an overestimation of area-source emissions. The State is considering adoption of Zero Net Energy (ZNE) building energy efficiency standards, but those standards are not yet adopted (CEC 2013). By default, version 2016.3.1 of CalEEMod applies the 2013 Title 24 standards to new construction. CalEEMod energy rate defaults were adjusted in CalEEMod to match 2016 Title 24 standards based on the percentage improvements over the previous standards estimated by the California Energy Commission (CEC). Based on CEC estimates, this analysis assumes that residential and nonresidential buildings compliant with 2016 Title 24 standards would consume 28 percent and 5 percent less energy (electricity and natural gas), respectively, from lighting, heating, cooling, ventilation, and water heating than residential and nonresidential buildings compliant with 2013 Title 24 standards (CEC 2015a, CEC 2015b).

Energy intensity rates for land uses developed between 2015 and 2040 were assumed to have CalEEMod's "historical" energy intensity rates. These represent energy usage rates reflecting 2005 Title 24 standards (CAPCOA 2016b:31). This means that any land uses that once operated in 2015 and are anticipated to no longer operate in 2040 are assumed to have consumed energy at "historical" energy intensity rates. This analysis anticipates that the removed land uses would be replaced by denser residential and office land use development that is forecasted to occur, as shown in **Table 2.2-6**.

Motor Vehicle Emissions

Motor vehicle, or mobile source, emissions were calculated using MTC's travel demand forecasting model, *Travel Model One,* and mobile source emission factors developed by ARB. *Travel Model One* produces forecasts of travel behavior and vehicle activity. *Travel Model One* has been extensively reviewed by federal and State agencies and refined in connection with the application to air quality analyses of various kinds. Key model outputs for use in air quality analyses include total daily vehicle trips, vehicle miles of travel (VMT), and distribution of VMT by speed. This information was then used to determine total emissions from transportation activity in the Bay Area using motor vehicle emission factors from ARB's Emission Factor (EMFAC) model.

Vehicle activity projections are correlated to changes in demographic, housing, and socioeconomic factors. As shown in **Table 2.2-6,** between 2015 and 2040, the Bay Area is projected to add about 1.9 million people (a 26 percent increase) and 688,000 jobs (a 17 percent increase). Based on expected future growth, the total vehicles miles traveled would increase by 21 percent, which means that VMT is projected to grow at a slightly slower rate than population, but at a faster rate than jobs in the region. This can be attributed to the anticipated job growth in current major employment centers such as San Francisco and Silicon Valley, consistent with current trends. Recent trends have also shown rapid job growth concurrent with slow housing growth (MTC 2017). MTC anticipates that, outside of major employment centers, residential development would occur at a faster rate than employment, resulting in a faster increase in regional VMT than employment. This is mostly because of more people commuting to major employment centers outside where they live, rather than to jobs within their city of residence.

EMFAC2014 is ARB's latest emissions inventory model used to calculate emissions for motor vehicles operating on roads in California. Estimates of on-road vehicle emissions include consideration of the fleet mix (vehicle type, model year, and accumulated mileage); miles traveled; ambient temperatures; vehicle speeds; and vehicle emission factors, as developed from Smog Check data, Department of Motor Vehicle registration data, Caltrans vehicle counts, and ARB testing programs. The model also incorporates the effects of recent diesel regulations including ARB's truck and bus rules; greenhouse gas (GHG) policies and programs including the Advanced Clean Cars program; and the newest national fuel standards for model year 2017 through 2025 light-duty motor vehicles. EMFAC2014 no longer accounts for the Low Carbon Fuels Standard (LCFS) because the additional emissions reductions under LCFS would only affect the emissions from the production of fuels rather than emissions from the vehicle exhaust at the tailpipe. For all pollutants, EMFAC only accounts for emissions related to the direct operation of on-road vehicles, including exhaust and tire and break wear. Thus, ARB determined that LCFS would not substantially reduce tailpipe emissions and thereby removed the regulation from EMFAC2014 estimates (ARB 2014c).

EMFAC2014 generates emission factors for all types of on-road vehicles under different meteorological and driving conditions. ARB developed these factors based on thousands of emissions tests on both new and used vehicles recruited randomly from the California fleet. In the EMFAC2014 model, the emission rates were combined with vehicle activity data provided by regional transportation agencies (such as MTC) to calculate the regional emissions inventories.

Emission estimates for ROG, NO_X, CO and particulate matter (associated with engine exhaust and tire wear) are direct outputs from EMFAC2014. To obtain estimates of the amount of particulate matter generated by autos from roads (called "entrained dust"), regional VMT was multiplied by the following (annual) factors: (1) 0.123 grams/mile entrained dust for $PM_{10,}$ and (2) 0.019 grams/mile entrained dust for $PM_{2.5}$ (ARB 2016). Note that before estimating emissions in EMFAC, MTC adjusts the regional VMT forecasts from *Travel Model One* to match the VMT estimates produced by ARB using a protocol prescribed by ARB.

Toxic Air Contaminants

TACs were evaluated on both a regional and local level. The regional analysis studies the impacts of the cumulative TAC emissions in the entire Plan area; the local analysis studies the impacts of TAC emissions on corridors within TPAs and disproportionally impacted communities to provide a better understanding of localized health impacts. The methodologies for regional and localized TACs analyses are described separately below along with a description of the specific methods used for each emissions source.

Regional TAC Levels

To calculate TACs from all on-road motor vehicles, MTC uses the CT-EMFAC2014 model, a complementary model to EMFAC2014, which estimates diesel PM, benzene and 1,3-butadiene emissions in units of kilograms per day. The EMFAC2014 and CT-EMFAC2014 emissions factors reflect travel speeds and vehicle types specific to each roadway link.

Local TAC Concentrations and Associated Levels of Health Risk Exposure

The purpose of the local pollutant impact analysis is to assess potential localized health impacts to new sensitive receptors that could be located within TPAs based on the transportation projects and the forecasted land use changes in the proposed Plan. SB 375 and the proposed Plan promotes residential and commercial/retail development along existing transit corridors (TPAs) to reduce vehicle trips, vehicle miles traveled, and mobile source air pollution. While this strategy is beneficial to air quality in general by reducing the mass of air pollution emitted regionally, sensitive receptors developed in close proximity to sources of TACs and $PM_{2.5}$ can be exposed to serious adverse health effects. Urbanized areas typically contain a wide range of TAC and $PM_{2.5}$ sources that can create localized health risks to residents and other sensitive receptors from prolonged exposure to elevated concentrations. Such sources include stationary and area-sources (e.g., gas stations, manufacturing facilities) and mobile sources (e.g., cars, trucks, trains).

An analysis of TAC concentrations from stationary and mobile sources was conducted within TPAs. As shown in Figure 1.2-3 in Section 1.2, "Project Description," many TPAs overlap with the land use growth footprint. The

local pollutant impact analysis focuses on impacts within TPAs, rather than at the regional level. This approach more closely aligns with CEQA opportunities under SB 375, the data and modeling prepared by BAAQMD, and future project-level impact analyses for potential development projects in the TPAs. Implementing agencies can utilize the analysis to support CEQA streamlining, as appropriate.

BAAQMD conducted dispersion modeling to estimate the health impact from mobile and stationary-sources throughout the Bay Area. Emissions from stationary-sources were compiled from existing permits issued by the BAAQMD, and mobile emissions were estimated based on recent traffic activity data and emissions factors. For the City and County of San Francisco, BAAQMD is assisting with the preparation of its Community Risk Reduction Plan (CRRP) to address TACs and $PM_{2.5}$. To identify the potential for adverse health effects to sensitive receptors within TPAs, BAAQMD mapped cancer risk levels and $PM_{2.5}$ concentrations to identify areas where existing concentrations of TACs and $PM_{2.5}$ may potentially exceed impact significance Criterion 5. Existing concentrations were used as a baseline because of potential for new land uses under the proposed Plan to be constructed at any point between the Plan's adoption and 2040.

Only sources permitted by the BAAQMD were modeled, using default release parameters if site-specific information were unavailable. The cancer risk levels and $PM_{2.5}$ concentrations for stationary-sources were calculated using health effect values adopted by the Office of Environmental Health Hazard Assessment (OEHHA) and health protective assumptions designed to protect early life stage exposures and breathing.

BAAQMD estimated levels and $PM_{2.5}$ concentrations for mobile sources for the entire Plan area. Mobile sources include freeways, roadways with over 30,000 annual average daily trips (AADT), and railroads. Mobile source TAC and $PM_{2.5}$ emissions from Plan area highways were modeled with CALINE4, which was developed by the California Department of Transportation (Caltrans 1989). The dispersion modeling applied EMFAC2014 emission factors and daily vehicle activity profiles by highway link provided by Caltrans. Surface street activity data were provided by local governments. BAAQMD-processed meteorological data were also used. A similar analysis was conducted to estimate TAC and $PM_{2.5}$ emissions from the Plan area's railroad network (further described on page 2.2-9).

A geospatial analysis was conducted using GIS software to evaluate potential cancer risk levels and $PM_{2.5}$ concentrations because of emissions from mobile and stationary-sources in TPAs. The geospatial analysis was executed using BAAQMD's estimated health risk data on stationary and mobile sources. The geospatial analysis identifies areas where the combined cancer risk levels and/or $PM_{2.5}$ concentrations exceed MTC's air quality significance criteria used to support the EIR thresholds. Appendix D contains a more detailed description of the GIS model methodology for air quality modeling.

The following subsections describe the emission sources included in the local pollutant analysis and how the levels of health risk associated with the emissions of each source were estimated.

Analysis of TAC and $PM_{2.5}$ in Disproportionally Impacted Communities

Some locations in the Plan area are exposed to higher concentrations of TACs and $PM_{2.5}$ than other areas. Areas of higher exposure tend to be located along major transportation and goods movement corridors and areas with lower household incomes. Communities in these areas are, therefore, more vulnerable to the harmful effects of air pollution. As a result, these areas experience higher rates of adverse health outcomes. The effects of the proposed transportation projects and projected land use growth are evaluated to determine whether communities that are already disproportionally impacted would be exposed to an increase or decrease in TAC and $PM_{2.5}$ emissions. For purposes of this analysis, disproportionally impacted communities were identified through BAAQMD's Community Air Risk Evaluation (CARE) Program (see description below).

CARE Impacted Communities

BAAQMD's CARE program was initiated in 2004 to identify areas that may be disproportionately affected by air pollution. The CARE program relies on health outcome data, predicted cancer risk levels and $PM_{2.5}$ concentrations, and additional criteria. The intent of the CARE program is to estimate the potential increased health risks associated with exposure to TACs and $PM_{2.5}$ from stationary and mobile sources, to identify the

primary sources causing this disproportionate impact, and to develop risk reduction strategies to reduce public exposure and associated health risks (BAAQMD 2015b).

CARE communities are defined as areas that (1) are close to or within areas of high cancer risk levels from TAC emissions; (2) are exposed to elevated $PM_{2.5}$ concentrations, and (3) experience increased mortality and illnesses from $PM_{2.5}$ and ozone levels above background levels. Socioeconomic data were not used in determining CARE communities although correlation was found in subsequent analysis between the CARE areas and socioeconomic characteristics such as race, income, and education level. Seven CARE communities have been identified: Concord, eastern San Francisco/Treasure Island, western Alameda County, Pittsburg/Antioch, Richmond/San Pablo, San Jose, and Vallejo. In general, these communities are adjacent to major arterials, roadways, freeways and ports. The counties of Marin, Napa, San Mateo, and Sonoma are not evaluated in this impact discussion because they do not contain any CARE communities.

The seven CARE communities overlap with most of the MTC Communities of Concern (CoC)—which are low income and minority communities defined by MTC as experiencing potential transportation accessibility disparities (MTC 2015). MTC's evaluation of the proposed Plan's transportation investments on CoCs is addressed in the Plan Bay Area Equity Analysis, prepared as a Supplemental Report and available at www.2040.planbayarea.org. This EIR focuses on potential impacts in CARE communities alone because these areas have been identified as those with the highest existing concentrations of TACs and $PM_{2.5}$ and are currently disproportionately impacted in comparison to other communities in the Plan area.

The CARE program also led to recent BAAQMD efforts in *Planning Healthy Places* to conduct local modeling of potential impact areas of air pollution in finer spatial detail (with grid sizes down to 20 meters by 20 meters), as opposed to the region-level assessment of the CARE program. Modeling work presented in *Planning Healthy Places* identified areas in close proximity to roadways with high traffic volume and major pollutant sources, such as refineries. For these identified areas, BAAQMD recommends either further study or a list of BMPs depending on the level of exposure and type of emission source, included in Mitigation Measure 2.2(g). (BAAQMD 2016).

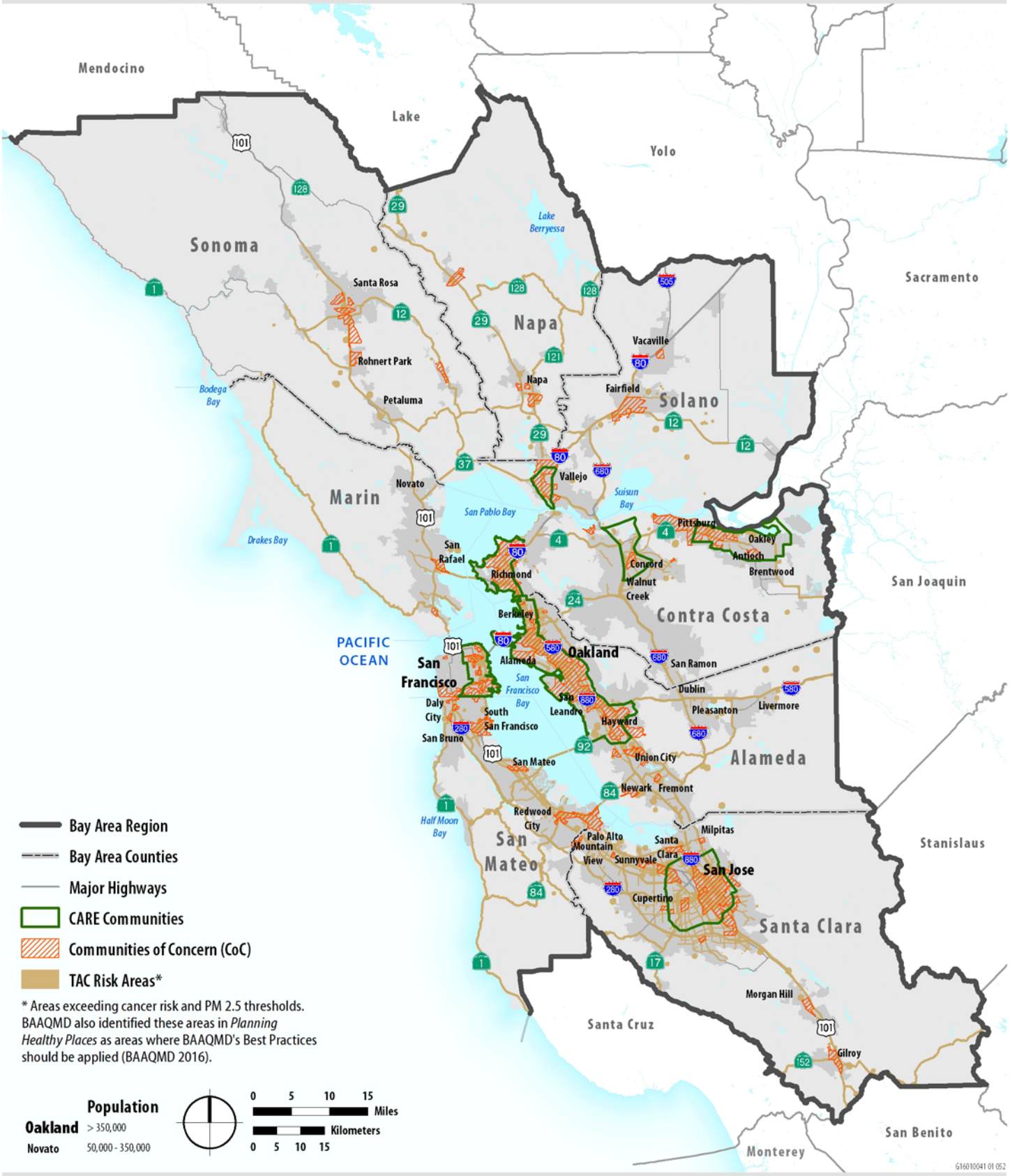
Figure 2.2-2 highlights the region's CARE communities and demonstrates how the CARE communities overlap with the majority of MTC's CoCs and TAC Risk Areas identified in *Planning Healthy Places*.

Motor Vehicle Emissions

Travel activity data for the roadway network were derived from MTC's travel demand forecasting model, *Travel Model One*. The model estimated travel behavior and vehicle activity for the proposed Plan's base year, 2015, and 2040 with and without implementation of the Plan. The model forecasts VMT, along with daily vehicle trips and distribution of vehicle miles of travel by speed. This data is then imported into EMFAC2014 to obtain emissions data.

In its analysis, MTC modeled regional impacts from VMT on all links in the network and used a separate methodology, described below, to assess impacts to CARE communities. This approach was developed by MTC's Equity Analysis workgroup and is consistent with the 2013 EIR. MTC identified the roadway links that run through identified CARE communities and non-CARE communities that meet these criteria. TAC and $PM_{2.5}$ emissions were then estimated for CARE and non-CARE roadway links in each county. For example, the emission estimates for CARE communities in Contra Costa County reflect vehicle activity on the roadway links in the Concord and Richmond/San Pablo CARE communities.

Figure 2.2-2
Communities of Concern and CARE



Map Data Sources: BAAQMD 2017; Metropolitan Transportation Commission (MTC), 2015, 2016; Tom Tom North America, 2015.

TAC Emissions Sources

The following describes the methods used to analyze TACs impacts by emissions source.

High Traffic Roadways

This source includes all roadways that carry more than 30,000 vehicles per day and pass through a TPA. Cancer risk levels and $PM_{2.5}$ concentrations were modeled using activity data along each roadway link and area-specific meteorological data.

Railroads

Railroad sources include all passenger and freight rail lines and wait times at rail stations in TPAs. BAAQMD modeled emissions using activity data for Amtrak, Caltrain, SMART rail, eBART, and ACE passenger lines. Fuel-based emissions along freight lines were provided by Union Pacific and BNSF rail lines.

Ferry Terminals

Buffer distances for ferry terminals shown in Table 2.2-10 were developed by extrapolating modeling results from excursions vessels departing San Francisco.

Large Stationary-sources

This source includes refineries and chrome platers located within or in close proximity to TPAs. Recommended buffer distances from large sources identified in the impact assessment (**Table 2.2-13**) are based on BAAQMD modeling results and ARB recommendations.

Stationary-sources

Stationary-sources include sources permitted by BAAQMD such as refineries, gas stations, back-up generators, auto body shops. Cancer risk levels and $PM_{2.5}$ concentrations are estimated using BAAQMD's Stationary-source Screening Analysis Tool (BAAQMD 2012b).

IMPACTS AND MITIGATION MEASURES

Impact 2.2-1: Implementation of the proposed Plan could conflict with or obstruct implementation of an applicable air quality plan, including: the primary goals, applicable control measures, or implementation of any control measures.

The Bay Area *2010 Clean Air Plan*, prepared by BAAQMD to address ozone planning requirements in the California Health and Safety Code, is the air quality plan applicable to the region. As mentioned under Regulatory Settings, an update to the *2010 Clean Air Plan* is currently underway. BAAQMD released the *Draft 2017 Clean Air Plan* in January 2017 (BAAQMD 2017). Adoption of the 2017 Clean Air Plan is anticipated in 2017, but has not occurred at the time of this analysis. Before adoption of the *Draft 2017 Clean Air Plan,* the *2010 Clean Air Plan* remains the applicable air quality plan for the purposes of this analysis. However, in anticipation of adoption of the Draft 2017 Clean Air Plan, the proposed Plan is compared to both the 2010 and draft 2017 versions of the *Clean Air Plan*.

There are slight differences in the overall control strategies between the 2010 and draft 2017 Clean Air Plans. The *2010 Clean Air Plan* sets forth a control strategy that includes control measures to reduce emissions and atmospheric concentrations of ozone and its precursors, $PM_{2.5}$, key TACs, as well as six major GHGs: carbon dioxide, methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride) (BAAQMD 2010a). The *Draft 2017 Clean Air Plan* would add emphasis on strategies to reduce GHGs. The *Draft 2017 Clean Air Plan's* overall control strategy is based on four key priorities: reducing emissions of criteria air pollutants and TACs; reducing emissions of "super-GHGs" such as methane, black carbon and fluorinated gases; decreasing demand for fossil fuels; and decarbonizing the energy system (BAAQMD 2017:ES/5). See Section 2.5, "Climate Change and Greenhouse Gases," for a discussion of this impact relative to GHG emissions.

The primary goals of the 2010 Clean Air Plan are to improve Bay Area air quality and protect public health. The control strategies in the 2010 and draft 2017 Clean Air Plans recognize the need to reduce motor vehicle travel and emissions by integrating transportation, land use, and air quality planning. Cleaner fuels and improved emission controls have substantially reduced emissions from mobile sources in recent decades. However, growth in motor vehicle use (as measured in VMT on both a per-capita and an absolute basis) has offset some of the benefit of the improved emission controls. This increase in VMT has been caused or facilitated by dispersed development patterns that result in increased dependency on motor vehicles and by population and job growth. Both the 2010 and draft 2017 versions of the *Clean Air Plan* encourage future population and job growth in areas that are well served by transit and where mixed-use communities provide jobs, housing, and retail in close proximity.

Key themes embedded in the 2010 and draft 2017 Clean Air Plans include:

- the need to reduce motor vehicle emissions by driving cleaner, driving smarter, and driving less;
- reducing per capita VMT and promoting policies that enable families to reduce their motor vehicle ownership;
- designing communities where people can walk, bike, or use transit on a convenient basis; and
- ensuring that focused growth in priority areas is planned and designed to protect people from both existing sources and new sources of emissions.

Impacts of Changes in Projected Land Use Projects

The 2010 and Draft 2017 Clean Air Plans include control measures in non-mobile sectors, such as measures to reduce stationary-source emissions, building energy use, water use, and agricultural emissions.

Although some of the projected land use growth under the proposed Plan could result in additional stationary sources and building energy and water usage, these would be subject to BAAQMD rules as established by the adopted Clean Air Plan at the time of permitting as well as project-level CEQA analyses, as applicable.

Impacts of Changes in Projected Transportation Projects

Consistent with the Clean Air Plans, the proposed Plan is based on the goals of reducing emissions of GHGs from the transportation sector, reducing VMT on a per-capita basis, and focusing growth in areas that are well-served by transit and existing infrastructure. As described in the project description (see Section 1.2), the transportation analysis (Section 2.1), and the climate change analysis (Section 2.5), each of these goals would be accomplished. Although regional growth and related emissions could occur with or without the proposed Plan (see Impacts 2.2-3 and 2.2-4), the land use patterns and the transportation investments defined in the proposed Plan support the primary goals of both Clean Air Plans.

Numerous transportation projects included in the proposed Plan would help implement the applicable control measures listed in both the *2010 Clean Air Plan* and the *Draft 2017 Clean Air Plan*. Both the policies and the transportation investments defined in the proposed Plan are consistent with the relevant control measures in the 2010 and Draft 2017 Clean Air Plans. **Table 2.2-7** provides a summary of the proposed Plan transportation projects that would help implement relevant control measures in the 2010 and draft 2017 Clean Air Plans. For purposes of evaluating consistency with the proposed Plan, the relevant *2010 Clean Air Plan* control measures include mobile source measures (MSMs) A-1 and A-2, the full set of 17 transportation control measures (TCMs), and land use and local impact measure (LUM) #4; the relevant *Draft 2017 Clean Air Plan* includes control measures TR1 through TR15, TR18, and TR19.

Table 2.2-7 Proposed Plan Investments and Policies that Support Implementation of 2010 Clean Air Plan and Draft 2017 Clean Air Plan Control Measures

Relevant Control Measures in 2010 Clean Air Plan	Relevant Control Measures in Draft 2017 Clean Air Plan	Supporting Policies and Investments in the proposed Plan[1]
MSM A-1: Promote Clean and Fuel-Efficient Vehicles: Promote the use of clean and fuel-efficient vehicles, and efficient driving habits and proper vehicle maintenance to reduce emissions.	TR12: Smart Driving: Implement smart driving programs with businesses, public agencies and possibly schools and fund smart driving projects. TR15: Public Outreach and Education: Implement the Spare the Air Every Day Campaign including Spare the Air alerts, employer program, and community resource teams, a PEV Outreach campaign and the Spare the Air Youth Program.	The Climate Program in the proposed Plan (RTP ID # 17-08-0003) includes measures to promote efficient driving habits.
MSM A-2: Zero Emission Vehicles and Plug-In Hybrids: Acquire and deploy battery-electric and plug-in hybrid electric vehicles. Install and expand public charging infrastructure. Promote the use of public charging infrastructure.	TR14: Cars and Light Trucks: Commit regional clean air funds toward qualifying vehicle purchases and infrastructure development. Partner with private, local, state and federal programs to promote the purchase and lease of battery-electric and plug-in hybrid electric vehicles.	As an element of the Climate Policy Initiatives (RTP ID # 230550), the proposed Plan would allocate approximately $170 million over ten years to promote electric vehicles, including consumer incentives, education, and installation of charging stations.
TCM A-1: Local and Area-Wide Bus Service Improvements: Sustain and improve bus service by funding existing service, implementing Bus Rapid Transit (BRT) in key corridors, and implementing transit priority measures to improve the speed of bus service.	TR5: Transit Efficiency and Use: Improve transit efficiency and make transit more convenient for riders through continued operation of 511 Transit, full implementation of Clipper® fare payment system and the Transit Hub Signage Program.	The proposed Plan includes substantial funding for bus operators throughout the region, including funding to implement BRT in key corridors. Projects to fund bus service improvements include RTP ID #s 17-07-0051, 17-07-0057, 17-01-0060, 17-01-0061, 17-05-0014, 17-05-0021, 17-05-0032, 17-05-0033, 17-06-0029, 17-07-0080, and 17-10-0003.
TCM A-2: Local and Regional Rail Service Improvements: Sustain and expand rail service providing funding for rail cars and stations. Fund BART extensions, Caltrain electrification, new Transbay Terminal, Capitol Corridor, and SMART commuter rail in the North Bay.	TR4: Local and Regional Rail Service: Fund local and regional rail service projects.	The proposed Plan includes substantial funding for commuter rail operators throughout the region. This includes BART (RTP ID #s 17-01-0058, 07-02-0043, 17-02-0045, 07-10-0005, and 17-10-0006); Transbay Transit Center/Caltrain extension (RTP ID # 17-10-0006); Caltrain electrification and improvements (RTP ID #s 07-05-0028, 17-07-0065, and 17-10-0008); SMART rail (RTP ID # 17-09-0016); and other rail improvements (RTP IDs # 17-02-0046, 17-05-0015, 17-05-0039, 17-07-0060, and 17-10-0032).
TCM B-1: Freeway and Arterial Operations Strategies: Implement freeway and arterial performance improvements, including the Freeway Performance Initiative, the Bay Area Freeway Service Patrol, and the Arterial Management Program.	TR6: Freeway and Arterial Operations: Improve the performance and efficiency of freeway and arterial systems through operational improvements, such as implementing the Freeway Performance Initiative, the Freeway Service Patrol and the Arterial Management Program.	The proposed Plan projects 17-06-0038, 17-07-0010, 17-10-0030, and 17-10-0033 would improve traffic flow on freeways and key arterials.
TCM B-2: Transit Efficiency and Use Strategies: Improve transit efficiency and rider convenience through continued operation of 511 Transit, and full implementation of Clipper fare payment system and the Transit Hub Signage Program.	TR5: Transit Efficiency and Use: Improve transit efficiency and make transit more convenient for riders through continued operation of 511 Transit, full implementation of Clipper® fare payment system and the Transit Hub Signage Program.	The proposed Plan includes funds to improve the Clipper fare system (RTP ID# 17-10-0028), 511 Traveler Information Program (RTP ID# 17-10-0029), and Muni Forward Transit Effectiveness Project (RTP ID#17-05-0014).

Table 2.2-7 Proposed Plan Investments and Policies that Support Implementation of 2010 Clean Air Plan and Draft 2017 Clean Air Plan Control Measures

Relevant Control Measures in 2010 Clean Air Plan	Relevant Control Measures in Draft 2017 Clean Air Plan	Supporting Policies and Investments in the proposed Plan[1]
TCM B-3: Bay Area Express Lane Network: Implement the regional express lane network; provide express bus service in these corridors.	TR3: Local and Regional Bus Service: Fund local and regional bus projects.	The proposed Plan includes funds to implement various BRT projects that provide express lanes for buses (RTP IDs# 17-07-0051, 17-07-0057, 17-01-0060, 17-01-0061, 17-05-0014, 17-05-0021, 17-05-0032, 17-05-0033, 17-06-0029, 17-07-0080, and 17-10-0003) and the regional express lane network via 30 specific projects, including 17-10-0056, 17-10-0055, 17-07-0076, 17-07-0075, 17-10-0058, and 17-07-0086.
TCM B-4: Goods Movement Improvements and Emission Reductions Strategies: Reduce diesel emissions from trucks used in goods movement. Implement seven Proposition 1B Trade Corridors Improvement Fund projects identified in this measure.	TR18: Goods Movement: Continue participation in the preparation and implementation of the Regional Goods Movement Plan. Participate in the Goods Movement Collaborative, led by the Alameda County Transportation Commission, and assist MTC in development of the Freight Emissions Action Plan TR19: Medium- and Heavy-Duty Trucks: Directly provide, and encourage other organizations to provide, incentives for the purchase of 1) new trucks with engines that exceed ARB's 2010 NO_X emission standards for heavy-duty engines, 2) new hybrid trucks, and 3) new zero-emission trucks. The Air District will work with truck owners, industry, ARB, the CEC, and others to demonstrate additional battery-electric and hydrogen fuel cell zero-emission trucks.	Projects in the proposed Plan that would implement TCM B-4 include the Goods Movement Clean Fuels and Impact Reduction Program (RTP ID # 17-110-0018); Oakland Army Base Transportation Infrastructure Improvements (RTP ID # 17-01-0016), SMART Rail Freight Improvements (RTP ID # 17-09-0002), and Plan Bay Area 2040's Freight Emissions Reduction Plan.
TCM C-1: Voluntary Employer Trip-Reduction Programs: Work with employers, transit agencies, and shuttle providers to promote ridesharing, transit, cycling and walking for work trips. Consider adopting a commute benefits ordinance to reduce out-of-pocket transit costs to employees.	TR1: Clean Air Teleworking Initiative: Develop teleworking best practices for employers and develop additional strategies to promote telecommuting. Promote teleworking on Spare the Air Days. TR2: Trip Reduction Programs: Implement the regional Commuter Benefits Program (Rule 14-1) that requires employers with 50 or more Bay Area employees to provide commuter benefits. Encourage trip reduction policies and programs in local plans. Encourage local governments to require mitigation of vehicle travel as part of new development approval, to adopt transit benefits ordinances in order to reduce transit costs to employees, and to develop innovative ways to encourage rideshare, transit, cycling, and walking for work trips. Fund various employer-based trip reduction programs.	The proposed Plan's Climate Programs in Alameda, Marin, San Francisco and regionwide (see RTP IDs # 17-01-0002, 17-03-0002, 17-05-0002, 17-08-0003, 17-10-0043, and 17-10-0015) include strategies to modernize TDM and improve emissions reduction technology, supporting implementation of TCM C-1. The proposed Plan also includes continued support for the Commuter Benefits Program, a key element of TCM-1.
TCM C-2: Safe Routes to Schools and Safe Routes to Transit Programs: Implement Safe Routes to Schools (SR2S) programs and other measures to promote safe access for pedestrians and cyclists to schools and transit.	TR7: Safe Routes to Schools and Safe Routes to Transit: Provide funds for the regional Safe Routes to School and Safe Routes to Transit Programs.	The proposed Plan includes $30 million to implement Safe Routes to Transit (RTP ID # 22245). Additional projects that would contribute to the implementation of TCM C-2 include Alameda County Transportation Demand Management Program (240393), and Safe

Table 2.2-7 Proposed Plan Investments and Policies that Support Implementation of 2010 Clean Air Plan and Draft 2017 Clean Air Plan Control Measures

Relevant Control Measures in 2010 Clean Air Plan	Relevant Control Measures in Draft 2017 Clean Air Plan	Supporting Policies and Investments in the proposed Plan[1]
		Routes to Schools programs in Napa County (22417), San Mateo County (240084), and Sonoma County (240561).
TCM C-3: Ridesharing Services and Incentives: Encourage ridesharing and promote and expand car-sharing services.	TR8: Ridesharing, Last-Mile Connection: Promote carpooling and vanpooling by providing funding to continue regional and local ridesharing programs, and support the expansion of carsharing programs. Provide incentive funding for pilot projects to evaluate the feasibility and cost-effectiveness of innovative ridesharing and other last-mile solution trip reduction strategies. Encourage employers to promote ridesharing and carsharing to their employees.	The proposed Plan includes a multi-county program called, Bay Area Forward (RTP ID # 17-10-0033), that includes shared mobility as a strategy, supporting ridesharing and car sharing goals. The proposed Plan includes approximately $700 million to implement various Climate Policy Initiatives (RTP ID #230550), including car sharing and vanpool strategies.
TCM C-4: Conduct Public Education and Outreach: Implement the Spare the Air program and related elements in the regional Transportation Climate Action Campaign.	TR15: Public Outreach and Education: Implement the Spare the Air Every Day Campaign including Spare the Air alerts, employer program, and community resource teams, a PEV Outreach campaign and the Spare the Air Youth Program.	The proposed Plan includes approximately $700 million to implement various Climate Policy Initiatives (RTP ID #230550), including public outreach and education.
TCM C-5: Promote "Smart Driving": Promote smart driving, compliance with posted speed limits, and related efforts to reduce greenhouse gas emissions from the transportation sector.	TR12: Smart Driving: Implement smart driving programs with businesses, public agencies and possibly schools and fund smart driving projects.	The proposed Plan includes approximately $700 million to implement various Climate Policy Initiatives (RTP ID #230550), including a public education campaign, a tire pressure cap rebate program, and a fuel economy meter rebate program.
TCM D-1: Bicycle Access and Facilities Improvements: Provide a comprehensive network of bicycle lanes, routes, and pathways, as well as continued and routine maintenance on existing bicycle facilities. Implement "complete streets" policies to ensure that cyclists and pedestrians are safely accommodated on all streets and roads. Maintain and expand facilities to accommodate bicycles on rail transit, buses and ferries. Consider implementing bicycle-sharing programs.	TR9: Bicycle Access and Pedestrian Facilities: Encourage planning for bicycle and pedestrian facilities in local plans, e.g. general and specific plans, fund bike lanes, routes, paths and bicycle parking facilities.	The proposed Plan would provide funding to implement bicycle and pedestrian projects throughout the region, including: Alameda County: 17-01-0001, 17-01-0037, 17-10-0034 Contra Costa County: 17-02-0003 Marin County: 17-03-0001 Napa County: 17-04-0001 San Francisco: 17-05-0001, 17-10-0034 San Mateo County: 17-06-0001 Santa Clara County: 17-07-0001 Solano County: 17-08-0002 Sonoma County: 17-09-0001
TCM D-2: Pedestrian Access and Facilities Improvements: Provide a comprehensive network of facilities, including sidewalks, pathways and provide for pedestrian access in their development plans. Implement "complete streets" policies to ensure that cyclists and pedestrians are safely accommodated on all streets and roads. Adopt land use policies that support more compact, infill development to make neighborhoods more walkable.	TR9: Bicycle Access and Pedestrian Facilities: Encourage planning for bicycle and pedestrian facilities in local plans, e.g. general and specific plans, fund bike lanes, routes, paths and bicycle parking facilities.	The proposed Plan projects to improve pedestrian facilities, including 24l bicycle and pedestrian programs and multimodal streetscape programs supporting relevant Clean Air Plan control measures. (RTP IDs # 17-01-0001, 17-01-0004, 17-01-0046, 17-02-0003, 17-02-0005, 17-03-0001, 17-03-0016, 17-04-0001, 17-04-0003, 17-05-0001, 17-05-0004, 17-05-0026, 17-06-0001, 17-06-0003, 17-06-0026, 17-06-0027, 17-07-0001, 17-07-0003, 17-08-0002, 17-08-0005, 17-09-0001, 17-09-0003, 17-10-0014, and 17-10-0034)

Table 2.2-7 Proposed Plan Investments and Policies that Support Implementation of 2010 Clean Air Plan and Draft 2017 Clean Air Plan Control Measures

Relevant Control Measures in 2010 Clean Air Plan	Relevant Control Measures in Draft 2017 Clean Air Plan	Supporting Policies and Investments in the proposed Plan[1]
TCM D-3: Local Land-Use Strategies: Update general plans and area plans to promote infill development and support land use that allows residents and employees to walk, bicycle, and use transit, instead of relying on private automobiles. Create mixed-use transit-oriented developments in proximity to transit stations and key bus routes.	TR10: Land Use Strategies: Support implementation of Plan Bay Area, maintain and disseminate information on current climate action plans and other local best practices, and collaborate with regional partners to identify innovative funding mechanisms to help local governments address air quality and climate change in their general plans.	Many of the policies and investments in the proposed Plan, such as the Priority Development Area (PDA) Planning Grant program, are directed toward implementation of the land-use strategies described in TCM D-3. Examples of local projects include projects # 17-06-0026 (incentive program to support transit-oriented development) in San Mateo county and # 17-03-0012 (an infill project development along Sir Francis Drake Boulevard, Red Hill Avenue, and Center Boulevard, known as "The Hub," in Marin county.
TCM E-1: Value-Pricing Strategies: Implement value pricing policies and programs such as time-of-day pricing on trans-bay bridges and cordon pricing recommendations from San Francisco County's Mobility, Access, and Pricing Study.	TR11: Value Pricing: Implement and/or consider various value pricing strategies.	The proposed Plan includes funding to implement San Francisco's Downtown Value Pricing/Incentive program which aims to test the program with a pilot and support the program through transit service and other supportive infrastructure (RTP ID # 17-05-0029).
TCM E-2: Promote Parking Policies to Reduce Motor Vehicle Travel: Implement parking policies to reduce motor vehicle travel, such as limiting the supply of off-street parking in areas well served by transit, eliminating or reducing minimum parking requirements, unbundling the price of parking spaces from rents, and implementing performance-based pricing for curb parking in high-use areas.	TR13: Parking Policies: Encourage parking policies and programs in local plans, e.g. reduce minimum parking requirements; limit the supply of off-street parking in transit-oriented areas; unbundle the price of parking spaces; support implementation of demand-based pricing (such as "SF Park") in high-traffic areas.	The proposed Plan relies on the reduction of building costs in PDAs and TPAs through easing of parking minimums to encourage development and reduce motor vehicle travel.
TCM E-3: Implement Transportation Pricing Reform: Develop and implement policies to ensure that user costs to own and operate motor vehicles reflect the full environmental and social costs related to vehicle use.	TR11: Value Pricing: Implement and/or consider various value pricing strategies.	The proposed Plan includes funding to implement the San Francisco congestion pricing program (RTP ID # 17-05-0029, discussed above) and programs that MTC has underway, including bridge tolls and express lane network.
LUM 4: Land Use Guidance: Provide tools and resources to local agencies to help them develop policies and plans to improve air quality, reduce motor vehicle travel, and reduce population exposure to air pollutants.	TR10: Land Use Strategies: Support implementation of Plan Bay Area, maintain and disseminate information on current climate action plans and other local best practices, and collaborate with regional partners to identify innovative funding mechanisms to help local governments address air quality and climate change in their general plans.	PDA Policy Action # 1.6 calls for regional agencies to provide tools to help local jurisdictions develop and implement plans to focus new growth in priority development areas.

Note: ARB = California Air Resources Board; BART = Bay Area Rapid Transit; BRT= bus rapid transit; CEC = California Energy Commission; MTC = Metropolitan Transportation Commission; PEV = plug-in electric vehicles; RTP = regional transportation plan; SMART = Sonoma Marin Area Rail Transit; TCM = transportation control measure; TDM = transportation demand management

[1] The investments of the Plan shown in Table 2.2-7 are intended to demonstrate how the Plan would help implement the 2010 Clean Air Plan and Draft 2017 Clean Air Plan. The Plan may include additional investments not shown in Table 2.2-7 that also help implement the Clean Air Plan control measures.

Sources: BAAQMD 2010a, BAAQMD 2017

Conclusion

Because the proposed Plan would not conflict with or obstruct implementation of the primary goals, applicable control measures, or implementation of any control measures of an applicable air quality plan, the impact would be **less than significant (LS)**. No mitigation measures are required.

Mitigation Measures

None required.

Impact 2.2-2: Implementation of the proposed Plan could result in a substantial net increase in construction-related emissions.

Impacts of Changes in Projected Land Use and Transportation Projects

Impacts of the proposed Plan related to construction-related emissions are generally regional in nature. Construction equipment and processes are generally similar between land use and transportation projects, except that transportation projects could result in more paving and concrete activity and tend to be larger than land use projects. This impact discussion considers the combination of land use and transportation project construction.

With respect to construction equipment, EPA and ARB have adopted rules and regulations establishing criteria pollutant and hazardous emissions limits for diesel powered on-road vehicles and off-road equipment. The current EPA and ARB rules and emission standards are in the process of being implemented and are therefore reasonably foreseeable. They will continue to be phased in through 2023 and are expected to reduce diesel PM emissions by 98 percent or more when compared to vehicles and equipment built before 2004 and still in operation, based on EMFAC2014 model outputs. EPA and ARB regulations of on-road and off-road engines target the primary sources of emissions at construction sites. These include on-road heavy-duty trucks and off-road aerial lifts, backhoes, cranes, crawler tractors, excavators, forklifts, graders, loaders, mowers, rollers, scrapers, skid steer loaders, tractors, trenchers, two-engine vehicles, and workover rigs. In addition, ARB's clean fuel standards would reduce emissions from all internal combustion engines and their stationary and portable equipment regulations would reduce emissions from the smaller equipment used at construction sites, such as portable generators and tub grinders.

Despite ongoing regulations to reduce emissions from construction equipment, construction of projected land use growth and transportation projects under the Plan would potentially result in a substantial net increase in construction-related emissions. As shown in **Table 2.2-5**. The proposed Plan includes up to 365 transportation projects that either modernize or expand existing transportation infrastructure. The proposed Plan would also accommodate land use growth in the Plan area of approximately 630,000 new households and a net increase of 95 million square feet of non-residential uses. Although EPA and ARB have adopted stringent air diesel PM emission regulations for construction equipment, these regulations alone cannot assure that all projects consistent with the proposed Plan would use only the lowest emissions-generating construction equipment due primarily to the fleet averaging component of the compliance requirements. Additionally, dust emissions from construction activity would occur from the disturbance of unpaved sites and material handling. Construction could also occur at any point under the Plan build-out period and could potentially occur over a short period of time, resulting in substantial construction-related emissions on a daily basis.

Conclusion

Because the proposed Plan could result in a substantial net increase in construction-related emissions, this impact would be **potentially significant (PS)**. Mitigation Measure 2.2-2 would reduce construction-related emissions.

Mitigation Measures

2.2-2 When screening levels are exceeded (see **Table 2.2-8** or those most currently updated by BAAQMD), implementing agencies and/or project sponsors shall implement measures, where applicable, feasible, and necessary based on project- and site-specific considerations, that include, but are not limited to the following:

Construction Best Practices for Exhaust

- The applicant/general contractor for the project shall submit a list of all off-road equipment greater than 25 horsepower (hp) that would be operated for more than 20 hours over the entire duration of project construction, including equipment from subcontractors, to BAAQMD for review and certification. The list shall include all information necessary to ensure the equipment meets the following requirement:
  - 1) Be zero emissions OR 2) have engines that meet or exceed either EPA or ARB Tier 2 off-road emission standards; and 3) have engines that are retrofitted with an ARB Level 3 Verified Diesel Emissions Control Strategy (VDECS), if one is available for the equipment being used. Equipment with engines that meet Tier 4 Interim or Tier 4 Final emission standards automatically meet this requirement; therefore, a VDECS would not be required.
  - Idling time of diesel powered construction equipment and trucks shall be limited to no more than two minutes. Clear signage of this idling restriction shall be provided for construction workers at all access points.
  - All construction equipment shall be maintained and properly tuned in accordance with the manufacturers' specifications.
  - Portable diesel generators shall be prohibited. Grid power electricity should be used to provide power at construction sites; or propane and natural gas generators may be used when grid power electricity is not feasible.

Construction Best Practices for Dust

- All exposed surfaces (e.g., parking areas, staging areas, soil piles, graded areas, and unpaved access roads) shall be watered two times per day. For projects over five acres in size, soil moisture should be maintained at a minimum of 12 percent. Moisture content can be verified by lab samples or a moisture probe.
- All haul trucks transporting soil, sand, or other loose material off-site shall be covered.
- All visible mud or dirt track-out onto adjacent public roads shall be removed using wet power vacuum street sweepers at least once per day. Dry power sweeping should only be performed in conjunction with thorough watering of the subject roads.
- All vehicle speeds on unpaved roads and surfaces shall be limited to 15 mph.
- All roadway, driveway, and sidewalk paving shall be completed as soon as possible. Building pads shall be paved as soon as possible after grading.
- All construction sites shall provide a posted sign visible to the public with the telephone number and person to contact at the Lead Agency regarding dust complaints. The recommended response time for corrective action shall be within 48 hours. BAAQMD's Complaint Line (1-800-334-6367) shall also be included on posted signs to ensure compliance with applicable regulations.
- All excavation, grading, and/or demolition activities shall be suspended when average wind speeds exceed 20 mph.
- Wind breaks (e.g., trees, fences) shall be installed on the windward side(s) of actively disturbed areas of construction. Wind breaks should have at maximum 50 percent air porosity.
- Vegetative ground cover (e.g., fast-germinating native grass seed) shall be planted in disturbed areas as soon as possible and watered appropriately until vegetation is established.

- The simultaneous occurrence of excavation, grading, and ground-disturbing construction activities on the same area at any one time shall be limited. Activities shall be phased to reduce the amount of disturbed surfaces at any one time.
- All trucks and equipment, including their tires, shall be washed off before leaving the site.
- Site accesses to a distance of 100 feet from the paved road shall be treated with a 6- to 12-inch compacted layer of wood chips, mulch, or gravel.
- Sandbags or other erosion control measures shall be installed to prevent silt runoff to public roadways from sites with a slope greater than one percent.

These BMPs are consistent with recommendations in BAAQMD's CEQA guidelines and *Planning Healthy Places* (BAAQMD 2010b, BAAQMD 2016). Applicable mitigation measures shall be required at the time grading permits are issued.

Table 2.2-8 Criteria Air Pollutants and Precursors and GHG Screening Level Sizes

Land Use Type	Operational Criteria Pollutant Screening Size	Operational GHG Screening Size	Construction Criteria Pollutant Screening Size
Single-family	325 du (NOX)	56 du	114 du (ROG)
Apartment, low-rise	451 du (ROG)	78 du	240 du (ROG)
Apartment, mid-rise	494 du (ROG)	87 du	240 du (ROG)
Apartment, high-rise	510 du (ROG)	91 du	249 du (ROG)
Condo/townhouse, general	451 du (ROG)	78 du	240 du (ROG)
Condo/townhouse, high-rise	511 du (ROG)	92 du	252 du (ROG)
Mobile home park	450 du (ROG)	82 du	114 du (ROG)
Retirement community	487 du (ROG)	94 du	114 du (ROG)
Congregate care facility	657 du (ROG)	143 du	240 du (ROG)
Day-care center	53 ksf (NOX)	11 ksf	277 ksf (ROG)
Elementary school	271 ksf (NOX)	44 ksf	277 ksf (ROG)
Elementary school	2747 students (ROG)	-	3904 students (ROG)
Junior high school	285 ksf (NOX)	-	277 ksf (ROG)
Junior high school	2460 students (NOX)	46 ksf	3261 students (ROG)
High school	311 ksf (NOX)	49 ksf	277 ksf (ROG)
High school	2390 students (NOX)	-	3012 students (ROG)
Junior college (2 years)	152 ksf (NOX)	28 ksf	277 ksf (ROG)
Junior college (2 years)	2865 students (ROG)	-	3012 students (ROG)
University/college (4 years)	1760 students (NOX)	320 students	3012 students (ROG)
Library	78 ksf (NOX)	15 ksf	277 ksf (ROG)
Place of worship	439 ksf (NOX)	61 ksf	277 ksf (ROG)
City park	2613 acres (ROG)	600 acres	67 acres (PM10)
Racquet club	291 ksf (NOX)	46 ksf	277 ksf (ROG)
Racquetball/health	128 ksf (NOX)	24 ksf	277 ksf (ROG)
Quality restaurant	47 ksf (NOX)	9 ksf	277 ksf (ROG)
High turnover restaurant	33 ksf (NOX)	7 ksf	277 ksf (ROG)
Fast food rest. w/ drive thru	6 ksf (NOX)	1 ksf	277 ksf (ROG)
Fast food rest. w/o drive thru	8 ksf (NOX)	1 ksf	277 ksf (ROG)
Hotel	489 rooms (NOX)	83 rooms	554 rooms (ROG)
Motel	688 rooms (NOX)	106 rooms	554 rooms (ROG)
Free-standing discount store	76 ksf (NOX)	15 ksf	277 ksf (ROG)

Table 2.2-8 Criteria Air Pollutants and Precursors and GHG Screening Level Sizes

Land Use Type	Operational Criteria Pollutant Screening Size	Operational GHG Screening Size	Construction Criteria Pollutant Screening Size
Free-standing discount superstore	87 ksf (NOX)	17 ksf	277 ksf (ROG)
Discount club	102 ksf (NOX)	20 ksf	277 ksf (ROG)
Regional shopping center	99 ksf (NOX)	19 ksf	277 ksf (ROG)
Electronic Superstore	95 ksf (NOX)	18 ksf	277 ksf (ROG)
Home improvement superstore	142 ksf (NOX)	26 ksf	277 ksf (ROG)
Strip mall	99 ksf (NOX)	19 ksf	277 ksf (ROG)
Hardware/paint store	83 ksf (NOX)	16 ksf	277 ksf (ROG)
Supermarket	42 ksf (NOX)	8 ksf	277 ksf (ROG)
Convenience market (24 hour)	5 ksf (NOX)	1 ksf	277 ksf (ROG)
Convenience market with gas pumps	4 ksf (NOX)	1 ksf	277 ksf (ROG)
Bank (with drive-through)	17 ksf (NOX)	3 ksf	277 ksf (ROG)
General office building	346 ksf (NOX)	53 ksf	277 ksf (ROG)
Office park	323 ksf (NOX)	50 ksf	277 ksf (ROG)
Government office building	61 ksf (NOX)	12 ksf	277 ksf (ROG)
Government (civic center)	149 ksf (NOX)	27 ksf	277 ksf (ROG)
Pharmacy/drugstore w/ drive through	49 ksf (NOX)	10 ksf	277 ksf (ROG)
Pharmacy/drugstore w/o drive through	48 ksf (NOX)	10 ksf	277 ksf (ROG)
Medical office building	117 ksf (NOX)	22 ksf	277 ksf (ROG)
Hospital	226 ksf (NOX)	39 ksf	277 ksf (ROG)
Hospital	334 beds (NOX)	84 ksf	337 beds (ROG)
Warehouse	864 ksf (NOX)	64 ksf	259 ksf (NOX)
General light industry	541 ksf (NOX)	121 ksf	259 ksf (NOX)
General light industry	72 acres (NOX)	-	11 acres (NOX)
General light industry	1249 employees (NOX)	-	540 employees (NOX)
General heavy industry	1899 ksf (ROG)	-	259 ksf (NOX)
General heavy industry	281 acres (ROG)	-	11 acres (NOX)
Industrial park	553 ksf (NOX)	65 ksf	259 ksf (NOX)
Industrial park	61 acres (NOX)	-	11 acres (NOX)
Industrial park	1154 employees (NOX)	-	577 employees (NOX)
Manufacturing	992 ksf (NOX)	89 ksf	259 ksf (NOX)

THE SCREENING VALUES IN THIS TABLE CANNOT BE USED AS SCREENING FOR RISK AND HAZARD IMPACTS

Notes: du = dwelling units; ksf = thousand square feet; NOX = oxides of nitrogen; ROG = reactive organic gases.

Screening levels include indirect and area source emissions. Emissions from engines (e.g., back-up generators) and industrial sources subject to Air District Rules and Regulations embedded in the land uses are not included in the screening estimates and must be added to the above land uses.

Refer to Appendix C for support documentation.

Source: Modeled by EDAW 2009

Significance after Mitigation

The measures described above would minimize PM_{10} and $PM_{2.5}$ dust emissions and minimize exhaust emissions of diesel PM through the use of readily available, lower-emitting diesel equipment, and/or equipment powered by alternative cleaner fuels (e.g., propane) or electricity, as well as on-road trucks using particulate exhaust filters.

To the extent that an individual project adopts and implements all feasible mitigation measures described above, the project's impact would be less than significant with mitigation (LS-M).

Projects taking advantage of CEQA Streamlining provisions of SB 375 (Public Resources sections 21155.1, 21155.2, and 21159.28) must apply the mitigation measures described above to address site-specific conditions. However, MTC/ABAG cannot require local implementing agencies to adopt the above mitigation measures, and it is ultimately the responsibility of a lead agency to determine and adopt mitigation. Therefore, this impact remains **significant and unavoidable (SU)** for purposes of this program-level review.

Impact 2.2-3: Implementation of the proposed Plan could result in a net increase of emissions of criteria pollutants from on-road mobile and land use sources compared to existing conditions, including emissions of ROG, NO_X, CO, PM_{10}, and $PM_{2.5}$, as the SFBAAB is in non-attainment for ozone, PM_{10}, and $PM_{2.5}$ standards.

Impacts of Projected Land Use

As shown in **Table 2.2-9**, the area-source emissions of criteria pollutants and precursors would increase over the planning horizon of the Plan because of the net increase in land use development, as presented in **Table 2.2-5**. When compared to existing conditions (2015), the proposed Plan would increase area-source ROG emissions by 16.2 tons per day, NO_X emissions by 4.9 tons per day, CO emissions by 68.4 tons per day, PM_{10} emissions by 7.1 tons per day, and $PM_{2.5}$ emissions by 7.1 tons per day. **Table 2.2-10** shows the percent breakdown of the net change in regional emissions by area-source type. As discussed under Methods, these area-source emissions estimates are based on the net change in land use development anticipated in the region under the Plan.

As shown in **Table 2.2-8**, the addition in development under the Plan would result in a net increase in ROG, NO_X, CO, PM_{10}, and $PM_{2.5}$ emissions from area-sources. As shown in **Table 2.2-9**, the majority of new ROG emissions would come from consumer products, CO emissions from landscaping equipment, and NO_X, PM_{10}, and $PM_{2.5}$ emissions from natural gas use. ARB and the three air districts in the region have policies in place that regulate emissions from architectural coatings and hearths. ARB also has four existing consumer product regulations (ARB 2015b). The State is also exploring ZNE building standards that would reduce emissions of criteria pollutants from natural gas use. However, these regulations alone cannot assure that all projects consistent with the proposed Plan would not exceed existing levels.

Table 2.2-9 Unmitigated Daily Area-Source Emissions from Changes in Land Uses by County (tons per day)[1]

County	ROG	NO_X	CO	PM_{10}	$PM_{2.5}$
Alameda	3.6	1.2	15.5	1.6	1.6
Contra Costa	2.5	0.8	10.6	1.2	1.2
Marin	0.1	0.0	0.4	0.1	0.1
Napa	0.2	0.1	0.5	0.1	0.1
San Francisco	2.2	0.7	9.8	1.0	1.0
San Mateo	1.4	0.4	4.9	0.5	0.5
Santa Clara	4.9	1.4	20.4	2.0	2.0
Solano	0.7	0.2	3.1	0.4	0.4
Sonoma	0.7	0.2	3.2	0.4	0.4
Regional Total	**16.2**	**4.9**	**68.4**	**7.1**	**7.1**

Source: Data provided by Ascent Environmental, Inc. in 2017 based on modeling using CalEEMod 2016.3.1 and land use estimates from Metropolitan Transportation Commission.

[1] "New land uses" are the net change in land uses between 2015 and 2040 anticipated under the proposed Plan.

Table 2.2-10 Distribution of Area-Source Emissions from Changes in Land Uses by Source[1]

Source	ROG	NO_X	CO	PM_{10}	$PM_{2.5}$
Architectural Coatings	11%	0%	0%	0%	0%
Consumer Products[2]	82%	0%	0%	0%	0%
Landscaping Equipment	3%	8%	83%	14%	14%
Natural Gas – Hearths[3]	2%	6%	12%	62%	62%
Natural Gas – Energy[4]	2%	86%	5%	24%	24%
Total	**100%**	**100%**	**100%**	**100%**	**100%**

Source: Estimates calculated by Ascent Environmental, Inc. in 2017 based on modeling using CalEEMod 2016.3.1 and land use estimates provided by Metropolitan Transportation Commission.

[1] "New land uses" are the net change in land uses between 2015 and 2040 anticipated under the proposed Plan.
[2] Includes emissions from consumer products such as aerosols and household chemicals.
[3] Includes emissions from natural gas combustion in hearths.
[4] Includes emissions from natural gas combustion in water heating, space heating, and cooking applications.

Impacts of Transportation Projects

The proposed transportation projects would result in a net increase in VMT (Table 2.2-6); however, as shown in Table 2.2-11, mobile source emissions of criteria pollutants ROG, NO_X (summertime and wintertime), and CO in the region would decrease between 2015 and 2040, the planning horizon for the proposed Plan. When compared to existing conditions (2015), emissions associated with development under the proposed Plan would be reduced: ROG emissions by 67 percent, summertime NO_X emissions by 72 percent, wintertime NO_X emissions by 77 percent, and CO emissions by 72 percent. The primary reason for these reductions is the increasingly stringent emission controls adopted by ARB for new vehicle engines and fuels. This includes the Truck and Bus Regulation, which requires diesel truck and bus engines to be upgraded to reduce emissions. Additional contributors include the Enhanced Smog Check Program and fleet turnover wherein older polluting cars are retired and replaced with newer and substantially less polluting cars. Additionally, the land use pattern in the proposed Plan concentrates future growth at higher densities around existing and proposed transit investments, which would reduce driving and motor vehicle emissions.

Table 2.2-11 ROG, NO_X, CO, PM_{10}, and $PM_{2.5}$ Emission Estimates for Criteria Pollutants using EMFAC2014 Emission Rates (tons per day)

	2015	2040	Change 2015 to 2040 Project
		Project	Numerical
ROG	55	19	-37
NO_X (Summertime)	105	29	-76
NO_X (Wintertime)	100	23	-77
CO	421	119	-302
$PM_{2.5}$	8	9	<1
PM_{10}	33	38	5

Source: Metropolitan Transportation Commission 2017

Conversely, mobile-source $PM_{2.5}$ and PM_{10} emissions would increase by 1 and 16 percent, respectively, during the proposed Plan's timeframe compared to existing conditions. The higher levels of $PM_{2.5}$ and PM_{10} emissions in 2040 conditions are primarily a function of the 21 percent growth in VMT (which directly affects the occurrence of entrained roadway dust), with some contributions from tire and brake wear and exhaust. Exhaust emissions of $PM_{2.5}$ and PM_{10} would not increase at the same rate as VMT (21 percent) because of the stringent emission controls that would take effect with fleet turnover. Note that daily VMT is projected to increase when comparing

the proposed Plan to existing conditions, but to a large degree, these increases would be offset by improvements to the vehicle fleet. PM control programs, such as PM filter retrofit and fleet turnover programs, implemented by local air districts, would also contribute to the emission reductions relative to VMT.

In addition to the Truck and Bus Regulation, there other ongoing State and regional efforts are in place to reduce $PM_{2.5}$ and PM_{10} emissions. For instance, ARB adopted its Diesel Risk Reduction Plan in October 2000 and, as a part of its plan, has since adopted a series of regulations that require cleaner diesel fuel, restrict idling of diesel engines, and reduce emissions from both old and new on-road and off-road diesel engines. The Proposed Plan plans to invest $21 billion in discretionary revenue for transit infrastructure over the 24 years of the Plan period. Starting in 2016, BAAQMD would provide up to $5 million to support of reductions in PM emissions from goods movement (BAAQMD 2017:4/13). Between 2010 and 2015, BAAQMD spent approximately $300 million to support reductions in ROG, NO_X, PM, and CO_2 emissions in Bay Area communities through grants provided to local projects (BAAQMD 2017:4/9 through 4/10). Furthermore, BAAQMD implements a variety of incentive programs that help fleet operators offset the cost of purchasing low-emission vehicles; re-power old polluting heavy duty engines with cleaner, lower-emission engines; and install after-market emission control devices that reduce particulate and NO_X.

Conclusion

Table 2.2-12 shows the net new daily emissions that would occur in the region under the proposed Plan.

Table 2.2-12 Net Mobile- and Area-Source Emissions Anticipated under the Plan[1]

Source	ROG	NO_X[2]	CO	PM_{10}	$PM_{2.5}$
Mobile	-37	-76	-302	5	<1
Area	16	5	68	7	7
Total	**-21**	**-71**	**-234**	**12**	**7**
Increase from Existing?	No	No	No	Yes	Yes

Source: Data provided by Ascent Environmental, Inc. in 2017 based on modeling using CalEEMod 2016.3.1 and land use estimates from Metropolitan Transportation Commission.

[1] "New land uses" are the net change in land uses between 2015 and 2040 anticipated under the proposed Plan.
[2] Summertime emissions.

As shown in Table 2.2-12, the proposed Plan would result in a net decrease in ROG, NO_X, and CO emissions. However, there would be a net increase in PM emissions. Therefore, the proposed Plan could cause a net increase of emissions of criteria pollutants from mobile and area-sources compared to existing conditions. This impact would be **potentially significant (PS)**. Mitigation Measures 2.2-3(a) through 2.2-3(d) are presented below to help reduce PM emissions from mobile and area-sources.

Mitigation Measures

2.2-3(a) MTC and ABAG, in partnership with BAAQMD, and implementing agencies, shall use existing air quality and transportation funds and seek additional funds to continue to implement BAAQMD and ARB programs (e.g., Carl Moyer) aimed at retrofits and replacements of trucks and locomotives.

2.2-3(b) MTC and ABAG, in partnership with BAAQMD and the Port of Oakland, and other agency partners, shall work together to secure incentive funding to reduce mobile PM emissions from mobile exhaust and entrained PM sources such as tire wear, break wear, and roadway dust.

2.2-3(c) MTC and ABAG, in partnership with local air districts, and implementing agencies shall implement Mitigation Measures 2.1-3 (a) and 2.1-3 (b).

2.2-3(d) When screening levels are exceeded (see Table 2.2-8 or those most currently updated by BAAQMD), implementing agencies and/or project sponsors shall implement measures, where applicable, feasible, and

necessary based on project- and site-specific considerations, that include, but are not limited to the following or are updated by BAAQMD or within CalEEMod (**Table 2.2-13**):

Table 2.2-13 On-Model Measures: CalEEMod's Mitigation Measures are Based on the CAPCOA Measures

CalEEMod Traffic Tab: Land Use & Site Enhancement Measures (Designated by associated CAPCOA measure)		
LUT-1	Increase Density	Project more dense than typical developments
LUT-3	Increase Density	Different types of land uses are near each other
LUT-4	Improve Destination Accessibility	Project close to regional employment or destination center
LUT-5	Improve Destination Accessibility	Project near high-quality transit
LUT-6	Integrate Below Market Rate Housing	Incorporates affordable housing
LUT-9	Improve Walkability Design	Walkable street network
CalEEMod Traffic Tab: Neighborhood Enhancement Measures (Designated by associated CAPCOA measure)		
SDT-1	Improve Pedestrian Network	On-site pedestrian access network links all of project internally and externally
SDT-2	Provide Traffic Calming Measures	Projects streets and intersections feature traffic calming features
SDT-2	Implement NEV Network	Project provides a viable NEV network
CalEEMod Traffic Tab: Parking Policy/Pricing Measures (Designated by associated CAPCOA measure)		
PDT-1	Limit Parking Supply	Parking supply below ITE rates
PDT-2	Unbundle Parking Costs	Parking cost separate from property costs
CalEEMod Traffic Tab: Transit Improvement Measures (Designated by associated CAPCOA measure)		
TST-1	Provide BRT System	Establish a Bus Rapid Transit line with permanent operational funding stream
TST-3	Expand Transit Network	Establishes or enhances bus line with permanent operational funding stream
TST-4	Increase Transit Frequency	Reduces headways of existing transit
CalEEMod Traffic Tab: Commute Trip Measures (Designated by associated CAPCOA measure)		
TRT-1&2	Implement Trip Reduction Program	TMA membership or other comprehensive services
CalEEMod Energy Tab: Building Energy Measures (Designated by associated CAPCOA measure)		
BE-1	Exceed Title 24	Use less energy than allowed by Title 24
CalEEMod Energy Tab: Alternative Energy Measures (Designated by associated CAPCOA measure)		
AE-1	On-site Renewable Energy	Establish on-site renewable energy. (No Ozone Precursor reductions if NO_X intensity is higher than electric utility.)

Significance after Mitigation

The exact reductions from Mitigation Measure 2.2-3(a) through 2.2-3(c) are not known at this time.

The measure described above for individual projects (Mitigation Measure 2.2-3 (d) would reduce operational emissions. To the extent that an individual project adopts and implements all feasible mitigation measures described above, the project's impact would be less than significant with mitigation (LS-M).

Projects taking advantage of CEQA Streamlining provisions of SB 375 (Public Resources sections 21155.1, 21155.2, and 21159.28) must apply the mitigation measures described above to address site-specific conditions. However, MTC/ABAG cannot require local implementing agencies to adopt some or all of the above mitigation measures, and it is ultimately the responsibility of a lead agency to determine and adopt mitigation. Therefore, this impact remains **significant and unavoidable (SU)** for purposes of this program-level review.

Impact 2.2-4: Implementation of the proposed Plan could cause a cumulative net increase in emissions of toxic air contaminants, including diesel PM, 1,3-butadiene, and benzene, from on-road mobile sources compared to existing conditions.

Impacts of Changes in Projected Land Use and Transportation Projects

As explained under the Method of Analysis in Section 2.1, "Transportation," the EIR analysis of mobile sources and projected changes in VMT are based on transportation and land use forecasts developed using the MTC travel demand forecasting model, known as Travel Model One, with the land use forecasting model, known as Bay Area UrbanSim. The integrated model produced the key outputs used in assessing the significance of transportation and air quality impacts, such as VMT. Based on this modeling, it is estimated that implementation of the proposed Plan would result in a net increase in VMT (Table 2.2-6); however, as shown in Table 2.2-14, there would be a 93 percent decrease in diesel PM, a 65 percent decrease in 1,3-butadiene, and a 65 percent decrease in benzene compared to existing conditions. These reductions can be attributed to ARB regulations that control TACs, namely AB 1807 of 1983 that created the Toxic Air Contaminant Identification and Control Act, AB 2588 of 1987 that established the Air Toxics "Hot Spots" Information and Assessment Act, and SB 656 of 2003 that requires ARB and local Air Districts to identify control measures for PM. Other state regulations that reduce smog or other pollutants also reduce TACs, such as the standards for low emission vehicles, clean fuels, reformulated gasoline, diesel fuel specifications, and ARB's Heavy Duty Diesel Inspection Programs discussed above. In addition, there are a number of programs in place to address PM in general and TACs in particular, including ARB, BAAQMD, and Port of Oakland's Bay Area Goods Movement Program that provides financial incentives to owners of equipment used in freight movement to upgrade to cleaner technologies, and numerous Port of Oakland Clean Air Programs such as the Maritime Air Quality Improvement Plan, Comprehensive Truck Management Plan, Truck Air Quality Project, Vision 2000 Program and Air Emissions, and West Oakland Particulate Air Quality Monitoring Program.

Table 2.2-14 Emission Estimates for Toxic Air Contaminants Pollutants (kilograms per day)

	2015	2040	Change 2015 to 2040 Project		Change 2015 to 2040 Project
		Project	Numerical	Percent	Numerical
Diesel Particulate Matter	1,160	84	-1,076	-93%	-1,076
1,3 Butadiene	74	26	-48	-65%	-48
Benzene	349	124	-225	-65%	-225

Source: Metropolitan Transportation Commission 2017

Conclusion

Because the proposed Plan would result in a reduction in TAC emissions, there would be **a less than significant impact (LS)**.

Mitigation Measures

None required. However, see also mitigation measures for Impact 2.2-3, which would have co-benefits for addressing TAC emissions.

Impact 2.2-5: Implementation of the proposed Plan could result in a net increase in sensitive receptors located in Transit Priority Areas (TPA) where: (a) TACs or $PM_{2.5}$ concentrations result in cancer risk levels greater than 100 in a million or a concentration of $PM_{2.5}$ greater than 0.8 µg/m^3; or (b) TACs or $PM_{2.5}$ concentrations result in noncompliance with an adopted Community Risk Reduction Plan.

Impacts of Changes in Projected Land Use

The Plan would result in land use growth, including land uses that would locate sensitive receptors, throughout the Plan area. A local pollutant analysis performed by BAAQMD quantified and mapped the anticipated increased risk levels and $PM_{2.5}$ concentrations within TPAs throughout the Bay Area based on 2015 conditions. For the purposes of this impact analysis, existing conditions of cancer risk levels and TAC and $PM_{2.5}$ concentrations are considered worst-case conditions because pollutant emissions are expected to generally decrease under adopted regulations. Under the Plan, TPAs could include commercial and residential units that accommodate sensitive receptors, such as daycare facilities and nursing facilities. TAC and $PM_{2.5}$ sources that were evaluated in this analysis include freeways, high volume roadways, rail lines, refineries, chrome plating facilities, backup generators; gas stations, and numerous other air district-permitted stationary-sources.

As discussed under Methods of Analysis, a geospatial analysis was used to compile cancer risk levels and $PM_{2.5}$ concentrations associated with all stationary and mobile sources and identify areas in and within 1,000 feet of a TPA where the levels would exceed 100 in a million and/or $PM2_{.5}$ concentrations would exceed 0.8 µg/m^3. **Figures 2.2-3** through **2.2-13** below display the results of the GIS spatial analysis throughout the region. In general, the figures show that areas where these cancer risk levels and/or $PM_{2.5}$ concentrations are exceeded, referred to as TAC Risk Areas, tend to occur along high-volume freeways and roadways, high-use rail lines, locations near numerous stationary-sources, and locations where a single stationary-source has very high estimated cancer risk levels or $PM_{2.5}$ concentration.

As shown in the figures above, certain TPAs and growth areas, and any potential sensitive receptors within those areas, would be located in areas where increased cancer risk levels and/or $PM_{2.5}$ concentration exceed 0.8 µg/m^3. Although Impact 2.2-4 finds that TAC and diesel PM emissions would decrease through 2040 in the Plan area, it is possible that sensitive receptors may locate within the risk areas identified in Figures 2.2-3 through 2.2-13 in the future.

Additionally, in jurisdictions with an adopted CRRP, any proposed project that includes sensitive land uses and or receptors should be evaluated against the standards and mitigation measures in those adopted plans. MTC does not have the jurisdiction to require that new land uses under the proposed Plan be built in locations that would exceed TAC and PM concentrations deemed noncompliant by an applicable CRRP.

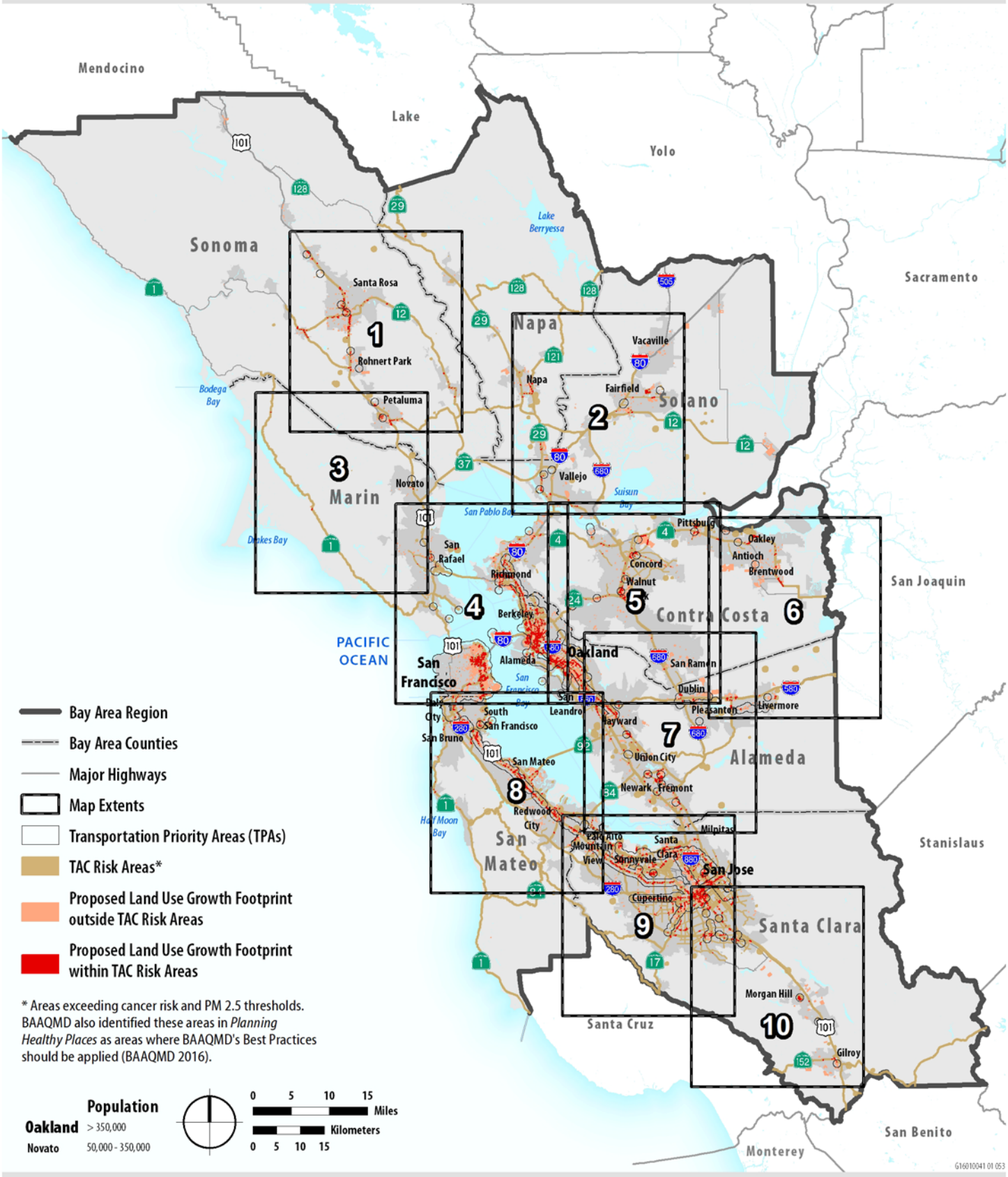
Impacts of Transportation Projects

The proposed Plan would result in additional traffic and congestion along existing corridors (see Section 2.1 "Transportation," and Section 2.6, "Noise"), and could result in localized increases in mobile-source TAC and $PM_{2.5}$ near existing sensitive receptors already located near existing corridors. These local increases could result in TAC and PM concentrations deemed noncompliant by an applicable CRRP.

Conclusion

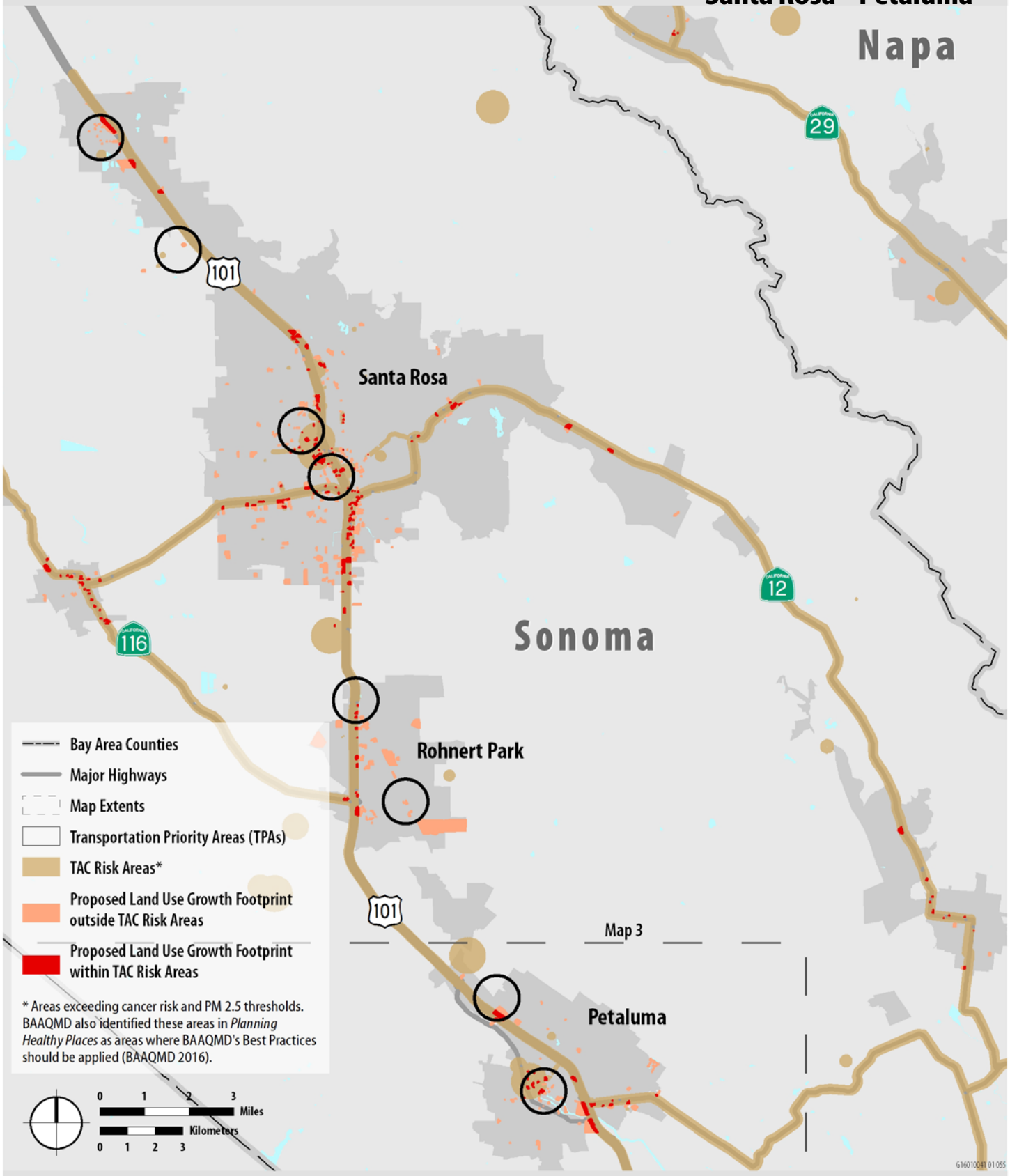
The proposed Plan could locate sensitive receptors in areas where TACs or fine particulate matter ($PM_{2.5}$) concentrations result in cancer risk levels greater than 100 in a million or a concentration of $PM_{2.5}$ greater than 0.8 micro grams (µg) per cubic meter (m^3), as mapped above, or where TACs or $PM_{2.5}$ concentrations are in noncompliance with an adopted CRRP. Thus, this impact would be **potentially significant (PS)**.

Figure 2.2-3
Bay Area Toxic Air Contaminant Impact Areas



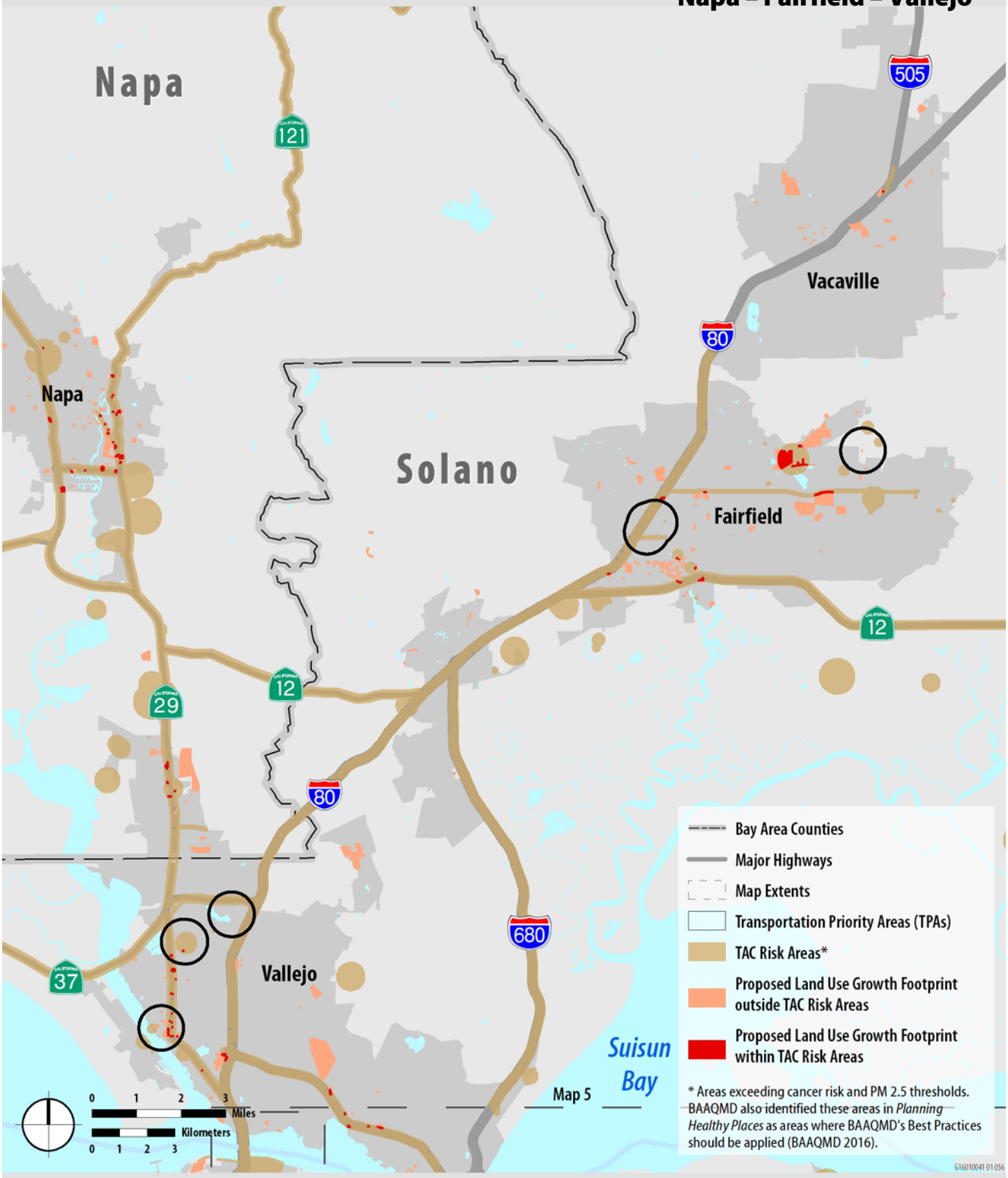
Map Data Sources: BAAQMD 2017; Metropolitan Transportation Commission (MTC), 2015, 2016; Tom Tom North America, 2015.

Figure 2.2-4
Bay Area Toxic Air Contaminant Impact Areas: (1) North Bay: Santa Rosa – Petaluma



Map Data Sources: BAAQMD 2017; Metropolitan Transportation Commission (MTC), 2015, 2016; Tom Tom North America, 2015.

Figure 2.2-5
Bay Area Toxic Air Contaminant Impact Areas: (2) North Bay: Napa – Fairfield – Vallejo

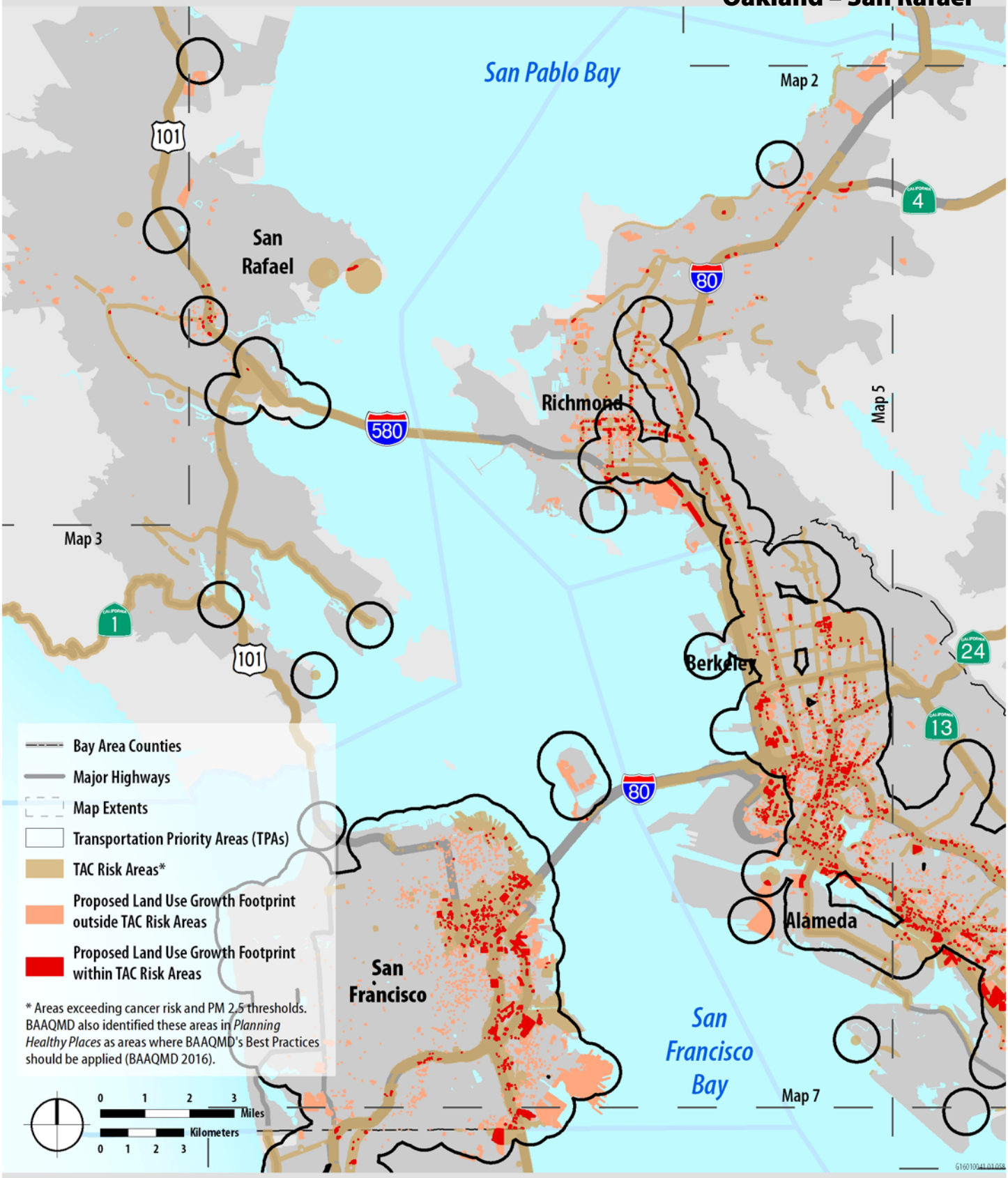


Map Data Sources: BAAQMD 2017; Metropolitan Transportation Commission (MTC), 2015, 2016; Tom Tom North America, 2015.

Figure 2.2-6
Bay Area Toxic Air Contaminant Impact Areas: (3) North Bay: Marin County

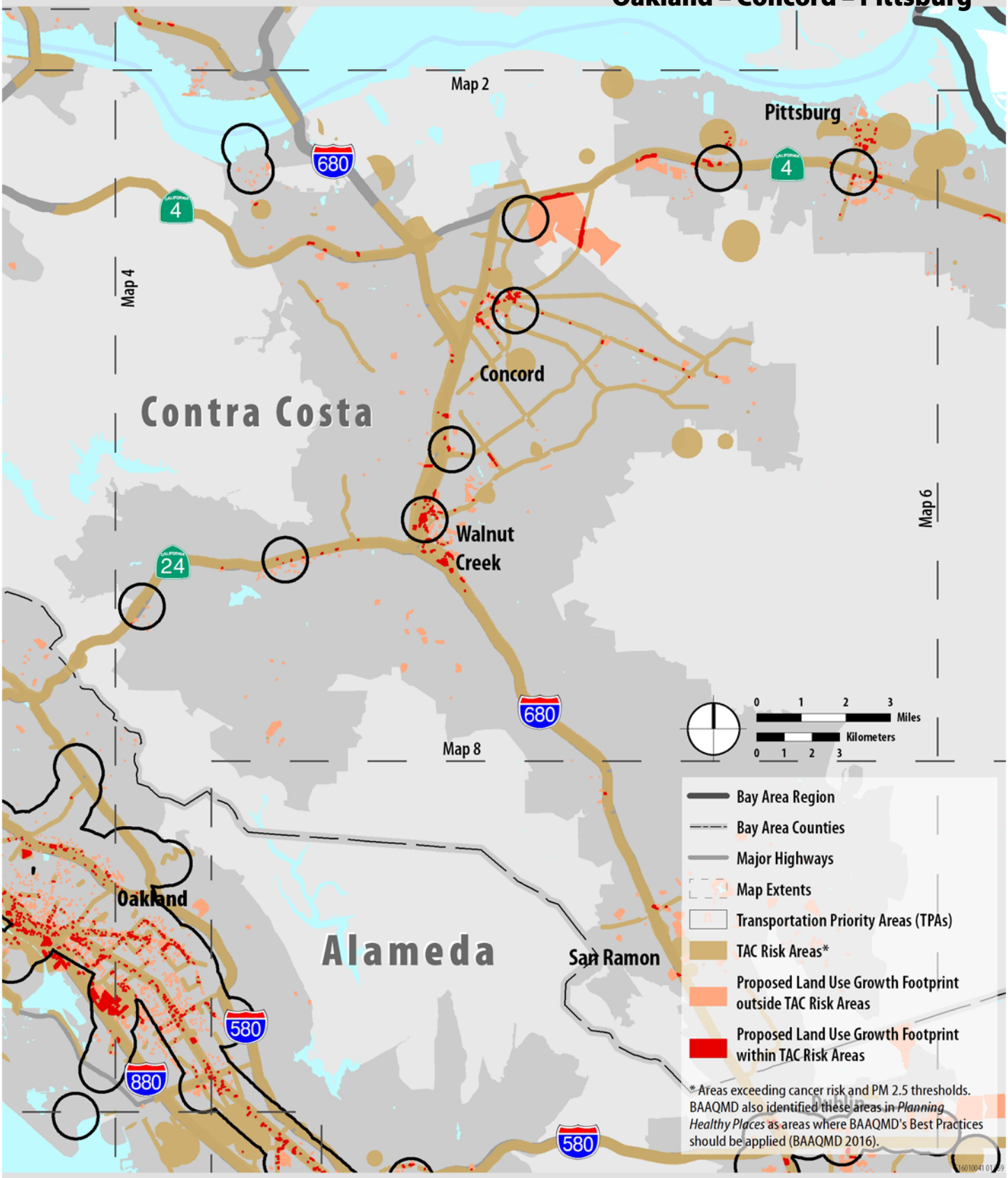
Map Data Sources: BAAQMD 2017; Metropolitan Transportation Commission (MTC), 2015, 2016; Tom Tom North America, 2015.

Figure 2.2-7
Bay Area Toxic Air Contaminant Impact Areas: (4) San Francisco – Oakland – San Rafael



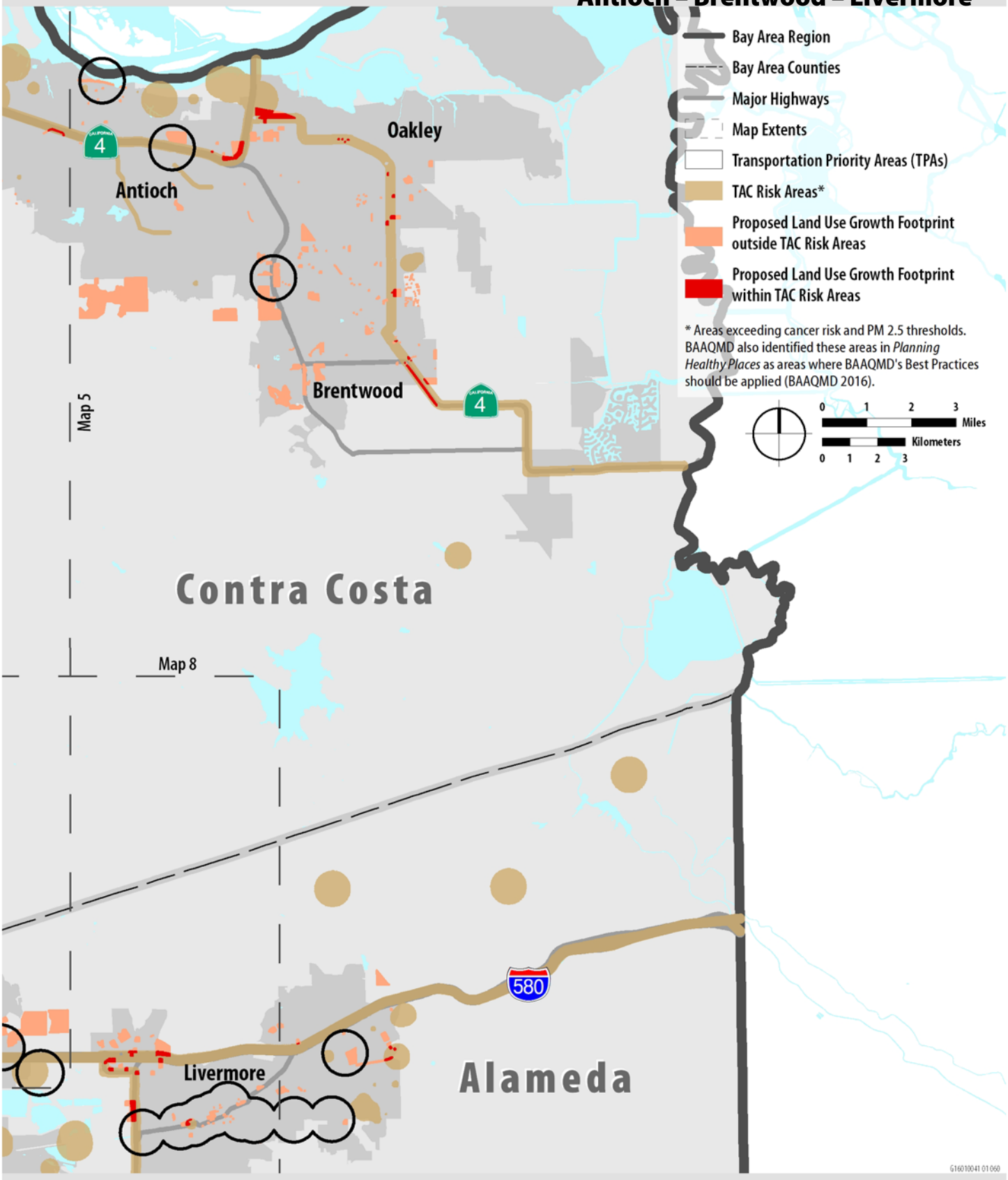
Map Data Sources: BAAQMD 2017; Metropolitan Transportation Commission (MTC), 2015, 2016; Tom Tom North America, 2015.

Figure 2.2-8
Bay Area Toxic Air Contaminant Impact Areas: (5) East Bay: Oakland – Concord – Pittsburg



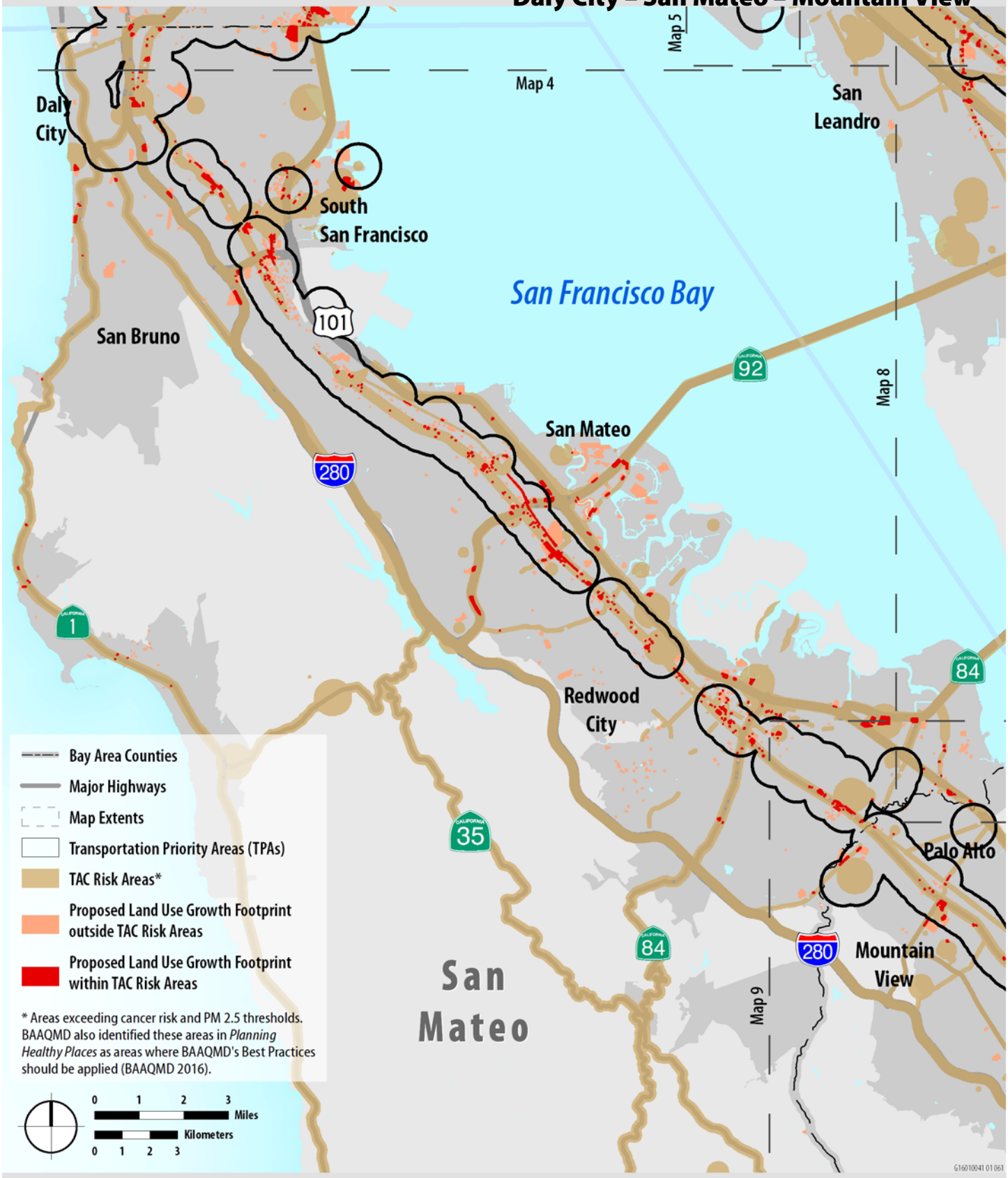
Map Data Sources: BAAQMD 2017; Metropolitan Transportation Commission (MTC), 2015, 2016; Tom Tom North America, 2015.

Figure 2.2-9
Bay Area Toxic Air Contaminant Impact Areas: (6) East Bay: Antioch – Brentwood – Livermore



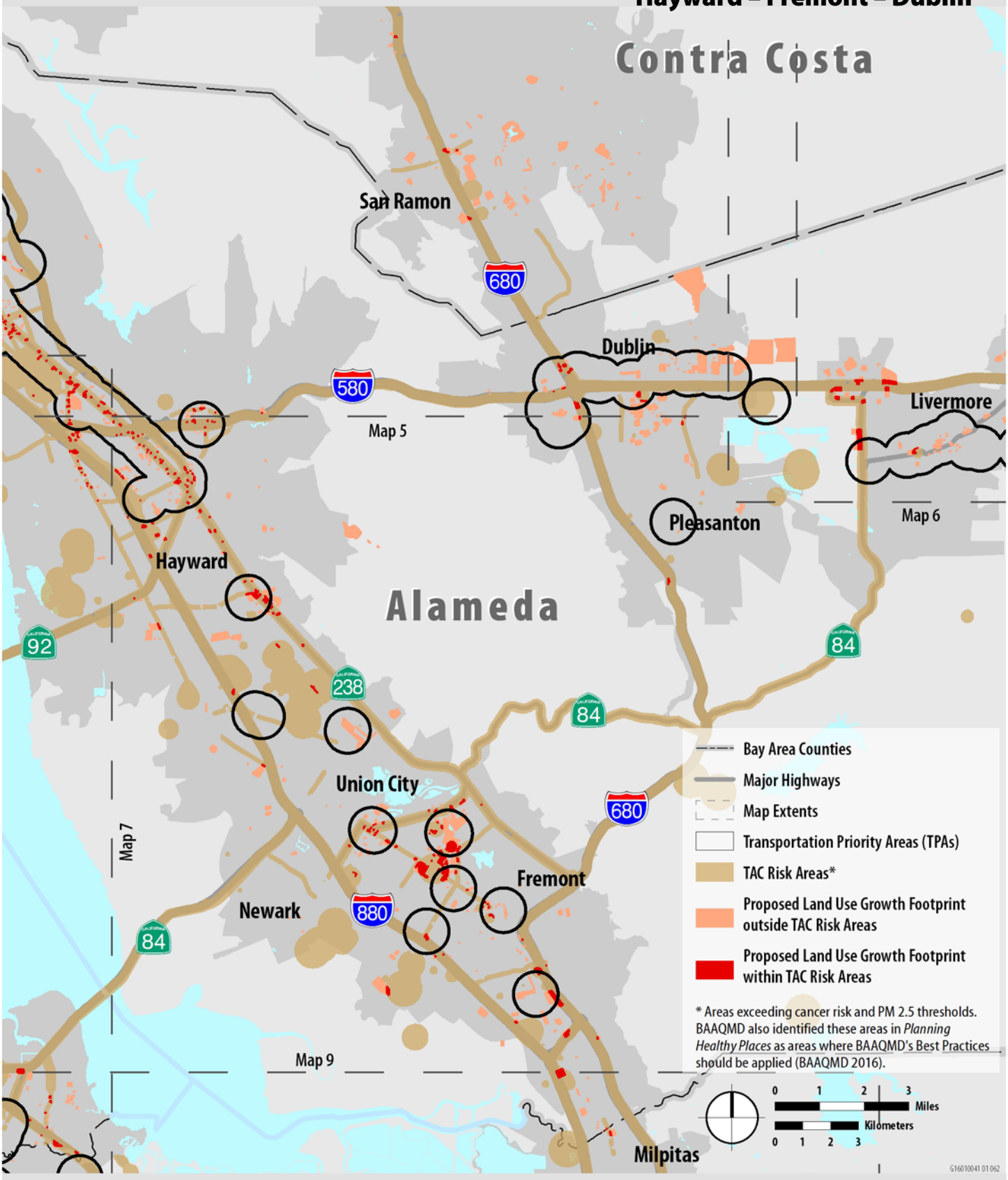
Map Data Sources: BAAQMD 2017; Metropolitan Transportation Commission (MTC), 2015, 2016; Tom Tom North America, 2015.

Figure 2.2-10
Bay Area Toxic Air Contaminant Impact Areas: (7) Peninsula: Daly City – San Mateo – Mountain View



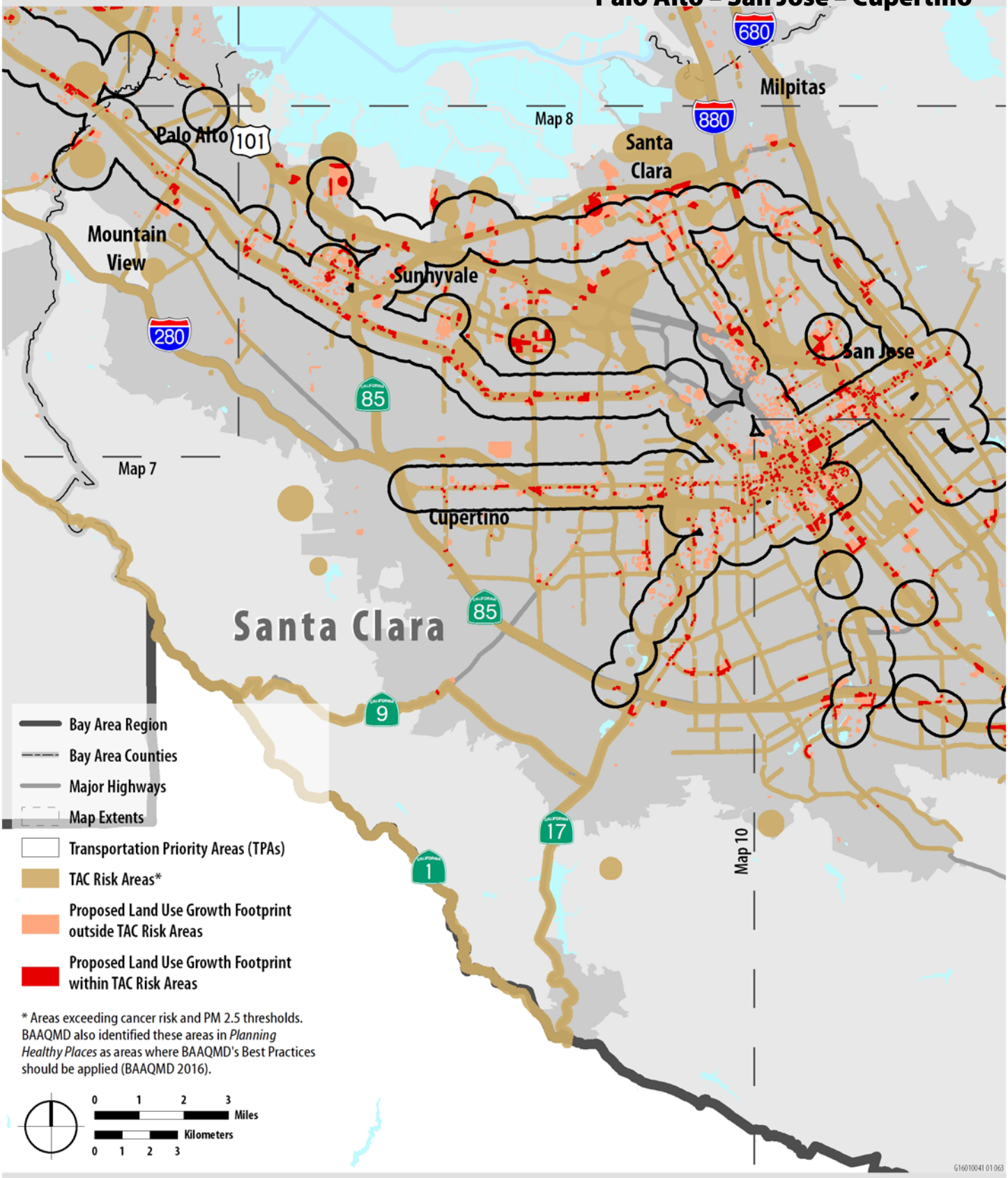
Map Data Sources: BAAQMD 2017; Metropolitan Transportation Commission (MTC), 2015, 2016; Tom Tom North America, 2015.

Figure 2.2-11
Bay Area Toxic Air Contaminant Impact Areas: (8) East Bay: Hayward – Fremont – Dublin



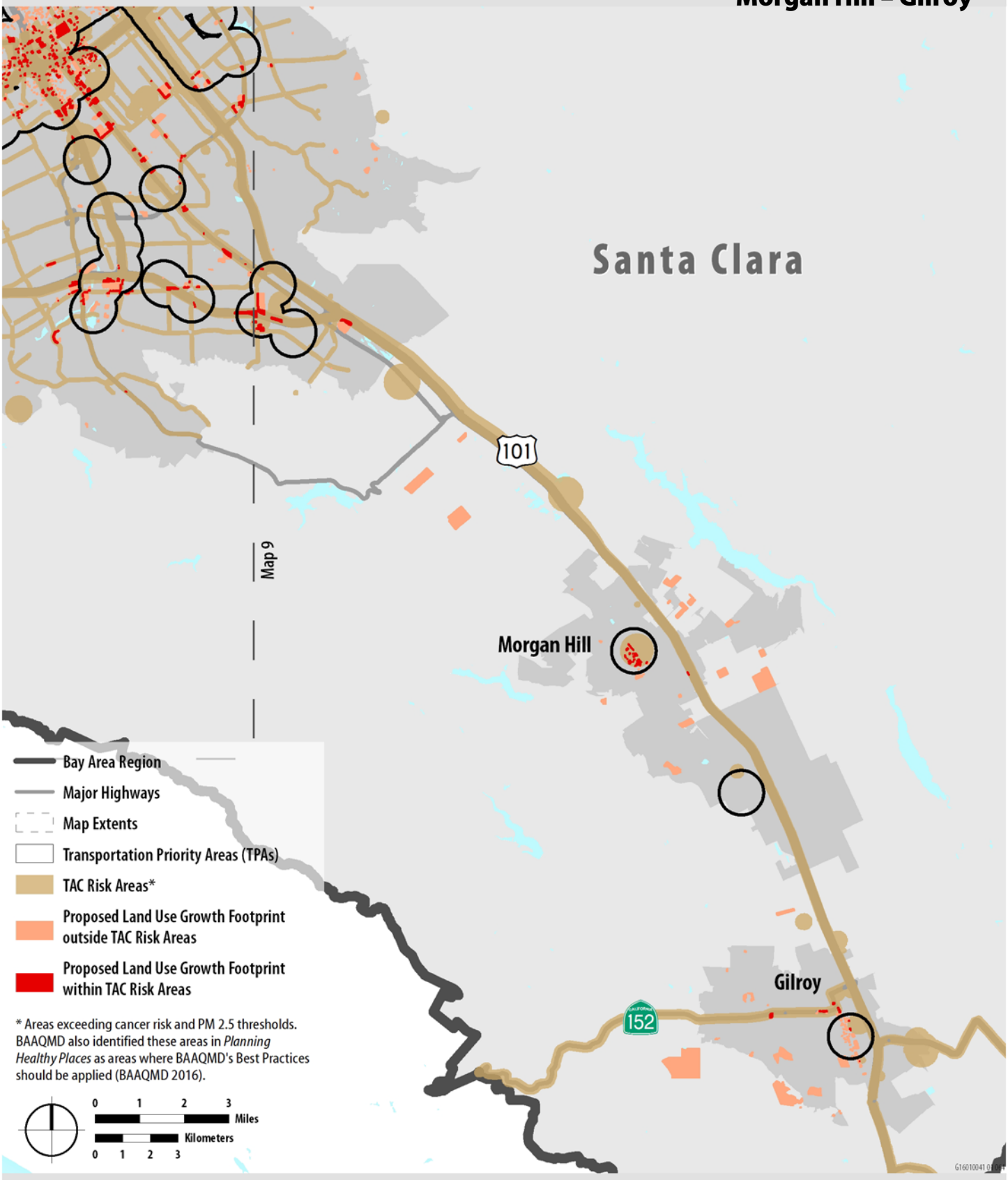
Map Data Sources: BAAQMD 2017; Metropolitan Transportation Commission (MTC), 2015, 2016; Tom Tom North America, 2015.

Figure 2.2-12
Bay Area Toxic Air Contaminant Impact Areas: (9) South Bay: Palo Alto – San Jose – Cupertino



Map Data Sources: BAAQMD 2017; Metropolitan Transportation Commission (MTC), 2015, 2016; Tom Tom North America, 2015.

Figure 2.2-13
Bay Area Toxic Air Contaminant Impact Areas: (10) South Bay: Morgan Hill – Gilroy



Map Data Sources: BAAQMD 2017; Metropolitan Transportation Commission (MTC), 2015, 2016; Tom Tom North America, 2015.

Mitigation Measures

2.2-5(a) When locating sensitive receptors in TAC risk areas, implementing agencies and/or project sponsors shall implement measures, where feasible and necessary based on project- and site-specific considerations that include, but are not limited to the following:

- Install, operate and maintain in good working order a central heating, ventilation and air conditioning (HVAC) system or other air intake system in the building, or in each individual unit, that meets or exceeds a minimum efficiency reporting value (MERV) of 13 (MERV-16 for projects located in the West Oakland Specific Plan area) or higher. The HVAC system shall include the following features: Installation of a high efficiency filter and/or carbon filter to filter particulates and other chemical matter from entering the building. Either high efficiency particulate air (HEPA) filters or American Society of Heating, Refrigeration, and Air-Conditioning Engineers (ASHRAE) certified 85% supply filters shall be used.

- Maintain, repair and/or replace HVAC system on an ongoing and as needed basis or shall prepare an operation and maintenance manual for the HVAC system and the filter. The manual shall include the operating instructions and the maintenance and replacement schedule. This manual shall be included in the Covenants, Conditions and Restrictions (CC&Rs) for residential projects and/or distributed to the building maintenance staff. In addition, the applicant shall prepare a separate homeowners manual. The manual shall contain the operating instructions and the maintenance and replacement schedule for the HVAC system and the filters.

- Install passive electrostatic filtering systems with low air velocities (i.e., less than 1 mph).

- Individual and common exterior open space and outdoor activity areas proposed as part of individual projects shall be located as far away as possible within the project site boundary, face away major freeways, and shall be shielded from the source (i.e., the roadway) of air pollution by buildings or otherwise buffered to further reduce air pollution for project occupants.

- Locate air intakes and design windows to reduce PM exposure (e.g., windows nearest to the roadway do not open).

- If sensitive receptors are located near a distribution center, residents shall not be located immediately adjacent to a loading dock or where trucks concentrate to deliver goods.

- Sensitive receptors within buildings shall be located in areas upwind of major roadway traffic to reduce exposure to reduce cancer risk levels and exposure to $PM_{2.5}$.

- Planting trees and/or vegetation between sensitive receptors and pollution source. Trees that are best suited to trapping PM shall be planted, including one or more of the following species: Pine (*Pinus nigra* var. *maritima*), Cypress (*X Cupressocyparis leylandii*), Hybrid popular (*Populus deltoids X trichocarpa*), California pepper tree (*Schinus molle)* and Redwoods *(Sequoia sempervirens*).

- Loading docks shall be required to include electric hookups for visiting trucks.

- Idling of heavy duty diesel trucks at these locations shall be prohibited or limited to no more than 2 minutes.

- If within the project site, existing and new diesel generators shall meet ARB's Tier 4 emission standards.

- Emissions from diesel trucks shall be reduced through establishing truck routes to avoid residential neighborhoods or other land uses serving sensitive populations, such as hospitals, schools, and child care centers. A truck route program, along with truck calming, parking and delivery restrictions, shall be implemented to direct traffic activity at non-permitted sources and large construction projects.

These BMPs are consistent with recommendations in BAAQMD's CEQA guidelines and *Planning Healthy Places* (BAAQMD 2011, BAAQMD 2016).

Significance after Mitigation

The mitigation measures described above would reduce exposure of new sensitive receptors to levels of cancer risk and $PM_{2.5}$ concentration reductions of 40 to 90 percent, depending on their applicability to a proposed project. See Appendix D for more information on the effectiveness of each mitigation measure.

Projects taking advantage of CEQA Streamlining provisions of SB 375 (Public Resources Code sections 21155.1, 21155.2, and 21159.28) must apply the mitigation measures described above, as feasible, to address site-specific conditions. Additional site-specific analysis would be needed when a project is proposed in these areas to determine the actual level of exposure and whether feasible mitigation exists for the project to implement to reduce its level of cancer risk exposure to less than 100 in a million and $PM_{2.5}$ concentrations less than 0.8 $\mu g/m^3$. To the extent that an individual project adopts and implements all feasible mitigation measures described above, the project's impact would be less than significant with mitigation (LS-M).

Moreover, MTC/ABAG cannot require local implementing agencies to adopt the above mitigation measures, and it is ultimately the responsibility of a lead agency to determine and adopt mitigation. Further, there may be instances in which site-specific or project-specific conditions preclude the reduction of all project impacts to less-than-significant the exposure criteria (as described above). Therefore, this impact would be **significant and unavoidable (SU)** for purposes of this program-level review.

Impact 2.2-6: Implementation of the proposed Plan could result in changes in TAC and or $PM_{2.5}$ exposure levels that disproportionally impact minority and low-income populations.

Impacts of Changes in Projected Land Use and Transportation Projects

The method of analysis described above was used to determine if the investments and land use scenario would result in a larger increase or smaller decrease in TAC and $PM_{2.5}$ emissions in disproportionately impacted communities when compared to the Bay Area at large. TAC and $PM_{2.5}$ emissions were estimated along the major transportation corridors within the CARE communities for the proposed Plan's base year (2015) and the horizon year (2040).

Table 2.2-15 lists MTC's modeling results, expressed as a percentage change in TAC, $PM_{2.5}$ exhaust, and total $PM_{2.5}$ emissions when compared to the base year emissions for each county with a CARE community and the entire region. Overall TAC and $PM_{2.5}$ exhaust emissions from diesel and gasoline vehicles decrease throughout the Bay Area between existing conditions in 2015 and the proposed Plan's horizon year 2040. Region-wide diesel PM; benzene; and 1, 3 butadiene TAC emissions from on-road vehicle exhaust are estimated to decrease between 63 and 93 percent. Region-wide $PM_{2.5}$ emissions from all on-road vehicle exhaust are expected to decrease by approximately 86 percent. These reductions are largely attributed to the implementation of ARB's On-Road Heavy-Duty Diesel Vehicle Regulations, which aims to reduce eligible vehicle's diesel PM emissions by up to 85 percent by 2023 from 1998 conditions (ARB 2015c:1,4).

The reductions in $PM_{2.5}$ and TACs from vehicle exhaust expected from 2015 to 2040 within CARE communities and within areas without CARE status vary by county. Areas without CARE status are considered non-CARE communities. In some counties, non-CARE communities are estimated to have higher $PM_{2.5}$ and TAC exhaust emission reductions than the CARE communities. In the case of Contra Costa County, these results may be explained by the increase expected in VMT within the county's CARE community when compared to the anticipated increase in VMT for the remainder of the county. Conversely, other counties, including Solano County, have CARE communities that are expected to exhibit slightly higher reductions in $PM_{2.5}$ and TACs than other CARE communities, proportional to the changes in VMT. While the differences in percent reductions in estimated $PM_{2.5}$ and TAC emissions are not substantial between CARE and non-CARE communities, the differences suggest that some minority and low-income communities may not experience as much reduction in $PM_{2.5}$ and TAC emission as other areas. On a region-wide basis, there would be less reductions in $PM_{2.5}$ and TAC from vehicle exhaust in CARE communities than in non-CARE communities.

Table 2.2-15 Percent Change in On-Road Mobile Source Exhaust Emissions, Years 2015 - 2040

County	CARE Status	Exhaust Emissions				Total $PM_{2.5}$[1]	VMT
		Exhaust Only $PM_{2.5}$	Diesel PM	Benzene	1, 3 Butadiene		
Alameda	CARE Community	-87%	-93%	-63%	-64%	<1%	24%
	Remainder of County	-87%	-93%	-66%	-66%	2%	23%
Contra Costa	CARE Community	-84%	-91%	-64%	-65%	7%	25%
	Remainder of County	-87%	-93%	-68%	-68%	-3%	14%
Marin	Entire County[2]	-88%	-94%	-70%	-69%	-6%	13%
Napa	Entire County[2]	-88%	-93%	-72%	-73%	2%	22%
San Mateo	Entire County[2]	-89%	-94%	-48%	-45%	-7%	14%
Santa Clara	CARE Community	-85%	-92%	-63%	-64%	7%	27%
	Remainder of County	-85%	-92%	-63%	-64%	8%	29%
Solano	CARE Community	-87%	-93%	-63%	-63%	-2%	17%
	Remainder of County	-84%	-93%	-60%	-59%	9%	25%
Sonoma	Entire County[2]	-88%	-94%	-73%	-74%	4%	24%
Regional Total	**CARE Community**	**-86%**	**-93%**	**-62%**	**-63%**	**3%**	**25%**
	Remainder of Region	**-87%**	**-93%**	**-63%**	**-63%**	**2%**	**22%**
	Total	**-86%**	**-93%**	**-63%**	**-63%**	**2%**	**23%**

Notes: CARE = Community Air Risk Evaluation, $PM_{2.5}$ = fine particulate matter, PM = particulate matter, VMT = vehicle miles travelled

Numbers rounded to nearest whole number

Source: Metropolitan Transportation Commission 2017

[1] Total $PM_{2.5}$ includes vehicle exhaust, re-entrained road dust, tire and brake wear.

[2] County does not have CARE-designated areas

Total $PM_{2.5}$ includes exhaust from all vehicles, as well as re-entrained road dust, brake wear and tire wear, and does not include TACs from gasoline vehicles. Brake wear and tire wear emission rates are estimated in EMFAC2014. Road dust emissions are estimated from ARB's paved road dust methodology, which is based on EPA's dust emission rates estimates (EPA, AP-42 13.2.1, January 2011).

When all sources of $PM_{2.5}$ are aggregated, the anticipated $PM_{2.5}$ emissions would increase over existing conditions by 2.2 percent, across all counties. Increases in total $PM_{2.5}$ emissions are generally slightly higher for CARE communities than non-CARE communities, except for Solano County. However, some non-CARE communities, such as Marin and San Mateo, would see an overall reduction in total $PM_{2.5}$ emissions.

This outcome may be explained by a number of factors. Emissions from gasoline and diesel on-road vehicles have been substantially reduced by stringent State and federal exhaust emission standards. ARB on-road Heavy-Duty Diesel Regulations are expected to reduce diesel PM by 85 percent by 2020 from 1998 conditions. According to EMFAC 2014 model runs for the MTC region, brake and tire wear from passenger vehicles is expected to represent approximately 94 percent of $PM_{2.5}$ from vehicles by 2040. At the time of this writing, no regulations have been adopted that would reduce future levels of particulate matter from tire and brake wear and re-entrained road dust emissions (ARB 2015d). Therefore, EMFAC2014 does not consider any improvements in brake and tire wear and re-entrained road dust emissions in future year's emission estimates. This means that as VMT increases, so would $PM_{2.5}$ emissions from brake and tire wear and re-entrained road dust.

Conclusion

Although exhaust-related emissions would decrease in the region between 2015 and 2040, the CARE communities in the region would experience higher total $PM_{2.5}$ emissions between 2015 and 2040 in comparison with non-CARE portions of the Region. Total $PM_{2.5}$ emissions would also increase in the Plan area as a whole. The projected increase of $PM_{2.5}$ emissions in the CARE communities from 2015 to 2040 would result in a **potentially significant (PS)** impact would occur based on the impact criteria for disproportionally impacted communities. Mitigation measures 2.2-6 (a) through 2.2-6 (d) are described below.

Mitigation Measures

2.2-6(a) MTC/ABAG shall partner with BAAQMD and local lead agencies to develop a program to install air filtration devices in existing residential buildings, and other buildings with sensitive receptors, located near freeways or sources of TACs and $PM_{2.5}$.

2.2-6(b) MTC/ABAG shall partner with BAAQMD to develop a program to provide incentives to replace older locomotives and trucks in the region to reduce TACs and $PM_{2.5}$.

2.2-6(c) MTC and ABAG, in partnership with local air districts, and implementing agencies shall implement Mitigation Measures 2.1-3 (a) and 2.1-3 (b).

2.2-6 (d) Implement measure 2.2-5.

Significance after Mitigation

The proposed Plan could result in changes in TAC and or $PM_{2.5}$ exposure levels that disproportionally impact minority and low-income communities. These impacts would vary across counties. The mitigation measures identified above would result in less emissions in and lower exposure levels to the minority and low-income communities. However, the exact reductions are not known at this time. Therefore, this impact would remain significant and unavoidable (SU).

Projects taking advantage of CEQA Streamlining provisions of SB 375 (Public Resources sections 21155.1, 21155.2, and 21159.28) must apply the mitigation measures described above, to address site-specific conditions. However, MTC/ABAG cannot require local implementing agencies to adopt some or all of the above mitigation measures, and it is ultimately the responsibility of a lead agency to determine and adopt mitigation. Therefore, this impact remains **significant and unavoidable (SU)** for purposes of this program-level review.

Impact 2.2-7: Implementation of the proposed Plan could result in a substantial emissions of objectionable odors.

Impacts of Changes in Projected Land Use and Transportation Projects

The occurrence and severity of odor impacts depends on numerous factors, including: the nature, frequency, and intensity of the source; wind speed and direction; and the sensitivity of the receptors. While offensive odors rarely cause any physical harm, they still can be unpleasant, leading to distress among members of the public.

Potential odor effects of the proposed Plan related to construction are generally regional in nature. Construction equipment and processes are generally similar between land use and transportation projects, except that transportation projects could result in more paving and concrete activity and tend to be larger than land use projects. This impact discussion considers the combination of land use and transportation project construction.

Projected development associated with the proposed Plan is generally related to new housing, commercial facilities, and transportation-related projects (e.g., extension of rail, widening of roadways, improvements to interchanges). These types of projects typically would not introduce new operational sources of odors to the area. However, facilities that may emit objectionable odors, would be subject to local zoning designations that limit odiferous businesses to areas where substantial numbers of residents or other sensitive receptors would

not be affected (e.g., commercial areas). Furthermore, BAAQMD Regulation 7, Odorous Substances, places general limitations on odorous substances and specific emission limitations on certain odorous compounds. The regulation also provides a process for receiving odor complaints, identifying sources of objectionable odors, and assisting the owner or facility responsible for the odor to find a way to reduce emissions.

Project-related construction activities could result in odorous diesel exhaust emissions from construction equipment and odors associated with asphalt paving. These types of construction-generated odorous emissions, however, would be temporary and not be generated at any one location for an extended period. Diesel exhaust fumes would also dissipate rapidly from the source with an increase in distance. Therefore, these activities would not result in the frequent exposure of receptors to objectionable odorous emissions and this would be a less-than-significant (LS) impact.

Conclusion

Because objectionable odors associated with construction of the proposed Plan would be regulated through BAAQMD regulations or would otherwise be temporary and because operational uses would be subject to local zoning ordinances as well as local air district permitting processes, this impact would be **less than significant (LS).** No mitigation is required.

Mitigation Measures

None required.

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2.3 LAND USE AND PHYSICAL DEVELOPMENT

This section evaluates the potential effects of the proposed Plan on land use and housing in the Bay Area. It describes trends in overall land use and physical development, including job and housing growth, and agricultural lands. The impact analysis addresses the potential for physical disruption to land uses, displacement of people or housing, loss of agricultural lands and forest lands, and division or separation of communities. In addition, the proposed Plan's consistency with adopted land use plans and policies is addressed (see the discussion under Impact 2.3-3, below).

Comment letters received in response to the Notice of Preparation included requests for consideration of the coastal zone, planned developments including high speed rail routes, jobs to housing balance, low income housing, removal of existing residential units, and transportation and development corridors. Project elements such as land use strategies to address the job to housing ratio and low-income populations and the development of the transportation projects are addressed in Section 1.2, "Project Description." Displacement of existing uses is discussed under Impact 2.3-1 in this section.

Consistency with Natural Community Conservation Plans and Habitat Conservation Plans is addressed in Section 2.9, "Biological Resources." Consistency with Airport Land Use Compatibility Plans is addressed in Section 2.13, "Hazards."

2.3.1 Environmental Setting

PHYSICAL SETTING

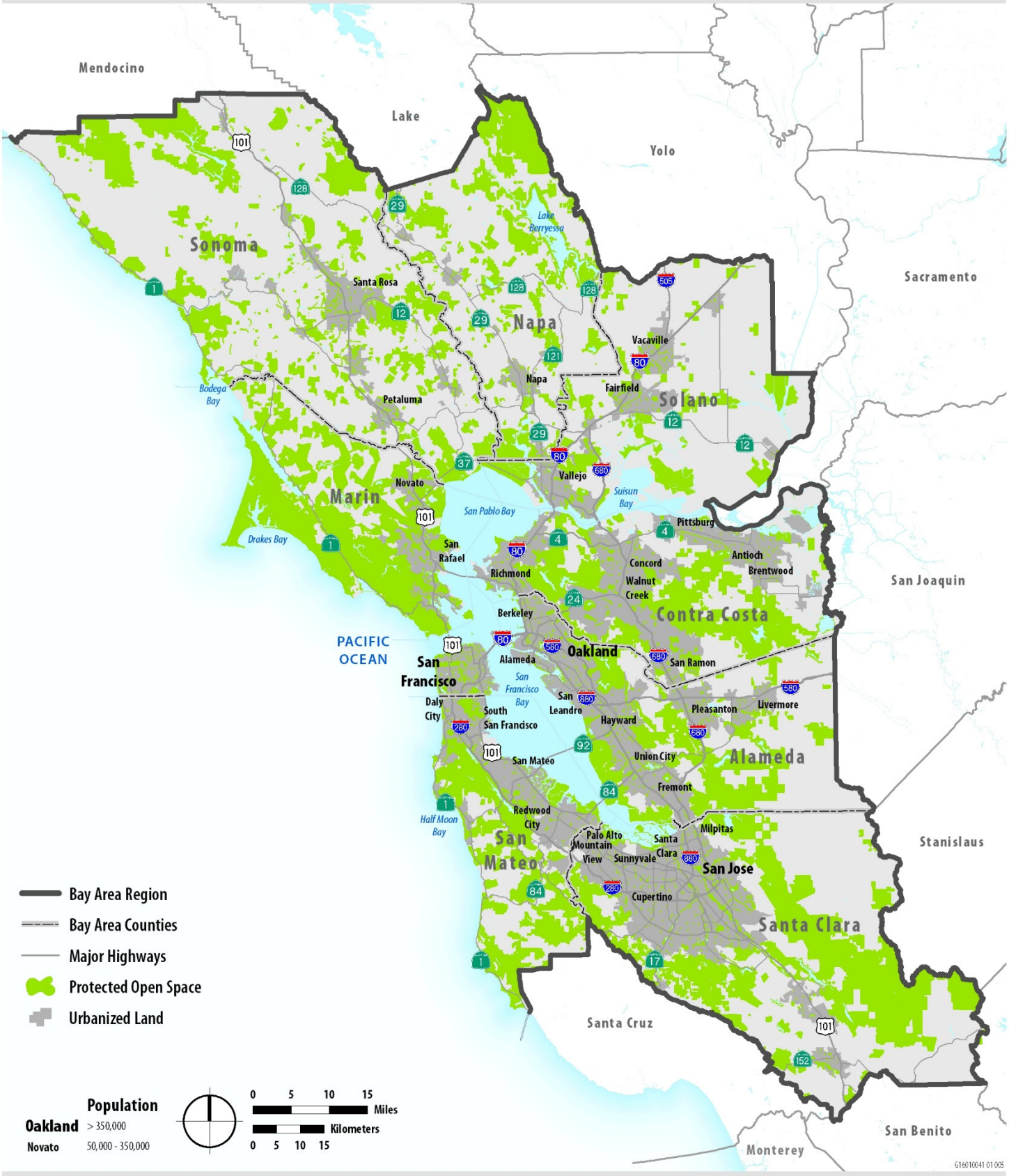
Land Use Patterns

The pattern of land uses in the Bay Area includes a mix of open space, agriculture, developed urban centers, a variety of suburban commercial and residential areas, and scattered older towns. This pattern reflects the landforms that physically define the region; the Bay, rivers, and valleys. The land uses surrounding the Bay margins tend to be more intensely developed, particularly from San Francisco south along the Peninsula to Santa Clara County, and Contra Costa County south through Alameda County to Santa Clara County. These areas also include extensive networks of open space. The counties north of the Bay (Marin, Sonoma, Napa) are more sparsely developed with a combination of suburban development, smaller cities and towns, and agriculture defining the landscape. Other areas of the Bay Area, such as the East Bay (away from the Bay margins) and Solano County further to the east, tend to be more suburban in character, with heavy industry related to oil refineries dotting the landscape as well as large swaths of agriculture. These are general characterizations, and do not capture all land use types or patterns associated with the nine counties and 101 cities that make up the Plan area.

Extent of Urban Development

According to the most recent data (available from 2012 and 2014), approximately 18 percent of the region's approximately 4.8 million acres were considered to be urban or built-up land according to the California Farmland Mapping and Monitoring Program (FMMP) (California Department of Conservation [DOC] 2015, Bay Area Open Space Council 2014). The remaining undeveloped area includes open space and agricultural lands as well as water bodies (excluding the San Francisco Bay) and parks. Approximately 29 percent of the region is identified as protected open space (Bay Area Open Space Council 2014). The amount of urban and built-up land according to FMMP, in each of the nine counties, varies from a low of five percent in Napa County to a high of 80 percent in San Francisco (DOC 2015, see Table 1.2-9). The Bay Area includes 101 cities, with San Jose, San Francisco, and Oakland representing the largest urbanized centers. Other major urban centers have formed throughout the region leading to a pattern of urban land and open space as illustrated in **Figure 2.3-1**. As shown in **Table 2.3-1**, the counties with the highest job totals are Santa Clara, Alameda, and San Francisco counties, while the counties with the highest population are Santa Clara, Alameda, and Contra Costa counties.

Figure 2.3-1
Urban Land and Open Space



Map Data Sources: California Conservation Easement Database, 2015; California Protected Areas Database, 2016; Metropolitan Transportation Commission (MTC), 2016; Tom Tom North America, 2015.

Table 2.3-1 2015 Jobs, Housing, and Population, by Region and County

County	Jobs	% in TPA	Households	% in TPA	Population
Alameda	829,000	57%	585,000	52%	1,619,000
Contra Costa	408,000	21%	387,000	13%	1,093,000
Marin	133,000	31%	107,000	10%	257,000
Napa	70,000	0%	49,000	0%	137,000
San Francisco	746,000	100%	389,000	99%	906,000
San Mateo	396,000	41%	271,000	40%	757,000
Santa Clara	1,068,000	52%	649,000	39%	1,905,000
Solano	137,000	10%	141,000	5%	414,000
Sonoma	223,000	11%	183,000	7%	483,000
Regional Total	**4,010,000**	**52%**	**2,760,000**	**41%**	**7,571,000**

Note: Whole numbers have been rounded (between 0 and 10 to the nearest whole number, between 11 and 999 to the nearest 10, between 1,000 and 1,000,000 to the nearest 100, over 10,000 to the nearest 1,000).

Source: California Department of Finance 2016; EDD 2016

HOUSING STOCK

The following discussion is summarized from the proposed Plan document. For more information, please see the full document available at www.mtc.ca.gov.

Currently, the Bay Area does not contain enough housing, market-rate or affordable, to accommodate the growing number of residents and jobs. This is because of several factors including the length of time it takes to secure development approvals at the local level, reduced support from state and federal government for affordable housing, and strong demand driven by exceptional regional economic performance. Relatively high salaries and job growth in the fast-growing technology industry, for example, coupled with limited growth in housing supply has driven up the cost of housing at a rapid pace. Today the Bay Area has one of the most severe housing crises of the nation's large metro areas and there are limited policy tools to help address the problem at a regional level. Please see the proposed Plan document for more information related to these issues.

In particular there has been a mismatch between growth in job levels and growth in housing supply. The Bay Area has added nearly two jobs for every housing unit built since 1990. This deficit in housing production has been most substantial in jobs-rich parts of the region, especially in high-income areas along the Peninsula and in Silicon Valley. Coming out of the recent economic downturn, the booming regional economy combined with increased household formation among the millennial generation has contributed to an ever-more acute housing shortage.

The lack of new housing supply combined with increasing job opportunities, growing population levels, and a growing disparity between high- and low-household income levels have been major contributors to rising housing prices. With the increased number of higher income households and most income growth going to the top 20 percent of earners, demand for housing has remained very strong at the upper end of the market. Conversely it has become more difficult for low- and middle-wage households to compete for market-rate housing as a larger pool of high-wage workers bid up a limited housing supply. Housing has become increasingly more expensive for lower- and middle-income households, which has further intensified competition for limited affordable housing opportunities.

COASTAL BAY LAND USES

The Coastal Commission and the Bay Conservation and Development Commission (BCDC) regulate land use near the coastline and along the Bay (respectively) to protect and enhance the coastline and to promote public access within the coastal zone of California. On land, the coastal zone varies in width from several hundred feet in highly urbanized areas to up to 5 miles in certain rural areas, and offshore, the coastal zone extends along a

3-mile-wide band of ocean, as shown on **Figure 2.3-2**. The coastal zone established by the California Coastal Act does not include San Francisco Bay, where development is regulated by the BCDC. More information on how these agencies regulate uses near the coast is addressed in the *Regulatory Setting* section below.

AGRICULTURAL LAND

Current and Historical Agricultural Uses

The Bay Area has a substantial amount of land in agricultural uses. In 2012, approximately half of the region's approximately 4.5 million acres were classified as agricultural land, as defined by the California Department of Conservation Farmland Mapping and Monitoring Program (DOC 2015) (the most comprehensive source of regional agricultural land data). Of these approximately 2.3 million acres of agricultural land, over 70 percent (about 1.7 million acres) are used for grazing. Products grown in the Bay Area include field crops, fruit and nut crops, seed crops, vegetable crops and nursery products. Field crops, which include corn, wheat, and oats, as well as pasture lands, represent approximately 62 percent of Bay Area agricultural land (DOC 2015, U.S. Census of Agriculture 2012).

Table 2.3-2 shows the acres of agricultural lands, by farmland type, for each county in the region, excluding San Francisco County. **Figure 2.3-3** shows the location of these agricultural lands within the region. The classification of agricultural lands is based primarily on soils and climate, though Prime Farmland, Farmland of Statewide Importance, and Unique Farmland must have been used for agricultural production at some time during the previous four years. When new data is released, map reviewers, including city and county planning departments, are notified of their availability. Maps prepared under the FMMP are reviewed at the local level for accuracy of land use classification and delineation. For example, the Contra Costa County 2014 Field Review reflected local review comments provided by the City of Antioch (DOC 2016a); the Santa Clara 2014 Field Review reflected local review comments provided by the Cities of Milpitas and Sunnyvale (DOC 2016b); and the 2014 Field Report for Sonoma County reflected local review comments from the Cities of Santa Rosa and Cloverdale (DOC 2016c). For more information about farmland classification, see the discussion under the *Regulatory Setting* section below.

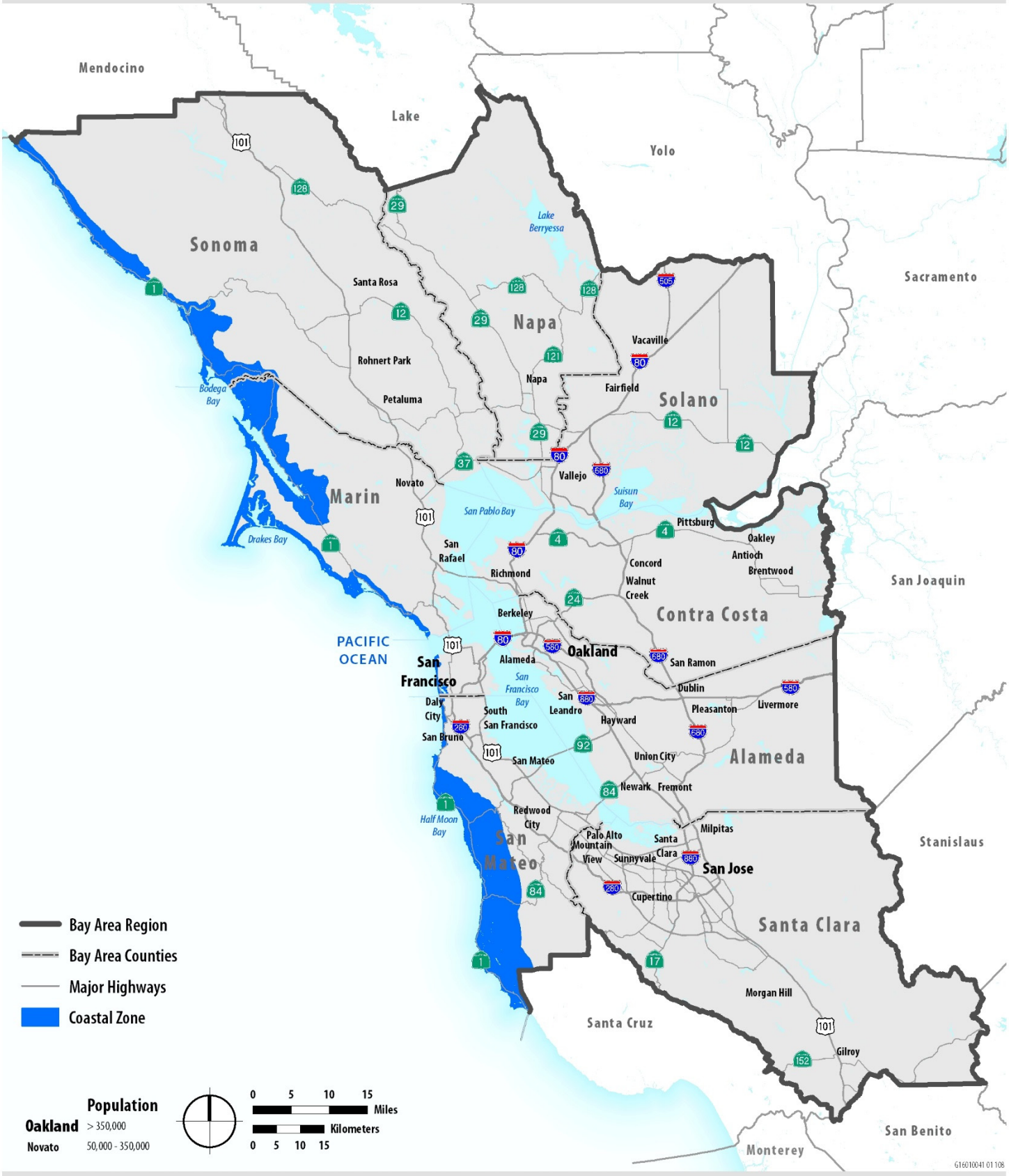
Williamson Act Lands

In 1965, the State Legislature passed the California Land Conservation Act (better known as the Williamson Act) in response to agricultural property tax burdens resulting from rapid land value appreciation. Rapidly rising property taxes, resulting from nearby urbanization, made agricultural uses increasingly less economically viable. See the discussion under Section "Regulatory Settings" of this section for a comprehensive description of the Williamson Act.

Agricultural land under Williamson Act contract includes both "prime" and "nonprime" lands. The California Land Conservation Acts defines prime agricultural land as: (1) U.S. Department of Agriculture (USDA) Class I or II soils; (2) Storie Index soil rating 80 to 100; (3) land that has returned a predetermined annual gross value for three of the past 5 years; (4) livestock-supporting land with a carrying capacity of at least one animal unit per acre; or (5) land planted with fruit or nut trees, vines, bushes or crops that have a non-bearing period of less than 5 years and that will normally return a predetermined annual gross value per acre per year during the commercial bearing period (Government Code Section 51200-51207). Nonprime lands include pasture and grazing lands and other non-irrigated agricultural land with lesser quality soils. Prime agricultural lands under the Williamson Act are defined differently from Prime Farmland under the Department of Conservation Farmland Mapping and Monitoring Program, as outlined above.

In 2014, about 1.25 million acres of land were under Williamson Act contract in the Bay Area. Of this, 203,200 acres were prime farmland and one million acres were nonprime (DOC 2015). This indicates that lands under Williamson Act contract in the Bay Area are primarily used for pasture and grazing and not for the cultivation of crops. **Table 2.3-3** shows the number of acres of land under Williamson Act contracts in the Bay Area as of 2014, and Williamson Act lands are shown on **Figure 2.3-4**.

Figure 2.3-2
California Coastal Zone



Map Data Sources: California Coastal Commission, 2015; Metropolitan Transportation Commission (MTC), 2016; Tom Tom North America, 2015.

Figure 2.3-3
Farmland

Map Data Sources: Farmland Mapping & Monitoring Program (FMMP), Department of Conservation, State of California, 2012-2014; Metropolitan Transportation Commission (MTC), 2016; Tom Tom North America, 2015.

Figure 2.3-4
Williamson Act Lands

Map Data Sources: Farmland Mapping & Monitoring Program (FMMP), Department of Conservation, State of California, 2012-2014; Marin County, 2012; Metropolitan Transportation Commission (MTC), 2016; Napa County, 2016; Santa Clara County, 2016; Solano County, 2016; Sonoma County, 2015; The Conservation Lands Network, Department of Conservation, State of California, 2006-2015; Tom Tom North America, 2015.

Table 2.3-2 Bay Area Agricultural Lands (2014)

	Alameda	Contra Costa	Marin	Napa	San Mateo	Santa Clara	Solano	Sonoma[1]	Region
Prime Farmland[1]	3,700	26,000	0	31,000	2,100	17,000	131,000	30,000	240,000
Farmland of Statewide Importance[2]	1,100	7,300	150	10,000	100	3,600	6,400	17,000	46,000
Unique Farmland[3]	2,400	3,000	270	16,000	2,200	2,600	9,000	33,000	69,000
Farmland of Local Importance[4]	0	53,000	63,000	19,000	700	4,000	0	81,000	220,000
Important Farmland Subtotal	**7,200**	**89,000**	**64,000**	**76,000**	**5,100**	**27,000**	**146,000**	**161,000**	**575,000**
Grazing Land[5]	244,000	168,000	89,000	179,000	49,000	394,000	211,000	417,000	1,750,000
Agricultural Land Total	**251,000**	**257,000**	**153,000**	**255,000**	**54,000**	**420,000**	**357,000**	**578,000**	**2,325,000**

Notes:

[1] Farmland with the best combination of physical and chemical features able to sustain long term agricultural production. This land has the soil quality, growing season, and moisture supply needed to produce sustained high yields.

[2] Similar to Prime Farmland but with minor shortcomings, such as greater slopes or less ability to store moisture.

[3] Farmland of lesser quality soils used for the production of the state's leading agricultural crops. This land is usually irrigated, but may include non-irrigated orchards or vineyards.

[4] Important to the local agricultural economy as determined by county's board of supervisors and local advisory committee.

[5] Land on which the existing vegetation is suited to the grazing of livestock.

[6] Whole numbers have been rounded (between 0 and 10 to the nearest whole number, between 11 and 999 to the nearest 10, between 1,000 and 1,000,000 to the nearest 100, over 10,000 to the nearest 1,000).

Source: DOC 2015

As a general rule, land can be withdrawn from Williamson Act contract only through the nine-year nonrenewal process. Immediate termination via cancellation is generally reserved for "extraordinary," unforeseen situations (See *Sierra Club v. City of Hayward (1961)* 28 Cal.3d 840, 852-855). Furthermore, it has been held that "cancellation is inconsistent with the purposes of the (Williamson) act if the objectives to be served by cancellation should have been predicted and served by nonrenewal at an earlier time, or if such objectives can be served by nonrenewal now" (*Sierra Club v. City of Hayward)*.

Table 2.3-3 Williamson Act Contracts in the Bay Area (2014)

	Prime Acres	Nonprime Acres	Total Acres	Percent
Alameda	2,500	133,100	135,600	12%
Contra Costa	9,300	34,200	43,500	4%
Marin	-	80,900	80,900	7%
Napa	19,100	52,500	71,600	6%
San Francisco	-	-	-	0%
San Mateo	-	-	-	0%
Santa Clara	9,700	295,500	305,200	26%
Solano	119,800	145,300	265,100	23%
Sonoma	43,700	227,900	271,600	23%
Region Total	**204,100**	**969,500**	**1,174,000**	**100%**

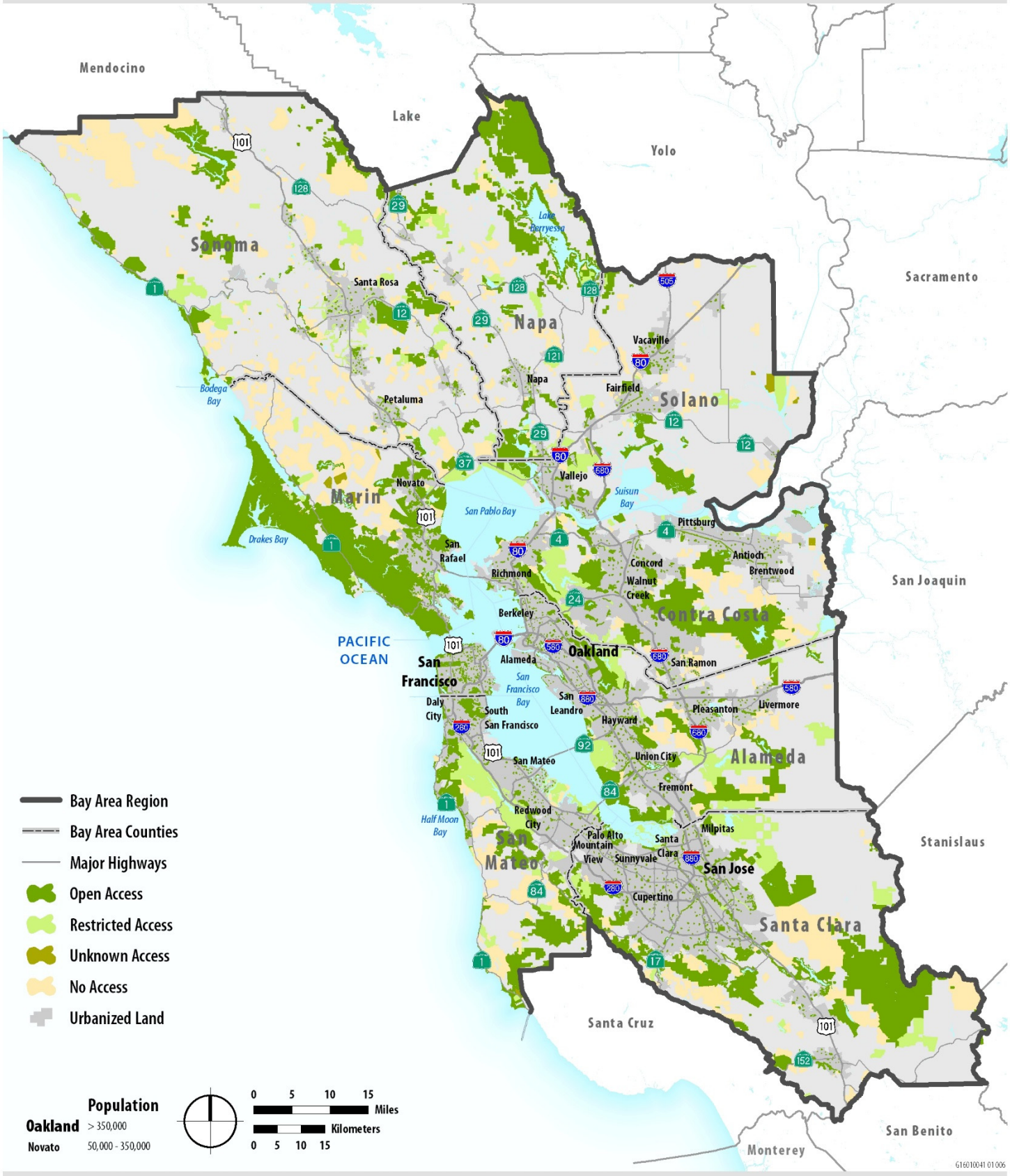
Note: Whole numbers have been rounded (between 0 and 10 to the nearest whole number, between 11 and 999 to the nearest 10, between 1,000 and 1,000,000 to the nearest 100, over 10,000 to the nearest 1,000).

Source: DOC 2015

Parks and Open Space

The Bay Area contains over one million acres of parks and open space across nine counties (see **Figure 2.3-5** and **Table 2.3-4**). Approximately 706,000 acres of parks and open space are available for public use (privately owned land held in permanent reserve as of 2014). The remainder of the approximately 1.3 million

Figure 2.3-5
Regional Parks and Open Space



Map Data Sources: California Conservation Easement Database, 2015; California Protected Areas Database, 2016; Metropolitan Transportation Commission (MTC), 2016; Tom Tom North America, 2015.

acres of parks and open space is not available for public use. While access by the general public to some areas is restricted, they are considered important for the preservation of wildlife habitats and the protection of the environmental and rural characteristics of various parts of the region. These areas, as defined in the Conservation Lands Network and the Bay Area Protected Areas Database (BPAD), are designated in one of two ways: either by purchasing or acquiring a "conservation easement" to a privately-owned property, or by purchasing a property outright for conservation purposes. These areas can be parks, preserves, ranches, farms, forests, small, large, publicly accessible, and not publicly accessible.

Table 2.3-4 Bay Area Parks and Open Space

County	Open Access Acres	Restricted Access Acres	No Access Acres	Other/Unknown Acres	Total Acres
Alameda	68,600	41,700	9,300	590	120,200
Contra Costa	90,300	30,700	13,000	7,900	142,000
Marin	141,200	16,000	6,900	47,500	211,600
Napa	73,500	43,700	9,100	19,000	145,300
San Francisco	5,600	9	110	1	5,700
San Mateo	52,600	34,400	23,600	7,400	118,100
Santa Clara	138,200	40,300	23,900	44,000	246,400
Solano	61,700	6,200	16,600	2,600	87,200
Sonoma	11,600	39,600	17,800	9,100	78,200
Regional Total	**643,300**	**252,600**	**120,300**	**138,100**	**1,154,700**

Notes: restricted access and no access refers to privately owned lands and land held in permanent reserve; includes publicly owned lands and privately owned lands that are accessible to the public. The most recent year that a full dataset is available is 2013.

Includes both incorporated cities and unincorporated areas of the county

Whole numbers have been rounded (between 0 and 10 to the nearest whole number, between 11 and 999 to the nearest 10, between 1,000 and 1,000,000 to the nearest 100).

Source: Bay Area Open Space Council 2014

Forests

The Bay Area includes a variety of forest types spread throughout the nine-county region. Forests are generally located at higher elevations of the Coastal Range in areas with sufficient moisture. Forest land is a valuable environmental and aesthetic resource and a defining feature in many parts of the landscape in the Bay Area. Forest habitats include a wide range of woodland and forest species. For a comprehensive description of specific forest types and species, please refer to Section 2.9, "Biological Resources."

PDAs and PCAs

The proposed Plan largely reflects the foundation and regional growth pattern established in the original 2013 Plan Bay Area. The proposed Plan's core strategy is "focused growth" in existing communities along the existing transportation network. This strategy helps to achieve key regional economic, environmental and equity goals: it builds upon existing community characteristics, efficiently leverages existing infrastructure and mitigates impacts on areas with less development. Key to implementing the "Focused Growth" strategy are Priority Development Areas (PDAs) and Priority Conservation Areas (PCAs), which are identified, recommended and approved by local governments.

- PDAs - The proposed Plan focuses growth and development within 188 PDAs. PDAs are specific geographic areas that meet the following criteria: 1) within an existing community; 2) within walking distance of frequent transit service; 3) designated for more housing in a locally adopted plan or identified by a local government for future planning and potential growth; and 4) nominated through a resolution adopted by a City Council or County Board of Supervisors. Staff recommendations are be presented to ABAG's Regional Planning Committee for approval and then to ABAG's Executive Board for regional adoption.

- PCAs - PCAs are open spaces that provide agricultural, natural resource, scenic, recreational, and/or ecological values and ecosystem functions. These areas are identified through consensus by local jurisdictions and park/open space districts as lands in need of protection because of pressure from urban development or other factors. PCAs are categorized into by four designations: Natural Landscapes, Agricultural Lands, Urban Greening and Regional Recreation. There are 192 PCAs within the region.

PCAs and PDAs complement one another: By promoting compact development in established communities with high-quality transportation access, there is less development pressure on the region's vast and varied open spaces and agricultural lands.

2.3.2 Regulatory Setting

Information on Natural Community Conservation Plans and Habitat Conservation Plans is included in Section 2.9, "Biological Resources," and information on Airport Land Use Compatibility Plans is included in Section 2.13, "Hazards."

FEDERAL REGULATIONS

Department of Housing and Urban Development Act

The Department of Housing and Urban Development Act created the U.S. Department of Housing and Urban Development (HUD) as a Cabinet-level agency. HUD is responsible for national policy and programs that address housing needs in the U.S. HUD is responsible for enforcing fair housing laws. HUD plays a major role in supporting homeownership by underwriting homeownership for lower- and moderate-income families through its mortgage insurance programs.

Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970

The Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970 (42 U.S. Code, § 4601 et seq.), passed in 1970 and amended in 1987, is intended to provide for uniform and equitable treatment for persons displaced through federally-funded or assisted transportation and redevelopment projects that require property acquisition. The act lays out rules for notification, relocation counseling, social services or assistance for disabled residents, and compensation for replacement housing and moving costs. The rules stipulate that replacement housing must be comparable to previous housing in terms of location, size, access to jobs and public facilities, and must be "decent, safe, and sanitary." The rules apply if federal funds are in any phase of the program or project, even if the property acquisition itself is not federally funded.

Farmland Protection Program

USDA, Natural Resources Conservation Service (NRCS) maps soils and farmland uses to provide comprehensive information necessary for understanding, managing, conserving, and sustaining the nation's limited soil resources. In addition to many other natural resource conservation programs, the NRCS manages the Farmland Protection Program, which provides funds to help purchase development rights to keep productive farmland in agricultural uses. Working through existing programs, USDA joins with state, tribal, or local governments to acquire conservation easements or other interests from landowners.

Federal Farm Bill

In 2008, the Federal Farm Bill added a provision to federal law that required states to provide assessments of the status of all forest resources and forest resource trends and conditions. Priority landscapes throughout the state are delineated through assessment reports to help forest management programs understand the issues behind forest resources. The assessment includes information on threats to forest lands in the state, including threats from wildfire, development, forest pests, and exotic invasive species; as well as more recent threats to forest lands including renewable energy infrastructure, off highway vehicle use, and climate change. The assessment includes statewide maps that pinpoint areas of concern related to these possible threats.

Federal Farmland Protection Policy Act

The USDA's NRCS oversees the Farmland Protection Policy Act (FPPA) (7 U.S. Code [USC] Section 4201 et seq.; see also 7 Code of Federal Regulations [CFR] 658). The FPPA (a subtitle of the 1981 Farm Bill) is national legislation designed to protect farmland. The FPPA states its purpose is to "minimize the extent to which federal programs contribute to the unnecessary conversion of farmland to nonagricultural uses." The FPPA applies to projects and programs that are sponsored or financed in whole or in part by the federal government. The FPPA does not apply to private construction projects subject to federal permitting and licensing, projects planned and completed without assistance from a federal agency, federal projects related to national defense during a national emergency, or projects proposed on land already committed to urban development. The FPPA spells out requirements to ensure federal programs are compatible with state, local, and private programs and policies to protect farmland, to the extent practical, and calls for the use of the Land Evaluation and Site Assessment (LESA) system to aid in analysis. Because MTC or its project sponsors may ultimately seek some federal funding for transportation projects, the FPPA is applicable to the proposed Plan.

Food, Conservation, and Energy Act of 2008 (Federal Farm Bill)

In 2008, the U.S. Department of Agriculture passed the 2008 version of the Federal Farm Bill, which is passed approximately every five years. The Federal Farm Bill governs Federal agriculture and related programs. It includes 15 titles that govern many areas related to food and agriculture production; among them are provisions governing farm credit, agricultural and forest conservation programs, stewardship of land and water resources, and the encouragement of renewable energy sources, among others.

Federal Forest Legacy Program

The Federal Forest Legacy Program was a part of the 1990 Farm Bill. Its purpose is to identify and protect environmentally important forestlands that are threatened by present or future conversion to nonforest uses. The program provides conservation easements and gives priority to lands that can be effectively protected and managed, as well as lands that have significant scenic, recreational, timber, riparian, fish and wildlife, threatened and endangered species, and other cultural or environmental values. Properties that are "working forests," where the forestland is managed for the production of forest products, are also eligible under this program. Involvement in this program by private land owners is voluntary.

Land and Water Conservation Fund Act, Section 6(f)(3)

Section 6(f)(3) of the Land and Water Conservation Fund Act (LWCF Act) of 1965 (16 U.S.C. § 460l et seq.) contains provisions to protect federal investments in park and recreation resources and the quality of those assisted resources. The law recognizes the likelihood that changes in land use or development may make park use of some areas purchased with LWCF Act funds obsolete over time, particularly in rapidly changing urban areas, and provides for conversion to other use pursuant to certain specific conditions.

Section 6(f)(3) states that no property acquired or developed with assistance under Section 6(f)(3) shall, without the approval of the Secretary, be converted to uses other than public outdoor recreation uses. The Secretary shall approve such conversion only if he or she finds it to be in accord with the existing comprehensive statewide outdoor recreation plan and only upon such conditions as he or she deems necessary to assure the substitution of other recreation properties of at least equal fair market value and of reasonably equivalent usefulness and location.

This requirement applies to all parks and other sites that have been the subject of LWCF Act grants of any type and includes acquisition of park land and development or rehabilitation of park facilities. If a transportation project would have an effect upon a park or site that has received LWCF Act funds, the requirements of Section 6(f)(3) would apply.

Code of Federal Regulations Title 25

Federally recognized Native American tribes are considered domestic dependent nations. Tribal sovereignty refers to tribes' right to govern themselves, define their own membership, manage tribal property, and regulate tribal business and domestic relations; it further recognizes the existence of a government-to-government relationship between such tribes and the federal government. In general, state and local governments do not

have "civil regulatory" jurisdiction (i.e., land use) on Indian Land, which is land held in trust or restricted status for a tribe.

STATE REGULATIONS

Zenovich–Moscone–Chacon Housing and Home Finance Act of 1975

In response to state population and household growth, and to ensure the availability of affordable housing for all income groups, the State Department of Housing and Community Development (HCD) is responsible for determining the regional housing need for all jurisdictions in California.

Housing Element Law

Enacted in 1969, Housing element law (Government Code Section 65580-65589.8) mandates that local governments adequately plan to meet the existing and projected housing needs of all economic segments of the community. The law acknowledges that, in order for the private market to adequately address housing needs and demand, local governments must adopt land use plans and regulatory systems that provide opportunities for, and do not unduly constrain, housing development. As a result, housing policy in the State rests largely upon the effective implementation of local general plans and, in particular, local housing elements. Housing element law also requires HCD to review local housing elements for compliance with State law and to report its written findings to the local government.

California Relocation Assistance Act of 1971

The California Relocation Assistance Act (Gov. Code, § 7260 et seq.) was passed in 1971, following the Uniform Act in 1970 (see discussion above in Federal Regulations). California's version of the law has similar provisions requiring notification, counseling, social services, and financial assistance for persons displaced by transportation and land redevelopment projects. Under the California act, these procedural protections and benefits apply when the project causing the displacement has received state funding during any phase of the program or project, even if it did not receive federal funding.

Regional Housing Needs Assessment

California Government Code §65583(a)(1) and §65584 require that each Council of Government consult with the California Division of Housing Policy Development and shall determine each region's existing and projected housing need through preparation of an RHNA that allocates a share of the regional housing need to each city, county, or city and county based on an analysis of population and employment trends and documentation of projections and a quantification of the locality's existing and projected housing needs for all income levels, including extremely low income households, as defined in subdivision (b) of Section 50105 and Section 50106 of the Health and Safety Code.

The future need for housing is determined primarily by the forecasted growth in households in a community, based on historical growth patterns, job creation, household formation rates, and other factors to estimate how many households will be added to each community over the projection period. The housing need for new households is then adjusted to account for an ideal level of vacancy needed to promote housing choice, maintain price competition, and encourage acceptable levels of housing upkeep and repair. The RHNA also accounts for units expected to be lost because of demolition, natural disaster, or conversion to nonhousing uses. The sum of these factors—household growth, vacancy need, and replacement need—form the "construction need" assigned to each community. Finally, the RHNA considers how each jurisdiction might grow in ways that will decrease the concentration of low-income households in certain communities. The need for new housing is distributed among income groups so that each community moves closer to the regional average income distribution.

Sustainable Communities and Climate Protection Act of 2008

Senate Bill 375 (SB 375; Chapter 728, Statutes of 2008) focuses on aligning transportation, housing, and other land uses to achieve regional greenhouse gas (GHG) emission reduction targets established under the

California Global Warming Solutions Act, also known as Assembly Bill 32 (AB 32). SB 375 requires California Metropolitan Planning Organizations to develop an SCS as part of the RTP, with the purposes of identifying policies and strategies to reduce per capita passenger vehicle-generated GHG emissions. The SCS must:

- identify the general location of land uses, residential densities, and building intensities within the region;
- identify areas within the region sufficient to house all the population of the region;
- identify areas within the region sufficient to house an eight-year projection of the regional housing need;
- identify a transportation network to service the regional transportation needs;
- gather and consider the best practically available scientific information regarding resources areas and farmland in the region; and
- consider the state housing goals; set forth a forecasted development pattern for the region; and allow the regional transportation plan to comply with the federal Clean Air Act (CAA) of 1970 (42 USC § 7401 et seq.).

The development pattern in the SCS, when integrated with the transportation network and other transportation measures and policies, must reduce the GHG from automobiles and light duty trucks to achieve the GHG emission reduction targets approved by the California Air Resources Board (ARB). If the SCS does not achieve the GHG emission targets set by ARB, an Alternative Planning Strategy must be developed to demonstrate how the targets could be achieved.

SB 375 also imposes a number of new requirements on the regional housing needs process. Before SB 375, the regional transportation plan and regional housing needs processes were not required to be coordinated. SB 375 now synchronizes the schedules of the RHNA and regional transportation plan processes. The RHNA, which is developed after the regional transportation plan, must also allocate housing units within the region consistent with the development pattern included in the SCS. Previously, the RHNA determination was based on population projections produced by the Department of Finance. SB 375 requires the determination to be based upon population projections by the Department of Finance and regional population forecasts used in preparing the regional transportation plan. If the total regional population forecasted and used in the regional transportation plan is within a range of three percent of the regional population forecast completed by the Department of Finance for the same planning period, then the population forecast developed by the regional agency and used in the regional transportation plan shall be the basis for the determination. If the difference is greater than three percent, then the two agencies shall meet to discuss variances in methodology and seek agreement on a population projection for the region to use as the basis for the RHNA determination. If no agreement is reached, then the basis for the RHNA determination shall be the regional population projection created by the Department of Finance.

Existing law requires local governments to adopt a housing element as part of their general plan. Unlike the rest of the general plan, where updates sometimes occur at intervals of 20 years or longer, under previous law the housing element was required to be updated as frequently as needed and no less than every five years. Under SB 375, this period has been lengthened to eight years and timed so that the housing element period begins no less than 18 months after adoption of the regional transportation plan to encourage closer coordination between the housing and transportation planning done by local governments and MPOs. SB 375 also changes the implementation schedule required in each housing element. Previous law required the housing element to contain a program which set forth a 5-year schedule of to implement the goals and objectives of the housing element. The new law instead requires this schedule of actions to occur during the eight-year housing element planning period, and requires each action have a timetable for implementation.

Senate Bill No. 2

SB 2 (Chapter 633, Statutes of 2007) strengthens state housing element law (Government Code Section 65583) by ensuring that every jurisdiction identifies potential sites where new emergency shelters can be located without discretionary review by the local government. It also increases protections for providers seeking to open a new emergency shelter, transitional housing or supportive housing development, by limiting the instances in which local governments can deny such developments.

California Coastal Act

The Coastal Commission is one of California's three designated coastal management agencies that administer the federal Coastal Zone Management Act (CZMA) in California. In partnership with coastal cities and counties, it plans and regulates the use of land and water in the coastal zone. Development activities, which are broadly defined by the CZMA to include (among others) construction of buildings, divisions of land, and activities that change the intensity of use of land or public access to coastal waters, generally require a coastal permit from either the Coastal Commission or the local government. CZMA gives State coastal management agencies regulatory control over all activities that may affect coastal resources including any new developments, and highway improvement projects that use federal funds.

The mission of the Coastal Commission, established by voter initiative in 1972 and later made permanent by the Legislature through adoption of the California Coastal Act of 1976, is to protect, conserve, restore, and enhance environmental and human-based resources of the California coast and ocean for environmentally sustainable and prudent use by current and future generations. The Coastal Act includes specific policies that address issues such as shoreline public access and recreation, lower cost visitor accommodations, terrestrial and marine habitat protection, visual resources, landform alteration, agricultural lands, commercial fisheries, industrial uses, water quality, offshore oil and gas development, transportation, development design, power plants, ports, and public works. The coastal zone, which was specifically mapped by the Legislature, covers an area larger than the State of Rhode Island. On land, the coastal zone varies in width from several hundred feet in highly urbanized areas to up to 5 miles in certain rural areas, and offshore, the coastal zone includes a three-mile-wide band of ocean. The coastal zone established by the Coastal Act does not include San Francisco Bay, where development is regulated by BCDC.

The Coastal Commission plans and regulates the use of land and water in the coastal zone in partnership with coastal cities and counties. Development activities are defined by the Coastal Act to include (among others) construction of buildings, divisions of land, and activities that change the intensity of use of land or public access to coastal waters and generally require a coastal permit from either the Coastal Commission or the local government. Implementation of Coastal Act policies is accomplished primarily through the preparation of local coastal programs (LCPs) that are required to be completed by each of the 15 counties and 60 cities located in whole or in part in the coastal zone. Completed LCPs must be submitted to the Coastal Commission for review and approval. An LCP includes a land use plan (LUP), which may be the relevant portion of the local general plan, including any maps necessary to administer it and the zoning ordinances, zoning district maps, and other legal instruments necessary to implement the land use plan. Coastal Act policies are the standards by which the Coastal Commission evaluates the adequacy of LCPs, and amendments to certified LUPs and LCPs only become effective after approval by the Coastal Commission. The Coastal Commission is required to review each certified LCP at least once every five years to ensure that coastal resources are effectively protected in light of changing circumstances.

The Bay Area coastline is part of the North Central Coast Area. As of 2016, LCPs were effectively certified for Sonoma County, Marin County (with deferred certification for the Calle del Arroyo Lots), San Francisco City and County (one of two segments), San Mateo County, Daly City, and the City of Pacifica (with deferred certification for the Quarry Area and Shell Dance).

McAteer-Petris Act

BCDC is dedicated to the protection and enhancement of San Francisco Bay and the Suisun Marsh and to the encouragement of their responsible use. As the other designated coastal zone management agency, and pursuant to the McAteer-Petris Act, BCDC is designated as the agency responsible for the protection of the

Bay and its natural resources and for the regulation of the development of the Bay and shoreline to their highest potential with a minimum of Bay fill. For development projects, including transportation projects, BCDC jurisdiction includes the Bay itself (including San Pablo and Suisun Bays, sloughs, and certain creeks) and, in general, a 100-foot band along the Bay shoreline.

The McAteer-Petris Act further specifies that certain water-oriented land uses should be permitted on the shoreline, including ports, water-related industries, airports, wildlife refuges, water-oriented recreation and public assembly, desalinization plants, and power plants requiring large amounts of water for cooling purposes. Priority areas designated for such uses in the proposed Plan are to be reserved for them to minimize the need for future filling in the Bay for such uses. It is necessary to obtain BCDC approval before undertaking any work within 100 feet of the Bay shoreline (including grading); filling of the Bay or certain tributaries of the Bay; dredging; Suisun Marsh projects; any filling, new construction, major remodeling, substantial change in use, and many land subdivisions in the Bay, along the shoreline, in salt ponds, duck hunting preserves or other managed wetlands adjacent to the Bay.

The Delta Protection Act of 1992

The Delta Protection Act of 1992 (Act) established the Delta Protection Commission, a State entity to plan for and guide the conservation and enhancement of the natural resources of the Delta, while sustaining agriculture and meeting increased recreational demand. The Act defines a Primary Zone, which comprises the principal jurisdiction of the Delta Protection Commission. The Secondary Zone is the area outside the Primary Zone and within the "Legal Delta"; the Secondary Zone is not within the planning area of the Delta Protection Commission. Portions of Alameda, Contra Costa, and Solano County overlap with the Primary Zone. The Act requires the Commission to prepare and adopt a Land Use and Resource Management Plan (LURMP) for the Primary Zone of the Delta, which must meet specific goals.

California Land Conservation Act

The California Land Conservation Act (Government Code Section 51200 et seq.) of 1965, commonly known as the Williamson Act, provides a tax incentive for the voluntary enrollment of agricultural and open space lands in contracts between local government and landowners. The Act allows local governments to assess agricultural land based on the income-producing value of the property, rather than the "highest and best use" value, which had previously been the rule. The contract enforceably restricts the land to agricultural and open space uses and compatible uses defined in state law and local ordinances. An agricultural preserve, which is established by local government, defines the boundary of an area within which a city or county will enter into contracts with landowners. Local governments calculate the property tax assessment based on the actual use of the land instead of the potential land value assuming full development.

Terms of Williamson Act contracts are 10 years and longer. The contract is automatically renewed each year, maintaining a constant, 10-year contract, unless the landowner or local government files to initiate nonrenewal. A "notice of nonrenewal" starts the nine-year nonrenewal period. During the nonrenewal process, the annual tax assessment gradually increases. At the end of the nine-year nonrenewal period, the contract is terminated. Only a landowner can petition for a contract cancellation. Tentative contract cancellations can be approved only after a local government makes specific findings and determines the cancellation fee to be paid by the landowner.

The State of California has the following policies regarding public acquisition of, and locating public improvements on lands in, agricultural preserves and on lands under Williamson Act contracts (Government Code Section 51290–51295):

- State policy is to avoid locating federal, state, or local public improvements and improvements of public utilities, and the acquisition of land, in agricultural preserves.

- State policy is to locate public improvements that are in agricultural preserves on land other than land under Williamson Act contract.

- State policy is that any agency or entity proposing to locate such an improvement, in considering the relative costs of parcels of land and the development of improvements, give consideration to the value to the public of land, particularly prime agricultural land, in an agricultural preserve.

Since 1998, another option in the Williamson Act Program has been established with the creation of Farmland Security Zone contracts. A Farmland Security Zone is an area created within an agricultural preserve by a board of supervisors upon the request of a landowner or group of landowners. Farmland Security Zone contracts offer landowners greater property tax reduction and have a minimum initial term of 20 years. Like Williamson Act contracts, Farmland Security Zone contracts renew annually unless a notice of nonrenewal is filed.

State funding was provided in 1971 by the Open Space Subvention Act, which created a formula for allocating annual payments to local governments based on acreage enrolled in the Williamson Act Program. Subvention payments were made through fiscal year 2009, but have been suspended in more recent years because of revenue shortfalls.

Assembly Bill 1265 of 2011

AB 1265 (Chapter 90, Statutes of 2011) was approved in Summer 2011 and essentially reinstated parts of the Williamson Act, Revenue & Tax Code, and Open Space and Subvention Act that allowed eligible counties to recapture 10 percent of the property tax benefits provided to their owners of Williamson Act lands by decreasing the duration of the Land Conservation Act and FSZ contracts by one and two years, respectively. Senate Bill 1353 (Chapter 322, Statutes of 2014), approved by the Governor on September 15, 2014, eliminates the January 1, 2016 sunset clause and makes the option for participating counties to recapture portions of foregone tax revenue permanent. In the proposed Plan area, Sutter and Yolo counties take advantage of this legislation but do not offer any new Williamson Act contracts without funding for the subvention program.

California Farmland Conservancy Program

The California Farmland Conservancy Program (Public Resources Code Section 10200 et seq.) supports the voluntary granting of agricultural conservation easements from landowners to qualified nonprofit organizations, such as land trusts, as well as local governments. Conservation easements are voluntarily established restrictions that are permanently attached to property deeds, with the general purpose of retaining land in its natural, open-space, agricultural, or other condition while preventing uses that are deemed inconsistent with the specific conservation purposes expressed in the easements. Agricultural conservation easements define conservation purposes that are tied to keeping land available for continued use as farmland. Such farmlands remain in private ownership, and the landowner retains all farmland use authority, but the farm owner is restricted in its ability to subdivide or use the land for nonagricultural purposes, such as urban uses. Potential impacts on conservation easements would be addressed in subsequent project-level documents.

Farmland Mapping and Monitoring Program

The Farmland Mapping and Monitoring Program (FMMP) is the only statewide land use inventory conducted on a regular basis. The California Department of Conservation administers the FMMP, pursuant to which it maintains an automated map and database system to record changes in the use of agricultural lands. Farmland under the FMMP is listed by category—Prime Farmland, Farmland of Statewide Importance, Unique Farmland, and Farmland of Local Importance. The farmland categories listed under the FMMP are described below. The categories are defined pursuant to USDA land inventory and monitoring criteria, as modified for California.

Prime Farmland

Prime Farmland is land with the best combination of physical and chemical features to sustain long-term production of agricultural crops. These lands have the soil quality, growing season, and moisture supply necessary to produce sustained high yields. Soil must meet the physical and chemical criteria determined by

the NCRS. Prime Farmland must have been used for production of irrigated crops at some time during the four years before the mapping date by the FMMP.

Farmland of Statewide Importance

Farmland of Statewide Importance is similar to Prime Farmland but with minor differences, such as greater slopes or a lesser ability of the soil to store moisture. Farmland of Statewide Importance must have been used for production of irrigated crops at some time during the four years before the mapping date.

Unique Farmland

Unique Farmland has lesser quality soils than Prime Farmland or Farmland of Statewide Importance. Unique Farmland is used for the production of the state's leading agricultural crops. These lands are usually irrigated but may include nonirrigated orchards or vineyards found in some climatic zones in California. Unique Farmland must have been used for crops at some time during the four years before the mapping date.

Farmland of Local Importance

Farmland of Local Importance is farmland that is important to the local agricultural community as determined by each county's board of supervisors and local advisory committees.

Right to Farm Act 1981

The Right to Farm Act (Civ. Code, § 3482.5) is designed to protect commercial agricultural operations from nuisance complaints that may arise when an agricultural operation is conducting business in a "manner consistent with proper and accepted customs." The code specifies that established operations that have been in business for three or more years that were not nuisances at the time they began shall not be considered a nuisance as a result of new land use.

OPEN SPACE SUBVENTION ACT (OSSA) OF 1972

OSSA (Gov. Code, § 16140 et seq.) was enacted on January 1, 1972 to provide for the partial replacement of local property tax revenue foregone as a result of participation in the Williamson Act and other enforceable open space restriction programs. Participating local governments receive annual payment on the basis of the quantity (number of acres), quality (soil type and agricultural productivity), and, for Farmland Security Zone contracts, location (proximity to a city) of land enrolled under eligible, enforceable open space restrictions.

SUSTAINABLE AGRICULTURAL LANDS CONSERVATION PROGRAM (SALCP)

The SALCP is a component of the Affordable Housing and Sustainable Communities Program (AHSC), developed and implemented under the Greenhouse Gas Reduction Fund within the California Budget Act of 2014. The goal of the AHSC is to reduce greenhouse gas emissions through projects that implement land use, housing, transportation, and agricultural land preservation practices to support infill and compact development.

Quimby Act

The 1975 Quimby Act (California Government Code section 66477) authorized cities and counties to pass ordinances requiring that developers set aside land, donate conservation easements, or pay fees for park improvements. The Act states that the dedication requirement of parkland can be a minimum of three acres per thousand residents or more, up to five acres per thousand residents if the existing ratio is greater than the minimum standard. Revenues generated through in lieu fees collected under the Quimby Act cannot be used for the operation and maintenance of park facilities. In 1982, the Act was substantially amended. The amendments further defined acceptable uses of or restrictions on Quimby funds, provided acreage/population standards and formulas for determining the exaction, and indicated that the exactions must be closely tied (nexus) to a project's impacts as identified through studies required by CEQA.

State Open Space Standards

State planning law (Government Code Section 65560) provides a structure for the preservation of open space by requiring every city and county in the State to prepare, adopt, and submit to the Secretary of the Resources

Agency a "local open-space plan for the comprehensive and long-range preservation and conservation of open-space land within its jurisdiction." The following open space categories are identified for preservation:

- *Open space for public health and safety,* including, but not limited to, areas that require special management or regulation because of hazardous or special conditions.
- *Open space for the preservation of natural resources,* including, but not limited to, natural vegetation, fish and wildlife, and water resources.
- *Open space for resource management and production,* including, but not limited to, agricultural and mineral resources, forests, rangeland, and areas required for the recharge of groundwater basins.
- *Open space for outdoor recreation,* including, but not limited to, parks and recreational facilities, areas that serve as links between major recreation and open space reservations (such as trails, easements, and scenic roadways), and areas of outstanding scenic and cultural value.
- *Open space for the protection of Native American sites,* including, but not limited to, places, features, and objects of historical, cultural, or sacred significance such as Native American sanctified cemeteries, places of worship, religious or ceremonial sites, or sacred shrines located on public property (further defined in California Public Resources Code Sections 5097.9 and 5097.993).

State Public Park Preservation Act of 1971

The primary instrument for protecting and preserving parkland is the State Public Park Preservation Act of 1971 (Pub. Resources Code, §§ 5400-5409). Under the Act, cities and counties may not acquire any real property that is in use as a public park for any non-park use unless compensation or land, or both, are provided to replace the parkland acquired. This ensures no net loss of parkland and facilities.

California Forestry Legacy Program Act of 2000

The California Forestry Legacy Program Act, similar to the Federal Forest Legacy Program, is a program of the California Department of Forestry and Fire Protection (CAL FIRE). The program provides conservation easements to environmentally sensitive forest areas that have environmental, aesthetic or commodity value. Money from the program is obtained by gifts, donations, federal grants and loans, and other appropriate funding sources, and from the sale of bonds pursuant to the Safe Neighborhood Parks, Clean Water, Clean Air, and Coastal Protection Bond Act of 2000. This program is entirely voluntary by landowners who wish to participate.

REGIONAL AND LOCAL REGULATIONS

Government Code Section 65584(a) through its role as the Bay Area's council of governments (COG), the Association of Bay Area Governments (ABAG) has been designated by the State and federal governments as the official comprehensive planning agency for the Bay Area. ABAG reviews projects of regional significance for consistency with regional plans and is also responsible for preparation of the Regional Housing Needs Allocation (RHNA), pursuant to California Government Code Section 65584(a). ABAG's locally adopted Regional Housing Needs Allocation (2007-2014) (approved by the ABAG Board May 15, 2008), along with the San Francisco Bay Area Housing Needs Plan, 2007-2014 (released June 5, 2008) provide a policy guide for planning the region's housing, economic development, environmental quality, transportation, recreation, and health and safety.

MTC Resolution 3434 Transit Oriented Development Policy for Regional Transit Expansion Projects

MTC adopted a Resolution 3434 Transit Oriented Development (TOD) Policy (Resolution 3434) in 2005 to support the development of communities around new transit lines and stations identified as part of the Resolution 3434 Regional Transit Expansion Program. Resolution 3434 aims to improve the cost-effectiveness of regional investments in new transit expansions to ease the Bay Area's chronic housing

shortage, create vibrant new communities, and help preserve open space through ensuring that new development patterns are more supportive of transit. The three key elements of the regional TOD policy are:

- corridor-level thresholds to quantify appropriate minimum levels of development around transit stations along new corridors;
- local station area plans that address future land use changes, station access needs, circulation improvements, pedestrian friendly design, and other key features in a transit-oriented development; and
- corridor working groups that bring together Congestion Management Agencies (CMAs), city and county planning staff, transit agencies, and other key stakeholders to define expectations, timelines, roles and responsibilities for key stages of the transit project development process.

TOD policy application only applies to physical transit extensions funded in Resolution 3434 with regional discretionary funds (as defined in the policy guidelines), regardless of the level of funding. However, single station extensions to international airports are not subject to the TOD policy because of the infeasibility of housing development. The implementation process of the TOD policy involved coordination with the transit agency, city, and MTC/CMA/ABAG to determine thresholds for station areas and housing. Each transit extension project funded in Resolution 3434 must determine corridor-level thresholds, which may vary by modes of transit, in the form of minimum number of housing units along the corridor. Along with determining thresholds, each physical transit extension project seeking funding from Resolution 3434 must demonstrate that the thresholds for the corridor are met through existing development and adopted station area plans that commit local jurisdictions to a level of housing that meets the threshold.

One Bay Area Grant Program

MTC's One Bay Area Grant program (OBAG) is a funding approach that aligns the Commission's investments with support for focused growth. Established in 2012, OBAG taps federal funds to maintain MTC's commitments to regional transportation priorities while also advancing the Bay Area's land-use and housing goals. OBAG includes both a regional program and a county program that:

- targets project investments in Priority Development Areas, or PDAs; and
- rewards cities and counties that approve new housing construction and accept allocations through the Regional Housing Need Allocation (RHNA) process.

Cities and counties can use these OBAG funds to invest in:

- local street and road maintenance,
- streetscape enhancements,
- bicycle and pedestrian improvements,
- transportation planning,
- Safe Routes to School projects, and
- Priority Conservation Areas.

MTC in late 2015 adopted a funding and policy framework for the second round of OBAG grants. Known as OBAG 2 for short, the second round of OBAG funding is projected to total about $800 million to fund projects from 2017-18 through 2021-22.

California Government Code, Section 56000

Each county in California has a local agency formation commission (LAFCO), which is the agency that has the responsibility to create orderly local government boundaries, with the goals of encouraging the orderly formation of local governmental agencies and the preservation of open space lands, and discouraging urban sprawl. LAFCOs are governed by Section 56000 of the California Government Code. This legislation sets the commission's powers and duties, procedures for establishing and changing governmental boundaries, and

other statewide policies that LAFCOs must consider while making their determinations. While LAFCOs have no direct land use power, their actions determine which local government will be responsible for planning new areas. LAFCOs address a wide range of boundary actions, including creation of spheres of influences for cities, adjustments to boundaries of special districts, annexations, incorporations, detachments of areas from cities, and dissolutions of cities.

City and County General Plans

The most comprehensive land use planning for the San Francisco Bay Area region is provided by city and county general plans, which local governments are required by State law (California Government Code Section 65300 et seq.) to prepare as a guide for future development. The general plan contains goals and policies concerning topics that are mandated by State law or which the jurisdiction has chosen to include. Required topics are: land use, circulation, housing, conservation, open space, noise, and safety. Other topics that local governments frequently choose to address are: public facilities, parks and recreation, community design, and/or growth management. City and county general plans must be consistent with each other. County general plans must cover areas not included by city general plans (i.e., unincorporated areas). Issues pertaining to land use are described in the land use element; issues pertaining to agricultural and forest resources are described in the conservation element; and, issues pertaining to open space are described in the open space element of general plans.

Specific and Master Plans

A city or county may also provide land use planning by developing community or specific plans for smaller, more specific areas within their jurisdiction. These plans are more localized and provide focused guidance for developing a specific area, including development standards tailored to the area, and systematic implementation of the general plan.

Zoning

The city or county zoning code is the set of detailed requirements that implement the general plan policies at the level of the individual parcel. The zoning code presents standards for different uses and identifies which uses are allowed in the various zoning districts of the jurisdiction. Since 1971, State law has required the city or county zoning code to be consistent with the jurisdiction's general plan (California Government Code Section 65860).

Growth Control Measures

Local growth control endeavors to manage community growth by various methods, including tying development to infrastructure capacity or traffic level of service standards, limiting the number of new housing units, setting limits on the increase of commercial square footage, linking development to a jobs-housing balance, and the adoption of urban growth boundaries. These goals and others can be achieved through the adoption of a countywide Growth Management Program (GMP). GMPs, including urban growth boundaries, have been implemented by county government and/or cities in all of the nine Bay Area counties. Table 2.3-14 lists cities and counties with urban growth boundaries and county-wide land use measures.

Public Ownership, Purchase of Development Rights, and Open Space Acquisition

Local governments and special districts, either on their own or working with land trusts and conservancies, can acquire fee title to agricultural and open space lands or purchase development rights to preserve rural and agricultural areas, watersheds, or critical habitat, or to create public parks and recreational areas. Such actions have been undertaken in all Bay Area counties and have had significant effects on the shape of cities and urban form in the region.

2.3.3 Impact Analysis

SIGNIFICANCE CRITERIA

The following significance criteria are based on CEQA Guidelines Appendix G, as well as the thresholds used in the EIR for the 2013 Plan Bay Area, and professional judgment. Under these criteria, implementation of the proposed Plan would have a potentially significant adverse impact if it would:

Criterion 1: Increase the risk of displacement for a substantial number of existing residents, necessitating the construction and preservation of additional affordable housing elsewhere within the region

Criterion 2: Physically divide an established community.

Criterion 3: Conflict with any applicable land use plan, policy, or regulation of an agency with jurisdiction over the project (including, but not limited to the general plan, specific plan, or local coastal programs) adopted for the purpose of avoiding or mitigating an environmental effect.

Criterion 4: Directly or indirectly convert substantial amounts of important agricultural lands and open space (Prime Farmland, Unique Farmland, or Farmland of Statewide Importance) or lands under Williamson Act contract to non-agricultural use.

Criterion 5: Directly or indirectly result in the loss of forest land, conversion of forest land to non-forest use, or conflict with existing zoning for, or cause rezoning of, forest land, timberland, or timberland zoned Timberland Production.

METHOD OF ANALYSIS

The EIR land use analysis addresses the following issues: community displacement and disruptions, including potential loss of housing; physical divisions of communities; proposed Plan consistency with adopted land use plans; conversion or loss of important agricultural lands or open space; and loss of forest land.

The land use analysis is based on outputs from the land use and transportation models (referenced below), which are compared to existing conditions to identify potential impacts. The transportation projects considered include those that have the potential for physical impacts based on characteristics such as expansion, widening, new construction, or new configurations. The land use strategy is analyzed based on areas with the greatest projected land use changes, in terms of projected population, jobs, densities, and land uses by location. The analysis also considers impacts by county to determine: (1) the general amount and type of land that might be impacted; and (2) where impacts may be concentrated. Where appropriate, acreages of areas within TPAs that would be affected under the proposed Plan are provided.

Residential or Business Displacement

This assessment evaluates potential direct impacts to existing communities, including potential displacement of residents, as a result of the proposed land use strategy and transportation projects. This analysis provides a qualitative approach to address effects of implementation of the proposed Plan. The Equity Report (which is available as a supplemental report to Plan Bay Area 2040; available at http://2040.planbayarea.org/reports) provides an analysis of risk of displacement; this information was used in consideration of potential Plan effects. Because the degree to which displacement actually occurs is dynamic and based on a variety of factors, such as actual development proposals, economic factors including land costs, and other inputs, the analysis does not attempt to quantify numbers of residences or businesses that may be displaced but instead focuses on the potential for displacement to occur.

Consistency with Local Growth Controls

The EIR qualitatively evaluates local and sub-regional growth controls and the potential impacts of the proposed Plan on those efforts, including:

- general plan policies and development controls that require voter approval (such as those set by initiative).
- general plan policies and development controls based on joint-powers agreements (such as regional open space reserves, buffers between communities, or urban service boundaries and urban limit lines).
- general plan policies and development controls reflecting infrastructure constraints or severe environmental constraints.

Local jurisdictions are responsible for adopting land use policies as part of their general and neighborhood plans and implementing them through local ordinance. As a result, MTC and ABAG have no direct control over local land use planning, nor does SB 375 require that local jurisdictions align their general plans to conform to the proposed Plan; this alignment is discretionary but encouraged through the availability of streamlined environmental review for consistent projects.

Agricultural Lands and Open Space

The following program-level analysis is based upon information compiled by the FMMP. The FMMP is updated every two years, with the use of computer mapping, aerial imagery, public review, and field reconnaissance. Whereas individual counties may track agricultural productivity (in terms of dollars of production by crop type through county agricultural commissioner reports) or provide policies pertinent to agricultural land preservation, the FMMP is the only program that tracks agricultural land quality and conversion/retention on a consistent basis, from one county to another. The FMMP was last updated in 2014 and is adequately representative of agricultural land use and land quality in the Bay Area. A geographic information system was used to digitally overlay the land use growth footprint associated with projected development and the footprint associated with transportation projects that would result in new construction on the mapped farmland and open space areas to assess the extent of impacts on agricultural lands and open space. Results are presented for the region (i.e., the entire growth footprint, often summarized by county), and for the portions of the growth footprint specifically within the transit priority areas (TPAs; this figure is a subset of the regional and county totals). Information provided by county includes both incorporated and unincorporated areas in the county.

The actual footprints and other design details of most proposed transportation projects are not known because the projects are in the early stages of planning. Transportation projects, including road widenings, new roads, new or expanded interchanges, and new rail transit infrastructure, were spatially analyzed by calculating buffer areas around the center line or center point of proposed roadway and transit projects. In practice, many of the transportation projects would not use the entire buffer area. The net result is that the acres of impact described in the tables presented in this section are conservative and avoid risks of underestimating the impacts resulting from the implementation of the proposed Plan.

Forest Lands

Forest data was collected from the USDA National Agricultural Statistics Service's 2016 Cropland Data Layer (CDL) for California. The CDL is produced yearly and uses satellite imagery to produce 30-meter resolution crop-specific land cover data. Similar to the agricultural analysis above, these four categories were compared with future transportation and planned development and the overlapping area was calculated.

IMPACTS AND MITIGATION MEASURES

Impact 2.3-1: Implementation of the proposed Plan could increase the risk of displacement for a substantial number of existing residents, necessitating the construction and preservation of additional affordable housing elsewhere within the region.

Impacts of Changes in Projected Land Use

The discussion in this section addresses both regional and localized displacement, including displacement of lower-income residents. These concepts are associated with performance targets 2 and 7 (see Section 1.2.4, Project Objectives, for more information on performance targets). These targets are discussed in two supplemental reports to the Plan: Performance Assessment Report and Equity Analysis Report, available for review at: http://2040.planbayarea.org/reports. The following analysis incorporates relevant information from these supplemental reports.

Displacement risk is a function of the location and availability of affordable housing near major job centers in a growing regional economy. As the growth in jobs (particularly those that pay higher wages) outpaces the supply of housing (particularly those that are affordable to lower-income households), the cost of housing inevitably rises faster than wages for all workers. In such market conditions, higher-income workers are better positioned to compete for the limited supply of housing opportunities, resulting in a higher risk of displacement for all other residents. To the extent that the private or the public sectors can provide more market rate and deed-restricted affordable housing in these communities, this risk subsides.

Displacement risk for lower-income residents may increase because of other reasons as well. These include:

- physical constraints such as a lack of available land for new housing in communities that have a significant number of jobs, with the resulting potential for redevelopment of existing residential areas with new employment or residential development;
- policy constraints such as regulations that hinder environmentally-sound development of infill sites or other sites that could support higher-density housing, and inadequate public spending on housing and transportation infrastructure;
- social constraints such as local community opposition to higher-density rental housing; and
- economic conditions, such as high land and labor costs, loss of household income as a result of a shrinking market for middle-wage jobs, and competition for available land from other uses.

As noted in Section 2.3.1, the Bay Area is currently facing a severe housing shortage, leading to significant displacement pressures on the region's lower-income residents. These risks are expected to continue to increase with or without the adoption of the proposed Plan. To the extent that the proposed Plan provides incentives to local jurisdictions to plan for and build new housing at all income levels, preserve existing affordable housing, and implement anti-displacement policies and programs, the future risk of displacement will be lower than what can be anticipated otherwise. Specifically, the proposed Plan decreases the risk of overall displacement compared to taking no action (i.e., the No Project Alternative); the proposed Plan would increase displacement risk by 5 percent, which is a much smaller increase compared to an increase of 18 percent for the No Project Alternative. (See Section 3.1 Alternatives, and the Equity Analysis Report for more information.)

Adoption of the proposed Plan does not authorize or provide entitlement to redevelopment or construction projects in the region. Rather, the proposed Plan is a regional strategy that sets a vision for future development, which must still be reviewed, analyzed and approved by local governments, which retain full control over local land use authority. This is described in more detail in Section 1.2.3 Plan Background.

Despite these limitations, the proposed Plan addresses displacement risk by increasing resources for affordable housing and non-automobile transportation access in lower-income neighborhoods, and by supporting economic opportunities across the region that benefit existing residents. Additional strategies to address housing affordability and displacement risk are described in Chapter 5 of the proposed Plan. The Action Plan includes several recommendations:

- **Advance funding and legislative solutions for housing**: Implement the recommendations of CASA, in coordination with ABAG's Regional Planning Committee.

- **Continue recent housing successes**: Implement the housing initiatives adopted in the One Bay Area Grant (OBAG) program, including the Naturally Occurring Affordable Housing (NOAH) preservation fund, JumpStart program, and funding for transportation conditioned on RHNA performance (80k by 2020 initiative).

- **Spur housing production at all income levels and invest directly in affordable housing**: Seek to include housing provisions or conditions in upcoming new funding sources (including planning grants), analyze applicability for additional regional funding sources to incentivize housing production and affordability. Continue to monitor and evaluate PDA performance.

- **Use housing performance to prioritize funding for long-range transportation projects**: Continue to evolve RTP/SCS Project Performance methods to seek stronger alignment between prioritizing transportation projects and housing performance.

- **Strengthen policy leadership on housing**: Expand and transform regional agency technical assistance for local jurisdictions tailored to both Bay Areawide challenges and challenges unique to specific parts of the region. Focus areas for technical assistance could include guidance on implementing state legislation for housing production, guidance on housing preservation and community stabilization policies and coordination of neighboring jurisdictions along transit corridors and in sub-regions to identify shared solutions to housing challenges.

- **Close data gaps for housing:** Continue to collect, analyze, and disseminate information about housing opportunity sites, zoning, development trends and policy implementation by local governments to inform local, regional, and state policy development and evaluation; create accessible database of major development and publicly owned sites.

CEQA requires analysis and mitigation of potentially substantial adverse changes in the physical environment (PRC Section 21151, 21060.5, and 21068). "Economic and social changes resulting from a project are not treated as significant environmental effects [citation] and, thus, need not be mitigated or avoided under CEQA." (*San Franciscans for Reasonable Growth v. City and County of San Francisco* (1984) 209 Cal.App.3d 1502, 1516.). Physical changes in the environment caused by economic or social effects of a project may constitute significant environmental effects (CEQA Guidelines Sections 15131 and 15064(e)). Social and economic effects in and of themselves, however, are not significant effects on the environment under CEQA. (*Melom v. City of Madera* (2010) 183 Cal.App.4th 41, 55.). The following addresses the potential for physical impacts associated with displacement risk at the regional and local levels.

Regional Displacement Impacts

Regional displacement is addressed under SB 375, which requires that the SCS identify sufficient areas in the region to house all the projected population. The proposed Plan's housing targets are derived from the Regional Housing Control Total per the 2014 settlement agreement signed with the Building Industry Association (BIA), which increases the housing forecast by adding the number of housing units necessary to accommodate potential growth in in-commuters from outside the region. The Regional Housing Control Total estimated the total number of units needed to accommodate all of the residents in the region plus the number of housing units that correspond to the potential in-commuter increase. The number of units also included a 3 percent vacancy level to allow for moves within the region.

Incorporating the Regional Housing Control Total into the proposed Plan ensures sufficient capacity such that the entire regional workforce added under the Plan is housed within the Bay Area with no net increase in in-commuting from other counties outside the region. Thus, the projected land use strategy would accommodate 666,000 new household and 688,000 new jobs between 2015 and 2040, which would be consistent with population and employment growth projections in the Bay Area. Through the use of modeling, described in detail in Section 1.2, "Project Description," the land use growth footprint assumes an adequate number of residential units to meet the forecasted demand, taking into account localized displacement of some households within the region. Thus, implementation of the proposed Plan would not result in displacement at the regional scale, and impacts at the regional level would be **less than significant (LS)**. Displacement outside of the region is discussed in the cumulative analysis provided in Section 3.2, Other CEQA Considerations.

Local Displacement Impacts

At the local level, displacement can result in physical effects both directly and indirectly. The potential for direct effects would result from projected growth occurring at the site of existing residential units. Redevelopment of such a site would require demolition of the existing residential units resulting in direct impacts. Projected redevelopment and new housing is included in the overall land use strategy and development footprint of the proposed Plan, and as a result the associated physical environmental impacts from this development is analyzed throughout this EIR. The full impacts from the projected redevelopment and new housing construction would depend on site-specific conditions and project design details that cannot be known at this time. Significant impacts that may result from this change have been identified in this EIR in the following areas: transportation, air quality, land use and physical development, climate change and greenhouse gases, noise, biological resources, visual resources, cultural resources, public utilities and facilities, hazards, and public services and recreation.

The potential for indirect (or secondary) impacts results from economic factors potentially driving some households to find other housing because of rising rents. When these forces result in housing further from jobs, household commutes may increase thus affecting air quality, noise, traffic, etc. These impacts are analyzed in other chapters of this EIR as part of the analysis of overall impacts of the proposed Plan on air quality, noise, traffic, and GHG emissions.

As explained above, the proposed Plan accounts for future replacement housing, because it includes sufficient housing to accommodate new job growth, including in-commuters from adjacent counties. The impacts of this growth are addressed throughout this EIR and in some cases has been identified as potentially significant. For this reason, this impact would be potentially significant (PS).

Impacts of Transportation Projects

Transportation projects that require the expansion of existing, or designation of new, rights-of-way have the potential to result in the direct displacement of existing housing that must be removed for infrastructure development. Generally, to minimize environmental impacts and project costs, it is common practice to design the footprint of new transportation projects within existing rights-of-way as much as feasible. This practice is assumed as a part of this analysis. However, development of some projects, such as roadway widening, roadway extension, and transit expansion projects, could result in the disturbance and/or loss of residential and business uses. In particular, the proposed Plan includes: California High Speed Rail in the Bay Area, and BART and Caltrain extension projects, which would be located in urban areas and could cause displacement of businesses and residents. The degree of the disruption would generally depend on the size and extent of the project and the resulting need for new right-of-way. For the purposes of this analysis, proposed transportation projects were assumed to affect approximately 25,000 additional acres across the Bay Area. This was calculated based on an assumed buffer of up to 100 feet for linear projects such as road widenings and rail extensions, and up to 500 feet for defined locations, such as interchange improvements and transit centers. This is a conservative assumption intended to avoid a risk of understating the impact. Actual displacement of homes by transportation projects would depend on site-specific conditions and project design details that cannot be known at this time. The replacement of these housing units would result in environmental impacts, which are described throughout this EIR. Impacts that would be significant are associated with: transportation, air quality, land use and physical development, climate change and

greenhouse gases, noise, biological resources, visual resources, cultural resources, public utilities and facilities, hazards, and public services and recreation. This impact would be potentially significant (PS).

Conclusion

Implementation of the proposed Plan may result in displacement of existing residential units, necessitating the construction of replacement housing elsewhere. Significant environmental impacts associated with the replacement housing are addressed throughout this EIR. This is a **potentially significant (PS)** impact. Mitigation Measures 2.3-1 is described below.

Mitigation Measures

2.3-1 Implementing agencies and/or project sponsors shall implement, where feasible and necessary, the mitigation measures described throughout this EIR to address the effects of displacement that could result in the construction of replacement housing, including Mitigation Measures 2.2-2 (air quality); 2.3-2, 2.3-4, and 2.3-5 (land use); 2.5-4 (sea level rise); 2.6-1, 2.6-5, and 2.6-6 (noise); 2.9-1 through 2.9-5 (biological resources); 2.10-1 and 2.10-3 through 2.10-5 (visual resources); 2.11-1 through 2.11-5 (cultural resources); and 2.13-4 (hazards).

Significance after Mitigation

Implementation of this mitigation measure would reduce potentially significant impacts to a less-than-significant with mitigation (LS-M), as explained in the impact discussions related to each impact and mitigation measure.

Projects taking advantage of CEQA Streamlining provisions of SB 375 (Public Resources Code sections 21155.1, 21155.2, and 21159.28) must apply the mitigation measure described above, to the extent feasible, to address site-specific conditions. MTC/ABAG cannot require local implementing agencies to adopt the above mitigation measure, and it is ultimately the responsibility of a lead agency to determine and adopt mitigation. Therefore, it cannot be ensured that this mitigation measure would be implemented in all cases, and this impact remains **potentially significant and unavoidable (SU)** for purposes of this program-level review.

Impact 2.3-2: Implementation of the proposed Plan could physically divide an established community.

Impacts of Changes in Projected Land Use

The land use growth footprint is located primarily within areas that are currently developed. New development (i.e., construction on land not designated as urban/built up land according to FMMP) is forecasted to occur on approximately 6,600 acres. That is, of the 18,700 acres of land associated with the land use growth footprint, approximately 35 percent would be located on land that is not currently developed. This would primarily occur in Contra Costa, Solano, Santa Clara, and Alameda counties.

The majority of the new development would occur as infill development, in accordance with the adopted land use plans and zoning ordinances of the cities and counties in the Plan area. Forecasted development under the proposed Plan would create more centralized areas of residential areas and commercial centers; and would not create features that would physically divide established communities. Construction activities could result in transportation-related effects from travel lane closures, detours, and/or temporary congestion from increased truck traffic on local roads (see Impact 2.1-7 in Section 2.1, "Transportation") resulting from increased truck traffic on local roads as construction vehicles and workers travel to and from project sites. These temporary effects would be minimized with the use of best practice strategies for construction activities. The development of new housing units and employment land uses within established communities would typically occur on vacant or underutilized sites and would not result in the physical division of established communities. Rather, development would be integrated into established communities. Thus, this impact would be less than significant (LS).

Impacts of Transportation Projects

The proposed Plan includes a variety of transportation projects, including regional transit projects, local transit projects, road pricing improvements, highway and roadway improvements, and Port of Oakland projects. Most of the major proposed transportation projects would be located in existing rights-of-way, meaning they would not contribute to a worsening of separation within existing communities. Some projects in the proposed Plan could improve or expand interconnections between neighborhoods and communities that are currently separated by major transportation corridors. Examples include bridges or undercrossings (with bike lanes) of commuter rail lines, bicycle/pedestrian overcrossings of freeways, and urban trail and pathway projects. Additionally, many proposed projects, such as expansion of transit services, are intended to improve mobility and accessibility and may, as a result, improve community connectivity. However, larger infrastructure projects, such as California High Speed Rail and Caltrain and BART expansion projects, may require the acquisition of land in existing communities, which may divide established communities. Thus, transportation project impacts related to community separation would be potentially significant (PS). Mitigation Measures 2.3 (d), 2.3(e), and 2.3(f), described below, would provide additional mitigation for impacts, as needed.

Conclusion

Implementation of the project land use growth under the proposed Plan would create more centralized development and would not physically divide established communities. Thus, this impact would be less than significant for the changes in projected land use. Implementation of the proposed transportation projects could result in physical division of established communities by placing structures in places that could divide several established communities throughout the region. As a result, impacts would be potentially significant (PS) related to the transportation projects. Overall, this impact would be **potentially significant (PS)**. Mitigation Measures 2.3-2 is described below.

Mitigation Measures

2.3-2 Implementing agencies and/or project sponsors shall implement measures, where feasible and necessary based on project-and site-specific considerations that include, but are not limited to:

- New transportation projects within urban areas shall be required to incorporate design features such as sidewalks, bike lanes, and bike/pedestrian bridges or tunnels that maintain or improve access and connections within existing communities and to public transit.

- Through regional programs such as the One Bay Area Grants (OBAG), MTC/ABAG shall continue to support planning efforts for locally sponsored traffic calming and alternative transportation initiatives, such as paths, trails, overcrossings, bicycle plans, that foster improved neighborhoods and community connections.

Significance after Mitigation

Implementation of Mitigation Measure 2.3-2 would reduce the potentially significant impact of division of an established community because it would implement design features that would improve access and connections within existing communities and to public transit, which would reduce the effects of separation on existing communities. Regional programs, such as OBAG would help to incentivize these types of efforts. To the extent that an individual project adopts and implements all feasible mitigation measures described above, the impact would be less than significant with mitigation (LS-M).

Projects taking advantage of CEQA Streamlining provisions of SB 375 (Public Resources sections 21155.1, 21155.2, and 21159.28) must apply the mitigation measures described above, as feasible, to address site-specific conditions. MTC/ABAG cannot require local implementing agencies to adopt the above mitigation measures, and it is ultimately the responsibility of a lead agency to determine and adopt mitigation. While MTC/ABAG have authority to distribute funds associated with OBAG, projects would remain subject to the discretion of local agencies. Therefore, it cannot be ensured that this mitigation measure would be implemented in all cases, and this impact remains **significant and unavoidable (SU)** for purposes of this program-level review.

Impact 2.3-3: Implementation of the proposed Plan could conflict with applicable land use plans, policies, or regulations of an agency with jurisdiction over the project (including, but not limited to the general plans, specific plans, local coastal programs) adopted for the purpose of avoiding or mitigating an environmental effect.

Impacts of Changes in Projected Land Use

General Plans and Specific Plans -- Implementation of the forecasted development pattern would affect land use patterns through increases to allowed density and intensity of development as compared to that planned for/allowed by the local jurisdiction. Please see Section 1.2.3 in Section 1.2, "Project Description," for information related to development of the proposed Plan. Development that occurs within land subject to adopted General Plan and Specific Plans would be subject to the respective land use designations. Local lead agencies would determine consistency with adopted General Plans and Specific Plans by conforming the projects or amending land use designations.

Local Coastal Plans -- Sonoma County, Marin County, the City and County of San Francisco, San Mateo County, and the cities of Daly City, Pacifica, and Half Moon Bay all have certified Local Coastal Programs (LCP). As calculated using a GIS-based overlay analysis, the land use growth footprint overlaps with areas of the Coastal Zone in approximately 7 acres in Marin, 3 acres in San Francisco County, and 30 acres in San Mateo County. Development that occurs within the Coastal Zone would be subject to the respective LCP. LCPs contain, generally, a land use plan, development code, and policy and zoning maps. Development in the coastal zone is subject to a coastal development permit when there would be change in the use of land or water. The overall goal of applying for and receiving a coastal development permit is to ensure that a project is consistent with the Coastal Act, and by extension LCPs. Thus, inconsistencies with LCPs would not occur.

BCDC -- The San Francisco Bay Plan establishes policies to guide the use of San Francisco Bay and its shoreline. In particular, BCDC, which is responsible for implementation of the Bay Plan, is authorized to control both bay filling/dredging and shoreline development. To minimize the future filling of the Bay, the Bay Plan identifies Priority Use Areas (PUAs), which are reserved for water-oriented land uses including ports, water-related industries, airports, wildlife refuges, water-oriented recreation and public assembly, desalinization plants, and power plants requiring large amounts of water for cooling purposes.

Regionally, overlap between PUAs and the SCS growth footprint is approximately 470 acres. As shown in **Table 2.3-5**, the overlap is greatest in the Port and Waterfront Park/Beach areas of San Francisco. LCPs must be consistent with Bay Plan PUA designations. Individual projects that overlap with PUAs would be required to conform to land use restrictions detailed in the Bay Plan. Generally, implementation of the proposed Plan is intended to result in development of communities that would complement transportation systems; however, some of the proposed uses in the projected development area may conflict with BCDC land use policies. In cases where the projected development area overlaps a PUA, the uses within the PUA must be consistent with Bay Plan requirements. Land use compatibility would be further addressed during subsequent environmental review as individual projects are implemented and detailed project design or specific plans resolve land use inconsistencies. This would include consideration of zoning and land use designation amendments, as appropriate, to allow for implementation of a specific project. This impact would be less than significant (LS).

Delta Plans -- Portions of Alameda, Contra Costa, and Solano County overlap with the Primary Zone. Projected development could affect consistency with the LURMP adopted by the Delta Protection Commission because development at the urban edge could adversely impact agriculture, natural resources, recreational land, and water quality in the Delta. However, jurisdictions with land in the Primary Zone are required by Public Resources Code Section 29763 to adopt general plans with land uses consistent with the goals and policies in the LURMP, subject to review by the DPC. Therefore, subsequent projects within the proposed Plan that fall within the LURMP boundaries would be required to demonstrate consistency with the plan and satisfy mitigation requirements.

Table 2.3-5 Growth Footprint within BCDC Priority Use Areas, by Region, County, and TPAs

County		Priority Use Area (acres)				
		Airport	Port	Wildlife	Waterfront Park, Beach	Water-Related Industry
Alameda	County Total		49	<1	21	
	Within TPAs		28		18	
Contra Costa	County Total				4	85
	Within TPAs					
San Francisco	County Total		157		130	
	Within TPAs		123		120	
San Mateo	County Total	<1		<1	30	
	Within TPAs	<1			10	

Source: compiled by Ascent in 2017

Notes: Number less than 1 are shown as "<1." Whole numbers have been rounded (between 0 and 10 to the nearest whole number, between 11 and 999 to the nearest 10, between 1,000 and 1,000,000 to the nearest 100, over 10,000 to the nearest 1,000). There are no acreages of BCDC priority use areas for Santa Clara, Marin, Napa, Solano, and Sonoma counties.

Impacts of Transportation Projects

General Plans and Specific Plans -- The majority of proposed transportation projects were nominated by local jurisdictions and may already exist in local or Countywide Transportation Plans. While it is not anticipated that the proposed RTP would conflict with local general plans, where inconsistencies could occur local agencies could amend their general plans to be consistent with the proposed RTP. Local jurisdictions are precluded by state law from undertaking land use activities inconsistent with their respective general plans. While transportation projects on state and interstate highways and those sponsored by special districts—such as BART, AC Transit, SamTrans, Golden Gate Transportation District—are not necessarily derived from local general plans, these project sponsors work with their respective county CMAs to ensure consistency with local jurisdiction planning efforts. As a result, the transportation projects in the proposed Plan are not expected to conflict with the land use designations of current local general plans.

Local Coastal Plans -- Transportation project footprints overlap with the Coastal Zone are located in San Mateo County (approximately 400 acres) and San Francisco County (approximately 2 acres). As described above, San Mateo County and San Francisco County have adopted LCPs, consistent with the Coastal Act. Development in the coastal zone is subject to a coastal development permit when there would be change in the use of land or water. The overall goal of applying for and receiving a coastal development permit is to ensure that a project is consistent with the Coastal Act, and by extension LCPs. Thus, inconsistencies with LCPs would not occur.

BCDC -- Of the proposed transportation projects, acreages of BCDC PUA designated areas consist of approximately: 110 acres in Airport PUAs, 970 acres in Port PUAs, 580 acres in Port PUAS, and 40 acres in Water-Related Industry PUAs. These projects consist of the following projects: one express lanes (conversions) and pricing, four express land (expansions) and roadway expansions, eight goods movement modernizations, seven highway operational and interchanges modernizations, nine transit efficiency and service improvements modernizations, and two transit expansions. Proposed transportation projects generally seek to improve access and mobility throughout the region and are expected to promote public access to lands within BCDC jurisdictions in general. BCDC can only permit auto and transit projects on Bay fill, if the structure is a bridge.

Delta Plans -- Portions of Alameda, Contra Costa, and Solano County overlap with the Primary Zone. Transportation project development could affect consistency with the LURMP adopted by the Delta Protection Commission because development at the urban edge could adversely impact agriculture, natural resources, recreational land, and water quality in the Delta. However, jurisdictions with land in the Primary Zone are required by Public Resources Code Section 29763 to adopt general plans with land uses consistent with the goals and policies in the LURMP, subject to review by the DPC. Therefore, subsequent projects within the

proposed Plan that fall within the LURMP boundaries would be required to demonstrate consistency with the plan and satisfy mitigation requirements.

Conclusion

Implementation of the proposed Plan could result in planning of forecasted development and/or transportation projects in areas that are not consistent with existing long-range plans. Projects would be required to demonstrate consistency with relevant plans to obtain permits and otherwise meet agency requirements. This would include consideration of project modifications and/or plan amendments, as appropriate, to allow for implementation of a specific project. Impacts would be **less than significant (LS)**. No mitigation is required.

Mitigation Measures

None required.

Impact 2.3-4: Implementation of the proposed Plan could directly or indirectly convert substantial amounts of important agricultural lands and open space (Prime Farmland, Unique Farmland, or Farmland of Statewide Importance) or lands under Williamson Act contract to non-agricultural use.

Impacts of Change in Projected Land Use

Land converted from Prime or Unique Farmland or Farmland of Statewide Importance to other uses can have direct effects when productive land no longer produces crops. Indirect effects would occur if the conversion of farmland results in fragmentation of agricultural land and adjacent use conflicts, hinders existing transportation access to agricultural lands, or restricts infrastructure options that are necessary to the function of the agricultural property.

The proposed Plan would affect land use patterns through increases to residential density and non-residential intensity within the Plan area. This minimizes the effects of the Plan on agricultural lands and open space because the projected growth would be largely infill within the urbanized footprint. A portion of the projected development area (approximately 1,624 acres) overlaps with Farmland of Local importance, Farmland of Statewide Importance, Prime Farmland, and Unique Farmland; and approximately 3,500 acres of land designated for grazing. Additionally, the land use growth footprints overlap with approximately 200 acres of lands that are under Williamson Act contract. Farmland and land subject to Williamson Act contracts within the projected development area is shown below and in **Table 2.3-6**. Table 2.3-6 also includes the portion of the affected acreages that are included in TPAs.

Table 2.3-6 Farmland Acres Potentially Affected by Land Type, by Region, County, and TPAs

		Prime Farmland	Farmland of Statewide Importance	Farmland of Local Importance	Unique Farmland	Grazing Land	Williamson Act Contract
Alameda	County Total	9	1		4	870	-
	Within TPAs	9	-	-	-	180	-
Contra Costa	County Total	100	110	690	20	1,300	-
	Within TPAs	70	-	20	-	170	-
Marin	County Total	-	-	1	-	-	-
	Within TPAs	-	-	-	-	-	-
Napa	County Total	4	4	160	2	130	-
	Within TPAs	-	-	-	-	-	-
San Mateo	County Total	-	-	-	-	-	-
	Within TPAs	-	-	-	-	-	-

Table 2.3-6 Farmland Acres Potentially Affected by Land Type, by Region, County, and TPAs

		Prime Farmland	Farmland of Statewide Importance	Farmland of Local Importance	Unique Farmland	Grazing Land	Williamson Act Contract
Santa Clara	County Total	160	20	80	-	390	50
	Within TPAs	-	-	-	50	20	-
Solano	County Total	120	-	-	-	940	150
	Within TPAs	-	-	-	-	-	-
Sonoma	County Total	9		120		1	-
	Within TPAs	-	-	-	1	1	-
Regional Total	**County Total**	**410**	**140**	**1,050**	**20**	**3,600**	**200**
	Within TPAs	**80**	**0**	**20**	**50**	**370**	**0**

Note: Whole numbers have been rounded (between 0 and 10 to the nearest whole number, between 11 and 999 to the nearest 10, between 1,000 and 1,000,000 to the nearest 100, over 10,000 to the nearest 1,000).

TPA acreages are a subset of County acreages.

Figures may not sum because of independent rounding.

Sources: Farmland Mapping and Monitoring Program, California Department of Conservation 2015

Approximately 450 acres of projected development overlaps with protected open space land (excluding agricultural land, forest land, or timberland, which are addressed separately). The largest overlaps are anticipated in Napa, San Francisco, Solano, and Alameda Counties (Table 2.3-7). In TPAs, open space included in the growth area is smaller, totaling 130 acres region-wide (see Table 2.3-7). While TPAs are areas in which growth is focused, they would not be developed in their entirety and would include diverse land uses in addition to jobs and housing that could include preservation of open space.

Table 2.3-7 Protected Open Space Acres Potentially Affected by Proposed Development, by County

County		Total Acres
Alameda	County Total	60
	Within TPAs	20
Contra Costa	County Total	9
	Within TPAs	3
Marin	County Total	-
	Within TPAs	-
Napa	County Total	170
	Within TPAs	-
San Francisco	County Total	90
	Within TPAs	90
San Mateo	County Total	7
	Within TPAs	1
Santa Clara	County Total	30
	Within TPAs	10

Table 2.3-7 Protected Open Space Acres Potentially Affected by Proposed Development, by County

County		Total Acres
Solano	County Total	90
	Within TPAs	-
Sonoma	County Total	3
	Within TPAs	-
Regional Total	**County Total**	**450**
	Within TPAs	**130**

Note: Whole numbers have been rounded (between 0 and 10 to the nearest whole number, between 11 and 999 to the nearest 10, between 1,000 and 1,000,000 to the nearest 100, over 10,000 to the nearest 1,000).

TPA acreages are a subset of acreages.

Figures may not sum because of independent rounding.

Source: California Protected Areas Database 2012

With the exception of San Francisco, all counties in the Bay Area protect open space and agricultural lands by county-wide land use measures, such as urban service areas, environmental corridors, slope/density restrictions, stream conservation areas, or riparian buffers. Additionally, some cities have Urban Growth Boundaries (UGB) to limit sprawl and protect agricultural land. Counties and cities with UGBs are summarized in Table 2.3-8. Generally, this means that if a project falls outside a UGB, there are regulatory measures in place to aid local jurisdictions in farmland protection. However, the general growth measures that are in place vary in effectiveness and enforcement, and there are many cities without UGBs.

Table 2.3-8 Bay Area Urban Growth Boundaries and Wide Land Use Measures

	-Wide Measure	Cities with an Urban Growth Boundary
Alameda	Yes	Dublin, Fremont, Hayward, Livermore, Pleasanton
Contra Costa	Yes	Antioch, Contra Costa, Danville, El Cerrito, Hercules, Martinez, Oakley, Orinda, Pinole, Pittsburg, Pleasant Hill, Richmond, San Pablo, San Ramon, Walnut Creek
Marin	Yes	Novato
Napa	Yes	American Canyon, Napa, St. Helena, Yountville
San Francisco[1]	No	–
San Mateo	Yes	Urban-Rural Boundary applies to all jurisdictions in the
Santa Clara	Yes	Cupertino, Gilroy, Los Gatos, Milpitas, Morgan Hill, Palo Alto, San José
Solano	Yes	Benicia, Fairfield, Rio Vista, Vallejo, Vacaville
Sonoma	Yes	Cloverdale, Cotati, Healdsburg, Petaluma, Rohnert Park, Santa Rosa, Sebastopol, Sonoma, Windsor

[1] San Francisco has no affected farmland acres.

Source: Greenbelt Alliance 2015

The potential conversion of farmland, lands under Williamson Act Contracts, and open space to urban uses is considered potentially significant (PS). Mitigation Measures 2.3(g) and 2.3(h) are described below.

Impacts of Transportation Projects

Generally, the effects of transportation projects on agricultural land and open space—conversion, fragmentation, use conflicts, decreased access, and limitations on agricultural infrastructure—are similar to those of planned land use development.

Transportation projects in the proposed Plan have the potential to convert 540 acres of farmland and 1,200 acres of grazing land. This represents less than one percent of all agricultural land in the Plan area. Of the potentially affected farmland, the majority (69 percent) is Grazing Land, 13 percent is Farmland of Local Importance, 14 percent is Prime Farmland, and the remainder is made up of Farmland of Statewide Importance and Unique Farmland, as documented for each county in Table 2.3-9. Further, of the agricultural land with potential for conversion, approximately 250 acres across six counties are under Williamson Act contract. This represents 0.02 percent of all Williamson Act land in the Plan area.

Table 2.3-9 Farmland Acres Potentially Affected by Transportation Projects Footprint, by and Type

	Prime	State Importance	Local Importance	Unique	Grazing	Williamson Act Contract Land
Alameda	1	0	0	8	280	10
Contra Costa	6	5	30	10	160	9
Marin	0	0	60	0	20	4
Napa	4	6	30	0	1	-
San Francisco	-	-	-	-	-	-
San Mateo	30	0	<1	20	20	20
Santa Clara	170	20	20	8	440	210
Solano	30	2	0	<1	220	1
Sonoma	0	0	70	0	70	3
Regional Total	**240**	**30**	**220**	**50**	**1,200**	**250**

Note: Numbers less than 1 are shown as "<1." Whole numbers have been rounded (between 0 and 10 to the nearest whole number, between 11 and 999 to the nearest 10, between 1,000 and 1,000,000 to the nearest 100, over 10,000 to the nearest 1,000).

The acreage calculation for transportation projects is based on buffers ranging from 100 to 500 feet on either side of the centerline of a linear project and radius around the center of a point project, such as an intersection improvement resulting in a new configuration. Projects that do not have a measurable footprint were not included. The farmland acre totals include land not currently in production. In some cases, these farmlands may be zoned for urban development. Multi-county projects include transit expansion and efficiency projects associated with California High Speed Rail, BART, Caltrain, and ferry services.

Source: DOC 2015

Transportation projects in the proposed Plan area have the potential to affect 630 acres of protected open space (excluding agricultural land, forest land, or timberland, which are addressed separately), as indicated in Table 2.3-10. This represents a small amount (0.05 percent) of open space land in the growth area.

The likelihood of farmland and open space conversion increases where transportation projects are located at the edges of existing urban areas, along waterways, or over hills separating urban areas. The extent of this area would depend on the final scale and design of proposed projects. Some conversion could be substantial, depending on the amount and type of farmland that is converted. The conversion of agricultural and open space acreage is considered potentially significant (PS). Mitigation Measures 2.3(g) and 2.3(h) are described below.

Table 2.3-10 Protected Open Space Acres Potentially Affected by Proposed Transportation Projects

	Overlap Acres
Alameda	150
Contra Costa	40
Marin	3
Napa	<1
San Francisco	270
San Mateo	60
Santa Clara	80
Solano	10
Sonoma	10
Regional Total	**630**

Notes: Note: Numbers less than 1 are shown as "<1." Whole numbers have been rounded (between 0 and 10 to the nearest whole number, between 11 and 999 to the nearest 10, between 1,000 and 1,000,000 to the nearest 100, over 10,000 to the nearest 1,000).

The acreage calculation is based on buffers ranging from 100 to 500 feet on either side of the centerline of a linear project and radius around the center of a point project, such as an intersection improvement resulting in a new configuration. Existing roadway is categorized as "roadway" and thus not counted in impact totals.

Source: California Protected Areas Database 2012

Conclusion

Together, land use and transportation projects in the proposed Plan have the potential to convert agricultural lands and open space to urban uses. The overall amount of these conversions relative to the resources would be small, as described above. However, because some conversion could be substantial within a county or local municipality, the conversion of agricultural or open space land as a result of land use or transportation projects is considered **potentially significant (PS)**. Mitigation Measure 2.3-4 is described below.

Mitigation Measures

2.3-4 Implementing agencies and/or project sponsors shall implement measures, where feasible and necessary based on project-and site-specific considerations that include, but are not limited to those identified below.

- require project relocation or corridor realignment, where feasible, to avoid agricultural land, especially Prime Farmland;
- maintain and expand agricultural land protections such as urban growth boundaries;
- compensatory mitigation may be achieved in advance of impacts through the purchase or creation of mitigation credits or the implementation of mitigation projects through Regional Advance Mitigation Planning (RAMP), as deemed appropriate by the permitting agencies;
- require acquisition of conservation easements on land at least equal in quality and size as mitigation for the loss of agricultural land; and/or
- institute new protection of farmland in the project area or elsewhere through the use of long-term restrictions on use, such as 20-year Farmland Security Zone contracts (Government Code Section 51296 et seq.) or 10-year Williamson Act contracts (Government Code Section 51200 et seq.).

Significance after Mitigation

Implementation of Mitigation Measure 2.3-4 would reduce the potentially significant impact of conversion of important agricultural land or open space or lands under a Williamson Act Contract to other uses because it would require avoidance or compensation for converted lands. To the extent that an individual project adopts and implements all feasible mitigation measures described above, the impact would be less than significant with mitigation (LS-M).

Projects taking advantage of CEQA Streamlining provisions of SB 375 (PRC Sections 21155.1, 21155.2, and 21159.28) must apply the mitigation measures described above, as feasible, to address site-specific conditions. However, MTC/ABAG cannot require local implementing agencies to adopt the above mitigation measures, and it is ultimately the responsibility of a lead agency to determine and adopt mitigation. Therefore, it cannot be ensured that this mitigation measure would be implemented in all cases, and this impact remains **significant and unavoidable (SU)** for purposes of this program-level review.

Impact 2.3-5: Implementation of the proposed Plan could directly or indirectly result in the loss of forest land, conversion of forest land to non-forest use, or conflict with existing zoning for, or cause rezoning of, forest land, timberland, or timberland zoned Timberland Production.

Impacts of Change in Projected Land Use

Land converted from timberland to other use would have direct effects related to the loss of timber crops production. Indirect effects would occur to the extent that conversion creates fragmentation of timberland and adjacent use conflicts or hinders existing transportation access to timberlands.

As shown in **Table 2.3-11**, a total of 467 acres of forestland overlap with the planned growth area. The majority of forestland that overlaps with the planned growth area is located in Santa Clara. Less than 5 acres of forestland is located within TPAs. In addition, current timberland or forest land zoning exists in Contra Costa, Sonoma, and San Mateo counties. The majority of projected development in the proposed Plan would occur on existing urban land, thereby minimizing impacts on forest land or timberland. As noted above, some Bay Area cities have UGBs to limit sprawl and protect forest land and timberland. While the potential conversion of 467 acres of forest and timberland is considered potentially significant (PS), it represents a small fraction of all Plan area forest land and timberland. Mitigation Measure 2.3(i) is described below.

Table 2.3-11 Forest and Timberland Acres Potentially Affected by Proposed Development

		Acres
Alameda	County Total	30
	Within TPAs	0
Contra Costa	County Total	50
	Within TPAs	0
Marin	County Total	6
	Within TPAs	0
Napa	County Total	7
	Within TPAs	0
San Francisco	County Total	4
	Within TPAs	4
San Mateo	County Total	20
	Within TPAs	1
Santa Clara	County Total	330
	Within TPAs	0
Solano	County Total	10
	Within TPAs	0
Sonoma	County Total	7
	Within TPAs	0
Regional Total	**County Total**	**470**
	Within TPAs	**5**

Notes: Less than one half acre were calculated in Alameda and Contra Costa Counties.
Source: USDA 2016

Impacts of Transportation Projects

Overall, there are transportation projects in seven counties (excluding Napa and Solano) with the potential to impact 180 acres of forest land or timberland. This is less than one percent of overall forest and land timberland acres in the Plan area. The majority of this forestland is located in Santa Clara (114 acres), followed by San Francisco (28 acres), Contra Costa (20 acres), Sonoma and Alameda (5 acres each), and San Mateo (3 acres). Less than half an acre of forestland is located where transportation projects are proposed in Marin. As discussed in Section 2.0, "Approach to Analysis," the buffer used to quantify potential impact of intersection improvements is necessarily general—a 100 to 500 foot area —and likely to be a conservative estimate of disturbance.

The likelihood of forest land and timberland conversion increases where transportation projects are located at the edges of existing urban areas, along waterways, or in areas currently separating urban areas. The extent of this impact will depend on the final scale and design of proposed projects. Nonetheless, the conversion of forest land and timberland acreage is considered potentially significant (PS).

Conclusion

The proposed Plan could result in conversion of forest land and timberland to urban other uses. . This impact would be **potentially significant (PS)**. Mitigation Measure 2.3-5 is described below.

Mitigation Measures

2.3-5 Implementing agencies and/or project sponsors shall implement measures, where feasible and necessary based on project-and site-specific considerations including but not limited to those identified below.

- require project relocation or corridor realignment, where feasible, to avoid forest land;
- maintain and expand forest land protections such as urban growth boundaries;
- compensatory mitigation may be achieved in advance of impacts through the purchase or creation of mitigation credits or the implementation of mitigation projects through Regional Advance Mitigation Planning (RAMP), as deemed appropriate by the permitting agencies; and/or
- require acquisition of conservation easements on land at least equal in quality and size as mitigation for the loss of forest land.

Significance after Mitigation

Implementation of Mitigation Measure 2.3-5 would reduce the potentially significant impact of conversion or forest or timberland to other uses because it would require avoidance or compensation for converted lands. To the extent that an individual project adopts and implements all feasible mitigation measures described above, the impact would be less than significant with mitigation (LS-M).

Projects taking advantage of CEQA Streamlining provisions of SB 375 (PRC Sections 21155.1, 21155.2, and 21159.28) must apply the mitigation measures described above, as feasible, to address site-specific conditions. However, MTC/ABAG cannot require local implementing agencies to adopt the above mitigation measures, and it is ultimately the responsibility of a lead agency to determine and adopt mitigation. Therefore, it cannot be ensured that this mitigation measure would be implemented in all cases, and this impact remains **significant and unavoidable (SU)** for purposes of this program-level review.

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2.4 ENERGY

This section was prepared pursuant to CEQA Guidelines Section 15126 and Appendix F of the CEQA Guidelines, which require that EIRs include a discussion of the potential energy impacts of projects, with particular emphasis on considering if the proposed Plan would result in inefficient, wasteful, and unnecessary consumption of energy. This section discusses the energy impacts of implementing transportation projects in the proposed Plan, as well as the energy-related consequences of land use decisions that are consistent with the proposed Plan.

Energy related to land use is primarily associated with direct energy consumption for space heating and onsite electricity/heating/cooling facilities at residential and commercial uses, industrial plant energy consumption, and indirect energy consumed in generation of electricity at power plants. Transportation energy use is related to the efficiency of cars, trucks, and public transportation; choice of travel modes (e.g., automobile, carpool, vanpool, and transit); and miles traveled by these modes. Energy is also consumed with construction and routine operation and maintenance of the transportation infrastructure.

Comments received in response to the Notice of Preparation included concerns regarding energy demand and capacity within Planned Development Areas. These items are addressed in this section.

For an analysis of greenhouse gas (GHG) production and proposed Plan impacts on climate change, please see Section 2.5, "Climate Change and Greenhouse Gases."

2.4.1 Environmental Setting

PHYSICAL SETTING

Energy Types and Sources

In 2013, the world total energy consumption was about 543 quadrillion British thermal units (Btu), 18 percent of which occurred within the U.S. Fossil fuels provide approximately 80 percent of the energy used in the U.S., nuclear power provides about 8.5 percent, and renewable energy provides approximately 9.8 percent (U.S. Energy Information Administration [EIA] 2016, Barr 2001). California is the most populous state in the U.S., and its energy consumption is second only to Texas; however, California has the lowest per capita energy consumption rate in the U.S. California relies on a regional power system composed of a diverse mix of natural gas, renewable, hydroelectric, and nuclear generation resources. Recent trends associated with energy use in California are discussed below.

Petroleum

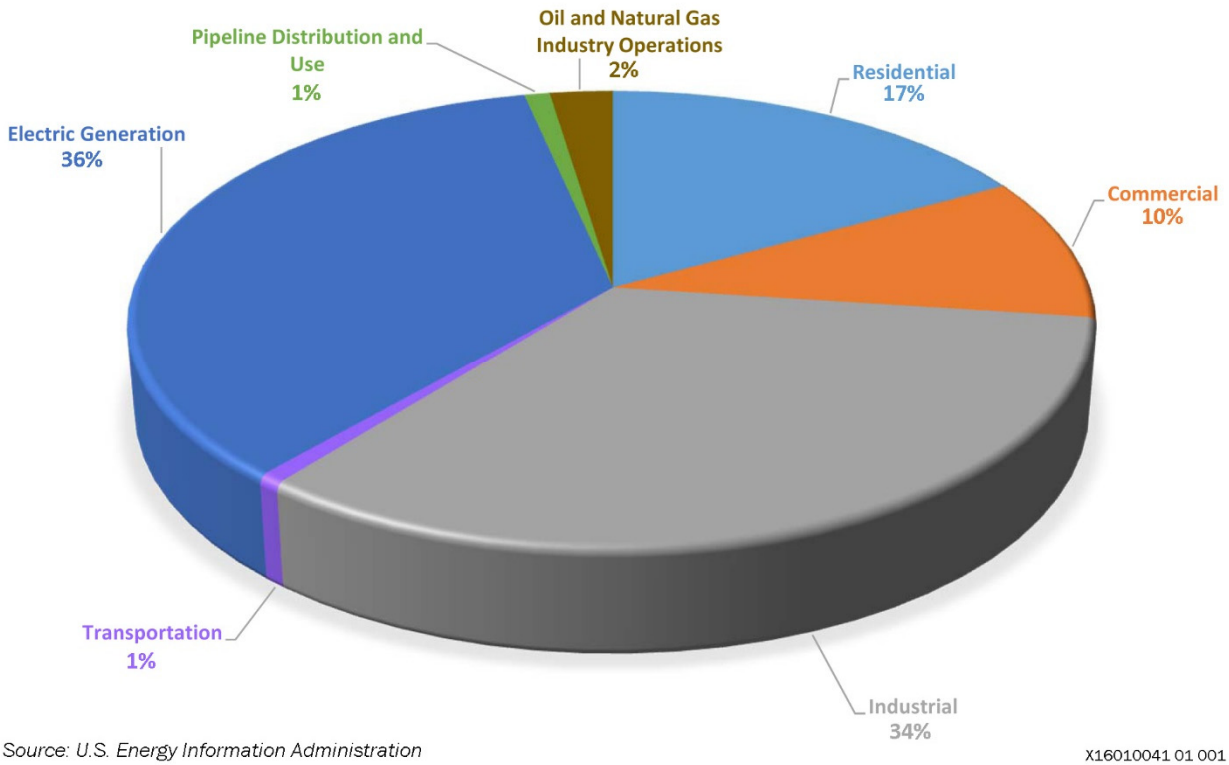
Gasoline and diesel fuel sold in California for motor vehicles is refined in California to meet State-specific formulations required by the California Air Resources Board (ARB). Major petroleum refineries in California are concentrated in three counties: Contra Costa County in northern California, Kern County in central California, and Los Angeles County in southern California. In the Bay Area, Valero, Tesoro, Phillips, Shell and Chevron operate refineries in Contra Costa County and adjacent Solano County.

Natural Gas

One third of energy commodities consumed in California is natural gas. The natural gas market continues to evolve and service options expand, but use falls mainly into four sectors - residential, commercial, industrial, and electric power generation. In addition, natural gas is an alternative to petroleum for use in trucks, buses, and some cars. Alternative transportation-related vehicles are increasing in use by consumers along with the development of a safe, reliable refueling infrastructure (California Energy Commission [CEC] 2016).

As illustrated in **Figure 2.4-1**, in 2014, approximately 35 percent of all natural gas consumed in the state was used to generate electricity. Residential consumption represented approximately 17 percent of California natural gas use with the balance consumed by the industrial, resource extraction, and commercial sectors (EIA 2014a).

Figure 2.4-1
Natural Gas Usage



Source: U.S. Energy Information Administration

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Electricity and Renewables

Power plants in California meet approximately 68 percent of the in-state electricity demand; hydroelectric power from the Pacific Northwest provides another 12 percent and power plants in the southwestern U.S. provide another 20 percent (EIA 2014b). The contribution of in-state and out-of-state power plants depends upon, among other factors, the precipitation that occurred in the previous year and the corresponding amount of hydroelectric power that is available. In the Bay Area, Contra Costa County is home to one of the largest power plants in California: the Pittsburg Power Plant. It is the seventh largest power plant in California (second largest in Northern California after Dyenergy's Moss Landing plant in Monterey County) and consumes natural gas. Smaller power plants and cogeneration facilities are located throughout the Bay Area. Pacific Gas & Electric (PG&E) is the primary electricity supplier to northern California.

As discussed below in Section 2.4.2, California regulations require that electricity consist of 33 percent renewables by 2020 and 50 percent renewables by 2030 for all electricity retailers in the state. As of July 2016, the California electricity system was powered by 21.9 percent renewables: biomass, geothermal, small hydroelectric, solar, and wind. In-State generation of electricity consisted of 24.5 percent renewables (CEC 2016).

Alternative Fuels

A variety of alternative fuels are used to reduce petroleum-based fuel demand. The use of these fuels is encouraged through various statewide regulations and plans (e.g., Low Carbon Fuel Standard [LCFS] and Assembly Bill [AB] 32 Scoping Plan). Conventional gasoline and diesel may be replaced (depending on the capability of the vehicle) with many transportation fuels, including:

- biodiesel,
- electricity,
- ethanol (E-10 and E-85),
- hydrogen,

- natural gas (methane in the form of compressed and liquefied natural gas),
- propane,
- renewable diesel (including biomass-to-liquid),
- synthetic fuels, and
- gas-to liquid and coal-to liquid fuels.

California has a growing number of alternative fuel vehicles through the joint efforts of the Energy Commission, California Air Resources Board, local air districts, federal government, transit agencies, utilities, and other public and private entities. As of September 2016, California contained nearly 14,000 alternative fueling stations (Alternative Fuels Data Center 2016).

COMMERCIAL AND RESIDENTIAL ENERGY USE

Homes built between 2000 and 2005 used 14 percent less energy per square foot than homes built in the 1980s and 40 percent less energy per square foot than homes built before 1950. However, larger home sizes offset these efficiency improvements. Primary energy consumption in the residential sector totaled 20.99 quadrillion Btu in 2009 (the latest year the *Residential Energy Consumption Survey* was completed), equal to 54 percent of consumption in the buildings sector and 22 percent of total primary energy consumption in the U.S. Energy consumption increased 24 percent from 1990 to 2009. However, because of projected improvements in building and appliance efficiency, the EIA 2012 Annual Energy Outlook forecast a 13 percent increase from 2009 to 2035 (U.S. Department of Energy [DOE] 2012).

Commercial buildings represent just under one-fifth of U.S. energy consumption, with office space, retail space, and educational facilities representing about half of commercial sector energy consumption. In aggregate, commercial buildings consumed 46 percent of building energy consumption and approximately 19 percent of U.S. energy consumption. In comparison, the residential sector consumed approximately 22 percent of U.S. energy consumption (DOE 2012).

Commercial and residential space heating (including onsite co-generation facilities at commercial buildings) comprise a large share of energy end use in the Bay Area. Other major energy users include industrial facilities (including oil refineries that consume energy in the production of gasoline and other fuels) and electricity-generating power plants, which burn fossil fuels (generally natural gas) to convert those fuels to electricity.

Electricity and natural gas consumption for the nine Bay Area counties in 2014 is shown in Table 2.4-1.

Table 2.4-1 Electricity and Natural Gas Consumption in the San Francisco Bay Area, 2014

County	Electricity (million kWh)	Natural Gas (million Therms)
Alameda	10,299	361
Contra Costa	9,583	1,099
Marin	1,350	63
Napa	1,046	35
San Francisco	5,832	220
San Mateo	4,443	193
Santa Clara	16,671	403
Solano	3,213	229
Sonoma	2,943	102
Regional Total	**55,380**	**2,705**

Notes: kWh=kilowatt hours
Source: CEC 2014

ENERGY USE FOR TRANSPORTATION

Transportation is the second largest energy consumer nationwide, accounting for 27 percent of the total national energy use (DOE 2016). On-road vehicles are estimated to consume approximately 80 percent of California's transportation energy demand, with cars, trucks, and buses accounting for nearly all of the on-road fuel consumption. Petroleum products (gasoline, diesel, jet fuel) account for almost 98.8 percent of the energy used by the California transportation sector with the rest provided by ethanol, natural gas and electricity (Bureau of Transportation Statistics 2015).

On-road vehicles use about 90 percent of the petroleum consumed in California. The California Department of Transportation (Caltrans) estimates that in 2006, over 3.2 billion gallons of gasoline and diesel fuel were consumed in the nine Bay Area counties—an increase of about 8 million gallons over 2000 consumption levels (Caltrans 2009).

Vehicle Miles Traveled and Gasoline Consumption

According to Caltrans, total gasoline consumption in California is expected to increase 57 percent from 2007 to 2030, and the number of vehicle miles traveled (VMT) is expected to increase 61 percent in the same time period (Caltrans 2009). As noted in the Regulatory Setting, below, several State mandates and efforts, such as Senate Bill (SB) 375, seek to reduce VMT. Fuel consumption per capita in California decreased by nearly 11 percent from 2008 to 2013 (Bureau of Transportation Statistics 2015). Despite the progress in reducing per capita VMT and per capita fuel consumption, the continued projected increases in total fuel consumption and VMT can be attributed to the overall increase in population; see Section 2.1, "Transportation," for more information on VMT and other travel-related data.

Total gasoline usage in California varies from year to year due to a variety of factors such as gas prices, periods of economic growth and decline, and fuel economy of vehicles. Between January 2007 and May 2016, an average of approximately 672 billion gallons of gasoline were purchased in California. During this time period, the volume of gasoline purchase ranged from a minimum of approximately 1.1 billion gallons in February 2013 to a maximum of approximately 1.37 billion gallons in August 2007 (California State Board of Equalization 2016).

Gasoline and diesel consumption for the nine Bay Area counties during 2010 and 2011 are shown in **Table 2.4-2**. Over this period, gasoline and diesel consumption in the Bay Area decreased by approximately 1.5 percent, with 4 percent decreases in Santa Clara and Solano counties.

Table 2.4-2 Gasoline and Diesel Consumption in the San Francisco Bay Area, 2010 and 2011 (1,000 gallons)

County	2010	2011	% Change
Alameda	709,971	691,879	-0.02%
Contra Costa	415,568	417,289	0.4%
Marin	138,606	139,564	0.7%
Napa	61,120	61,454	0.5%
San Francisco	158,105	164,537	0.4%
San Mateo	310,976	311,078	0.03%
Santa Clara	765,325	737,831	-4.0%
Solano	236,490	226,451	-4.0%
Sonoma	204,797	206,692	0.9%
Regional Total	**3,000,985**	**2,956,775**	**-1.5%**

Source: Caltrans 2009

With the highest fuel prices in the nation, California has seen fuel usage continue its downward trend, and gasoline consumption per capita is also slowing. The average California gas price per gallon at the pump increased from $1.88 in 2003 to $3.12 in 2007 to $3.61 in 2008 to $4.07 in 2012 and decreased to $2.91 in July of 2016 (CEC 2017).

Long-term energy consumption trends for transportation are generally determined by fuel efficiency trends for motor vehicles, as motor vehicles are the predominant transportation mode for passengers and commercial goods.

Energy Used by Public Transit

Public transit energy consumption includes energy consumed for the operation of public buses, electrified and diesel rail systems, and ferries.

The energy efficiency of each of these modes may vary according to operating conditions and ridership. For example, if a ferry that uses 1.256 million Btu per mile carries 400 passengers on a trip, the energy usage is approximately 3,140 Btu per passenger mile, while a bus carrying 30 passengers consumes 37,310 Btu per mile which equates to about 1,245 Btu per passenger mile.

Energy Used by Private and Commercial Vehicles

Commercial vehicles, generally composed of light, medium, and heavy trucks, are typically fueled by diesel or gasoline and are part of the general fleet mix of vehicles present within the Bay Area transportation system.

Average fuel economy is expected to increase for automobiles and all types of trucks. The federal Corporate Average Fuel Economy (CAFE) is the required average fuel economy for a vehicle manufactures' entire fleet of passenger cars and light trucks for each model year. For many years, the standard for passenger automobiles was 27.5 miles per gallon (mpg), and the standard for light trucks, a classification that also includes sport utility vehicles (SUVs) under 8,500 pounds, rose to 22.5 mpg for 2008 models. Effective with the 2011 model year, the CAFE standard was revised from a single number to a model-specific formulation based on the size of the vehicle, in square feet (wheelbase times track, or the distance between the axles multiplied by the distance between the wheels of each axle), referred to the vehicle's "footprint." For 2012, the average CAFE standard for passenger cars is 33.3 mpg, while for light trucks, it is 25.4 mpg (Federal Register 2010).

ENERGY USE AND GLOBAL WARMING

Scientists and climatologists have produced evidence that the burning of fossil fuels by vehicles, power plants, industrial facilities, residences and commercial facilities has led to an increase of the earth's temperature. For an analysis of greenhouse gas production and proposed Plan impacts on climate change, please see Section 2.5, "Climate Change and Greenhouse Gases."

2.4.2 Regulatory Setting

Federal and State agencies regulate energy consumption through various policies, standards, and programs. At the local level, individual cities and counties establish policies in their general plans and climate action plans related to the energy efficiency of new development and use of renewable energy sources. Local jurisdictions can also influence energy consumption through local design regulations and building code requirements.

Energy conservation is embodied in many federal, State, and local statutes and policies. At the federal level, energy standards apply to numerous products (e.g., the EnergyStar™ program) and transportation (e.g., fuel efficiency standards). At the State and local level, Title 24 of the California Administrative Code sets forth energy standards for buildings, rebates/tax credits are provided for installation of renewable energy systems, and the Flex Your Power program promotes conservation in multiple areas.

FEDERAL REGULATIONS

Energy Policy and Conservation Act, and CAFE Standards

The Energy Policy and Conservation Act of 1975 established nationwide fuel economy standards in order to conserve oil. Pursuant to this Act, the National Highway Traffic and Safety Administration, part of the U.S. Department of Transportation (DOT), is responsible for revising existing fuel economy standards and establishing new vehicle fuel economy standards.

The CAFE program was established to determine vehicle manufacturer compliance with the government's fuel economy standards. Compliance with CAFE standards is determined based on each manufacturer's average fuel economy for the portion of their vehicles produced for sale in the United States. The U.S. Environmental Protection Agency (EPA) calculates a CAFE value for each manufacturer based on city and highway fuel economy test results and vehicle sales. The CAFE values are a weighted harmonic average of the EPA city and highway fuel economy test results. Based on information generated under the CAFE program, DOT is authorized to assess penalties for noncompliance. Under the Energy Independence and Security Act of 2007 (described below), the CAFE standards were revised for the first time in 30 years.

Energy Policy Act of 1992

The Energy Policy Act of 1992 (EPAct) was passed to reduce the country's dependence on foreign petroleum and improve air quality. EPAct includes several parts intended to build an inventory of alternative fuel vehicles (AFVs) in large, centrally fueled fleets in metropolitan areas. EPAct requires certain federal, state, and local government and private fleets to purchase a percentage of light duty AFVs capable of running on alternative fuels each year. In addition, financial incentives are also included in EPAct. Federal tax deductions will be allowed for businesses and individuals to cover the incremental cost of AFVs. States are also required by the act to consider a variety of incentive programs to help promote AFVs.

Energy Policy Act of 2005

The Energy Policy Act of 2005 provides renewed and expanded tax credits for electricity generated by qualified energy sources, such as landfill gas; provides bond financing, tax incentives, grants, and loan guarantees for clean renewable energy and rural community electrification; and establishes a federal purchase requirement for renewable energy.

Energy Independence and Security Act of 2007

The Energy Independence and Security Act of 2007 is designed to improve vehicle fuel economy and help reduce U.S. dependence on oil. It represents a major step forward in expanding the production of renewable fuels, reducing dependence on oil, and confronting global climate change. The Energy Independence and Security Act of 2007:

- Increases the supply of alternative fuel sources by setting a mandatory Renewable Fuel Standard requiring fuel producers to use at least 36 billion gallons of biofuel in 2022, which represents a nearly five-fold increase over current levels; and
- Reduces U.S. demand for oil by setting a national fuel economy standard of 35 mpg by 2020—an increase in fuel economy standards of 40 percent.

By addressing renewable fuels and CAFE standards, the Energy Independence and Security Act of 2007 will build on progress made by the Energy Policy Act of 2005 in setting out a comprehensive national energy strategy for the 21st century.

STATE REGULATIONS

Warren-Alquist Act

The 1975 Warren-Alquist Act established the California Energy Resources Conservation and Development Commission, now known as CEC. The Act established a State policy to reduce wasteful, uneconomical, and unnecessary uses of energy by employing a range of measures. The California Public Utilities Commission (CPUC) regulates privately-owned utilities in the energy, rail, telecommunications, and water fields.

State of California Energy Plan

CEC is responsible for preparing the State Energy Plan, which identifies emerging trends related to energy supply, demand, conservation, public health and safety, and the maintenance of a healthy economy. The current plan is the 1997 California Energy Plan The plan calls for the State to assist in the transformation of the transportation system to improve air quality, reduce congestion, and increase the efficient use of fuel supplies with the least environmental and energy costs. To further this policy, the plan identifies a number of strategies, including assistance to public agencies and fleet operators in implementing incentive programs for zero-emission vehicles and addressing their infrastructure needs; and encouragement of urban designs that reduce VMT and accommodate pedestrian and bicycle access.

Assembly Bill 2076: Reducing Dependence on Petroleum

Pursuant to AB 2076 (Chapter 936, Statutes of 2000), CEC and ARB prepared and adopted in 2003 a joint agency report, *Reducing California's Petroleum Dependence*. Included in this report are recommendations to increase the use of alternative fuels to 20 percent of on-road transportation fuel use by 2020 and 30 percent by 2030, significantly increase the efficiency of motor vehicles, and reduce per- capita vehicles miles traveled (ARB 2003a). Further, in response to the CEC's 2003 and 2005 *Integrated Energy Policy Reports*, the Governor directed CEC to take the lead in developing a long-term plan to increase alternative fuel use.

A performance-based goal of AB 2076 was to reduce petroleum demand to 15 percent below 2003 demand.

Integrated Energy Policy Report

SB 1389 (Chapter 568, Statutes of 2002) required CEC to: "[C]onduct assessments and forecasts of all aspects of energy industry supply, production, transportation, delivery and distribution, demand, and prices. The Energy Commission shall use these assessments and forecasts to develop energy policies that conserve resources, protect the environment, ensure energy reliability, enhance the state's economy, and protect public health and safety." (Public Resources Code Section 25301(a)) This work culminated in the Integrated Energy Policy Report (IEPR).

CEC adopts an IEPR every two years and an update every other year. The 2015 IEPR is the most recent IEPR, which was adopted in February 24, 2016. The 2015 IEPR provides a summary of priority energy issues currently facing the State, outlining strategies and recommendations to further the State's goal of ensuring reliable, affordable, and environmentally responsible energy sources. Energy topics covered in the report include progress toward State-wide renewable energy targets and issues facing future renewable development; efforts to increase energy efficiency in existing and new buildings; progress by utilities in achieving energy efficiency targets and potential; improving coordination among the State's energy agencies; streamlining power plant licensing processes; results of preliminary forecasts of electricity, natural gas, and transportation fuel supply and demand; future energy infrastructure needs; the need for research and development efforts to support State-wide energy policies; and issues facing California's nuclear power plants.

Senate Bill 1078: California Renewables Portfolio Standard Program

SB 1078 (Chapter 516, Statutes of 2002) establishes a renewable portfolio standard (RPS) for electricity supply. The RPS requires that retail sellers of electricity, including investor-owned utilities and community choice aggregators, provide 20 percent of their supply from renewable sources by 2017. This target date was moved forward by SB 1078 to require compliance by 2010. In addition, electricity providers subject to the RPS must increase their renewable share by at least 1 percent each year. The outcomes of this legislation will

impact regional transportation powered by electricity. As of 2016, the state has reported that 21 percent of electricity is sourced from certified renewable sources (see Section 2.4.1, "Environmental Setting").

Senate Bill X1-2: California Renewable Energy Portfolio Standard

In 2011, Governor Brown signed SB X1-2, which requires retail sellers of electricity, including investor-owned utilities and community choice aggregators, to provide at least 33 percent of their electricity supply (portfolio) from renewable sources by 2020. CPUC and CEC jointly implement the Statewide RPS program through rulemakings and monitoring the activities of electric energy utilities in the state.

Senate Bill 350: Clean Energy and Pollution Reduction Act of 2015

The Clean Energy and Pollution Reduction Act of 2015 (SB 350) requires the amount of electricity generated and sold to retail customers per year from eligible renewable energy resources be increased to 50 percent by December 31, 2030. This act also requires doubling of the energy efficiency savings in electricity and natural gas for retail customers, through energy efficiency and conservation by December 31, 2030.

Assembly Bill 1493: Reduction of Greenhouse Gas Emissions

AB 1493 (Chapter 200, Statutes of 2002), known as the "Pavley bill," amended Health and Safety Code sections 42823 and 43018.5 requiring ARB to develop and adopt regulations that achieve maximum feasible and cost-effective reduction of GHG emissions from passenger vehicles, light-duty trucks, and other vehicles used for noncommercial personal transportation in California.

Implementation of new regulations prescribed by AB 1493 required that the State of California apply for a waiver under the federal Clean Air Act. Although EPA initially denied the waiver in 2008, EPA approved a waiver in June 2009, and in September 2009, ARB approved amendments to its initially adopted regulations to apply the Pavley standards that reduce GHG emissions to new passenger vehicles in model years 2009 through 2016. According to ARB, implementation of the Pavley regulations is expected to reduce fuel consumption while also reducing GHG emissions (ARB 2010).

Energy Action Plan

The first Energy Action Plan (EAP) emerged in 2003 from a crisis atmosphere in California's energy markets. The state's three major energy policy agencies (CPUC, CEC, and the Consumer Power and Conservation Financing Authority [established under deregulation and now defunct]) came together to develop one high-level, coherent approach to meeting California's electricity and natural gas needs. It was the first time that energy policy agencies formally collaborated to define a common vision and set of strategies to address California's future energy needs and emphasize the importance of the impacts of energy policy on the California environment.

In the October 2005 *Energy Action Plan II*, CEC and CPUC updated their energy policy vision by adding some important dimensions to the policy areas included in the original EAP, such as the emerging importance of climate change, transportation-related energy issues and research and development activities. CEC recently adopted an update to the EAP II in February 2008 that supplements the earlier EAPs and examines the State's ongoing actions in the context of global climate change.

Assembly Bill 1007: State Alternative Fuels Plan

AB 1007 (Chapter 371, Statutes of 2005) required CEC to prepare a State plan to increase the use of alternative fuels in California. CEC prepared the State Alternative Fuels Plan (SAF Plan) in partnership with the ARB and in consultation with other State, federal, and local agencies. The SAF Plan presents strategies and actions California must take to increase the use of alternative non- petroleum fuels in a manner that minimizes costs to California and maximizes the economic benefits of in-state production. The SAF Plan assessed various alternative fuels and developed fuel portfolios to meet California's goals to reduce petroleum consumption, increase alternative fuels use, reduce GHG emissions, and increase in-state production of biofuels without causing a significant degradation of public health and environmental quality.

Bioenergy Action Plan, Executive Order #S-06-06

Executive Order (EO) S-06-06, April 25, 2006, establishes targets for the use and production of biofuels and biopower, and directs State agencies to work together to advance biomass programs in California while providing environmental protection and mitigation. The EO establishes the following target to increase the production and use of bioenergy, including ethanol and biodiesel fuels made from renewable resources: produce a minimum of 20 percent of its biofuels within California by 2010, 40 percent by 2020, and 75 percent by 2050. EO S-06-06also calls for the State to meet a target for use of biomass electricity. The 2011 Bioenergy Action Plan identifies those barriers and recommends actions to address them so that the State can meet its clean energy, waste reduction, and climate protection goals. The 2012 Bioenergy Action Plan updates the 2011 Plan and provides a more detailed action plan to achieve the following goals:

- increase environmentally and economically sustainable energy production from organic waste;
- encourage development of diverse bioenergy technologies that increase local electricity generation, combined heat and power facilities, renewable natural gas, and renewable liquid fuels for transportation and fuel cell applications;
- create jobs and stimulate economic development, especially in rural regions of the state; and
- reduce fire danger, improve air and water quality, and reduce waste.

As of 2015, 3.2 percent of the total electricity system power in California was derived from biomass.

Title 24, California Code of Regulations

California Code of Regulations, Title 24, Part 6, is California's Energy Efficiency Standards for Residential and Non-residential Buildings. Title 24 was established by CEC in 1978 in response to a legislative mandate to create uniform building codes to reduce California's energy consumption, and provide energy efficiency standards for residential and nonresidential buildings. The standards are updated on an approximately three-year cycle to allow consideration and possible incorporation of new efficient technologies and methods. In 2016, CEC updated Title 24 standards with more stringent requirements effective January 1, 2017. All buildings for which an application for a building permit is submitted on or after January 1, 2017 must follow the 2016 standards. Energy efficient buildings require less electricity; therefore, increased energy efficiency reduces fossil fuel consumption and decreases GHG emissions. The CEC Impact Analysis for California's 2016 Building Energy Efficiency Standards estimates that the 2016 Standards are 28 percent more efficient than the previous 2013 standards for residential buildings and 5 percent more efficient for non-residential buildings (CEC 2015). The building efficiency standards are enforced through the local plan check and building permit process. Local government agencies may adopt and enforce additional energy standards for new buildings as reasonably necessary due to local climatologic, geologic, or topographic conditions, provided that these standards exceed those provided in Title 24.

California Global Warming Solutions Act of 2006 (AB 32 as amended by SB 32 of 2016)

AB 32, the California Global Warming Solutions Act (Health and Safety Code Section 38500 et seq.), was signed in September 2006. AB 32 requires the reduction of statewide GHG emissions to 1990 levels by the year 2020. This change, which is estimated to be a 25 to 35 percent reduction from current emission levels, will be accomplished through an enforceable statewide cap on GHG emissions that will be phased in starting in 2012. AB 32 also directs ARB to develop and implement regulations to reduce statewide GHG emissions from stationary sources and address GHG emissions from vehicles. ARB has stated that the regulatory requirements for stationary sources will be first applied to electricity power generation and utilities, petrochemical refining, cement manufacturing, and industrial/commercial combustion. The second group of target industries will include oil and gas production/distribution, transportation, landfills and other GHG-intensive industrial processes.

On December 11, 2008, ARB adopted its *Climate Change Scoping Plan* (Scoping Plan), which functions as a roadmap of the ARB's plans to achieve GHG reductions in California required by AB 32 through subsequently

enacted regulations. In May 2014, ARB released and has since adopted the First Update to the Climate Change Scoping Plan to identify the next steps in reaching AB 32 goals and evaluate the progress that has been made between 2000 and 2012 (ARB 2014:4, 5). According to the update, California is on track to meet the near-term 2020 GHG limit and is well positioned to maintain and continue reductions beyond 2020 (ARB 2014:ES-2). The update also reports the trends in GHG emissions from various emission sectors.

On September 8, 2016, Governor Brown approved SB 32 (Pavley, Chapter 249, Statutes of 2016), which added a 2030 target to the Global Warming Solutions Act of 2006. SB 32 requires that statewide GHG emissions are reduced to 40 percent below 1990 levels by 2030. This bill was tied to passage of a companion bill, AB 197.

On January 20, 2017, ARB released its Proposed 2017 Climate Change Scoping Plan Update (2017 Scoping Plan Update), which lays out the proposed framework for achieving the 2030 reductions as established in EO B-30-15, SB 32, and AB 197. The Proposed 2017 Scoping Plan Update identifies the GHG reductions needed by emissions sector to achieve a statewide emissions level that is 40 percent below 1990 levels before 2030. At the time of writing this DEIR, the Proposed 2017 Scoping Plan Update has not been approved by ARB.

These measures will have the co-benefit of reducing California's dependency of fossil fuels and making land use development and transportation systems more energy efficient. More details about the statewide GHG reduction goals and Scoping Plan measures are provided in the regulatory setting of Section 2.5, "Climate Change and Greenhouse Gases."

Executive Order B-30-15

On April 20, 2015, Governor Edmund G. Brown, Jr., signed EO B-30-15 to establish a California GHG reduction target of 40 percent below 1990 levels by 2030. (This EO preceded SB 32.) The Governor's EO aligns California's GHG reduction targets with those of leading international governments such as the 28-nation European Union which adopted the same target in October 2014. California's new emission reduction target of 40 percent below 1990 levels by 2030 will make it possible to reach the ultimate goal of reducing emissions 80 percent below 1990 levels by 2050. This is in line with the scientifically established levels needed in the U.S. to limit global warming below 2° Celsius, the warming threshold at which there will likely be major climate disruptions such as super droughts and rising sea levels.

Senate Bill 375 (Chapter 728, Statutes of 2008)

SB 375, adopted September 30, 2008 helps meet the AB 32 goals of reducing emissions from cars and light duty trucks. SB 375 requires regional planning agencies to include a Sustainable Communities Strategy (SCS) in their regional transportation plan (RTP) that demonstrates how the region could achieve GHG emissions reductions set by ARB through integrated land use and transportation planning. Local governments retain control of land use planning authority; however, SB 375 amended CEQA (Pub. Resources Code Section 21000 et seq.) to ease environmental review of specific types of developments that are anticipated to reduce emissions. Plan Bay Area 2040, which will replace Plan Bay Area, is the integrated SCS and RTP for the San Francisco Bay Area, consistent with SB 375.

LOCAL REGULATIONS

City and County General Plans

Many of the counties and cities in the Bay Area region have general plan elements and policies that specifically address energy use and conservation. Those energy conservation measures contain goals, objectives, and policies aimed at reducing energy consumption. These include policies on energy retrofits to existing residential and commercial land uses, zoning and building ordinances for energy efficiency of new construction, and ways to reduce VMT through land use and transportation priorities.

City and County Climate Action Plans

Additionally, many counties and cities in the Bay Area region are drafting or have adopted climate action plans or energy action plans. These documents set goals and targets on the reduction of GHG emissions and outline polices to help achieve those goals. Strategies often focus on reducing emissions from transportation, which modify land use and transportation policy specifically focused on reducing VMT. For an analysis of GHG production and proposed Plan impacts on climate change, please see Section 2.5, "Climate Change and Greenhouse Gases."

2.4.3 Impact Analysis

SIGNIFICANCE CRITERIA

The following significance criteria are based on CEQA Guidelines Appendix F (energy), thresholds used in the EIR for the 2013 Plan Bay Area, and professional judgment. Under these criteria, implementation of the proposed Plan would have a potentially significant adverse impact if the Plan would:

Criterion 1: Result in wasteful, inefficient, or unnecessary consumption of energy, during project construction or operation, as evidenced by a failure to decrease overall per capita energy consumption or decrease reliance on fossil fuels such as coal, natural gas, and oil.

Criterion 2: Fail to incorporate feasible renewable energy or energy efficiency measures into building design, equipment use, transportation, or other project features, or otherwise fail to increase reliance on renewable energy sources.

METHOD OF ANALYSIS

The total levels of energy consumption by the proposed Plan residential and commercial sectors, measured in gigawatt-hours of electricity, therms of natural gas, gallons of gasoline, and gallons of diesel fuel, were estimated for the baseline year (2015) and the Plan horizon year (2040). Consistent with the methodology described in Chapter 2.0, "Approach to the Analysis," the year 2015 was used for the baseline due to the availability of data for this single calendar year from State and local sources. This includes data on energy consumption from CEC; emission inventories from ARB (which can be used as a surrogate for energy consumption); default values for the consumption of electricity and natural gas from the California Emissions Estimator Model (CalEEMod) Version 2016.3.1 computer program (South Coast Air Quality Management District [SCAQMD] 2016); and, land use and demographic estimates from ABAG. In addition, the lack of regional land use data for more recent years makes forecasting energy consumption difficult as estimates that are not based on accurate small-scale geographic land uses, like parcels, are less accurate. **Table 2.4-3** summarizes the levels of energy consumption for each year by source estimated for the Plan area.

Table 2.4-3 Net Change in Energy Consumption

Land Use/Energy Type	Net Change in Energy Consumption From 2015 to 2040	Units
Single-Family Residential		
Electricity	1,238,800	MWh/year
Natural Gas[2]	4,489,200	MMBTU/year
Multi-Family Residential (Low/Mid-Rise)		
Electricity	1,508,200	MWh/year
Natural Gas[2]	4,074,400	MMBTU/year

Table 2.4-3 Net Change in Energy Consumption

Land Use/Energy Type	Net Change in Energy Consumption From 2015 to 2040	Units
Multi-Family Residential (High Rise)		
Electricity	640,000	MWh/year
Natural Gas[2]	1,562,200	MMBTU/year
Residential Subtotal[1]		
Electricity	3,387,000	MWh/year
Natural Gas[2]	10,125,800	MMBTU/year
Office		
Electricity	1,835,000	MWh/year
Natural Gas[2]	1,992,900	MMBtu/year
Retail		
Electricity	-161,300	MWh/year
Natural Gas[2]	-79,700	MMBtu/year
Industrial		
Electricity	-287,000	MWh/year
Natural Gas[2]	-328,800	MMBtu/year
Non-Residential Subtotal[1]		
Electricity	1,386,700	MWh/year
Natural Gas[2]	1,584,400	MMBtu/year
All Land Uses in Plan area[1]		
Electricity	4,773,600	MWh/year
Natural Gas[2]	11,710,000	MMBTU/year
Water	95,700	MG/year
Waste	475,700	tons/year
Hearths[3]	NA[4]	NA[4]
Landscaping	NA[4]	NA[4]

Note: NA = not available, MWh = megawatt hour; MMBtu = one million British thermal units; MG = million gallons

[1] Whole numbers have been rounded (between 1,000 and 1,000,000 to the nearest 100, above 1,000,000 to the nearest 1,000). Figures may not sum due to independent rounding.

[2] Does not include natural gas from hearths (e.g., fireplaces).

[3] Emissions from hearths are based on natural gas hearths only.

[4] CalEEMod Version 2016.3.1 does not output hearths and landscaping activity.

Source: data provided by MTC in 2017, data compiled by Ascent Environmental 2017

The total levels of gasoline and diesel fuel consumption in the region were estimated based on the analysis of VMT in the region (see Table 2.5-7 in Section 2.5, "Climate Change and Greenhouse Gases") estimates of mobile-source GHGs in the region provided by MTC, fleet-average carbon dioxide (CO_2) emission rates for the region, and the carbon content of both fuel types. Fleet-average CO_2 emission rates for the region for both 2015 and 2040 were developed using ARB's emission factor model, EMFAC2014 (ARB 2014). Table 2.4-4 summarizes the levels of gasoline and diesel consumption for each year by vehicle category in the Plan area. Table 2.4-4 also shows the reductions in consumption of gasoline and diesel by passenger vehicles that would occur from implementation of MTC's Climate Initiatives Program.

Table 2.4-4 Annual Levels of Gasoline and Diesel Consumption

Vehicle Category	2015		2040		Net Change	
	Gasoline (million gal/year)	Diesel (million gal/year)	Gasoline (million gal/year)	Diesel (million gal/year)	Gasoline (million gal/year)	Diesel (million gal/year)
Passenger Vehicles	2,063.2	12.2	1,322.3	12.0	-740.9	-0.2
Trucks	99.1	411.6	55.0	555.6	-44.2	144.1
Buses	15.1	53.2	20.3	33.8	5.2	-19.3
Other Vehicles	13.7	0.2	12.5	0.4	-1.2	0.2
All Vehicle Types	2,191.1	477.1	1,410.0	601.8	-781.1	124.7
MTC Climate Policy Initiatives (Passenger Vehicles)[1]	–	–	–	–	-265.6	-2.4

Notes: gal = gallons

Detailed calculations are provided in Appendix C.

[1] Reductions in gasoline and diesel consumption resulting from implementation of MTC's Climate Policy Initiatives were based on the reductions in carbon dioxide emissions estimated by MTC.

Source: Compiled by Ascent Environmental 2017.

IMPACTS AND MITIGATION MEASURES

Impact 2.4-1: Implementation of the proposed Plan could result in wasteful, inefficient, or unnecessary consumption of energy, during project construction or operation, as evidenced by a failure to decrease overall per capita energy consumption or decrease reliance on fossil fuels such as coal, natural gas, and oil.

Impacts of Changes in Projected Land Use

As explained in Section 1.2, "Project Description," the proposed Plan provides a strategy for accommodating projected household and employment growth in the nine-county Plan area by 2040 as well as a transportation investment strategy for the region. As shown in Table 2.2-5 (see Section 2.2, "Air Quality"), the future percentage of multi-family residential dwelling units compared to single-family homes in the region is forecasted to increase from 25 percent in 2015 to 35 percent in 2040. This distinction is important because the levels of energy consumption associated with both the construction and operation of multi-family dwelling units is generally less than for single-family homes. The average multi-family dwelling unit has a lower floor-to-area ratio resulting in less ground disturbance during construction and is designed to house more inhabitants per unit of floor area. With fewer exterior walls and more interior walls shared by multiple units, the space heating and cooling of multi-family units is generally more energy efficient than single-family homes. Moreover, development of multi-family units supports the land use strategy that enables a residential density more conducive to operating local and regional transit in a more efficient manner. In other words, more residents can live in closer proximity to transit stops, increasing the viability of transit as a transportation mode. The development of multi-family dwelling units also improves the jobs-housing balance in the region preventing more workers from having to commute long distances from outside the region.

The land use forecast for 2040 under the proposed Plan considers future population growth of the Bay Area region with consideration of demographic trends and market forces. The proposed Plan serves as a comprehensive strategy to accommodate growth beyond existing general plans, with an increase in the percentage of multi-family compared to single-family residential dwelling units, as described above. Therefore, as compared to existing conditions, wherein current land use trends remain consistent with existing general plans, per capita energy consumption associated with the proposed Plan would be lower per capita due to the increased energy efficiency of multi-family housing. While total energy consumption is projected to increase

for both multi-family and single-family land uses (see Table 2.4-3), this projected increase is the result of accommodating the region's anticipated population and housing increase by 2040 (i.e., 2,056,000 people and 666,000 households). Therefore, although overall energy consumption in the region is projected to increase, per capita energy consumption is expected to decrease due to shifts in land use patterns that favor more dense housing. In addition, as described in Section 2.4.2, "Regulatory Setting," and under Methods of Analysis in Section 2.5, "Climate Change and Greenhouse Gases," it is assumed that future construction and operation of residential and non-residential buildings would be more energy efficient than the current 2016 Title 24 standards as the standards are periodically updated on an approximate three-year cycle to accommodate technological improvements in efficiency. Therefore, this is a less-than-significant (LS) impact.

Impacts of Transportation Projects

The proposed Plan is designed to increase the efficiency of transportation in the region by reducing per capita VMT in passenger vehicles and light-duty trucks. Thus, the proposed Plan inherently increases the energy efficiency of mobility in the region. As shown in Table 2.4-4, implementation of the proposed Plan would result in a decrease in gasoline consumption of 781.1 million gallons per year and an increase in diesel consumption of 127.7 million gallons per year. The decrease in gasoline consumption is also attributable to increasing fuel efficiency standards on passenger vehicles and light-duty trucks. The projected increase in diesel consumption is attributable to a projected increase in the level of VMT by diesel-powered heavy trucks in the region. Accounting for the fact that the energy-content of diesel is approximately 13 percent greater than gasoline, implementation of the proposed Plan would result in reduced consumption of automotive fuel by 71.4 trillion Btu. Much of this decrease in gasoline and diesel consumption would be due to the improved energy efficiency of passenger vehicles from more stringent emission and fuel efficiency standards established by ARB.

Also shown in Table 2.4-4, implementation of the Climate Initiatives Program would result in an additional reduction in the consumption of gasoline and diesel by passenger cars of 252.8 and 2.3 million gallons per year, respectively, which amounts to an additional reduction of 28.6 trillion Btu. This is a less-than-significant (LS) impact.

Conclusion

In summary, because the proposed Plan would result in the densification of land use and related decrease in per capita energy consumption and a net reduction in the consumption of automotive fuel, while also accommodating growth in both population and economic activity, the proposed Plan would not result in wasteful, inefficient, or unnecessary consumption of energy, during project construction or operation. Moreover, these effects also decrease the region's reliance on fossil fuels. Therefore, this impact would be **less than significant (LS)**. No mitigation is required.

Mitigation Measures

None required.

Impact 2.4-2: Implementation of the proposed Plan could fail to incorporate feasible renewable energy or energy efficiency measures into building design, equipment use, transportation, or other project features, or otherwise fail to increase reliance on renewable energy sources.

Impacts of Changes in Projected Land Use and Transportation Projects

As described under Impact 2.4-1, implementation of the proposed Plan would result in the densification of land use and an increase in multi-family residential uses, which are generally more energy efficient than single family homes and which support the land use strategy that enables a residential density more conducive to operating local and regional transit in a more efficient manner. Further, as described in Section 2.4.2, "Regulatory Setting," land use projects constructed under the proposed Plan would be more reliant on renewable energy sources because public utility companies (PUCs) (e.g., PG&E) would be required to comply with RPS benchmark goals pursuant to SB X1-2 and SB 350 (i.e., 33 percent renewable by 2020 and 50 percent renewable by 2030). Implementation of the proposed Plan would not preclude PUCs from complying with the RPS. Future land use projects would also be required to comply with the Title 24 Standards Building

Code, which, as discussed previously, are updated in approximate three-year cycles to account for technological advances. As such, it is expected that future land uses will be more efficient as well as better equipped to use renewable energy. For instance, the 2016 Title 24 Standards include requirements that new construction after January 1, 2017 be "solar ready" or designed to accommodate use of on-site solar technology (CEC 2017a, 2017b). Also, future discretionary land use projects would be subject to environmental review where potential additional energy efficiency measures would be identified and implemented by the applicable agency/project sponsor.

As explained in Section 1.2, "Project Description," of this EIR, the proposed Plan's Climate Initiatives Program includes strategies that support the use of renewable energy and energy efficiency measures. For operation of the transportation system, one initiative included in the Climate Initiatives Program is to establish a regional public network of electric vehicle supply equipment for plug-in hybrid electric and battery electric vehicles. Another strategy is to provide rebates to consumers who trade in older, less efficient vehicles for new plug-in hybrid electric or battery electric vehicles to accelerate turnover of vehicles for clean vehicles. These measures would create incentives for the use of electric-powered automobiles, which would be connected to the energy grid and require electricity. As described above, PUCs within the Plan Area would be required to comply with RPS; therefore, future use of electric vehicles would encourage the use of renewable energy in the mobile sector. The Program also includes a smart driving program that includes an in-vehicle device rebate program that encourages energy-efficient driving practices and regular vehicle maintenance. The Plan's Climate Initiatives Program would include incentives for participation in car sharing and vanpools to discourage car ownership. Other considerations include an expanded bike share system and additional investment in bicycle infrastructure. These strategies would discourage the operation of single-occupancy vehicles, which in turn would reduce the amount of infrastructure improvements needed. This impact would be less than significant (LS).

Conclusion

Because the proposed Plan would include implementation of the Climate Initiatives Program and because implementation of the proposed Plan itself would result in the densification of land use, increased energy efficiency from residential uses, and a net reduction in the consumption of automotive fuel, the proposed Plan would incorporate feasible measures to reduce wasteful, inefficient, or unnecessary consumption of energy during project construction or operation, and would increase reliance on renewable energy sources. Therefore, this impact would be **less than significant (LS)**. No mitigation is required.

Mitigation Measures

None required.

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2.5 CLIMATE CHANGE AND GREENHOUSE GASES

This section of the EIR quantitatively analyzes how implementation of the proposed Plan Bay Area 2040 may contribute to global climate change through greenhouse gas emissions related to transportation and land uses. In addition, the analysis qualitatively describes the potential impacts of sea level rise on the proposed regional land use patterns included in the Plan, as well as on the proposed transportation investment projects.

Comments on the Notice of Preparation included concerns regarding sea level rise, transportation improvements, the need to emphasize trip reduction measures and alternative modes of transportation, and maximizing overall greenhouse gas emissions reductions. These items are addressed in this section.

2.5.1 Environmental Setting

PHYSICAL SETTING

Global Climate Change

Climate is defined as the average statistics of weather, which include temperature, precipitation, and seasonal patterns such as storms and wind, in a particular region. Global climate change refers to the long term and irrevocable shift in these weather-related patterns. Using ice cores and geological records, baseline temperature and CO_2 data extends back to previous ice ages thousands of years ago. Over the last 10,000 years, the rate of temperature change has typically been incremental, with warming and cooling occurring over the course of thousands of years. However, scientists have observed an unprecedented increase in the rate of warming over the past 150 years, roughly coinciding with the global industrial revolution, which has resulted in substantial increases in greenhouse gas emissions (defined below) into the atmosphere. The anticipated impacts of climate change in California range from water shortages to inundation from sea level rise. Transportation systems contribute to climate change primarily through the emissions of certain greenhouse gases (CO_2, CH_4, and N_2O) from nonrenewable energy (primarily gasoline and diesel fuels) used to operate passenger, commercial and transit vehicles. Land use changes contribute to climate change through construction and operational use of electricity and natural gas, and waste production.

Climate modeling capabilities have been greatly enhanced in recent years allowing for the future range of climate change effects to be better understood. However, there are limitations to representing the anticipated changes at a downscaled or regional level. However, even if specifics are unknown, the global forecasted future trends will still apply at a local level.

The Intergovernmental Panel on Climate Change (IPCC) has reached consensus that human-caused emissions of greenhouse gases in excess of natural ambient concentrations are responsible for intensifying the greenhouse effect and leading to a trend of unnatural warming of the earth's climate, known as global climate change or global warming. It is "extremely likely" that more than half of the observed increases in global average surface temperature from 1951 to 2010 were caused by the anthropogenic increase in greenhouse gas concentrations and other anthropogenic forces together (IPCC 2014:3, 5).

The IPCC predicts that the global mean surface temperature increase by the end of the 21st century (2081–2100) relative to 1986–2005, could range from 0.5 to 8.7 degrees Fahrenheit. Additionally, the IPCC projects that global mean sea level rise will continue during the 21st century, very likely at a faster rate than observed from 1971 to 2010. For the period 2081–2100 relative to 1986–2005, the rise will likely range from 10 to 32 inches (0.26 to 0.82 meters) (IPCC 2014:10, 13).

According to the California Energy Commission (CEC), accelerating global climate change has the potential to cause adverse impacts in the Bay Area, including but not limited to:

- *Water Supply:* Changes in local rainfall, salt water intrusion, sea water flooding the delta, and a reduced Sierra snowpack can all threaten the Bay Area's water supply.

- *Infrastructure*: Increased risks of flooding because of sea level rise, coastal erosion, more frequent and extreme storms, and stronger precipitation events may lead to damage, inoperability, or impairment of critical infrastructure such as wastewater treatment plants, sewage, power plants, and transportation. This would affect not only daily commutes and activities, but also emergency response.

- *Agriculture:* Changes in temperatures, more extreme heat days, and the earlier onset of spring may lead to suboptimal growing conditions for grapes and other agricultural products that significantly contribute to the Bay Area economy and tourism.

- *Ecosystems and Biodiversity:* With sea level rise, the Bay Area's coastal wetlands are threatened and cannot naturally move inland because of existing developments, thus destroying this important ecosystem. This threatens the region's freshwater fish species and may allow non-native species to thrive. Increased temperatures also result in increased fire risk.

- *Energy Demand, Supply, and Transmission:* Energy demand will increase as temperature extremes become more common. This could lead to rolling blackouts or other issues with the Bay Area's aging energy infrastructure.

- *Public Health:* Most Bay Area residences and businesses were not built with air conditioning to control temperatures on extreme heat days, which may lead to heat stroke. Higher temperatures also lead to worsened air quality and potentially the spread of diseases and pests. Increased incidence and severity of wildfires may also contribute to worsening air quality. These changes will disproportionately burden children, the elderly, and those with pre-existing health conditions (CEC 2012).

Greenhouse Gases

Gases that trap heat in the Earth's atmosphere are called greenhouse gases (GHGs). These gases play a critical role in determining the Earth's surface temperature. Part of the solar radiation that would have been reflected back into space is absorbed by these gases, resulting in a warming of the atmosphere. Without natural GHGs, the Earth's surface would be about 61 degrees cooler (Climate Action Team 2006, cited in MTC 2013). This phenomenon is known as the greenhouse effect. However, scientists have proven that emissions from human activities—such as electricity generation, vehicle emissions, and even farming and forestry practices—have elevated the concentration of GHGs in the atmosphere beyond naturally-occurring concentrations, enhancing the greenhouse effect and contributing to the larger process of global climate change. The six primary GHGs are:

- carbon dioxide (CO_2), emitted when solid waste, fossil fuels (oil, natural gas, and coal), and wood and wood products are burned;

- methane (CH_4), produced through the anaerobic decomposition of waste in landfills, animal digestion, decomposition of animal wastes, production and distribution of natural gas and petroleum, coal production, incomplete fossil fuel combustion, and water and wastewater treatment;

- nitrous oxide (N_2O), typically generated as a result of soil cultivation practices, particularly the use of commercial and organic fertilizers, fossil fuel combustion, nitric acid production, and biomass burning;

- hydrofluorocarbons (HFCs), primarily used as refrigerants;

- perfluorocarbons (PFCs), originally introduced as alternatives to ozone depleting substances and typically emitted as by-products of industrial and manufacturing processes; and

- sulfur hexafluoride (SF_6), primarily used in electrical transmission and distribution.

Although there are other contributors to global warming, these six GHGs are identified by the U.S. Environmental Protection Agency (EPA) as threatening the public health and welfare of current and future generations (EPA 2009). GHGs have varying potential to trap heat in the atmosphere, known as global warming potential (GWP), and atmospheric lifetimes. GWP reflects how long GHGs remain in the atmosphere, on average, and how intensely they absorb energy. Gases with a higher GWP absorb more energy per pound than gases with a lower GWP, and thus contribute more to warming Earth. For example, one ton of CH_4 has the same contribution to the greenhouse effect as approximately 28 tons of CO_2; hence, CH_4 has a 100-year GWP of 28 while CO_2 has a GWP of 1. GWP ranges from 1 (for CO_2) to 23,500 (for SF_6). (IPCC 2014:731-737).

GWP is alternatively described as "carbon dioxide equivalents," or CO_2e. The parameter "atmospheric lifetime" describes how long the molecules will remain in the atmosphere. Atmospheric lifetimes of GHGs range from tens to thousands of years. All of these gases remain in the atmosphere long enough to become well mixed. The amount that is measured in the atmosphere is roughly the same all over the world, regardless of the source of the emissions.

California and Bay Area Greenhouse Gas Emissions

GHG emissions contributing to global climate change are attributable in large part to human activities associated with the electricity, transportation, industrial, commercial, residential, and agricultural/forestry sectors. The State of California alone produces about 2 percent of the entire world's GHG emissions, with major emitting sources including fossil fuel consumption from transportation (37 percent), electricity production (20 percent), industry (24 percent), agricultural and forestry (8 percent), residential (6 percent), and commercial (5 percent) (ARB 2016). California government is putting in place programs and legislation to reduce GHG emissions with the hope of delaying, mitigating, or preventing at least some of the anticipated impacts of global climate change on California communities.

Furthermore, local and regional agencies in the Bay Area have taken steps to measure, quantify, evaluate, and mitigate their contributions to GHG emissions and global climate change. For example, 67 cities and counties in the Bay Area have developed their own climate action plans and 103 have completed GHG emissions inventories (OPR 2016). Additionally, many cities, businesses, and municipal agencies are voluntary members of the Climate Action Registry, a private non-profit organization originally formed by the State of California that serves as a voluntary GHG registry to protect and promote early actions to reduce GHG emissions by organizations.

In 2017, the Bay Area Air Quality Management District (BAAQMD) updated a baseline inventory of GHG emissions for the year 2015 in the *Draft 2017 Clean Air Plan*. According to that inventory, 86.6 million tons of CO_2e ($MMTCO_2e$) were emitted in the Bay Area in 2015 (BAAQMD 2017). Table 2.5-1 and Table 2.5-2 show the emissions breakdown by pollutant and source.

Table 2.5-1 2015 Bay Area CO_2e Emissions by Pollutant

Pollutant	Percentage	CO_2e ($MMTCO_2e$ /Year)
Carbon Dioxide	90	78
Methane	3	3
Nitrous Oxide	2	2
HFC, PFC, SF_6	5	4
Regional Total	**100**	**87**

Note: $MMTCO_2e$ = million metric tons of carbon dioxide equivalent. Totals may not sum because of independent rounding.

Source: BAAQMD 2017: Table E

Table 2.5-2 2015 Bay Area CO_2e Emissions by Source

Source Category	Percentage	CO_2e ($MMTCO_2e$ /Year)
On and Off-Road Transportation	40	35
Stationary Sources	24	21
Electricity / Co-Generation[1]	18	16
Buildings[2]	11	10
Waste Management	3	2
High Global Warming Potential Gases	3	3
Agriculture	1	1
Regional Total	**100**	88

Note: $MMTCO_2e$ = million metric tons of carbon dioxide equivalent. Totals may not sum because of independent rounding.

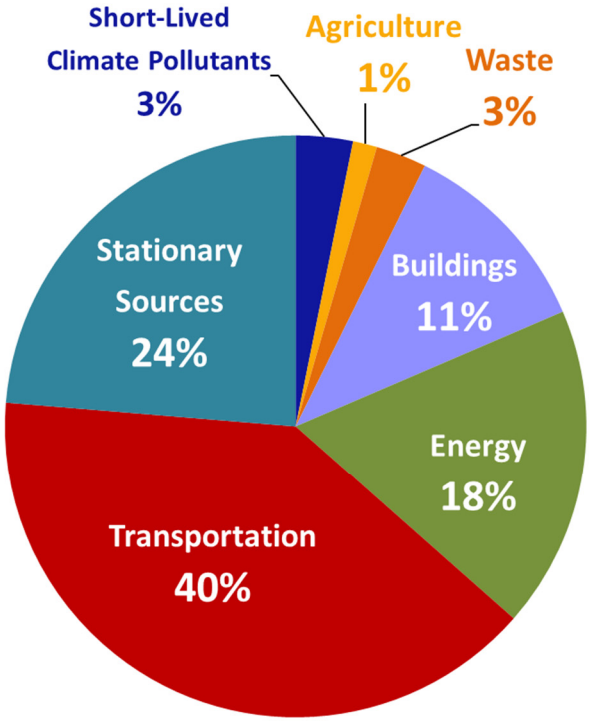
[1] Includes imported electricity emissions 2.7 $MMTCO_2e$

[2] Residential and commercial fuel use, excluding electricity

Source: BAAQMD 2017: Table F

The Bay Area's transportation sector alone contributes 40 percent of the CO_2e GHG emissions, followed by stationary sources (e.g., oil refineries and stationary fuel usage) (24 percent), electricity generation and co-generation (18 percent), buildings (11 percent), waste management (3 percent), high GWP gases (3 percent), and agriculture (1 percent). Bay Area emissions by sector are illustrated in Figure 2.5-1.

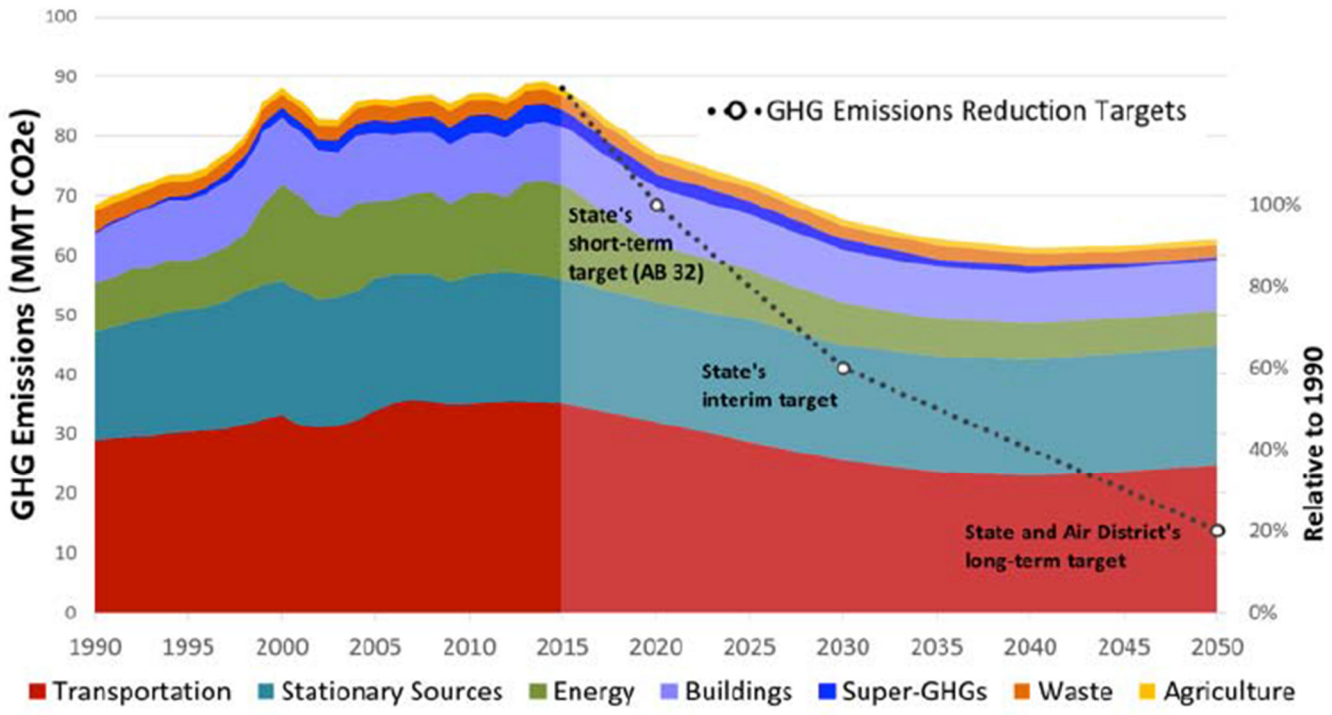
Figure 2.5-1
2015 Bay Area Greenhouse Gas Emissions by Source, as a Percent of Total



Source: BAAQMD 2017: Figure 3-6

Economic activity variations and the fraction of electric power generation in the region will cause year-to-year fluctuations in the emissions trends. Currently adopted policies and regulations would also affect future emission trends. Figure 2.5-2 shows the emission trends by major sources for the period of 1990 to 2050 alongside adopted GHG reduction targets.

Figure 2.5-2
Bay Area Greenhouse Gas Emissions Trends by Major Source from 1990 to 2050



Source: BAAQMD 2017: Figure 3-9

Sea Level Rise

Historical Data

Sea levels began rising globally at the end of the last ice age more than 10,000 years ago (USGS 2009, cited in MTC 2013). Data on ocean water levels is collected continuously from a worldwide network of more than 1,750 tidal gages, and new satellite-based sensors are extending these measurements. The data indicates that the global mean sea level is rising at an increasing rate, and sea level rise is already affecting much of California's coastal region, including the San Francisco Bay and its upper estuary (the Sacramento-San Joaquin Delta). Water level measurements from the San Francisco Presidio gage (CA Station ID: 9414290), indicate that mean sea level rose by an average of 0.08 ± 0.008 inches per year (reported as 2.01 ± 0.21 millimeters per year) from 1897 to 2006, equivalent to a change of about eight inches in the last century (Heberger et al. 2009).

According to California's Ocean Protection Council Science Advisory Team, future sea level rise projections should not be based on linear extrapolation of historic sea level observations. For estimates beyond one or two decades, linear extrapolation of sea level rise based on historic observations is considered inadequate and would likely underestimate the actual sea level rise because of expected non-linear increases in global temperature and the unpredictability of complex natural systems (California Climate Action Team 2013).

Projected Climate Conditions

Global and regional climate models can be used to project the range of estimated sea level rise rates based on emission scenarios and climate simulations. Climate models continue to be developed and improved, and many models have been extended into Earth System models by including the representation of biogeochemical cycles important to climate change (IPCC 2014: 743). Global climate models are based on well-established physical principles and have been demonstrated to reproduce observed features of recent climate and past climate changes. Global models provide information about climate response to various scenarios, but usually at a low resolution that does not provide the level of detail needed to make planning decisions at a local level.

On a regional scale (sub-continental and smaller), the confidence in model capability to simulate surface temperature is less than for the larger scale; however, there is high confidence that regional-scale surface temperature is better simulated now than at the time of the IPCC Fourth Assessment Report. A regional-based model can provide an evaluation of climate processes that are unresolved at the global model scale. Regional-based climate models that provide locally-relevant climate information are based on model output from global models, and the scale and resolution of the regional-based climate models vary widely depending on the original application and intent of the developed model.

Global Climate Projections

In order to evaluate climate change effects such as sea level rise as part of the IPCC Fifth Assessment Report, the IPCC developed future emission scenarios that differ based on varying combinations of economic, technological, demographic, policy, and institutional futures. Four emissions scenarios were developed and used by IPCC to represent a broad range of climate outcomes, and develop sea level rise projections. The scenarios, or Representative Concentration Pathways (RCP), document the projected future emissions, concentrations, and land-cover change projections.

The RCP 2.6 emissions scenario assumes very low greenhouse gas concentration levels, a scenario in which greenhouse gas emissions (and indirectly emissions of air pollutants) are reduced substantially over time. The RCP 4.5 emissions scenario is a stabilization scenario where the total change in energy in the atmosphere because of GHG emissions is stabilized before 2100 through implementation of a range of technologies and strategies for reducing greenhouse gas emissions. The RCP 6.0 emissions scenario is a stabilization scenario where the total change in energy in the atmosphere because of GHG emissions is stabilized after 2100 and assumes the implementation of a range of technologies and strategies for reducing greenhouse gas emissions. The RCP 8.5 emissions scenario is characterized by increasing greenhouse gas emissions over time leading to high greenhouse gas concentration levels (IAMC 2009).

Sea Level Rise Projections

The IPCC projects that global mean sea level rise will likely range from 10 to 32 inches (0.26 to 0.82 meters) for the period 2081–2100 relative to 1986–2005. It is very likely that by the end of the 21st century, sea level will rise in more than 95 percent of the ocean area worldwide. About 70 percent of the coastlines worldwide are projected to experience a sea level change within ±20 percent of the global mean. Based on current understanding, only the collapse of marine-based sectors of the Antarctic ice sheet could cause global mean sea level to rise substantially above the likely range during the 21st century (IPCC 2014: 13, 1140).

Sea Level Rise in San Francisco Bay

Overall sea level rise projections in the Bay Area were developed using two map sets. In coordination with the San Francisco Bay Conservation and Development Commission's (BCDC) Adapting to Rising Tides Sea Level Rise Analysis and Mapping (Rising Tides) study, Alameda, Contra Costa, Marin, San Mateo, and San Francisco counties developed county-specific analyses of sea level rise projections in 2015 and 2016 (BDBC 2015, BDBC 2016b, BDBC 2016a, San Francisco Public Utilities Commission 2016, County of Marin 2015). Sea level rise projections for all other counties were based on the National Oceanic and Atmospheric Administration (NOAA) Coastal Service Center's sea level rise inundation maps for the San Francisco Bay Area in 2012. Both maps depict sea level rise relative to a mean higher high water (MHHW) condition in the Bay. Table 2.5-3 and Figure 2.5-3 present NOAA and BCDC sea level rise inundation information with 24 inches of sea level rise, including disconnected low-lying areas.

Table 2.5-3 Projected Midcentury (2050) Sea Level Rise Inundation Zone by County

County	Areas Inundated by Sea Level Rise[1] (acres)	Total County Area[2] (Million acres)	Percent Inundated
Alameda	28,300	472,000	6
Contra Costa	6,700	457,100	1
Marin	14,200	321,200	4
Napa	210	30,000	1
San Francisco	15,900	286,600	6
San Mateo	9,300	815,400	1
Santa Clara	12,100	479,400	3
Solano	68,000	526,300	13
Sonoma	27,300	1,008,200	3
Regional Total	**182,200**	**4,396,200**	**4**

Note: Based on 24-inch of sea level rise.
[1] Includes disconnected low-lying areas.
[2] Excludes existing bodies of water within county boundaries
Source: BCDC 2015, BCDC 2016b, BCDC 2016a, San Francisco Public Utilities Commission 2016, County of Marin 2016, NOAA 2012. Data compiled by Ascent Environmental 2017

San Francisco Bay Shoreline

The San Francisco Bay and adjacent Pacific coast shoreline is highly diverse, ranging from natural wetlands with limited inboard (or landward) development, to hardened shorelines with developments built up to, and beyond, the shoreline. The level of coastal flood protection and armoring along the shoreline varies based on the inboard land use, topographic conditions, and a site's exposure to extreme water levels and waves – both of which can lead to inland flooding and shoreline erosion. As sea level rises, the exposure to higher water levels and increasing wave hazards will increase along the shoreline, thereby increasing the likelihood for inland inundation and flooding. This section describes the existing shoreline characteristics of the nine Bay Area counties at a high level, using a shoreline categorization approach developed for the Rising Tides project

Shoreline Categories

The Rising Tides project categorized the highly varied and diverse shoreline in for the nine Bay Area Counties into eight categories based on their primary physical characteristics, functions and abilities to inhibit inland inundation. The categories include the following:

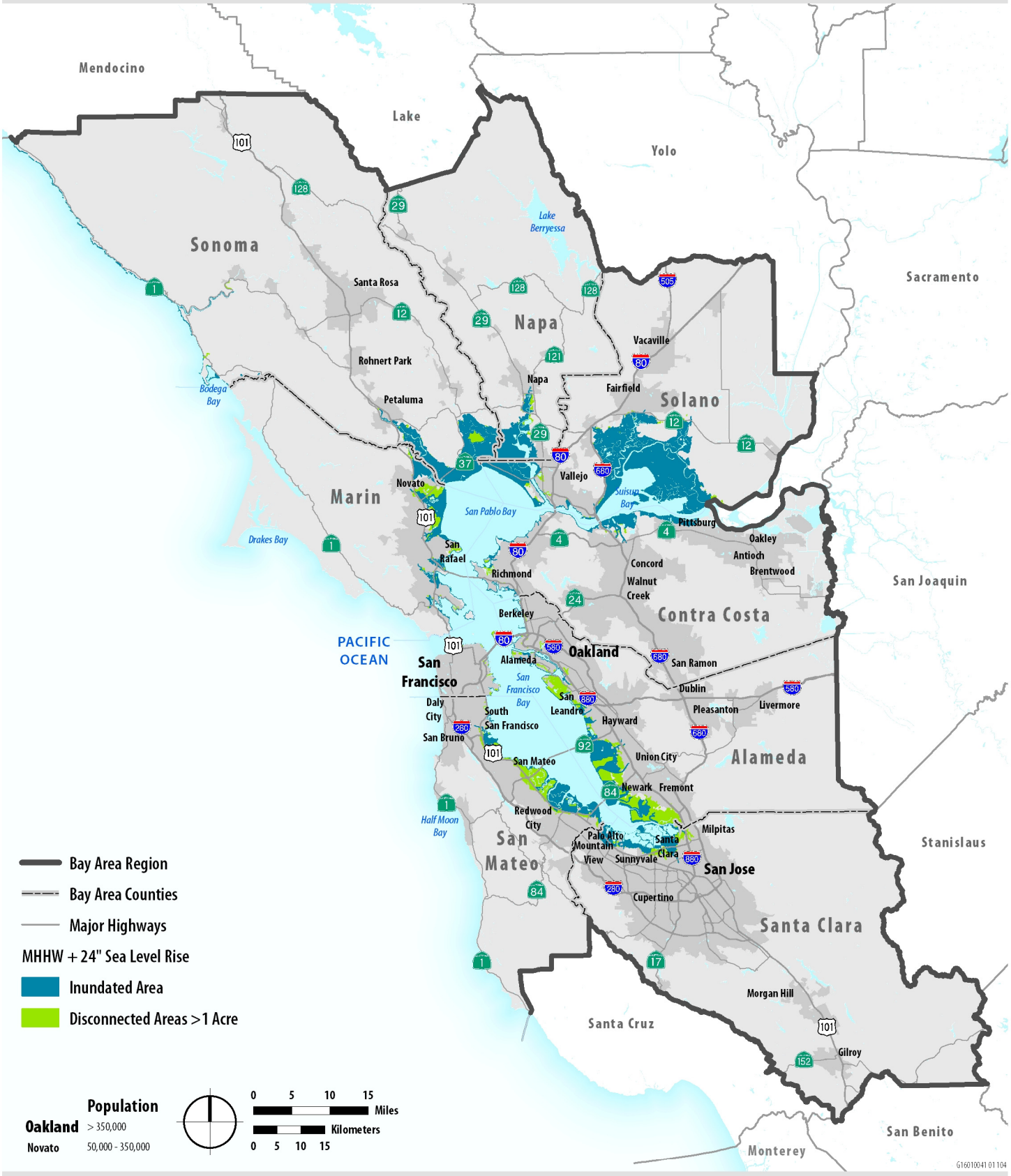
- **Engineered flood protection structures:** These structures are designed and built to protect inland areas from flooding, including from major storm events and extreme water levels that may also be accompanied by waves. This category includes both engineered levees and flood walls. Levees within this category have a Federal Emergency Management Agency (FEMA) accreditation date in the FEMA Midterm Levee Inventory Database or in information provided by the applicable County and cities stating that the structure has been engineered.

- **Non-engineered berms:** Non-engineered berms include other levees or levee-like structures that do not have current or previous FEMA accreditation. These features are similar in shape to a levee but do not provide a standard level of flood protection. They may still serve as a line of defense against flood hazards during storm events.

- **Embankments:** Embankments are typically an earthen slope within an inland area (e.g., channel banks upstream of the coastal shoreline) that transitions to flat or hilly inland areas. Unlike levees and berms, which have a crest and two slopes, embankments have only one slope. These barrier features do not provide a standard level of flood protection, but serve as a line of defense against flood hazards during storm events.

- **Shoreline protection structures**: These features share the same single-slope profile as embankments, but are Bay-facing, rather than inland. They generally abut development or a modification to the Bay shoreline.

Figure 2.5-3
24-Inch Sea Level Rise at Mean Higher High Water



Map Data Sources: Adapting to Rising Tides, San Francisco Bay Conservation and Development Commission (BCDC), 2015-2016; Metropolitan Transportation Commission (MTC), 2016; NOAA Coastal Services Center Sea Level Rise Data: 1-6 ft Sea Level Rise Inundation Extent, 2012; Tom Tom North America, 2015.

- **Transportation structures – major roads/rail:** These features were built for transportation purposes and do not provide a standard level of flood protection but can serve as a line of defense against flood hazards during storm events. Only major roads and rail lines were delineated for this assessment to evaluate potential hazards to these assets.

- **Natural shorelines/wetlands:** These features include tidal marshes along the edge of the Bay or within larger creek channels.

- **Natural shorelines or hills**: These features are areas where engineered flood protection or shoreline protection structures are absent, and no clear landward structure that provides a level of flood protection is visible.

- **Tide gates:** These structures are barriers that span creeks or channels but allow tidal flushing to occur, and they can provide a level of flood protection for upstream areas. Thirty-six tide gates in total were identified within the shoreline delineation for San Mateo County (BCDC 2015).

Figure 2.5-4 depicts the locations of the engineered levees and non-engineered berms within the low-lying areas in the Bay Area Region. This data set does not distinguish between engineered levees and non-engineered berms.

Air Quality and Public Health

The negative effects of climate change on air quality in the Bay Area will affect public health, largely through increasing levels of ozone and fine particulate matter (PM). These pollutants will increase through emissions from wildfires and more frequent and longer-lasting heat waves. The health effects of exposure to both ozone and particulate matter have historically been primarily associated with respiratory ailments, such as asthma and bronchitis. However, in recent years, many epidemiological studies have also been published linking exposure to these pollutants, especially PM, with serious cardiovascular illness, including arteriosclerosis, strokes, and heart attacks all of which can cause premature death. (Raun and Ensor 2012.)

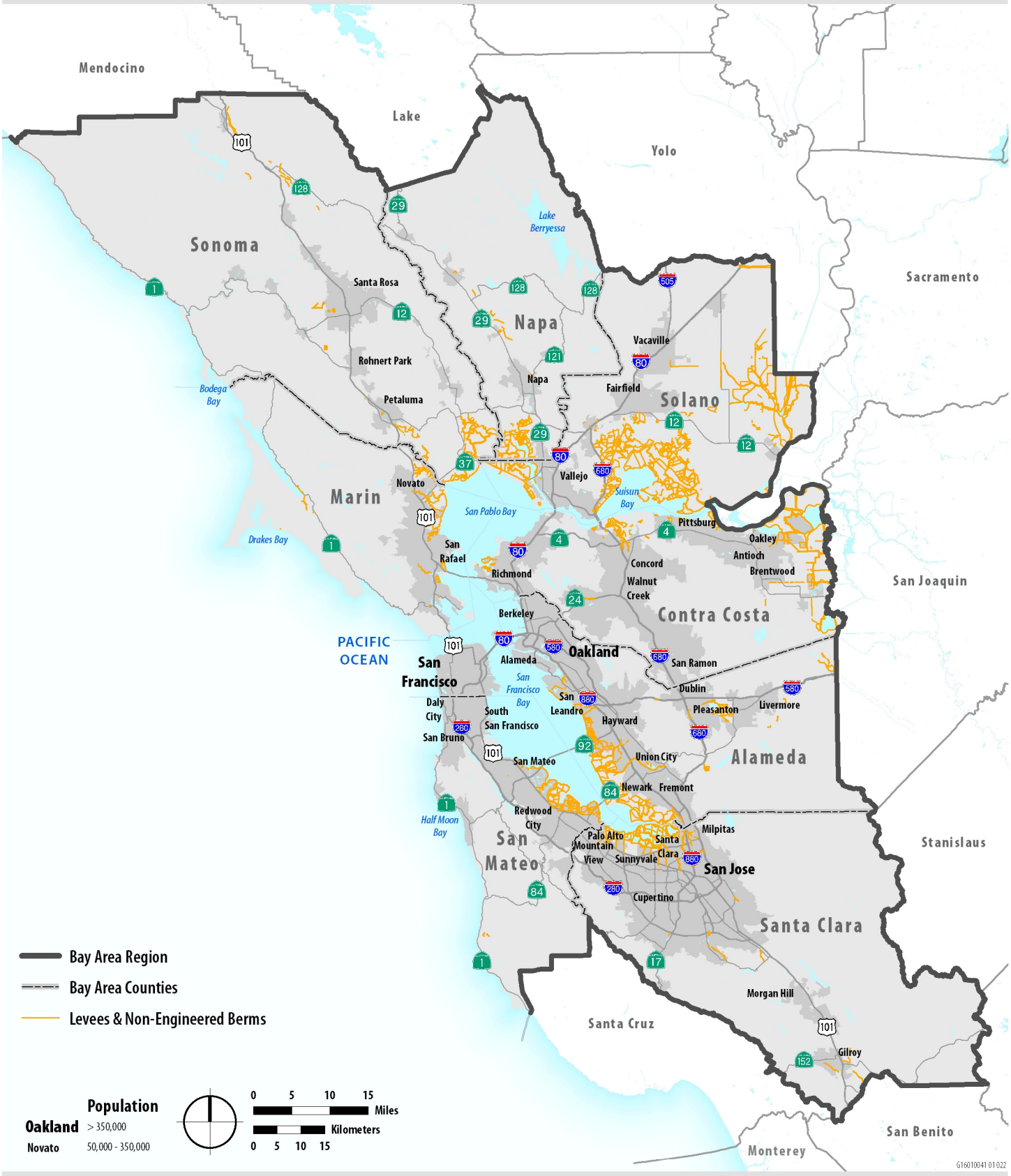
Exposure to higher levels of ozone and fine particulate matter tend to disproportionately affect the more vulnerable people in a population —children, the elderly, and the health-impaired. In addition, many people affected by poor air quality are also subject to socioeconomic conditions that make them less able to prepare for and cope with these effects of climate change.

Wildfires

Climate change is expected to increase the frequency and severity of wildfires in California by altering precipitation and wind patterns, changing the timing of snowmelt, and inducing longer periods of drought. In addition to the direct threat to human life and property, wildfires emit huge quantities of fine particles such as black carbon and can cause dramatic short-term spikes in pollution levels, greatly increasing population exposure to PM and other harmful pollutants.

According to the BAAQMD report, *Understanding Particulate Matter: Protecting Public Health in the San Francisco Bay Area*, the rash of wildfires that swept across California in late June 2008 caused ambient concentrations of ozone and PM to soar to unprecedented levels (BAAQMD 2012) A study found that the PM concentrations from these fires not only reached high levels, but that the PM they released was much more toxic than the PM more typically present in the California atmosphere (Wegesser et al. 2009). Smoke from wildfires can cause a variety of acute health effects, including irritation of the eyes and the respiratory tract, reduced lung function, bronchitis, exacerbation of asthma, and premature death. In addition to these health effects, wildfires also release immense quantities of carbon dioxide stored in trees and vegetation into the atmosphere. Therefore, to the extent that climate change increases wildfires, this will increase atmospheric concentrations of GHGs that contribute to climate change, establishing a feedback loop.

Figure 2.5-4
Levees and Non-Engineered Berms



Map Data Sources: Metropolitan Transportation Commission (MTC), 2016; National Flood Hazard Layer (NFHL), Federal Emergency Management Agency (FEMA), 2016; Tom Tom North America, 2015.

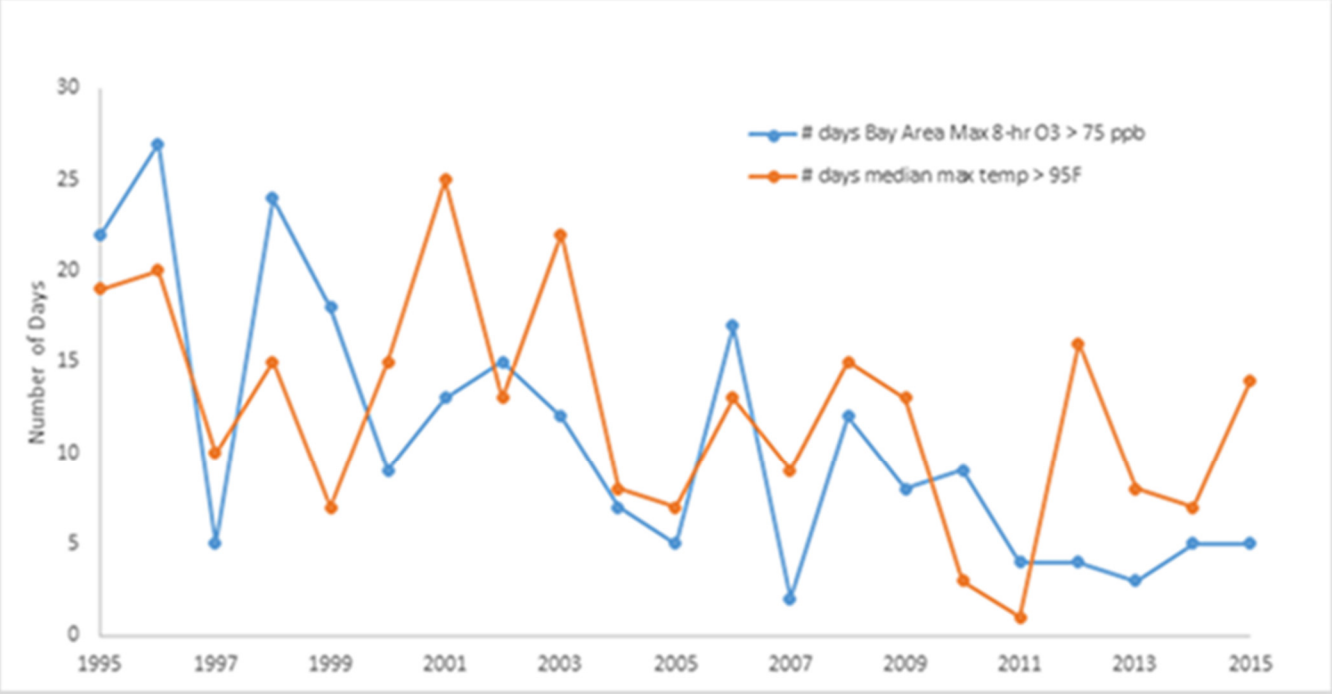
Heat

Rising temperatures because of climate change are likely to have negative effects on air quality and public health in the Bay Area. Ground level ozone—the primary component of smog—is formed through photo-chemical reactions among precursor pollutants. The most important of these precursor pollutants are oxides of nitrogen (NO_2) and volatile organic compounds (VOCs). Higher temperatures lead to greater evaporative emissions of VOCs from sources such as fuel storage tanks and motor vehicle fuel tanks, as well as greater emissions of VOCs from biogenic sources such as trees and vegetation. Increased demand for electricity to power air conditioners can also lead to higher emissions of ozone precursors from power plants. In addition to greater emissions of ozone precursors, ozone levels are also expected to increase because ozone formation is highly temperature-sensitive, increasing rapidly as temperatures rise above 90 degrees Fahrenheit. As the Bay Area experiences more extreme heat days, with higher temperatures during both the days and evenings, higher ozone levels will make it more difficult for the region to attain and maintain air quality standards.

Increasing amounts of ground level ozone pose a threat to human health. Breathing ozone can trigger a variety of health problems, such as asthma, bronchitis, impacts to lung function, and chest pains. Recent studies have linked premature death to even short-term exposure to ozone (Bell and Samet 2005; Levy and Sarnat 2005; Ito and Lippmann 2005). Certain segments of the population are less able to adapt to extreme weather events than others. The 2009 California Adaptation Strategy highlights "elderly, infants, individuals suffering from chronic heart or lung disease, persons with mental disabilities, the socially and/or economically disadvantaged, and those who work outdoors" as particularly vulnerable (CNRA 2009). According to a 2011 report by the Union of Concerned Scientists, increases in ozone levels induced by climate change in California could result in nearly 443,000 additional cases of serious respiratory illnesses. These and other health-related impacts could cost more than $729 million (in 2008 dollars) in 2020 alone (Union of Concerned Scientists 2011).

As shown in **Figure 2.5-5** the years in which the Bay Area has greater numbers of days exceeding the 8-hour ozone standard correlate very closely with years in which the region experiences higher temperatures.

Figure 2.5-5
Number of Days Exceeding the 8-Hour Ozone Standard and 99 Degree Weather[1]



Source: BAAQMD 2016. 1 Shows data from long-running monitoring sites to show long-term trends.

If higher temperatures lead to increased ozone formation for the reasons described above, this may erode the progress that the region has made over the past 50 years of regulatory action. BAAQMD's research indicates that, at the current rate of emissions control, the projected increase in ozone because of climate change from 2000 to 2050 would offset about 15 years of progress in reducing ambient ozone levels.

Urban Heat Islands

The high concentration of buildings, parking lots and roadways in urban areas create dry, hot microclimates, or "heat islands," which absorb more of the sun's heat than surrounding rural areas. As urban areas develop, paved and dark surfaces and impermeable structures replace natural vegetation and open spaces. According to EPA, on hot, sunny summer days, the sun can heat dry, exposed urban surfaces, such as roofs and pavement, to temperatures of 50 to 90 degrees Fahrenheit (27 to 50 degrees Celsius) hotter than the surrounding air, while more shaded and open surfaces—often in more rural surroundings—remain close to air temperatures (Berdahl and Bretz 1997, cited in EPA 2016). These impermeable, dark manmade surfaces also tend to retain heat longer after the sun goes down, thus limiting the ability of urban areas to cool off during periods of heat waves.

Urban heat islands have a direct impact on human health. In addition to contributing to direct health impacts from heat, such as heat stroke, heat islands also contribute to elevated ozone levels, which contribute to a range of cardio-respiratory ailments as described above. The Chicago heat wave of 1995 resulted in the deaths of over 700 people, many of whom were low income and/or elderly. According to the National Weather Service, heat is one of the leading weather-related killers in the United States (NOAA 2016).

Increased High Global Warming Potential Gases

Certain gases hold the potential to warm the climate at far greater levels than equivalent amounts of carbon dioxide. Certain HFCs, PFCs, and SF_6 have "global warming potential," ranges from 140 to 23,500 times that of CO_2. The greatest source of HFCs, and the greatest source of any high GWP gas, is leakage from refrigeration, heat pumps and air conditioning equipment. However, the total emissions of high GWP gases in CO_2 equivalents generally accounts for a small percentage, about 2 percent, of global anthropogenic GHG emissions (IPCC 2014:46).

2.5.2 Regulatory Setting

FEDERAL

Federal Clean Air Act

The federal Clean Air Act (CAA) of 1970, amended in 1977 and 1990 (42 USC 7506(c)), was enacted for the purposes of protecting and enhancing the nation's air resources to benefit public health. In 1971, the CAA required the EPA to set National Ambient Air Quality Standards that establish emission limits for certain pollutants. In 2009, EPA signed two findings related to GHGs. First, EPA found that current and project concentrations of CO_2, CH_4, N_2O, HFCs, PFCs, and SF6 would threaten public health and welfare of current and future generations. Second, EPA found that mobile vehicles contribute to GHG pollution which threaten public health and welfare. (EPA 2017.)

Global Change Research Act (1990)

In 1990, Congress passed and the President signed Public Law 101-606, the Global Change Research Act. The purpose of the legislation was: "…to require the establishment of a United States Global Change Research Program aimed at understanding and responding to global change, including the cumulative effects of human activities and natural processes on the environment, to promote discussions towards international protocols in global change research, and for other purposes." To that end, the Global Change Research Information Office was established in 1991 to serve as a clearinghouse of information. The Act requires a report to Congress every four years on the environmental, economic, health and safety consequences of climate change; however, the first and only one of these reports to date, the *National Assessment on Climate Change*,

was not published until 2000. In February 2004, operational responsibility for GCRIO shifted to the U.S. Climate Change Science Program.

Energy Policy Act of 1992 (EPAct)

The Energy Policy Act of 1992 (EPAct) was passed to reduce the country's dependence on foreign petroleum and improve air quality. EPAct includes several parts intended to build an inventory of alternative fuel vehicles (AFVs) in large, centrally fueled fleets in metropolitan areas. EPAct requires certain federal, state, and local government and private fleets to purchase a percentage of light duty AFVs capable of running on alternative fuels each year. In addition, financial incentives are also included in EPAct. Federal tax deductions will be allowed for businesses and individuals to cover the incremental cost of AFVs. States are also required by the act to consider a variety of incentive programs to help promote AFVs.

Energy Policy Act of 2005

The Energy Policy Act of 2005 provides renewed and expanded tax credits for electricity generated by qualified energy sources, such as landfill gas; provides bond financing, tax incentives, grants, and loan guarantees for clean renewable energy and rural community electrification; and establishes a federal purchase requirement for renewable energy.

Energy Independence and Security Act of 2007

The Energy Independence and Security Act of 2007 was intended to move the U.S. toward greater energy independence and security. This energy bill increases the supply of alternative fuel sources by setting a mandatory Renewable Fuel Standard requiring fuel producers to use at least 36 billion gallons of biofuel in 2022. It also tightens the Corporate Average Fuel Economy (CAFE) standards that regulate the average fuel economy in the vehicles produced by each major automaker.

National Fuel Efficiency Policy

On May 7, 2010, the U.S. Department of Transportation and EPA jointly issued national fuel efficiency and GHG emissions standards for model year 2012-2016 passenger vehicles and light duty trucks. The National Highway Traffic Safety Administration (NHTSA) issued CAFE standards for model year (MY) 2012-2016 passenger cars and light trucks under the Energy Policy and Conservation Act and Energy Independence and Security Act and EPA issued national GHG emissions standards under the federal Clean Air Act. These joint GHG and fuel economy standards represent the first phase of the National Program to improve fuel economy and reduce GHG emissions from U.S. light-duty vehicles. Starting with 2012 model year vehicles, the rules require automakers to improve fleet-wide fuel economy and reduce fleet-wide GHG emissions by approximately five percent every year. It is expected that the regulations will result in a 2016 fleet average of 35.5 mpg. These standards are expected to conserve about 1.8 billion barrels of oil and reduce nearly a billion tons of GHG emissions over the lives of the vehicles covered.

In 2012, NHTSA and EPA proposed draft language to extend the National Program (coordinated GHG and fuel economy standards) for model year 2017 through model year 2025. The proposed CAFE standards are projected to require, on an average industry fleet-wide basis for cars and trucks combined, 40.3 to 41.0 miles per gallon (mpg) in model year 2021, and 48.7-49.7 mpg in model year 2025. EPA's proposed GHG standards, which are consistent with NHTSA's CAFE standards, are projected to require 163 grams/mile of CO_2 in model year 2025.

On August 28, 2014, EPA and NHTSA finalized this new national program that would reduce GHG emissions and improve fuel economy for all new cars and trucks sold in the U.S. EPA proposed the first-ever national GHG emissions standards under the CAA, and NHTSA proposed Corporate Average Fuel Economy standards under the Energy Policy and Conservation Act. This proposed national program allows automobile manufacturers to build a single light-duty national fleet that satisfies all requirements under both Federal programs and the standards of California and other states. While this program will increase fuel economy to the equivalent of 54.5 miles per gallon for cars and light-duty trucks by Model Year 2025, additional phases are being developed by NHTSA and EPA that address GHG emission standards for new medium- and heavy-duty trucks (NHTSA 2014).

STATE REGULATIONS

Assembly Bill 1493 (Chapter 200, Statutes of 2002)

Assembly Bill (AB) 1493 (Pavley) amended Health and Safety Code sections 42823 and 43018.5 requiring the California Air Resources Board (ARB) to develop and adopt regulations that achieve maximum feasible and cost-effective reduction of GHG emissions from passenger vehicles, light-duty trucks, and other vehicles used for noncommercial personal transportation in California. The regulations prescribed by AB 1493 took effect on January 1, 2006, and apply only to 2009 and later model year motor vehicles.

In September 2004, pursuant to AB 1493, ARB approved regulations to reduce GHG emissions from new motor vehicles. Under the new regulations, one manufacturer fleet average emission standard is established for passenger cars and the lightest trucks, and a separate manufacturer fleet average emission standard is established for heavier trucks. The regulations took effect on January 1, 2006 and set near-term emission standards, phased in from 2009 through 2012, and mid-term emission standards, to be phased in from 2013 through 2016 (referred to as the Pavley Phase I rules). For model years 2017 through 2025, ARB has adopted the National Fuel Efficiency Policy standards as previously described (ARB 2012). ARB established the Advanced Clean Cars program in 2012 to work with manufacturers to develop vehicle technologies, such as zero emission vehicles, that would meet both the adopted GHG and criteria air pollutant standards.

Executive Order S-3-05 (Gov. Schwarzenegger, June 2005)

Executive Order S-3-05 was signed on June 1, 2005. The Order recognizes California's vulnerability to climate change, noting that increasing temperatures could potentially reduce snow pack in the Sierra Nevada, which is a primary source of the State's water supply. Additionally, according to this Order, climate change could influence human health, coastal habitats, microclimates, and agricultural yield. The Order set the GHG reduction targets for California: by 2010, reduce GHG emissions to 2000 levels; by 2020 reduce GHG emissions to 1990 levels; by 2050 reduce GHG emissions to 80 percent below 1990 levels.

The Order directs the Secretary of the California Environmental Protection Agency to coordinate oversight of efforts made to achieve these targets with other state agencies and, like all executive orders, the Order has no binding legal effect on regional agencies, such as MTC and ABAG, which are outside of the California Executive Branch. MTC and ABAG may voluntarily consider the emissions reduction targets and other provisions of the Order, but MTC and ABAG play no formal role in the Order's implementation.

A recent California Appellate Court decision, *Cleveland National Forest Foundation v. San Diego Association of Governments* (November 24, 2014) Cal.App.4th, further examined the executive order and concluded it should be viewed as having the equivalent force of a legislative mandate for specific emissions reductions. The case has been accepted for review by the California Supreme Court, and therefore is not currently considered a precedent.

California Global Warming Solutions Act of 2006 (AB 32 and SB 32)

Assembly Bill (AB) 32, the California Global Warming Solutions Act (Health and Safety Code Section 38500 et seq.), was signed in September 2006. The Act requires the reduction of statewide GHG emissions to 1990 levels by the year 2020. This change, which is estimated to be a 25 to 35 percent reduction from current emission levels, will be accomplished through an enforceable statewide cap on GHG emissions that will be phased in starting in 2012. The Act also directs ARB to develop and implement regulations to reduce statewide GHG emissions from stationary sources and address GHG emissions from vehicles. ARB has stated that the regulatory requirements for stationary sources will be first applied to electricity power generation and utilities, petrochemical refining, cement manufacturing, and industrial/commercial combustion. The second group of target industries will include oil and gas production/distribution, transportation, landfills and other GHG-intensive industrial processes.

On December 11, 2008, ARB adopted its *Climate Change Scoping Plan* (Scoping Plan), which functions as a roadmap of ARB's plans to achieve GHG reductions in California required by AB 32 through subsequently enacted regulations. The Scoping Plan contains the main strategies California will implement to reduce CO_2e

emissions by 174 MMT, or approximately 30 percent, from the State's projected 2020 emissions level of 596 MMT CO_2e under a "business-as-usual" scenario. The Scoping Plan also breaks down the amount of GHG emissions reductions ARB recommends for each emissions sector of the State's GHG inventory. The Scoping Plan's recommended measures were developed to reduce GHG emissions from key sources and activities while improving public health, promoting a cleaner environment, preserving natural resources, and ensuring that the impacts of the reductions are equitable and do not disproportionately impact low-income and minority communities. These measures also put the State on a path to meet the long-term goal of reducing California's GHG emissions by 2050 to 80 percent below 1990 levels.

In May 2014, ARB released and has since adopted the First Update to the Climate Change Scoping Plan to identify the next steps in reaching AB 32 goals and evaluate the progress that has been made between 2000 and 2012 (ARB 2014a:4, 5). According to the update, California is on track to meet the near-term 2020 GHG limit and is well positioned to maintain and continue reductions beyond 2020 (ARB 2014a:ES-2). The update also reports the trends in GHG emissions from various emission sectors.

On September 8, 2016, Governor Brown approved SB 32 (Pavley, Chapter 249, Statutes of 2016), which added a 2030 target to the Global Warming Solutions Act of 2006. SB 32 requires that statewide GHG emissions are reduced to 40 percent below 1990 levels by 2030. This bill was tied to passage of a companion bill, AB 197, described below.

On January 20, 2017, ARB released its Draft 2017 Climate Change Scoping Plan Update (2017 Draft Scoping Plan Update), which lays out the framework for achieving the 2030 reductions as established in EO B-30-15, SB 32, and AB 197. The 2017 Draft Scoping Plan Update identifies the GHG reductions needed by emissions sector to achieve a statewide emissions level that is 40 percent below 1990 levels before 2030. Many of the programs require statewide action, promulgated through regulation, and are outside the ability of sub-state jurisdictions to implement on their own accord. This is important to recognize in terms of GHG emissions efficiency and attaining GHG targets. The ability to attain targets will not only rely on transportation strategies, (e.g., the SCS), but also on land use strategies implemented by local cities and counties (e.g., qualified GHG reduction plans) and controls and actions tied to economy-wide changes promulgated by the State.

Examples listed in the 2017 Draft Scoping Plan Update include:

- reliance on SB 350 targets of providing 50 percent of the State's electricity via renewable resources (this is largely accomplished by actions of utilities);
- attaining 18 percent reduction in carbon intensity of fuels (Low Carbon Fuel Standard);
- vehicle fleet mix that includes 4.2 million zero-emission vehicles (ZEV) by 2030 and similar changes in urban buses and light- and heavy-duty trucks;
- regulations that reduce short-lived GHGs;
- deployment of 100,000 ZEV freight vehicles by 2030;
- reduction of refinery GHG emissions by 20 percent;
- continuation (past 2020) of the Cap- and Trade-Program; and
- reduction in VMT by implementation of SB 375 (i.e., this SCS) and other strategies intended to reduce VMT (ARB 2017:ES4,ES5).

Some of these programs have already been initiated and others will require legislative or regulatory action by the State. In addition, and as mentioned above, the 2017 Draft Scoping Plan states that local governments (e.g., cities and counties) play an important role in achieving the State's long-term GHG goals because they have broad influence, and sometimes-exclusive authority, over activities that enable or thwart uptake of

policies that contribute to significant direct and indirect GHG emissions. These actions include community-scale planning and permitting processes, discretionary actions, local codes and ordinances, outreach and education efforts, and municipal operations. ARB states that to achieve the 2030 target, local governments are essential partners and their action is required to complement and support State-level actions. ARB also acknowledges that without land use decisions from local governments that allow more efficient use and management of land use, longer-term targets cannot be met. ARB recommends that local jurisdictions develop sufficiently detailed and adequately supported GHG reduction plans (including climate action plans [CAPs]) that look holistically at GHG emissions and local strategies to support statewide limits.

Assembly Bill 197

Governor Brown signed AB 197 (Garcia, Chapter 250, Statutes of 2016) on September 8, 2016. AB 197 creates a legislative committee to oversee ARB and requires ARB to take specific actions when adopting plans and regulations pursuant to SB 32 (described below) related to disadvantaged communities, identification of specific information regarding reduction measures, and information regarding existing greenhouse gases at the local level.

Senate Bill 1368 (Chapter 598, Statutes of 2006)

Senate Bill (SB) 1368, signed in September 2006, required the California Public Utilities Commission (PUC) to establish a GHG emissions performance standard for "baseload" generation from investor-owned utilities by February 1, 2007. The CEC was required to establish a similar standard for local publicly-owned utilities by June 30, 2007. The legislation further required that all electricity provided to California, including imported electricity, must be generated from plants that meet or exceed the standards set by the PUC and the CEC. In January 2007, the PUC adopted an interim performance standard for new long-term commitments (1,100 pounds of CO_2 per megawatt-hour), and in May 2007, the CEC approved regulations that match the PUC standard.

Executive Order S-01-07 (Gov. Schwarzenegger, January 2007)

In January 2007, Executive Order S-01-07 established a Low-Carbon Fuel Standard. The Order calls for a statewide goal to be established to reduce the carbon intensity of California's transportation fuels by at least 10 percent by 2020 ("2020 Target"), and that a Low Carbon Fuel Standard (LCFS) for transportation fuels be established for California. Further, it directs ARB to determine if an LCFS can be adopted as a discrete early action measure pursuant to AB 32, and if so, to consider the adoption of an LCFS on the list of early action measures required to be identified by June 30, 2007, pursuant to Health and Safety Code Section 38560.5. The LCFS applies to all refiners, blenders, producers or importers ("Providers") of transportation fuels in California, will be measured on a full fuels cycle basis, and may be met through market-based methods by which Providers exceeding the performance required by an LCFS shall receive credits that may be applied to future obligations or traded to Providers not meeting the LCFS.

In June 2007, ARB approved the LCFS as a Discrete Early Action item under AB 32 and, in April 2009, ARB approved the new rules and carbon intensity reference values with the new regulatory requirements taking effect in January 2011. The standards require providers of transportation fuels to report on the mix of fuels that they provide and demonstrate that they meet the LCFS intensity standards annually. This is accomplished by ensuring that the number of "credits" earned by providing fuels with a lower carbon intensity than the established baseline (or obtained from another party) is equal to or greater than the "deficits" earned from selling higher intensity fuels.

In December 2011, the U.S. District Court for the Eastern District of California issued three rulings against the LCFS including a requirement for ARB to abstain from enforcing the LCFS. In April 2012, the Ninth Circuit granted ARB's motion for a stay of the injunction while it continued to consider ARB's appeal of the lower court's decision. Consequently, ARB re-adopted the LCFS regulation in September 2015, and the changes went into effect on January 1, 2016. The program establishes a strong framework to promote the low carbon fuel adoption necessary to achieve the Governor's 2030 and 2050 greenhouse gas goals.

Executive Order B-16-2012

Executive Order B-16-2012 directs State entities to support and facilitate the rapid commercialization of zero-emission vehicles. The order outlines benchmarks for 2015, 2020, and 2025 related to establishing infrastructure to support and accommodate zero-emission vehicles, helping get zero-emission vehicles to market and on the road, and increasing their use for public transportation and public use, among others. It also establishes a goal of an 80 percent reduction of greenhouse gas emissions from the transportation sector in California as compared to 1990 levels by 2050. This Executive Order also explicitly states that it "is not intended to, and does not create any rights or benefits, substantive or procedural, enforceable at law or in equity, against the State of California, its agencies, departments, entities, officers, employees, or any other person."

Senate Bill 375 (Chapter 728, Statutes of 2008)

Senate Bill (SB) 375, adopted September 30, 2008 helps meet the AB 32 goals of reducing emissions from cars and light duty trucks. SB 375 requires regional planning agencies to include a Sustainable Communities Strategy (SCS) in their regional transportation plan (RTP) that demonstrates how the region could achieve GHG emissions reductions set by ARB through integrated land use and transportation planning. Local governments retain control of land use planning authority; however, SB 375 amended the California Environmental Quality Act (Pub. Resources Code § 21000 et seq.) to ease environmental review of specific types of developments that are anticipated to reduce emissions. Plan Bay Area is the integrated SCS and RTP for the San Francisco Bay Area, consistent with SB 375.

California's Energy Efficiency Standards for Residential and Nonresidential Buildings

Known by the shorthand name of "Title 24," this policy was established in 1978 in response to a legislative mandate to reduce California's energy consumption. Title 24 is updated periodically to allow for incorporation of new energy efficiency technologies and methods. The standards are updated on an approximately three-year cycle to allow consideration and possible incorporation of new energy efficient technologies and methods. All buildings for which an application for a building permit is submitted on or after January 1, 2017 must follow the most recent update, the 2016 standards (CEC 2015). Energy efficient buildings require less electricity; therefore, increased energy efficiency reduces fossil fuel consumption and decreases GHG emissions. The CEC Impact Analysis for California's 2016 Building Energy Efficiency Standards estimates that the 2016 Standards are 28 percent more efficient than the previous 2013 standards for residential buildings and 5 percent more efficient for non-residential buildings (CEC 2015).

California Green Building Standards Code (2016), California Code of Regulations Title 24, Part 11

California's green building code, referred to as "CalGreen," was developed to provide a consistent approach to green building within the State. Taking effect in January 2016, the most recent version of the Code lays out the minimum requirements for newly constructed residential and nonresidential buildings to reduce GHG emissions through improved efficiency and process improvements. It also includes voluntary tiers to further encourage building practices that improve public health, safety and general welfare by promoting the use of building concepts which minimize the building's impact on the environment and promote a more sustainable design. Local jurisdictions are required to adopt the CalGreen provisions. CalGreen is complimentary with California Energy Code, Title 24, Part 6, which continues to regulate energy efficiency in buildings.

Senate Bill 1 (Chapter 132, Statutes of 2006)

The "Million Solar Roofs" legislation sets a goal of installing 3,000 megawatts of new solar capacity by 2017 to move the State toward a cleaner energy future and help lower the cost of solar systems for consumers. The Million Solar Roofs program is a ratepayer-financed incentive program aimed at transforming the market for rooftop solar systems by driving the cost down over time. It provides up to $3.3 billion in financial incentives that decline over time.

Executive Order S-13-08

Governor Schwarzenegger signed California Executive Order (EO) S-13-08 on November 14, 2008, to address the potential impacts of global climate change, including sea level rise. The order emphasizes the need for

timely planning to mitigate and adapt to the potential effects of sea level rise on the State's resources. As a result, any State agency planning construction projects in areas vulnerable to future sea level rise must evaluate and reduce the potential risks and increase resiliency, to the extent feasible. Planning must consider a range of sea level rise scenarios for 2050 and 2100.

Executive Order B-30-15

On April 20, 2015 Governor Edmund G. Brown Jr. signed Executive Order B-30-15 to establish a California GHG reduction target of 40 percent below 1990 levels by 2030. The Governor's executive order aligns California's GHG reduction targets with those of leading international governments such as the 28-nation European Union which adopted the same target in October 2014. California's new emission reduction target of 40 percent below 1990 levels by 2030 will make it possible to reach the ultimate goal of reducing emissions 80 percent under 1990 levels by 2050. This is in line with the scientifically established levels needed in the U.S. to limit global warming below 2 °C - the warming threshold at which there will likely be major climate disruptions such as super droughts and rising sea levels according to scientific consensus. SB 32, discussed previously, legislatively implements the targets in this executive order.

State of California Sea Level Rise Guidance Document

EO S-13-08 directs the California Natural Resources Agency, in coordination with other state agencies and the National Academy of Sciences, to assess sea level rise for the Pacific Coast and create official sea level rise estimates for state agencies in California, Oregon and Washington. The assessment and official estimates are provided within the State of California Sea-Level Rise Guidance Document.

The State of California Sea Level Rise Interim Guidance Document contains eight recommendations for incorporating sea level rise into project planning:

- use the ranges of SLR presented in the June 2012 National Research Council report on Sea Level Rise for the Coasts of California, Oregon, and Washington as a starting place and select SLR values based on agency and context-specific considerations of risk tolerance and adaptive capacity;
- consider timeframes, adaptive capacity, and risk tolerance when selecting estimates of SLR;
- consider storms and other extreme events;
- coordinate with other state agencies when selecting values of SLR and, where appropriate and feasible, use the same projections of SLR;
- future SLR projections should not be based on linear extrapolation of historic sea level observations;
- consider changing shorelines;
- consider predictions in tectonic activity; and
- consider trends in relative local mean sea level.

The interim guidance document is expected to be updated regularly, to keep pace with scientific advances associated with sea level rise.

California Climate Adaptation Strategy

In response to EO S-13-08, the California Natural Resources Agency released the California Climate Adaptation Strategy (CAS) in 2009. The strategy proposes a comprehensive set of recommendations designed to inform and guide State agencies in their decision-making processes as they begin to develop policies to protect the State, its residents, and its resources from a range of climate change impacts, including sea level rise. The CAS presents recommendations for seven sectors, including Ocean and Coastal Resources and Transportation and Energy Infrastructure.

CAS recommendations specific to Ocean and Coastal Resources emphasize hazard avoidance, adaptation planning, and collaboration with local governments to address sea level rise. The CAS directs State agencies, in general, not to plan, develop, or build any new significant structure in a location requiring significant protection from sea level rise, storm surges, or coastal erosion during the expected life of the structure. The strategy notes that the most risk-averse approach for minimizing the adverse effects of sea level rise and storm activities is to carefully consider new development within areas vulnerable to inundation and erosion. The CAS also recommends that all State agencies prepare sea level rise adaptation plans, guidance, and criteria, as appropriate. The strategy directs State agencies to coordinate with any other agencies with jurisdiction over the coastal zone, (e.g., BCDC, the California Coastal Commission), local governments, and regional organizations on regional adaptation planning. The CAS also recommends that State agencies encourage local governments to adopt policies on setbacks, buffer areas, clustered coastal development, and engineering solutions, among others.

Within the Transportation Energy Infrastructure sector, the CAS specifically directs Caltrans to incorporate climate change vulnerability assessment planning tools, policies, and strategies into existing transportation and investment decisions. The strategy also instructs Caltrans to develop guidelines to establish buffer areas and setbacks to avoid risks to structures within projected "high" future sea level rise or flooding inundation zones.

Caltrans Guidance on Incorporating Sea Level Rise

Pursuant to EO S-13-08 and the California Sea Level Rise Interim Guidance Document, in May 2011 Caltrans released guidance on incorporating sea level rise into planning and decision making with respect to transportation projects. Caltrans' guidance recommends first determining if sea level should be incorporated into project planning, based on the project location and level of risk. A screening process with ten criteria guides the assessment of whether to incorporate sea level rise: design life, redundancy/alternative route(s), anticipated travel delays, evacuations/emergencies, traveler safety, expenditure of public funds, scope of project, effect on non-state highways, and environmental constraints. If the screening determines that sea level rise should be incorporated into project planning, the next step is to estimate the degree of potential impact and assess alternatives for preventing, mitigating and/or absorbing the impact. Caltrans uses the statewide sea level rise estimates presented in the California Sea Level Rise Interim Guidance Document for different years (2030 through 2100) to determine target sea level rise values; Caltrans directs projects with a life that extends to 2030 or earlier not to assume impacts from sea level rise. Having identified target sea level rise values for a project, Caltrans then lays out steps for implementation, including conducting more technical studies of inundation and subsidence and determining any adverse effects on facility functions and operations (e.g., from erosion, exposure to salt water), necessary adaptation measures, and the costs of mitigation.

California Department of Public Health Guidance on Integrating Public Health into Climate Action Planning

In February of 2012, the California Department of Public Health released a guidance document, *Climate Action for Health: Integrating Public Health into Climate Action Planning*. This document introduces key health connections to climate change mitigation strategies, and suggestions for where these fit into a local climate action plan or general plan. The guidance document also provides a number of examples of strategies taken from actual climate action plans that integrate public health objectives, with policy efforts to improve community health and reduce GHG emissions. The information provided is advisory, voluntary, and educational. The document includes specific policy recommendations for transportation and land use planning, including incorporation of green space and tree canopy to mitigate urban heat islands, and healthy siting of housing, schools and health care facilities to avoid major air quality impacts.

Coastal Act

The California Coastal Act of 1976 directs the California Coastal Commission (Coastal Commission) to protect and enhance the State's coastal resources. The Coastal Commission has planning, regulatory, and permitting authority over all development within the coastal zone, whose landward boundary varies with location. The Act

governs coastal hazards for new development, mandating that it minimize risks to life and property in areas of high flood. New development must be located such that it will not be subject to erosion or stability hazard over the course of its design life, and construction of protective devices (e.g., seawalls, revetment) that substantially alter natural land forms along bluffs and cliffs are not permitted (Section 30253).

The Coastal Commission's mandate extends to climate change, including sea level rise; however, the agency is currently assessing how best to address sea level rise and other challenges resulting from climate change. The Coastal Commission partners with local governments to form Local Coastal Programs (LCPs), transferring the power to regulate development within the coastal zone to cities and counties. Within the Bay Area, all of San Mateo, San Francisco, Marin, and Sonoma counties, along with the cities of Daly City, Pacifica and Half Moon Bay have certified LCPs. Any changes in the Coastal Commission's policies and/or regulations with respect to sea level rise may ultimately require revisions to LCPs.

REGIONAL COORDINATION

In the Bay Area, the Bay Area Regional Collaborative (BARC) coordinates the regional planning efforts of ABAG, BAAQMD, BCDC, and MTC. Current BARC efforts are focused on the following five major tasks:

1. Completing Resiliency report related to the Sustainable Communities Strategy;

2. Integrating climate-planning documents;

3. Preparing to develop comprehensive regional adaptation plan;

4. Providing strategic leadership to key institutions and collaborative efforts addressing climate change in the Bay Area; and

5. Galvanizing resources and increase visibility of Bay Area regional agencies' climate initiatives.

Past projects completed as a result of the BARC collaborative efforts includes the Bay Area Climate and Energy Resilience Strategy to provide guidance on how to include protecting the Bay Area's economy, public health, infrastructure and ecosystems from the effects of climate change, and development of a Regional Sea Level Rise Adaptation Strategy.

REGIONAL AND LOCAL REGULATIONS

San Francisco Bay Plan

The BCDC is charged with the protection, enhancement, and responsible use of the San Francisco Bay. The agency's jurisdiction includes the Bay itself, all land within 100 feet of the Bay shoreline, salt ponds, managed wetlands and certain waterways named in the Commission' law. BCDC guides uses of the Bay and its shoreline through policies set forth in the McAteer-Petris Act, the Suisun Marsh Preservation Act, the San Francisco Bay Plan, originally adopted in 1968, and the Suisun Marsh Protection Plan, originally adopted in 1977. In October 2011, BCDC amended its Bay Plan sea level rise policies and added new climate change findings and policies to the Bay Plan with the adoption of Amendment No. 1-08.

The policies included in the Bay Plan amendment aim to protect existing and planned development from sea level rise while preserving public access to the Bay and ecosystems. New large shoreline projects must assess the risks of sea level rise and storms, based on the best available estimates of sea level rise. Large projects that could experience risks to public safety, e.g., flooding, must be designed to cope with flood levels expected at the midcentury and have an adaptive strategy for the end of century, depending on the life of the project. The new policies encourage projects whose benefits outweigh the risks of flooding—specifically, those that reduce carbon emissions by locating jobs and housing near public transportation. Projects may place fill in the Bay to protect existing and planned development from flooding and erosion, provided that a number of

provisions are met to minimize flood risks (e.g., shoreline setbacks, elevation above flood levels) and avoid, minimize and mitigate impacts to Bay resources. Shoreline protection projects (e.g., levees, sea walls) and public access must be designed to withstand the effects of sea level rise and storms. The new policies also encourage habitat preservation and enhancement in undeveloped areas subject to flooding. Finally, the Bay Plan directs BCDC to collaborate with other agencies and the public to create a regional strategy that addresses and adapts to sea level rise.

Local Climate Action Plans

Consistent with ARB recommendations, several Bay Area jurisdictions have completed community emissions inventories (103), and 67 jurisdictions have finalized and adopted community climate action plans, as shown in Table 2.5-4. It is noted that there are also jurisdictions that have drafted or are in the process of drafting climate actions plans, which are not included in Table 2.5-4.

Table 2.5-4 Bay Area Cities with Completed GHG Emissions Inventories or Climate Action Plans

Jurisdiction	Completed Community Emissions Inventory	Finalized and Adopted Community Climate Action Plan
Alameda County	X	X
Alameda	X	X
Albany	X	X
Berkeley	X	X
Dublin	X	X
Emeryville	X	X
Fremont	X	X
Hayward	X	X
Livermore	X	X
Newark	X	X
Oakland	X	X
Piedmont	X	X
Pleasanton	X	X
San Leandro	X	X
Union City	X	X
Contra Costa County	X	X
Antioch	X	X
Brentwood	–	–
Clayton	–	–
Concord	X	-
Danville	X	X
El Cerrito	X	X
Hercules	X	–
Lafayette	X	–
Martinez	X	X
Moraga	X	X
Oakley	X	–
Orinda	X	–

Table 2.5-4 Bay Area Cities with Completed GHG Emissions Inventories or Climate Action Plans

Jurisdiction	Completed Community Emissions Inventory	Finalized and Adopted Community Climate Action Plan
Pinole	X	–
Pittsburg	X	–
Pleasant Hill	–	–
Richmond	X	–
San Pablo	X	X
San Ramon	X	X
Walnut Creek	X	X
Marin County	X	X
Belvedere	X	X
Corte Madera	X	X
Fairfax	X	X
Larkspur	X	X
Mill Valley	X	X
Novato	X	X
Ross	X	X
San Anselmo	X	X
San Rafael	X	X
Sausalito	X	X
Tiburon	X	X
Napa County	X	-
American Canyon	X	–
Calistoga	X	X
Napa	X	X
St. Helena	X	–
Yountville	X	–
San Francisco	X	X
San Mateo County	X	X
Atherton	X	–
Belmont	X	–
Brisbane	X	X
Burlingame	X	X
Colma	X	X
Daly City	X	X
East Palo Alto	X	X
Foster City	X	-
Half Moon Bay	–	–
Hillsborough	X	X
Menlo Park	X	X

Table 2.5-4 Bay Area Cities with Completed GHG Emissions Inventories or Climate Action Plans

Jurisdiction	Completed Community Emissions Inventory	Finalized and Adopted Community Climate Action Plan
Millbrae	X	–
Pacifica	X	X
Portola Valley	X	–
Redwood City	X	X
San Bruno	X	–
San Carlos	X	X
San Mateo	X	X
S. San Francisco	X	–
Woodside	X	X
Santa Clara County	X	X
Campbell	–	–
Cupertino	X	X
Gilroy	X	X
Los Altos	X	X
Los Altos Hills	X	–
Los Gatos	X	–
Milpitas	X	X
Monte Sereno	–	–
Morgan Hill	X	–
Mountain View	X	X
Palo Alto	X	X
San Jose	X	X
Santa Clara	X	X
Saratoga	X	–
Sunnyvale	X	X
Solano County	X	X
Benicia	X	X
Dixon	X	–
Fairfield	X	X
Rio Vista	X	–
Suisun City	X	–
Vacaville	X	–
Vallejo	X	X
Sonoma County	X	X
Cloverdale	X	–
Cotati	X	–
Healdsburg	X	–
Petaluma	X	–

Table 2.5-4 Bay Area Cities with Completed GHG Emissions Inventories or Climate Action Plans

Jurisdiction	Completed Community Emissions Inventory	Finalized and Adopted Community Climate Action Plan
Rohnert Park	X	–
Sebastopol	X	–
Santa Rosa	X	X
Sonoma (city)	X	–
Windsor	X	–
Regional Total	**103**	**67**

Source: OPR 2016, Ascent Environmental 2016

Brief descriptions of selected adopted GHG reduction plans (e.g., CAPs) are included below.

Alameda County Climate Action Plans

The County of Alameda has adopted two climate action plans addressing specific county-wide concerns. Both plans seek to achieve a goal of 15 percent GHG reductions by 2020.

Alameda County (Unincorporated Areas) Climate Action Plan

The Alameda County (Unincorporated Areas) Community Climate Action Plan addresses reduction of greenhouse gas emissions in the unincorporated areas of Alameda County. These communities include Ashland, Castro Valley, Cherryland, Fairview, Hayward Acres, San Lorenzo, Sunol, and Rural East County. The Plan identifies a series of 37 local programs and policy measures related to transportation, land use, building energy, water, waste, and green infrastructure. The Plan identifies a total potential reduction in community-wide emissions by more than 15 percent by the year 2020. The Plan was approved by the Board of Supervisors on February 4, 2014.

Alameda County Climate Action Plan for Government Services and Operations

The Alameda County Climate Action Plan for Government Services and Operations was adopted in 2010. The Board of Supervisors adopted 16 Commitments to Climate Protection that provide overarching vision, a goal of 15 percent GHG reductions by 2020, and the Climate Action Plan, which includes 80 recommended actions to achieve the identified goal.

Contra Costa Climate Action Plan

On December 26, 2012, a Draft Climate Action Plan was completed for Contra Costa County and released by the Department of Conservation and Development for public review and comment. On December 15, 2015, the Climate Action Plan was approved by the Board of Supervisors. The Climate Action Plan identifies specific measures on how the County can achieve a GHG reduction target of 15% below baseline levels by the year 2020. In addition to reducing GHG, the Climate Action Plan includes proposed policies and actions to improve public health and provide additional community benefits, and it lays the groundwork for achieving long-term greenhouse reduction goals for 2020 and 2035.

Marin County Greenhouse Gas Reduction Plan

Adopted in October 2006, the Marin County Greenhouse Gas Reduction Plan identifies an emissions inventory and reduction target. It includes a range of CO_2 reduction measures to reduce GHG emissions to 15 to 20 percent below 1990 levels by the year 2020 for internal government and 15 percent countywide. Measures are organized in the categories of building energy use, transportation, waste management, and land use.

Climate Action Plan for San Francisco

Adopted in 2004, the Climate Action Plan for San Francisco: Local Actions to Reduce Greenhouse Gas Emissions includes an emissions inventory of community-wide and municipal operations and a reduction target of 20 percent below 1990 levels by 2012. With "business as usual," greenhouse gas emissions are predicted to rise to 10.8 million tons per year in 2012. The 20 percent reduction target would reduce San

Francisco's overall GHG emissions to 7.2 million tons per year by 2012. As of 2010 San Francisco had achieved citywide emission reductions of 14.5 percent from 1990 levels. The Climate Action Plan includes several actions and next steps related to transportation, energy, renewable energy and solid waste. San Francisco further adopted GHG emissions reduction goals including 20 percent reduction below 1990 levels for 2012, 25 percent by 2017, 40 percent by 2025 and 80 percent by 2050.

Sonoma County Community Climate Action Plan

Adopted in October 2008, the Sonoma County Community Climate Action Plan includes an emissions inventory and several solutions designed to reach its goal of reducing greenhouse gas (GHG) emissions to 25 percent below 1990 levels by 2015. Strategies are related to electricity and natural gas, transportation and land use, agriculture and forests, and solid waste.

The Climate Action Plan finds that implementation of all major quantified solutions will reach about 22 percent below 1990 levels, which is about 37 percent below business as usual (multiple solutions are not yet quantified).

County of Solano Climate Action Plan

Adopted in 2011, the County of Solano Climate Action Plan communitywide GHG emissions reduction goal of 20 percent below 2005 levels by 2020. The Climate Action Plan addresses both municipal and communitywide emissions for the unincorporated County. The Climate Action Plan recommends 31 measures and 94 implementing actions that the community can take to reduce both emissions and communitywide contributions to global climate change. Measures and actions are related to statewide reductions, agriculture, energy and efficiency, transportation and land use, waste reduction and recycling, and water conservation.

County Sea Level Rise Programs

San Francisco Sea Level Rise Action Plan

In March 2016, City and County of San Francisco released its *Sea Level Rise Action Plan* to identify actions that San Francisco can take now and in the near future to meet the challenge of sea level rise.

Goals of the San Francisco Sea Level Rise Action Plan include the following:

- a resilient city that is adaptable to the impacts of SLR, and recognizes and protects physical, economic, and social value;
- communities that understand and are reassured by a comprehensive response to SLR, and are mobilized and empowered to support efforts over the long term;
- interagency and regional collaboration and partnerships that are coordinated, transparent, and focused on delivering implementable and innovative solutions for a resilient future for San Francisco and the Bay Area region;
- capacity building that enables leadership and staff to implement good solutions; and
- a Citywide SLR Adaptation Plan that can serve as a local and global model.

This plan addresses the immediate and long-term threats of sea level rise to San Francisco shoreline through development of a comprehensive understanding of the threat of sea level rise and to creating a decisive plan of action. In general, the San Francisco Sea Level Rise Action Plan recommends one or a combination of three options to address SLR: accommodate (raise or waterproof assets in place), protect (create natural or engineered barriers, such as wetlands or levees), or retreat (relocate sensitive assets to low-risk areas and/or transition high-risk areas to lower-risk uses) (City of San Francisco 2016).

Solano County Sea Level Rise Strategic Program

In June 2011, Solano County released its Sea Level Rise Strategic Program (SLRSP) to address climate change and associated sea level rise at the local level. As directed by the County's General Plan, the SLRSP investigates the potential effects of sea level rise on Solano County, including specific properties and resources, and presents protection and adaptation strategies. The SLRSP considers two inundation scenarios: 16 inches by midcentury and 55 inches by the end of the century. According to their analysis, sea level rise is expected to inundate 130 square miles in Solano County by midcentury, including approximately 27 miles of total roadway (Interstate highways, State highways and local roadways) and eight miles of railway. By the end of the century, sea level rise will inundate 163 square miles of land, 80 miles of total roadway, and 15 miles of railway.

Major roads and highways, along with railways, in the County are considered to be highly sensitive and vulnerable to the effects of sea level rise, with low adaptive capacity. Residential, industrial, and commercial developments are also all highly sensitive and vulnerable to sea level rise, although the adaptive capacity of these uses is low-to-medium, given the ability for residents and businesses with resources to pursue alternative locations. For all new transportation infrastructure and development, the SLRSP recommends designing projects to tolerate periodic flooding and providing for new development that can be adapted or relocated. New development in areas prone to flooding from sea level rise should be minimal. The SLRSP notes the difficulty in determining adaptive strategies for transportation infrastructure, as they will be developed based on future vulnerability and risk analyses specific to each asset. However, it specifically recommends collaborating with MTC and Caltrans on adaptation planning for affected roadways.

Marin Ocean Coast Sea Level Rise Vulnerability Assessment

The Marin Ocean Coast Sea Level Rise Vulnerability Assessment Public Review Draft was released in October 2015. This Vulnerability Assessment for Marin County's ocean coast describes the vulnerability of parcels and buildings, transportation networks, utilities, working lands, natural resources, recreational activities, emergency services, and historic and archaeological resources; and community profiles highlighting vulnerable assets. Each profile details key issues, geographic locations, existing policies, and other economic, environmental, equity, and management considerations related to sea level rise vulnerability. SLR scenarios were based on SLR projections for California adopted by the National Research Council in 2012.

The key findings of this assessment are based on five sea level and storm combinations representing near-term, medium-term, and long-term futures. In the coastal zone, over 10 percent of buildings are vulnerable at the low end of the long-term scenario (scenario 4, 40 inches with a 100-year storm), and 20 percent are vulnerable at the high end of the long-term scenario (scenario 5, 80 inches with a 100-year storm) (Marin County 2015).

City and County General Plans

Marin Countywide Plan

The Marin Countywide Plan (November 2007), effectively the County's general plan, includes goals, policies, and implementing programs that address climate change and the risks of sea level rise in Marin County.

The Natural Systems and Agriculture Element includes a section on Atmosphere and Climate, including the following goal and policies, which are supported by implementing programs:

GOAL AIR-4: Minimization of Contributions to Greenhouse Gases. Prepare policies that promote efficient management and use of resources in order to minimize greenhouse gas emissions. Incorporate sea level rise and more extreme weather information into the planning process.

- **Policy AIR-4.1 Reduce Greenhouse Gas Emissions.** Adopt practices that promote improved efficiency and energy management technologies; shift to low-carbon and renewable fuels and zero emission technologies.

- **Policy AIR-4.2 Foster the Absorption of Greenhouse Gases.** Foster and restore forests and other terrestrial ecosystems that offer significant carbon mitigation potential.

Goal AIR-5: Adaptation to Climate Change. Adopt policies and programs that promote resilient human and natural systems in order to ease the impacts of climate change.

- **Policy AIR-5.1 Determine Marin-Specific Climate Change.** Participate in research that examines the effects of climate change on human and natural systems in Marin.

- **Policy AIR-5.2 Prepare Response Strategies for Impacts.** Prepare appropriate response strategies that aid systems in adapting to climate change based on sound scientific understanding of the potential impacts.

In terms of sea level rise, the Plan's Environmental Hazards Element includes policies to minimize flooding, including evaluating the potential for sea level rise when processing development applications (Policy EH-3.3). Additional policies specifically address the risk of sea level rise by directing the County to amend its Development Code to incorporate construction standards consistent with Bay Plan policies for areas subject to increased flooding from sea level rise (Implementing Program EH-3.k) and limit new construction or require elevated buildings and infrastructure in areas subject to sea level rise (Implementing Program EH-3.n). The Environmental Hazards Element also seeks to limit the repair, replacement, and construction of coastal seawalls and erosion barriers to protect against sea level rise (Implementing Program EH-3.l) and pursue funding for levee reconstruction in areas threatened by sea level rise (Implementing Program EH-3.o).

The Marin Countywide Plan's Natural Systems and Agriculture Element specifically states the goal of incorporating sea level rise into the planning process (GOAL AIR-4) and adopting policies and programs to adapt to climate change (GOAL AIR-5). More specific policies seek to assess the effects of sea level rise on property and infrastructure (Implementing Program AIR-5.b) and prepare response strategies in coordination with BCDC, the Coastal Commission, and other relevant agencies, including limiting development on coastal wetlands (Implementing Program AIR-5.c). The Natural Systems and Agriculture Element also calls for the establishment of criteria for setbacks to buffer existing and historic baylands from development, including the possible implications of future sea level rise (Implementing Program BIO-5.a) and the identification of baylands that could provide protection from sea level rise (GOAL BIO-5, Implementing Program BIO-5.i).

Contra Costa County General Plan

The Contra Costa County General Plan (January 2005) includes several policies that address sea level rise. The general plan specifically notes the flood hazards for islands in the Sacramento-San Joaquin Delta. The Safety Element requires that buildings in urban development near the shoreline and in flood-prone areas be protected from flood dangers, including from sea level rise (Policy 10-41). New housing must be sited above the highest water level expected during the life of the project or protected by levees (Policy 10-42). The County must review flooding policies annually to incorporate new scientific data on sea level rise and amend the policies as necessary (Policy 10-44).

Napa County General Plan

The Napa County General Plan (June 2008) addresses climate change – including the risk of sea level rise—and sustainable practices for environmental health related to water, energy conservation, air pollutant, greenhouse gas emissions, clean energy generation, and similar issues in its Conservation Element. Goals, policies, and action items specific to climate change and greenhouse gases include:

Goal CON-15: Reduce emissions of local greenhouse gases that contribute to climate change.

- **Policy CON-65:** The County shall support efforts to reduce and offset greenhouse gas (GHG) emissions and strive to maintain and enhance the County's current level of carbon sequestration functions through the following measures:

  - Study the County's natural, agricultural, and urban ecosystems to determine their value as carbon sequesters and how they may potentially increase.

- Preserve and enhance the values of Napa County's plant life as carbon sequestration systems to recycle greenhouse gases.

- Perpetuate policies in support of urban-centered growth and agricultural preservation preventing sprawl.

- Perpetuate policies in support of alternative modes of transportation, including transit, paratransit, walking, and biking.

- Consider GHG emissions in the review of discretionary projects. Consideration may include an inventory of GHG emissions produced by the traffic expected to be generated by the project, any changes in carbon sequestration capacities caused by the project, and anticipated fuel needs generated by building heating, cooling, lighting systems, manufacturing, or commercial activities on the premises. Projects shall consider methods to reduce GHG emissions and incorporate permanent and verifiable emission offsets.

- Establish partnerships with experts, trade associations, non-governmental associations, and community and business leaders to support and participate in programs related to global climate change. [Implemented by Action Items CON CPSP-1 and 2]

- **Policy CON-74:** The County shall evaluate new technologies for energy generation and conservation and solid waste disposal as they become available, and shall pursue their implementation as appropriate in a manner consistent with the principle of adaptive management. This evaluation shall include review of promising technological advances which may be useful in decreasing County greenhouse gas (GHG) emissions, increase in renewable energy that is generated locally, and review of the County's success in meeting targets for GHG emission reductions. [Implemented by Action Item CON CPSP-4]

- **Policy CON-75:** The County shall work to implement all applicable local, state, and federal air pollution standards, including those related to reductions in GHG emissions. [Implemented by Action Item CON CPSP-6]

Action Item CON CPSP-1: The County shall develop a greenhouse gas (GHG) emissions inventory measuring baseline levels of GHGs emitted by County operations through the use of electricity, natural gas, fossil fuels in fleet vehicles and County staff commute trips, and shall establish reduction targets. [Implements Policy CON-65]

Action Item CON CPSP-2: The County shall conduct a GHG emission inventory analysis of all major emission sources in the County by the end of 2008 in a manner consistent with Assembly Bill 32, and then seek reductions such that emissions are equivalent to year 1990 levels by the year 2020. Development of a reduction plan shall include consideration of a "green building" ordinance and other mechanisms that are shown to be effective at reducing emissions. [Implements Policy CON-65]

Action Item CON CPSP-3: The County shall conduct an audit within the next five years of County facilities to evaluate energy use, the effectiveness of water conservation measures, production of GHGs, use of recycled and renewable products and indoor air quality to develop recommendations for performance improvement or mitigation. The County shall update the audit periodically and review progress towards implementation of its recommendations. [Implements Policy CON-67]

Action Item CON CPSP-5: The County shall quantify increases in locally generated energy between 2000 and 2010, and establish annual numeric targets for local production of "clean" (i.e., minimal GHG production) energy by renewable sources, including solar, wind, biofuels, waste, and geothermal. [Implements Policy CON-70]

In terms of sea level rise, the plan establishes the goal of maintaining and improving marshland habitat in the County's southern portion. Specific policies direct the County to monitor the effects of sea level rise on

marshlands, wetlands, agriculture, and the economy and to modify practices through adaptive management, when necessary (Policy CON-31-e, Policy CON-73).

Solano County General Plan

The Solano County General Plan includes several goals, policies, and implementation programs to address climate change. In addition, the plan includes a table that identifies a range of policies from related to other issues addressed throughout the plan (such as community form, Energy Efficiency Transportation Water Management, etc.) that are related to addressing climate change. Specific climate change policies include:

- **Policy HS.G-5:** Recognize the multiple functions of the natural environment for safety, recreation, protection from climate changes, and economic uses.
- **Policy HS.G-6:** Increase awareness of the effect humans have on the environment and encourage individuals and organizations to modify habits and operations that cause degradation to the environment and contribute to climate change.
- **Policy HS.G-7:** Prepare for and adapt to the effects of climate change.
- **Policy HS.P-53:** Evaluate the potential effects of climate change on Solano County's human and natural systems and prepare strategies that allow the County to appropriately respond and adapt.
- **Policy HS.I-57:** Comply with all federal and/or state GHG emission reduction targets to reduce the County's contribution to global climate change. The plan should include strategies to reduce vehicle miles traveled, energy consumption, and other sources of GHGs within the county. This should be done in conjunction with the County's Climate Action Plan found in HS.I-73.
- **Policy HS.I-73:** Develop and adopt a climate action plan for Solano County. It is the intent of Solano County to coordinate and seek participation from all cities in preparation of a countywide baseline study and in preparation and implementation of the CAP.

Sonoma County General Plan 2020

In 2005, Sonoma County and all of its Cities pledged to measure and reduce their greenhouse gas emissions by 25 percent below 1990 levels by 2015. The Sonoma County General Plan, adopted in 2008 and updated in 2013, includes the following policies and objectives related to GHG emissions (in addition to polices related to energy efficiency and green development):

Objective OSRC-14.4: Reduce greenhouse gas emissions by 25 percent below 1990 levels by 2015.

- **Policy OSRC-14g:** Develop a GHG Emissions Reduction Program, as a high priority, to include the following:
  - a methodology to measure baseline and future VMT and GHG emissions;
  - targets for various sectors including existing development and potential future development of commercial, industrial, residential, transportation, and utility sources;
  - collaboration with local, regional, and State agencies and other community groups to identify effective greenhouse gas reduction policies and programs in compliance with new State and federal standards;
  - adoption of development policies or standards that substantially reduce emissions for new development;
  - creation of a task force of key department and agency staff to develop action plans, including identified capital improvements and other programs to reduce GHGs and a funding mechanism for implementation; and

- monitoring and annual reporting of progress in meeting emission reduction targets.

- **Policy OSRC-14i:** Manage timberlands for their value both in timber production and offsetting GHG emissions.

Objective OSRC-16.1: Minimize air pollution and GHG emissions.

2.5.3 Impact Analysis

The climate change impact analysis assesses the potential for significant adverse impacts related to GHG emissions, plan consistency, and impacts of sea level rise. The effects of the environment (such as sea level rise) on a project are generally outside the scope of CEQA, as concluded recently by the California Supreme Court (see California Building Industry Association v. Bay Area Air Quality Management District [2015] 62 Cal.4th 369, 377 ["we conclude that agencies generally subject to CEQA are not required to analyze the impact of existing environmental conditions on a project's future users or residents. But when a proposed project risks exacerbating those environmental hazards or conditions that already exist, an agency must analyze the potential impact of such hazards on future residents or users."]). Changes to the CEQA Guidelines to reflect this decision are in process by the State, but have not been adopted. The impacts discussed in this section related to sea level rise are effects of preexisting environmental hazards on structures that would be built under the proposed Plan's projected land use development and the population located within the Plan area, which may fall into the category of impacts of "existing environmental conditions on a project's future users or residents." An analysis of these impacts is included herein for disclosure purposes.

SIGNIFICANCE CRITERIA

The following significance criteria are based on CEQA Guidelines Appendix G, as well as the thresholds used in the EIR for the 2013 Plan Bay Area, and professional judgment. Under these criteria, implementation of the proposed Plan would have a potentially significant adverse impact if the Plan would:

Criterion 1: Fail to reduce per capita passenger vehicle and light duty truck CO_2 emissions by seven percent by 2020 and by 15 percent by 2035 as compared to the 2005 baseline, per SB 375.

Criterion 2: Result in a net increase in direct and indirect GHG emissions by 2040 when compared to existing conditions.

Criterion 3: Substantially conflict with the goal of SB 32 to reduce statewide GHG emissions to 40 percent below 1990 levels by 2030.

Criterion 4: Substantially conflict with any local plans or policies adopted to reduce emissions of GHGs.

Criterion 5: Result in a net increase in transportation projects within areas projected to be regularly inundated by sea level rise by midcentury.

Criterion 6: Result in an increase in land use development within areas projected to be regularly inundated by sea level rise by midcentury.

METHOD OF ANALYSIS

Global Warming Potential Factors

To stay consistent with BAAQMD's 2015 GHG inventory for the Bay Area, 100-year timeframe GWP factors from the IPCC Fifth Assessment Report (FAR) were applied to calculate CO_2e. Under FAR, CH_4 and N_2O are

considered to have GWP factors of 34 and 298, respectively (IPCC 2014). Also, to simplify the analysis, only CO_2, CH_4, and N_2O emissions were considered. Other GHGs were considered to be negligible.

Construction Emissions

GHG emissions from operation of construction equipment can vary depending on the level of activity, the specific operations taking place, the equipment being operated, and other factors. A qualitative analysis of potential GHG emissions from construction activity associated with projected land use development and proposed transportation projects was conducted. At the program level of analysis, it is not possible to quantify the amount of emissions expected from implementation of the proposed Plan because of variability in the extent of construction based on site conditions throughout the Bay Area, and the fact that project details needed to conduct such an analysis are not and cannot be known at this level of analysis. However, the level of GHG emissions from the construction of any one project or all projects combined would be primarily dependent on the quantity, age, and fuel type of the equipment and the duration of their operation at the construction site or in the region. This analysis identifies the measures, or best management practices (BMPs), that must be implemented for an individual construction project to have less than significant impacts. Thus, should implementing agencies adopt feasible mitigation measures for each construction project resulting from the proposed Plan, impacts associated with construction activity on local and regional air quality would be less than significant.

Operational Emissions

Land use Emissions

To compare operational GHG emissions from land use under existing conditions to those forecasted under the Plan buildout, the analysis assumes that the net change in emissions between existing conditions and buildout would be equivalent to emissions from the operation of:

- New land uses built between 2015 and 2040 using 2040 emission factors, minus
- Existing land uses that would be removed between 2015 and 2040 using 2015 emission factors.

Existing land uses that are removed are expected to be replaced by denser residential and commercial land use development. The net change in land uses anticipated under the Plan is identified in **Table 2.2-5**.

Emissions from the operation of forecasted development under the proposed Plan were calculated using default model assumptions in the California Emissions Estimator Model (CalEEMod) Version 2016.3.1 as well as county- and region-specific emission factors (CAPCOA 2016a). Land use-related emissions included in this analysis consist of CO_2, CH_4, and N_2O emissions from a range of direct and indirect sources comprised of:

- natural gas combustion for heating and cooking (e.g., furnaces, water heaters, stoves, and hearths);
- fuel use in landscaping equipment;
- indirect electricity generation for buildings, water and wastewater treatment, and water conveyance; and
- methane emissions from regular disposal of solid waste in landfills.

Emissions from natural gas use, landscaping equipment, water use, and waste emissions were calculated using default assumptions within CalEEMod. Emissions from hearths were based on current BAAQMD rules and CalEEMod default emission factors. As of November 2016, BAAQMD prohibits any wood-burning devices, such as wood-burning fireplaces or stoves, from being installed in new construction under BAAQMD Regulation 6 Rule 3 Section 6-3-306. Thus, it was assumed that any new development would not operate wood-burning stoves and any new fireplaces would use natural gas instead of wood. The distribution of fireplaces included in new residential units was based on default CalEEMod assumptions for single and multi-family units.

Emissions from electricity generation for new land uses were estimated based on emission factors from Pacific Gas and Electric (PG&E) forecasts, local Community Choice Aggregation (CCA) programs, and the Renewable Portfolio Standard and SB 350 targets for the State's renewable energy mix (PG&E 2015). **Table 2.5-5** below shows the emission factors used to estimate the emissions from electricity use within each County and for the

existing and proposed Plan buildout years, 2015 and 2040, respectively. These emission factors are based on the CCA program or utility that best represent the emissions associated with the electricity purchased in a county. Not all CCA programs, especially those adopted by cities, may be reflected in these emission factors.

Table 2.5-5 Electricity Emission Factors

County/Counties	Applicable CCA Program or Utility	Year	Percent Renewable Mix	lb CO_2e/MWh[1]
Marin and Napa	MCE	2015	50%	300
		2040	80%	120
Sonoma	Sonoma Clean Power	2015	36%	380
		2040	50%	300
San Francisco	Clean Power SF	2015	27%	440
		2040	50%	300
San Mateo	Peninsula Clean Energy	2015	27%	440
		2040	75%	150
Santa Clara	Silicon Valley Clean Energy	2015	27%	440
		2040	90%	60
Contra Costa, Alameda and, Solano	PG&E Default[2]	2015	27%	440
		2040	50%	300

Notes: CCA = Community Choice Aggregation, MCU = Marin Clean Energy, SF = San Francisco, PG&E = Pacific Gas and Electric, MWh = megawatt-hour, lb CO_2e = pounds of carbon dioxide equivalent

[1] Based on CO_2, CH_4, and N_2O emission factors using global warming potentials from IPCC's Fifth Annual Report (IPCC 20147). CO_2 emission factors for CCA programs and 2040 calendar years based combining PG&E's non-renewable factor with the reported renewable mix. The PG&E non-renewable factor – 596 lb CO_2/MWh – was calculated from PG&E's reported emission factor and renewable mix for 2014 (435 lb CO_2/MWh with a 27 percent renewable mix). CH_4 and N_2O emission factors were calculated using the same approach, but with emission factors from EPA's eGRID2012 summary tables for CAMX region, which assumes a renewable factor of 27.3 percent. (EPA 2015)

[2] 2015 emission factors based on PG&E reports for the 2014 calendar year.

Source: PG&E 2015, PGE2017, MCE 2015, MEA 2012, SCP 2016, PCE 2017, SVCE 2016, EPA 2015, IPCC 2014

The energy intensity rates (e.g., therms per 1,000 square feet) for new land uses built between 2015 and 2040 were assumed to meet 2016 Title 24 standards. Although new construction built between 2015 and 2017 would be subject to 2013 Title 24 standards, it was assumed that future standards would exceed 2016 Title 24 standards, and the application of 2016 standards to all new construction is a conservative approach. The State is considering adoption of ZNE building energy efficiency standards, but those standards are not yet adopted (CEC 2013b). By default, version 2016.3.1 of CalEEMod applies the 2013 Title 24 standards to new construction. CalEEMod energy rate defaults were adjusted in CalEEMod to match 2016 Title 24 standards based on the percentage improvements over the previous standards estimated by the California Energy Commission (CEC). Based on CEC estimates, this analysis assumes that residential and nonresidential buildings compliant with 2016 Title 24 standards would consume 28 percent and 5 percent (respectively) less energy (electricity and natural gas combined) from lighting, heating, cooling, ventilation, and water heating than residential and nonresidential buildings compliant with 2013 Title 24 standards (CEC 2015a, CEC 2015b).

Energy intensity rates for land uses removed between 2015 and 2040 were assumed to have CalEEMod's "historical" energy intensity rates. This assumes that areas from which the land uses would be removed would be redeveloped to accommodate the anticipated new development under the Plan. These represent energy usage rates reflecting 2005 Title 24 standards (CAPCOA 2016b: 31). This means that any land uses that once operated in 2015 and is anticipated to no longer operate in 2040 are assumed to have used energy at "historical" energy intensity rates. The changes in land use under 2015 and 2040 conditions under the proposed Plan are summarized in **Table 2.2-5** in Section 2.2, "Air Quality."

Motor Vehicle Emissions

Motor vehicle, or mobile source, emissions were calculated using MTC's travel demand forecasting model, Travel Model One, and mobile source emission factors developed by ARB. Travel Model One produces

forecasts of travel behavior and vehicle activity. Travel Model One has been extensively reviewed by federal and State agencies and refined in connection with the application to air quality analyses of various kinds. Key model outputs for use in air quality analyses include total daily vehicle trips, vehicle miles of travel (VMT), and distribution of VMT by speed. This information was then used to determine total emissions from transportation activity in the Bay Area using motor vehicle emission factors from ARB's Emission Factor (EMFAC) model.

Vehicle activity projections are correlated to changes in demographic, housing, and socioeconomic factors. As shown in **Table 2.2-6,** between 2015 and 2040, the Bay Area is projected to add about 1.9 million people (a 26 percent increase) and 688,000 jobs (a 17 percent increase). Based on expected future growth, the total vehicles miles traveled would increase by 21 percent, which means that VMT is projected to grow at a slightly slower rate than population, but at a faster rate than jobs in the region. This can be attributed to the anticipated job growth in current major employment centers such as San Francisco and Silicon Valley, consistent with current trends. Recent trends have also shown rapid job growth concurrent with slow housing growth (MTC 2017). MTC anticipates that, outside of major employment centers, residential development would occur at a faster rate than employment to help fulfill unmet demand, resulting in a faster increase in regional VMT than employment. This is mostly because of more people commuting to major employment centers outside where they live, than to jobs within their city of residence.

MTC used EMFAC2014 to calculate the CO_2 emissions from motor vehicle sources. Because the emissions model is based on travel demand forecast model outputs, it accounts for the projected land use development as well as transportation projects outlined in the proposed Plan. The emissions model also accounts for the effects of congestion (changes in average vehicle speeds) on CO_2 emissions. A detailed description of EMFAC2014 is included in Section 2.2, "Air Quality," and a detailed description of the MTC travel demand forecasting model is included in Section 2.1, "Transportation." MTC then prepared an "off-model" calculation to account for MTC's Climate Initiatives Program's CO_2 reduction estimates. This program includes grants to test innovative GHG emission reduction strategies, tax incentives to encourage car/van pooling, incentives to migrate to more electric vehicle use, and other strategies aimed at reducing GHG emissions. Detailed information on how the policy reductions were calculated and details on the assumed implementation year for each policy are included in MTC's supplemental report available at http://2040.planbayarea.org/reports.

The analysis conducted for Criterion 1 focuses on consistency with SB 375 and AB 32's 2020 goals pertaining to CO_2 emissions related to the operation of passenger vehicles and light duty trucks. Impact 2.5-1 addresses Criterion 1 using a conservative approach where emissions exclude reductions in mobile source emissions because of the implementation of Pavley regulations and LCFS, as required per SB 375. Although EMFAC2014 is the most recent available model, the EMFAC2014 emission outputs were converted to EMFAC2007 equivalents by applying an adjustment methodology in accordance with ARB staff's guidance and consultation. This was done to ensure per-capita vehicle emissions are reduced by the same intensity intended by the SB 375 targets, which were also calculated using EMFAC2007 (see Appendix D).

For Criterion 2, the analysis incorporates operational land use and mobile source emissions. Unlike Criterion 1, transportation emissions are modeled solely using EMFAC2014, which improves upon EMFAC2007 and EMFAC2011 with updated emission factor data and incorporation of various GHG reduction policies. The analysis for this criterion also compares the mobile source emissions under the proposed Plan with the emissions reduction benefits from Scoping Plan provisions such as for Pavley fuel efficiency standards, the Advanced Clean Cars program, and truck and bus rules. Application of LCFS are anticipated to reduce emission levels even further in 2020 and 2040; however, EMFAC2014 does not include LCFS reductions in its calculations, and thus, the effect of LCFS on emissions were not included in this analysis.

EMFAC2014 no longer accounts for the LCFS because the additional emissions reductions under LCFS would only affect the emissions from the production of fuels rather than emissions from the vehicle exhaust at the tailpipe. For all pollutants, EMFAC only accounts for emissions related to the direct operation of on-road vehicles, including exhaust and tire and break wear. Thus, ARB determined that LCFS would not substantially reduce tailpipe emissions and thereby removed the regulation from EMFAC2014 estimates (ARB 2014b).

The methods described above related to EMFAC modeling follow the direction from ARB related to the use of these models for this plan cycle.

The methods also comply with the CBE Settlement Agreement component that the analysis of direct and indirect total on-road transportation GHG emission over the planning period must include disclosure of the total amount of emissions, with and without reductions achieved from state -wide reduction programs under AB 32 (Scoping Plan, Pavley, etc.) (see Table 1.2-2 in Section 1.2, "Project Description").

Consistency with Greenhouse Gas Reduction Policies and Plans

The assessment for Criterion 3 evaluates the proposed Plan's likelihood to impede implementation of longer term (post-2020) policies and plans, including SB 32, 2040 targets, local CAPs, and other applicable GHG reduction plans and policies.

SB 32 calls for a statewide reduction of GHG emissions to 40 percent below 1990 levels by 2030. Because SB 32 includes a target in 2030, which is along the trajectory toward IPCC goal of reducing GHG emissions by 80 percent below 1990 levels by 2050 (the same goal as Executive Order S-03-05), this analysis assumes that the proposed Plan would be consistent with 2050 targets if it is consistent with SB 32 at the regional level. Although individual local government efforts could exceed or fall short of the target to meet the statewide GHG reduction goals, at the regional level it is assumed that the proposed Plan would be consistent with SB 32 if area GHG emissions from the proposed Plan are also reduced to 40 percent below 1990 levels by 2030.

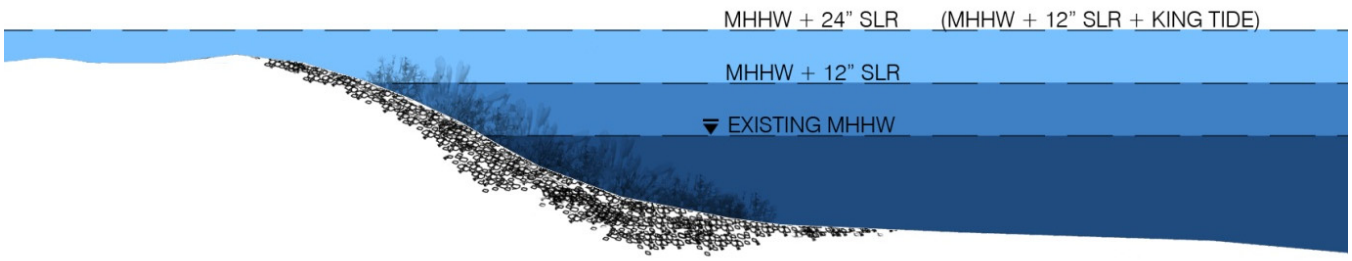
Sea Level Rise

The sea level rise analysis provides a program-level assessment of generalized potential impacts associated with future sea level rise in the San Francisco Bay Area utilizing the inundation mapping produced by 1) the San Francisco Bay Conservation and Development Commission (BCDC) using the Adapting to Rising Tides (Rising Tides) methodology and 2) NOAA for the Sea Level Rise and Coastal Flooding Impacts Viewer. Rising Tides data was available for Alameda, Contra Costa, Marin, San Mateo, and San Francisco counties. Sea level rise for all other counties was modeled using NOAA data. Potential midcentury (e.g., 2050) sea level rise conditions were selected for this analysis, rather than 2040 conditions, as most sea level rise projections are associated with midcentury and end-of-century conditions. Rising Tide and NOAA's inundation maps depict sea level rise on top of MHHW conditions, which are a good approximation of the highest "average" daily tidal inundation an area could be subjected to under future conditions. However, extreme high tides occur that are higher than MHHW. The most well-known extreme high tide condition in San Francisco Bay is often referred to as a "King Tide." King Tide is a colloquial term that refers to the especially high tide conditions that happen only a few times a year. In San Francisco Bay and along the California coast, King Tides generally occur during the winter months.

King Tides can be 12 (or more) inches higher than MHHW; therefore, the inundation of low-lying areas around the Bay observed during a King Tide event is often used as a real-world illustration of the areas around the Bay that would be subjected to regular, daily inundation by midcentury with sea level rise. In other words, the extent of inundation that occurs during an existing King Tide event could be used as a surrogate for the future, regular inundation extent that would be observed with 12 inches of sea level rise relative to MHHW.

The sea level rise impact analysis considers the inundation extent associated with 24 inches of sea level rise at MHHW, as presented within Rising Tide reports and NOAA's Sea Level Rise and Coastal Flooding Impacts Viewer and in **Figure 2.5-3.** This extent of inundation is used as a surrogate for 12 inches of sea level rise at midcentury, coupled with a King Tide event. This scenario was selected as it represents a level of future inundation by Bay waters that could be expected to occur multiple times each year, particularly during the winter months when King Tides typically occur, even in the absence of extreme coastal storm surge events. For the purposes of this assessment, this level of inundation is considered "regular inundation" by sea level rise. **Figure 2.5-6** presents the relationship of these different scenarios for illustrative purposes.

Figure 2.5-6
Comparative Inundation by Scenario



Source: AECOM 2012

The transportation projects footprint and land use growth footprint are analyzed by county and TPA, based upon their location relative to inundation areas presented in **Figure 2.5-3**. For Criterion 4 transportation projects located entirely or partially within the inundated areas are identified. For linear transportation projects, such as highway projects, the length of the projects within the inundated area is calculated relative to the total length of the projects (presented as the percent within the inundation zone). For non-linear projects (such as facility projects), it is assumed that the project is 100 percent within the inundation zone.

Along with the areas subject to potential future inundation, **Figure 2.5-3** displays low-lying hydraulically disconnected areas—these are areas with ground elevations below the projected future sea level rise water surface elevations, but they are not inundated, as they do not have a direct hydraulic connection to the Bay. In other words, these areas are protected from inundation by levees, embankments, or other topographic features. Although the transportation projects within these low-lying areas are not projected to be within the sea level rise inundation zone, based on existing levels of protection, they remain at risk of inundation if an existing structure fails or is not properly maintained into the future.

Similarly, for Criterion 5, the land use growth footprint that intersects the inundated areas and the low-lying, hydraulically-disconnected areas are identified by county and TPA to estimate the potentially-impacted land use development changes within the region. Information provided by county includes both incorporated and unincorporated areas in the county. Because the exact location of new residential and non-residential land uses within growth areas and TPAs is uncertain, the impact on land use development is determined by the portion of growth areas and TPAs, by area, that would be inundated by sea level rise under midcentury conditions.

Multiple uncertainties are inherent in the sea level rise impact analysis, beyond the uncertainties associated with the projected rate of sea level rise anticipated to occur by midcentury. The inundation mapping used for the analysis is intended as a planning-level tool to illustrate the potential for inundation and coastal flooding under future conditions. The maps are based on model outputs and do not account for all potential factors or future conditions such as erosion, subsidence, future construction or shoreline protection upgrades, or other changes to San Francisco Bay or the region that may occur in response to sea level rise.

IMPACTS AND MITIGATION MEASURES

Because GHG emissions are global in nature and regulatory targets are defined at the state and regional level, this analysis considers only the cumulative effects of implementation of the proposed Plan. Further, modeling of passenger vehicle and light duty truck emissions accounts for both forecasted land use development (increase in households and jobs) and transportation projects; therefore, projected land use development and transportation projects are addressed together for each impact.

While GHG emissions are evaluated regionally, and by county for effects associated with the land use growth footprint, the impacts associated with sea level rise vary throughout the region depending on the inland topography and the existing shoreline protection structures. Therefore, sea level rise analysis evaluates the impacts at the local scale. Regional impacts are essentially the culmination of localized impacts throughout the region. Each of the affected transportation projects is evaluated individually. The impacts associated with land-use development are also evaluated spatially at the local scale, with impacts presented at the county level.

Impact 2.5-1: Implementation of the proposed Plan could fail to reduce per capita passenger vehicle and light duty truck CO_2 emissions by seven percent by 2020 and by 15 percent by 2035 as compared to the 2005 baseline, per SB 375.

Impact of Changes in Projected Land Use and Transportation Projects

The proposed Plan would result in implementation of transportation projects and the Climate Initiatives Program, the latter of which would reduce emissions from cars and light duty trucks. As shown in Table 2.5-6, strategies associated with MTC's Climate Initiatives Program, which are part of the proposed Plan, are expected to reduce vehicle trips and, subsequently, on-road passenger vehicle emissions by 3,600 $MTCO_2$ per day in 2020, by 7,900 $MTCO_2$ per day in 2035, and by 7,700 $MTCO_2$ per day in 2040.

Table 2.5-6 Plan Bay Area 2040 Climate Policy Initiatives and Reductions

Strategy	2020		2035		2040	
	Daily Reductions (tons CO_2)	Annual Reductions (tons CO_2)[1]	Daily Reductions (tons CO_2)	Annual Reductions (tons CO_2)[1]	Daily Reductions (tons CO_2)	Annual Reductions (tons CO_2)[1]
Commuter Benefits Ordinance	-300	-90,000	-330	-99,000	-340	-102,000
Trip Caps	-120	-36,000	-690	-207,000	-860	-258,000
Regional Electric Vehicle Charger Network	-250	-75,000	-1,190	-357,000	-1,290	-387,000
Feebate Program	0	0	-680	-204,000	-450	-135,000
Vehicle Buyback Program	0	0	-360	-108,000	-230	-69,000
Targeted Transportation Alternatives	-950	-285,000	-1,600	-480,000	-1,580	-474,000
Car Sharing	-1,710	-513,000	-1,930	-579,000	-1,900	-570,000
Smart Driving	0	0	-680	-204,000	-670	-201,000
Vanpool Incentives	-60	-18,000	-170	-51,000	-170	-51,000
Employer Shuttles	-160	-48,000	-160	-48,000	-160	-48,000
Bike Infrastructure	-20	-6,000	-50	-15,000	-50	-15,000
Bike Share	-20	-6,000	-20	-6,000	-20	-6,000
Total	**-3,600**	**-1,080,000**	**-7,860**	**-2,358,000**	**-7,720**	**-2,316,000**

Note: Figures may not sum because of independent rounding. Estimates calculated using EMFAC2014, adjusted to EMFAC2007 equivalents based on ARB guidance.

[1] Emissions are annualized by multiplying by 300 to take account for the fact that there is less traffic on weekends. A ratio of 1.00:1.02 was applied to all EMFAC2014 generated CO_2 estimates for conversion to CO2E.

Source: MTC 2017

Table 2.5-7 shows the change in daily and per-capita car and light duty truck CO_2 emissions between 2005 and future years. Emissions are expected to decline over time with and without the Climate Initiatives Program. With the Climate Initiatives Program, the proposed Plan is expected to result in a 14.3 percent decline in per-capita emssions from 2005 to 2020, and a 15.5 percent decline in per capita CO_2 emissions from 2005 to

2035, exceeding the SB 375 targets of seven and 15 percent, respectively. As a result, the proposed Plan also meets AB 32 targets for per-capita car and light duty CO_2 emissions. (As described in Impact 2.5-3, the overall plan would fully attain AB 32 targets.) This decline is attributable to numerous factors, most importantly the integrated land use and transporation stratgies reflected in the proposed Plan in which the land use pattern focuses growth in higher-density locations near transit services. This compact approach to growth allows more efficient use of the existing transportation infrasturcture. The land use development pattern is described in greater detail in Section 1.2, "Project Description."

Table 2.5-7 SB 375 Target Analysis of Passenger Vehicle and Light Duty Truck CO_2 Emissions[1]

Year	Population	VMT	Modeled GHG Emissions (tons CO_2/day)	Climate Policy Initiatives Reduction relative to 2005 (tons CO_2/day)	Emissions per Capita (lb CO_2)[2]	Percent Reduction in Per Capita CO_2 Emissions Relative to 2005[2]	
						Proposed Plan with Climate Initiatives Program	SB 375 Target
2005	6,979,000	149,164,000	63,500	0	18.2	0	NA
2020	7,890,000	164,346,000	65,200	-3,600	15.6	-14.3	-7%
2035	9,076,000	185,930,000	77,700	-7,900	15.4	-15.5%	-15%
2040	9,561,000	191,529,000	80,200	-7,700	15.2	-16.7%	NA

Note: "—" = not applicable, lb = pound, CO_2 = carbon dioxide, NA = not available, SB = Senate Bill, VMT = vehicle miles travelled
[1] Estimates calculated using EMFAC2014, adjusted to EMFAC2007 equivalents based on ARB guidance.
[2] Figures may not sum because of independent rounding.
Source: MTC 2017

As noted, per the requirements of SB 375, this analysis does not include emissions reductions associated with Pavley, LCFS standards, and any other Scoping Plan provisions adopted since 2007, which are expected to further reduce CO_2 emissions and result in a decrease in total CO_2 emissions over time. Because the proposed Plan would reduce per capita passenger vehicle and light duty truck CO_2 emissions by over seven percent by 2020 and by over 15 percent by 2035 as compared to 2005 baseline, per SB 375, there would be a less-than-significant impact (LS).

Conclusion

Because implementation of the projected development projects under the proposed Plan woud reduce per capita passenger vehicle and light duty truck CO_2 emissions by over seven percent by 2020 and by over 15 percent by 2035 as compared to 2005 baseline, per SB 375, there would be **less-than-significant (LS)** impact. No mitigation measures are required.

Mitigation Measures

None required.

Impact 2.5-2: Implementation of the proposed Plan could result in a net increase in direct and indirect GHG emissions in 2040 when compared to existing conditions.

Impact of Changes in Projected Land Use and Transportation Projects

Construction Emissions

Construction-related GHG emissions from implementation of both projected land use development and transportation projects would contribute to GHG emissions, but would not likely result in a net increase in GHG emissions under the proposed Plan. Construction activity tends to be temporary in nature and would be expected to occur throughout the proposed Plan's implementation period through 2040 because of the various land use and transportation projects that could be constructed. The level of GHG emissions from construction activity would depend on the type and scale of projects being constructed under the Plan. Because of the project-specific nature of construction emissions, quantitative construction estimates are not included in this assessment.

However, generally, GHGs could be generated from a variety of activities and emission sources (e.g., exhaust emissions from off-road construction equipment, material delivery trips, and construction worker-commute trips). These emission types and associated levels fluctuate greatly depending on the particular type, number, and duration of usage for the varying equipment. The site preparation phase typically generates the most substantial emission levels because of the on-site equipment and ground-disturbing activities associated with grading, compacting, and excavation. Site preparation equipment and activities typically include backhoes, bulldozers, loaders, and excavation equipment (e.g., graders and scrapers). Although detailed construction information is not available at this time, the types of projects generally result in a couple hundred to a couple thousand metric tons of GHGs on a yearly basis, but as mentioned above these would not be expected to result in an increase because of the large magnitude in reduction for overall emissions.

Operational Emissions

As explained in Section 1.2, "Project Description," the proposed Plan provides a strategy for accommodating projected household and employment growth in the nine-county Bay Area by 2040 as well as a transportation investment strategy for the region. The projected development would increase indirect and direct GHG emissions from building electricity and natural gas use, water use, wastewater treatment, waste generation, and landscaping equipment. However, improved building energy efficiency standards and increased renewable energy sources for electricity would reduce future GHG emissions from new land use. An overview of GHG emissions related to land use projects is shown in **Table 2.5-8,** by land use type and source, and **Table 2.5-9**, by county.

Operational GHG emissions from projected development were determined based on existing and forecasted single family and multifamily occupied housing units and existing and forecasted jobs by sector. As shown in **Table 2.5-8**, GHG emissions from the net change in land uses would result in a net increase of 1.5 $MTCO_2e$ in the Plan area.

Table 2.5-8 New Change in Annual Land Use GHG Emissions by GHG Source

Land Use/GHG Source	Net Change in Activity 2015-2040	Activity Units	Net Change in $MTCO_2e$/year between 2015-2040
Single-Family Residential			
Electricity	1,238,800	MWh/year	138,500
Natural Gas[2]	4,489,200	MMBTU/year	241,300
Multi-Family Residential (Low/Mid-Rise)			
Electricity	1,508,200	MWh/year	129,800
Natural Gas[2]	4,074,400	MMBTU/year	218,800
Multi-Family Residential (High Rise)			
Electricity	640,000	MWh/year	64,300
Natural Gas[2]	1,562,200	MMBTU/year	83,900
		Residential Subtotal[1]	**876,500**
Office			
Electricity	1,835,000	MWh/year	115,700
Natural Gas[2]	1,992,900	MMBTU/year	107,000
Retail			
Electricity	-161,300	MWh/year	-36,400
Natural Gas[2]	-79,700	MMBTU/year	-2,300
Industrial			
Electricity	-287,000	MWh/year	-55,800
Natural Gas[2]	-328,800	MMBTU/year	-18,000
		Non-Residential Subtotal[1]	**219,500**

Table 2.5-8 New Change in Annual Land Use GHG Emissions by GHG Source

Land Use/GHG Source	Net Change in Activity 2015-2040	Activity Units	Net Change in $MTCO_2e$/year between 2015-2040
All Land Uses in Plan Area			
Electricity	4,773,600	MWh/year	356,200
Natural Gas[2]	11,710,000	MMBTU/year	630,600
Water and Wastewater[3]	95,700	MG/year	130,200
Waste	475,100	tons	290,200
Hearths[4]	NA[5]	NA[5]	48,300
Landscaping	NA[5]	NA[5]	7,900
		Regional Total[1]	**1,464,400**

Note: Activity and emissions estimates modeled using CalEEMod v. 2016.3.1. NA = not available, MWh = megawatt hour, MMBtu = one million British thermal units, MG = million gallons, $MTCO_2e$ = metric tons of carbon dioxide equivalent.

[1] Figures may not sum because of independent rounding.
[2] Does not include natural gas from hearths (e.g., fireplaces).
[3] Includes indoor and outdoor water use.
[4] Emissions from hearths are based on natural gas hearths only.
[5] CalEEMod Version 2016.3.1 does not output hearths and landscaping activity.

Source: MTC 2017, Data compiled by Ascent Environmental 2017

Table 2.5-9 Net Change in Annual Land Use GHG Emissions by County[1]

County	County/GHG Source	Net Change in Activity 2015-2040	Activity Units	Net Change in $MTCO_2e$/year between 2015-2040
Alameda	Electricity	904,700	MWh/year	118,000
	Natural Gas[2]	2,984,100	MMBTU/year	162,100
	Other[3]	-	-	104,800
			Alameda Total	384,800
Contra Costa	Electricity	678,000	MWh/year	90,900
	Natural Gas[2]	1,647,000	MMBTU/year	88,400
	Other[3]	-	-	74,600
			Contra Costa Total	254,000
Marin	Electricity	17,300	MWh/year	630
	Natural Gas[2]	87,900	MMBTU/year	4,700
	Other[3]	-	-	2,200
			Marin Total	7,600
Napa	Electricity	70,600	MWh/year	3,600
	Natural Gas[2]	126,600	MMBTU/year	6,800
	Other[3]	-	-	5,600
			Napa Total	16,000
San Francisco	Electricity	564,600	MWh/year	73,500
	Natural Gas[2]	1,492,300	MMBTU/year	80,100
	Other[3]	-	-	63,100
			San Francisco Total	216,700
San Mateo	Electricity	559,800	MWh/year	32,500
	Natural Gas[2]	1,382,400	MMBTU/year	74,200
	Other[3]	-	-	51,700
			San Mateo Total	158,400

Table 2.5-9 Net Change in Annual Land Use GHG Emissions by County[1]

County	County/GHG Source	Net Change in Activity 2015-2040	Activity Units	Net Change in $MTCO_2e$/year between 2015-2040
Santa Clara	Electricity	1,693,300	MWh/year	1,100
	Natural Gas[2]	3,055,200	MMBTU/year	164,000
	Other[3]	-	-	138,100
			Santa Clara Total	303,200
Solano	Electricity	161,600	MWh/year	21,400
	Natural Gas[2]	504,600	MMBTU/year	27,100
	Other[3]	-	-	20,200
			Solano Total	68,700
Sonoma	Electricity	123,900	MWh/year	14,600
	Natural Gas[2]	430,000	MMBTU/year	23,100
	Other[3]	-	-	17,500
			Sonoma Total	55,200
Regional Total				**1,464,400**

Note: Activity and emissions estimates modeled using CalEEMod v. 2016.3.1. "–" = not applicable, GHG = greenhouse gas, MWh = megawatt hour, MMBtu = one million British thermal units, $MTCO_2e$ = metric tons of carbon dioxide equivalent

[1] Figures may not sum because of independent rounding.
[2] Does not include natural gas from hearths (e.g., fireplaces).
[3] Includes emissions from hearths, water use, wastewater treatment, solid waste generation, and landscaping equipment.

Source: Data compiled by Ascent Environmental 2017

The proposed Plan would result in the operation of new transportation projects, as well as the Climate Initiatives Program, aimed at reducing GHG emissions from mobile sources. Overall, as a result of the growing number of residents and jobs in the region, total on-road transportation GHG emissions would be expected to increase over time if no standards were put in place. However, this analysis incorporates implementation of Pavley regulations over the life of the proposed Plan. As shown in Table 2.5-10, when these standards are considered, overall on-road vehicle GHG emissions decline by 36 percent for passenger vehicles. Because Pavley standards only affect passenger vehicles, regardless of the standard, emissions would decline by 21 percent for buses and by seven percent for "Other Vehicles." Emissions from trucks, accounting for 20 percent of total GHG emissions in 2015, are anticipated to increase by 20 percent between 2015 and 2040. Despite this increase, the annual GHG emissions from all mobile sources with reductions from MTC's Climate Initiatives Program are expected to decrease by over 8 $MMTCO_2e$ from 2015 to 2040 under the proposed Plan, a 35 percent decline. Pavley regulations also contribute a reduction of 9 $MMTCO_2e$ relative to a 2015 baseline without Pavley regulations. As discussed above, CARB removed LCFS from the 2014 EMFAC model.

Table 2.5-10 Existing and Forecasted Annual Transportation GHG Emissions by Vehicle Source ($MTCO_2e$)[1]

Emissions Source	2015 Baseline	2040 Proposed Plan	Change from Existing[1]	Percent Change from Existing[2]
Without Pavley Regulations				
Passenger Vehicles	19,358,000	23,418,000	4,060,000	21%
Trucks	4,484,000	5,361,000	877,000	20%
Buses	599,000	475,000	-124,000	-21%
Other Vehicles	122,000	113,000	-9,000	-7%
MTC Climate Initiatives Program	0	-2,350,000	-2,350,000	–
Total (without Pavley regulations)	**24,563,000**	**27,01,000**	**2,454,000**	**10%**

Table 2.5-10 Existing and Forecasted Annual Transportation GHG Emissions by Vehicle Source ($MTCO_2e$)[1]

Emissions Source	2015 Baseline	2040 Proposed Plan	Change from Existing[1]	Percent Change from Existing[2]
With Pavley Regulations				
Passenger Vehicles	18,222,000	11,715,000	-6,507,000	-36%
Trucks	4,484,000	5,361,000	877,000	20%
Buses	599,000	475,000	-124,000	-21%
Other Vehicles	122,000	113,000	-9,000	-7%
MTC Climate Initiatives Program	0	-2,350,000	-2,350,000	–
Total (with Pavley regulations)[1]	**23,427,000**	**15,314,000**	**-8,113,000**	**-35%**
Emission Reductions because of Pavley regulations	**1,136,000**	**11,703,000**	**10,567,000**	–

Notes: $MTCO_2e$ = metric tons of carbon dioxide equivalent, MTC = Metropolitan Transportation Commission, "—" = not applicable

[1] Estimates calculated using EMFAC2014. MTC applied a ratio of 1.00:1.02 to all EMFAC2014 generated CO_2 estimates for conversion to CO_2e. Emissions were annualized by multiplying by 300 to take account for the fact that there is less traffic on weekends.

[2] Figures may not sum because of independent rounding.

Source: MTC 2017

A breakdown of mobile emissions by county was not conducted because of the global nature of GHG emissions (and because transportation emissions may originate in separate counties while passing through other counties). Thus, emissions are only reported on a regional basis, with respect to mobile sources.

Changes in land use and transportation activity under the proposed Plan would result in a net reduction of 6.6 $MMTCO_2e$, or 13 percent, from 2015 to 2040, as shown in **Table 2.5-11**. Therefore, there would be a less than significant (LS) impact.

Table 2.5-11 Annual GHG Emissions from Projected Land Use and Transportation Sources ($MTCO_2e$/year)[1]

Sources	2015	2040	Net Change in $MTCO_2e$/year between 2015-2040	Percent Change in $MTCO_2e$/year between 2015-2040
Land Use	28,140,0002	29,604,4003	1,464,400	5%
Transportation	23,427,0004	15,314,0004	-8,113,000	-35%
Regional Emissions Total	**51,567,000**	**44,918,400**	**-6,648,600**	**-13%**

Note: $MTCO_2e$ = metric tons of carbon dioxide equivalent

[1] Figures may not sum because of independent rounding.

[2] Based on emissions from electricity consumption, building energy usage (e.g., natural gas, propane), and waste management emissions from BAAQMD's 2015 Bay Area GHG Inventory (BAAQMD 2017:Table3-2).

[3] Calculated by adding net change to 2015 values. Calculations assume residential and non-residential land uses built between 2015 and 2040 would be built to 2016 building energy efficiency standards.

[4] Calculated by MTC using EMFAC2014.

Source: BAAQMD 2017, MTC 2017, Data compiled by Ascent Environmental 2017

Conclusion

Because implementation of the proposed Plan would result in a net reduction in GHG emissions in 2040 when compared to existing conditions, this impact is **less than significant (LS)** and no mitigation measures are required.

Mitigation Measures

None required.

Impact 2.5-3: Implementation of the proposed Plan could substantially conflict with the goal of SB 32 to reduce statewide GHG emissions to 40 percent below 1990 levels by 2030.

Impact of Changes in Projected Land Use and Transportation Projects

The proposed Plan would provide a strategy for accommodating projected household and employment growth in the Plan area by 2040 as well as a transportation investment strategy for the region. As discussed under Impact 2.5-2, anticipated reductions in mobile source GHG emissions would be greater than new GHG emissions from projected development resulting in a net reduction in GHG emissions. As shown in Table 2.5-11, the land use and transportation emissions under the Plan would be reduced by 13 percent from 2015 to 2040. Although this reduction would meet AB 32 targets, it would not meet 2030 targets under SB 32, which would require a reduction of 41 percent in GHG emissions between 2015 and 2030, which is equivalent to the formal target of achieving 40 percent below 1990 levels by 2030. This equivalency is explained further below.

To estimate whether the anticipated net GHG reductions under the proposed Plan would achieve the 2030 target under SB 32, the estimated reductions under Impact 2.5-2 are compared to the 2015 transportation emissions developed by MTC and the estimated 2015 land use emissions from the 2015 Bay Area GHG inventory, developed by BAAQMD in 2017 and shown in Table 2.5-1 and 2.5-2 (BAAQMD 2017). The 2015 inventory is the most recent available inventory for the region.

To estimate a GHG reduction target relative to 2015 that is consistent with SB 32 goals, a comparison was made between the State's 1990 and 2014 GHG inventories (2014 is the latest inventory and is used as a surrogate for 2015 values). According to ARB's estimate of California's GHG inventory, the State emitted approximately 431 million $MTCO_2e$ ($MMTCO_2e$) in 1990 and 442 $MMTCO_2e$ in 2014, a two percent increase (ARB 2016). Based on the available data and assumptions described, above, under Method of Analysis, a reduction of 40 percent below 1990 levels would be approximately equivalent to a reduction of 41 percent below 2015 levels; and, two percent below 2015 levels would be equivalent to 1990 conditions. In 2015, land use and transportation accounted for 52 $MMCO_2e$ in the Bay Area (BAAQMD 2017, MTC 2017). Consequently, the proposed Plan would need to achieve 21 $MMTCO_2e$ in reductions from land use and transportation between 2015 and 2030 (52 $MMCO_2e$ x 41 percent = 21 $MMCO_2e$) to be consistent with SB 32 and subsequently, would place the proposed Plan along the trajectory needed to meet the 2050 target identified under S-03-05. As shown in Table 2.5-11, the proposed Plan would only achieve a reduction of 7 $MMTCO_2e$ from 2015 land use and on-road transportation emissions. Table 2.5-12 below presents these calculations.

Table 2.5-12 Calculation of GHG Reductions and Targets from Land use and Transportation relative to 1990 and 2015 levels

Year	Bay Area Transportation and Land Use Emissions with Targets ($MTCO_2e$/year)	Percent over 1990 Levels	Reductions needed from 1990 ($MTCO_2e$/year)	Reductions needed from 2015 ($MTCO_2e$/year)	Reductions from Proposed Plan ($MTCO_2e$/year)	Additional Reductions Needed from 2015
1990	50,555,900[1]	0%	NA	NA	NA	NA
2015	51,567,000[2]	2%	NA	NA	NA	NA
2030	30,333,500	-40%[3]	20,222,400	21,233,500	NA	NA
2040	20,222,400	-60%[4]	30,333,500	31,344,600	6,648,600	24,696,000
2050	10,111,200	-80%[5]	40,444,700	41,455,800	6,648,600	34,807,200

[1] Calculated assuming a 2% increase between 1990 and 2015, based on statewide trends
[2] Based on land use emissions from BAAQMD's 2017 Clean Air Plan and transportation estimates from MTC.
[3] Reflects the SB32 Target
[4] Interpolated target between 2030 and 2050.
[5] Reflects B-30-15 Target.
Source: Compiled by Ascent Environmental in 2017 with data from BAAQMD 2017 and MTC 2017

In further consideration of long term goals, to remain on a trajectory toward the IPCC goals of GHG emissions of 80 percent below 1990 levels by 2050, the proposed Plan would need to achieve a target of reduction in

2040 of 60 percent below 1990 GHG levels (2030 = 40 percent below, 2040 = 60 percent below, 2050 = 80 percent below 1990 GHG levels). This would require a reduction, based on full attainment of growth projections, to 32 $MMCO_2e$ in 2040 (52 $MMCO_2e$ x 62 percent = 32 $MMCO_2e$).

MTC /ABAG, in developing the land use and transportation strategy for the Bay Area, has demonstrated that its proposed Plan has been designed to reduce potential GHG emissions as required under SB 375 (see Impact 2.5-1). In effect, MTC/ABAG has taken responsibility for the land use component of feasible GHG reduction. As explained in Section 2.5.1, the ability to meet the 2030 target (and, subsequently, the 2040 target) is tied, in large part, to statewide actions mandated by new legislation or regulations that are anticipated to emerge from the 2017 Scoping Plan Update (to be finalized in late June). This was the same issue that faced achievement of AB 32's far less aggressive 2020 targets (1990 GHG emissions level by 2020), and these goals are expected to be achieved, in large part, because of State legislation and regulation. For instance, the state-mandated Renewable Portfolio Standard (RPS) requires that all utilities provide 50 percent of their electricity via renewable (non GHG-producing) sources by 2030, which reduces GHG emissions in all areas of the state. The existing Cap-and- Trade program, which is set to expire in 2020, allows large GHG emitters (such as oil refineries and power plants) to achieve major emissions reductions through regulatory actions that set a cap over GHG emissions allowances, and provide for regulated purchase of offsets (funding solar farms, high speed rail, other actions) that reduce GHG emissions. This program will require State legislative action that, if passed, would substantially reduce GHG emissions past 2020 in all economic sectors, and help (along with other programs) achieve 2030 goals and beyond. Because these regulations are under development, they cannot be relied upon as part of this analysis to demonstrate compliance with the 2030 targets in the Bay Area. Importantly, this is not unique to the Bay Area; all MPO's in California are faced with the same challenge. Thus, without sufficient State legislation and regulation, attainment of 2030 goals is extremely difficult. In addition, as discussed above, ARB recommends GHG reduction plans be developed by local jurisdictions (e.g., cities and counties) to reduce land use-related emissions. This would be a potentially significant (PS) impact.

Conclusion

MTC/ABAG has developed a land use and transportation strategy that meets SB 375 goals and places the Bay Area on a downward trajectory in GHG emissions, which sets it on a path toward meeting longer-term GHG reduction goals. There are no additional land use strategies available to feasibly bridge the gap between the proposed Plan GHG emissions and 2030 (and beyond) targets. This is not unique to MTC/ABAG; all MPOs in California are faced with this same challenge. In the absence of State and local jurisdictional action (e.g., new State regulations, city and county GHG reduction plans targeted to 2030 and beyond) it is not possible to demonstrate compliance with the SB 32 GHG reduction targets. The development of GHG reduction plans is advocated in the State's draft 2017 Scoping Plan as a means to attain 2030 GHG targets. Thus, while the proposed Plan would not impede the possibility of attaining the longer-term (2030 and 2050) targets, even more aggressive GHG reduction actions, such as local implementation of GHG reduction plans, would be needed to conform to these longer-term targets. Therefore, the proposed Plan may conflict with an applicable plan, policy, or regulation adopted to reduce emissions of GHGs. This impact is considered **potentially significant (PS)**. Mitigation Measure 2.5-3 would reduce emissions from forecasted land use-related growth.

Mitigation Measures

2.5-3 Consistent with the recommendations in the Draft 2017 Scoping Plan, implementing agencies and/or project sponsors shall implement measures, where feasible and necessary based on project- and site-specific considerations that include, but are not limited to:

- MTC and ABAG, in partnership with the BAAQMD, shall work with the counties and cities in the Bay Area to adopt qualified GHG reduction plans (e.g., CAPs). The CAPs can be regional or adopted by individual jurisdictions, so long as they meet the standards of a GHG reduction program as described in CEQA Guidelines Section 15183.5. At the regional level, the cumulative emissions reduction of individual CAPs within the region or a regional CAP should demonstrate an additional Bay Area-wide reduction of 24 $MMTCO_2e$ from land uses and on-road transportation compared with projected 2040 emissions levels already expected to be achieved by the Plan. (This is based on the 2015 Bay Area land use and on-road transportation emissions of 52 $MMTCO_2e$, an interpolated statewide GHG reduction target of 60 percent

below 1990 levels by 2040, and a two percent increase in statewide emissions between 1990 and 2015). The CAP(s) should also show a commitment to achieving a downward trajectory in emissions post-2040 to meet statewide goals of reducing GHG emissions by 80 percent below 1990 levels by 2050, per S-03-05.

These reductions can be achieved through a combination of programs, including ZNE in new construction, retrofits of existing buildings, incentivizing and development of renewable energy sources that serve both new and existing land uses, and other measures so long as the overall 32 $MMTCO_2e$ reduction (by 2040) can be demonstrated. This target can be adjusted if statewide legislation or regulations would reduce GHG emissions, so long as a trajectory to achieve this target in the Bay Area is maintained.

Implementation of CAPs in the region would help to reduce both GHG and area source emissions from the land use projects that would be constructed under the Plan, as well as reducing GHG emissions from existing uses. However, this may require installation of renewable energy facilities on houses and businesses, construction of community-serving facilities such as small-scale solar farms, or other actions. These additional facilities, if needed, could require in additional land conversion, resulting in similar environmental impacts associated with land use development described throughout this EIR.

Significance after Mitigation

Mitigation, via CAPs for individual jurisdictions, or other programs, including retrofitting existing buildings, installing renewable energy facilities that replace reliance on fossil-fuel power in the region, alterations in the vehicle fleet (toward more non-fossil fuel-powered vehicles) and other measures would be required to meet the goals needed to attain the 2030 targets. Thus, compliance with the CAP measure, throughout the Bay Area, is needed to assure mitigation to a less than significant level (LS-M).

However, there is no assurance that this level of mitigation would be accomplished throughout the Bay Area. Additional regulatory action that results in substantial GHG reductions throughout all sectors of the State economy and based on State-adopted regulations would likely be needed to attain such goals, and they are beyond the feasible reach of MTC/ABAG and local jurisdictions. The 2017 Scoping Plan Update being prepared by ARB is the first step toward regulatory action that could help attain 2030 goals.

Moreover, MTC/ABAG cannot require local implementing agencies to adopt the above mitigation measure, and it is ultimately the responsibility of a lead agency to determine and adopt mitigation. Even with full implementation of the mitigation measure, forecasted emissions would not be reduced to target levels under SB 32. Therefore, this impact would be **significant and unavoidable (SU)**.

Impact 2.5-4: Implementation of the proposed Plan could substantially conflict with local plans or policies adopted to reduce emissions of GHGs.

Impact of Changes in Projected Land Use and Transportation Projects

Projected development facilitated by the proposed Plan is not expected to conflict with any climate action plans and General Plans of cities and counties located in the jurisdiction of MTC/ABAG, or any local regulations adopted with the intent to reduce GHG emissions. The Regulatory Setting, above, describes the plans, policies, and regulations relevant to the proposed Plan that are related to the reduction of GHG emissions.

Local CAPs or GHG reduction plans are adopted in an effort to comply with the goals set for local governments in ARB's Scoping Plan and are therefore designed to support the same State-mandated goals and targets for GHG reduction outlined above. It is ultimately local jurisdictions that have authority to determine if land use development projects are consistent with local plans. MTC and ABAG do not have jurisdiction in approval of development within the region.

The proposed Plan does not address all of the potential reduction measures, goals, and GHG targets that are identified in local CAPs, general plans, and other plans that address climate change; each locality will set targets based on state, regional, or local conditions. Further, not all plans will have the same reduction goals and implementation measures because they account for various local factors and considerations (see Table

2.5-4 in the Regulatory Setting for a list of local jurisdictions with GHG inventories and adopted CAPs). The proposed Plan identifies a compact land use pattern that is paired with targeted transportation investments to identify an efficient system that results in reductions to per capita and overall GHG emissions. However, some variations may exist on the local level. For instance, the proposed Plan's focused growth pattern may not support an individual jurisdiction's efforts to meet its GHG target by constraining growth. While some variations may exist between the proposed Plan and specific local CAPs, these variations would need to be assessed at the local level. On a whole, it is expected that local CAPs and the proposed Plan would be complimentary efforts towards the reduction of GHG emissions in line with State goals and mandates.

Therefore, the proposed Plan is not expected to substantially conflict with local climate action or GHG reduction plans, and the impact is considered to be **less than significant (LS)**. No mitigation is required.

Mitigation Measures

None required.

Impact 2.5-5: Implementation of the proposed Plan could result in a net increase in transportation projects within areas projected to be regularly inundated by sea level rise by midcentury.

Impacts of Changes in Projected Land Use

Implementation of the proposed Plan would provide a strategy for accommodating projected household and employment growth in the Plan area by 2040. The resultant placement of land uses within areas regularly projected to be inundated by sea level rise is addressed in Impact 2.5-5. As described below, this would be a potentially significant (PS) impact.

Impacts of Transportation Projects

Approximately 510 acres associated with 50 transportation projects under the proposed Plan are located, partially or wholly, within areas projected to be regularly inundated (i.e., inundated multiple times each year) by sea level rise by midcentury, as shown in **Table 2.5-13**. The full list of transportation projects that are located within or partially within areas projected to be regularly inundated (i.e., inundated multiple times each year) by sea level rise by midcentury is provided in Appendix E. Any increase in transportation projects within the sea level rise inundation zone is considered a significant impact.

Table 2.5-13 Proposed Transportation Projects within Midcentury Sea Level Rise Inundation Zone

County	Inundated Acres
Alameda	50
Contra Costa	1
Marin	30
Napa	1
San Francisco	100
San Mateo	160
Santa Clara	160
Solano	2
Sonoma	<1
Regional Total	**510**

Notes: Number less than 1 are shown as "<1." Whole numbers have been rounded (between 0 and 10 to the nearest whole number, between 11 and 999 to the nearest 10, between 1,000 and 1,000,000 to the nearest 100, over 1,000,000 to the nearest 1,000). Figures may not sum because of independent rounding.
Inundation calculations are based on based on MTC GIS files identifying transportation project locations. The projects were mapped to the best of MTC's ability based on the information submitted by the project sponsor. The exact project locations may change as the projects are further developed.
Source: MTC 2017, NOAA 2012, data compiled by Ascent Environmental 2017

Conclusion

Because the proposed Plan would result in portions of some transportation projects being constructed in areas projected to be inundated by sea level rise, this impact is considered **potentially significant (PS)**. Mitigation measures 2.5-4(a) through 2.5-4(c) are outlined below.

Mitigation Measures

Implementing agencies and/or project sponsors shall implement measures, where feasible and necessary based on project- and site-specific considerations that include, but are not limited to:

2.5-4(a) MTC and ABAG shall continue coordinating with BCDC, in partnership with the Joint Policy Committee and regional agencies and other partners, to conduct vulnerability and risk assessments for the region's transportation infrastructure. These assessments will build upon MTC and BCDC's Adapting to Rising Tides studies focused in several Bay Area counties. Evaluation of regional and project-level vulnerability and risk assessments will assist in the identification of the appropriate adaptation strategies to protect transportation infrastructure and resources, as well as land use development projects, that are likely to be impacted. The *Adaptation Strategies* (see Appendix F of this Draft EIR) includes a list of potential adaptation strategies that can mitigate the impacts of sea level rise. In most cases, more than one adaptation strategy will be required to protect a given transportation projector land use development project, and the implementation of the adaptation strategy will require coordination with other agencies and stakeholders. As MTC and ABAG conduct vulnerability and risk assessments for the region's transportation infrastructure, the *Adaptation Strategies* should serve as a guide for selecting adaptation strategies, and should be expanded as additional strategies are identified.

2.5-4(b) Implementing agencies and/or project sponsors shall implement measures, where feasible and necessary based on project- and site-specific considerations that include, but are not limited to, coordination with BCDC, Caltrans, local jurisdictions (cities and counties), and other transportation agencies to develop Transportation Asset Management Plans that consider the potential impacts of sea level rise over the life cycle of threatened assets.

2.5-4(c) Implementing agencies shall require project sponsors to incorporate the appropriate adaptation strategy or strategies to reduce the impacts of sea level rise on specific local transportation and land use development projects, where feasible, based on project- and site-specific considerations. Potential adaptation strategies are included in the *Adaptation Strategies* (see Appendix F of this Draft EIR).

Significance after Mitigation

Any increase in transportation projects within the area projected to be inundated by sea level rise is considered significant. Selection and implementation of appropriate mitigation measures and adaptation strategies may reduce the impact associated with sea level rise to less than significant on a project-by-project basis. The appropriate adaptation strategies would be selected as part of the future project-level analysis and planning. At this time, sufficient detail is not available to identify which adaptation strategy or strategies would be the most effective for each individual transportation project. In addition, successful implementation of the mitigation measures and adaptation strategies requires participation by other agencies and stakeholders.

This EIR includes a range of adaptation strategies to guide local jurisdictions, regional agencies, and transportation agencies in identifying strategies that are appropriate for transportation and development projects that may experience regular future inundation by sea level rise.

To the extent that an individual project adopts and implements all feasible mitigation measures described above, the impact would be less than significant with mitigation (LS-M).

Projects taking advantage of CEQA Streamlining provisions of SB 375 (Public Resources sections 21155.1, 21155.2, and 21159.28) must apply the mitigation measures described above, to address site-specific conditions. However, MTC/ABAG cannot require local implementing agencies to adopt the above mitigation

measures, and it is ultimately the responsibility of a lead agency to determine and adopt mitigation. Therefore, this impact remains **significant and unavoidable (SU)**.

Impact 2.5-6: Implementation of the proposed Plan could result in an increase in land use development within areas regularly inundated by sea level rise by midcentury.

Impact of Changes in Projected Land Use

Implementation of the proposed Plan would result in projected development across the region, some of which could occur within areas regularly inundated by sea level rise. **Table 2.5-14** shows the percent of the land use growth footprint that would be regularly inundated by sea level rise by midcentury.

Table 2.5-14 Land Use Growth Footprint within the Projected Midcentury Sea Level Rise Inundation Zone by Region, County, and TPAs

County	Sub-Area	Inundated Area (acres)	Total (acres)	Percent Inundated
Alameda	County Total	70	7,400	<1%
	Within TPAs	30	3,900	<1%
Contra Costa	County Total	40	8,100	<1%
	Within TPAs	<1	1,200	<1%
Marin	County Total	40	420	10%
	Within TPAs	3	100	3%
Napa	County Total	<1	920	<1%
	Within TPAs	<1	<1	<1%
San Francisco	County Total	50	2,900	2%
	Within TPAs	50	2,800	2%
San Mateo	County Total	280	2,800	10%
	Within TPAs	40	1,400	3%
Santa Clara	County Total	210	9,500	2%
	Within TPAs	80	5,000	2%
Solano	County Total	10	3,200	<1%
	Within TPAs	<1	30	2%
Sonoma	County Total	<1	2,300	<1%
	Within TPAs	<1	270	<1%
Regional Total	**Plan Area**	**700**	**37,500**	**2%**
	Within TPAs	**210**	**14,800**	**1%**

Notes: Number less than 1 are shown as "<1." Whole numbers have been rounded (between 0 and 10 to the nearest whole number, between 11 and 999 to the nearest 10, between 1,000 and 1,000,000 to the nearest 100, over 1,000,000 to the nearest 1,000). Figures may not sum because of independent rounding.

TPA = transit priority AREA

Source: MTC 2016, BCDC 2015, NOAA 2012, data compiled by Ascent Environmental 2017

Impact of Transportation Projects

Implementation of the proposed Plan would result in the development of transportation projects, which are addressed in Impact 2.5-4. As described above, this would be a potentially significant (PS) impact.

Conclusion

As shown in **Table 2.5-14,** the proposed Plan would result in an increase of nearly 700 acres of projected land uses to be located in areas that would be regularly inundated by sea level rise by midcentury. This impact is considered **potentially significant (PS)**. Mitigation measures 2.5-4(a) and 2.5-4(b) are outlined for Impact 2.5-5.

Mitigation Measures

Implement Mitigation Measures 2.5-4(a) and 2.5-4(b) under Impact 2.5-4.

Significance after Mitigation

Any increase in projected land use development within areas projected to be regularly inundated by sea level rise is considered a significant impact. Selection and implementation of the appropriate mitigation measures and adaptation strategies could reduce the impact associated with sea level rise to a less-than-significant level. However, the appropriate adaptation strategies would be selected as part of future project-level analysis and planning. At this time, sufficient detail is not available to identify which adaptation strategy or strategies would be the most effective at protecting the projected land use development within the sea level rise inundation zone. In most cases, regional strategies that protect large developed areas would be the most effective at protecting the affected development, but successful implementation of regional adaptation strategies requires participation by other agencies and stakeholders.

This EIR includes a range of adaptation strategies to guide local jurisdictions, regional agencies, and transportation agencies in identifying strategies that are appropriate for transportation and projected development that may experience regular future inundation by sea level rise.

To the extent that an individual project adopts and implements all feasible mitigation measures described above, the impact would be less than significant with mitigation (LS-M).

Projects taking advantage of CEQA Streamlining provisions of SB 375 (Public Resources Code sections 21155.1, 21155.2, and 21159.28) must apply the mitigation measures described above, to address site-specific conditions. However, MTC/ABAG cannot require local implementing agencies to adopt the above mitigation measures, and it is ultimately the responsibility of a lead agency to determine and adopt mitigation. Further, there may be instances in which site-specific or project-specific conditions preclude the reduction of all project impacts to less-than-significant levels. For purposes of a conservative analysis, therefore, this impact remains **significant and unavoidable (SU)** for this program-level review.

2.6 NOISE

This section assesses the potential noise/vibration impacts associated with implementation of the proposed Plan. The following includes acoustical terminology and background information relevant to the proposed Plan, a presentation of applicable regulatory standards, assessment of acoustical impacts related to implementation of the proposed Plan, and identification of potentially feasible noise mitigation measures where appropriate.

Comments received in response to the Notice of Preparation addressed mobile-source noise and ground vibration effects to cyclists and pedestrians, as well as within the Santa Clara County Parks system, and regional trail routes. The localized effects of construction-related vibration are addressed under Impact 2.6-1 in this section.

2.6.1 Environmental Setting

PHYSICAL SETTING

Acoustical Terminology

Sound can be described as the mechanical energy of a vibrating object transmitted by pressure waves through a liquid or gaseous medium (e.g., air). Noise is generally defined as unwanted sound (i.e., loud, unexpected, or annoying sound). Acoustics is defined as the physics of sound. In acoustics, the fundamental scientific model consists of a sound (or noise) source, a receiver, and the propagation path between the two. The loudness of the noise source and obstructions or atmospheric factors affecting the propagation path to the receiver determines the sound level and characteristics of the noise perceived by the receiver. Acoustics addresses primarily the propagation and control of sound.

Frequency

The number of sound pressure peaks travelling past a given point in a single second is referred to as the frequency, expressed in cycles per second or hertz (Hz). A given sound may consist of energy at a single frequency (pure tone) or in many frequencies over a broad frequency range (or band). Human hearing is generally affected by sound frequencies between 20 Hz and 20,000 Hz (20 kHz).

Amplitude

The amplitude of pressure waves generated by a sound source determines the perceived loudness of that source. Sound pressure amplitude is measured in micro-Pascals (µPa). One µPa is approximately one hundred billionths (0.00000000001) of normal atmospheric pressure. Sound pressure amplitudes for different kinds of noise environments can range from fewer than 100 µPa to 100,000,000 µPa. Because of this huge range of values, sound is rarely expressed in terms of pressure. Instead, a logarithmic scale is used to describe sound pressure level (SPL) in terms of decibels (dB). The threshold of human hearing (near total silence) is approximately 0 dB which corresponds to 20 µPa.

Addition of Decibels

Because decibels are logarithmic units, addition and subtraction of SPL is not linear. Under the decibel scale, a doubling of sound energy corresponds to a 3 dB increase. In other words, when two sources are each producing sound of the same loudness, the resulting sound level at a given distance would be approximately 3 dB higher than one of the sources under the same conditions. For example, if one automobile produces an SPL of 70 dB when it passes an observer, two cars passing simultaneously would not produce 140 dB—rather, they would combine to produce 73 dB. Under the decibel scale, three sources of equal loudness together produce a sound level of approximately 5 dB louder than one source, and 10 sources of equal loudness together produce a sound level of approximately 10 dB louder than the single source.

A-Weighted Decibels

Figure 2.6-1 illustrates sound levels associated with common sound sources. The perceived loudness of sounds is dependent on many factors, including sound pressure level and frequency content. However, within the usual range of environmental sound levels, perception of loudness is relatively predictable, and can be approximated by frequency filtering using the standardized A-weighting network. There is a strong correlation between A-weighted sound levels (expressed as dBA) and community response to noise. For this reason, the A-weighted sound level has become the standard descriptor for environmental noise assessment. All noise levels reported in this section are in terms of A-weighting.

Human Response to Changes in Noise Levels

As discussed above, doubling sound energy results in a 3 dB increase in sound; however, given that a sound level change measured with precise instrumentation, the subjective human perception of a doubling of loudness will usually be different than what is measured.

Under controlled conditions in a laboratory setting, the trained, healthy human ear is able to discern 1 dB changes in sound levels when exposed to steady, single-frequency ("pure-tone") signals in the mid- frequency range (1,000 Hz–8,000 Hz). In typical noisy environments, changes in noise of 1 to 2 dB are generally not perceptible; however, it is widely accepted that people are able to begin to detect sound level increases of 3 dB in typical noisy environments. Further, a 5 dB increase is generally perceived as a distinctly noticeable increase, and a 10 dB increase is generally perceived as a doubling of loudness; therefore, a doubling of sound energy that would result in a 3 dB increase in sound pressure level would generally be perceived as barely detectable. Please refer to Table 2.6-1.

Table 2.6-1 Approximate Relationship between Increases in Environmental Noise Level and Human Perception

Noise Level Increase, dB	Human Perception (Typical)
Up to about 3	Not perceptible
About 3	Barely perceptible
About 6	Distinctly noticeable
About 10	Twice as loud
About 20	Four times as loud

Source: Egan 2007

Noise Sensitive Land Uses

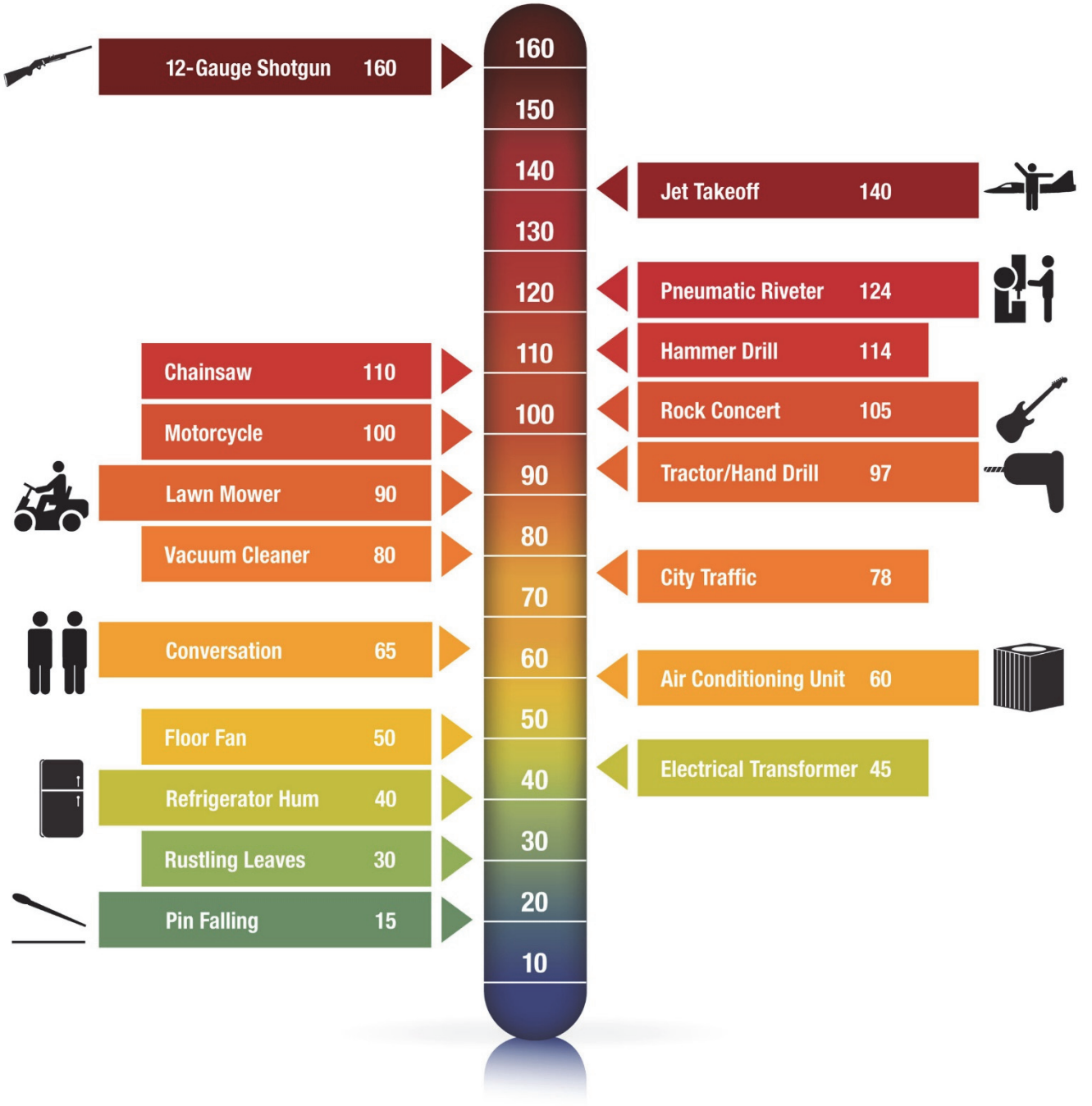
Noise-sensitive land uses are generally defined as locations where people reside or where the presence of unwanted sound could adversely affect the use of the land. Noise-sensitive land uses typically include residences, hospitals, schools, transient lodging, libraries, and certain types of recreational uses. Noise-sensitive, residential receivers are found throughout the study area.

Noise Descriptors

Noise in daily environments fluctuates over time. Various noise descriptors have been developed to describe time-varying noise levels. The following are the noise descriptors most commonly used in environmental noise analysis:

- **Equivalent Sound Level (L_{eq}):** The L_{eq} represents an average of the sound energy occurring over a specified time period. In effect, the L_{eq} 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 ($L_{eq}[h]$) is the energy average of A-weighted sound levels occurring during a 1-hour period, and is the basis for noise abatement criteria (NAC) used by the California Department of Transportation (Caltrans) and the Federal Highway Administration (FHWA).

Figure 2.6-1
Decibel Scale and Common Noise Sources



Source: National Institute of Occupational Safety and Health, 2016 and 3M no date.

- **Percentile-Exceeded Sound Level (L_n):** The L_n represents the sound level exceeded "n" percentage of a specified period (e.g., L_{10} is the sound level exceeded 10 percent of the time, and L_{90} is the sound level exceeded 90 percent of the time).

- **Maximum Sound Level (L_{max}):** The L_{max} is the highest instantaneous sound level measured during a specified period.

- **Day-Night Average Level (L_{dn}):** The L_{dn} is the energy-average of A-weighted sound levels occurring over a 24-hour period, with a 10 dB penalty applied to A-weighted sound levels occurring during nighttime hours (10 p.m.-7 a.m.). The L_{dn} is often noted as the DNL.

- **Community Noise Equivalent Level (CNEL):** Similar to L_{dn}, CNEL is the energy-average of the A-weighted sound levels occurring over a 24-hour period, with a 10 dB penalty applied to A- weighted sound levels occurring during the nighttime hours (10 p.m.-7 a.m.), and a 5 dB penalty applied to the A-weighted sound levels occurring during evening hours (7 p.m.-10 p.m.). The CNEL is usually within 1 dB of the L_{dn}, and for all intents and purposes, the two are interchangeable.

- **Single-Event Noise Levels (SEL):** A receiver's cumulative noise exposure from a single impulsive-noise event, which is defined as an acoustical event of short duration and which involves a change in sound pressure above some reference value. Typically used for evaluating noise exposure from aircraft flight events.

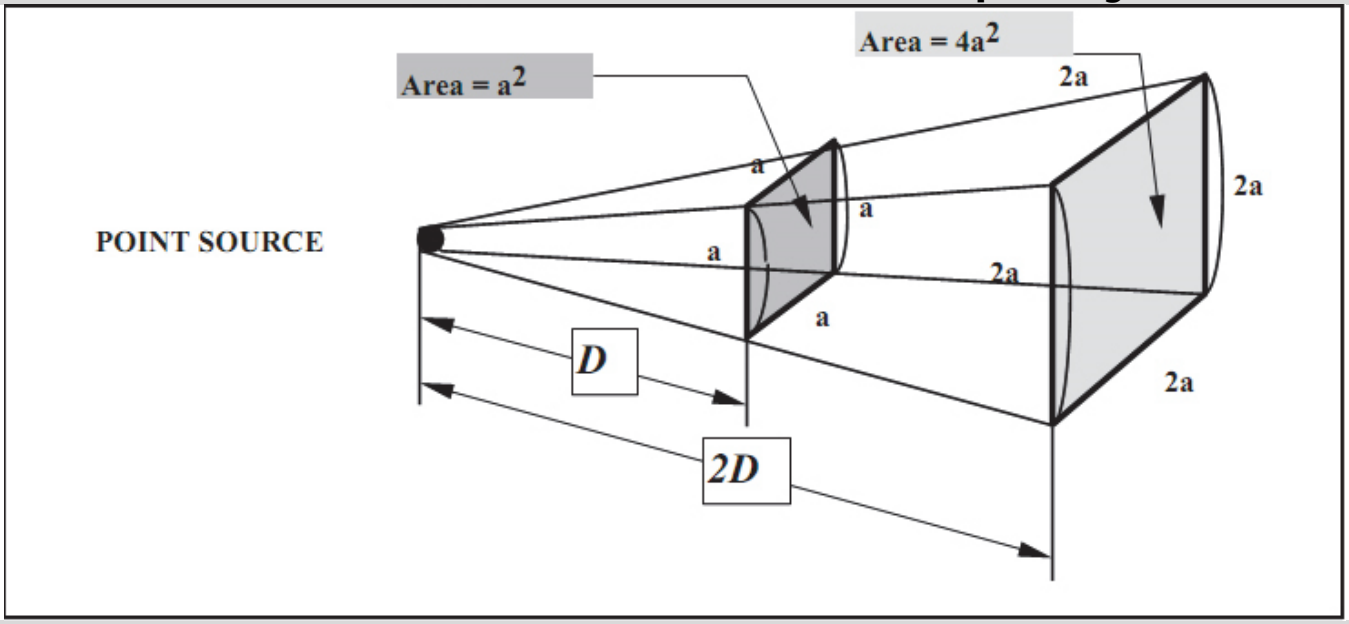
Sound Propagation

When sound propagates over a distance, it changes in level and frequency content. The manner in which noise reduces with distance depends on the following factors:

Geometric Spreading

Sound from a localized source (i.e., point source) propagates uniformly outward in a spherical pattern; therefore, this type of propagation is called *spherical spreading*. The sound level attenuates (or decreases) at a rate of 6 dB for each doubling of distance from a point/stationary source as its energy is continuously spread out over a spherical surface (see **Figure 2.6-2**).

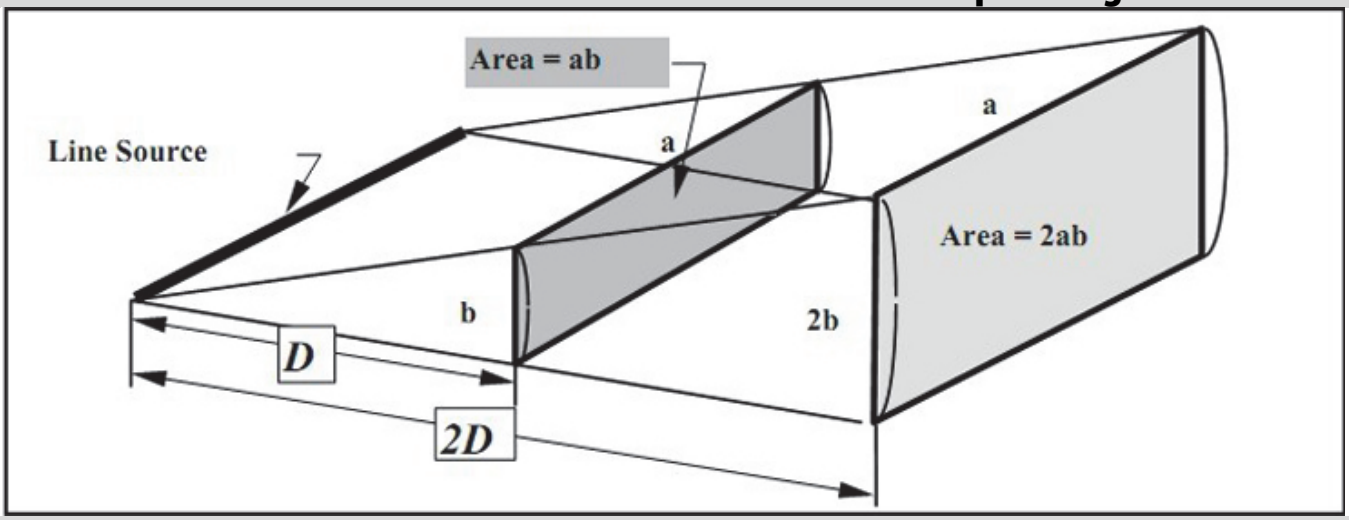
Figure 2.6-2
Point Source Spreading with Distance



Source: Caltrans 2013

Roadways and highways, and to some extent, moving trains, consist of several localized noise sources on a defined path, and hence are treated as "line" sources, which approximate the effect of several point sources (see Figure 2.6-3). Noise from a line source propagates over a cylindrical surface, often referred to as *cylindrical spreading*. Sound levels attenuate at a rate of 3 dB for each doubling of distance from a line source. Therefore, noise due to a line source attenuates less with distance than that of a point source with increased distance.

Figure 2.6-3
Line Source Spreading with Distance



Source: Caltrans 2013

Ground Absorption

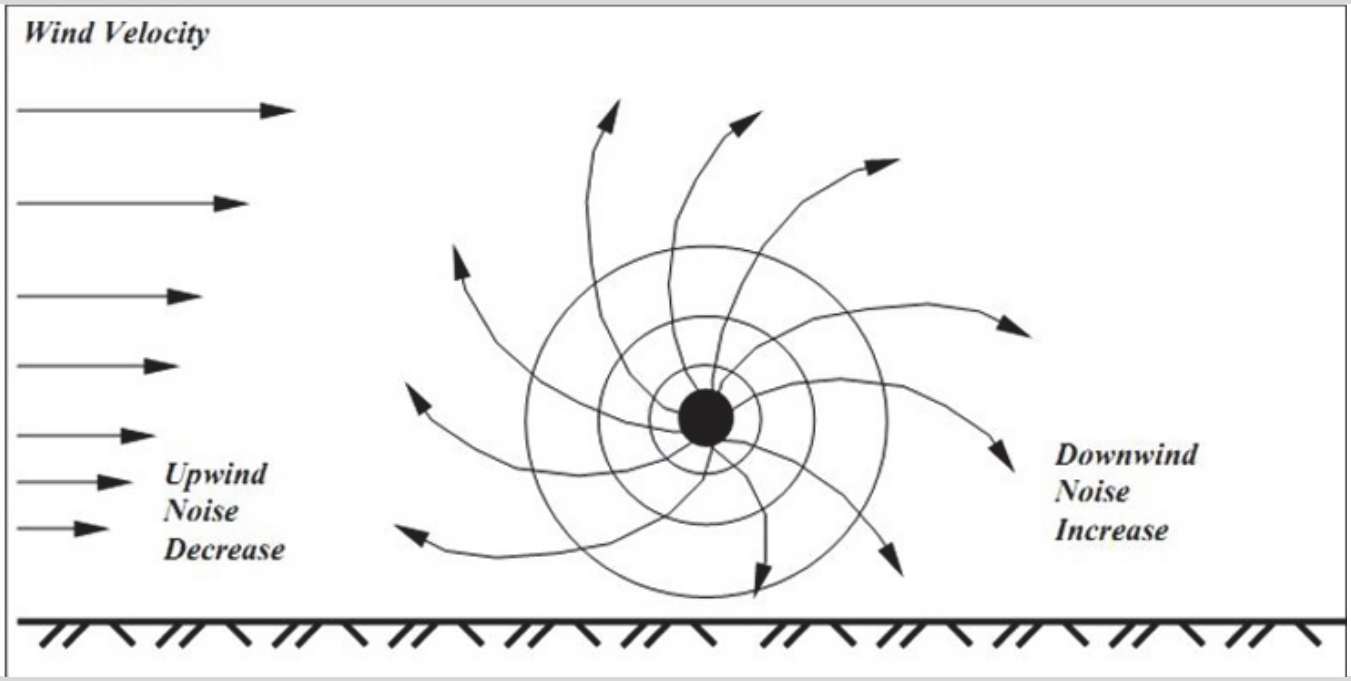
The propagation path of noise from many typical sources such as roadways to a receiver is usually very close to the ground. Noise attenuation from ground absorption and reflective-wave canceling adds to the attenuation associated with geometric spreading. Traditionally, the excess attenuation has also been expressed in terms of attenuation per doubling of distance. For acoustically hard sites (i.e., sites with a reflective surface between the source and the receiver, such as a paved parking lot or body of water,), no excess ground attenuation is generally assumed. For acoustically absorptive or soft sites (i.e., those sites with an absorptive ground surface between the source and the receiver, such as soft dirt, grass, or scattered bushes and trees), an excess ground-attenuation value of 1.5 decibels per doubling of distance is typically assumed. When added to cylindrical spreading from traffic noise sources, the excess ground attenuation results in an overall drop-off rate of 4.5 dB per doubling of distance. When added to spherical spreading (point sources), it results in overall drop-off rates of approximately 7.5 dB. These approximations are generally only applicable for receivers within 300 feet of the noise source(s), and should not be applied to sound path lengths of more than 300 feet.

Atmospheric Effects

Receivers located downwind from a source can be exposed to increased noise levels relative to calm conditions, whereas receivers upwind from the source can have lowered noise levels. This is illustrated in Figure 2.6-4.

In addition to the enhancing effect produced by wind, sound levels can increase at large distances from the source (e.g., more than 500 feet) due to atmospheric temperature inversions (i.e., increasing temperature with elevation) or can decrease with distance from the source at a higher rate than the typical spreading loss with distance rate (see above) due to a temperature lapse condition (i.e., decreasing temperature with elevation).

Figure 2.6-4
Wind Effects on Noise Levels



Source: Caltrans 2013

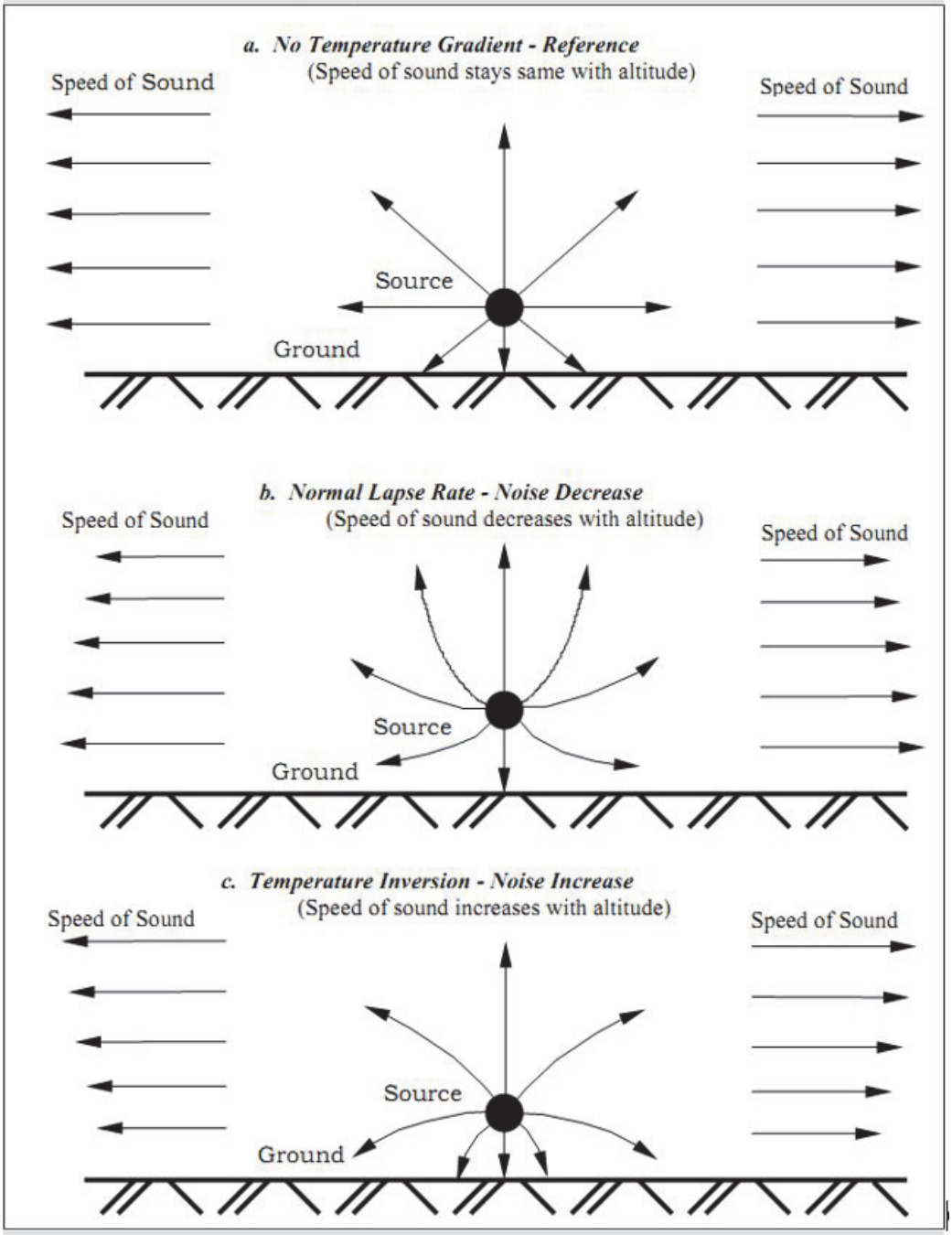
Temperature inversions are a common part of the meteorological environment in California. During a temperature inversion, the air temperature at the ground is cooler than that several hundred feet above the ground. These temperature inversions are typically caused when a warm, sunny day is followed by a cold, clear night; generally, this occurs more frequently and with higher intensity in the fall and the spring seasons. The sun warms the earth surface during the day and generally the air temperature near the ground is higher than the air temperature at higher elevations, but when the sun sets, the earth cools quickly by infrared radiation into space and so does the air mass at lower elevations, so that the temperature of air at high elevations soon becomes warmer than that of the air near the ground. The speed of sound is higher in warmer air, and this inverted temperature profile causes the sound waves in the warmer air to overtake those travelling in cooler air, thus the sound "bends" back toward the ground (see **Figure 2.6-5**).

Other factors such as air temperature, humidity, and turbulence can also effect sound propagation. For instance, air temperature and humidity effect on the rate of molecular absorption as sound travels large distances. A sound consisting primarily of middle frequencies such as speech or animal vocalization attenuates approximately five additional decibels for every 1,000 feet of travel with an air temperature of 70 degrees Fahrenheit and a humidity of 30 to 40 percent. This atmospheric effect is in addition to the other effects discussed above.

Vibration

Generally speaking, vibration is energy transmitted in waves through the ground. These energy waves dissipate with distance from the vibration source. Because energy is lost during the transfer of energy from one particle to another, the vibratory energy is reduced with increasing distance from the source. Vibration attenuates at a rate of approximately 50 percent for each doubling of distance from the source. This approach only takes into consideration the attenuation from geometric spreading. Because there are additional factors that reduce vibration over distance (e.g., damping from soil condition), this approach tends to provide for a conservative assessment of vibration level at the receiver.

Figure 2.6-5
Effects of Temperature Gradients on Noise



Source: Caltrans 2013

Vibration is an oscillatory motion that can be described in terms of the displacement, velocity, or acceleration. Vibration is typically described by its peak amplitude and its root-mean-square (RMS) amplitude. The RMS value can be considered an average value over a given time interval. The peak vibration velocity is the same as the "peak particle velocity" (PPV), generally presented in units of inches/second (in/sec). Peak particle velocity is defined as the maximum instantaneous positive or negative peak of the vibration signal, and PPV is generally used to assess the potential for damage to buildings and structures. The RMS amplitude is typically used for assessing human annoyance to vibration.

Physical Setting

The existing noise environment in the Bay Area is comprised of two primary categories of noise sources: transportation and non-transportation. Transportation sources include surface vehicle traffic; railroad train operations, including light rail and commuter trains; and aircraft operations. Non-transportation, or stationary/fixed sources include commercial/industrial equipment, construction equipment, and any other sources not associated with the transportation of people or goods. Existing noise exposure in the Bay Area associated with these primary noise sources is presented below.

Traffic Noise Sources

The ambient noise environment in urban areas is primarily influenced by traffic-noise. Traffic noise exposure is primarily a function of the volume of vehicles per day, the speed of those vehicles, type of ground (i.e., hard or soft), the number of those vehicles represented by medium and heavy trucks, the distribution of those vehicles during daytime and nighttime hours, and the proximity of noise-sensitive receivers to the roadway. Existing traffic noise (based on 2015, the latest year for which a full dataset is available) within the Plan area has been characterized by traffic-noise modeling. The baseline for the noise analysis is a simulation of 2015 traffic levels and land use. Based on modeling conducted for all roadways types within the Plan area, average noise levels range from 52.1 dBA CNEL (next to collector and small roads) to as high as 75.9 dBA CNEL (next to freeways). Refer to Impact 2.6-2 and Table 2.6-6 for more details regarding traffic-noise modeling. The traffic noise assessment in this analysis is inclusive of bus transit, as buses are an assumed percentage of overall roadway volumes used in the calculation of roadside noise levels.

Rail Noise Sources

The Bay Area is also affected by noise from freight and passenger rail operations. While these operations generate significant noise levels in the immediate vicinity of the railways, train operations are intermittent and area railways are widely dispersed. Commuter rail such as San Francisco Municipal Railway (MUNI) and Valley Transportation Authority (VTA) operate with more frequency than standard gauge rail operations but at lower speeds resulting in lower noise levels. BART operations, on the other hand, can attain higher speeds and have the potential for greater noise levels along extended stretches. Based on available data, noise levels from rail operations within the Plan area can range from 70 dBA CNEL to 82 dBA CNEL (Peninsula Joint Powers Board 2014). Train operations may also be a source of ground vibration near the tracks. Vibration levels depend on several factors, including track and train type, ground type, speed and weight of passing train.

Aircraft Noise Sources

The Bay Area has many airports—including public use, private use, and military facilities. Major airports include San Francisco International, Oakland International, and Norman Y. Mineta San Jose International. In addition to the daily aircraft operations originating and terminating at these facilities, aircraft not utilizing these airports frequently fly over the Bay Area. All of these operations contribute to the overall ambient noise environment. In general, like rail noise, the proximity of the receiver to the airport and aircraft flight path determines the noise exposure. Other contributing factors include the type of aircraft operated, altitude of the aircraft, and atmospheric conditions. Atmospheric conditions may contribute to the direction of aircraft operations (flow) and affect aircraft noise propagation.

As discussed in further detail below, State law requires land use commissions to prepare and adopt an airport land use compatibility plan (ALUCP) for each public use and military airport. These plans typically include airport noise contour maps, which are modeled based on airport-specific activity data. Airport noise contours are specific to each airport. However, for informational purposes, noise contours from three of the largest airports within the Plan area (San Francisco International Airport, Oakland International Airport, and Mineta San Jose International Airport) are briefly identified below.

Based on the ALUCP for San Francisco International Airport, the 65 dBA CNEL contour extends approximately 6 miles north west of the airport (C/CAG 2012). Based on the ALUCP for Oakland International Airport, the 65 dBA CNEL contour extends approximately 5 miles south of the airport (Alameda County 2010). Based on the ALUCP for Mineta San Jose International Airport, the 65 dBA CNEL contour extends approximately 2.5 miles

northwest from the airport (Santa Clara County 2016). Many other smaller airports and airstrips existing within the Plan area with widely varying noise levels contribute to the existing ambient noise levels.

Construction Noise Sources

New development and implementation of transportation improvements will necessarily include construction activities that create relatively short-term noise exposure. Noise production from construction equipment varies greatly depending on factors such as operation being performed and equipment type, model, age, and condition. Noise associated with heavy equipment diesel engine operations often dominates the noise environment in the vicinity of construction sites. Stationary sources such as generators, pumps, and compressors may also produce a significant contribution; however, if present, operations from impact equipment (e.g., pile driving, pavement breaking) will generally produce the highest noise levels, and may also produce significant vibration in the vicinity. Maximum noise exposure from typical construction equipment operations is approximately 75-100 dB (L_{max} at 50 feet) with noise from heavy demolition and pile driving operations having the highest noise production. Please refer to Table 2.6-2 for typical construction noise levels.

Table 2.6-2 Typical Noise Levels from Demolition/Construction Equipment Operations

Construction Equipment	Noise Exposure Level, dB L_{max} at 50 Feet
Air Compressor	78-81
Backhoe	78-80
Ballast Equalizer	82
Ballast Tamper	83
Compactor	82-83
Concrete Mixer (Truck)	79-85
Concrete Pump (Truck)	81-82
Concrete Vibrator	76-80
Crane	81-88
Dozer	82-85
Generator	81
Grader	85
Impact Wrench	85
Jack Hammer	88-89
Loader	79-85
Paver	77-89
Pile Driver (Impact)	101
Pneumatic Tool	85
Pump	76-81
Rail Saw	90
Rock Drill	81-98
Roller	74-80
Saw	76
Scarifier	83-90
Scraper	84-89
Shovel	82
Spike Driver	77

Table 2.6-2 Typical Noise Levels from Demolition/Construction Equipment Operations

Construction Equipment	Noise Exposure Level, dB L_{max} at 50 Feet
Tie Cutter	84
Tie Handler	80
Tie Inserter	85
Heavy Diesel Truck	88

Sources: FTA 2006

Industry and Other Non-Transportation Noise Sources

A wide variety of industrial and other non-transportation noise sources are located within the Bay Area. These include manufacturing plants, landfills, treatment plants (e.g., water), power generation facilities, food packaging plants, lumber mills, and aggregate mining facilities, just to name a few. Noise generated by these sources varies widely, but in many cases may be a significant if not dominant contributor to the noise environment.

2.6.2 Regulatory Setting

FEDERAL REGULATIONS

Title 23, Part 772 of the Code of Federal Regulation (23 CFR 772)

Title 23, Part 772 of the Code of Federal Regulation (23 CFR 772) is the federal regulation governing traffic noise impact. A federal or federally-funded project would have a traffic noise impact if it involves the construction of a new highway, or includes substantial modification of an existing highway, where the project would result in a substantial operational noise increase, or where the predicted operational noise level approaches or exceeds the FHWA Noise Abatement Criteria (NAC). In this case, a "substantial increase" is not defined by FHWA, but is generally defined by the state and/or local governing agencies. The noise level is defined as "approaching" the NAC if it is within 1 dB of the applicable criterion. Table 2.6-3 summarizes the FHWA NAC as presented in the U.S. Department of Transportation (DOT)/FHWA Highway Traffic Noise Analysis and Abatement Policy and Guidance document.

Table 2.6-3 Summary of FHWA Noise Abatement Criteria

Activity Category	NAC, Hourly-Average Noise Level (L_{eq}[h], dBA)	Description of Activities
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	67 Exterior	Picnic areas, recreation areas, playgrounds, active sport areas, parks, residences, motels, hotels, schools, churches, libraries, and hospitals
C	72 Exterior	Developed lands, properties, or activities not included in categories A or B above
D	–	Undeveloped lands
E	52 Interior	Residences, motels, hotels, public meeting rooms, schools, churches, libraries, hospitals, and auditoriums

Source: DOT 1995

Title 14, Part 36 of the Code of Federal Regulation (14 CFR 36)

Aircraft operated in the United States are subject to federal requirements for noise emissions levels. The requirements are set forth in Title 14, Part 36 of the Code of Federal Regulation (14 CFR 36), which establishes maximum acceptable noise levels for specific aircraft types, considering model year, aircraft weight, and number of engines.

The Federal Aviation Administration (FAA) Part 150 program encourages airports to prepare noise exposure maps that show land uses that are incompatible with high noise levels (FICON 1992). The program proposes measures to reduce any incompatibility. With an FAA Part 150 program approved, airport projects such as land acquisition, residential/school sound insulation, etc. become eligible for federal Airport Improvement Program (AIP) funding.

Federal Transit Administration Noise Impact Criteria

Transit Operations Noise

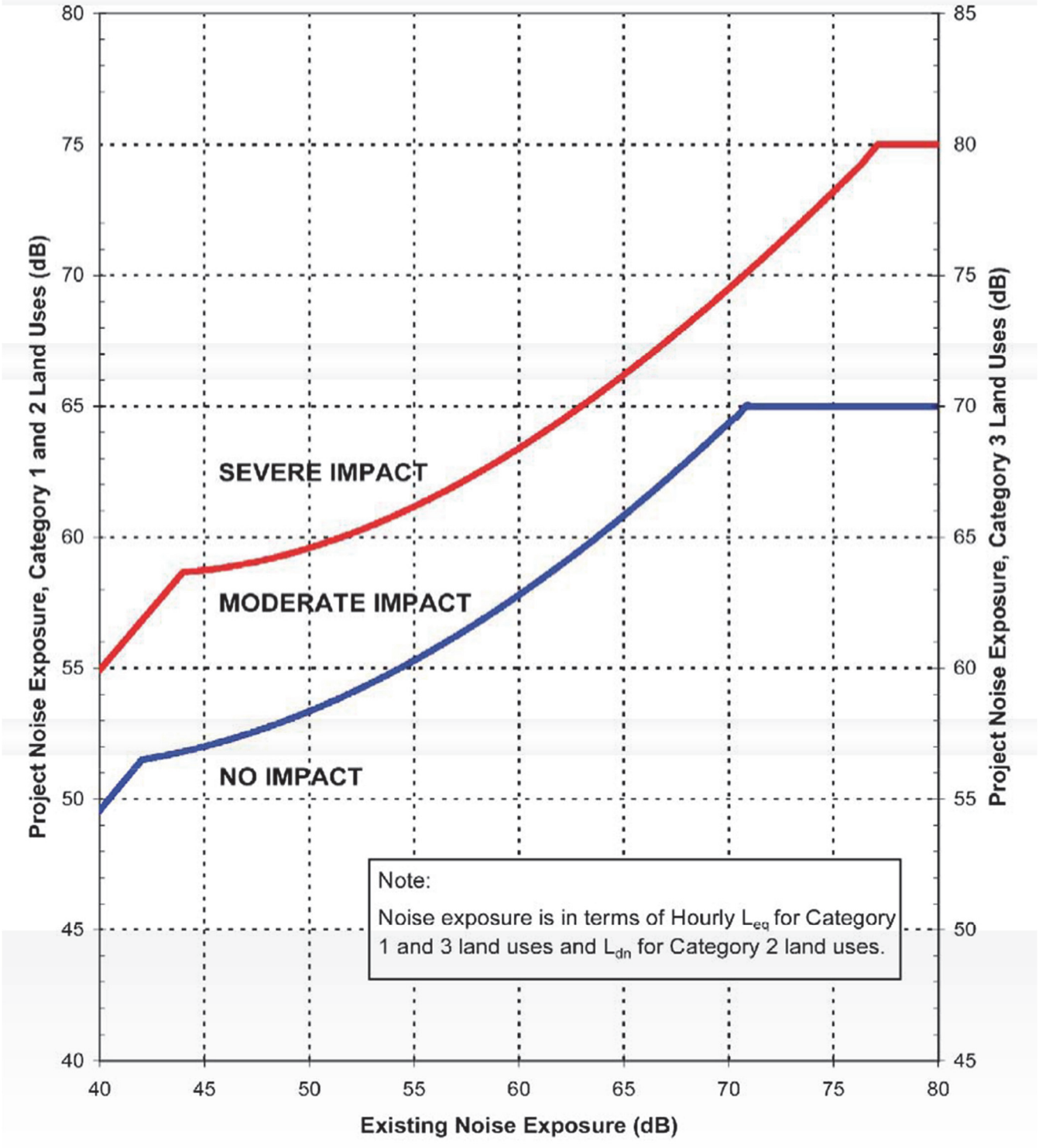
The Federal Transit Administration (FTA) offers regulations regarding noise exposure associated with federally funded transit projects. "Moderate impact" and "severe impact" criteria are established based on the existing ambient noise environment and the noise sensitivity of the receiving land use. Three categories of land use are established for the impact analysis.

- Category 1: Includes lands set aside for serenity and quiet or for outdoors performing arts entertainment (e.g., national historic landmarks, outdoor amphitheaters).
- Category 2: Residences and buildings where people normally sleep (e.g., homes, hospitals, hotels).
- Category 3: Institutional land with primary daytime and/or evening use (e.g., schools, libraries, churches, medical offices, theaters, parks).

Figure 2.6-6 is a graphical representation of the FTA noise impact criteria. Please note that Categories 1 and 3 apply the L_{eq} for the noisiest hour of transit-related activity during hours of noise sensitivity. Category 2 applies the L_{dn} because these receivers may be impacted by nighttime (10 p.m.-7 a.m.) transit- related events.

Subjectively, a "moderate impact" is generally noticeable to most people but may not be sufficient to cause strong, adverse reactions from the community. A "severe impact" would likely produce a high percentage of highly annoyed people in the community.

Figure 2.6-6
FTA Noise Impact Criteria



Source: FTA 2006

Federal Transit Administration Vibration and Noise Impact Criteria

FTA offers regulations regarding vibration exposure associated with federally funded transit projects. Three categories of land use are established for the impact analysis.

- Category 1: Buildings where vibration would interfere with interior operations.
- Category 2: Residences and buildings where people normally sleep (e.g., homes, hospitals, hotels).
- Category 3: Institutional land with primary daytime and/or evening use (e.g., schools, libraries, churches, medical offices, theaters, parks).

Table 2.6-4 summarizes the FTA vibration impact criteria.

Table 2.6-4 FTA Ground-Borne Vibration (GVB) Impact Criteria for General Assessment

Land Use Category	GVB Impact Levels (VdB re 1 micro-inch /sec)		
	Frequent Event[1]	Occasional Events[2]	Infrequent Events[3]
Category 1: Buildings where vibration would interfere with interior operations.	65 VdB	65 VdB	65 VdB
Category 2: Residences and buildings where people normally sleep.	72 VdB	75 VdB	80 VdB
Category 3: Institutional land uses with primarily daytime use.	75 VdB	78 VdB	80 VdB

Notes:

[1] "Frequent Events" is defined as more than 70 vibration events of the same source per day. Most rapid transit projects fall into this category.

[2] "Occasional Events" is defined as between 30 and 70 vibration events of the same source per day. Most commuter trunk lines have this many operations.

[3] "Infrequent Events" is defined as fewer than 30 vibration events of the same kind per day. This category includes most commuter rail branch lines.

[4] This criterion limit is based on levels that are acceptable for most moderately sensitive equipment such as optical microscopes. Vibration-sensitive manufacturing or research will require detailed evaluation to define the acceptable vibration levels. Ensuring lower vibration levels in a building often requires special design of the HVAC systems and stiffened floors.

Source: FTA 2006

Construction Noise

In addition to transit operations noise, FTA offers guidance with respect to the evaluation of transit construction noise exposure. Like the operational noise criteria, construction noise criteria should consider the existing (ambient) noise environment. Additionally, construction noise exposure should consider the duration of construction activities and the receiving land use (i.e., sensitivity of receiver). The FTA construction noise guidelines are summarized in Table 2.6-5.

Table 2.6-5 Summary of FTA Construction Noise Criteria (Guidelines)

Impacted Land Use Type	Hourly L_{eq} dBA		8-hour L_{eq} dBA	
	Daytime (7 a.m.-10 p.m.)	Nighttime (10 p.m.-7 a.m.)	Daytime (7 a.m.-10 p.m.)	Nighttime (10 p.m.-7 a.m.)
Residential	90	80	80	70
Commercial	100	100	85	85
Industrial	100	100	90	90

Note: In urban areas with very high ambient noise levels, construction noise should not exceed ambient plus 10 dB.

Source: FTA 2006

Construction Vibration

FTA has published guidance relative to impacts from vibration exposure. FTA has established a general impact criterion of 0.5 in/sec peak particle velocity (PPV). Structural damage to buildings would not be expected below this value. It is expected that regularly experienced vibration levels of 80 VdB (0.01 in/sec PPV) or higher may create an annoyance response from human receivers, and may be considered a nuisance.

STATE REGULATIONS

California Department of Transportation Noise and Vibration Standards

Traffic Operations Noise

The California Department of Transportation Traffic Noise Analysis Protocol (Protocol) establishes the policies and procedures to be used in the assessment of traffic noise exposure and impact for new construction and reconstruction projects. The NAC in the Protocol are the same as those presented in 23 CFR 772 (see USDOT/FHWA information above). The Protocol defines a substantial project-related traffic noise level increase when the project's worst-case hour exceeds the ambient worst-case hour by 12 dB or more.

Rail Operations Noise

Caltrans endorses the use of the FTA noise criteria and methodologies for assessing project-related rail noise and vibration impacts.

Construction Noise

As presented in the Protocol, Section 14-8.2, Noise Control, Caltrans standard specifications establishes a construction noise exposure/production limit of 86 dB (Lmax) at a distance of 50 feet. Additionally, this specification establishes that all internal combustion engines should be equipped with manufacturer-recommended mufflers, and that no internal combustion engines may be operated without mufflers.

Vibration

In 2004, Caltrans published the Transportation- and Construction-Induced Vibration Manual, which provides general guidance on vibration issues associated with construction and operation of projects in relation to human perception and structural damage. Table 2.6-6 presents recommended levels of vibration that could result in damage to structures exposed to continuous vibration.

Table 2.6-6 Caltrans Recommended Vibration Levels

PPV (in/sec)	Effect on Buildings
0.4-0.6	Architectural damage and possible minor structural damage
0.2	Risk of architectural damage to normal dwelling houses
0.1	Virtually no risk of architectural damage to normal buildings
0.08	Recommended upper limit of vibration to which ruins and ancient monuments should be subjected
0.006-0.019	Vibration unlikely to cause damage of any type

Notes: PPV=peak particle velocity, in/sec=inches per second

Source: Caltrans 2004

California Code of Regulations

Aircraft Operations

The California Airport Noise Standards, Title 21, Section 5000 et seq. of the California Code of Regulations (CCR) apply to any airport that is deemed to have a "noise problem" as established by the local County Board of Supervisors in accordance with the provisions in the regulation. Currently, within the Bay Area, Norman Y. Mineta-San José International Airport and San Francisco International Airport have been given this designation. The Standards establish a noise exposure limit "acceptable to a reasonable person residing in the vicinity of an airport" of 65 dB CNEL.

Noise Insulation Standard

The California Noise Insulation Standards found in CCR, Title 24 establish requirements for new multi- family residential units, hotels, and motels that may be subject to relatively high levels of transportation noise. In this

case, the noise insulation criterion is 45 dB L_{dn}/CNEL inside noise-sensitive spaces. For developments with exterior transportation noise exposure exceeding 60 dB L_{dn}/CNEL, an acoustical analysis and mitigation (if required) must be provided showing compliance with the 45 dB L_{dn}/CNEL interior noise exposure limit.

LOCAL REGULATIONS

City and County General Plans

Cities and counties within California must adopt a noise element as part of their general plans to identify, assess, and provide mitigation for noise problems within their communities. According to California Government Code 65302, the noise element of a general plan is to be used as "a guide for establishing a pattern of land uses in the land use element that minimizes the exposure of community residents to excessive noise." The noise element should assess current and projected future noise levels associated with local noise sources, including, but not limited to, traffic, trains, aircraft, and industrial operations. California general plan guidance establishes land use compatibility guidelines for various land uses and considers exterior noise levels of below 60 dBA CNEL as normally acceptable for low density residential land uses, and below 65 dBA CNEL as normally acceptable for multi-family residential land uses. Local jurisdictions may adopt their own noise exposure goals and policies, which may or may not be the same or similar to those recommended by the State.

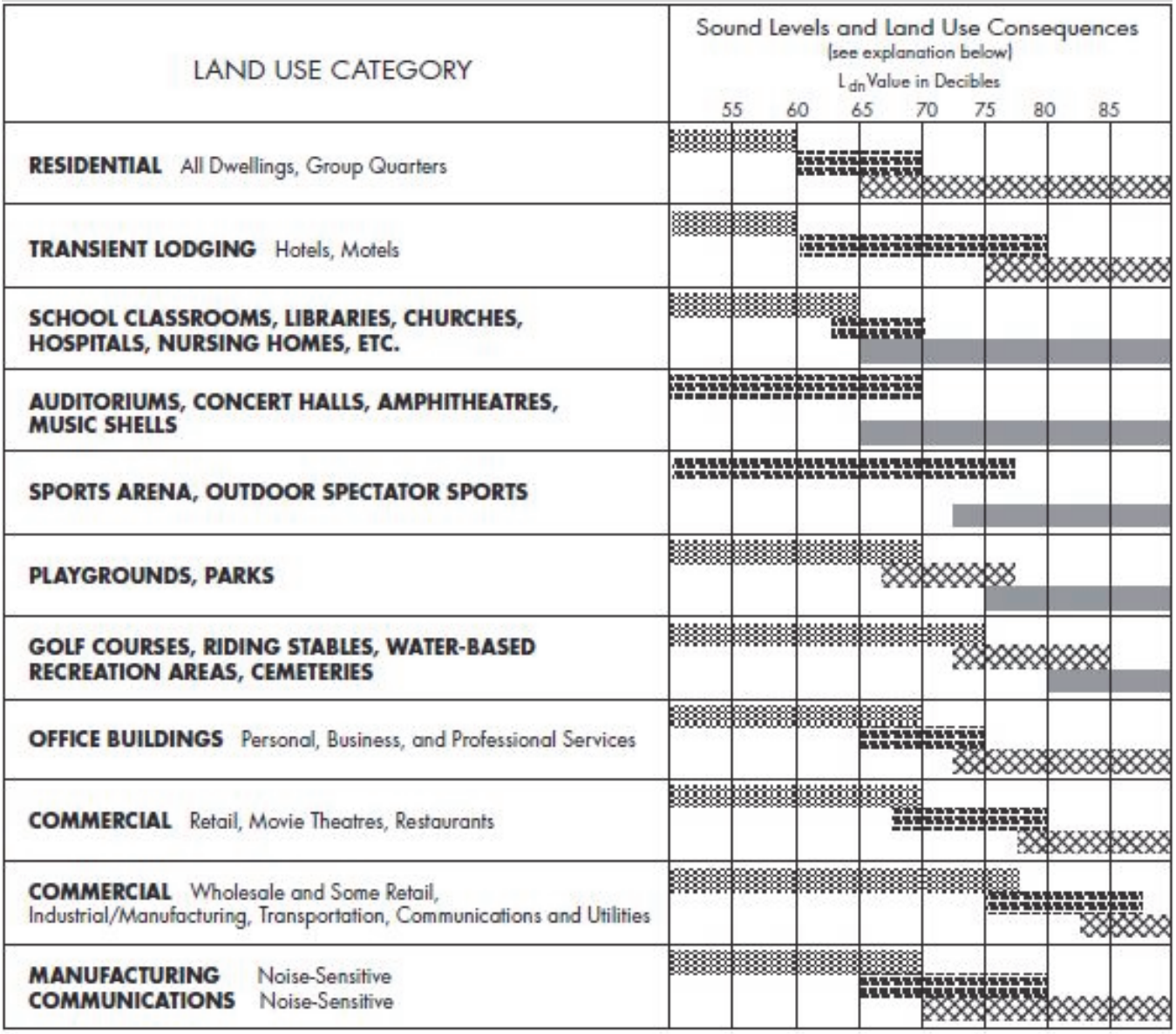
In general, state guidance reflects that noise-sensitive land uses are compatible with exterior transportation-related noise exposure not exceeding 65 dB L_{dn}/CNEL, typical standards for suburban areas. However, urban development, such as would occur in TPAs (required to be near transit, typically near highly trafficked roadways), are frequently located in areas subject to higher noise and local standards often provide that higher noise levels are conditionally acceptable for residential uses in such areas, so long as it can be demonstrated that interior noise levels would be acceptable, as discussed further below. One example of an urban area with higher noise compatibility standards is the City of San Francisco, which lists noise levels as high as 70 dB L_{dn}/CNEL as conditionally acceptable for residential land uses (see **Figure 2.6-7**). Thus, in San Francisco in areas exceeding 70 dBA CNEL, if appropriate measures are taken to reduce noise exposure, especially interior noise levels, higher exterior noise levels are considered acceptable.

Additionally, based on the Title 24 standards described above and State general plan guidelines, interior noise exposure should not exceed 45 dB L_{dn}/CNEL within noise-sensitive spaces, whether in suburban or urban environments. Standard modern building techniques and requirements, such as use of dual-paned windows, typically reduce exterior to interior noise transmission by 25 dB. The standards within the noise element of locally adopted general plans are for planning policy purposes and are generally not regulatory. Most jurisdictions regulate noise through their municipal code.

The local noise code is generally applied to address noise complaints associated with non-transportation sources (e.g., public address systems, mechanical equipment), and may also address construction noise exposure/production limits. Noise exposure criteria presented within municipal codes should match performance criteria presented in the noise element of the general plan for the given jurisdiction.

Cities and counties often provide noise level performance standards for non-transportation noise sources (e.g., commercial/industrial facilities, mechanical equipment). These standards are used to address intermittent noise exposure, and are often in terms of the hourly average noise level (L_{eq}) or maximum noise level (L_{max}). These criteria are generally tied directly to the standards presented in the city/county municipal code (i.e., noise ordinance).

Figure 2.6-7
City of San Francisco Representative Land Use Compatibility Criteria



Satisfactory, with no special noise insulation requirements.

New construction or development should be undertaken only after a detailed analysis of the noise reduction requirements is made and needed noise insulation features included in the design.

New construction or development should generally be discouraged. If new construction or development does proceed, a detailed analysis of the noise reduction requirements must be made and needed noise insulation features included in the design.

New construction or development should generally not be undertaken.

Source: San Francisco 2004

2.6.3 Impact Analysis

SIGNIFICANCE CRITERIA

The following significance criteria are based on CEQA Guidelines Appendix G, as well as the thresholds used in the EIR for the 2013 Plan Bay Area, and professional judgment. Under these criteria, implementation of the proposed Plan would have a potentially significant adverse impact if it would:

Criterion 1 (construction): Result in exposure of persons to or generation of temporary construction noise levels and/or ground vibration levels in excess of standards established by local jurisdictions or other applicable regulatory agencies. Where local jurisdiction standards are not presented, it is assumed that the proposed construction noise and vibration limits established by Caltrans and FTA would apply. The following criteria are used to evaluate construction noise and vibration impacts.

Construction Noise

- Local jurisdiction's construction noise standards and limits.
- Caltrans' 86 dB L_{max} at a distance of 50 feet.
- FTA: Construction Noise Criteria, not to exceed ambient levels plus 10 dB.

Construction Vibration

- Caltrans recommended vibration levels for structural damage (0.1 to 0.6 PPV inches/second depending on building type).
- FTA vibration impact criteria for human annoyance (65 VdB to 80 VdB depending on event frequency).

Criterion 2 (operation): Result in long-term permanent increases in traffic-noise levels that exceed applicable thresholds or result in a substantial increase in noise. The following criteria are used to evaluate operational noise impacts.

- Based on the range of existing standards in the Plan area, exceeds project-specific exterior noise levels of 70 dBA CNEL associated with noise levels from major freeways/ expressways and 65 dBA CNEL from all other roadway types.
- California Building Code and California General Plan Guidelines recommended interior noise levels of 45 dBA CNEL for any roadway type.
- Results in a long-term perceptible increase in the ambient noise level (1.5 dBA or greater) in an area where the applicable noise threshold is already exceeded. In areas where applicable thresholds are not exceeded, a 3 dBA increase or greater would be considered substantial.

Criterion 3 (operational mobile and stationary sources): Result in long-term increased noise exposure from rail transit sources that exceed applicable thresholds or result in a substantial increase in noise. The following criteria are used to evaluate this noise impact:

- Based on the range of existing standards in the Plan area, exceeds project-specific exterior noise levels of 70 dBA CNEL.
- California Building Code and California General Plan Guidelines recommended interior noise levels of 45 dBA CNEL.
- Results in a long-term perceptible increase in the ambient noise level (1.5 dBA or greater) in an area where the applicable noise threshold is already exceeded. In areas where applicable thresholds are not exceeded, a 3 dBA increase or greater would be considered substantial.

Criterion 4 (operation): Result in long-term permanent increase in transit-vibration levels that exceed applicable thresholds. The following criteria are used to evaluate operational transit vibration impacts.

- Caltrans recommended vibration Levels for structural damage (0.1 to 0.6 PPV in/sec depending on building type).
- FTA vibration impact criteria for human annoyance (65 VdB to 80 VdB depending on event frequency).
- For vibration levels already exceeding applicable thresholds (without the proposed Plan), a Plan-related increase in vibration level of 1.5 VdB would be considered significant.

Criterion 5 (land use compatibility all noise sources and land use): General increases in new ambient noise and associated exposure of sensitive receptors to new or additional stationary noise sources in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies:

- Based on the range of existing standards in the Plan area, exterior project-specific noise levels of 70 dBA CNEL (applicable to urban areas/mixed-use/TPAs) and 65 dBA CNEL (applicable to suburban/rural areas).
- California Building Code and California General Plan Guidelines recommended interior noise level of 45 dBA CNEL.

Criterion 6 (airport land use compatibility): Where an airport land use plan is adopted or, where such a plan has not been adopted, within two miles of a public airport, public use airport, or private airstrip, result in exposure of people residing or working in the planning area to excessive noise levels, defined by:

- California Airport Noise Standards, Title 21, Section 5000: 65 dBA CNEL.
- Federal Interagency Committee on Aviation Noise: 65 dBA (interior) SEL (FICON).

METHOD OF ANALYSIS

The method for the program-level analysis of noise impacts is described below. Because this analysis is programmatic and does not account for site-specific conditions (elevation differences, noise barriers, precise site conditions, detailed traffic conditions), it is expected that project-specific noise and/or acoustical analyses may be required as part of the environmental review prior to project approval by the appropriate lead agency.

Regional Growth/Land Use Changes

This impacts analysis assesses how implementation of the proposed Plan, including forecasted development, could affect the noise environment. The analysis of noise impacts associated with the projected land use pattern assesses the potential noise levels associated with future mobile and stationary sources of noise. A comprehensive review of noise compatibility standards for cities and counties within the Plan area was conducted, which revealed widely varying standard of noise levels that are considered acceptable for different land uses (e.g., residential, commercial, schools). However, the overarching theme identified was that acceptable noise levels for sensitive land uses likely to be located within urbanized and densely populated areas, such as downtowns and/or near major roadways or transit corridors (e.g., Highway 101, BART right-of-way), are higher than for land uses that would likely be in suburban or rural areas.

Under the proposed Plan, projected development would be primarily focused within existing urbanized areas and highly concentrated within the largest cities in the Plan area (i.e., San Francisco, Oakland, and San Jose), which currently experience relatively high noise levels. Therefore, considering the relatively high noise environment where development would occur and available guidance from the State and local jurisdictions within the Plan area, the noise compatibility thresholds described above were established based on the range of standards in the region. In addition to exterior noise compatibility guidelines, this analysis also considers interior noise standards set by the California Building Code.

Transportation Network

Traffic and Transit Noise

For this noise analysis, 24-hour CNEL traffic-noise levels were modeled using outputs from Travel Model One, including traffic volume, speed information, vehicle type (i.e., passenger vehicles, trucks, buses), and time of day volume profiles. The modeled traffic-noise levels are based on average daily traffic volumes occurring on every road type (e.g., freeway, expressway, arterial, collector) throughout each county. Thus, reported noise levels represent average noise levels by roadway type in each county within the Plan area.

Traffic-noise modeling for the proposed Plan does not account for noise attenuation provided by existing noise barriers and, therefore, represents a conservative and worst-case approach. To evaluate the proposed Plan, the base year (2015) condition was compared with the proposed Plan (2040). The analysis reports the potential for absolute noise impacts as well as increases in noise.

With regard to transit noise, existing noise levels were determined based on available data for transit (i.e., BART, Caltrain) within the Plan area. Increases in transit noise were not modeled, but evaluated based on best available information, such as growth projections and ridership data.

Consistent with the method used to establish noise compatibility thresholds discussed above, traffic- and transit-noise was also evaluated by considering existing traffic-noise levels and reviewing applicable traffic-noise standards already established by local agencies. Traffic-noise is generally the primary noise source within urban areas; therefore, it is treated separately by many agencies when establishing noise standards.

Freeways, expressways, and transit routes are designed to carry heavy traffic volumes and, therefore, typically generate the highest noise levels. Further, these types of facilities are typically concentrated in urban areas in proximity to commercial centers where ambient noise levels are highest. For these reasons, these facilities are inherently noisy and contribute substantially to ambient noise levels. Major arterials, collectors, and all other roadway types do not carry as much traffic as freeways and expressways, and typically extend to beyond the centralized urban core to potentially quieter areas less influenced by freeways. Therefore, these roadway types result in lower noise levels than freeways, expressways, and transit routes and also use lower significance thresholds because they serve less urban areas.

In addition to the use of a maximum noise threshold for transportation-noise, relative noise increases because of the proposed Plan were also evaluated. As ambient noise levels increase, a smaller increase in noise is sufficient to cause annoyance. Therefore, when existing noise levels exceed applicable thresholds, a smaller increase threshold was applied.

Transit Vibration

To evaluate vibration levels from transit-related vibration, Caltrans and FTA guidance was used. Caltrans guidance provides reference levels for structural damage and FTA guidance provides reference vibration levels for human disturbance. Generally, there are insufficient data available (e.g., the increase in the number of additional hourly train pass-by events) to provide a detailed analysis; therefore, vibration impacts were assessed using the best available data from published sources and established reference vibration levels.

Construction

Projected land use growth and transportation projects implemented under the proposed Plan would be expected to generate short-term noise and vibration level increases during construction. These levels may be substantially higher than existing ambient noise levels or exceed the applicable local construction noise standards, Caltrans, or FTA criteria, adversely affecting acoustically sensitive receivers in the vicinity. Because detailed construction information was not available, the analysis addresses these potential impacts at a program level.

IMPACTS AND MITIGATION MEASURES

Impact 2.6-1: Implementation of the proposed Plan could result in exposure of persons to or generation of temporary construction noise levels and/or ground vibration levels in excess of standards established by local jurisdictions or other applicable regulatory agencies.

Impacts of Changes in Projected Land Use

As discussed above in the Environmental Setting, noise levels, including construction-related noise and vibration, dissipate rapidly from the source. Thus, sensitive land uses closest to activities are of greatest concern when evaluating construction noise and vibration. In addition, construction activities are typically temporary and change throughout the day. Thus, short-term construction-related noise and vibration do not contribute to overall regional noise levels and is considered a local impact. Construction of projected development, including transportation projects, could result in temporary noise and vibration impacts associated with grading, excavating, earthmoving, paving, building construction, and other related activities. Construction activities would require the use of various noise-generating construction equipment such as dozers, loaders, forklifts, cranes, jackhammers, pile drivers, paving equipment, trucks, and other equipment.

Forecasted development under the proposed Plan would range from high intensity regional center development of high and midrise offices and residences in San Francisco, Oakland and San Jose, to low-rise development in rural towns such as Sebastopol and Graton. Construction noise standards vary throughout the Plan area, but generally limit construction activities to times when noise would have the least effect on nearby land uses (i.e., during the daytime). Some cities include robust noise ordinances that contain either property line performance standards on construction equipment relative to land use and time of day (Oakland Planning Code Section 17.130.050) or identify performance noise standards for construction equipment at a specific distance (Article 29 of the San Francisco Police Code). The City of San Jose restricts construction-related activities to certain hours of the day (City of San Jose Municipal Code Section 20.100.450). In addition, some jurisdictions have identified maximum allowable noise limits specifically for construction activities (e.g., Napa County, San Mateo County). Consequently, depending on the extent of construction activities involved and the proximity of construction to existing receptors, localized construction-related noise effects may vary substantially throughout the Plan area.

Implementation of the proposed Plan would result in implementation of forecasted development and associated construction activities. However, due to the regional scale (110 jurisdictions) of the proposed Plan and the programmatic level of this analysis, specific construction-related details (e.g., location, schedule, equipment) for individual development projects are not available. Therefore, to evaluate potential construction impacts, a representative construction scenario, including typical equipment (e.g., pile driving, cranes, trucks, generators, jackhammers, backhoes) was assumed. Based on reference noise levels for these types of construction equipment (shown in **Table 2.6-2**), construction noise could reach levels of 92.8 dBA L_{eq} and 97.0 dBA L_{max} at 50 feet from construction sites (see Appendix H for modeling inputs and results).

Based on the modeling conducted, construction-related noise levels could exceed local construction-related noise standards and thresholds identified in Criterion 1, depending on proximity to existing land uses and duration of construction activities.

With regard to construction-related vibration, typically, cities and counties, including the jurisdictions within the Plan area, do not establish individual standards. As discussed above, under Criterion 2, Caltrans guidance was used to evaluate potential damage to existing structures from vibration activities and FTA vibration criteria were used to evaluate potential disturbance to sensitive receptors from vibration noise.

Construction activities may result in varying degrees of temporary ground vibration and noise, depending on the specific construction equipment used and activities involved. When considering new construction, pile driving generates the highest vibration levels and is, therefore, of greatest concern when evaluating construction-related vibration impacts. According to FTA, vibration levels associated with pile driving are 1.518 in/sec PPV at 25 feet. Based on FTA's recommended procedure for applying a propagation adjustment to

these reference levels, vibration levels from pile driving could exceed Caltrans recommended level of 0.5 in/sec PPV with respect to the structural damage for older structures within 50 feet of pile driving activities (refer to Appendix H for modeling details). Therefore, because the majority of projected development would occur in already developed and urban areas, the potential exists for pile driving to occur within 50 feet of a historic or old building, resulting in a potentially significant (PS) vibration impact related to structural damage and Mitigation Measure 2.6(b) is recommended.

Vibration levels can also result in interference or annoyance impacts for residences or other land uses where people sleep, such as hotels and hospitals. According to FTA, vibration levels associated with pile driving are 112 VdB at 25 feet (FTA 2006). FTA vibration annoyance potential criteria depend on the frequency of the vibration events. When vibration events occur more than 70 times per day, as would likely be the case with pile driving, they are considered "frequent events." Frequent events in excess of 72 VdB are considered to result in a significant vibration impact. Based on FTA's recommended procedure for applying propagation adjustments to these reference levels, vibration levels from pile driving could exceed FTA recommended guidance for "frequent events" within 550 feet of an existing sensitive land use (refer to Appendix H for modeling details). Construction noise and vibration impacts would be potentially significant (PS).

Impacts of Transportation Projects

Construction-related noise and vibration impacts of transportation projects, similar to land use development, would depend on the extent of construction being undertaken, proximity to existing sensitive land uses, and applicable noise standards. Nonetheless, construction noise and vibration would be of greatest concern to the land uses closest to construction activities. Transportation projects are proposed throughout the Bay Area and, like the projected land use development discussed above, would have the potential for localized noise and vibration impacts, particularly when pile driving or other similar invasive foundation work would be required.

Proposed transportation projects are spread throughout the region. Refer to Figure 1.2-7 (see Section 1.2, "Project Description") for specific transportation project types and locations. In addition, transportation projects typically progress in a linear fashion (i.e., along the right-of-way) and construction is sometimes required to occur during the night, to minimize traffic congestion during peak travel periods. Construction activities may affect individual receptors for shorter periods of time as construction moves in a linear fashion, but could result in greater disturbance to nearby receptors if construction occurs during sleeping hours. Further, transportation construction activities that occur in less urbanized areas, where existing ambient noise levels would be less than urbanized and densely populated areas, could result in a greater relative increase in temporary noise levels. High noise levels added to a lower existing ambient noise level result in a greater increase of annoyance than the same high noise level added to an existing high level.

Implementation of the proposed Plan would result in construction activities associated with transportation projects. However, specific construction-related details (e.g., location, schedule, equipment) for individual projects are unknown at this time. Therefore, to evaluate potential construction impacts, a representative construction scenario, including typical equipment (e.g., pile driving, cranes, trucks, generators, jackhammers, backhoes) was assumed. Based on reference noise levels for these types of construction equipment (shown in **Table 2.6-2**), construction-noise could reach levels of 92.8 dBA L_{eq} and 97.0 dBA L_{max} at 50 feet from future proposed construction sites. Please refer to Appendix H for modeling inputs and results.

Based on the modeling conducted, construction-related noise levels could exceed Caltrans recommended levels of 86 dBA L_{max}, would likely exceed FTA construction noise criteria (i.e., ambient levels plus 10 dB) depending on the location of construction, and could exceed local construction-related noise standards and thresholds identified in Criterion 2, depending on proximity to existing land uses and duration of construction activities.

With regard to vibration levels, transportation projects involving roadway expansion, new transit lines, new overpasses or roadways, or other related invasive foundation work would likely require pile driving. It is unknown at this time where specific pile driving activities would be required and to what extent they would occur. Therefore, it is possible that pile driving and other vibration-inducing construction activities could occur near existing sensitive land uses. Specifically, the potential exists for pile driving to occur within 50 feet of an older building, exceeding Caltrans recommended levels for structural damage, and within 550 feet of an

existing sensitive land use, exceeding FTA recommended levels for vibration annoyance. Construction noise and vibration impacts would be potentially significant (PS).

Conclusion

As discussed above, projected development and implementation of transportation projects have the potential to result in substantial construction noise and vibration levels such that nearby receptors could be adversely affected and applicable noise standards exceeded. Construction and vibration from projected development and transportation projects would be considered **potentially significant (PS)**. Mitigation Measures 2.6-1(a) and 2.6-1(b) are recommended.

Mitigation Measures

Implementing agencies and/or project sponsors shall implement measures, where feasible and necessary based on project- and site-specific considerations that include, but are not limited to:

2.6-1(a) To reduce construction noise levels, implementing agencies and/or project sponsors shall:

- comply with local construction-related noise standards, including restricting construction activities to permitted hours as defined under local jurisdiction regulations (e.g.; Alameda County Code restricts construction noise to between 7:00 am and 7:00 pm on weekdays and between 8:00 am and 5:00 pm on weekend);
- properly maintain construction equipment and outfit construction equipment with the best available noise suppression devices (e.g. mufflers, silencers, wraps);
- prohibit idling of construction equipment for extended periods of time in the vicinity of sensitive receptors;
- locate stationary equipment such as generators, compressors, rock crushers, and cement mixers a minimum of 50 feet from sensitive receptors, but further if possible;
- erect temporary construction-noise barriers around the construction site when adjacent occupied sensitive land uses are present within 75 feet;
- use noise control blankets on building structures as buildings are erected to reduce noise emission from the site; and
- use cushion blocks to dampen impact noise from pile driving.

2.6-1(b) To reduce construction vibration levels, implementing agencies and/or project sponsors shall comply with the following:

- to minimize disturbance of receptors within 550 feet of pile-driving activities, implement "quiet" pile-driving technology (such as pre-drilling of piles and the use of more than one pile driver to shorten the total pile driving duration), where feasible, in consideration of geotechnical and structural requirements and conditions; and
- to reduce structural damage, where pile driving is proposed within 50 feet of an older or historic building, engage a qualified geotechnical engineer and qualified historic preservation professional (for designated historic buildings only) and/or structural engineer to conduct a pre-construction assessment of existing subsurface conditions and the structural integrity of nearby (i.e., within 50 feet) historic structures that would be exposed to pile-driving activity. If recommended by the pre-construction assessment, for structures or facilities within 50 feet of pile-driving activities, the project sponsors shall require ground vibration monitoring of nearby historic structures. Such methods and technologies shall be based on the specific conditions at the construction site such as, but not limited to, the pre-construction surveying of potentially affected historic structures and underpinning of foundations of potentially affected structures, as necessary. The pre-

construction assessment shall include a monitoring program to detect ground settlement or lateral movement of structures in the vicinity of pile-driving activities and identify corrective measures to be taken should monitored vibration levels indicate the potential for building damage. In the event of unacceptable ground movement with the potential to cause structural damage, all impact work shall cease and corrective measures shall be implemented to minimize the risk to the subject, or adjacent, historic structure.

Significance after Mitigation

Implementation of Mitigation Measures 2.6-1(a) would provide substantial reduction in day and night construction noise and vibration levels by ensuring proper equipment use: locating equipment away from sensitive land uses; and requiring the use of enclosures, shields, and noise curtains (noise curtains typically can reduce noise by up to 10 dB [EPA 1971]). To the extent that an individual project adopts and implements all feasible mitigation measures described above, construction-noise levels could be reduced by 10 dB, bringing sound levels to acceptable levels. Greater reductions may be achieved and the frequency and intensity of construction-related noise at nearby receptors may be further reduced, depending on actual construction activities and proximity to receptors. Implementation of Mitigation Measure 2.6-1(b) would further reduce vibration impacts by requiring the use of quieter pile-driving technology and ensuring the proper considerations are taken to minimize vibration impacts to adjacent structures. This impact would be less than significant with mitigation (LS-M).

Projects taking advantage of CEQA Streamlining provisions of SB 375 (PRC Sections 21155.1, 21155.2, and 21159.28) must apply the mitigation measures described above to address site-specific conditions. However, MTC/ABAG cannot require local implementing agencies to adopt the above mitigation measures, and it is ultimately the responsibility of a lead agency to determine and adopt mitigation. Therefore, this impact remains **significant and unavoidable (SU)** for purposes of this program-level review.

Impact 2.6-2: Implementation of the proposed Plan could result in long-term permanent increases in traffic-noise levels that exceed applicable thresholds.

Impacts of Changes in Projected Land Use and Transportation Projects

Traffic noise impacts were assessed at the county level and based on baseline (2015) and buildout (2040) modeled traffic volumes by roadway types, including all on-road vehicles and busses. Thus, traffic-noise modeling represents both regional and local noise levels, but because it is based on large scale traffic modeling, the noise modeling is necessarily imprecise and should be treated as representative of likely noise levels and changes from baseline conditions.

The proposed Plan envisions a mixture of development and redevelopment land use growth patterns throughout the Plan area, primarily in PDAs and TPAs. Projected development projects would generate new vehicle trips, and these trips would be distributed on existing and Plan-related roadways. Even with improved land use distribution that generates relatively fewer trips, increased roadway volumes would result from implementation of development projects.

Implementation of the proposed transportation projects would affect the distribution of vehicle travel throughout the region. Bay Area UrbanSim and Travel Model One allow for the proposed Plan (2040) traffic simulation to reflect both forecasted development and implementation of transportation projects. Therefore, with respect to the potential for an increase in regional roadway noise, this impact assessment includes VMT increases from implementation of both the land use growth patterns and transportation projects under the proposed Plan. **Table 2.6-7** identifies existing and existing-plus proposed Plan average noise levels by roadway type (e.g., freeways, expressways, major arterials, and collectors) for each county within the Plan area.

Significant impacts from traffic-noise would result if noise levels exceed the noise levels expressed in the Significance Criteria (by roadway type), or if traffic noise levels result in a substantial increase in noise, defined by 1.5 dBA if existing traffic noise exceeds thresholds or 3 dBA if existing noise levels do not exceed noise thresholds.

Table 2.6-7 Average Noise Levels by Roadway Type by County

County	Roadway Type	Modeled Traffic-Noise CNEL/L_{dn} (dBA) at 100 feet from Roadway Centerline		
		2015	2040 Plan	Net Change (dB)
San Francisco	Freeway	**73.8**	**74.0**	+0.2
	Expressway	67.8	69.7	+1.9
	Major Arterial	63.4	64.1	+0.7
	Collector and Other	55.3	56.9	+1.6
San Mateo	Freeway	**72.8**	**76.2**	**+3.4**
	Expressway	68.7	69.9	+1.2
	Major Arterial	60.0	60.8	+0.8
	Collector and Other	54.3	55.1	+0.8
Santa Clara	Freeway	**74.3**	**74.8**	+0.6
	Expressway	68.9	69.7	+0.7
	Major Arterial	60.6	61.6	+1.0
	Collector and Other	54.9	55.4	+0.5
Alameda	Freeway	**75.9**	**76.1**	+0.2
	Expressway	**69.1**	**71.3**	+2.2
	Major Arterial	61.2	62.0	+0.8
	Collector and Other	54.4	55.0	+0.6
Contra Costa	Freeway	**74.6**	**74.8**	+0.2
	Expressway	69.2	68.8	-0.4
	Major Arterial	60.3	61.5	+1.1
	Collector and Other	53.8	54.6	+0.9
Solano	Freeway	**75.3**	**75.8**	+0.4
	Expressway	67.9	68.6	+0.7
	Major Arterial	57.6	58.5	+0.9
	Collector and Other	52.1	52.1	0.0
Napa	Freeway	**74.4**	**75.0**	+0.5
	Expressway	**71.2**	**72.0**	+0.8
	Major Arterial	60.8	61.3	+0.5
	Collector and Other	53.6	54.4	+0.8
Sonoma	Freeway	**72.4**	**72.5**	+0.1
	Expressway	**70.5**	**72.5**	**+1.9**
	Major Arterial	60.1	60.9	+0.8
	Collector and Other	57.3	58.0	+0.8
Marin	Freeway	**74.5**	**74.7**	+0.2
	Major Arterial	61.2	61.6	+0.3
	Collector and Other	55.1	55.4	+0.3

Notes: Bolded text represents areas that exceed project-specific maximum noise exposure limits (i.e., 70 dBA CNEL for freeways and expressways and 65 dBA CNEL for major arterials, collectors, and all other roads) and where substantial permanent increase in noise occur.

Based on the modeling conducted, and indicated by bold numbers within the 2015 column in Table 2.6-6, average noise levels on freeways under existing conditions exceed applicable noise thresholds of 70 dBA CNEL in every county within the region. In addition, existing noise levels on expressways exceed 70 dBA in Napa and Sonoma counties. Existing average noise levels on smaller roads such as major arterials and collectors do not currently exceed levels of 65 dBA CNEL (i.e., threshold applied to roads other than freeways/expressways) in any county. In areas where traffic-noise levels currently exceed thresholds, it would continue to exceed thresholds with implementation of the proposed Plan.

Implementation of the proposed Plan would result in increases in traffic-related noise on almost every roadway type within the Plan area, except for expressways in Contra Costa County where a slight decrease was modeled. Increases in traffic-related noise ranged from 0.1 dB to 3.4 dB, with a majority of the increases being below 1 dB. Freeways in San Mateo County currently exceed 70 dBA CNEL (without the proposed Plan) and would experience an average increase of 3.4 dB, which would be considered substantial (above the 1.5 dB increase). Freeways and Expressways in Sonoma County currently exceed applicable noise thresholds and with the proposed Plan, expressways would result in a substantial (i.e., 1.5 dB) increase in noise. Traffic-noise levels that do not exceed exterior noise levels would not result in a 3 dB increase as a result of the proposed Plan.

With regard to interior noise thresholds of 45 dBA CNEL, buildings provide varying degrees of exterior-to-interior noise reduction but typically can achieve a minimum 25 dBA reduction. Thus, receptors within areas experiencing noise levels below the exterior noise thresholds of 70 dBA CNEL would also experience acceptable interior noise levels of 45 dBA CNEL (i.e., areas beyond the freeway's 70 dBA CNEL contour). Based on the modeling conducted, under baseline conditions, freeway 70 dBA CNEL contours within the Plan area range from a minimum distance of 153 feet to a maximum distance of 268 feet from the freeway centerlines. With implementation of the proposed Plan, freeway 70 dBA CNEL contours within the Plan area would range from a minimum distance of 155 feet to a maximum distance of 281 feet from the freeway centerlines, an increase of 13 feet (see Appendix H for noise contour details).

Thus, given that freeways within the area currently exceed 70 dBA CNEL (up to 268 feet from the freeway centerlines) and would continue to exceed 70 dBA CNEL (up to 281 feet from the freeway centerline) with the proposed Plan, the interior noise thresholds may also be exceeded in these areas. Therefore, traffic-related noise as a result of the proposed Plan, could result in excessive noise levels (i.e., 70 dBA CNEL land use compatibility and traffic-noise threshold) and a substantial permanent noise increase at existing and future projected development.

Because the proposed Plan would result in traffic-noise levels that exceed applicable noise thresholds and would result in a substantial noise increase in some areas, this impact is considered potentially significant (PS).

Conclusion

The proposed Plan would result in regional average noise increases and localized traffic-related noise levels that exceed applicable thresholds and a substantial permanent increase in noise in some areas due to implementation of the projected land use growth and transportation projects. This change would represent a **potentially significant (PS)** impact. Mitigation Measure 2.6-2 is recommended.

Mitigation Measures

Implementing agencies and/or project sponsors shall implement measures, where feasible and necessary based on project- and site-specific considerations that include, but are not limited to:

2.6-2 For all new development that could be located within the 70 dBA CNEL noise contour of a roadway (within 270 feet of the roadway's centerline based on freeways with the greatest volumes in the region), a site-specific noise study shall be conducted by a qualified acoustical engineer or noise specialist, to evaluate noise exposure at new receptors and recommend appropriate measures to reduce noise exposure. To reduce exposure from traffic-noise, lead agencies and/or project sponsors shall consider mitigation measures including, but not limited to those identified below:

- design adjustments to proposed roadway or transit alignments to reduce noise levels in noise sensitive areas (e.g., below-grade roadway alignments can effectively reduce noise levels in nearby areas);
- use techniques such as landscaped berms, dense plantings, reduced-noise paving materials, and traffic calming measures in the design of their transportation improvements;
- contribute to the insulation of buildings or construction of noise barriers around sensitive receptor properties adjacent to the transportation improvement;
- use land use planning measures, such as zoning, restrictions on development, site design, and buffers to ensure that future development is noise compatible with adjacent transportation facilities and land uses;
- construct roadways so that they are depressed below-grade of the existing sensitive land uses to create an effective barrier between new roadway lanes, roadways, rail lines, transit centers, park- n-ride lots, and other new noise generating facilities; and
- maximize the distance between noise-sensitive land uses and new noise-generating facilities and transportation systems.

Significance after Mitigation

Implementation of Mitigation Measure 2.6-2 would result in substantial reductions in traffic-noise. Depending on barrier construction, up to 10 dBA in noise reduction is typically feasible (FHWA 2006), which would be adequate to bring the highest modeled traffic noise levels of 76.2 dBA CNEL to below the 70 dBA CNEL threshold. Site design, including proximity to the noise source, can achieve varying degrees of noise reduction depending on the distance to the source. Building construction methods can typically achieve at a minimum a 25-dB exterior-to-interior noise reduction, but much higher levels of reduction are achievable through additional wall insulation and sound proofing techniques. To the extent that an individual project adopts and implements all feasible mitigation measures described above, the impact would be less than significant with mitigation (LS-M).

Projects taking advantage of CEQA Streamlining provisions of SB 375 (PRC Sections 21155.1, 21155.2, and 21159.28) must apply the mitigation measures described above to address site-specific conditions. However, MTC/ABAG cannot require local implementing agencies to adopt the above mitigation measures, and it is ultimately the responsibility of a lead agency to determine and adopt mitigation. Therefore, this impact remains **significant and unavoidable (SU)** for purposes of this program-level review.

Impact 2.6-3: Implementation of the proposed Plan could result in long-term permanent increases in rail transit noise levels that exceed applicable thresholds.

Impacts of Changes in Projected Land Use

Forecasted development would occur throughout the region, which could result in traffic-noise increases on affected roadways. However, transit-noise exposure would vary greatly depending on proximity to existing noise sources (i.e., transit corridors) and ambient noise levels. Typically, urbanized areas where a majority of development would occur, experience higher noise levels compared to more rural or less densely populated areas. Nonetheless, noise impacts would vary greatly depending on the local conditions. Many of the land use growth footprints in the proposed Plan are purposely located along existing and projected transit corridors to help facilitate a reduction in VMT within the region. Locating residential land uses in proximity to transit could result in exposure of future residents to noise levels in excess of land use compatibility thresholds established for this analysis (i.e., 70 dBA CNEL exterior and 45 dBA CNEL interior). For example, TPAs are identified within San Francisco, San Mateo and Santa Clara counties adjacent to the Caltrain alignment, while some TPAs in Alameda, Contra Costa and Solano counties are adjacent to Amtrak alignments.

Noise from rail-transit can vary depending on the frequency of trains passing throughout the day, the type of train (i.e., electric or diesel), whether or not a warning horn is used, and the type of track (i.e., elevated or not).

Based on available data for Caltrain lines within the region, 24-hour noise levels can range from 70 dBA CNEL/L_{dn} at 50 feet from the track to 82 dBA CNEL/L_{dn} at 45 feet from the track (Peninsula Corridor Joint Powers Board 2014).

Based on these reference noise levels, forecasted land uses placed in close proximity (i.e., within 50 feet) to existing rail-transit lines could be exposed to noise levels that exceed applicable exterior noise thresholds of 70 dBA CNEL. Typical building construction can achieve, at a minimum, a 25-dBA exterior-to-interior noise reduction. Thus, in many cases without additional insulation or advanced acoustical construction methods (e.g., duel or triple pane windows; additional sound insulation; etc.), interior noise thresholds would be met within new development. However, considering that some trains may result in noise exposure of up to 82 dBA CNEL at 45 feet, additional consideration may be necessary to determine if interior noise thresholds would be met, taking into consideration existing transit-noise levels and proximity to projected development.

Due to the variability in noise levels generated from transit lines and the potential for projected land use growth footprints to be located in close proximity to these sources, it is likely that exterior and interior noise thresholds would be exceeded at residences within 50 feet of the tracks, thus exposing new sensitive receptors to excessive noise levels. Exterior and interior noise exposure impacts to projected development from transit-related noise would be potentially significant (PS).

Impacts of Transportation Projects

Transit expansion projects would occur in multiple areas within the Plan area, but would occur primarily in urbanized areas and near existing transit facilities. Increases in transit-related noise as a result of the proposed Plan could occur throughout the region as transit lines are expanded and service frequency increased. However, noise levels would vary greatly depending on the type of transit facility and proximity to existing sensitive land uses. Because transit noise impacts would vary greatly depending on local conditions, these impacts are addressed at the local level below.

Extension of rail transit service to previously unserved areas of the Plan area could result in exposure of existing sensitive land uses to noise levels in excess of thresholds developed for this analysis (i.e., 70 dBA CNEL). Such projects include:

- East County Rail Extension (eBART), Phase 1 (Contra Costa County);
- Historic Streetcar Extension – Fort Mason to 4th & King (San Francisco);
- BART Silicon Valley Extension – San Jose (Barryessa) to Santa Clara (Santa Clara County);
- Extend light-rail transit from Winchester Station to Route 85 (Vasona Junction) (Santa Clara County);
- SMART Rail Extension to Windsor (Sonoma County); and
- Caltrain/California High Speed Rail Downtown San Francisco Extension (San Francisco).

The degree of this potential impact would depend upon the type (diesel or electric powered) and frequency of rail pass-by events and the existing ambient noise level at the existing receptor. These projects are generally located in urban areas that are already exposed to high levels of vehicle traffic noise.

Expanding or building new transit lines in areas without existing rail lines would result in a new substantial noise source that could result in excessive noise exposure depending on the type of existing land uses and proximity to the new noise sources. Further, it is likely that new rail lines would have similar noise levels to those discussed above. Therefore, they could exceed applicable exterior (i.e., 70 dBA CNEL) and interior (i.e., 45 dBA CNEL) noise thresholds at existing sensitive land uses. In addition, because new or expanded rail lines could result in noise levels of 70 dBA CNEL and up to 82 dBA CNEL, when compared to existing conditions where no rail currently exists, noise levels would substantially increase (i.e., likely more than 3 dB above ambient levels). Some of the above identified rail extension projects included within the proposed Plan would result in potentially significant (PS) impacts resulting from excessive noise exposure to existing sensitive receptors along the extended transit alignment and permanent substantial increases in noise and would require mitigation. Mitigation Measures 2.6(d), 2.6(e), and 2.6(f) are described below.

With regard to potential increases in rail-transit noise at existing transit facilities, a doubling of a noise source is required to result in a 3 dB increase. When considering noise from rail operations, this means that the total daily train frequency would need to double as a result of the proposed Plan, which is not likely to occur. However, considering that trains could generate noise levels of up to 82 dBA CNEL/L_{dn}, and transit lines are currently located in urbanized areas near major roads and freeways, where noise levels are currently high, a 1.5 dBA increase in transit-noise would be considered substantial. Given the projected population growth in the region, it is likely that additional transit services and potentially increased frequency of passenger trains would be required in the future to meet increasing demand. As explained in Impact 2.1-5 in Section 2.1, "Transportation," the proposed Plan includes major investments that create new transit lines or boost frequencies on existing lines. Thus, it is expected that implementation of the proposed Plan would result in a 1.5 dBA or more increase in transit-nose. Increases in transit noise on existing facilities would result in potentially significant (PS) impacts that would require mitigation.

Conclusion

Projected development could be exposed to exterior and interior noise levels in excess of established thresholds. Further, new and expanded transit lines would result in new noise sources and substantial increases in noise depending on proximity to existing sensitive land uses, resulting in a **potentially significant (PS)** impact. Mitigation Measures 2.6-3(a), 2.6-3(b), and 2.6-3(c) are described below.

Mitigation Measures

To reduce transit-related noise exposure to existing or proposed development within 50 feet of a rail transit line, implementing agencies and/or project sponsors shall implement measures, where feasible and necessary based on project- and site-specific considerations that include, but are not limited to:

2.6-3(a) When finalizing development project site plans, noise-sensitive outdoor use areas shall be sited as far away from adjacent noise sources as possible and site plans shall be designed to shield noise-sensitive spaces with buildings or noise barriers whenever possible.

2.6-3(b) When finalizing development project site plans or transportation project design, sufficient setback between occupied structures and the railroad tracks shall be provided to minimize noise exposure to the extent feasible.

2.6-3(c) Prior to project approval, the implementing agency for a transportation project shall ensure that the transportation project sponsor applies the following mitigation measures (or other technologically feasible measures) to achieve a site-specific exterior noise level of 70 dBA CNEL (or other applicable local noise standard) and interior noise level of 45 dBA CNEL at sensitive land uses, as applicable for transit projects:

- use of sound reduction barriers such as landscaped berms and dense plantings,
- locate rail extension below grade as feasible,
- use of damped wheels on railway cars,
- use of vehicle skirts,
- use under car acoustically absorptive material, and
- install sound insulation treatments for impacted structures.

Significance after Mitigation

Implementation of the above mitigation measure would ensure that site-specific planning would include all technologically feasible measures to reduce transit noise to the extent possible. Further, site planning and building construction would be developed to achieve the necessary noise reduction, based on site-specific parameters. To the extent that an individual project adopts and implements all feasible mitigation measures described above, the impact would be less than significant with mitigation (LS-M).

Projects taking advantage of CEQA Streamlining provisions of SB 375 (PRC Sections 21155.1, 21155.2, and 21159.28) must apply the mitigation measures described above to address site-specific conditions. However, MTC/ABAG cannot require local implementing agencies to adopt the above mitigation measures, and it is

ultimately the responsibility of a lead agency to determine and adopt mitigation. Therefore, this impact remains **significant and unavoidable (SU)** for purposes of this program-level review.

Impact 2.6-4: Implementation of the proposed Plan could result in long-term permanent increase in transit-vibration levels that exceed applicable thresholds.

Impacts of Changes in Projected Land Use

Vibration can result in structural damage to buildings or disturbance to people at nearby sensitive land uses (e.g., residences, hospitals, offices). However, vibration levels dissipate rapidly from the source and are typically short-term events (i.e., train passing-by). Therefore, vibration effects are limited to localized areas near the vibration source, as discussed in further detail below.

Many of the projected development areas in the proposed Plan are purposely located along existing and projected transit corridors to help facilitate a reduction in VMT in the region. Locating residential land uses in proximity to transit could also result in exposure of the future residents to vibration levels in excess of guidelines established by FTA or Caltrans. Unlike noise impacts from transportation which are assessed in terms of 24-hour noise levels (i.e., CNEL, L_{dn}), vibration impacts are assessed relative to peak vibration levels.

Ground vibration can be a concern for land uses in close proximity of a transit system route or maintenance facility. It is unusual for vibration from sources such as buses and trucks to be perceptible (FTA 2006). The smoothness of the running surface (e.g. road or rail) is correlated to the level of vibration from a moving vehicle. Smooth roadways for buses and smooth rail running surfaces for rail systems substantially reduce vibration. Further, urbanized and developed areas where roads are paved and maintained regularly would be considered a smooth surface for bus transit. Thus, transit over rail would be considered the primary ground vibration sources within the Plan area.

The proposed Plan could facilitate the construction of sensitive land uses within portions of the Plan area where known vibration sources exist, primarily in the TPAs located along the existing active railroad corridors (i.e., primary ground vibration sources within urban areas).

With regard to vibration impacts on projected development near railroads, human disturbance is the primary concern. For the purposes of this analysis, it is assumed that rail transit would comply with Caltrans design recommendations for control of vibration (Caltrans 2013) and therefore, as a result vibration levels from trains passing would not result in structural damage to projected development Therefore, this analysis focusses on the effects of ground vibration on human disturbance from rail transit.

The FTA Transit Noise and Vibration Impact Assessment Guidelines provide recommended vibration levels for various land use types based on the frequency of exposure from vibration events (i.e., number of trains passing by a sensitive land use). In some areas within the region, future projected development could be exposed to frequent vibration events (i.e., more than 70 trains per day), occurring adjacent to rail lines used by BART, Caltrain, Amtrak, or others. Based on this frequency of train passing events, the FTA recommended level for which human disturbance would occur is 72 VdB. Thus, based on the Generalized Ground Surface Vibration curves in the FTA guidance, projected development within 200 feet of an existing railroad could exceed the recommended threshold for human disturbance of 72 VdB for sensitive receptors that are exposed to a higher frequency of vibration events (i.e., 70 or more trains passing by in one day. Consequently, land use projects could be exposed to vibration effects that exceed vibration thresholds (i.e., 72 VdB). This would be a potentially significant (PS) impact.

Impacts of Transportation Projects

Transit expansion projects would occur in multiple areas within the region but would occur primarily in urbanized areas and near existing transit facilities. Increases in transit-related vibration as a result of the proposed Plan could occur throughout the region as transit lines are expanded and service frequency increased. However, vibration levels would vary greatly depending on the type of transit facility and proximity

to existing sensitive land uses. Because vibration impacts would vary greatly depending on the local conditions, these impacts are addressed at the local level below.

Extension of rail transit service to new areas of the Bay Area could result in exposure of existing sensitive land uses to vibration levels in excess of vibration thresholds (i.e., levels developed by the FTA as shown in **Table 2.6-4**). Such projects include:

- East County Rail Extension (eBART), Phase 1 (Contra Costa County);
- Historic Streetcar Extension – Fort Mason to 4th & King (San Francisco);
- BART Silicon Valley Extension – San Jose (Barryessa) to Santa Clara (Santa Clara County);
- Extend light-rail transit from Winchester Station to Route 85 (Vasona Junction) (Santa Clara County);
- SMART Rail Extension to Windsor (Sonoma County); and
- Caltrain/California High Speed Rail Downtown San Francisco Extension (San Francisco).

The degree of increased vibration exposure would depend upon the type (diesel or electric powered) and frequency of rail pass-by events and the existing soil conditions at the existing receptor. Expanding or building new transit lines in unserved areas would result in a new substantial vibration source that could result in vibration effects that exceed FTA recommended levels (i.e., 72 VdB) within 200 feet of the source. In addition, because new or expanded rail lines could result in vibration levels that exceed applicable criteria (i.e., 72 VdB) within 200 feet, when compared to existing conditions where no rail currently exists, vibration levels would substantially increase (i.e., more than 1.5 VdB). Some of the above identified rail extension projects included within the proposed Plan would result in potentially significant (PS) impacts resulting from excessive vibration exposure to existing sensitive receptors along the extended transit alignment and permanent substantial increases in vibration levels.

Conclusion

Projected development could be exposed to vibration levels in excess of established thresholds. Further, new and expanded transit lines would result in new vibration sources and substantial increases in vibration depending on proximity to existing sensitive land uses, resulting in a **potentially significant (PS)** impact. Mitigation Measures 2.6-4(a) and 2.6-4(b) are described below.

Mitigation Measures

To reduce vibration effects from rail operations, implementing agencies and/or project sponsors shall implement measures, where feasible and necessary based on project- and site-specific considerations that include, but are not limited to:

2.6-4(a) When finalizing site plans for a development or transportation project, implementing agencies shall conduct a project-level noise and vibration assessments for new residential or other sensitive land uses to be located within 200 feet of an existing rail line. These studies shall be conducted by a qualified acoustical engineer or noise specialist to determine vibration levels at these projects and recommend feasible mitigation measures (e.g., insulated windows and walls, sound walls or barriers, distance setbacks, or other construction or design measures) that would reduce vibration-noise to an acceptable level.

2.6-4(b) Prior to project approval, the implementing agencies shall ensure that project sponsors apply the following mitigation measures to achieve FTA recommended vibration levels of 72 VdB at residential land uses, or other applicable standard, for rail extension projects:

- use of high resilience (soft) direct fixation fasteners for embedded track;
- install ballast mat, or other approved technology for the purpose of reducing vibration, for ballast and tie track; and
- conduct regular rail maintenance including rail grinding, wheel truing to re-contour wheels, providing smooth running surfaces.

Significance after Mitigation

Implementation of the above measures could provide a reduction of 15 to 20 VdB (FTA 2006), which would be adequate to reduce vibration levels to below 72 VdB within 200 feet. To the extent that an individual project adopts and implements all feasible mitigation measures described above, the impact would be less than significant with mitigation (LS-M).

Projects taking advantage of CEQA Streamlining provisions of SB 375 (PRC Sections 21155.1, 21155.2, and 21159.28) must apply the mitigation measures described above to address site-specific conditions. However, MTC/ABAG cannot require local implementing agencies to adopt the above mitigation measures, and it is ultimately the responsibility of a lead agency to determine and adopt mitigation. Therefore, this impact remains **significant and unavoidable (SU)** for purposes of this program-level review.

Impact 2.6-5: Implementation of the proposed Plan could result in general increases in ambient noise and associated exposure of sensitive receptors to new or additional stationary noise sources in excess of standards established in the local general plan or noise ordinance or applicable standards of other agencies.

Impacts of Changes in Projected Land Use and Transportation Projects

This impact assesses the long-term exposure of sensitive receptors to increased operational stationary source noise levels from forecasted land use. Transportation noise is addressed separately in the discussion of Impact 2.6-2 (traffic) and Impact 2.6-3 (transit).

Typical community noise sources include small mechanical devices (e.g., lawn mowers, leaf blowers), parks and playgrounds, restaurants and bars, commercial uses, and industrial plants. Stationary sources may include HVAC units, delivery trucks loading and unloading at commercial land uses, and other equipment associated with commercial and industrial land uses (e.g., pumps, back-up generators, auto body shops). To evaluate noise exposure to existing and new receptors, the land use compatibility thresholds of 70 dBA CNEL (exterior) and 45 dBA CNEL (interior) established for this EIR were used. To evaluate substantial increases in noise from new stationary sources resulting from projected development, substantial increases in noise were based on existing noise levels. Because traffic noise is generally the primary noise source within communities, modeled traffic-noise shown in Table 2.6-7 for 2015 was used to characterize existing ambient levels. Larger urban areas (e.g., San Francisco, Oakland, San Jose) within close proximity to freeways currently exceed 70 dBA CNEL as discussed under impact 2.6-2 and, therefore, in these areas a substantial permanent increase in noise would be considered 1.5 dB or more. Other areas, urban or rural, are less likely to exceed exterior levels of 65 dBA CNEL and therefore an increase of 3 dB or more would be considered substantial in other areas within the region.

Projected development would result in new residential, commercial, and industrial land use development that could include stationary sources (e.g., HVAC units, mechanical equipment) and community noise (e.g., people congregating outside nightclubs or bars, recreation activity at schools or parks, commercial loading docks) that could expose existing receptors to excessive noise levels or result in a substantial permanent increase in noise. Noise levels from HVAC equipment vary substantially depending on unit efficiency, size, and location, but generally range from 45 to 70 dB L_{eq} at a distance of 50 feet (EPA 1971). Reference noise-level measurements of emergency generators with rated power outputs from 50 to 125 kilowatts (kw) result in noise levels ranging from 61 to 73 dB L_{eq} and 63–84 dB L_{max} at a distance of 45 feet (EPA 1971, FHWA 2006). Based on reference noise values and accounting for typical usage factors of equipment used for commercial loading/unloading, noise levels could reach 82 dB L_{eq} and 86 dB L_{max} at a distance of 50 feet.

Stationary and community noise are typically intermittent in nature and fluctuate throughout the day. For example, HVAC units do not typically run all day but operate in short bursts, while noise generated at commercial loading docks may occur more frequently early in the morning, and noise associated with bars and nightclubs would generally occur more frequently in the evening hours. Stationary equipment and community noise is typically regulated through local municipal codes, which provide specific performance

based noise standards, specific to the noise source, and give the local jurisdiction the ability to enforce noise sources that violate the code (e.g., excessive car stereos, equipment operating loudly, people causing disturbances at night, excessive dog barking).

However, implementation of the proposed Plan would result in increased development within areas already experiencing high noise levels (See Table 2.6-8). Although specific locations for these noise sources are not known at this time, considering the projected high density of land development in already urbanized areas, where existing sensitive receptors already exist, it is possible that projected land use development (and associated noise sources) could result in exposure to existing sensitive receptors to noise levels above 70 dBA CNEL (exterior), 45 dBA CNEL (interior), or a substantial increase in noise (i.e., 1.5 dB).

In addition, projected development would place new sensitive receptors (e.g., homes, hospitals, schools, and elder-care facilities) in areas that could be exposed to excessive noise levels. Because traffic noise is generally the primary noise source within communities, modeled traffic-noise shown in Table 2.6-7 for 2015 was used to characterize existing ambient levels. Based on the modeling conducted, projected land use development could place new sensitive land uses in areas where existing ambient noise exceeds the land use compatibility thresholds of 70 dBA CNEL (exterior) and 45 dBA CNEL (interior). Implementation of the proposed Plan could result in a substantial noise exposure to new sensitive land uses and this impact would be considered potentially significant (PS).

Conclusion

Implementation of the proposed Plan could result in noise exposure to existing or new sensitive receptors in excess of land use compatibility thresholds and could result in a permanent substantial increase in noise. This impact is considered **potentially significant (PS)** and Mitigation Measures 2.6-2, 2.6-3, and 2.6-5 are recommended.

Mitigation Measures

2.6-5 To reduce exposure to new and existing sensitive receptors from non-transportation noise associated with projected development, implementing agencies and/or project sponsors shall implement measures, where feasible and necessary based on project- and site-specific considerations that include, but are not limited to:

- Local agencies approving land use projects shall require that routine testing and preventive maintenance of emergency electrical generators be conducted during the less sensitive daytime hours (per the applicable local municipal code). Electrical generators or other mechanical equipment shall be equipped with noise control (e.g., muffler) devices in accordance with manufacturers' specifications.

- Local agencies approving land use projects shall require that external mechanical equipment, including HVAC units, associated with buildings incorporate features designed to reduce noise to below 70 dBA CNEL or the local applicable noise standard. These features may include, but are not limited to, locating equipment within equipment rooms or enclosures that incorporate noise reduction features, such as acoustical louvers, and exhaust and intake silencers. Equipment enclosures shall be oriented so that major openings (i.e., intake louvers, exhaust) are directed away from nearby noise-sensitive receptors.

Significance after Mitigation

To the extent that an individual project adopts and implements all feasible mitigation measures described above, the impact would be less than significant with mitigation (LS-M) because stationary noise sources would be designed to comply with local noise codes. Further, community noise complaints associated with human activity are addressed at the local level and enforced by the applicable regulatory agency.

Projects taking advantage of CEQA Streamlining provisions of SB 375 (PRC Sections 21155.1, 21155.2, and 21159.28) must apply the mitigation measures described above to address site-specific conditions. However, MTC/ABAG cannot require local implementing agencies to adopt the above mitigation measures, and it is ultimately the responsibility of a lead agency to determine and adopt mitigation. Therefore, this impact remains **significant and unavoidable (SU)** for purposes of this program-level review.

Impact 2.6-6: Implementation of the proposed Plan could result in exposure of people residing or working in the planning area to excessive noise levels where an airport land use plan is adopted or, where such a plan has not been adopted, within two miles of a public airport, public use airport, or private airstrip.

Impacts of Changes in Projected Land Use

Public airports typically service entire regions whereas smaller private airports or airstrips tend to serve local users. However, like other noise sources, noise from airports and aircraft flight events have the greatest effect on nearby land uses. There are 26 public use and military airports and numerous private airstrips throughout the Plan area (see Tables 2.13-2 and 2.13-3 in Section 2.13, "Hazards"). Many of the public airports are in urbanized areas where the proposed Plan envisions new development. Specifically, the following airports are located immediately adjacent or TPAs identified in the proposed Plan:

- Oakland International Airport,
- San Francisco International Airport,
- San Jose International Airport,
- Reid-Hillview Municipal Airport (San Jose),
- Moffett Federal Airfield (Mountain View),
- Travis Air Force Base (Fairfield),
- Livermore Municipal Airport, and
- Buchanan Field (Concord).

Most of these airports and airfields have an active Airport Land Use Compatibility Plan (ALUCP) (or the equivalent) to discourage incompatible land uses within the vicinity of the airport. The FAA Part 150 program encourages airports to prepare noise exposure maps that show land uses that are incompatible with high noise levels and these are often included within the ALUCP. For example, the ALUCP for San Francisco International Airport includes information on the number of housing opportunity sites within the 70 CNEL contour for airport operations. In addition, noise contours identified in the Oakland International ALUCP indicate that the 65 dBA CNEL is close to existing development. Thus, the potential exists for forecasted development pursuant to the proposed Plan to occur in areas of 65 dBA CNEL or 70 dBA CNEL, exceeding recommended airport noise thresholds of 65 dBA CNEL for residential land uses and the project-specific land use compatibility thresholds of 70 dBA CNEL.

In addition to consideration of exterior CNEL noise levels, increases in interior noise levels near airports have the potential to result in sleep disturbance at nearby sensitive land uses. In accordance with FICAN guidance, aircraft-generated interior single-event noise levels (SEL) of 65 dBA could result in a five percent or less chance of awakening someone.

Local land use compatibility standards contained in City and County General Plans would typically discourage or require specific site review for construction of sensitive land uses in areas potentially impacted by aircraft noise. However, given the regional scale of the proposed Plan, the high level of potential projected development throughout the region, it is possible that forecasted land use development could be exposed to exterior and interior noise levels from existing airports or airstrips that exceed applicable thresholds. There would be a potentially significant (PS) impact resulting from excessive airport noise levels if projected development were to occur in close proximity to existing airports or airstrips that would require mitigation.

Impacts of Transportation Projects

There are no airport-related transportation investment projects identified in the proposed Plan. Consequently, this would be a less-than-significant impact (LS) with regard to airport or aircraft related noise as a result of implementation of the proposed Plan.

Conclusion

Projected development could potentially be located in close proximity to existing airports such that applicable exterior and interior noise thresholds would be exceeded. No transportation projects are proposed related to

airports; therefore, a **potentially significant (PS)** impact would occur to projected development only. Mitigation Measure 2.6-6 is described below.

Mitigation Measures

To reduce exposure from airport-related noise, implementing agencies and/or project sponsors shall implement measures, where feasible and necessary based on project- and site-specific considerations that include, but are not limited to:

2.6-6 Local lead agencies for all new development proposed to be located within an existing airport influence zone, as defined by the locally adopted airport land use compatibility plan or local general plan, shall require a site-specific noise compatibility. The study shall consider and evaluate existing aircraft noise, based on specific aircraft activity data for the airport in question, and shall include recommendations for site design and building construction to ensure compliance with interior noise levels of 45 dBA CNEL, such that the potential for sleep disturbance is minimized.

Significance after Mitigation

To the extent that an individual project adopts and implements all feasible mitigation measures described above, the appropriate design and building construction would ensure interior noise levels of 45 dBA CNEL, and this impact would be less than significant with mitigation (LS-M).

Projects taking advantage of CEQA Streamlining provisions of SB 375 (PRC Sections 21155.1, 21155.2, and 21159.28) must apply the mitigation measures described above to address site-specific conditions. However, MTC/ABAG cannot require local implementing agencies to adopt the above mitigation measures, and it is ultimately the responsibility of a lead agency to determine and adopt mitigation. Therefore, this impact remains **significant and unavoidable (SU)** for purposes of this program-level review.

2.7 GEOLOGY AND SEISMICITY

This section evaluates the potential impacts related to geology and seismicity resulting from the implementation of the proposed Plan. In addition to regional geologic and seismic hazards, the potential effects related to mineral resources, and local hazards, such as risks related to underlying geologic materials and soils, are also evaluated. The effects of erosion on water quality are addressed in Section 2.8, "Water Resources." No comments regarding geology and seismicity were received in response to the Notice of Preparation.

2.7.1 Environmental Setting

REGIONAL GEOLOGY

The State of California has 11 natural geologic regions, known as geomorphic provinces, which are defined by the presence of similar physical characteristics such as relief, landforms, and geology (California Geological Survey [CGS] 2002). The majority of the nine-county San Francisco Bay Area is located within what is known as the Coast Range geomorphic province, with eastern portions of Solano, Contra Costa, and Alameda Counties extending into the neighboring Great Valley geomorphic province located east of the Coast Ranges.

Coast Range Province

The Coast Range is a geologically complex province that extends 400 miles along the Pacific Coast, from Oregon south into Southern California. The Coast Range province is characterized by a series of northwest-trending ridges and valleys that run roughly parallel to the San Andreas fault zone, and can be further divided into the northern and southern ranges that are separated by San Francisco Bay. The San Francisco Bay is a broad, shallow regional structural depression created from an east-west expansion between the San Andreas and the Hayward fault systems. In the southern Bay Area, the Santa Cruz Mountains border San Francisco Bay on the west, while the Berkeley Hills, an extension of the Diablo Range, are to the east. Mount Diablo marks the northern end of the Diablo Range, which stretches 130 miles southward to the Kettleman Hills at the cusp of the San Joaquin Valley. The broad, low-relief Santa Clara and San Benito valleys lie between the Santa Cruz Mountains and the Diablo Range. In the North Bay, the rugged, mountainous character of the Marin Peninsula is dominated by Mount Tamalpais (elevation 2,604 feet above sea level).

Much of the Coast Range province is composed of marine sedimentary and volcanic rocks that form the Franciscan Assemblage, located east of the San Andreas Fault. The Franciscan Assemblage in this region of California is approximately 65 to 150 million years old and consists primarily of greenstone (altered volcanic rocks), basalt, chert (ancient silica-rich ocean deposits), and sandstone that originated as ancient sea floor sediments. The region west of the San Andreas Fault is underlain by a mass of basement rock known as the Salinian Block that is comprised of mainly marine sandstone (up to 65 million years old), and various metamorphic rocks[1] believed to have originated some 350 miles to the south. The Salinian Block has been moving northward along the west side of the San Andreas Fault and associated rocks can be found as far north as Point Arena.

Marginal lands surrounding San Francisco Bay consist generally of alluvial plains of low relief that slope gently bayward from the bordering uplands and foothills. The alluvial plains that comprise the Bay margin are composed of alluvial sediments (up to two million years old) consisting of unconsolidated stream and basin deposits. These alluvial plains terminate bayward at the tidal marshlands that immediately surround the Bay. Marshlands are composed of intertidal deposits, including widely–found, fine-grained plastic clays commonly referred to as Bay Mud, which, in some areas, underlies artificial fills. Historic shoreline reclamation projects beginning at the turn of the twentieth century have resulted in the placement of varying types of man-made

[1] Metamorphic rocks are sedimentary or volcanic rocks altered by prolonged heating and deformation.

artificial fill that overlie intertidal deposits. San Francisco Bay is originally believed to have encompassed 700 square miles, although dredging and fill operations have reduced the Bay to approximately 400 square miles.

Great Valley

Portions of Solano, Contra Costa, and Alameda Counties are located in the Great Valley geomorphic province, which is characterized by a large, nearly level inland alluvial plain 400 miles in length and averaging 50 miles in width. The topography of the Great Valley is flat, but slopes gently along its eastern margin (Sierra Nevada foothills) and western margin (Coast Ranges). Sediments in the Great Valley consist of gravels, sands, clays, and silts that originated largely from the Sierras, with sediments from the Coast Ranges contributing to a lesser extent. The sediments that compose the valley floor are thick, and in some areas extend as far as 10 miles below the surface. The Great Valley Sequence, a thick section of ancient sea floor sediments extending under the Great Valley, overlies the Coast Range Franciscan Assemblage along the valley's western flank.

SOILS

A wide variety of soils and soil types can be found throughout the nine-county Bay Area region. Soils in the Bay Area fall within four major classifications established by the United States Department of Agriculture's Natural Resource Conservation Service. Depending on localized conditions, these general classifications are grouped into more specific soil types by location, climate, and slope. The Santa Clara valley and the alluvial plains surrounding San Francisco Bay are classified as deep alluvial plain and floodplain soils. These soils occupy the valleys in areas with higher rainfall and are considered productive when drained and fertilized. Soils closer to the Bay margin are generally dark-colored clays that have a high water table or are subject to flooding. Soils at the extreme edge of San Francisco Bay have a moderate to high content of soluble salts; these soils are referred to as alkali soils. Soils in northern San Mateo County, the eastern portion of San Francisco, and Marin County are classified as residual soils and are characterized by moderate depth to underlying bedrock. However, much of the Bay Area has been developed and in urbanized areas native soils are commonly no longer present or have been reworked and combined with imported fill materials over a long history of earthwork activities associated with development.

Seismologists have observed differences in seismic shaking effects that are partially dependent on underlying soil deposits. Soft soils are known to amplify ground shaking and are considered in seismic design requirements. The National Earthquake Hazards Reduction Program (NEHRP) has defined five soil types based on several different criteria. The U.S. Geological Survey (USGS) has modified these definitions slightly, based on studies of earthquake damage in the Bay Area (USGS 2016). The modified definitions are below:

Soil Type A: Includes unweathered intrusive igneous rock. Occurs infrequently in the Bay Area. Does not contribute greatly to shaking amplification.

Soil Type B: Includes volcanics, most Mesozoic bedrock, and some Franciscan bedrock. (Mesozoic rocks are between 245 and 64 million years old. The Franciscan Complex is a Mesozoic unit that is common in the Bay Area.) Does not contribute greatly to shaking amplification.

Soil Type C: Includes some Quaternary (less than 1.8 million years old) sands, sandstones and mudstones, some Upper Tertiary (1.8 to 24 million years old) sandstones, mudstones and limestone, some Lower Tertiary (24 to 64 million years old) mudstones and sandstones, and Franciscan melange and serpentinite. Can contribute to shaking amplification depending on site-specific characteristics.

Soil Type D: Includes some Quaternary muds, sands, gravels, silts and mud. Significant amplification of shaking by these soils is generally expected.

Soil Type E: Includes water-saturated mud and artificial fill. The strongest amplification of shaking is expected for this soil type.

SEISMICITY

The Bay Area is considered a region of high seismic activity with numerous active and potentially active faults capable of producing significant seismic events. An active fault is defined by the State of California as a fault that has had surface displacement within Holocene time (approximately the last 10,000 years). A potentially active fault is defined as a fault that has shown evidence of surface displacement during the Quaternary (last 1.6 million years), unless direct geologic evidence demonstrates inactivity for all of the Holocene or longer. This definition does not mean that faults lacking evidence of surface displacement are necessarily inactive. "Sufficiently active" is also used to describe a fault if there is some evidence that Holocene displacement occurred on one or more of its segments or branches (MTC and ABAG 2013). The USGS Working Group on California Earthquake Probabilities has evaluated the probability of one or more earthquakes occurring in the Bay Area and concluded that there is currently a 63 percent likelihood of a magnitude 6.7 or higher earthquake occurring in the Bay Area by 2037 (USGS 2008).

The San Andreas and the Hayward faults are the two faults considered to have the highest probabilities of causing a significant seismic event in the Bay Area. These two faults are classified as strike-slip-type faults[2] that have experienced movement within the last 150 years. The San Andreas Fault is a major structural feature in the region and forms a boundary between the North American and Pacific tectonic plates. Other principal faults capable of producing significant Bay Area ground shaking are listed in **Table 2.7-1** and shown on **Figure 2.7-1,** and include the Calaveras fault, the Rodgers Creek fault, and the Concord – Green Valley fault. A major seismic event on any of these active faults could cause significant ground shaking and surface fault rupture, as was experienced during earthquakes in recorded history, namely the 1868 Hayward earthquake, the 1906 San Francisco earthquake, and the 1989 Loma Prieta earthquake. The estimated magnitudes (moment) identified in **Table 2.7-1** represent *characteristic* earthquakes on particular faults.[3] In addition, active blind- and reverse-thrust faults[4] in the region that accommodate compressional movement include the Monte Vista–Shannon and Mount Diablo faults.

Table 2.7-1 Active Faults in The Bay Area[1]

Fault	Recency of Movement	Historical Seismicity[2]	Maximum Moment Magnitude Earthquake (Mw)[3]
Hayward	1868 Holocene	M6.8, 1868; Many <M4.5	7.1
San Andreas	1989 Holocene	M7.1, 1989; M8.25, 1906; M7.0, 1838; Many <M6	7.9
Rodgers Creek- Healdsburg	1969 Holocene	M6.7, 1898; M5.6, 5.7, 1969	7.0
Concord–Green Valley	1955 Holocene	Historic active creep	6.9
Marsh Creek-Greenville	1980 Holocene	M5.6 1980	6.9
San Gregorio–Hosgri	Holocene; Late Quaternary	Many M3-6.4	7.3
West Napa	2000 Holocene	M5.2 2000	6.5
Maacama	Holocene	Historic active creep	7.1
Calaveras	1990 Holocene	M5.6-M6.4, 1861 M4 to M4.5 swarms 1970, 1990	6.8
Mount Diablo Thrust	Quaternary (possibly active)	n/a	6.7

Notes:
1 See footnote 4 of the text for definition of active faults.
2 Richter magnitude (M) and year for recent and/or large events. Richter magnitude scale reflects the maximum amplitude of a particular type of seismic wave.
3 The maximum moment magnitude earthquake (Mw), derived from the joint CGS/USGS Probabilistic Seismic Hazard Assessment for the State of California, 1996 (CGS OFR 96-08 and USGS OFR 96-706).

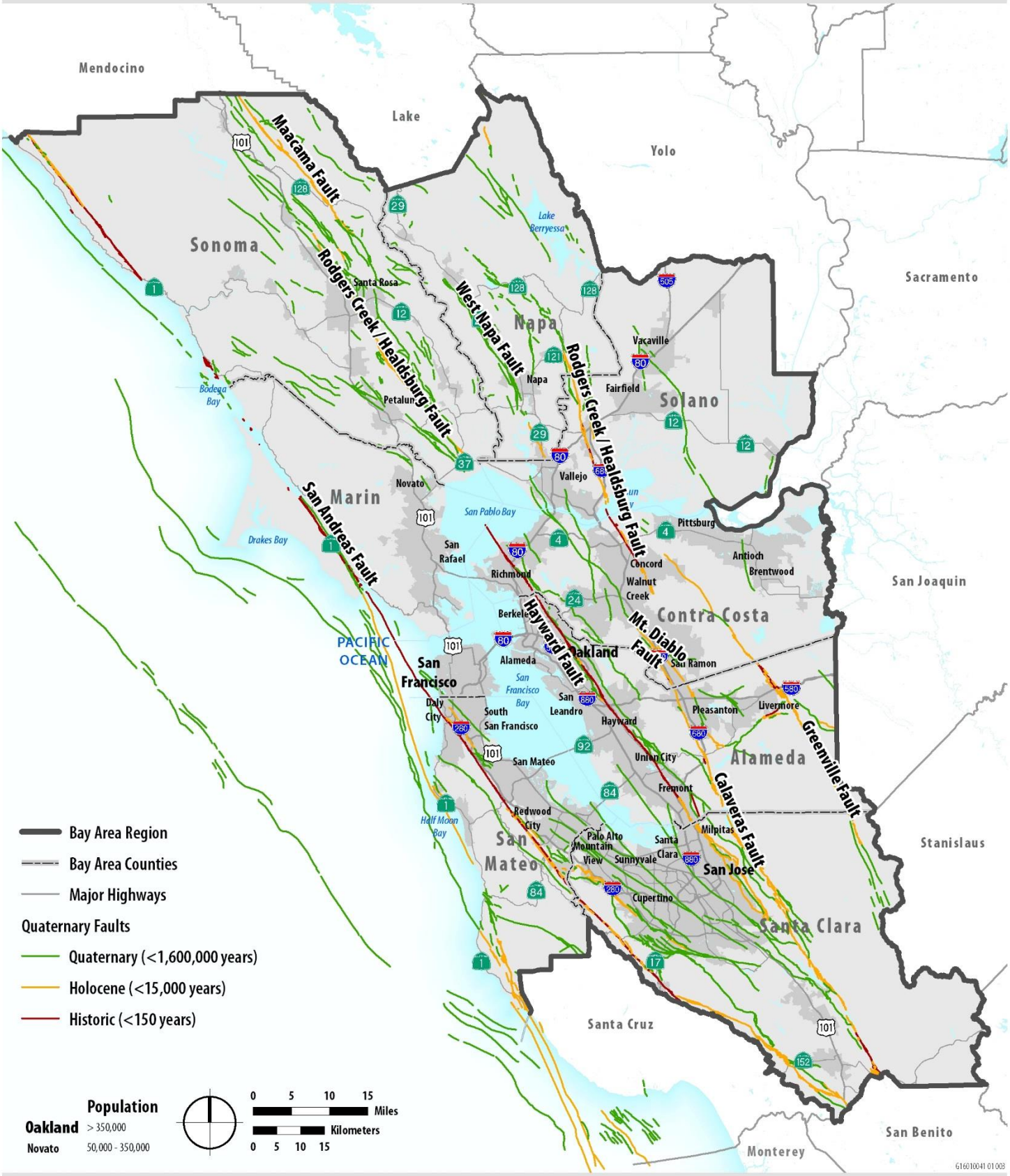
Source: MTC and ABAG, Plan Bay Area Draft Environmental Impact Report, 2013.

[2] "Strike-slip" faults primarily exhibit displacement in a horizontal direction, but may have a vertical component. Right-lateral strike-slip movement of the San Andreas fault, for example, means that the western portion of the fault is slowly moving north while relative motion of the eastern side is to the south.

[3] Moment magnitude is related to the physical size of a fault rupture and movement across a fault, while Richter magnitude scale reflects the maximum amplitude of a particular type of seismic wave. Moment magnitude provides a physically meaningful measure of the size of a faulting event. The concept of "characteristic" earthquake means that we can anticipate, with reasonable certainty, the actual damaging earthquakes [the size of the earthquakes] that can occur on a fault.

[4] A reverse fault is one with predominantly vertical movement in which the upper block moves upward in relation to the lower block; a thrust fault is a low-angle reverse fault. Blind-thrust faults are low-angled subterranean faults that have no surface expression.

Figure 2.7-1
Principal Faults



Map Data Sources: Metropolitan Transportation Commission (MTC), 2016; Tom Tom North America, 2015; Quaternary Faults, U.S. Geological Survey, 2010.

GEOLOGIC AND SEISMIC HAZARDS

Surface Fault Rupture

Seismically induced ground rupture is defined as the physical displacement of surface deposits in response to an earthquake's seismic waves. The magnitude and nature of fault rupture can vary for different faults or even along different strands of the same fault. Future faulting is generally expected along different segments of faults with recent activity (CGS 2008). Structures, transportation facilities, and utility systems crossing fault traces are at risk during a major earthquake due to ground rupture caused by differential lateral and vertical movement on opposite sides of the active fault trace. Lateral displacement may range from a few inches to over 20 feet, as occurred in the 1906 San Francisco earthquake. Thrust faults, as well as faults with strike-slip movement, can have a vertical displacement component that can total several feet.

However, the exception to obvious surface displacement is the "blind-thrust" fault. The Mount Diablo blind-thrust fault, for example, is a newly recognized earthquake source for the Bay Area. It has been mapped on the western base of Mount Diablo on the east side of the San Ramon Valley. The USGS Working Group on California Earthquake Probabilities recommended that this particular thrust fault be considered in their seismic probability calculations. This fault is considered a "blind thrust" because it does not exhibit a surficial expression of displacement. The Mount Diablo thrust fault slips at a long-term rate of about 3 millimeters per year, but has not been zoned as an active fault under the Alquist-Priolo Earthquake Fault Zoning Act due to the inability to identify its exact location on the surface (see description of the Alquist-Priolo Act in Section 2.7.2, "Regulatory Setting"). Although surface fault rupture could occur on any of the multiple active and potentially active faults located within the Bay Area, ground rupture is most likely to occur along active faults zoned as Earthquake Fault Zones under mandate of the Alquist-Priolo Act.

Ground Shaking

Strong ground movement from a major earthquake could affect the Bay Area during the next 30 years. Ground shaking may affect areas hundreds of miles distant from the earthquake's epicenter. The intensity of ground movement during an earthquake can vary depending on the overall magnitude, distance from the fault, focus of earthquake energy, and type of geologic material.

Areas that are underlain by bedrock tend to experience less ground shaking than those underlain by unconsolidated sediments, such as artificial fill. The composition of underlying materials in areas located relatively distant from faults can intensify ground shaking. For example, portions of the Bay Area that experienced the worst structural damage due to the Loma Prieta earthquake were not those closest to the fault, but rather those with soils that amplified the effects of ground shaking. The Modified Mercalli (MM) intensity scale (see **Table 2.7-2**) is a common measure of earthquake effects due to ground shaking intensity. The MM values for intensity range from I (earthquake not felt) to XII (damage nearly total), and intensities ranging from IV to X could cause moderate to significant structural damage.[5]

[5] The damage level represents the estimated overall level of damage that will occur for various MM intensity levels. The damage, however, will not be uniform. Some structures will experience substantially more damage than this overall level, and others will experience substantially less damage. Not all structures perform identically in an earthquake. The age, material, type, method of construction, size, and shape of a structure all affect its performance.

Table 2.7-2 Modified Mercalli Intensity Scale

Intensity	Description	Average Peak Acceleration[1]
I	Not felt except by a very few persons under especially favorable circumstances.	<0.0017g
II	Felt only by a few persons at rest, especially on upper floors on buildings. Delicately suspended objects may swing.	<0.014g
III	Felt quite noticeably indoors, especially on upper floors of buildings, but many persons do not recognize it as an earthquake. Standing motor cars may rock slightly. Vibration similar to a passing of a truck.	<0.014g
IV	During the day felt indoors by many, outdoors by few. At night, some awakened. Dishes, windows, doors disturbed; walls make cracking sound.	0.014g-0.039g
V	Felt by nearly everyone, many awakened. Some dishes, windows, broken; a few instances of cracked plaster; unstable objects overturned. Disturbances of trees, poles, and other tall objects sometimes noticed. Pendulum clocks may stop.	0.039g-0.092g
VI	Felt by all, many frightened and run outdoors. Some heavy furniture moved; a few instances of fallen plaster or damaged chimneys. Damage slight.	0.092g-0.18g
VII	Everybody runs outdoors. Damage negligible in buildings of good design and construction; slight to moderate in well-built ordinary structures; considerable in poorly built or badly designed structures; some chimneys broken. Noticed by persons driving motor cars.	0.18g-0.34g
VIII	Damage slight in specially designed structures; considerable in ordinary substantial buildings, with partial collapse; great in poorly built structures. Panel walls thrown out of frame structures. Fall of chimneys, factory stacks, columns, monuments, walls. Heavy furniture overturned. Persons driving motor cars disturbed.	0.34g-0.65g
IX	Damage considerable in specially designed structures; well-designed frame structures thrown out of plumb; great in substantial buildings, with partial collapse. Buildings shifted off foundations. Ground cracked conspicuously. Underground pipes broken.	0.65g-1.24g
X	Some well-built wooden structures destroyed; most masonry and frame structures destroyed with foundations; ground badly cracked. Rails bent. Landslides considerable from riverbanks and steep slopes.	> 1.24g
XI	Few, if any, masonry structures remain standing. Bridges destroyed. Broad fissures in ground. Underground pipelines completely out of service. Earth slumps and land slips in soft ground. Rails bent greatly.	0.092g-0.18g
XII	Practically all works of construction are damaged greatly or destroyed. Waves seen on ground surface. Lines of sight and level are distorted. Objects are thrown upward into the air.	0.18g-0.34g

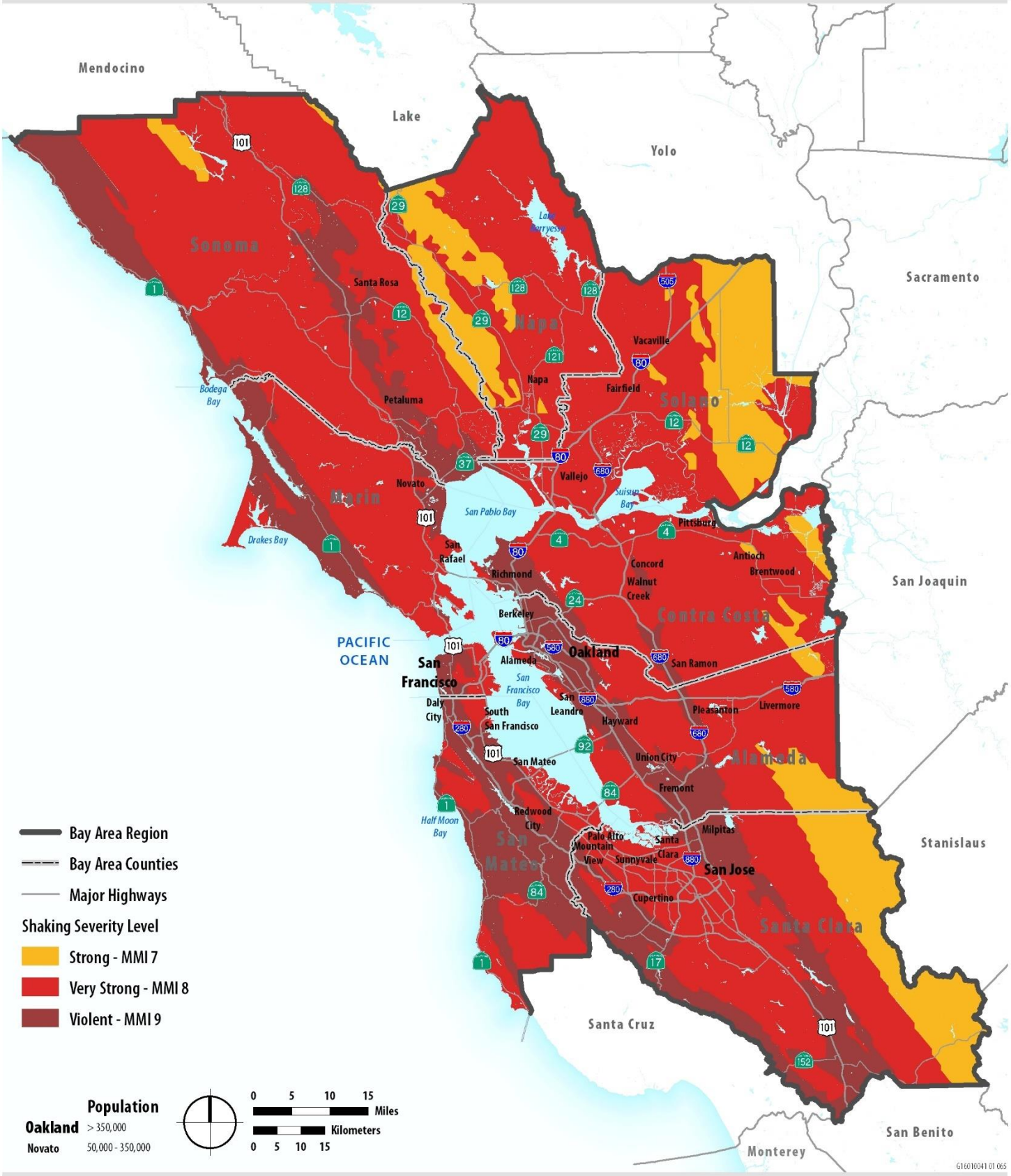
Notes: [1] g (gravity)= 980 centimeters per second squared. Acceleration of 1.0 g is equivalent to a car traveling 328 feet from rest in 4.5 seconds.
Source: MTC and ABAG, Plan Bay Area Draft Environmental Impact Report, 2013.

Areas most susceptible to intense ground shaking are those areas located closest to the earthquake-generating fault, and areas underlain by thick, loosely unconsolidated, saturated sediments, particularly soft, saturated Bay Muds and artificial fill along the tidal margins of San Francisco Bay. Probabilistic ground shaking is mapped in **Figure 2.7-2**. This map shows likely shaking intensity in the Bay Area in any 50 year period from all possible faults.

Liquefaction

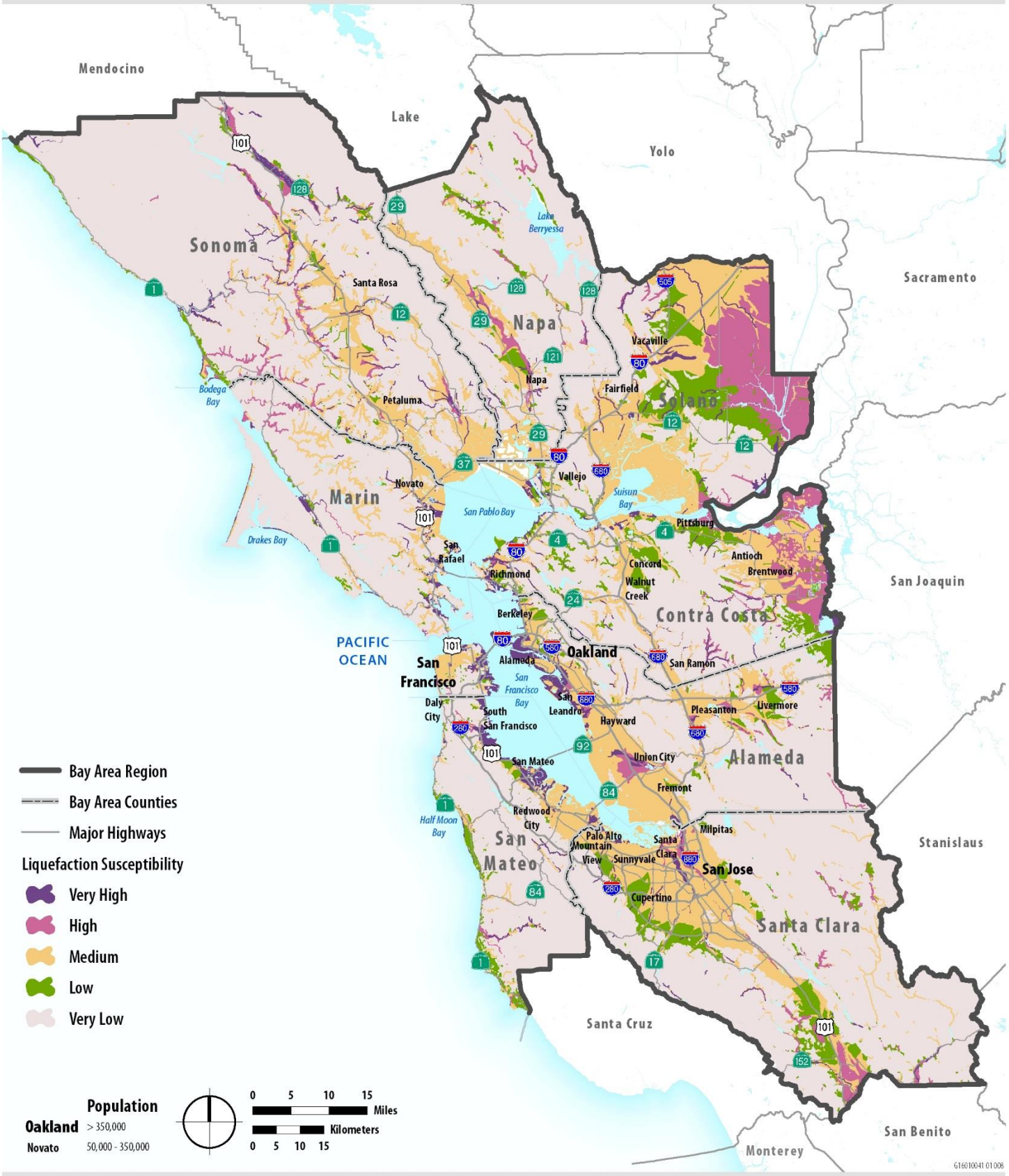
Liquefaction is a phenomenon whereby unconsolidated and/or near saturated soils lose cohesion and are converted to a fluid state as a result of severe vibration. The relatively rapid loss of soil shear strength during strong earthquake shaking results in the temporary fluid-like behavior of the soil. Soil liquefaction causes ground failure that can damage roads, airport runways, pipelines, underground cables, and buildings with shallow foundations. Liquefaction can occur in areas characterized by water-saturated, cohesion-less, granular materials at shallow depths, or in saturated unconsolidated or artificial fill sediments located in reclaimed areas along the margin of San Francisco Bay. Liquefaction potential is highest in areas underlain by shallow groundwater and Bay fills, Bay Mud, and unconsolidated alluvium. **Figure 2.7-3** illustrates liquefaction susceptibility in the Bay Area.

Figure 2.7-2
Ground Shaking Intensity



Map Data Sources: Association of Bay Area Governments (ABAG) & U.S. Geological Survey (USGS), 2013; Metropolitan Transportation Commission (MTC), 2016; Tom Tom North America, 2015.

Figure 2.7-3
Liquefaction



Map Data Sources: Metropolitan Transportation Commission (MTC), 2016; Tom Tom North America, 2015; U.S. Geological Survey (USGS), 2006.

Expansive Soils

Expansive soils possess a "shrink-swell" characteristic. Shrink-swell is the cyclic change in volume (expansion and contraction) that occurs in fine-grained clay sediments from the process of wetting and drying. Changes in soil moisture can result from rainfall, landscape irrigation, utility leakage, roof drainage, and/or perched groundwater. Perched groundwater is a local saturated zone above the water table that typically exists above an impervious layer (such as clay) of limited extent. Expansive soils are typically very fine grained and have a high to very high percentage of clay. Structural damage may occur incrementally over a long period of time, usually as a result of inadequate soil and foundation engineering or the placement of structures directly on expansive soils. Soils with high clay content, such as the Bay Muds located on the margins of the San Francisco Bay, are highly expansive.

Soil Erosion

Soil erosion is the process whereby soil materials are worn away and transported to another area, either by wind or water. Rates of erosion can vary depending on soil material and structure, building placement, and human activity. The potential for soil erosion is variable throughout the Bay Area. Soil with high amounts of silt can be easily eroded, while sandy soils are less susceptible to erosion. Excessive soil erosion can eventually damage building foundations, roadways, and dam embankments. Erosion is most likely on sloped areas with exposed soil, especially where unnatural slopes are created by cut-and-fill activities. Soil erosion rates can, therefore, be higher during the construction phase. Typically, the soil erosion potential is reduced once the soil is graded and covered with concrete, structures, or asphalt.

Settlement

Settlement is the depression of the bearing soil when a load, such as that of a building or new fill material, is placed upon it. Settlement can occur from immediate settlement, consolidation, shrinkage of expansive soil, and liquefaction (discussed above). Immediate settlement occurs when a load from a structure or placement of new fill material is applied, causing distortion in the underlying materials. This settlement occurs quickly and is typically complete after placement of the final load. Consolidation settlement occurs in saturated clay from the volume change caused by squeezing out water from the pore spaces. Consolidation occurs over a period of time and is followed by secondary compression, which is a continued change in void ratio under the application of the load. Soils tend to settle at different rates and by varying amounts, depending on the load weight, which is a phenomenon referred to as differential settlement. Areas are susceptible to differential settlement if underlain by compressible sediments, such as poorly engineered artificial fill or the Bay Mud present in the marshland on the San Francisco Bay margin.

Earthquake-Induced Settlement

Settlement of the ground surface can be accelerated and accentuated by earthquakes. During an earthquake, settlement can occur as a result of the relatively rapid compaction and settling of subsurface materials (particularly loose, non-compacted, and variable sandy sediments) due to the rearrangement of soil particles during prolonged ground shaking. Settlement can occur both uniformly and differentially (i.e., where adjoining areas settle at different rates).

Land Subsidence

Land subsidence can occur in areas experiencing significant declines in groundwater levels. When groundwater is extracted from aquifers in sufficient quantity, the groundwater level is lowered and the water pressure, which supports the sediment grains structure, decreases. In unconsolidated deposits, as aquifer pressures decrease, the increased weight from overlying sediments may compact the fine-grained sediments and permanently decrease the porosity of the aquifer and the ability of the aquifer to store water. In the Bay Area, historical land subsidence has been observed only in Santa Clara County. Nonetheless, contemporary groundwater management plans in the area address the potential for land subsidence (California Department of Water Resources 2013).

Landslides

Slope failures, commonly referred to as landslides, include many phenomena that involve the downslope displacement and movement of material, either triggered by static (i.e., gravity) or dynamic (i.e., earthquake) forces. A slope failure is a mass of rock, soil, and debris displaced downslope by sliding, flowing, or falling. Exposed rock slopes undergo rockfalls, rockslides, or rock avalanches, while soil slopes experience shallow soil slides, rapid debris flows, and deep-seated rotational slides. Landslides may occur on slopes of 15 percent or less; however, the probability is greater on steeper slopes that exhibit old landslide features such as scarps, slanted vegetation, and transverse ridges. Cutting into the slope and removing the lower portion, or slope toe, can reduce or eliminate the slope support, thereby increasing stress on the slope.

Landslide-susceptible areas are characterized by steep slopes and downslope creep of surface materials. Debris flows consist of a loose mass of rocks and other granular material that, if saturated and present on a steep slope, can move downslope. The rate of rock and soil movement can vary from a slow creep over many years to a sudden mass movement. Landslides occur throughout California, but the density of incidents increases in zones of active faulting.

Slope stability can depend on a number of complex variables. The geology, structure, and amount of groundwater in the slope affects slope failure potential, as do external processes (i.e., climate, topography, slope geometry, and human activity). The factors that contribute to slope movements include those that decrease the resistance in the slope materials and those that increase the stresses on the slope. Slope failure under static forces occurs when those forces initiating failure overcome the forces resisting slope movement. For example, a soil slope may be considered stable until it becomes saturated with water (e.g., during heavy rains, or due to a broken pipe or sewer line). Under saturated conditions, the water pressure in the individual pores within the soil increases, reducing the strength of the soil. Areas mapped by USGS as subject to rain-induced landslide hazards are shown in **Figure 2.7-4**. Areas classified as Mostly Landslides consist of mapped landslides and intervening areas between groups of mapped landslides. The Many Landslides designation also consists of mapped landslides and more extensive intervening areas than Mostly Landslides areas. Areas classified as Few Landslides contain few, if any, large mapped landslides, but locally contains scattered small landslides and questionably identified larger landslides (USGS 1997).

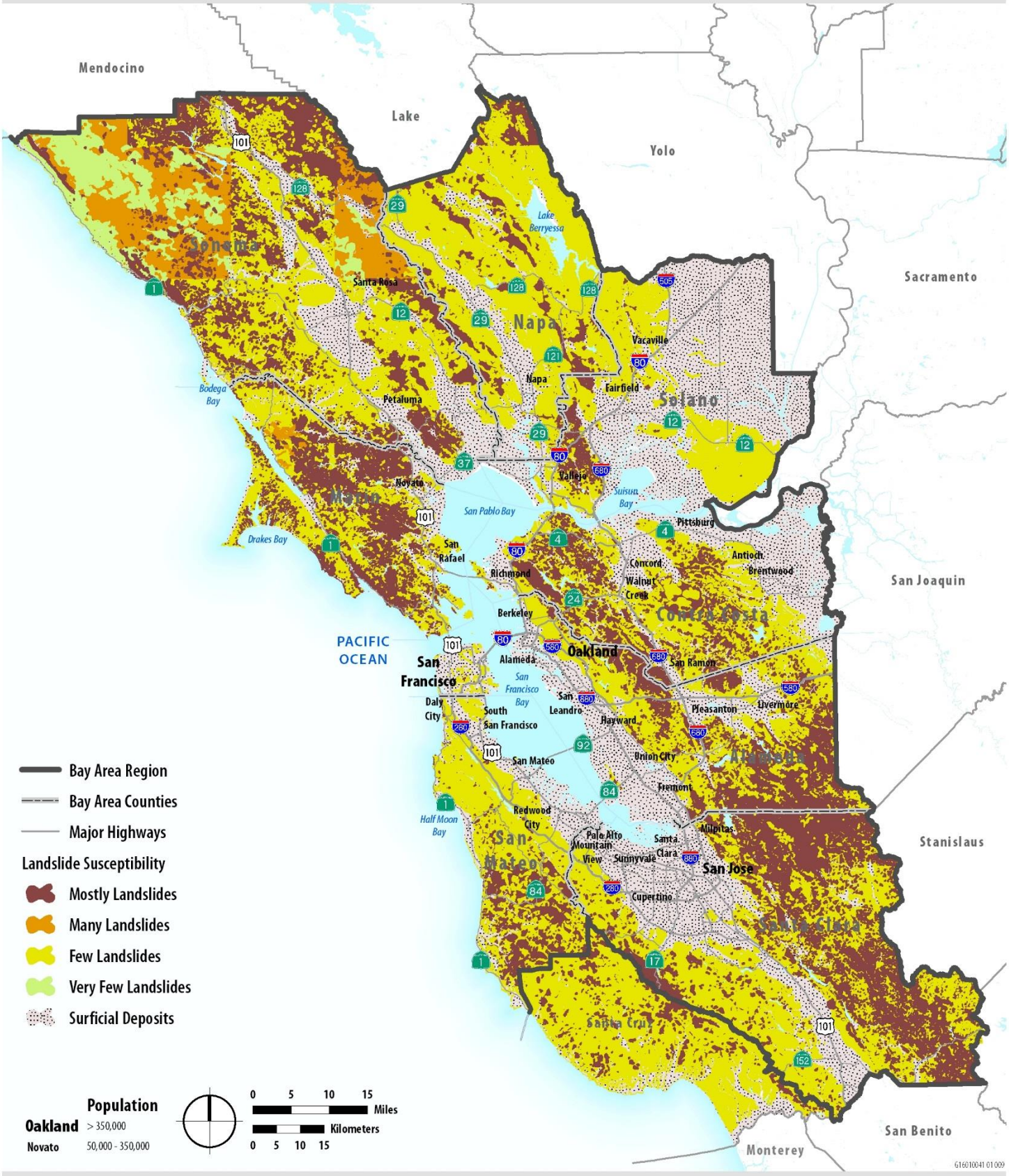
Earthquake motions can induce significant horizontal and vertical dynamic stresses in slopes that can trigger failure. Earthquake-induced landslides can occur in areas with steep slopes that are susceptible to strong ground motion during an earthquake. Earthquake-induced landslide hazards have only been mapped for a portion of the Plan area. Where mapping is available, the hazard areas generally coincide with the areas mapped as Mostly, Many, and Few Landslides in **Figure 2.7-4**.

MINERAL RESOURCES

Most of the mineral resources in the Bay Area are located in the populated plains or valleys (rather than in the mountainous areas), which limits the potential for extraction. Nevertheless, substantial mineral resource extraction has occurred. There are over 25 mineral commodities that have been recovered in substantial quantities (USGS 1975).

Table 2.7-3 lists key mineral resources in the Bay Area. The major mineral resources recovered in the Bay Area are (1) construction materials, such as limestone and oyster shells (used in manufacture of cement), sand and gravel, and crushed stone; (2) energy sources such as gas, oil, and geothermal power; and (3) salines. Historically, most mineral products have been used locally, fulfilling a need for low-cost construction materials and a supply of energy (USGS 1975).

Figure 2.7-4
Landslides



Map Data Sources: Metropolitan Transportation Commission (MTC), 2016; Tom Tom North America, 2015; U.S. Geological Survey (USGS), 1997.

Table 2.7-3 Mineral Resources in the Plan Area, by County

	Alameda County	Contra Costa County	Marin County	Napa County	San Francisco County	San Mateo County	Santa Clara County	Solano County	Sonoma County
Asbestos	X	X		X					
Chromite	X	X	X	X	X	X	X	X	X
Clay	X	X	X	X	X	X	X	X	X
Coal	X	X							
Copper	X	X	X	X			X		X
Diatomite		X		X					X
Expansible shale	X	X	X	X	X	X	X	X	X
Gemstones	X	X	X	X	X	X	X	X	X
Geothermal Resources				X					X
Limestone and shells	X	X	X	X		X	X	X	X
Magnesite	X			X			X		X
Manganese	X	X	X	X			X		X
Mercury	X	X	X	X	X	X	X	X	X
Mineral water		X	X	X		X	X		X
Oil and gas	X	X	X	X		X	X	X	X
Peat		X					X	X	
Pumice		X		X	X			X	X
Pyrite	X								
Salines	X		X	X		X	X	X	
Sand and gravel	X	X	X	X	X	X	X	X	X
Sands, specialty	X	X			X	X			
Silver				X					
Stone, crushed and broken	X	X	X	X	X	X	X	X	X
Stone, dimension	X	X	X	X	X	X	X	X	X
Stone, ornamental			X					X	
Sulfur, byproduct		X							

Source: USGS 1975

2.7.2 Regulatory Setting

FEDERAL REGULATIONS

Earthquake Hazards Reduction Act

The Earthquake Hazards Reduction Act was enacted in 1977 to "reduce the risks to life and property from future earthquakes in the United States through the establishment and maintenance of an effective earthquake hazards and reduction program." To accomplish this, the Act established the NEHRP. NEHRP's mission includes improved understanding, characterization, and prediction of hazards and vulnerabilities; improvement of building codes and land use practices; risk reduction through post- earthquake investigations and education; development and improvement of design and construction techniques; improvement of mitigation capacity; and accelerated application of research results. The NEHRP designates the Federal Emergency Management Agency

(FEMA) as the lead agency of the program and assigns it several planning, coordinating, and reporting responsibilities. Programs under NEHRP help inform and guide planning and building code requirements such as emergency evacuation responsibilities and seismic code standards.

Disaster Mitigation Act of 2000

The Disaster Mitigation Act of 2000 (DMA2K) (Public Law 106-390) amended the Robert T. Stafford Disaster Relief and Emergency Assistance Act of 1988 to establish a Pre-Disaster Mitigation program and new requirements for the federal post-disaster Hazard Mitigation Grant Program. DMA2K encourages and rewards local and state pre-disaster planning. It promotes sustainability, and seeks to integrate state and local planning with an overall goal of strengthening statewide hazard mitigation. This enhanced planning approach enables local, tribal, and state governments to identify specific strategies for reducing probable impacts of natural hazards such as floods, fire, and earthquakes. In order to be eligible for hazard mitigation funding, local governments are required to develop a Hazard Mitigation Plan that incorporates specific program elements of the DMA2K law. In the Bay Area, ABAG has adopted a multi-jurisdictional FEMA-approved 2010 Local Hazard Mitigation Plan Update, which cities and counties can adopt and use, in full or in part, in lieu of preparing all or part of a Local Hazard Mitigation Plan themselves (ABAG 2010).

Clean Water Act Section 402

Section 402 of the Clean Water Act (33 U.S. Code Section 1251 et seq.) establishes a framework for regulating municipal and industrial stormwater discharges under the National Pollutant Discharge Elimination System (NPDES) program. The NPDES program controls water pollution by regulating point sources that discharge pollutants, including rock, sand, dirt, and agricultural, industrial, and municipal waste, into waters of the United States. The Environmental Protection Agency has delegated to the State Water Resources Control Board the authority for the NPDES program in California, which is implemented by the State's nine Regional Water Quality Control Boards. Under the NPDES Phase II Rule, construction activity disturbing 1 or more acres must obtain coverage under the State's General Permit for Discharges of Storm Water Associated with Construction Activity (General Construction Permit). As described further in Section 2.8, "Water Resources," the Construction General Permit requires that applicants develop and implement a Stormwater Pollution Prevention Plan (SWPPP), which specifies best management practices (BMPs) that reduce pollution in stormwater discharges to the Best Available Technology Economically Achievable/Best Conventional Pollutant Control Technology standards and perform inspections and maintenance of all BMPs.

National Pollutant Discharge Elimination System

The NPDES is a federal program for addressing discharges which adversely affect the quality of our nation's waters. NPDES stormwater permits are what regulate the implementation of controls designed to prevent harmful pollutants from being washed by stormwater runoff into local water bodies. Most states, including California, are authorized to implement the NPDES program and issue their own permits for stormwater discharges associated with construction activities. These permits, generally, can be thought of as umbrella permits that cover all stormwater discharges associated with construction activity for a designated time period. Operators of individual construction sites then apply for coverage under the state's General Permit. In California, the General Permit (Order No. 2009-0009-DWQ) was issued by the State Water Resources Control Board and went into effect on July 1, 2010.

Dischargers whose projects disturb 1 or more acres of soil or whose projects disturb less than one acre but are part of a larger common plan of development that in total disturbs one or more acres, are required to obtain coverage under the General Permit for Discharges of Storm Water Associated with Construction Activity Construction General Permit Order 2009-0009-DWQ. Construction activity subject to this permit includes clearing, grading and disturbances to the ground such as stockpiling, or excavation, but does not include regular maintenance activities performed to restore the original line, grade, or capacity of the facility. The Construction General Permit requires the development of a SWPPP by a certified Qualified SWPPP Developer (QSD).

The California Green Building Code (CalGreen) requires SWPPPs for projects that disturb less than 1 acre. CalGreen also requires post construction treatment control BMPs ensure storm water runoff quality. It also requires that project reduce peak runoff through the use of "low impact development" BMPs which indirectly reduce erosion.

International Building Code

The International Building Code (IBC) is published by the International Code Council, a non-profit organization dedicated to developing a single set of comprehensive and coordinated national model construction codes. The IBC addresses health and safety concerns related to structural stability through prescriptive and performance-related requirements. The IBC is used widely across the nation, and many states (including California) adopt the IBC and then add requirements that are more stringent.

STATE REGULATIONS

Alquist-Priolo Earthquake Fault Zoning Act

The Alquist-Priolo Earthquake Fault Zoning Act (formerly the Alquist-Priolo Special Studies Zone Act) of 1972 (revised in 1994) is the State law that addresses hazards from earthquake fault zones and requires the delineation of zones along active faults. The purpose of this law is to mitigate the hazard of surface fault rupture by regulating development on or near active faults. As required by the Act, the State has delineated Earthquake Fault Zones (formerly Special Studies Zones) along known active faults in California. Cities and counties must regulate certain development projects within these zones.

Seismic Hazards Mapping Act

The Seismic Hazards Mapping Act was developed to protect the public from the effects of strong ground shaking, liquefaction, landslides, or other ground failure, and from other hazards caused by earthquakes. This act requires the State Geologist to delineate various seismic hazard zones and requires cities, counties, and other local permitting agencies to regulate certain development projects within these zones. Before a development permit may be granted for a site within a Seismic Hazard Zone, a geotechnical investigation of the site must be conducted and appropriate mitigation measures incorporated into the project design.

The Bay Area includes numerous Seismic Hazard Zones for liquefaction and earthquake induced landslides, as designated by CGS. Any projects in these designated zones require evaluation and mitigation of potential liquefaction or landslide hazards, which must be conducted in accordance with CGS Special Publication 117, adopted March 13, 1997 by the State Mining and Geology Board pursuant to the Seismic Hazards Mapping Act.

California Building Code

The California Building Code (CBC) has been codified in the California Code of Regulations (CCR) as Title 24, Part 2. Title 24 is administered by the California Building Standards Commission, which, by law, is responsible for coordinating all building standards. The purpose of the CBC is to establish minimum standards to safeguard the public health, safety, and general welfare through structural strength, means of egress facilities, and general stability by regulating and controlling the design, construction, quality of materials, use and occupancy, location, and maintenance of all building and structures within its jurisdiction. The 2016 CBC is based on the 2009 IBC published by the International Code Council. In addition, the CBC contains necessary California amendments, which are based on reference standards obtained from various technical committees and organizations such as the American Society of Civil Engineers (ASCE), the American Institute of Steel Construction, and the American Concrete Institute. ASCE Minimum Design Standards 7-05 provides requirements for general structural design and includes means for determining earthquake loads, as well as other loads (e.g., flood, snow, wind), for inclusion into building codes. The provisions of the CBC apply to the construction, alteration, movement, replacement, and demolition of every building or structure or any appurtenances connected or attached to such buildings or structures throughout California.

The earthquake design requirements take into account the occupancy category of the structure, site class, soil classifications, and various seismic coefficients which are used to determine a Seismic Design Category (SDC) for a project as described in Chapter 16 of the CBC. The SDC is a classification system that combines the occupancy categories with the level of expected ground motions at the site and ranges from SDC A (very small seismic vulnerability) to SDC E (very high seismic vulnerability and near a major fault), as well as SDC F (hospitals, police stations, emergency control centers in areas near major active faults). Design specifications are then determined according to the SDC in accordance with Chapter 16 of the CBC. Chapter 16, Section 1613 provides earthquake loading specifications for design and construction to resist the effects of earthquake motions in accordance with ASCE 7-05.

Chapter 18 of the CBC covers the requirements of geotechnical investigations (Section 1803), excavation, grading, and fills (Section 1804), load-bearing of soils (1805), as well as foundations (Section 1808), shallow foundations (Section 1809), and deep foundations (Section 1810). Chapter 18 also describes analysis of expansive soils and the determination of the depth to groundwater table. For SDC D, E, and F, Chapter 18 requires analysis of slope instability, liquefaction, and surface rupture attributable to faulting or lateral spreading, plus an evaluation of lateral pressures on basement and retaining walls, liquefaction and soil strength loss, and lateral movement or reduction in foundation soil-bearing capacity. It also addresses mitigation measures to be considered in structural design, which may include ground stabilization, selecting appropriate foundation type and depths, selecting appropriate structural systems to accommodate anticipated displacements, or any combination of these measures. The potential for liquefaction and soil strength loss must be evaluated for site-specific peak ground acceleration magnitudes and source characteristics consistent with the design earthquake ground motions.

Specifically, Section 1802.7.1 of the CBC requires geologic and earthquake engineering reports for all proposed construction. The purpose of the engineering report is to identify geologic and seismic conditions that may require mitigations. The reports, which are prepared by a California certified engineering geologist in consultation with a California-registered geotechnical engineer, assess the nature of the site and potential for earthquake damage based on appropriate investigations of the regional and site geology, project foundations conditions, and potential seismic shaking at the site. These reports must consider the most recent CGS Note 48 (Checklist for the Review of Engineering Geology and Seismology Reports California Public Schools, Hospitals, and Essential Services Buildings), CGS Special Publication 42: Fault Rupture hazard Zones in California (for projects sites within an Alquist-Priolo Zone), and the most recent version of CGS Special Publication 117: Guidelines for Evaluating and Mitigating Seismic Hazard in California (project sites proposed within a Seismic Hazard Zone). All conclusions must be fully supported by satisfactory data and analysis.

The geotechnical report required in Section 1802.8.1 provides completed evaluations of the foundation conditions of the site and the potential geologic and seismic hazards. It includes site-specific evaluations of design criteria related to the nature and extent of foundation materials, groundwater conditions, liquefaction potential, settlement potential and slope stability; as well as the results of the analysis of problem areas identified in the engineering geologic report. The geotechnical report incorporates estimates of the characteristics of site ground motion provided in the engineering geologic report. The geotechnical report must be prepared by a geotechnical engineer registered in the State of California with the advice of the certified engineering geologist and other technical experts, as necessary. The approved engineering geologic report is submitted with, or as part of, the geotechnical report. Local jurisdictions in the proposed Plan area typically regulate construction activities through a process that requires the preparation of a site-specific geotechnical investigation, consistent with Title 24, Part 2, Chapter 18 of the CBC.

CCR Title 24 also includes the California Residential Code and the California Green Building Code, which have been adopted as separate documents (CCR Title 24, Part 2.5 and 11, respectively). The 2013 California Green Building Standards Code, otherwise known as "CALGreen," was the first State-mandated green building code in the nation. It establishes mandatory minimum green building standards and optional Tier 1 and Tier 2 more stringent provisions. Cities and counties have the discretion to adopt either tier as mandatory or to adopt their own more stringent standards. The green building standards included in CALGreen enhance the design and construction of buildings using planning and design concepts that reduce negative impacts to the environment

through energy efficiency, water efficiency and conservation, and material conservation and resource efficiency. Sections 4.106.2 and 5.106.1 contain requirements intended to limit erosion due to development that would disturb less than 1 acre. The California Residential Code includes structural design standards for residential one- and two-family dwellings and covers all structural requirements for conventional construction. This part incorporates by adoption the 2009 International Residential Code of the International Code Council with necessary California amendments for seismic design. All other structures, including multi-family residential projects, are found in the other parts of the CBC as discussed above.

California Surface Mining and Reclamation Act

The Surface Mining and Reclamation Act of 1975 (SMARA) mandated the initiation by the State Geologist of mineral land classification in order to help identify and protect mineral resources in areas within the State subject to urban expansion or other irreversible land uses that would preclude mineral extraction. Areas are classified into mineral resource zones based on the presence of deposits and how much evaluation of the resource has occurred.

SMARA also allowed the State Mining and Geology Board (SMGB), after receiving classification information from the State Geologist, to designate lands containing mineral deposits of regional or statewide significance. Areas designated by the SMGB are incorporated by regulation into Title 14, Division 2 of the California Code of Regulations. Such designations require that a lead agency's land use decisions involving designated areas are made in accordance with its mineral resource management policies, and that they consider the importance of the mineral resource to the region or the state as a whole and not just the lead agency's jurisdiction. In 1979, SMGB adopted guidelines for the management of mineral resources and preparation of local plans. The guidelines require local general plans to reference the State-identified mineral deposits and sites that are identified by the State geologist for conservation and/or future mineral extraction. Subsequently, the SMGB identified urbanized areas where irreversible land uses precluded mineral extraction.

CGS has mapped mineral resource zones in parts of the Bay Area, but has not created comprehensive digital maps for much of the Plan area.

REGIONAL AND LOCAL REGULATIONS

City and County General Plans

Safety elements are one of the seven required elements of a general plan listed in Section 65302 of the California Government Code. Among other mandatory topics, the safety element establishes policies and programs to protect the community from risks associated with seismic and geologic hazards. Every city and county must consult with CGS and the Office of Emergency Services before the adoption or revision of a safety element.

Hazard Mitigation Plans

As discussed above (see "Disaster Mitigation Act of 2000"), in February 2011, ABAG adopted the 2010 multi-jurisdictional Hazard Mitigation Plan for the Bay Area, originally adopted in 2005. Participating local county and city governments in the Bay Area prepare an Annex to this plan to explain how the plan specifically applies to that agency. Approximately 80 annexes have been approved by FEMA and adopted by Bay Area jurisdictions.

Local Building Codes

Local building codes, like the CBC, are generally customized versions of the IBC. Local boards, councils, and assemblies may exclude portions of the standard codes or adopt more specific requirements to regulate individual land use for the health, safety, and general welfare of the people.

Local Grading and Erosion Control Ordinances

Most counties and cities in the Plan area have grading and erosion control ordinances. These ordinances control erosion and sedimentation caused by construction activities. A grading permit is typically required for construction-related projects. As part of the permit, project applicants are typically required to submit a grading

and erosion control plan, vicinity and site maps, and other supplemental information. Standard conditions in the grading permit typically include a description of BMPs similar to those contained in a SWPPP.

2.7.3 Impact Analysis

SIGNIFICANCE CRITERIA

The effects of the environment on a project are generally outside the scope of CEQA, as concluded recently by the California Supreme Court (see California Building Industry Association v. Bay Area Air Quality Management District [2015] 62 Cal.4th 369, 377 ["we conclude that agencies generally subject to CEQA are not required to analyze the impact of existing environmental conditions on a project's future users or residents. But when a proposed project risks exacerbating those environmental hazards or conditions that already exist, an agency must analyze the potential impact of such hazards on future residents or users."]). Changes to the CEQA Guidelines to reflect this decision are in process by the State, but have not been adopted.

The analysis of geologic effects, which may fall into the category of impacts of "existing environmental conditions on a project's future users or residents" is included herein for disclosure purposes and because CEQA Section 21155.1(a)(6)(D), (E) requires consideration of various geologic hazards (seismic risk, fault zone considerations, landslide hazard) for transit priority project sites eligible for an exemption from further CEQA review under the Sustainable Communities Act.

The following significance criteria are based on CEQA Guidelines Appendix G, as well as the thresholds used in the EIR for the 2013 Plan Bay Area, and professional judgment. Under these criteria, implementation of the proposed Plan would have a potentially significant adverse impact related to geology and seismicity if the Plan would:

Criterion 1: Increase exposure of people or structures to the risk of property loss, injury, or death involving: 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.

Criterion 2: Increase exposure of people or structures to the risk of property loss, injury, or death involving strong seismic ground shaking.

Criterion 3: Increase exposure of people or structures to the risk of property loss, injury, or death involving seismic-related ground failure, including liquefaction.

Criterion 4: Increase exposure of people or structures to the risk of property loss, injury, or death involving landslides.

Criterion 5: Result in substantial soil erosion or topsoil loss.

Criterion 6: Locate development on a geologic unit or soil that is unstable, contains expansive properties, 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.

Criterion 7: Result in the loss of availability of a known mineral resource that would be of value to the region or the residents of the State or a locally-important mineral resources recovery site delineated on a local land use plan.

METHOD OF ANALYSIS

The following program-level analysis is based upon generalized geology maps produced by USGS and CGS. A geographic information system was used to digitally overlay the land use growth footprint associated with

projected development and the footprint associated with transportation projects that would result in new construction on these geological maps to assess the potential for increased exposure to geologic hazards. Results are presented for the region (i.e., the entire growth footprint, often summarized by county), and for the portions of the growth footprint specifically within the transit priority areas (TPAs; this figure is a subset of the regional and county totals). Information provided by county includes both incorporated and unincorporated areas in the county.

The actual footprint and other design details of most of the proposed transportation projects are not known because the projects are in the early stages of planning. Transportation projects, including road widenings, new roads, new or expanded interchanges, and new rail transit infrastructure, were spatially analyzed by calculating buffer areas around the center line or center point of proposed roadway and transit projects. In practice, many of the transportation projects would not use the entire buffer area. The net result is that the acres of impact described in the tables presented in this section are conservative and avoid risks of underestimating the impacts resulting from the implementation of the proposed Plan.

Specific requirements of existing laws and regulations described in the regulatory setting are assessed for their ability to avoid or reduce the exposure of people or structures to substantial adverse effects. For the purposes of this analysis, it is assumed that development in the proposed Plan area would adhere to the latest federal, state, and local regulations, as applicable for individual projects (see Chapter 2, "Introduction to the Analysis," of this Draft EIR).

IMPACTS AND MITIGATION MEASURES

Impact 2.7-1: Implementation of the proposed Plan could increase the exposure of people or structures to the risk of property loss, injury, or death involving 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.

Impacts of Changes in Projected Land Use

Surface fault rupture could occur along any of the active fault traces or within the associated Alquist-Priolo Zone for the active faults within the Plan area. Although fault rupture is not entirely confined to the boundaries of an Alquist-Priolo Zone, the likelihood of rupture occurring outside of these zones is very low based on historical evidence and geologic records. The risk outside these zones is considered acceptable based on established state regulations, including CBC requirements tied to seismic risk in building design, and is, therefore, not considered substantial for purposes of this analysis. The amount and location of surface displacement would depend on the magnitude and nature of the seismic event. In some cases, surface fault rupture can cause displacement of the ground surface, resulting in substantial damage to foundations, roadways, and utilities. Buried thrust faults and inferred faults are also located within the boundaries of the Plan area; however, these fault types do not typically experience surface ruptures and are not officially recognized by the Alquist-Priolo Act. Projected development associated with the proposed Plan would include a variety of land uses (e.g., residential, commercial, industrial) that would increase the population (from 7,571,000 in 2015 to 9,628,000 in 2040), number of structures, and density and intensity of housing and jobs—particularly in the growth areas—that could potentially be exposed to hazards as a result of surface fault rupture.

The acreage of the land use growth footprint that either fully or partially intersect Alquist- Priolo Zones within the Plan area are listed below in **Table 2.7-4,** along with the associated acreage that intersects Alquist-Priolo Zones. Approximately 160 acres of the land use growth footprint is within an Alquist-Priolo Zone (**Table 2.7-4**). This includes TPAs in Alameda County (70 acres) and Contra Costa County (6 acres). TPAs in Marin, Napa, San Mateo, Solano, and Sonoma counties are not located in Alquist-Priolo Zones; in other words, where the growth footprint within these counties overlap with Alquist-Priolo Zones, these areas do not include any area identified as a TPA. Projects in TPAs that are located in delineated earthquake fault zones do not qualify for the exemption from CEQA review for sustainable community projects under PRC Section 21155.1 unless the

applicable general plan or zoning ordinance contains provisions to mitigate the risk. To minimize risks to lives and property, the Safety Element of the Alameda County General Plan establishes several policies, including Policy P9, which provides that a site-specific geologic hazard assessment, conducted by a licensed geologist, must be completed prior to approval for development proposals submitted in Alquist-Priolo Zones and "mitigation measures needed to reduce the risk to life and property from earthquake induced hazards should be included" (Alameda County 2014:17). The Contra Costa County General Plan also includes policies to address seismic hazards. These include Policy 10-12, which prohibits construction of structures for human occupancy, and structures essential to public safety and the provision of needed services over active fault traces; Policy 10-16, which indicates that critical structures located in active fault zones must be carefully sited, designed, and constructed to withstand the anticipated earthquake stress; and Policy 10-14, which requires preparation of a geologic report in areas of known or suspected faulting (Contra Costa County 2005:10-19 to 10-20).

Table 2.7-4 Acreage of Land Use Growth Footprint within Fault Rupture Zones, By Region, County, and TPA[1]

County		Area within Alquist-Priolo Zones (acres)[2,3]
Alameda	County Total	120
	Within TPAs	70
Contra Costa	County Total	30
	Within TPAs	6
Marin	County Total	3
	Within TPAs	0
Napa	County Total	3
	Within TPAs	0
San Francisco	County Total	0
	Within TPAs	0
San Mateo	County Total	10
	Within TPAs	0
Santa Clara	County Total	0
	Within TPAs	0
Solano	County Total	<1
	Within TPAs	0
Sonoma	County Total	<1
	Within TPAs	0
Regional Total[4]	County Total	**160**
	Within TPAs	**80**

Notes: [1] TPA acreages are a subset of County acreages
[2] Numbers less than 1 are shown as "<1".
[3] Whole numbers have been rounded (between 0 and 10 to the nearest whole number, between 11 and 999 to the nearest 10, between 1,000 and 1,000,000 to the nearest 100).
[4] Figures may not sum due to independent rounding.

Source: data provided by MTC in 2017

Federal, state, and local laws, regulations and programs in place and described herein avoid or reduce impacts from earthquakes and other seismic-related geologic hazards. To reduce impacts related to fault rupture, implementing agencies require project sponsors to comply with provisions of the Alquist-Priolo Act for project

sites located within or across an Alquist-Priolo Zone. Project sponsors must prepare site-specific fault identification investigations conducted by licensed geotechnical professionals in accordance with the requirements of the Act, as well as any existing local policies that exceed or reasonably replace any of the Act's requirements. Fault identification studies required by the Alquist-Priolo Act involve on-site trenching and excavation for site-specific identification and location of fault rupture planes where any future rupture would be anticipated. Structures intended for human occupancy (defined as a structure that might be occupied more than 2,000 hours per year) must be located a minimum distance of 50 feet from any identified active fault traces. In addition, the CBC regulates the design and construction of excavations, foundations, building frames, retaining walls, and other building elements to mitigate the effects of seismic shaking and adverse soil conditions, and the Seismic Hazards Mapping Act reduces threats to public safety by identifying and mitigating for seismic hazards. All projects are required to adhere to design standards described in the CBC and all standard geotechnical investigation, design, grading, and construction practices to avoid or reduce impacts from earthquakes, ground shaking, ground failure, and landslides.

Regulatory agencies with oversight of development associated with the proposed Plan have developed regulations and engineering design specifications that address and substantially reduce hazards associated with site-level geological and seismic conditions. Therefore, the impact related to fault rupture hazards is considered less than significant (LS).

Impacts of Transportation Projects

As noted above for the land use projects, surface fault rupture could cause displacement of the ground surface, resulting in substantial damage to transportation projects including transit expansion projects, foundations, roadways, roadway interchanges, and utilities. Improvements associated with the transportation projects within the region would include a variety of different projects that could potentially be exposed to hazards as a result of surface fault rupture. There are approximately 310 acres associated with 19 transportation projects that are within an Alquist-Priolo Zone and could be developed in conjunction with the proposed Plan (see Table 2.7-5). The full list of transportation projects that are located within or partially within an identified Alquist-Priolo Zone is provided in Appendix I (see Table I-1).

Table 2.7-5 Acreage of Transportation Projects within Alquist-Priolo Zones, by Region and County

County	Area within Alquist-Priolo Zones (acres)[1]
Alameda	190
Contra Costa	20
Marin	0
Napa	20
San Francisco	0
San Mateo	30
Santa Clara	0
Solano	30
Sonoma	7
Regional Total[2]	**310**

Notes:
[1] Whole numbers have been rounded (between 0 and 10 to the nearest whole number, between 11 and 999 to the nearest 10).
[2] Figures may not sum due to independent rounding.

Source: CGS 2015; data provided by MTC in 2016

To reduce impacts related to fault rupture, implementing agencies require project sponsors to comply with provisions of the Alquist-Priolo Act for project sites located within or across an Alquist-Priolo Zone. Project sponsors must prepare site-specific fault identification investigations conducted by licensed geotechnical

professionals in accordance with the requirements of the Act, as well as any existing local or California Department of Transportation (Caltrans) regulations and policies that exceed or reasonably replace any of the Act's requirements. Projects such as interchange improvements to existing roadways that are located within an Alquist-Priolo Zone would not result in a substantial change to the risk or hazard, but would nonetheless be constructed following preparation of a required geotechnical investigation to fully evaluate the level of potential damage from fault rupture. The potential for adverse fault impacts related to transportation projects from implementation of the proposed Plan is considered less than significant (LS) for Impact 2.7-1.

Conclusion

Land use and transportation project effects related to fault rupture hazards are site specific and dependent on the location of the individual projects in relation to the active fault traces. The Alquist-Priolo Act regulates where development and road projects can occur in relation to faults by requiring detailed fault identification studies and stipulating minimum setback requirements. Local agencies and Caltrans also have requirements to address impacts related to fault rupture. The potential for adverse fault impacts related to land use changes from implementation of the proposed Plan is therefore considered **less than significant (LS)** because there are the existing federal, state, and local regulations and oversight in place that would effectively reduce the inherent hazard associated with these conditions to an acceptable level. No mitigation is required.

Mitigation Measures

None required.

Impact 2.7-2: Implementation of the proposed Plan could increase exposure of people or structures to the risk of property loss, injury, or death involving strong seismic ground shaking.

Impacts of Changes in Projected Land Use

According to modeling conducted by USGS in conjunction with CGS, the Bay Area is predicted to experience at least one major earthquake (greater than moment magnitude 6.7 [see footnote 3 on page 2.7-3]) within the next 20 years. The intensity of such an event would depend on the causative fault and the distance to the epicenter, the magnitude, the duration of shaking, and the characteristics of the underlying geologic materials. The potential for damage or loss during an earthquake of this magnitude could be substantial, especially in non-retrofitted older structures and infrastructure that were constructed under less stringent building codes. As shown in **Figure 2.7-2**, the entire Bay Area is classified as potentially experiencing strong to violent ground shaking (MMI 7-9). **Table 2.7-6**, below, quantifies the area within the land use growth footprint based on this data.

Table 2.7-6 Acreage of the Land Use Growth Footprint Potentially Subject to Strong, Very Strong, and Violent Ground Shaking by Region, County, and TPA

County		Strong – MMI 7 (acres)[1,2]	Very Strong – MMI 8 (acres)[1,2]	Violent – MMI 9 (acres)[1,2]
Alameda	County Total	0	1,600	2,100
	Within TPAs	0	540	1,400
Contra Costa	County Total	20	3,300	750
	Within TPAs	0	460	140
Marin	County Total	0	140	80
	Within TPAs	0	20	30
Napa	County Total	9	450	0
	Within TPAs	0	0	0
San Francisco	County Total	0	1,300	170
	Within TPAs	0	1,300	170

Table 2.7-6 Acreage of the Land Use Growth Footprint Potentially Subject to Strong, Very Strong, and Violent Ground Shaking by Region, County, and TPA

County		Strong – MMI 7 (acres)[1,2]	Very Strong – MMI 8 (acres)[1,2]	Violent – MMI 9 (acres)[1,2]
San Mateo	County Total	0	620	770
	Within TPAs	0	200	510
Santa Clara	County Total	0	4,200	600
	Within TPAs	0	2,300	190
Solano	County Total	540	1,000	0
	Within TPAs	0	20	0
Sonoma	County Total	0	700	420
	Within TPAs	0	60	70
Regional Total[3]	County Total	**560**	**13,300**	**4,900**
	Within TPAs	**0**	**4,900**	**2,500**

Notes:

[1] TPA acreages are a subset of County acreages.

[2] Whole numbers have been rounded (between 0 and 10 to the nearest whole number, between 11 and 999 to the nearest 10, between 1,000 and 1,000,000 to the nearest 100).

[3] Figures may not sum due to independent rounding.

Source: ABAG and USGS 2013, data provided by MTC in 2016

In general, ground shaking is more severe in softer sediments, such as alluvial deposits where surface waves can be amplified, causing a longer duration of ground shaking compared to bedrock materials. Areas where bedrock is exposed or located at relatively shallow depth tend to experience surface waves from an earthquake as more of a sharp jolt, compared to other areas. Areas located within or near the Bay shoreline where alluvial sediments tend to be thicker, especially in areas where un-engineered fill or loose alluvial materials are found, could experience considerable ground shaking.

To reduce impacts related to ground shaking, implementing agencies require project sponsors to comply with the applicable version of the CBC. Compliance with the regulatory requirements in the CBC and any applicable local ordinances, and ensuring that structures are constructed in compliance with the law, is the responsibility of the project engineers and building officials (typically associated with the local jurisdiction). The geotechnical engineer, as a registered professional with the State of California, is required to comply with the CBC and local codes while applying standard engineering practice and the appropriate standard of care for the particular region in California.

Projected development must comply with Chapter 16, Section 1613 of the CBC, which provides earthquake loading specifications for structures and associated attachments that must also meet the seismic criteria of ASCE Standard 07-05. In order to determine seismic criteria for proposed improvements, geotechnical investigations would be prepared by state-licensed engineers and engineering geologists that provide recommendations for site preparation and foundation design, as required by Chapter 18, Section 1803 of the CBC. Geotechnical investigations would also evaluate hazards such as liquefaction, lateral spreading, landslides, and expansive soils in accordance with CBC requirements and CGS' *Guidelines for Evaluating and Mitigation Seismic Hazards in California* (Special Publication 117A, 2008), where applicable.

The geotechnical engineer is responsible for investigating the underlying soils and bedrock on a site and, if necessary, developing remedies to improve soil conditions based on standard engineering practices. The geotechnical investigation must characterize, log, and test soils and bedrock conditions and determine the response of those underlying materials to ground shaking generated during an earthquake. Seismic response to varying material types is particularly critical in the Plan area, where construction may occur over soft clay

and fills at the San Francisco Bay margin. The geotechnical investigation and the recommendations developed during the investigation must be presented in a report, which is reviewed, signed, and stamped by the professional engineer in charge. Based on the site's geotechnical conditions, the geotechnical report must include methods and materials for all aspects of the site development, including the site preparation, building foundations, structural design, utilities, and sidewalks and roadways, to remedy any geotechnical conditions related to seismic impacts. Once finalized, the geotechnical report would be submitted to the local permitting agency for review and comment. The local building officials work with the applicant and the geotechnical engineer to resolve inconsistencies and ensure that the investigation complies with the CBC and local ordinances. In connection with grading, foundation, building, and other site development permits, the local jurisdiction reviews the geotechnical investigation and recommendations and imposes permit requirements based on the geotechnical recommendations and CBC provisions. Recommended corrective measures, such as structural reinforcement and replacing native soils with engineered fill, must be incorporated into project designs. Developments must also adhere to local building code requirements for seismic safety, which identify and require specified construction techniques that aid in structural resistance to ground shaking, as well as local general plans and zoning ordinances, where applicable policies exist.

As discussed above, state laws and local regulations require that potential seismic hazards be identified and remedied prior to construction. Reliable mechanisms are in place to enforce these regulations and the implementation of design strategies identified in required geotechnical investigations are anticipated to protect public health and safety from substantial risks through appropriate engineering practices. Therefore, the potential for adverse ground shaking impacts related to land use changes from implementation of the proposed Plan is considered to be less than significant (LS).

Impacts of Transportation Projects

As noted above for the projected land use growth, an earthquake on any one of the active faults in the Bay Area region could cause a large degree of ground shaking, resulting in damage to transportation projects if they are not engineered appropriately. Further, the proposed transportation projects within the region would include a variety of transit modifications that could increase the number of people in transit corridors potentially exposed to ground shaking hazards. There are 195 transportation projects totaling 200 acres located in areas of strong ground shaking, 13,700 acres located in areas of very strong ground shaking, and 6,100 acres in areas of violent ground shaking (see **Table 2.7-7**).

Table 2.7-7 Transportation Projects Potentially Subject to Strong, Very Strong, and Violent Ground Shaking, by Region and County

County	Strong – MMI 7 (acres)	Very Strong – MMI 8 (acres)	Violent – MMI 9 (acres)
Alameda	0	880	2,900
Contra Costa	4	2,200	540
Marin	0	240	30
Napa	0	110	0
San Francisco	0	4,000	220
San Mateo	0	860	1,400
Santa Clara	190	3,800	910
Solano	0	1,300	910
Sonoma	0	310	140
Regional Total	**200**	**13,700**	**6,100**

Notes: Whole numbers have been rounded (between 0 and 10 to the nearest whole number, between 11 and 999 to the nearest 10, between 1,000 and 1,000,000 to the nearest 100). Figures may not sum due to independent rounding.

Source: ABAG and USGS 2013; data provided by MTC in 2016

Seismic design criteria are required of all construction, including transportation projects, where adverse effects from ground shaking could occur. The most current applicable version of the CBC and local building standards require roadway projects to employ design standards that consider seismically active areas in order to safeguard against major structural failures or loss of life. Similarly, bridge and overpass design is required to comply with Caltrans' design criteria. Caltrans provides seismic design criteria for new bridges in California, specifying minimum levels of structural system performance, component performance, analysis, and design practices. Based on application of these requirements, the potential for adverse ground shaking impacts related to transportation projects is considered to be less than significant (LS).

Conclusion

The proposed Plan would accommodate an increased population within the seismically active Plan area. The degree of risk associated with specific land use and transportation projects is dependent on site-specific criteria including the location of the projects in relation to the seismic event, underlying geologic materials, and the magnitude of the event. Regulatory requirements exist that specify mandatory actions that must occur during project development to address these risks These impacts are considered **less than significant (LS)** because there are existing federal, state, and local regulations and oversight in place that would effectively reduce the inherent hazard associated with these conditions to an acceptable level. No mitigation is required.

Mitigation Measures

None required.

Impact 2.7–3: Implementation of the proposed Plan could increase exposure of people or structures to the risk of property loss, injury, or death involving seismic-related ground failure, including liquefaction.

Impacts of Changes in Projected Land Use

Liquefaction typically occurs in areas underlain with loose, saturated, cohesion-less soils within the upper 50 feet of subsurface materials. These soils, when subjected to ground shaking, can lose their strength due to buildup of excess pore water pressure, causing them to function in a manner closer to a liquefied state. As shown in **Figure 2.7-3** and summarized below in **Table 2.7-8**, there are many areas throughout the Bay Area region that are prone to liquefaction hazards. The full list of PDAs located within liquefaction zones, ranging from very low to very high susceptibility, is shown in Appendix I (see Table I-2).

Table 2.7-8 Acreages of Liquefaction Potential within Land Use Growth Footprint by Region, County, and TPA

County		Very Low Potential (Acres)[1,2,3]	Low Potential (Acres) [1,2,3]	Medium Potential (Acres) [1,2,3]	High Potential (Acres) [1,2,3]	Very High Potential (Acres) [1,2,3]	Water (Acres)[1,2,3]
Alameda County	County Total	760	190	2,000	90	630	10
	Within TPAs	180	120	1,200	20	440	7
Contra Costa County	County Total	1,800	580	1,400	120	180	30
	Within TPAs	240	180	150	2	30	<1
Marin County	County Total	1120	3	30	<1	70	1
	Within TPAs	30	<1	4	0	10	<1
Napa County	County Total	250	20	140	40	10	<1
	Within TPAs	0	0	0	0	0	0
San Francisco County	County Total	370	30	70	<1	960	10
	Within TPAs	370	30	70	<1	930	10
San Mateo County	County Total	430	70	390	30	450	10
	Within TPAs	220	30	250	30	170	<1

Table 2.7-8 Acreages of Liquefaction Potential within Land Use Growth Footprint by Region, County, and TPA

County		Very Low Potential (Acres)[1,2,3]	Low Potential (Acres) [1,2,3]	Medium Potential (Acres) [1,2,3]	High Potential (Acres) [1,2,3]	Very High Potential (Acres) [1,2,3]	Water (Acres)[1,2,3]
Santa Clara County	County Total	430	390	3,300	390	220	10
	Within TPAs	7	90	2,100	150	130	7
Solano County	County Total	760	420	260	1	10	5
	Within TPAs	10	4	<1	0	1	0
Sonoma County	County Total	270	60	770	20	10	<1
	Within TPAs	20	<1	100	10	<1	<1
Regional Total[4]	County Total	**5,200**	**1,800**	**8,300**	**690**	**2,600**	**80**
	Within TPAs	**1,100**	**450**	**3,900**	**210**	**1,700**	**20**

Notes:

[1] TPA acreages are a subset of County acreages.

[2] Numbers less than 1 are shown as "<1".

[3] Whole numbers have been rounded (between 0 and 10 to the nearest whole number, between 11 and 999 to the nearest 10, between 1,000 and 1,000,000 to the nearest 100).

[4] Figures may not sum due to independent rounding.

Source: data provided by MTC in 2017

Ground failure, including liquefaction, as a result of an earthquake could occur in the Plan area depending on the underlying conditions including moisture content, relative size of soil particles, and density of subsurface materials within 50 feet of ground surface. Damage from earthquake-induced ground failure associated with liquefaction could be high in buildings constructed on improperly engineered fill or saturated alluvial sediments that have not received adequate compaction or treatment in accordance with current building code requirements. The impacts from ground failure, including liquefaction, from development of land uses associated with the proposed Plan would be addressed through site-specific geotechnical studies prepared in accordance with CBC requirements and standard industry practices, as well as State-provided guidance, such as CGS Special Publication 117A, which would specifically address liquefaction (especially in areas that have been mapped as seismic hazard zones by CGS). Subsequent development would be required to conform to the current seismic design provisions of the CBC to reduce potential losses from ground failure as a result of an earthquake. These future projects would also be required to adhere to the local general plans and local building code requirements that contain seismic safety policies to resist ground failure through modern construction techniques. Therefore, the potential for adverse ground failure impacts related to land use changes from implementation of the proposed Plan is considered less than significant (LS).

Impacts of Transportation Projects

Although regional mapping of areas considered to have higher liquefaction potential has been conducted throughout the Plan area, liquefaction hazards are generally determined on a site-specific basis. As noted above for development pursuant to the proposed Plan, ground failure associated with liquefaction could result in damage to transportation projects if not engineered appropriately. Improvements associated with the proposed transportation projects within the region would include a variety of transit and roadway modifications that could increase the number of people and transit corridors potentially exposed to liquefaction hazards. The proposed Plan could result in development of approximately 194 projects in liquefaction areas with 3,700 acres of transportation projects in areas classified as very low liquefaction hazard, 2,200 acres in areas classified as low liquefaction hazard, 8,300 acres in areas classified as medium liquefaction hazard, 330 acres in areas of high liquefaction hazard, and 3,600 acres in areas classified as very high liquefaction hazard (see **Table 2.7-9**). The full list of transportation projects located within liquefaction zones, ranging from very low to very high susceptibility, is shown in Appendix I (see Table I-3).

Table 2.7-9 Transportation Project Footprint within Liquefaction Zones, by Region and County

County	Liquefaction Zone (acres)				
	Very Low	Low	Medium	High	Very High
Alameda	380	240	2,000	60	850
Contra Costa	680	660	620	3	40
Marin	80	0	90	2	80
Napa	30	7	70	0	4
San Francisco	1,400	130	470	0	1,700
San Mateo	380	250	850	50	700
Santa Clara	460	690	3,300	200	170
Solano	120	190	570	0	40
Sonoma	180	40	200	10	10
Regional Total	**3,700**	**2,200**	**8,300**	**330**	**3,600**

Note: Whole numbers have been rounded (between 0 and 10 to the nearest whole number, between 11 and 999 to the nearest 10, between 1,000 and 1,000,000 to the nearest 100). Figures may not sum due to independent rounding.

Source: data provided by MTC in 2016; USGS 2006

Roadway projects must comply with the applicable version of the CBC and local building standards by employing geotechnical practices such as ground treatment, replacing existing soils with engineered fill, or using deep foundation systems to anchor improvements into more competent materials. Similarly, bridge and overpass design must comply with Caltrans design criteria. As stated above, Caltrans provides seismic design criteria for new bridges in California, specifying minimum levels of structural system performance, component performance, analysis, and design practices that would include minimizing damage that could be expected from potential liquefaction hazards. Therefore, the potential for liquefaction hazards to result in adverse impacts related to the transportation projects is considered less than significant (LS).

Conclusion

Implementation of the land use and transportation projects would result in projects being constructed or redeveloped in areas that could be susceptible to liquefaction. Liquefaction hazards are dependent on site-specific conditions and other considerations, such as the distance and magnitude of the seismic event. The impacts of ground failure, including liquefaction, on development of the land uses or transportation projects in the proposed Plan would be addressed through site-specific geotechnical studies required by local jurisdictions in accordance with standard industry practices and State-provided guidance, such as CGS Special Publication 117A. In addition, development would conform to the current seismic design provisions of the IBC and CBC in order to reduce potential losses from ground failure as a result of an earthquake. Proposed projects would also adhere to local general plans and local building code requirements that contain seismic safety requirements to resist ground failure through modern construction techniques. Therefore, liquefaction hazards are considered **less than significant (LS)** because there are existing federal, state, and local regulations and oversight in place that would effectively reduce the inherent hazard associated with these conditions to an acceptable level. No mitigation is required.

Mitigation Measures

None required.

Impact 2.7–4: Implementation of the proposed Plan could increase exposure of people or structures to the risk of property loss, injury, or death involving landslides.

Impacts of Changes in Projected Land Use

The Plan area includes a wide range of topographical conditions, and landslide hazards vary from very low in low lying areas to very high in some upland areas, especially areas with slopes that exceed 15 percent. **Figure 2.7-4** shows areas throughout the region that are considered prone to rain-induced landslide hazards. According to regional data, approximately 310 acres of the land use growth footprint are located in areas mapped as mostly landslides, and 3,500 acres are mapped as few landslides. **Table 2.7-10** summarizes the acreage of land use growth footprint within counties and TPAs (this number is a subset of the county total) within areas subject to landslides and areas.

Table 2.7-10 Acreage of Landslide Zones within the Land Use Growth Footprint, by Region, County, and TPA

County		Growth Areas in TPAs in Landslide Zones (acres) [1,2]	
		Few Landslides[3]	Mostly Landslides[4]
Alameda	County Total	810	70
	Within TPAs	230	0
Contra Costa	County Total	970	100
	Within TPAs	50	<1
Marin	County Total	80	20
	Within TPAs	20	<1
Napa	County Total	50	10
	Within TPAs	0	0
San Francisco	County Total	150	20
	Within TPAs	150	20
San Mateo	County Total	230	10
	Within TPAs	40	1
Santa Clara	County Total	390	40
	Within TPAs	5	4
Solano	County Total	670	10
	Within TPAs	4	0
Sonoma	County Total	100	40
	Within TPAs	20	0
Regional Total[5]	County Total	**3,500**	**310**
	Within TPAs	**530**	**20**

Notes:
[1] Numbers less than 1 are shown as "<1."
[2] Whole numbers have been rounded (between 0 and 10 to the nearest whole number, between 11 and 999 to the nearest 10, between 1,000 and 1,000,000 to the nearest 100).
[3] Few Landslides: areas characterized by scattered small landslides or location near large landslides.
[4] Mostly Landslides: areas where substantial landslides have been mapped.
[5] Figures may not sum due to independent rounding.

Source: data provided by MTC in 2017

Existing slopes and slope stability are generally considered in local land use planning and zoning, and these areas tend to be designated for uses other than development. Approvals of development projects in areas subject to slope failures are also generally contingent on geologic and engineering studies that define and delineate potentially hazardous conditions and recommend adequate mitigation. Earthwork

recommendations for improved slope stability follow adopted State standards, such as the *Guidelines for Evaluating and Mitigation Seismic Hazards in California* (CGS 2008), and are incorporated into the project construction documents. These documents are checked by the appropriate building official or engineer, and may be reviewed by other departments of the county or city to check compliance with the laws and ordinances under their jurisdiction.

Future proposed developments must also be consistent with the CBC and adhere to the requirements for structural design, special inspections, and soils and foundations contained in Chapters 16 through 18 of the code. Local general plans and local building codes also often contain development policies to avoid landslides through construction design and slope stabilization techniques. Therefore, the potential for adverse landslide impacts related to land use changes from implementation of the proposed Plan at the regional and local (county and TPA) level is considered a less-than-significant (LS) impact.

Impacts of Transportation Projects

The list of transportation projects located within landslide zones ranging from surficial deposits on relatively flat terrain to mostly landslides is shown in Appendix I (see Table I-4). Of the transportation projects, 2,500 acres would be located in areas zoned few landslides and 400 acres would be located in areas zoned mostly landslides (see **Table 2.7-11**). Most of the transportation projects (15,300 acres) would be outside of landslide zones (see Table I-4 in Appendix I). Projects that would develop land identified as mostly landslides generally include construction of auxiliary lanes and other transportation system expansions, as well as corridor improvements and modernizations. These hazards would generally be addressed through compliance with existing regulations, as discussed above. Transportation projects would be required to identify potential slope stability hazards and provide slope stabilization measures to meet the applicable version of the CBC and local building standards by employing geotechnical practices such as use of retaining walls, setback requirements, and deep foundation systems. Incorporation of slope stability measures would be effective in minimizing landslide hazards on proposed transportation projects. Therefore, the potential for landslide hazards to result in adverse impacts to the transportation projects at the regional and local (County and TPA) level is considered less than significant (LS).

Table 2.7-11 Transportation Project Footprint within Landslide Zones, by Region and County

County	Few Landslides (acres)	Mostly Landslides (acres)
Alameda	540	50
Contra Costa	530	80
Marin	60	30
Napa	2	0
San Francisco	660	40
San Mateo	140	30
Santa Clara	320	110
Solano	80	20
Sonoma	120	40
Regional Total	**2,500**	**400**

Note: Whole numbers have been rounded (between 0 and 10 to the nearest whole number, between 11 and 999 to the nearest 10, between 1,000 and 1,000,000 to the nearest 100). Figures may not sum due to independent rounding.

Source: data provided by MTC in 2016; USGS 1997

Conclusion

Landslide hazards are dependent on site-specific conditions, including the steepness of slopes, and other conditions such as, in the case of seismically induced landslides, the distance and magnitude of the seismic event. State and local standards have been developed to address this condition. Landslide hazards would have a **less-than-significant (LS)** impact because there are existing federal, state, and local regulations and

oversight in place that would effectively reduce the inherent hazard associated with these conditions to an acceptable level. No mitigation is required.

Mitigation Measures

None required.

Impact 2.7-5: Implementation of the proposed Plan could result in substantial soil erosion or topsoil loss.

Impacts of Changes in Projected Land Use

Development associated with the proposed Plan would include earthwork activities that could expose soils to the effects of erosion or loss of topsoil. Once disturbed, either through removal of vegetation, asphalt, or demolition of a structure, stockpiled soils may be exposed to the effects of wind and water. Generally, earthwork and ground-disturbing activities, unless below minimum requirements, require a grading permit, compliance with which minimizes erosion, and local grading ordinances ensure that construction practices include measures to protect exposed soils such as limiting work to dry seasons, covering stockpiled soils, and use of straw bales and silt fences to minimize off-site sedimentation. Additional reports, such as a soil engineering report, engineering geology report, or plans and specifications for grading may be required by the local building or engineering departments, depending on the proposal. The application, plans, and specifications (if any) would be checked by the appropriate building official or engineer, and may be reviewed by other departments of the county or city to ensure compliance with the laws and ordinances under their jurisdiction. Earthwork recommendations for improved erosion controls, based on site conditions, would be incorporated into the project construction documents.

Development that disturbs more than 1 acre is subject to compliance with a NPDES permit, including the implementation of BMPs, some of which are specifically implemented to reduce soil erosion or loss of topsoil, and the implementation of a SWPPP through the local jurisdiction. BMPs that are required under a SWPPP would include erosion prevention measures that have proven effective in limiting soil erosion and loss of topsoil. Projects that would disturb less than 1 acre would be subject to the CalGreen requirements related to stormwater drainage that have been designed to prevent or reduce discharges of sediments through BMPs that include on-site retention and filtration. Generally, once construction is complete and exposed areas are revegetated or covered by buildings, asphalt, or concrete, the erosion hazard is substantially eliminated or reduced.

Existing regulatory requirements specify mandatory and relatively prescriptive actions that must occur during project development, and it is reasonable to assume compliance with existing regulations and permitting requirements of independent regulatory agencies to address potential project effects. Therefore, because there are regulations in place that would effectively reduce the potential for loss of topsoil or erosion impacts related to land use changes from implementation of the proposed Plan at the regional, local, and TPA level, there would be a less-than-significant (LS) impact.

Impacts of Transportation Projects

Transportation projects within the region would also include earthwork activities that would disturb underlying soils during construction, potentially exposing them to erosion and loss of topsoil in the same manner discussed above for projected land use. Construction of additional lanes on freeways and other transportation facilities could result in loss of topsoil if work includes grading, trenching, excavation, or soil removal of any kind in an area not previously used as a paved transportation facility. As with land use development, earthwork activities for transportation projects would be required to adhere to NPDES permit requirements for construction, as well as any local grading ordinance requirements that may include erosion prevention measures. Incorporation of erosion control BMP measures, such as use of straw bales, inlet protective measures, silt fences, and construction scheduling, in accordance with grading codes and any revegetation requirements, would be effective in minimizing erosion hazards and loss of topsoil associated with transportation projects. Therefore, the potential for loss of topsoil or erosion impacts related to the

transportation projects included in the proposed Plan at the regional, local, and TPA level is less than significant (LS) for Impact 2.7-5.

Conclusion

As noted above, construction associated with both the land use and transportation projects would include ground disturbances that could expose underlying soils to the effects of erosion. Existing regulatory requirements specify mandatory actions that must occur during project development that would address this potential impact. Therefore, this impact is **less than significant (LS)** because there are existing federal, state, and local regulations and oversight in place that would effectively reduce the inherent hazard associated with these activities to an acceptable level. No mitigation is required.

Mitigation Measures

None required.

Impact 2.7-6: Implementation of the proposed Plan could result in locating development on a geologic unit or soil that is unstable, contains expansive properties, 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.

Impacts of Changes in Projected Land Use

Some land use development associated with implementation of the proposed Plan could be located on geologic units or soils that are unstable, or that could become unstable and result in geologic hazards. Areas with underlying materials that include undocumented fills, soft compressible Bay Mud deposits, or loose debris could be inadequate to support development, especially multi-story buildings. Soils that exhibit expansive properties when exposed to varying moisture content over time could result in damage to foundations, walls, or other improvements. Structures, including residential units and commercial buildings, could be damaged as a result of settlement or differential settlement where structures are underlain by materials of varying engineering characteristics. Construction of new structures in the vicinity of relatively steep slopes could also provide additional loading, causing landslides or slope failure from unstable soils or geologic units. The potential hazards of unstable soil or geologic units would be largely addressed through the integration of geotechnical information in the planning and design process to determine the local soil suitability for specific projects in accordance with standard industry practices and state requirements, such as CBC requirements and CGS Special Publication 117A for liquefaction and landslide hazards in seismic hazard zones. Corrective measures such as structural reinforcement for unstable geologic units and using engineered fill to replace unstable soils would be required for the design of individual future projects.

All site designs would be reviewed and approved by the appropriate federal, State, and local agencies. Project-specific geotechnical investigations consistent with existing regulatory requirements would identify areas of potential concern and recommend geotechnical measures for long-term stability, ensuring that regional growth and land use changes on geologic units or soils that are expansive would not become unstable as a result of the project, or result in on- of off-site landslide, lateral spreading, subsidence, liquefaction, or collapse. The potential for landslide, lateral spreading, subsidence, liquefaction, or collapse related to land use changes from implementation of the proposed Plan at the regional, local, and TPA level is considered a less-than-significant (LS) impact.

Impacts of Transportation Projects

Transportation projects within the planning area would include a variety of transit modifications that could be located on unstable soil or geologic units. In general, many of the transportation projects would be located in areas where previous roads or other improvements have occurred, and unstable soils or geologic units would have been addressed at the time of construction. However, some may have been addressed under older code requirements that may not be as stringent as current codes. Geotechnical investigations required by grading ordinances, Special Publication 117A, and current CBC requirements would address the identification, evaluation, and recommended measures for addressing potential hazards that may be present at transportation

project sites. As described above for land use projects, the potential hazards of unstable soil or geologic units would be addressed through the integration of geotechnical information in the planning and design process. Preventative measures, such as structural reinforcement for unstable geologic units and using engineered fill to replace unstable soils, would be required for the design of individual future projects. All site designs would be reviewed and approved by the appropriate federal, State, and local agencies.

The potential for landslide, lateral spreading, subsidence, liquefaction, or collapse to result in adverse impacts to the transportation projects at the regional, local, and TPA level is considered less than significant (LS) for Impact 2.7-6.

Conclusion

Both the proposed changes in land use and transportation projects would be located on a range of different geologic materials and conditions. Hazards associated with unstable soils or geologic units are dependent on site- specific conditions, as well as the specific nature of the individual project proposed. With adherence to grading permit and building code requirements, including seismic design criteria as required by the CBC, Caltrans, Special Publication 117A, and local building code requirements, all improvements and development associated with both the land use development and transportation projects would be designed to minimize potential risks related to unstable soils and geologic units. Existing regulatory requirements specify mandatory and relatively prescriptive actions that must occur during project development, and would effectively reduce the inherent hazard. Therefore, this impact is **less than significant (LS)** because there are existing federal, state, and local regulations and oversight in place that would effectively reduce the inherent hazard associated with these activities to an acceptable level. No mitigation is required.

Mitigation Measures

None required.

Impact 2.7-7: Implementation of the proposed Plan could result in the loss of availability of a known mineral resource that would be of value to the region or the residents of the State or a locally-important mineral resources recovery site delineated on a local land use plan.

Impacts of Changes in Projected Land Use

Local jurisdictions have general plan policies to manage mineral resources and are required under SMARA to consider significant mineral deposits identified by CGS. The proposed Plan relies on local general plan development regulations to identify appropriate areas to protect and/or allow harvesting/mining of mineral resources, and to designate appropriate areas where housing and employment growth should occur. By developing more compactly, the proposed Plan directs more growth to the areas that are already urbanized and prevents undeveloped land from being converted to urban uses. Harvesting/mining of mineral resources in or near urban development may create incompatibilities, and/or may be economically infeasible. Compact growth and urban infill allows for the preservation of non-urban areas where mineral recourses may be more feasible to remove.

Local general plans, specific plans, and other land use plans include policies to protect existing and planned future mineral production and extraction activities from surrounding uses, and require that future projects near mining activities have compatible land uses. In addition, the potential loss of availability of a designated mineral resource is a consideration in the final design of individual land use projects. Existing regulations and policies listed above reduce this impact to a less-than-significant (LS) level.

Impacts of Transportation Projects

The proposed projects have been developed to most efficiently meet the demands created by the forecasted growth in population and jobs, and focus mainly on the existing regional transportation system. Proposed improvements would largely be constructed within existing rights-of-ways (see Impact 2.3-2 in Section 2.3, "Land Use and Physical Development"). In addition, the potential loss of availability of a designated mineral resource is a consideration in the final design of individual transportation projects, and must be addressed in

the project-level environmental review and mitigation process. Therefore, the proposed Plan would have a less-than-significant (LS) impact.

Conclusion

Although the proposed Plan could result in development that would preclude the future extraction of mineral resources, these impacts are considered less than significant because the projected land use growth was designed to be consistent with local planning documents, which are required to consider mineral resource zones mapped by the State in the land use decisions. Further, most development would be located in urban areas or within existing right of way for transportation-related uses where extraction of mineral resources is unlikely. This would be a **less-than-significant (LS)** impact. No mitigation is required.

Mitigation Measures

None required.

2.8 WATER RESOURCES

This section analyzes the surface water and groundwater resources of the Bay Area. Stormwater runoff, flooding, and inundation hazards are also addressed in this section. For a discussion of sea (and Bay) level rise impacts, see Section 2.5, "Climate Change and Greenhouse Gases." For a discussion of water supply impacts, including drought, see Section 2.12, "Public Utilities and Facilities."

Comments received in response to the Notice of Preparation for this EIR expressed concerns about preserving groundwater recharge areas and the overall effects of open space on water quality. These issues are addressed in the impact discussions, below.

2.8.1 Environmental Setting

CLIMATE

Climatic conditions in the Bay Area are generally characterized as Mediterranean with moist, mild winters and hot, dry summers. However, the region's varied topography creates several microclimates dependent upon elevation, proximity to the San Francisco Bay or coast, and orientation. As a result, stark climatic differences reflected in temperature, rainfall amounts, and evapotranspiration can occur over relatively short distances. The Bay Area is largely governed by weather patterns originating in the Pacific Ocean, primarily by the southern descent of the Polar Jet Stream bringing with it mid-latitude cyclonic storms in winter. More than 90 percent of precipitation in the Bay Area falls between November and April. Bay Area lowlands (i.e., valley bottoms) receive an annual rainfall of about 15 to 20 inches in the South Bay and about 20 to 25 inches in the North Bay. Higher elevations in the region, particularly along the north- or west-facing slopes of the North Bay, may receive over 40 inches of rain per year. In the summer, the Hawaiian High Pressure cell over the northern Pacific creates mild and dry weather for the region. However, summer in the Bay Area is also known for its thick marine fog layer, which is brought into the Bay by a diurnal westerly breeze formed by the strong pressure gradient between the hot Central Valley and the cooler coastal areas. This moist air is cooled to dewpoint when it crosses the cooler waters of the California Current near the coast. This advection process results in a thick fog forming just offshore, which is pulled eastward through gaps and passes into the Bay Area. Fog diminishes with distance inland from the Bay (MTC and ABAG 2013). **Table 2.8-1** summarizes monthly and annual average precipitation for select sites throughout the Bay Area.

Table 2.8-1 Average Monthly Precipitation, Selected Bay Area Sites

Site	Inches[1]												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Fairfield (1950-2016)	4.8	4.0	3.1	1.4	0.6	0.2	0.0	0.1	0.2	1.3	2.8	4.3	**22.7**
Los Gatos (1983-2016)	6.1	5.2	4.3	1.7	0.6	0.1	0.0	0.1	0.3	1.2	2.5	4.9	**26.9**
Napa, State Hospital (1893-2016)	5.1	4.4	3.4	1.7	0.7	0.2	0.0	0.1	0.3	1.4	3.0	4.5	**24.7**
Oakland, Airport (1948-2016)	3.7	2.7	2.6	1.4	0.4	0.2	0.0	0.1	0.2	1.1	2.5	3.1	**18.0**
Redwood City (1906-2016)	4.4	3.5	2.7	1.2	0.4	0.1	0.0	0.1	0.2	1.0	2.1	3.5	**19.2**
Richmond (1950-2016)	4.8	3.8	3.3	1.7	0.5	0.2	0.0	0.1	0.2	1.3	2.9	4.4	**23.2**
San Francisco, Oceanside (1948-2016)	4.0	3.6	2.8	1.2	0.5	0.2	0.0	0.1	0.2	1.1	2.7	3.8	**20.0**

Table 2.8-1 Average Monthly Precipitation, Selected Bay Area Sites

Site	Inches[1]												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
San Rafael, Civic Center (1894-2016)	8.1	6.5	4.7	2.0	0.7	0.2	0.0	0.1	0.4	1.9	4.1	6.8	**35.6**
Santa Rosa/Sonoma (1998-2016)	5.5	6.2	4.4	2.1	1.2	0.3	0.0	0.0	0.1	1.9	3.5	7.1	**32.2**

Rounded to the nearest one-tenth of an inch.

Source: Western Regional Climate Center 2016

REGIONAL HYDROLOGY

San Francisco Bay encompasses approximately 1,600 square miles and is surrounded by the nine Bay Area counties, of which seven border the Bay. San Francisco Bay is partially enclosed and is relatively shallow, with a median depth of approximately 12 feet (USGS 2007). Based on mean sea level; median depth varies from roughly 8 feet in San Pablo Bay to 36 feet in the central area of the Bay near the Golden Gate. Much of the perimeter of the Bay is shallow tidal mud flats, tidal marshes, diked or leveed agricultural areas, and salt ponds. The north lobe of San Francisco Bay is brackish and is known as San Pablo Bay. It is surrounded by Marin, Sonoma, Napa, and Solano counties. Suisun Marsh is between San Pablo Bay and the Delta and is the largest contiguous brackish marsh on the West Coast of North America, providing more than 10 percent of California's remaining natural wetlands. The south and central lobes of San Francisco Bay are saltier than San Pablo Bay, as the marine influence dominates (DWR 2013).

The San Francisco Bay estuary system is one of the largest in the country and drains approximately 40 percent of California. Water from the Sacramento and San Joaquin Rivers of the Central Valley flow into what is known as the Delta region, then into the sub-bays, Suisun Bay and San Pablo Bay, and finally into the Central Bay and out the Golden Gate strait. The Delta is a large triangle of interconnected sloughs and agricultural "islands" that form a key link in California's water delivery system. Some of the fresh water flows through the Delta and into Bay, but much is diverted from the Bay for agricultural, residential, and industrial purposes, as well as delivery to distant cities of southern California as part of state and federal water projects.

The two major drainages, the Sacramento and San Joaquin Rivers, receive more than 90 percent of runoff during the winter and spring months from rainstorms and snow melt. Other surface waters flow either directly to the Bay or Pacific Ocean. The drainage basin that contributes surface water flows directly to the Bay covers a total area of 3,464 square miles. The largest watersheds include the Alameda Creek (695 square miles), the Napa River (417 square miles), and the Coyote Creek (353 square miles) watersheds. The San Francisco Bay estuary includes deep-water channels, tidelands, and marshlands that provide a variety of habitats for plants and animals.

The interaction between Delta outflow and Pacific Ocean tides determines how far salt water intrudes into the Delta. The salinity of the water varies widely as the landward flows of saline water and the seaward flows of fresh water converge near the Benicia Bridge. The salinity levels in the Central Bay can vary from near oceanic levels to one- quarter as much, depending on the volume of freshwater runoff, which depends on precipitation, reservoir releases, and upstream diversions. An average of 18.4 million acre-feet of fresh water flows out of the Delta annually into the Bay (DWR 2013:SFB-11).

Surface Waters

Surface waters in the Bay Area include freshwater rivers and streams, coastal waters, and estuarine waters. Many of the original drainages toward the San Francisco Bay have been channelized and put underground through urbanization of the area. Estuarine waters include the San Francisco Bay Delta from the Golden Gate Bridge to the Sacramento and San Joaquin Rivers, and the lower reaches of various streams that flow directly

into the Bay, such as the Napa and Petaluma Rivers in the North Bay and the Coyote and San Francisquito Creeks in the South Bay. Major water bodies, including creeks and rivers, in the Bay Area are presented in Figure 2.8-1. Major rivers and streams are also listed below by county:

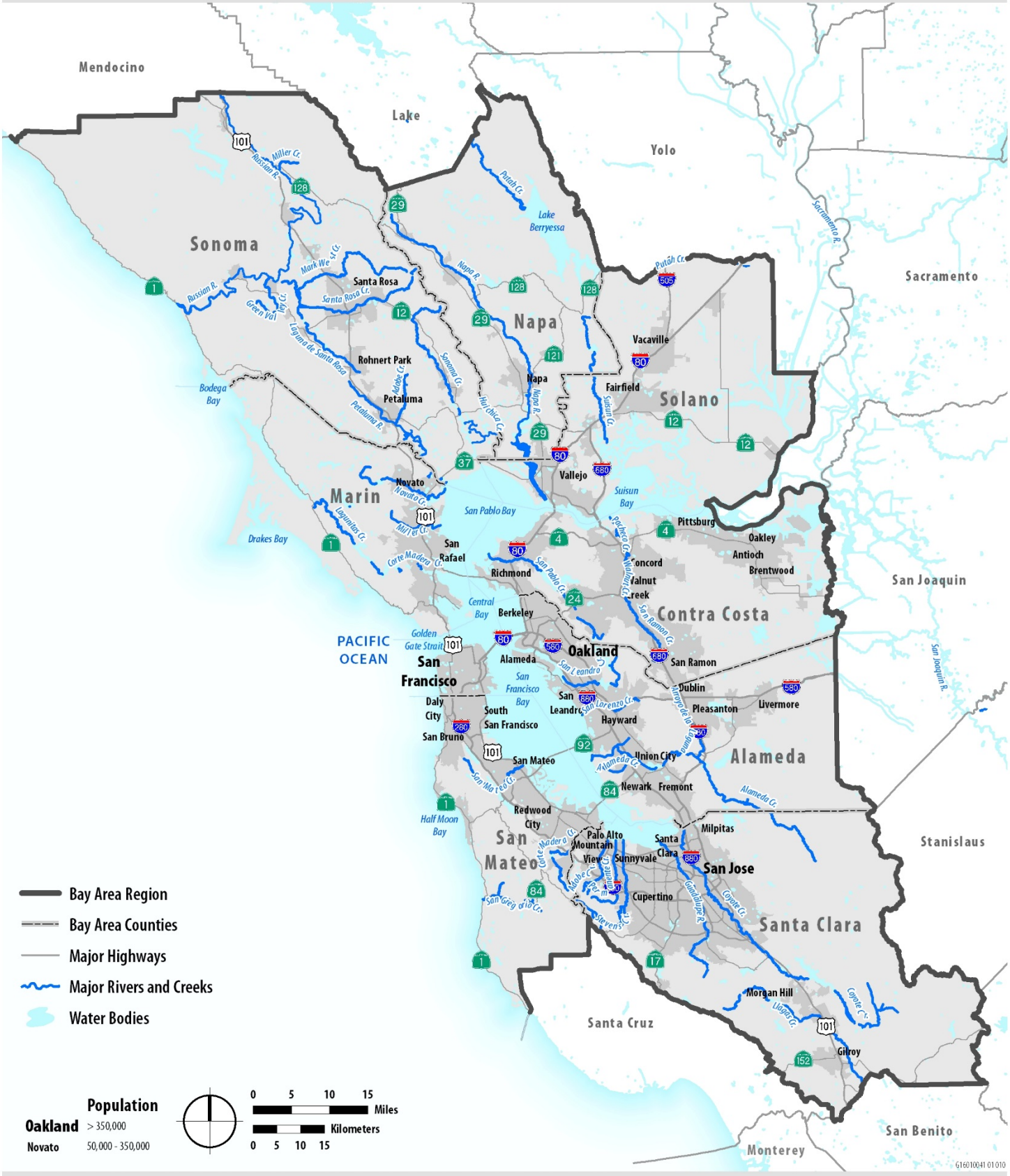
- Alameda County: Alameda Creek, San Leandro Creek, San Lorenzo Creek;
- Contra Costa County: San Pablo Creek;
- Marin County: Corte Madera Creek, Lagunitas Creek, Gallinas Creek, Miller Creek, Novato Creek;
- Napa County: Huichica Creek, Napa River;
- San Francisco County: none;
- San Mateo County: Cordilleras Creek, San Mateo Creek, Sanchez Creek;
- Santa Clara County: Adobe Creek, Coyote Creek, Guadalupe River, Llagas Creek (drains to the Pacific Ocean via the Pajaro River), Los Gatos Creek, Permanente Creek, San Francisquito Creek, Steven's Creek;
- Solano County: Green Valley Creek, Napa River, Putah Creek, Suisun Creek; and
- Sonoma County: Petaluma River, Russian River, Santa Rosa Creek, Sonoma Creek.

Groundwater

A groundwater basin is defined as an area underlain by permeable materials capable of furnishing a significant supply of groundwater to wells or storing a significant amount of water. Groundwater basins are considered as three-dimensional units defined by physical barriers that contain flow. Groundwater basins are closely linked to local surface waters. As water flows from the hills toward San Francisco Bay, it percolates through permeable soils into the groundwater basins. The entire Bay Area region is divided into a total of 28 groundwater basins and two of those basins (Napa-Sonoma Valley and Santa Clara Valley) are further divided into sub-basins. The ten primary groundwater basins in the Bay Area are the Petaluma Valley, Napa-Sonoma Valley, Suisun-Fairfield Valley, San Joaquin Valley, Clayton Valley, Diablo Valley, San Ramon Valley, Livermore Valley, Sunol Valley, and Santa Clara Valley basins.

Groundwater in the region is used for numerous purposes, including municipal and industrial water supply. However, groundwater use accounts for only about 5 percent of the total water usage. In general, many of the water bearing units, or aquifers, are relatively thin and yield relatively low amounts of groundwater. Groundwater quality varies throughout the Bay Area, with some areas of poor water quality as a result of past industrial uses or intrusion of brackish Bay water. Some of the larger basins such as Santa Clara Valley, Napa-Sonoma Valley, and Petaluma Valley have much thicker aquifers that can produce larger volumes of groundwater and generally have good water quality. Because of water quality and available resources, water supply for much of the Bay Area is provided by imported water supplies through water conveyance facilities such as the Hetch Hetchy Aqueduct, the Mokelumne Aqueduct, the North and South Bay Aqueduct, and others. A detailed discussion of water supply is included in Section 2.12, "Public Utilities and Facilities."

Figure 2.8-1
Major Rivers, Creeks, and Other Water Bodies



Map Data Sources: Metropolitan Transportation Commission (MTC), 2016; Tom Tom North America, 2015.

SURFACE WATER QUALITY

The quality of regional surface water resources in the Bay Area varies considerably and is locally affected by point-source and nonpoint-source discharges throughout individual watersheds. Regulated point sources, such as wastewater treatment effluent and industrial waste discharges usually involve a single point discharge into receiving waters. Point-source pollutants can also enter water bodies from urban runoff that includes oil and gasoline by-products from parking lots, streets, and freeways that are collected in drainage systems and discharged directly to surface waters. Most urban runoff flows untreated into creeks, lakes, and San Francisco Bay. This nonpoint-source runoff often carries pollutants, including copper from brake linings and lead from counterweights that contribute heavy metals to local waters. Other pollutant sources include upstream historic and current mining discharges and legacy pollutants that were historically emitted by industry or other human activities, but are currently banned or significantly restricted from current usage. Examples include mercury, lead, polychlorinated biphenyls, and dichlorodiphenyltrichloroethane.

Nonpoint-source pollutants are transported into surface waters through rainfall, air, and other pathways. The nonpoint-source pollutants originate from many diffuse sources and are the leading cause of water quality degradation in the region's waterways. Regionally, stormwater runoff is estimated to contribute more heavy metals to San Francisco Bay than direct municipal and industrial dischargers, as well as significant amounts of motor oil, paints, chemicals, debris, grease, and detergents. Runoff in storm drains may also include pesticides and herbicides from landscaping products and bacteria from animal waste.

In addition to the degradation of water quality in many of the region's surface waters, many of the region's creeks are channelized, culverted, or otherwise geomorphically altered, which has had adverse effects on aquatic and riparian habitats, sediment transfer, and hydrology. Water quality in the more rural areas of the region has also been affected by grazing and agriculture, confined animal facilities, onsite sewage systems, and land conversions. Coastal watersheds have been impaired because of sedimentation and habitat degradation.

The San Francisco Bay Regional Water Quality Control Board (RWQCB), the main agency charged with protecting and enhancing surface water and groundwater quality in the Bay Area, has classified the San Francisco Bay and many of its tributaries as impaired for various water quality constituents, as required by the Clean Water Act (CWA; see Regulatory Setting discussion in this section). The San Francisco RWQCB implements the Total Maximum Daily Load (TMDL) Program for impaired water bodies, which involves determining a safe level of loading for each problem pollutant, determining the pollutant sources, allocating loads to all of the sources, and implementing the load allocations. Within the Bay Area region, the 2010 303(d) list (applied to impaired water bodies, as defined below in Regulatory Settings discussion) includes more than 270 listings in 88 water bodies. Water Board staff are currently developing TMDL projects or studies to address more than 160 of these listings. Completed and current TMDL projects in the Bay Area are listed below (San Francisco RWQCB 2016).

Completed TMDL Projects (managed pollutant follows name of water body):

- Guadalupe River Watershed – Mercury;
- Lagunitas Creek – Sediment;
- Napa River –Sediment and Pathogens;
- North San Francisco Bay – Selenium;
- San Francisco Bay Beaches – Bacteria;
- San Francisco Bay – Mercury and PCBs;
- San Vicente Creek and Fitzgerald Marine Reserve – Bacteria;
- San Pedro Creek and Pacifica State Beach – Bacteria;
- Sonoma Creek – Pathogens and Sediment;
- Tomales Bay – Mercury and Pathogens;
- Urban Creeks – Pesticide Toxicity;

- Walker Creek – Mercury TMDL Projects in Development;
- Butano and Pescadero Creeks – Sediment;
- Permanente Creek – Selinium;
- San Francisquito Creek – Sediment;
- Stevens Creek – Toxicity; and
- Suisun Marsh – Low Dissolved Oxygen/Organic Enrichment, Mercury, Nutrients, and Salinity.

TMDLs account for all pollutant sources, including discharges from wastewater treatment facilities; runoff from homes, agriculture, and streets or highways; "toxic hot spots;" and deposition from the air. The specific urban runoff best management practices (BMPs) and levels of implementation are determined through TMDL development.

FLOOD HAZARDS

The San Francisco Bay contains many flat low-lying marginal areas and highly developed valleys with surrounding steep terrain that are conducive to flooding, especially during intense storms. Urban areas can flood when storm drains and small channels become blocked or surcharged during intense short-duration storms. Valley flooding tends to occur when large, widespread storms fall on previously saturated watersheds that drain into the valley. The greatest flood damages occur in the lower reaches of streams when floodwaters spill onto the floodplain and spread through urban neighborhoods (DWR 2013). Because of the topography of alluvial plains, floodwaters escaping some stream channels may flow away from the flooding stream, crossing open areas or flowing through city streets until reaching an adjacent watercourse. This type of flooding compounds and exacerbates local flooding that occurs when storm drains and small channels become blocked or surcharged during storms. In addition, hillsides denuded by wildfires can exacerbate flood damages by intercepting less precipitation and generating more runoff containing massive sediment loads. Storm surges coincident with high tides can also create severe flooding in low-lying areas by the mouths of rivers (DWR 2013).

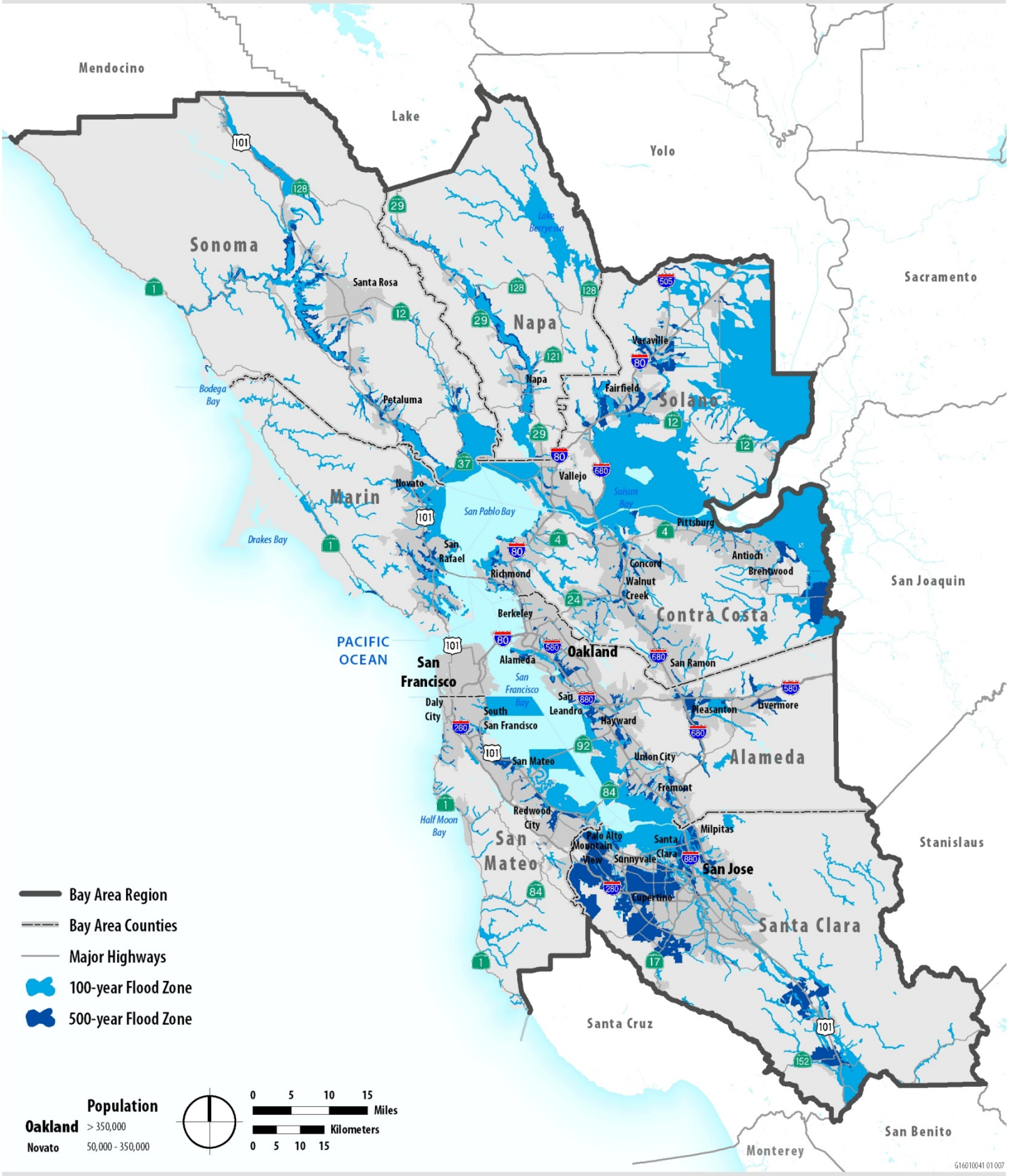
Major floods occur regularly in the Bay Area, and local structural flood damage reduction measures, such as reservoirs, levees, and channel improvements, have been implemented. Two reservoirs in the region have a designated flood protection function — Lake Del Valle and Cull Canyon Reservoir with 38,000 and 310 acre-feet of flood control capacity, respectively. Lake Del Valle is a State Water Project facility that protects Pleasanton, Fremont, Niles, and Union City. Alameda County Flood Control and Water Conservation District constructed Cull Canyon Reservoir to protect Castro Valley. Channel improvement projects designed to reduce stream flooding include channel construction, enlargement, realignment, lining, stabilization, and bank protection (DWR 2013). Flood protection agencies have constructed infrastructure projects along the following waterways to reduce the impacts of flooding (Alameda County Water District et al. 2013):

- Alameda Creek,
- Corte Madera Creek,
- Guadalupe River,
- Napa River,
- Novato Creek,
- Petaluma River, and
- San Francisquito Creek.

The Federal Emergency Management Agency (FEMA) administers the National Flood Insurance Program (NFIP). The program provides subsidized flood insurance to communities that comply with FEMA regulations to limit development in floodplains. FEMA issues Flood Insurance Rate Maps for communities participating in the NFIP. **Figure 2.8-2** identifies federally designated 100-year and 500-year storm event flood hazard zones in the Bay Area.

FEMA further classifies high risk flood hazard zones for communities that participate in the NFIP where mandatory flood insurance purchase requirements apply, as shown in **Table 2.8-2**.

Figure 2.8-2
Flood Hazard Areas



Map Data Sources: National Flood Hazard Layer (NFHL), Federal Emergency Management Agency (FEMA), 2016; Metropolitan Transportation Commission (MTC), 2016; Tom Tom North America, 2015.

Table 2.8-2 Flood Hazard Zone Classification

Zone	Description
A	Areas with a 1% annual chance of flooding and a 26% chance of flooding over the life of a 30-year mortgage. Because detailed analyses are not performed for such areas; no depths or base flood elevations are shown within these zones.
AE	The base floodplain where base flood elevations are provided. AE Zones are now used on new format FIRMs instead of A1-A30 Zones.
A1-30	These are known as numbered A Zones (e.g., A7 or A14). This is the base floodplain where the FIRM shows a BFE (old format).
AH	Areas with a 1% annual chance of shallow flooding, usually in the form of a pond, with an average depth ranging from 1 to 3 feet. These areas have a 26% chance of flooding over the life of a 30-year mortgage. Base flood elevations derived from detailed analyses are shown at selected intervals within these zones.
AO	River or stream flood hazard areas, and areas with a 1% or greater chance of shallow flooding each year, usually in the form of sheet flow, with an average depth ranging from 1 to 3 feet. These areas have a 26% chance of flooding over the life of a 30-year mortgage. Average flood depths derived from detailed analyses are shown within these zones.
AR	Areas with a temporarily increased flood risk because of the building or restoration of a flood control system (such as a levee or a dam). Mandatory flood insurance purchase requirements will apply, but rates will not exceed the rates for unnumbered A zones if the structure is built or restored in compliance with Zone AR floodplain management regulations.
A99	Areas with a 1% annual chance of flooding that will be protected by a Federal flood control system where construction has reached specified legal requirements. No depths or base flood elevations are shown within these zones.
High Risk Coastal Areas	
V	Coastal areas with a 1% or greater chance of flooding and an additional hazard associated with storm waves. These areas have a 26% chance of flooding over the life of a 30-year mortgage. No base flood elevations are shown within these zones.
VE, V1 - 30	Coastal areas with a 1% or greater chance of flooding and an additional hazard associated with storm waves. These areas have a 26% chance of flooding over the life of a 30-year mortgage. Base flood elevations derived from detailed analyses are shown at selected intervals within these zones.

Dam Failure

The California Department of Water Resources (DWR), Division of Safety of Dams (DSOD) oversees the design, construction, and annual inspection of dams statewide. DSOD imposes strict standards for the design, maintenance, and monitoring of dams under its jurisdiction to ensure that they meet static and seismic standards to prevent catastrophic failure. Periodically, some of these dams will receive modifications, such as the San Pablo Dam, which has undergone a seismic upgrade to increase its stability and minimize the potential for liquefaction to cause any slump or failure of the embankment. Since 1950, there have been nine dam failures statewide. The most recent failure of a dam causing flooding hazards occurred in 1965. A partial failure of a spillway gate at Folsom Lake Dam occurred in 1995, and a partial failure of a spillway gate at Oroville Dam occurred in 2017. Based on these statistics, dam failure is a relatively low likelihood event.

Seiches and Tsunamis

A tsunami is a series of waves generated in a body of water by a rapid disturbance (e.g., submarine seismic, volcanic, or landslide event) that vertically displaces water. Tsunamis affecting the Bay Area can result from offshore earthquakes within the Bay Area or from distant events. While it is most common for tsunamis to be generated by subduction faults such as those in Washington and Alaska, local tsunamis can be generated from strike-slip faults (such as the small one that was triggered by the 1906 San Andreas earthquake). In general, a tsunami can move hundreds of miles per hour in the open ocean and reach land with waves as high as 100 feet or more. A total of 51 tsunamis have been recorded or observed within the San Francisco Bay since 1850. Of these, only the tsunamis generated by the 1960 Chile earthquake and the 1964 Alaska earthquake caused damage in San Francisco Bay. The 1964 tsunami event caused the most damage of these events and had a recorded amplitude of approximately 3.7 feet (1.1 meters) at the Presidio in San Francisco. According to newspaper articles in the San Francisco Chronicle (March 29, 1964) and Marin Independent Journal (March 30,

1964), damage in San Francisco Bay was largely isolated to small boats. ABAG has mapped portions of the Plan area as within tsunami inundation areas for emergency planning (see **Figure 2.8-3**).

Seiches are oscillations of enclosed and semi-enclosed bodies of water, such as bays, lakes or reservoirs, because of strong ground motion from seismic events, wind stress, volcanic eruptions, large landslides and local basin reflection of tsunamis. Seiches can result in creation of long-period waves that can cause water to overtop containment features or run-up on adjacent landmasses (San Francisco 2011).

Mudflow

Mudflows are characterized by a downhill movement of soft wet earth and debris, made fluid by rain or melted snow and often building up great speed. Mudflows occur on steep slopes where vegetation is not sufficient to prevent rapid erosion but can occur on gentle slopes if other conditions are met. Other factors are heavy precipitation in short periods and an easily erodible source material. Mudflows can be generated in any climatic regime, but are most common in arid and semiarid areas and can be associated with volcanic events.

2.8.2 Regulatory Setting

FEDERAL REGULATIONS

Clean Water Act

The CWA establishes the basic structure for regulating discharges of pollutants into "waters of the United States." The Act specifies a variety of regulatory and non-regulatory tools to sharply reduce direct pollutant discharges into waterways, finance municipal wastewater treatment facilities, and manage polluted runoff. Some of these tools include:

- Section 303(d) –TMDLs
- Section 401 – Water Quality Certification
- Section 402 – National Pollutant Discharge Elimination System (NPDES) Program
- Section 404 – Discharge of Dredge or Fill Material

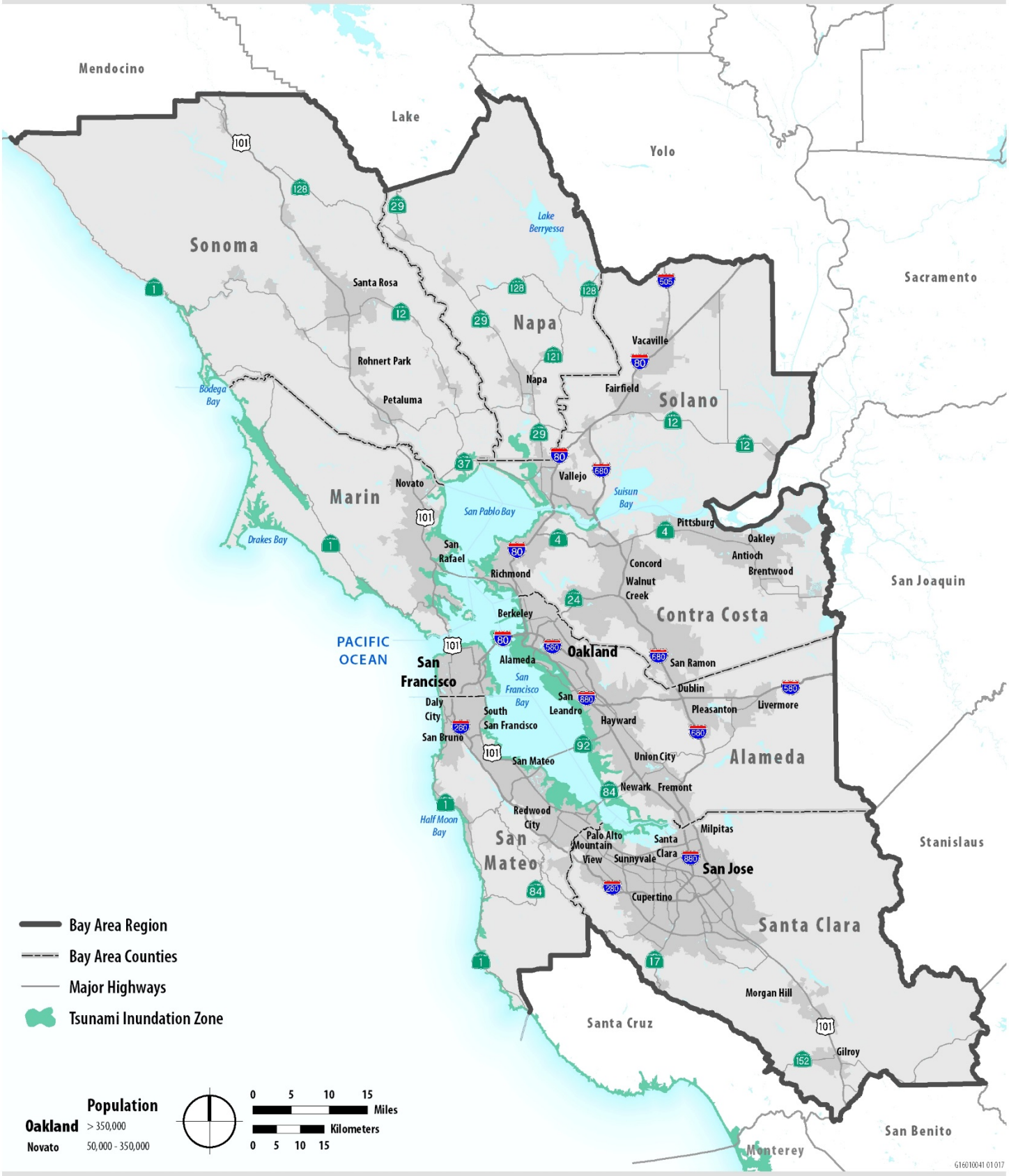
In 2000, the U.S. Environmental Protection Agency (EPA) established the California Toxics Rule, which sets water quality criteria for priority toxic pollutants and other provisions for water quality standards to be applied to inland surface waters, enclosed bays, and estuaries for all purposes and programs under the CWA.

Section 303(d) requires states, territories, and authorized tribes to develop a list of water-quality limited segments of rivers and other water bodies under their jurisdiction. The waters on the list do not meet water quality standards, even after point sources of pollution have installed the minimum required levels of pollution control technology. The law requires that these jurisdictions establish priority rankings for waters on the list and develop action plans to improve water quality. These are action plans designed to improve the quality of water resources. As part of the TMDL process, municipalities must examine the water quality problems and identify sources of pollutants to create specific actions designed to improve water quality.

Section 401 requires every applicant for a federal permit or license for any activity that may result in a discharge to a water body to obtain a water quality certification that the proposed activity will comply with applicable water quality standards.

Section 402 regulates point-source discharges to surface waters through the NPDES program. In California, the State Water Resources Control Board (SWRCB) oversees the NPDES program, which is administered by the RWQCBs. The NPDES program provides for both general permits (those that cover a number of similar or related activities) and individual permits. The NPDES program covers municipalities, industrial activities,

Figure 2.8-3
Tsunami Inundation Zones



Map Data Sources: California Emergency Management Agency (CalEMA), the University of Southern California (USC), and the California Geological Survey (CGS), 2015; Metropolitan Transportation Commission (MTC), 2016; Tom Tom North America, 2015; U.S. Geologic Survey (USGS), 2011.

and construction activities. The NPDES program includes an industrial stormwater permitting component that covers ten categories of industrial activity that require authorization under an NPDES industrial stormwater permit for stormwater discharges. Construction activities, also administered by the SWRCB, are discussed below. Section 402(p) of the federal CWA, as amended by the Water Quality Act of 1987, requires NPDES permits for stormwater discharges from municipal separate storm sewer systems (MS4s), stormwater discharges associated with industrial activity (including construction activities), and designated stormwater discharges, which are considered significant contributors of pollutants to waters of the United States. On November 16, 1990, EPA published regulations (Code of Federal Regulations [CFR] Title 40, Part 122), which prescribe permit application requirements for MS4s pursuant to CWA 402(p). On May 17, 1996, EPA published an Interpretive Policy Memorandum on Reapplication Requirements for Municipal Separate Storm Sewer Systems, which provided guidance on permit application requirements for regulated MS4s. MS4 permits include requirements for post-construction control of stormwater runoff in what is known as Provision C.3. The goal of Provision C.3 is for the permittees to use their planning authorities to include appropriate source control, site design, and stormwater treatment measures in new development and redevelopment projects to address both soluble and insoluble stormwater runoff pollutant discharges and prevent increases in runoff flows from new development and redevelopment projects. This goal is to be accomplished primarily through the implementation of low impact development (LID) techniques.

Section 404 establishes a permit program, administered by the U.S. Army Corps of Engineers (USACE), to regulate the discharge of dredge or fill materials into waters of the United States, including wetlands. Activities in waters of the United States that are regulated under this program include fills for development, water resource projects (such as dams and levees), infrastructure development (such as highways and airports), and conversion of wetlands to uplands for farming and forestry. CWA Section 404 permits are issued by USACE.

Section 10 of the Rivers and Harbors Act

Section 10 of the Rivers and Harbors Act, administered by USACE, requires permits for all structures (such as riprap) and activities (such as dredging) in navigable waters of the United States.

Executive Order 11990 - Protection of Wetlands

This executive order is an overall wetlands policy for all agencies managing federal lands, sponsoring federal projects, or providing federal funds to state or local projects. This executive order requires that when a construction project involves wetlands, a finding must be made by the federal agency that there is no practicable alternative to such construction, and that the proposed action includes all practicable measures to minimize impacts to wetlands resulting from such use.

National Flood Insurance Act

The U.S. Congress passed the National Flood Insurance Act in 1968 and the Flood Disaster Protection Act in 1973 to restrict certain types of development on floodplains and to provide for a NFIP. The purpose of these acts is to reduce the need for large, publicly-funded flood control structures and disaster relief. The NFIP is a federal program administered by the Flood Insurance Administration of FEMA. It enables individuals who have property (a building or its contents) within the 100-year floodplain to purchase insurance against flood losses. FEMA works with the states and local communities to identify flood hazard areas and publishes a flood hazard boundary map of those areas. Floodplain mapping is an ongoing process in the Bay Area and flood maps must be regularly updated for both major rivers and tributaries as land uses and development patterns change.

Executive Order 11988 - Floodplain Management

Executive Order 11988 directs federal agencies to avoid, to the extent practicable and feasible, short- and long-term adverse impacts associated with the occupancy and modification of floodplains and to avoid direct and indirect support of floodplain development wherever there is a practicable alternative. Further, this executive order requires the prevention of uneconomic, hazardous, or incompatible use of floodplains; protection and preservation of the natural and beneficial floodplain values; and consistency with the standards and criteria of the NFIP.

STATE REGULATIONS

Sustainable Groundwater Management Act

The Sustainable Groundwater Management Act (SGMA) was enacted in September of 2014. Pursuant to SGMA, sustainable groundwater management is the management and use of groundwater in a manner that can be maintained during a 50-year planning and implementation horizon without causing undesirable results. The SGMA establishes a new structure for locally managing California's groundwater and includes the following key elements:

- provides for the establishment of a Groundwater Sustainability Agency (GSA) by one or more local agencies overlying a designated groundwater basin or subbasin, as established by DWR Bulletin 118-03;
- requires all groundwater basins found to be of "high" or "medium" priority to prepare Groundwater Sustainability Plans (GSP). Sonoma, Napa, Solano, Contra Costa, Alameda, and Contra Costa Counties include basins designated as high or medium priority (see **Figure 2.8-4**);
- provides for the proposed revisions, by local agencies, to the boundaries of a DWR Bulletin 118 basin, including the establishment of new subbasins;
- provides authority for DWR to adopt regulations to evaluate GSPs, and review the GSPs for compliance every 5 years;
- requires DWR to establish BMPs and technical measures for GSAs to develop and implement GSPs; and
- provides regulatory authorities for the SWRCB for developing and implementing interim groundwater monitoring programs under certain circumstances (such as lack of compliance with development of GSPs by GSAs).

Porter-Cologne Water Quality Control Act

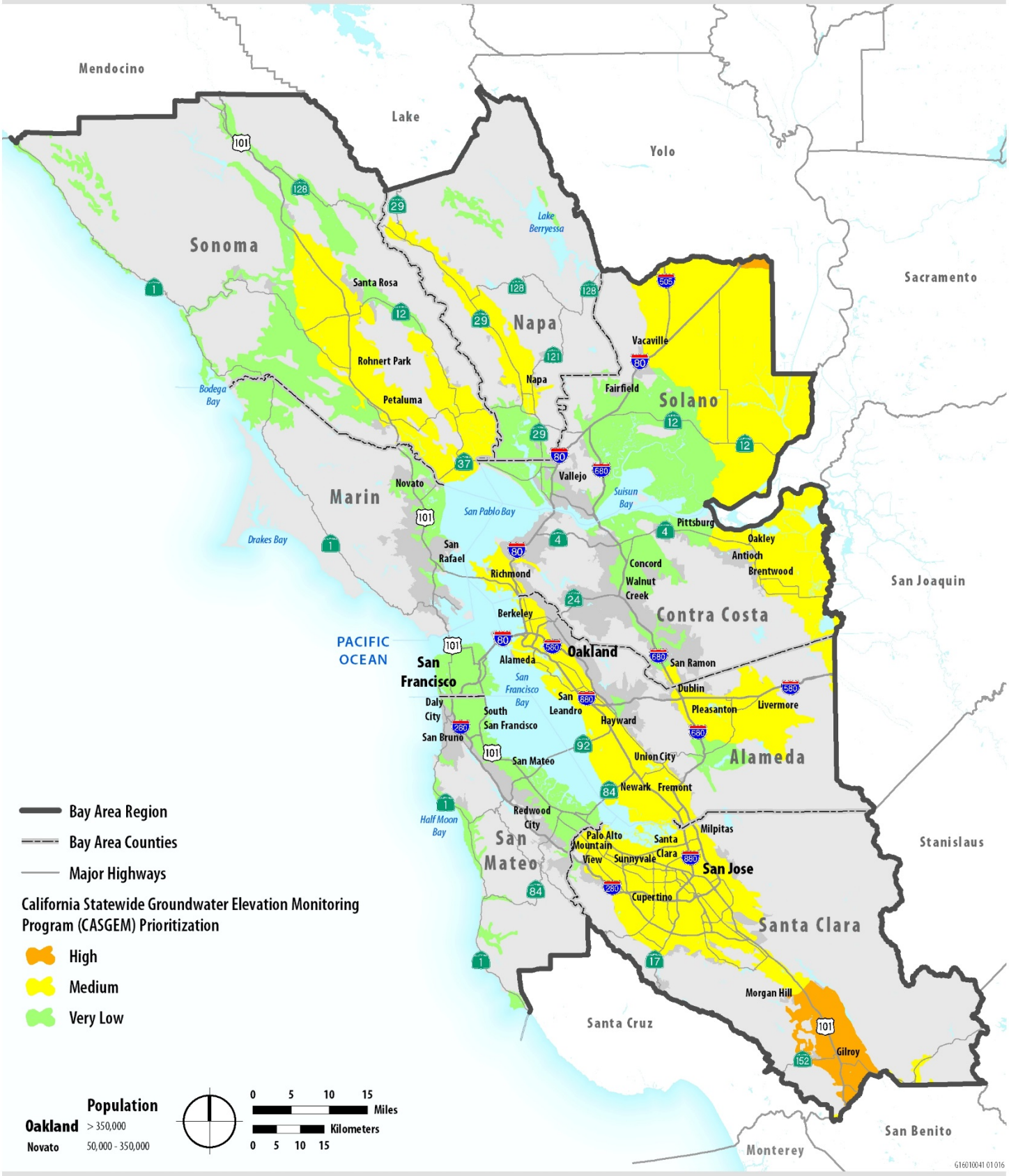
The Porter-Cologne Water Quality Control Act established the SWRCB and divided the state into nine regions, each overseen by a RWQCB. The nine regional boards have the primary responsibility for the coordination and control of water quality within their respective jurisdictional boundaries. Under the Porter-Cologne Water Quality Control Act, water quality objectives are limits or levels of water quality constituents or characteristics established for the purpose of protecting beneficial uses. The Act requires the RWQCBs to establish water quality objectives while acknowledging that water quality may be changed to some degree without unreasonably affecting beneficial uses. Designated beneficial uses, together with the corresponding water quality objectives, also constitute water quality standards under the federal CWA. Therefore, the water quality objectives form the regulatory references for meeting state and federal requirements for water quality control.

Each RWQCB is required to prepare and update a Basin Plan for their jurisdictional area. Pursuant to the CWA NPDES program, the RWQCB also issues permits for point source discharges that must meet the water quality objectives and must protect the beneficial uses defined in the Basin Plan.

ANTIDEGRADATION POLICY

California's antidegradation policy, formally known as the Statement of Policy with Respect to Maintaining High Quality Waters in California (SWRCB Resolution No. 68-16), restricts degradation of surface and ground waters. It protects waters where existing quality is higher than necessary for the protection of beneficial uses. Any actions with the potential to adversely affect water quality must 1) be consistent with maximum benefit to the people of the State, 2) not unreasonably affect present and anticipated beneficial use of the water, and 3) not result in water quality less than that prescribed in water quality plans and policies. Any actions that can adversely affect surface waters are also subject to the federal antidegradation policy (40 CFR Section 131.12) developed under the CWA.

Figure 2.8-4
Groundwater Basin Prioritization



Map Data Sources: California Statewide Groundwater Elevation Monitoring Program (CASGEM), 2014; Metropolitan Transportation Commission (MTC), 2016; Tom Tom North America, 2015; U.S. Geologic Survey (USGS), 2011.

Construction General Permit

The California Construction Stormwater Permit (Construction General Permit)[1], adopted by the SWRCB, regulates construction activities that include clearing, grading, and excavation resulting in soil disturbance of at least 1 acre of total land area. The Construction General Permit authorizes the discharge of stormwater to surface waters from construction activities. It prohibits the discharge of materials other than stormwater and authorized non-stormwater discharges and all discharges that contain a hazardous substance in excess of reportable quantities established in Title 40, Sections 117.3 or 302.4 of the CFR, unless a separate NPDES permit has been issued to regulate those discharges.

The Construction General Permit requires that all developers of land where construction activities will occur over more than 1 acre do the following:

- complete a Risk Assessment to determine pollution prevention requirements pursuant to the three Risk Levels established in the General Permit,
- eliminate or reduce non-stormwater discharges to storm sewer systems and other waters of the Nation,
- develop and implement a stormwater pollution prevention plan (SWPPP), which specifies BMPs that will reduce pollution in stormwater discharges to the Best Available Technology Economically Achievable/ Best Conventional Pollutant Control Technology standards, and
- perform inspections and maintenance of all BMPs.

To obtain coverage under the NPDES Construction General Permit, the Legally Responsible Person must electronically file all permit registration documents with the SWRCB before the start of construction. Permit registration documents must include:

- Notice of Intent,
- Risk Assessment,
- Site Map,
- SWPPP,
- Annual Fee, and
- Signed Certification Statement.

Typical BMPs contained in SWPPPs are designed to minimize erosion during construction, stabilize construction areas, control sediment, control pollutants from construction materials, and address post construction runoff quantity (volume) and quality (treatment). The SWPPP must also include a discussion of the program to inspect and maintain all BMPs.

California Green Building Standards Code

Chapters 4 and 5 of the California Green Building Standards Code (CalGreen) include mandatory measures for residential and nonresidential development, respectively. Section 4.106.2 requires residential projects that disturb less than 1 acre and are not part of a larger common plan of development, manage stormwater drainage during construction through use of on-site retention basins, filtration systems where stormwater is conveyed to a public drainage system, and/or compliance with a stormwater management ordinance. Section 5.106.1 requires newly constructed nonresidential projects and additions of less than 1 acre to prevent the pollution of stormwater runoff because of construction through compliance with a local ordinance or implementing BMPs that address soil loss and good housekeeping to manage equipment, materials, and wastes.

[1] *General Permit for Stormwater Discharges Associated with Construction and Land Disturbance Activities,* Order No. 2009- 0009-DWQ, as amended by Order No. 2010-0014-DWQ, National Pollutant Discharge Elimination System No. CAS000002.

California Department of Transportation NPDES Permit

The California Department of Transportation (Caltrans) was originally issued a statewide NPDES permit (Order 99-06-DWQ) in 1999, which requires Caltrans to regulate nonpoint source discharge from its properties, facilities, and activities. The Caltrans permit requires development of a program for communication with local agencies, and coordination with other MS4 programs where those programs overlap geographically with Caltrans facilities. As part of the permit, Caltrans is required to create and annually update a Stormwater Management Plan (SWMP) that is used to outline the regulation of pollutant discharge caused by current and future construction and maintenance activities. SWMP requirements apply to discharges from Caltrans stormwater conveyances, including catch basins and drain inlets, curbs, gutters, ditches, channels, and storm drains. The SWMP applies to discharges consisting of stormwater and non-stormwater resulting from the following:

- maintenance and operation of state-owned highways, freeways, and roads;
- maintenance facilities;
- other facilities with activities that have the potential for discharging pollutants;
- permanent discharges from subsurface dewatering;
- temporary dewatering; and
- construction activities.

The discharges addressed by the SWMP flow through municipal stormwater conveyance systems or flow directly to surface water bodies in the state. These surface water bodies include creeks, rivers, reservoirs, lakes, wetlands, lagoons, estuaries, bays, and the Pacific Ocean and tributaries.

This SWMP applies to the oversight of outside agencies' or non-Caltrans entities' (third parties) activities performed within Caltrans' MS4 to ensure compliance with stormwater regulations. Non-Caltrans activities include highway construction and road improvement projects, as well as residential use and business operations on leased property.

The SWMP must be approved by the SWRCB and, as specified in the permit, it is an enforceable document. Compliance with the permit is measured by implementation of the SWMP. Caltrans' policies, manuals, and other guidance related to stormwater are intended to facilitate implementation of the SWMP. Caltrans also requires all contractors to prepare and implement a program to control water pollution effectively during the construction of all projects.

In lieu of the more recently adopted General Construction Permit as described above, Caltrans continues to modify its current policies and procedures to be consistent with the new permit.

California Stormwater Quality Association Best Management Practices Handbooks

The California Stormwater Quality Association (CASQA) is a professional member association dedicated to the advancement of stormwater quality management through collaboration, education, implementation guidance, regulatory review, and scientific assessment. CASQA's membership is comprised of a diverse range of stormwater quality management organizations and individuals, including cities, counties, special districts, industries, and consulting firms throughout the state. CASQA develops and publishes four BMP Handbooks. The New Development and Redevelopment Handbook provides guidance on developing project-specific SWMPs, including selection and implementation of BMPs, for a particular development or redevelopment project.

Cobey-Alquist Floodplain Management Act

The Cobey-Alquist Floodplain Management Act (California Water Code 8400-8415) and Executive Order B-39-77 give support to the NFIP. The Act encourages local governments to plan, adopt, and enforce land use regulations for floodplain management, to protect people and property from flooding hazards. The Act also identifies requirements that jurisdictions must meet to receive State financial assistance for flood control. Executive Order B-39-77 requires state agency compliance with good floodplain management practices.

California Fish and Game Code

The California Department of Fish and Wildlife is responsible for conserving, protecting, and managing California's fish, wildlife, and native plant resources. To meet this responsibility, the Fish and Game Code (Section 1602) requires an entity to notify the Department of any proposed activity that may substantially modify a river, stream, or lake. Notification is required by any person, business, state or local government agency, or public utility that proposes an activity that will:

- substantially divert or obstruct the natural flow of any river, stream or lake;
- substantially change or use any material from the bed, channel, or bank of, any river, stream, or lake; or
- deposit or dispose of debris, waste, or other material containing crumbled, flaked, or ground pavement where it may pass into any river, stream, or lake.

The notification requirement applies to any work undertaken in or near a river, stream, or lake that flows at least intermittently through a bed or channel. This includes ephemeral streams, desert washes, and watercourses with a subsurface flow. It may also apply to work undertaken within the flood plain of a body of water.

REGIONAL AND LOCAL REGULATIONS

McAteer-Petris Act/San Francisco Bay Conservation and Development Commission

The McAteer-Petris Act is a provision under California law that preserves San Francisco Bay from indiscriminate filling. The Act established the San Francisco Bay Conservation and Development Commission (BCDC) as the agency charged with preparing a plan for the long-term use of the Bay and regulating development in and around the Bay while the plan was being prepared. The San Francisco Bay Plan, completed in January 1969, includes policies on 18 issues critical to the wise use of the bay, ranging from ports and public access to design considerations and weather. The McAteer-Petris Act authorizes BCDC to incorporate the policies of the Bay Plan into state law. The Bay Plan has two features: policies to guide future uses of the bay and shoreline, and maps that apply these policies to the Bay and shoreline.

Bay Area Stormwater Management Agencies Association

The Bay Area Stormwater Management Agencies Association (BASMAA) is a consortium of the following nine San Francisco Bay Area municipal stormwater programs: Alameda Countywide Clean Water Program, Contra Costa Clean Water Program, Fairfield-Suisun Urban Runoff Management Program, Marin County Stormwater Pollution Prevention Program, Napa Countywide Stormwater Pollution Prevention Program, San Mateo Countywide Water Pollution Prevention Program, Santa Clara Valley Urban Runoff Pollution Prevention Program, Sonoma County Water Agency, and the Vallejo Sanitation and Flood Control District. BASMAA was started in an effort to promote regional consistency and to facilitate efficient use of public resources. BASMAA has prepared *Start at the Source*, a manual that aims to help designers, developers, and municipal agencies create communities that achieve water quality goals (BASMAA 1999).

Flood Planning

Many agencies in the region have some level of flood planning. The City of Napa has a system of road closures based on the stage of the Napa River that reduces the risk to individuals and property in the event of flooding. The Contra Costa Resource Conservation District has a watershed management plan for Alhambra Creek that discusses a myriad of options to reduce the risk of flooding in Martinez and surrounding areas. The Bay Area Flood Protection Agencies Association is a consortium of flood control and water agencies in the region that provides a forum for discussing flood issues, collaborating on multi-agency projects, and sharing resources.

All local jurisdictions regulate development within floodplains. Construction standards are established within local ordinances and planning elements to reduce flood impedance, safety risks, and property damage.

Dam Inundation

Counties are required by State regulation to map potential dam inundation areas and prepare emergency plans and procedures for preparing and responding to a dam breach as part of their Multi-Hazard Mitigation Plans (Title 19 CCR Section 2575). Additionally, the Federal Energy Regulatory Commission is required to approve local Emergency Action Plans for dams with the potential to cause massive damage. Emergency Action Plans outline notification procedures for people and property owners within a potential inundation area. Because of the large number of dams within the Plan area, many of the proposed development areas would likely be located within one or more inundation areas. There is no policy or regulatory requirement restricting development within potential dam inundation areas largely because of the continued maintenance and oversight, which results in a relatively low risk for damage or injury.

City and County General Plans

Of the seven required general plan elements, the conservation, open space and safety elements are the most relevant to hydrology and water quality. The conservation element typically addresses watershed protection, land or water reclamation, prevention or control of the pollution of streams and other coastal waters, regulation of land uses along stream channels and in other areas required to implement the conservation plan (e.g., buffer areas), to control or correct soil erosion, and for flood control. The open space element applies to the preservation of natural resources, including fish and wildlife habitat, rivers, streams, bays and estuaries, and open space. The safety element applies to the potential risk of death, injuries, property damage, and economic and social dislocation resulting from floods and other hazards.

Government Code Section 65302, as amended, requires that on or after January 1, 2009, the updated safety elements of general plans must incorporate significantly enhanced geographic data, goals, and policies related to flood hazards. This enhanced assessment of flood hazards must include: flood mapping information from multiple agencies including FEMA, USACE the Office of Emergency Services, DWR, and any applicable regional dam, levee, or flood protection agencies; historical data on flooding; an inventory of existing and planned development (including transportation infrastructure) in flood zones; and new policies that comprehensively address existing and future flood risk in the planning area.

2.8.3 Impact Analysis

SIGNIFICANCE CRITERIA

The following significance criteria are based on CEQA Guidelines Appendix G, thresholds used in the EIR for the 2013 Plan Bay Area, and professional judgment. Implementation of the proposed Plan would have a potentially significant adverse impact on water resources if it would:

Criterion 1: Violate any water quality standards or waste or stormwater discharge requirements.

Criterion 2: Substantially interfere with or reduce rates of groundwater recharge due to the increased amount of impervious surfaces, such that there would be a net deficit in aquifer volume or a lowering of the groundwater table.

Criterion 3: Increase erosion by altering the existing drainage patterns of a site, contributing to sediment loads of streams and drainage facilities, and thereby affecting water quality.

Criterion 4: Increase non-point pollution of stormwater runoff due to litter, fallout from airborne particulate emissions, or discharges of vehicle residues, including petroleum hydrocarbons and metals, that would impact the quality of receiving waters.

Criterion 5: Increase non-point-source pollution of stormwater runoff from construction sites due to discharges of sediment, chemicals, and wastes to nearby storm drains and creeks.

Criterion 6: Increase rates and amounts of runoff due to additional impervious surfaces, cut-and-fill slopes, or result in alterations to drainage systems that could cause potential flood hazards and effects on water quality.

Criterion 7: Place structures that would impede or redirect flows within a 100-year flood hazard area.

Criterion 8: Expose people to a significant risk of loss, injury, or death involving flooding (including flooding as a result of the failure of a levee or dam), seiche, tsunami, or mudflow.

METHOD OF ANALYSIS

This program-level analysis generally evaluates potential impacts on water resources based on the location of land use growth footprints and transportation project footprints relative to the known distribution of water resources throughout the Bay Area. For this impact assessment, a geographic information system was used to digitally overlay the projected land use growth footprint associated with projected development and the projected footprint associated with transportation projects onto documented locations of groundwater basins, and 100-year and 500-year flood zones. Results are presented for the region, for each county, and for the portions of the land use growth footprint specifically within the TPAs. A quantitative analysis of the potential for impacts (e.g., acres of new impervious surface on groundwater basins, or acres of projected development or transportation projects in flood hazard zones) was undertaken where possible. Potential effects relative to increased runoff and water quality are assessed qualitatively.

The actual footprints and other design details of most proposed transportation projects are not known because the projects are in the early stages of planning. Transportation projects, including road widenings, new roads, new or expanded interchanges, and new rail transit infrastructure, were spatially analyzed by calculating buffer areas around the center line or center point of proposed roadway and transit projects. In practice, many of the transportation projects would not use the entire buffer area. The net result is that the acres of impact described in the tables presented in this section are conservative and avoid risks of underestimating the impacts resulting from the implementation of the Plan.

Effects on area hydrology could occur where projects substantially alter stormwater drainage, groundwater recharge, or potential for flooding. Effects on water quality could result from increases in erosion and other non-point-source pollutants at levels exceeding established regulatory thresholds. As explained in Chapter 2, "Introduction to the Analysis," of this Draft EIR, where regulatory or permitting requirements exist, it is assumed that compliance with these regulations would occur. Regulatory requirements that would minimize project effects are discussed in the appropriate impact analyses, below, and factored into the assessment of impact significance.

IMPACTS AND MITIGATION MEASURES

Impact 2.8-1: Implementation of the proposed Plan could result in violation of water quality standards or waste or stormwater discharge requirements.

Impacts of Changes in Projected Land Use

Land development under the proposed Plan would increase the amount of impervious surface in the region, such as new paved areas, building rooftops, and parking lots. This increase in impervious surface has the potential to generate additional stormwater runoff. Common urban pollutants (e.g., petroleum hydrocarbons, lubricants, herbicides and pesticides, sediments, and metals [generated by the wear of automobile parts]) could be transported in runoff, washed by rainwater from rooftops and landscaped areas into onsite and local drainage networks, and potentially adversely affect the quality of receiving surface waters or groundwater. Further, depending on the location and need for trenching and excavation, construction activities may reach depths that could expose the groundwater table and create a direct path through which contaminants could enter the groundwater system.

The Section 402 NPDES MS4 Phase I and Phase II permits required under the CWA, which cover all jurisdictions as well as large institutional users (as further described under the state regulatory settings discussion above), require agencies and developments to implement SWMPs, which in turn require the implementation of source and treatment control measures. The Section 402 NPDES Construction General permits require project proponents to incorporate general site design control measures into project design. These control measures may include conserving natural areas, protecting slopes and channels, and minimizing impervious areas. Treatment control measures may include use of vegetated swales and buffers, grass median strips, detention basins, wet ponds, or constructed wetlands, infiltration basins, and other measures. Filtration systems may be either mechanical (e.g., oil/water separators) or natural (e.g., bioswales and settlement ponds). Selection and implementation of these measures would occur on a project-by-project basis depending on project size and stormwater treatment needs. NPDES MS4 permittees are also required to develop and enforce ordinances and regulations to reduce the discharge of sediments and other pollutants in runoff, and must verify compliance. NPDES Construction General permittees are also required to develop a SWPPP for each site, which include BMPs to reduce potential construction impacts.

New development that would introduce 10,000 or more square feet of new impervious surfaces would be required under Provision C.3 of the NPDES program to incorporate LID strategies such as stormwater reuse, onsite infiltration, and evapotranspiration. Most development related to land use under the plan would be subject to these requirements. The requirements for smaller projects would vary by local jurisdiction. In many cases, stormwater drainage measures and compliance with RWQCB Municipal Regional Stormwater Permit Order No. 2011-0083 Provision C.3 may be required by local jurisdictions as standard conditions of approval for building permit applications.

Typical BMPs used to meet regulatory standards include:

Construction

- Limit excavation and grading activities to the dry season (April 15 to October 15) to the extent possible to reduce the chance of severe erosion from intense rainfall and surface runoff, as well as the potential for soil saturation in swale areas.

- Cover stockpiles of loose material; diverting runoff away from exposed soil material; locating and operating sediment basin/traps to minimize the amount of offsite sediment transport and dissipate energy; and removing any trapped sediment from the basin/trap for placement at a suitable location onsite, away from concentrated flows, or removal to an approved disposal site.

- Provide erosion protection on all exposed soils either by revegetation or placement of impervious surfaces after completion of grading.

- Store hazardous materials such as fuels and solvents used on the construction sites in covered containers that are protected from rainfall, runoff, and vandalism.

Operation

- Design roadway and parking lot drainage to run through grass median strips that are contoured to provide adequate storage capacity and to provide overland flow, detention, and infiltration before runoff reaches culverts or detention basins. Oil and sediment separators or absorbent filter systems may also be installed within the storm drainage system to provide filtration of stormwater before discharge to reduce the potential for water quality impacts.

- Use integrated pest management techniques (i.e., methods that minimize the use of potentially hazardous chemicals) in landscaped areas.

- Handle, store, and apply potentially hazardous chemicals in accordance with all applicable laws and regulations.

- Implement an erosion control and revegetation program designed to allow re-establishment of native vegetation on slopes in undeveloped areas as part of the long-term sediment control plan.

- Use alternative discharge options to protect sensitive fish and wildlife populations in areas where habitat for fish and other wildlife would be threatened by facility discharge.

Under Section 303(d) of the CWA, states evaluate water quality-related data and information to develop a list of waters that do not meet established water quality standards (impaired) and develop a TMDL for every pollutant/waterbody combination on the list. This includes the development of a loading capacity that is allocated among various point sources and non-point sources. Permits for point sources are issued through the NPDES program.

As discussed above, San Francisco RWQCB has identified more than 270 listings on 88 water bodies that are classified as impaired under Section 303(d) of the CWA. Standards have been developed for approximately 110 of these listings. Water quality constituents addressed through existing TMDLs include mercury and sediment loading. Where TMDLs have been established, compliance with the standards (which is required through the NPDES permitting process) would substantially address the potential to contribute to existing pollution. As such, projects associated with forecasted land use development would not be expected to contribute to violations of water quality standards.

Regional growth and land use changes associated with the proposed Plan would not substantially degrade water quality in violation of water quality standards. Although individual projects under the proposed Plan have the potential to adversely affect water quality at a project-specific level, these impacts are considered less than significant (LS) because future projects associated with land use development would adhere to existing regulations and would operate under the oversight of applicable regulatory agencies. Through these actions, it is anticipated that growth would occur without resulting in a violation of water quality standards.

Impacts of Transportation Projects

Transportation projects would include a variety of improvements such as new express lanes, auxiliary lanes, roadway widening, increased transit service, and other maintenance and rehabilitation projects that would increase the amount of impervious surface in the region. Transportation projects would require similar drainage control measures as those described above for land use projects, including LID measures. Projects such as the creation of express lanes, or repaving projects where there is no substantial change in the drainage patterns or exposure to stormwater pollutants, would have no effect on water quality in stormwater runoff during operation. New impervious surfaces required for streets or highways could have minor effects on the receiving waters, water that filters into the ground, and groundwater basins, all of which could be affected by pollutants in the runoff from proposed future projects.

As discussed above for land use and growth under the Plan, specific regulations, such as the statewide Construction General Permit, are in place to substantially reduce the effects of construction activities on receiving waters. Transportation projects that fall under Caltrans jurisdiction would be covered by the Caltrans NPDES Stormwater Program. As described in the Regulatory Setting section above, this NPDES permit regulates all stormwater discharges from Caltrans-owned conveyances, maintenance facilities, and construction activities. Caltrans also has a Statewide SWMP (Caltrans 2016) that describes the procedures and practices used to reduce or eliminate the discharge of pollutants to storm drainage systems and receiving waters. Guidance documents have also been developed by Caltrans to implement stormwater BMPs in the design, construction, and maintenance of highway facilities. The need for, and design of, BMPs would be dictated by the project-level SWPPP and the presence of surrounding sensitive resources. During the SWPPP development process, BMPs aimed at reducing erosion and subsequent sediment transport, such as silt fencing, fiber rolls, sandbag barriers, and slope stabilization, would be identified to substantially reduce or eliminate the discharge of pollutants into receiving waters, including 303(d)-listed water bodies.

During operations and maintenance of transportation projects, operational BMPs would prevent substantial water quality degradation in compliance with applicable stormwater runoff discharge permits. Operation-phase BMPs would be evaluated during the development of drainage designs and would consider factors such

as permanent stabilization of disturbed soil and natural stormwater quality treatment. They may include LID, hydromodification measures, and erosion control/revegetation efforts. Transportation projects where local agencies are the lead agency would be subject to local and State regulations for post-construction runoff management requirements.

The regulatory requirements outlined above would require treatment of runoff to substantially reduce or eliminate the discharge of pollutants to storm drain systems and receiving waters. For projects that discharge to 303(d)-listed impaired water bodies, compliance with established TMDLs that target the removal of the pollutants causing the impairment would be required. Although individual projects under the proposed Plan have the potential to adversely affect water quality at a project-specific level, these impacts are considered less than significant (LS) because transportation projects would adhere to existing regulations and would operate under the oversight of applicable regulatory agencies. Transportation network improvements and programs associated with the proposed Plan would not substantially degrade water quality in violation of applicable water quality standards.

Conclusion

Both the land use and transportation projects would likely result in a net increase of impervious surfaces. The proposed Plan would have a **less-than-significant (LS)** impact because existing federal, state, and local regulations and oversight are in place to specify mandatory actions that must occur during project development, which would adequately address potential for construction or operation of projects to result in violation of water quality standards, or waste or stormwater discharge requirements. No mitigation is required.

Mitigation Measures

None required.

Impact 2.8-2: Implementation of the proposed Plan could substantially interfere with or reduce rates of groundwater recharge because of the increased amount of impervious surfaces, such that there could be a net deficit in aquifer volume or a lowering of the groundwater table.

Impacts of Changes in Projected Land Use

Infiltration rates can vary and largely depend on the characteristics of the exposed overlying soils and vegetation. In general, sandy soils have higher infiltration rates and can contribute to groundwater recharge; clay soils tend to have lower percolation potentials; and impervious surfaces such as pavement substantially reduce infiltration capacity. Regional development associated with the proposed Plan may result in the addition of new impervious surface areas, which may interfere with infiltration of precipitation. This can result in localized lowering of the groundwater table.

Throughout the region, 21 groundwater basins could be affected by development in the land use growth footprint (**Table 2.8-3**). These basins are generally large, and the land use growth footprint where development is expected to increase impervious surfaces is generally a small portion of the basin (i.e., less than 3 percent of the basin in all instances except Clayton Valley [40 percent] and South San Francisco [10 percent]). Therefore, even relatively large increases in the developed area within the land use growth footprint would not significantly affect the conditions of the basin as a whole. For example, in the Kenwood Valley Groundwater Basin approximately 70 percent of the land use growth footprint in the basin may be developed; however, because the growth area represents <1 percent of the basin, the effect of this future development on groundwater recharge would be limited. The possible exception is the Clayton Valley Groundwater Basin, where future development related to the proposed growth areas could result in a 40 percent increase in development in the basin overall because the growth footprint represents approximately 40 percent of the basin and the developed area within the growth footprint could increase by 90 percent.

As new development and redevelopment occurs, onsite drainage plans would be designed to retain, capture, and convey increased runoff in accordance with the city or county design standards (e.g., Alameda Countywide Clean Water Program, Contra Costa Clean Water Program, Santa Clara Clean Water Program) and State requirements such as Provision C.3 site control features. These standards and regulations generally require

or encourage the use of LID features such as vegetated swales, permeable paving, use of landscaping for infiltration, and other measures that would retain runoff as much as possible and allow for onsite infiltration.

Table 2.8-3 Potential Increase in Impervious Area because of Changes in Projected Land Use, by Groundwater Basins

Groundwater Basin	Basin Size (Acres)	Area in Land Use Growth Footprint (Acres)[1]	Portion of the Groundwater Basin within the Land Use Growth Footprint (%)[1, 2]	Undeveloped Area within Groundwater Basin and Land Use Growth Footprint (Acres)[1, 2, 3]	Increase in Developed Area within Groundwater Basin and Land Use Growth Footprint (%)[1, 2, 4]
Alexander Valley	51,000	40	<1	<1	<1
Clayton Valley	2,300	970	40	890	90
Downtown	12,200	370	3	<1	<1
Gilroy-Hollister Valley	288,200	390	<1	240	6
Half Moon Bay Terrace	14,500	5	<1	<1	4
Islais Valley	9,500	260	3	1	<1
Kenwood Valley	8,400	10	<1	9	70
Livermore Valley	111,200	620	1	190	30
Napa-Sonoma Valley	213,100	390	<1	250	60
Novato Valley	33,200	50	<1	2	5
Petaluma Valley	74,800	190	<1	73	40
Pittsburg Plain	18,700	80	<1	<1	<1
Sacramento Valley	6,291,800	800	<1	720	90
San Joaquin Valley	13,792,900	600	<1	390	60
Santa Clara Valley	578,000	7,400	1	650	9
Santa Rosa Valley	170,500	830	<1	130	20
South San Francisco	3,500	500	10	120	20
Suisun-Fairfield Valley	216,600	430	<1	270	60
Visitacion Valley	9,300	260	3	100	40
Westside	40,600	390	1	10	3
Wilson Grove Formation Highlands	140,700	20	<1	1	4

Notes:

[1] Numbers less than 1 are shown as "<1."

[2] Whole numbers have been rounded (between 0 and 10 to the nearest whole number, between 11 and 999 to the nearest 10, between 1,000 and 1,000,000 to the nearest 100).

[3] Based on Urban and Built Up Land from the Farmland Mapping and Monitoring Program 2012-2014. This source was used because it was determined to be the proxy for urbanized areas in the region.

[4] The land use growth footprint is located primarily within areas that are currently developed. Only new development where lands would be converted to urban uses from non-urban uses are considered.

Source: data provided by MTC in 2017

Activities would be implemented under California regulations governing use of groundwater, including Executive Order B-29-15 and the Groundwater Management Act, as well as groundwater provisions of applicable local general plans. Taken as a whole, these regulations are intended to reduce groundwater use and subsequent overdraft of groundwater basins. Further, as discussed above under Impact 2.8-1, Provision C.3 of the NPDES program requires new development in the region that would introduce 10,000 or more square feet of new impervious surfaces to incorporate LID strategies, including onsite infiltration, as initial stormwater management strategies. Therefore, the potential for land use projects to interfere with

groundwater recharge from implementation of the proposed Plan at the regional and local level is considered less than significant (LS) for Impact 2.8-2.

Impacts of Transportation Projects

As stated in Impact 2.8-1, the proposed transportation projects may result in some increases in impervious surfaces. Table 2.8-4 lists the groundwater basins potentially affected by the proposed transportation projects However, many of the proposed transportation facilities would be located on or adjacent to existing highways, streets, and roads. Extensive storm drainage systems present in these areas currently intercept rainfall and runoff waters, thus limiting the amount of groundwater recharge that occurs. Local agency standards (e.g., Alameda Countywide Clean Water Program, Contra Costa Clean Water Program, Santa Clara Clean Water Program, as well as any City drainage control requirements) and Caltrans standards, combined with State and federal regulations and BMPs, require drainage studies for transportation projects. These studies address drainage issues, including incorporation of infiltration systems where appropriate to limit offsite runoff volumes.

Table 2.8-4 Potential Increase in Impervious Area because of Transportation Projects, by Groundwater Basin

Groundwater Basin	Basin Size (Acres)	Area in Transportation Project Footprint (Acres)[1]	Portion of the Groundwater Basin within Transportation Project Footprint (%)[1]	Undeveloped Area within Transportation Project Footprint (Acres)[1]	Increase in Developed Area within Transportation Project Footprint (%)[1]
Arroyo del Hambre Valley	1,300	7	1	<1	<1
Castro Valley	2,900	50	2	<1	<1
Clayton Valley	2,300	310	14	70	20
Downtown	12,200	700	6	20	3
Gilroy-Hollister Valley	288,200	910	<1	590	60
Half Moon Bay Terrace	14,500	480	3	230	50
Islais Valley	9,500	1,600	17	60	4
Livermore Valley	111,200	580	1	110	20
Lobos	3,800	70	2	2	2
Marina	3,500	90	3	70	70
Napa-Sonoma Valley	213,000	250	<1	50	20
Novato Valley	33,200	150	<1	80	50
Petaluma Valley	74,800	360	<1	140	40
Pittsburg Plain	18,700	270	1	10	5
Sacramento Valley	6,292,000	290	<1	100	40
San Joaquin Valley	13,793,000	470	<1	160	30
San Pedro Valley	1,100	7	1	<1	7
San Rafael Valley	1,400	80	6	7	8
San Ramon Valley	11,300	15	<1	<1	<1
Santa Clara Valley	578,000	12,800	2	830	6
Santa Rosa Valley	170,500	280	<1	70	24
South San Francisco	3,500	2,400	70	330	14
Suisun-Fairfield Valley	216,600	880	<1	250	28
Sunol Valley	26,500	220	1	190	90
Visitacion Valley	9,300	590	6	220	40

Table 2.8-4 Potential Increase in Impervious Area because of Transportation Projects, by Groundwater Basin

Groundwater Basin	Basin Size (Acres)	Area in Transportation Project Footprint (Acres)[1]	Portion of the Groundwater Basin within Transportation Project Footprint (%)[1]	Undeveloped Area within Transportation Project Footprint (Acres)[1]	Increase in Developed Area within Transportation Project Footprint (%)[1]
Westside	40,600	1,100	3	30	3
Wilson Grove Formation Highlands	140,700	5	<1	<1	9
Ygnacio Valley	24,900	490	2	<1	<1

Note:
[1]Numbers less than 1 are shown as "<1." Whole numbers have been rounded (between 0 and 10 to the nearest whole number, between 11 and 999 to the nearest 10, between 1,000 and 1,000,000 to the nearest 100, greater than 1,000,000 to the nearest 1,000).
Source: data provided by MTC in 2017

Many of the transportation projects would occur on existing impervious surfaces where groundwater recharge is currently limited. In addition, the transportation projects would typically affect a small portion (i.e., less than 10 percent) of the overall groundwater basin. Where the transportation project footprints constitute a larger portion of the basin area, the potential for increase in developed area within the footprint is relatively low. For example, the transportation project footprint covers 14 percent of the Clayton Valley groundwater basin, but only 20 percent of the 14 percent could be developed. Similarly, in the Islais Valley groundwater basin, the Plan could result in a 4 percent increase in developed area within 17 percent of the groundwater basin; and in the South San Francisco groundwater basin, the Plan could result in a 14 percent increase in developed area within 70 percent of the groundwater basin Because of the regulations discussed above that address drainage issues, the potential to interfere with groundwater recharge from implementation of the proposed transportation projects at the regional and local level is considered less than significant (LS) for Impact 2.8-2.

Conclusion

Both land development and transportation projects would increase the total amount of impervious surfaces in the region and, as a result, redirect precipitation that might otherwise recharge groundwater. However, existing regulatory requirements at the local, state, and federal level include measures to minimize any increases in offsite stormwater runoff by encouraging onsite infiltration, which would effectively minimize the potential reduction in groundwater recharge to an acceptable level. Therefore, the proposed Plan would have a **less–than-significant (LS)** impact. No mitigation is required.

Mitigation Measures

None required.

Impact 2.8-3: Implementation of the proposed Plan could increase erosion by altering the existing drainage patterns of a site, contributing to sediment loads of streams and drainage facilities, and thereby affecting water quality.

Impacts of Changes in Projected Land Use

The following discussion addresses the potential for forecasted land use development to permanently alter drainage patterns in a manner that could affect water quality by contributing to sediment loads of streams and drainage facilities. As discussed above, the Plan area contains a number of impaired waterways under Section 303(d) of the CWA. Stormwater discharge to these impaired waters and other waters within the Plan area would be subject to the provisions of any adopted basin plans, the statewide NPDES General Construction Permit, the California Non-degradation Policy, and State Implementation Policy, as well as applicable general plan polices.

New development would not necessarily substantially alter existing drainage patterns, especially in urbanized areas where the TPAs are generally located. Because TPAs are already urbanized, most of the development in

these areas would be redevelopment, infill, and intensification of existing land uses. These types of development usually do not alter the existing drainage pattern of the area because they do not substantially increase the amount of impervious surface and they are served by existing infrastructure. The proposed growth in either urbanized or non-urbanized areas would not result in substantially increased rates of stormwater runoff that could result in substantial erosion or siltation because of compliance with federal, State, and local regulations (as described above under Impact 2.8-1).

In addition, NPDES Provision C.3 requirements include post-construction drainage control requirements that address the volume of offsite flows, which can be effective in reducing sedimentation effects on downstream receiving waters. Project proponents are required to plan, design, and develop sites to: (1) protect areas that provide important water quality benefits necessary to main riparian and aquatic biota, and/or are particularly susceptible to erosion and sediment loss; (2) limit increases of impervious areas; (3) limit land disturbance activities such as clearing and grading, and cut-and-fill to reduce erosion and sediment loss; (4) limit disturbance of natural drainage features and vegetation; and (5) reduce erosion and, to the extent practicable, retain sediment onsite during and after construction. For some projects, NPDES permits and regulations include hydromodification requirements where project proponents must study the potential impacts of proposed channelization and channel modification and then develop and implement plans to protect against undesirable impacts, including erosion. Implementing agencies would also generally require project sponsors to commit to BMPs that would minimize or eliminate existing sources of polluted runoff during operation, such as those contained in the CASQA's *California Stormwater Best Management Practice Handbook for New Development and Redevelopment*.

At the regional and local level, implementation of the proposed Plan would result in new development and redevelopment that would have the potential to disturb underlying soils and result in changes to existing drainage patterns. Although individual projects under the proposed Plan have the potential to adversely affect water quality at a project-specific level, because the local, State, and federal policies and regulations specified above are in place to provide adequate analysis of potential impacts and preventative measures to limit or avoid substantial alteration of the existing drainage pattern of the Plan area, these impacts are considered less than significant (LS).

Impacts of Transportation Projects

Transportation projects that would have the potential to alter drainage patterns, such as road widening or construction of other additional impervious surfaces, would be subject to local stormwater drainage master plans, regional MS4 permit requirements, and any Caltrans drainage requirements. These requirements would include BMPs and drainage requirements that minimize exposed soils and the potential for offsite transport of sediments. As discussed above for land use projects, although individual transportation projects have the potential to adversely affect water quality at a project- specific level, because the local, state, and federal policies and regulations specified above are in place to provide adequate analysis of potential impacts and preventative measures to limit or avoid substantial alteration of the existing drainage pattern of the Plan area, these impacts are considered less than significant (LS).

Conclusion

Implementation of the proposed Plan could result in new development and redevelopment that would have the potential to result in project-specific changes to existing drainage patterns. As discussed above, this could affect surface water quality. The potential for individual projects under the proposed Plan to adversely affect water quality at a project-specific level would be addressed through regulatory requirements that specify mandatory and relatively prescriptive actions that must occur during project development, leaving little discretion in their implementation. This impact is **less than significant (LS)** because the existing federal, state, and local regulations and oversight in place would effectively reduce the alterations of existing draining patterns to an acceptable level. No mitigation is required.

Mitigation Measures

None required.

Impact 2.8-4: Implementation of the proposed Plan could increase non-point pollution of stormwater runoff because of litter, fallout from airborne particulate emissions, or discharges of vehicle residues, including petroleum hydrocarbons and metals, that would impact the quality of receiving waters.

Impacts of Changes in Projected Land Use

The following discussion addresses the potential for increases in non-point pollution of stormwater runoff following development of projects. As discussed in Impact 2.8-1, development associated with implementation of the proposed Plan would result in a net increase in the area of paved and other impervious surfaces (e.g., structures, rooftops, parking lots). Nonpoint source pollutants could include oil and grease, petroleum hydrocarbons, and metals that would be transported by stormwater runoff to receiving water bodies.

Also as discussed above, operational phases of new development and redevelopment generally require drainage control measures in accordance with local, State, and federal regulatory requirements. These requirements include measures to limit the potential sources of pollution in non-point stormwater runoff sources, as well as point sources. Post-construction measures that are required under Provision C.3 of the regional NPDES MS4 permit would include implementation of LID drainage control features. These source control measures could include incorporation of permeable paving, vegetated swales, rooftop gardens, infiltration retention basins, and other features that have proven successful in minimizing pollution of stormwater runoff and protecting receiving waters. For redevelopment projects, implementation of LID source control drainage features could represent an improvement over existing stormwater drainage infrastructure.

Because TPAs are already urbanized, most of the land use changes in these areas would be redevelopment, infill, and intensification of existing land uses. Infrastructure upgrades would accommodate the stormwater and water quality treatment needs of the individual development, and these projects would not be expected to create or contribute runoff water that would provide substantial additional sources of polluted runoff. Where infrastructure is upgraded to facilitate development, local and State regulations would require developments to apply BMPs, implement control measures, adhere to NPDES permit requirements, and comply with local drainage standards. Combined with the application of BMPs, implementation of control measures, adherence to NPDES permit requirements, and SWRCB Management Measures for Urban Areas, implementation of the proposed Plan in TPAs could reduce net polluted runoff.

Although individual projects under the proposed Plan have the potential to adversely affect water quality at a project-specific level, because existing regulations provide adequate analysis of potential impacts and preventative measures to limit or avoid substantial release of pollutants during project operation, these impacts are considered less than significant (LS).

Impacts of Transportation Projects

The operation of transportation projects could increase non-point pollution of stormwater runoff because of litter, fallout from airborne particulate emissions, or discharges of vehicle residues, including petroleum hydrocarbons and metals, that could impact the quality of receiving waters. During the dry season, vehicles and other urban activities release contaminants onto the impervious surfaces, where they can accumulate until the first storm event. During a storm event, the concentrated pollutants would be transported via runoff to stormwater drainage systems that discharge into rivers, agricultural ditches, sloughs, and channels and ultimately could degrade the water quality of any of these water bodies. As new roads, lanes, or other new impervious surfaces are added to accommodate projected vehicular traffic, the potential also increases for associated stormwater pollutants to enter receiving waters of the Bay Area because of the increase in impervious surfaces and the anticipated increase in vehicle travel.

As mentioned above and in Impact 2.8-1, operational phases of new transportation projects generally require drainage control measures in accordance with local, State, and federal regulatory requirements. These requirements include measures to limit the potential sources of pollution from both non-point and point sources of stormwater runoff. The NPDES permit requirements described in the discussion of land use projects, above, also apply to transportation impacts. In addition, transportation projects where Caltrans is the lead agency are covered by the Caltrans Stormwater Program. Caltrans also has a SWMP that describes the

procedures and practices used to reduce or eliminate the discharge of pollutants to storm drainage systems and receiving waters.

Because existing regulations provide adequate analysis of potential impacts and preventative measures to limit or avoid substantial release of pollutants during project operation, individual transportation projects under the proposed Plan are not expected to adversely affect water quality at a project-specific level. These impacts are considered less than significant (LS).

Conclusion

The effects of both the land development and transportation projects would have the potential to increase stormwater pollutants in runoff. Individual projects under the proposed Plan would be subject to regulations that provide adequate analysis of potential impacts and preventative measures to limit or avoid substantial release of pollutants during project operation. This impact is **less than significant (LS)** because the existing federal, state, and local regulations and oversight in place would effectively reduce the release of pollutants to an acceptable level. No mitigation is required.

Mitigation Measures

None required.

Impact 2.8-5: Implementation of the proposed Plan could increase non-point-source pollution of stormwater runoff from construction sites because of discharges of sediment, chemicals, and wastes to nearby storm drains and creeks.

Impacts of Changes in Projected Land Use

Implementation of the Plan could increase non-point-source pollution of stormwater runoff from construction sites because of discharges of sediment, chemicals, and wastes to nearby storm drains and creeks. The potential for chemical releases is present at most construction sites given the types of materials used, including fuels, oils, paints, and solvents. Once released, these substances could be transported to the receiving waters in stormwater runoff, potentially incrementally reducing water quality. Construction and grading activities associated with development of the proposed Plan could require temporary disturbance of underlying soils through excavation, soil stockpiling, boring, and grading activities that strip existing vegetation or pavement before commencing with construction of proposed improvements. These activities could result in exposure of soil to runoff, potentially causing erosion and entrainment of sediment and contaminants in the runoff. Bare soils are much more likely to erode than vegetated areas because of the lack of dispersion, infiltration, and retention properties created by covering vegetation. The extent of the impacts is dependent on soil erosion potential, type of construction practice, extent of disturbed area, timing of precipitation events, and topography and proximity to drainage channels. If precautions are not taken to contain sediments and/or accidental hazardous spills, construction activities could produce substantial pollutants in stormwater runoff.

All development within the region that would disturb 1 acre or more would be required to prepare and implement a SWPPP, in accordance with the NPDES General Construction Permit, which would greatly diminish potential impacts because only small projects would be exempt from this requirement. Project SWPPPs would describe the site, construction activities, proposed erosion and sediment controls, means of waste disposal, maintenance requirements for temporary BMPs, and management controls unrelated to stormwater. Temporary BMPs to protect water quality would be required during all site development activities. Stormwater quality sampling and reporting requirements outlined as a Construction Site Monitoring and Reporting Plan are also part of the SWPPP. The SWPPP could include BMP erosion control measures such as those listed in the discussion of Impact 2.8-1, above. Projects that would disturb less than 1 acre would be subject to the CalGreen requirements related to stormwater drainage that have been designed to prevent or reduce discharges of sediments, chemicals, and wastes through BMPs that include on-site retention and filtration.

Therefore, although individual projects under the proposed Plan would have the potential to adversely affect water quality at a project-specific level, because existing regulations provide adequate analysis of potential

impacts and preventative measures to limit or avoid substantial release of pollutants during project construction, these impacts are considered less than significant (LS).

Impacts of Transportation Projects

Construction and earth-moving activities associated with transportation projects could increase erosion and sedimentation, and could result in sediment loading in local waterways and subsequent effects on water quality. Bare soils are much more likely to erode than vegetated areas because of the lack of dispersion, infiltration, and retention properties created by covering vegetation. The extent of the impacts is dependent on soil erosion potential, type of construction practice, extent of disturbed area, timing of precipitation events, and topography and proximity to drainage channels. In addition, construction equipment and activities would have the potential to leak hazardous materials, such as oil and gasoline, and potentially affect surface water or groundwater quality. Improper use or accidental spills of fuels, oils, and other construction-related hazardous materials, such as pipe sealant, solvents, and paints, could also pose a threat to the quality of local waters. If precautions are not taken to contain sediments and/or accidental hazardous spills, construction activities could produce substantial pollutants in stormwater runoff.

Transportation projects that disturb more than 1 acre would be required to adhere to the same NPDES General Construction Permit requirements as land development projects discussed above. The permit requirements include preparation and implementation of a SWPPP detailing BMPs that would be employed to control onsite stormwater drainage during construction. Components of SWPPPs typically include project risk determination (categorized into Risk Levels 1, 2, and 3), visual inspection requirements, identification of sampling locations, collection and handling procedures (for Risk Level 2 and Risk Level 3 projects), and specifications for BMPs to be implemented during project construction for the purpose of minimizing the discharge of pollutants in stormwater from the construction area. Projects that fall under Caltrans jurisdiction are also required to adhere to the Caltrans NPDES permit. Projects that would disturb less than 1 acre would be subject to the CalGreen requirements related to stormwater drainage for nonresidential projects, including BMPs designed to prevent soil loss and release of contaminants. As indicated in the discussion above, although individual transportation projects have the potential to adversely affect water quality at a project- specific level, because existing regulations provide adequate analysis of potential impacts and preventative measures to limit or avoid substantial release of pollutants during project construction, these impacts are considered less than significant (LS).

Conclusion

Before commencement of major construction activities, project applicants would submit a SWPPP to the SWRCB that identifies the BMPs that would be used in construction of the planned project. The applicant must receive approval of the SWPPP and submit a Notice of Intent before initiating construction. Individual development and transportation projects are expected to adopt BMPs appropriate to local conditions. Impacts related to land development and transportation projects are considered **less than significant (LS)** because both land development and transportation projects would be subject to existing regulatory requirements that would effectively reduce the release of pollutants associated with these activities to an acceptable level. No mitigation is required.

Mitigation Measures

None required.

Impact 2.8-6: Implementation of the proposed Plan could increase rates and amounts of runoff because of additional impervious surfaces, cut-and-fill slopes, or result in alterations to drainage systems that could cause potential flood hazards and effects on water quality.

Impacts of Changes in Projected Land Use

Implementation of the proposed Plan could result in new development that would increase the total amount of impervious surfaces and result in an incremental reduction in the amount of natural soil surfaces available for filtration of rainfall and runoff, potentially generating additional runoff during storm events. The increased

runoff could also discharge at a greater rate, leading to higher peak flows during storm events that could increase the potential for stormwater to cause flood conditions and to transport urban pollutants. However, local and State drainage control requirements would apply to most improvements where both rates and volumes of runoff would be required to meet minimum thresholds, such that potential flood hazards and effects on water quality would be minimized.

As discussed further in Impact 2.8-1, implementing agencies would require project sponsors to comply with State and federal water quality regulations for all projects that would alter existing drainage patterns. Erosion control measures would be consistent with NPDES General Construction Permit requirements, including preparation and implementation of a SWPPP, and final drainage plans would be consistent with the San Francisco Regional MS4 NPDES permit or any applicable local drainage control requirements that exceed or reasonably replace any of these measures to protect receiving waters from pollutants. Projects would also generally comply with the design guidelines established in the *California Stormwater Best Management Practice Handbook for New Development and Redevelopment* (CASQA 2003) to minimize both increases in the volume and rate of stormwater runoff, and the amount of pollutants entering the storm drain system. Once constructed, the NPDES Provision C.3 requirements for new development would include source control measures in site designs to address both soluble and insoluble stormwater runoff pollutant discharges.

In cases where existing infrastructure would not adequately handle stormwater drainage or control polluted runoff, lead agencies would be required to make infrastructure upgrades. The infrastructure upgrades would accommodate the stormwater and water quality treatment needs of the individual development and, thus, these projects would not be expected to create or contribute runoff water that would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff. Where infrastructure is upgraded to facilitate development, local and State regulations would require developments to apply BMPs, implement control measures, adhere to NPDES permit requirements, and comply with local drainage standards. In some cases, adherence to NPDES Provision C.3 requirements may result in improved retention of stormwater rates and volumes, compared to existing conditions, through implementation of LID drainage control measures.

The federal, State, and local policies and regulations specified above are in place to provide preventative measures to limit or avoid substantial alteration of the existing drainage pattern of the Plan area. Because land use projects would comply with these requirements, implementation of the proposed Plan would not be expected to increase the rate or amount of surface runoff in a manner that would result in on- or offsite flooding, or substantial erosion or siltation. The potential for implementation of the proposed Plan to increase rates and amounts of runoff such that it could result in flood hazards and effects on water quality is considered a less-than-significant (LS) impact.

Impacts of Transportation Projects

Most of the transportation projects would be on or adjacent to existing facilities. Those improvements that are on existing facilities, such as paved shoulders converted to lanes, would not likely alter drainage patterns because the facilities are already served by drainage systems. Those improvements that involve grading, recontouring, bridge pilings, and new impervious surfaces may alter existing drainage patterns, including the course of streams and rivers, which may result in increased stormwater flow volumes and velocity, resulting in on- and offsite flooding, erosion, or siltation. Transportation projects would be required to adhere to the same regulatory requirements as described above for land use projects where impervious surfaces are constructed or replaced. Projects that fall under Caltrans jurisdiction would adhere to the Caltrans Stormwater Program, which includes measures to control stormwater volumes as well as stormwater quality. These projects would be subject to the Caltrans NPDES Construction General Permit and the Caltrans SWMP, which sets the maintenance practices for controlling erosion and siltation. These existing regulatory requirements substantially address the potential for impacts to drainage patterns and rates. The Caltrans *Highway Design Manual* also requires that: road storm drain systems are designed to safely drain the 25-year return interval storm; cross- culverts are designed to safely drain the 10-year interval storm; and the headwater depth for the 100-year interval storm must not overtop freeways.

As discussed in Impact 2.8-1, drainage systems are designed on a site-specific basis in accordance with the findings of the studies and the regulations of the applicable local flood control agencies and flood control design criteria. Adherence to local and State regulations would help prevent substantial alterations to the existing drainage pattern of the site or area and avoid substantial increases in the rate or amount of surface runoff in a manner that would result in on- or offsite flooding, or substantial siltation or erosion.

Transportation projects where local agencies are the lead agency are subject to local and State regulations for construction and non-construction runoff prevention. The regional MS4 NPDES permit described above in the discussion of land use projects would also apply to transportation projects (unless under Caltrans jurisdiction, as described above). Caltrans regulations combined with federal and State regulations require that engineered conveyances integrate energy dissipation protection, streambank erosion protection, and other design controls to minimize erosion or the transport of sediment or silt to downstream areas. Because transportation projects would comply with these requirements, implementation of the proposed Plan would not be expected to increase the rate or amount of surface runoff in a manner that would result in on- or offsite flooding, or substantial erosion or siltation. The potential for implementation of the transportation projects in the proposed Plan to increase rates and amounts of runoff such that they could result in flood hazards and effects on water quality is considered a less-than-significant (LS) impact.

Conclusion

All projects implemented under the proposed Plan would be required to adhere to the appropriate local and state requirements that are designed to ensure that flooding conditions are not exacerbated and water quality is not adversely affected. This impact is **less than significant (LS)** because there are existing state and local regulations and oversight in place that would effectively reduce the amount of surface runoff in a manner that would result in on- or offsite flooding, or substantial erosion or siltation to an acceptable level. No mitigation is required.

Mitigation Measures

None required.

Impact 2.8-7: Implementation of the proposed Plan could place structures that would impede or redirect flows within a 100-year flood hazard area.

Impacts of Changes in Projected Land Use

Despite efforts to improve regional drainage control infrastructure, there are locations throughout the Plan area that are susceptible to flooding during heavy storm events. **Figure 2.8-3** shows 100-year flood hazard areas that are located within the region.

While the majority of growth under the proposed Plan would take place outside these hazard areas, there are areas within the land use growth footprint and TPAs that have been mapped as being in the 100-year and 500-year flood hazard zones (see **Table 2.8-5**). Siting structures in flood zones can result in direct effects on new development related to flooding where substantial damage can occur. In addition, structures that impede flood flows can cause a backwater effect by potentially raising flood levels, causing more severe flooding impacts to existing vulnerable areas, or by exposing new areas that would not have previously flooded to flooding impacts.

Table 2.8-5 Land Use Growth Footprint in Flood Zones, by Region, County, and TPA

County		Land Use Growth Footprint within the 100-year flood zone (acres) [1,2]	Land Use Growth Area Footprint within the 500-year flood zone (acres) [1,2]
Alameda	County Total	100	440
	Within TPAs	20	280
Contra Costa	County Total	110	170

	Within TPAs	20	10
Marin	County Total	60	20
	Within TPAs	7	8
Napa	County Total	60	8
	Within TPAs	0	0
San Francisco	County Total	0	0
	Within TPAs	0	0
San Mateo	County Total	100	50
	Within TPAs	30	20
Santa Clara	County Total	410	2,300
	Within TPAs	130	1,500
Solano	County Total	70	100
	Within TPAs	<1	<1
Sonoma	County Total	30	50
	Within TPAs	7	20
Regional Total[3]	County Total	**930**	**3,100**
	Within TPAs	**210**	**1,900**

Notes:

[1] Numbers less than 1 are shown as "<1."

[2] Whole numbers have been rounded (between 0 and 10 to the nearest whole number, between 11 and 999 to the nearest 10, between 1,000 and 1,000,000 to the nearest 100).

[3] Figures may not sum because of independent rounding.

Source: data provided by MTC in 2017

Any developments proposed within the 100-year flood zone would be required to meet local, State, and federal flood control design requirements. Implementing agencies would conduct or require project- specific hydrology studies for projects proposed to be constructed within floodplains to demonstrate compliance with Executive Order 11988 (for federally-funded projects), the NFIP, National Flood Insurance Act, and the Cobey-Alquist Floodplain Management Act, as well as any further FEMA or State requirements that are adopted at the local level. These studies would identify project design features (such as requiring minimum elevations for finished first floors, typically at least 1 foot above the 100-year base flood elevation) that reduce impacts to either floodplains or flood flows. Local jurisdictions also require adequate storm drainage capacities and retention such that new development does not exacerbate any existing problem areas. Projects in TPAs that are located within a floodplain or floodway do not qualify as sustainable community projects under Section 21155.1 of the Public Resources Code unless the applicable general plan or zoning ordinance contains provisions to mitigate the risk of a flood.

With these floodplain development requirements, continuing flood protection programs, and the drainage requirements described above, impacts related to proposed development within the 100-year floodplain from implementation of the proposed Plan at the regional and local level are considered less than significant (LS).

Impacts of Transportation Projects

Some of the transportation projects included in the proposed Plan intersect areas mapped within the 100- year flood hazard area. A total of 181 projects are located within, or partially within, the flood hazard areas (see Appendix J). However, most of these linear projects only intersect in relatively small geographical areas and total approximately 1,700 acres of potential construction in 100-year flood zones for the entire region (see **Table 2.8-**

6). Those projects in identified flood hazard areas could involve support structures or other above-ground improvements in the floodway that could potentially obstruct floodwaters in some locations. Placement of structures within a floodplain can displace floodwaters and alter the base flood elevations in the surrounding areas. As described above, structures can create a backwater effect, resulting in an increase in the flood elevation level upstream and in neighboring areas. Drainage areas could also be altered by highway corridors, in which floodwaters could be detained by medians and along the roadside. Proposed bridge supports could block debris in waterways, creating obstructions and further elevating upstream flood levels.

Table 2.8-6 Transportation Projects Growth Footprint in Flood Zones, by Region and County

County	100-year flood zone (acres)	500-year flood zone (acres)
Alameda County	140	200
Contra Costa County	350	40
Marin County	40	40
Napa County	10	<1
San Francisco	0	0
San Mateo County	250	150
Santa Clara County	430	2,100
Solano County	420	110
Sonoma County	20	40
Regional Total	1,700	2,700

Notes: Whole numbers have been rounded (between 0 and 10 to the nearest whole number, between 11 and 999 to the nearest 10, between 1,000 and 1,000,000 to the nearest 100). Figures may not sum because of independent rounding.

Source: FEMA 2016; MTC 2016

The regulatory requirements listed in the discussion of land use projects also apply to transportation projects. Local, State, and federal floodplain requirements combined with ongoing flood protection projects would minimize the potential impact of the transportation projects at the regional and local level. Projects in the proposed Plan also would be required to comply with FEMA regulations, which mandate no development within the 100-year regulatory floodplain if it could increase the flood elevation by 1 foot or more, and no development within 100-year floodways. Federally-funded projects must also comply with the federal Executive Order 11988, which requires that floodplain encroachment only occur if there is no alternative to avoid the floodplain and all feasible mitigation for floodplain impacts must be included in the project.

Any enhancements or modifications to California state highways would be required to follow Caltrans guidelines, which include the preparation of a hydraulic study and submittal of a hydraulics study report for any project intercepting a waterway or encroaching upon a floodplain to assess the potential impacts to natural processes and beneficial uses as part of the environmental review (Caltrans 2016). With such measures, the potential impacts related to transportation projects are considered less than significant (LS).

Conclusion

Land development and transportation projects would be subject to implementation of existing local, state, and federal flood protection regulations. These measures would effectively reduce the potential for structures that could impede or redirect flows associated with individual projects to be located within the 100- year flood zone to an acceptable level, and would result in a **less-than-significant (LS)** impact. No mitigation is required.

Mitigation Measures

None required.

Impact 2.8-8: Implementation of the proposed Plan could expose people to a significant risk of loss, injury, or death involving flooding (including flooding as a result of the failure of a levee or dam), seiche, tsunami, or mudflow.

Impacts of Changes in Projected Land Use

As discussed above, DSOD oversees the design, construction, and annual inspection of dams statewide. DSOD imposes strict standards for the design, maintenance, and monitoring of dams under its jurisdiction to ensure that they meet static and seismic standards to prevent catastrophic failure. Because of this oversight and based on statistics regarding the frequency of past dam failures, dam failure is a relatively low likelihood event.

Counties are required by State regulation to map potential dam inundation areas and prepare emergency plans and procedures for responding to a dam breach as part of their Multi-Hazard Mitigation Plans (CCR Title 19 Section 2575). Additionally, the Federal Energy Regulatory Commission is required to approve local Emergency Action Plans for dams with the potential to cause massive damage. Emergency Action Plans outline notification procedures for people and property owners within a potential inundation area. Because of the large number of dams within the Plan area, subsequent projects would likely be located within one or more inundation areas. There is no policy or regulatory requirement restricting development within potential dam inundation areas, largely because of the continued maintenance and oversight which results in a relatively low risk for damage or injury.

Substantial precipitation, major storm events, or seismic events have the potential to cause any of the many levees in the Plan area to fail. Specific projects developed under the proposed Plan may create structures or obstructions to flood flows from levee failures. In addition, impervious surfaces increase runoff quantities, taxing flow capacities of local flood control systems and deteriorating natural habitats. However, any projects constructed within areas subject to flooding because of levee failure, as mapped by FEMA, must be built in compliance with standard building codes and federal, State, and local regulations. Specifically, the State and federal regulations for 100-year flood protection assess the adequacy of protection, including from levees. In addition, the following regulations would further reduce potential exposure of people or structures to a significant risk of loss, injury or death involving flooding, including flooding as a result of the failure of a levee or dam: California Building Code, State and federal regulations to control stormwater runoff and limit drainage pattern alteration described under Impacts 2.8-6 and 2.8-7, and State real estate disclosure laws requiring notification to new property owners for property that lies within any dam inundation area or floodplain.

Given that no significant damage from tsunamis has ever been reported in the San Francisco Bay, the risk of loss, injury, or death because of a tsunami is considered low (CGS 2005). The potential hazard related to tsunamis within the Bay Area has been analyzed in regional studies and mapped. Generally, there is more risk for coastal areas that are adjacent to the Pacific Ocean than for internal Bay shoreline areas where tsunami waves would be expected to attenuate after passing through the narrow Golden Gate. Seiches are normally caused by an earthquake or high wind activity and can affect harbors, bays, lakes, rivers and canals. However, no seismically induced seiche waves have been documented in San Francisco Bay throughout history, which may be because of the size of the Bay. No substantial damage is expected from either tsunamis or seiches in the Plan area and implementation of the Plan would not increase the inherent risk of these natural forces on the Plan area.

Mudflows are characterized by a downhill movement of soft, wet earth and debris that are made fluid by rain or melted snow and often build up great speed. Mudflows occur most often on steep slopes where vegetation is not sufficient to prevent rapid erosion, but can occur on gentle slopes if other conditions (i.e., heavy precipitation in short periods and an easily erodible source material) are met. Mudflows can be generated in any climatic regime, but are most common in arid and semiarid areas and can be associated with volcanic events. Considering the geologic context of the Plan area and the developed nature of the region, the potential

for mudslides to affect land development would be considered very low. See also Section 2.7, "Geology and Seismicity," where landslides are discussed.

Therefore, considering the existing regulatory framework, physical context of the Plan area and proposed areas of improvements, the projected growth under the Plan would not exacerbate the effects of flooding, seiche, tsunami, or mudflow. Impacts associated with implementation of the proposed Plan at the regional and local level are considered less than significant (LS).

Impacts of Transportation Projects

Some of the transportation projects included in the proposed Plan would be placed within the 100-year flood hazard area and potential dam inundation areas, potentially exposing people or structures to a significant risk of loss, injury, or death involving flooding from failure of a dam or levee. In addition, projects located in the immediate vicinity of shoreline areas may be exposed to inundation from tsunami or seiche waves. As noted above, new transportation structures proposed within a floodplain or inundation areas would be required to adhere to State and federal regulations, which would address potential exposure of people or structures to a significant risk of loss, injury, or death involving flooding, including flooding as a result of the failure of a levee or dam. As discussed above, there is no documented history of significant damage from either tsunamis or seiches, and the highest risk areas are generally limited to coastal areas of the Pacific Ocean. Therefore, because of the existing regulatory framework, physical context of the Plan area and proposed areas of improvements, the impacts associated with implementation of the proposed transportation projects at the regional and local level are considered less than significant (LS).

Conclusion

Land development and transportation projects would both be subject to implementation of local, state, and federal floodplain regulations and project-level review. Therefore, considering the existing regulatory framework and physical context of the Plan area, potential impacts related to the potential for adverse effects from flooding because of failure of levee or dam, tsunamis, seiches, or mudflows would be reduced to an acceptable level and this impact would be **less than significant (LS)**. No mitigation is required.

Mitigation Measures

None required.

2.9 BIOLOGICAL RESOURCES

This section describes the common and sensitive vegetation, terrestrial wildlife, and aquatic biological resources known or with potential to occur in the Plan area. Biological resources include common vegetation and habitat types, sensitive natural communities and other areas of ecological significance, and special-status plant and animal species. Potential impacts of Plan implementation are analyzed, and mitigation measures are provided for those impacts determined to be significant. The information and analysis presented are regional in scope, as appropriate for a program-level EIR.

Comments received on the Notice of Preparation for this EIR expressed the importance of analyzing effects on wildlife corridors at the appropriate geographic scale, and requested a detailed assessment of the impacts of each alternative on natural resources in the Bay Area. These items are addressed in this chapter for the proposed Plan. Effects of the alternatives are addressed in Section 3.1, "Alternatives to the Proposed Plan."

2.9.1 Environmental Setting

PHYSICAL SETTING

Natural Communities of the Bay Area

The Bay Area supports numerous distinct natural communities composed of a diversity of vegetative types that provide habitat for a wide variety of plant and wildlife species. Broad habitat categories in the region include grasslands, coastal scrubs and chaparral, woodlands and forests, riparian systems and freshwater aquatic habitat, and wetlands. Urban and otherwise highly-disturbed habitats, such as agricultural fields, also provide natural functions and values as wildlife habitat and are also considered in this EIR,[1] as are the aquatic and estuarine resources of the Bay Area. The following discussion summarizes the natural communities located within the Bay Area and references special-status species associated with these communities.[2]

Grasslands

Natural Community Summary

Grasslands within the Bay Area include two basic types: non-native annual grasslands and perennial grasslands, including, among others, serpentine bunchgrass and valley needlegrass grasslands (Holland 1986). Non-native annual grasslands comprise the vast majority of grassland habitat occurring throughout the Bay Area and consist of a sparse to dense cover of primarily introduced annual grasses associated with a variety of broadleaf herbs and, occasionally native or introduced perennial grasses. The most abundant species are typically non-native annual grasses in the genera *Bromus, Avena, Festuca*, and *Hordeum*. Broadleaf species common to Bay Area grasslands are quite variable, but often include filaree (*Erodium* spp.), yellow-star thistle (*Centaurea solstitialis*), lupines (*Lupinus* spp.), peppergrass (*Lepidium* spp.), Indian paintbrush (*Castilleja* spp.), and California poppy (*Eschscholzia californica*). In addition to considerable site-to-site variation that is largely based on soils and management practices, there is also much year-to-year variation in species composition in response to the timing and amount of precipitation.

[1] Natural communities are assemblages of species that reoccur because of responses to similar combinations of environmental conditions and are not dependent on human intervention. For this discussion, native vegetation pertains to those species present in California prior to European settlement, while species such as wild oats and brome grasses, which were introduced with colonization dominate much of the current California landscape, are considered non-native. Vegetation communities that are dependent on human intervention, such as irrigated agriculture or landscaped or urbanized areas, are considered introduced communities.

[2] Certain plant and wildlife species are protected pursuant to federal and/or State endangered species laws, or are otherwise protected through a variety of mechanisms. These species are collectively referred to as "special-status species." See Appendix K for categories of special-status species.

Serpentine bunchgrass and valley needlegrass grasslands are both native perennial grasslands with limited distribution in the Bay Area. The first has limited distribution because of its dependency upon serpentine soils, which are scattered throughout the Coast Ranges. Serpentine bunchgrass grasslands are most widespread in Marin County, on the San Mateo peninsula, and in southern Santa Clara County. This open grassland community is dominated by native perennial bunchgrasses of the genera *Bromus, Melica, Poa, Calamagrostis,* and *Festuca*. Native herbaceous associates include California poppy, tarweed (*Hemizonia* spp.), and lotus (*Lotus* spp.). Valley needlegrass grasslands typically occur on seasonally moist, fine- textured soils and often intergrade with oak woodland communities. This formerly extensive grassland type is dominated by clump-forming purple needlegrass (*Stipa pulchra*) and a variety of native and introduced grasses and herbs.

Grassland habitats of all types are used by a wide variety of wildlife. Reptile species typically found in grasslands include western fence lizard (*Sceloporus occidentalis*), western terrestrial garter snake (*Thamnophis elegans*), and western rattlesnake (*Crotalus viridis*). Mammals within this habitat include black-tailed jackrabbit (*Lepus californicus*), western harvest mouse *(Reithrodontomys megalotis*), California vole (*Microtus californicus*), and coyote (*Canis latrans*). Bird species that use grasslands for foraging habitat include raptors such as turkey vulture (*Cathartes aura*), northern harrier (*Circus cyaneus*), American kestrel (*Falco sparverius*), and red-tailed hawk (*Buteo jamaicensis*), as well as a variety of insect and seed eating birds, such as white-crowned sparrows (*Zonotrichia leucophrys*), Brewer's blackbirds (*Euphagus cyanocephalus*), mourning doves *(Zenaida macroura*), meadowlarks (*Sturnella neglecta*), and lesser goldfinch (*Carduelis psaltria*).

Special-Status Plants

Many special-status plant species associated with grasslands occur in particular microhabitats (e.g., specific soil or hydrologic conditions) or areas that support a relatively low abundance of introduced annual grasses and forbs. Many species are now restricted to serpentine soils or thin soils with low nutrient content that introduced species are unable to colonize. These include white-rayed pentachaeta (*Pentachaeta bellidiflora*), San Francisco popcorn flower (*Plagiobothrys diffusus*), most beautiful jewel-flower (*Streptanthus albidus* ssp. *peramoenus*), Tiburon jewel-flower (*Streptanthus niger*), Tiburon Indian paintbrush (*Castilleja affinis* ssp. *neglecta*), Tamalpais lessingia (*Lessingia micradenia* var. *micradenia*), Contra Costa goldfields (*Lasthenia conjugens*), fountain thistle (*Cirsium fontinale* var. *fontinale*), Santa Cruz tarplant (*Holocarpha macradenia*), Marin western flax (*Hesperolinon congestum*), Brewer's western flax (*Hesperolinon breweri*), Diablo helianthella (*Helianthella castanea*), diamond-petaled California poppy (*Eschscholzia rhombipetala*), caper-fruited tropidocarpum (*Tropidocarpum capparideum*), and recurved larkspur (*Delphinium recurvatum*). Most of these species may also occur in vegetation communities other than grassland with their distribution generally restricted to specific soil types, hydrologic regimes, elevation range, and geographic distribution. See **Table K-1** in Appendix K for a complete list of special-status species with potential to occur in the Plan area.

Special-Status Wildlife

A variety of special-status wildlife species are associated with grassland habitats of the Bay Area, including callippe silverspot butterfly (*Speyeria callippe callippe*), mission blue butterfly (*Icaricia icarioides missionensis*), bay checkerspot butterfly (*Euphydryas editha bayensis*), California tiger salamander (*Ambystoma californiense*), western spadefoot toad (*Scaphiopus hammondii*), California red-legged frog (*Rana aurora draytonii*), Alameda whipsnake (*Masticophis lateralis euryxanthus*), San Joaquin whipsnake (*Masticophis flagellum ruddocki*), white- tailed kite (*Elanus leucurus*), golden eagle (*Aquila chrysaetos*), burrowing owl (*Athene cunicularia*), loggerhead shrike (*Lanius ludovicianus*), and San Joaquin kit fox (*Vulpes macrotis mutica*).

Coastal Scrub and Chaparral

Natural Community Summary

Coastal scrub and sage scrub plant communities in the Bay Area are characterized on the basis of the dominant species: California buckwheat (*Eriogonum fasciculatum*), California sagebrush (*Artemesia californica*), coyote brush (*Baccharis pilularis*), black sage (*Salvia mellifera*), and purple sage (*Salvia dorrii*) (Sawyer et al. 2009). Coastal scrub communities are particularly dominant in the drier southern slopes and on exposed rocky slopes and bluffs within the Coast Ranges in the Bay Area. Coastal scrub is best considered as a collection or

assemblage of different vegetation series, with various intergrades between the above-described plant communities. Coastal scrubs often intergrade with various chaparral types, and occur in a vegetative mosaic with grasslands and woodlands based on soil type, slope, aspect, and available moisture. Generally, these are communities of dense, low shrubs with sparse understory except in scattered grassy openings.

Chaparral is dominated by hard-leaved evergreen shrubs, generally with little or no herbaceous ground cover or overstory trees. Chamise (*Adenostoma fasciculatum)* and a variety of manzanita species (*Arctostaphylos* spp.) are the dominant or codominant species throughout Bay Area chaparral communities. Gaps in chaparral support primarily grassland species, ranging from non-native herbaceous annuals and grasses to native perennial bunchgrasses, small ferns, and bulbiferous species.

Coastal scrub and chaparral habitat provide dense vegetative cover for many common small mammals and reptiles including deer mouse (*Peromyscus maniculatus*), California mouse (*Peromyscus californicus*), brush rabbit (*Sylvilagus bachmani*), western fence lizard, common garter snake (*Pituophis catenifer*), common kingsnake (*Lampropeltis getulus*), and western rattlesnake. Bird species that nest in shrub dominated habitats include California quail (*Callipepla californica*), western scrub-jay (*Aphelocoma californica*), bushtit (*Psaltriparus minimus*), California thrasher (*Toxostoma redivivum*), spotted towhee (*Pipilo maculatus*), sage sparrow (*Amphispiza belli*), and Bewick's wren (*Thryomanes bewickii*). Coastal scrub and chaparral provide important foraging habitat for black-tailed deer (*Odocoileus hemionus columbianus*) and other large mammals that prey upon smaller mammals and reptiles in scrub and chaparral habitat including coyote, gray fox (*Urocyon cinereoargenteus*), and raccoon (*Procoyon lotor*).

Special-Status Plants

Similar to Bay Area grasslands, distribution of rare plants and wildlife in scrub and chaparral communities often coincides with the distribution of uncommon geological features. In the case of coastal scrub plant communities, an array of plants and wildlife have adapted to serpentine-derived soils in both scrub habitats and grasslands. Conditions such as slope, aspect, precipitation, temperature, degree of exposure, and the presence of suitable soil conditions often control the distribution of rare species.

Special-status serpentine-adapted scrub species include: coyote ceanothus (*Ceanothus ferrisae*), Presidio clarkia (*Clarkia franciscana*), Mt. Diablo bird's beak (*Cordylanthus nidularius*), Marin checker lily (*Fritillaria affinis* var. *tristulis*), fragrant fritillary (*Fritillaria liliacea*), Crystal Springs lessingia (*Lessingia arachnoidea*), smooth lessingia (*Lessingia micradenia* var. *glabrata*), Marin checkerbloom (*Sidalcea hickmanii* var. *viridis*), San Francisco campion (*Silene verecunda* var. *verecunda*), and Tamalpais jewel-flower (*Streptanthus batrachopus*). Plants not specifically adapted to serpentine habitats include: pallid manzanita (*Arctostaphylos pallida*), San Francisco Bay spineflower (*Chorizanthe cuspidata* var. *cuspidata*), woolly-headed spineflower (*Chorizanthe cuspidata* var. *villosa*), yellow larkspur (*Delphinium luteum*), supple daisy (*Erigeron supplex*), Mt. Diablo buckwheat (*Eriogonum truncatum*), coast wallflower (*Erysisum ammophilum*), robust monardella (*Monardella villosa* var. *globosa*), Marin County navarretia (*Navarretia rosulata*), north coast phacelia (*Phacelia insularis* var. *continentis*), and Metcalf Canyon jewel flower (*Streptanthus albidus* ssp. *albidus*). In addition to these species, twelve species of manzanita considered to be of special-status occur in Bay Area chaparral habitats.

Special-Status Wildlife

There are relatively few special-status wildlife species within coastal scrub or chaparral habitats. Some of these are highly specialized invertebrates whose life histories are intimately dependent upon serpentine-associated species. These include callippe silverspot butterfly (*Speyeria callippe callippe*) and two non-serpentine-dependent species, San Bruno elfin butterfly (*Incisalia mossii bayensis*) and mission blue butterfly (*Icaricia icarioides missionensis*).

In Contra Costa, Alameda, and northeastern Santa Clara counties, chaparral and scrub habitats and adjacent grasslands support the federal and State threatened Alameda whipsnake (*Masticophis lateralis euryxanthus)*. Other special-status wildlife occurring in Bay Area chaparral and scrub communities include silvery legless lizard (*Aniella pulchra pulchra*), San Francisco dusky-footed woodrat (*Neotoma fuscipes annectens*), and coast horned lizard (*Phrynosoma blainvillii*). See Table K-1 in Appendix K for a complete list of special-status species with potential to occur in the Plan area.

Woodlands and Forest

Natural Community Summary

The diverse topography, soils, and climate of the Bay Area region support a wide range of woodland and forest types, from the oak savannas of the dry interior to the redwood forests of the coastal hills and mountains.

Bay Area woodlands are either dominated by a single oak species, including coast live oak (*Quercus agrifolia*), blue oak (*Q. douglasii*), California black oak (*Quercus kelloggii*), or valley oak (*Quercus lobata*), or are classified as mixed hardwood woodlands comprised of a variety of tree species including one or more oaks, and most often, big-leaf maple (*Acer macrophyllum*), tan-oak (*Notholithocarpus densiflorus*), California bay (*Umbellaria californica*), madrone (*Arbutus menziesii*), and California buckeye (*Aesculus californica*). Woodland understory vegetation is dependent on canopy cover, which can range from oak savanna with widely spaced trees and annual grasslands as understory, to a denser but still relatively open mixed woodland canopy often seen on north and east facing slopes or in canyons, which supports both shrubs and herbaceous vegetation. Here the shrub layer of the understory often contains toyon (*Heteromeles arbutifolia*), snowberry (*Symphoricarpos albus*), poison oak (*Toxicodendron diversilobum*), gooseberry (*Ribes* spp.), ocean spray (*Holodiscus discolor*), and California blackberry (*Rubus ursinus*). The herb layer can consist of non-native grasses such as soft chess (*Bromus mollis*) and ripgut brome (*Bromus diandrus*) and perennial native bunchgrasses such as blue wildrye (*Elymus glaucus*), intermixed with native and non-native wildflowers including mission bells (*Fritillaria affinis*), chickweed (*Stellaria media*), bedstraw (*Galium aparine*), mugwort (*Artemesia douglasiana*), fiesta flower (*Pholistoma auritum*), and miner's lettuce (*Claytonia perfoliata*). Where canopy cover is most dense, understory is sparse or absent and is typically made up of herbaceous species.

Bay Area oak and mixed woodlands provide water, foraging, nesting, cover, and migratory and dispersal corridors for a variety of wildlife species. Insect eaters such as ash-throated flycatcher (*Myiarchus cinerascens*), plain titmouse (*Parus inornatus*), and dark-eyed junco (*Junco hyemalis*) are woodland foliage gleaners. Bark gleaner species, such as scrub jay, Steller's jay (*Cyanocitta stelleri*), and acorn woodpecker (*Melanerpes formicivorus*), feed on insects as well as acorns. California quail and California towhee (*Pipilo crissalis*) are ground foragers in this habitat. Cooper's hawk and sharp-shinned hawk are often associated with woodland habitat, where they hunt small birds. Mammals such as gray squirrel (*Sciurus griseus*) forage and nest in the canopy of the trees, while long-tailed weasels (*Mustela frenata*) hunt on the ground for shrews (*Sorex* sp.) and California voles (*Microtus californicus*). Larger mammals such as black-tailed deer utilize the oak understory for shelter and food from acorns, berries, and foliage. Amphibians such as Pacific slender salamander (*Batrachoseps attenuatus*), arboreal salamander (*Aneides lugubris*), and ensatina (*Ensatina eschscholtzii*) live under the cover of fallen leaf litter.

Bay Area forest types are generally found at higher elevations of the Coast Ranges in areas with adequate moisture and are either dominated by a mix of hardwood species on drier slopes, as noted above for mixed woodlands, sometimes with one or more coniferous tree species, including coast redwood (*Sequoia sempervirens*) and Douglas fir (*Pseudotsuga menziesii*) or are dominated by conifers, with tan-oak and big-leaf maple as common associates. Typical understory species include wood rose (*Rosa gymnocarpa*), coastal wood fern (*Dryopteris arguta*), ocean spray, bracken fern (*Pteridium aquilinum*), yerba buena (*Clinopodium douglasii*), hazelnut (*Corylus cornuta*), creeping snowberry (*Symphoricarpos mollis*), and poison oak. Blue blossom (*Ceanothus thyrsiflorus*) and toyon are common in sunnier openings.

Redwood forest typically occupies coastal areas where fog drip and precipitation create moist and humid conditions. Redwood and Douglas fir dominate the canopy, their fallen needles forming a thick layer of duff. Several hardwood tree species are also associated with redwood forest including tan oak, California bay, big-leaf maple, madrone, and several oak species. The redwood forest understory is often sparse where canopy is dense and slopes are steep, but contains a diversity of species generally not found in adjacent plant communities. These include huckleberry (*Vaccinium ovatum*), hazelnut, thimbleberry (*Rubus parviflorus*), sword fern (*Polystichum munitum*), and redwood sorrel (*Oxalis oregana*). Redwood violet (*Viola sempervirens*), western trillium (*Trillium ovatum*), red clintonia (*Clintonia andrewsiana*), and several fern species often occur on moister slopes along ravines.

Mixed hardwood forest wildlife is similar to that described above for woodland habitats. Redwood and Douglas fir forest wildlife is generally lower in diversity than other forest types, in part because the canopy density of second-growth forest precludes the establishment of many understory plants. Moist conditions in the understory support amphibians, such as yellow-eyed salamander (*Ensatina eschscholzii xanthopicta*), California slender salamander (*Batrachoseps attenuatus*), and giant salamander (*Dicamptodon ensatus*), as well as coastal rubber boa (*Charina bottae*). Birds found in the redwood forest include brown creeper (*Certhia americana*), varied thrush (*Ixoreus naevius*), chestnut-backed chickadee (*Poecile rufescens*), and Steller's jay.

Special-Status Plants

Special-status plant species associated with woodland habitats are often also found in adjacent chaparral and scrub habitats. In the Bay Area, these species include: rayless ragwort (*Senecio aphanactis*), hooked popcorn-flower (*Plagiobothrys uncinatus*), Mt. Diablo phacelia (*Phacelia phacelioides*), Baker's navarretia (*Navarretia leucocephala* ssp. *bakeri*), showy madia (*Madia radiata*), Mt. Hamilton lomatium (*Lomatium observatorium*), Jepson's linanthus (*Linanthus jepsonii*), coast lily (*Lilium maritimum*), Contra Costa goldfields (*Lasthenia conjugens*), drymaria-like western flax (*Hesperolinon drymarioides*), Diablo helianthella (*Helianthella castanea*), talus fritillary (*Fritillaria falcata*), Hillsborough chocolate lily (*Fritillaria biflora* var. *ineziana*), San Mateo woolly sunflower (*Eriophyllum latilobum*), Brandegee's eriastrum (*Eriastrum brandegeae*), western leatherwood (*Dirca occidentalis*), Hospital Canyon larkspur (*Delphinium californicum* ssp. *interius*), robust spineflower (*Chorizanthe robusta* var. *robusta*), big-scale balsamroot (*Balsamorhiza macrolepis* var. *macrolepis*), Marin manzanita (*Arctostaphylos virgata*), Mt. Diablo fairy lantern (*Calochortus pulchellus*), large-flowered fiddleneck (*Amsinckia grandiflora*), and Sharsmith's onion (*Allium sharsmithae*).

Special-Status Wildlife

Special-status wildlife species associated with woodlands include those described for grassland and riparian habitats, as well as purple martin (*Progne subis*) and other species such as tree swallow (*Tachycineta bicolor*), Bullock's oriole (*Icterus bullockii*), and many other nesting birds, which are protected under the Migratory Bird Treaty Act and the California Fish and Game Code (see the Regulatory Setting later in this section). Bay Area forests in San Mateo, Marin, Sonoma and Napa Counties support the federally and State listed marbled murrelet (*Brachyramphus marmoratus*) and the federally listed and California species of special concern northern spotted owl (*Strix occidentalis caurina*).

Riparian

Natural Community Summary

Riparian plant communities are tree- or shrub-dominated communities that occur along streams, rivers, and other aquatic features. Riparian forests, woodlands, and scrub are often separated from one another depending on the amount and density of tree canopy versus shrub canopy. Forests support a closed or nearly closed canopy of trees with variable understory, while woodlands have an open canopy of trees with an understory that is primarily grassy or herbaceous. Shrubs, rather than trees, dominate riparian scrub habitat, which is common both in the coastal mountains of San Mateo, Marin, and Sonoma counties, and in the more arid regions of the east and south Bay Area. The composition and density of riparian vegetation is very much dependent upon the duration of flowing or near-surface water, the amplitude and periodicity of flow (brief, high-velocity flows versus more sustained flows), and the texture of the substrate (cobble, gravel, sand, silt, clay). Different reaches of a stream may support different types of riparian vegetation. The major rivers, streams, and other surface waters that support riparian vegetation in the Bay Area are presented in **Figure 2.8-1** of Chapter 2.8, "Water Resources." The most well developed riparian vegetation occurs in relatively undisturbed reaches of the largest Bay Area streams, including Sonoma Creek, the Russian River, the Napa River, Putah Creek, Alameda Creek, Coyote Creek, the Guadalupe River, San Francisquito Creek, Llagas Creek, and others listed in Chapter 2.8.

Typical dominant species in the forest, woodland, and scrub habitats along Bay Area rivers and streams are Fremont cottonwood (*Populus fremontii*), California sycamore (*Platanus racemosa*), various species of willow (*Salix* spp.), coast live oak, valley oak, and white alder (*Alnus rhombifolia*). Where they are not modified by urbanization, lower stream reaches typically intergrade into broad freshwater to brackish emergent wetlands dominated by cattails and bulrush (*Scirpus* spp.). Where the riparian habitat has been degraded, either

through alteration of the hydrology or direct disturbance to vegetation, including along many urban stream reaches, the non-native blue gum eucalyptus (*Eucalyptus globulus*), fennel (*Foeniculum vulgare*), poison hemlock (*Conium maculatum*), perennial pepperweed (*Lepidium latifolium*), giant reed (*Arundo donax*), or French broom (*Genista monspessulana*) are often dominant, as seen in portions of most large Bay Area streams. Upper stream reaches are also often lacking riparian cover because of long-standing grazing, agricultural practices, or channelization because of urbanization. Most remaining riparian vegetation is afforded regulatory protection by the California Department of Fish and Wildlife (CDFW). A discussion of specific regulations is provided in the Regulatory Setting below.

Within the urbanized portions of the Bay Area, riparian habitats, even though often degraded, support the densest and most diverse wildlife communities available. The diversity of plant species, multilayered vegetation, and perennial water provides a variety of foods and microhabitat conditions for wildlife. Mature willows, oaks, sycamores, and other riparian trees provide high-quality nesting habitat for the region's avifauna.

Special-Status Plants

Special-status riparian plants in the Bay Area include western leatherwood (*Dirca occidentalis*), Mason's lilaeopsis (*Lilaeopsis masonii*), Sonoma alopecurus (*Alopecurus aequalis* var. *sonomensis*), and Davidson's bush mallow (*Malacothamnus davidsonii*). See **Table K-1** in Appendix K for a complete list of special-status species with potential to occur in the Plan area.

Special-Status Wildlife

Special-status avifauna that nest in Bay Area riparian corridors include yellow warbler (*Dendroica petechia*), yellow-breasted chat (*Icteria virens*), and accipiters such as Cooper's hawk (*Accipiter cooperii*), and sharp-shinned hawk (*A. striatus*). Habitat destruction, habitat fragmentation, and nest parasitism by the brown- headed cowbird (*Molothrus ater*) are suspected causes of the two former species' decline. The western red bat (*Lasiurus blossevillii*), a California species of special concern, often roosts in tree foliage in riparian corridors.

The federally threatened valley elderberry longhorn beetle (*Desmocerus californicus dimorphus*) is dependent upon the elderberry bush (*Sambucus nigra* ssp. *caerulea*) throughout its entire life history. Elderberry bushes occur statewide and commonly occur in riparian corridors, but may also be present in isolated stands or in woodlands outside riparian habitats. The range of the valley elderberry longhorn beetle includes portions of Solano County and eastern Contra Costa and Alameda counties.

Aquatic Habitat

Natural Community Summary

Rivers and Streams

Rivers and streams of the Bay Area have several common ecological attributes:

- As a result of urbanization, many smaller streams on the San Francisco Peninsula, south San Francisco Bay, East Bay, and in portions of the North Bay have been channelized or otherwise developed for flood control or agriculture.
- Most of these waterways are small, seasonal streams, and in the case of urbanized streams, many maintain perennial flows from urban runoff sources during late summer months.
- There are a handful of native streams and rivers in each county that account for the majority of freshwater flows to San Francisco Bay and provide the greatest opportunities for special-status plants and wildlife species.

The Bay Area is drained by many small to mid-sized rivers and creeks spread throughout the region. The Sacramento-San Joaquin River Delta contributes the majority of the freshwater input to San Francisco Bay; however, this discussion concentrates on other tributaries in the region that provide important riverine and aquatic habitat. In the North Bay, Petaluma River, Sonoma Creek, and Napa River account for much of the

freshwater flows into San Pablo Bay. Relatively smaller, though biologically important contributions are made by Gallinas Creek, Novato Creek, Corte Madera Creek, and Miller Creek in Marin County. In general, there are few impediments or obstructions in these creeks, and their watersheds. These tributaries are less channelized, offering habitat for listed native salmonids including coho salmon (*Oncorhynchus kisutch*) and steelhead (*Oncorhynchus mykiss irideus*). The Russian River in Sonoma County also provides good habitat for salmonids. Solano County watersheds are also relatively undeveloped, including the Putah Creek watershed. Lake Berryessa limits the availability of headwater habitats in Putah Creek to anadromous fish, but this creek still provides valuable aquatic resources.

Stream resources in the East Bay, South Bay, and San Francisco Peninsula have been degraded by urban development, particularly adjacent to and within stream courses. As a result of these changes, only a handful of major streams in these areas support native fisheries and special-status fisheries. These include Alameda Creek, which drains the largely undeveloped watershed of the Sunol Valley and Livermore- Amador Valley, Coyote Creek, Guadalupe River, and Los Gatos Creek in the South Bay, and San Francisquito Creek, Permanente Creek, and San Mateo Creek on the San Francisco Peninsula. In Gilroy and Morgan Hill, Llagas Creek transports flows southward to the Pajaro River. Major dams or other fish impediments that prevent fish from reaching the upper watersheds are present in all of these streams, with the exception of San Francisquito Creek.

Habitat for common fish species occurs primarily in the streams listed in *Chapter 2.8*: *Water Resources* though other smaller streams in the Bay Area can and do support them.

Lacustrine

Lacustrine habitats are permanent water bodies that do not support emergent vegetation (except around their margins) and are not subject to tidal exchange; they include natural and man-made lakes and ponds, oxbows, flooded gravel pits, and flooded islands. Vegetation can include submerged plants such as pondweeds (*Potamogeton* spp.) and algae in deepwater habitat, while near shore habitat may support smartweeds (*Polygonum* spp.), cattails (*Typha* spp.), spikerush (*Eleocharis* spp.), and other freshwater wetland vegetation. Lakes and ponds may support willow scrub along the shoreline. Bay Area reservoirs are typically stocked with game fish, including rainbow trout (*Oncorhynchus mykiss*), striped bass (*Morone saxatilis*), largemouth bass (*Micropterus salmoides*), sunfish (*Lepomis* sp.), brown bullhead catfish (*Ameiurus nebulosus*), and channel catfish (*Ictalurus punctatus*), among others. Resident waterfowl using lacustrine habitat include a variety of ducks such as mallard (*Anas platyrhinchos*) and American coot (*Fulica americana*), Canada geese (*Branta canadensis*), and wading birds, such as great blue heron (*Ardea herodias*), snowy egret (*Egretta thula*), and great egret (*Ardea alba*).

Special-Status Plants

With the exception of several species, such as eel-grass pondweed (*Potamogeton zosteriformis*), there are few special-status plants occurring in freshwater aquatic habitat of the region.

Special-Status Wildlife

As noted above, special-status fish occur in a limited number of rivers and streams in the Bay Area. Species include the federally listed tidewater goby (*Eucyclogobius newberryi*), coho salmon—central California Evolutionarily Significant Unit (ESU), steelhead—northern California Distinct Population Segment (DPS), central California coast DPS, and south/central California coast DPS, chinook salmon—California coast ESU (*Oncorhynchus tshawytscha*), and Sacramento splittail (*Pogonichthys macrolepidotus*). Several species of limited distribution and rarity occur exclusively in the lower reaches of drainages near and within the Delta, such as longfin smelt (*Spirinichus thaleichthys*) and the State- and federally listed threatened Delta smelt (*Hypomesus transpacificus*).

Suitable steelhead and coho spawning habitat is found in streams and rivers where there is less development. Several small, cool-water drainages in Marin County support coho salmon, which are not known to successfully reproduce south of the Golden Gate (Federal Register 1999). Steelhead require higher gradient, upper reaches of streams, with access to the ocean during emigration and spawning, and cool year-round water temperatures for the juveniles' rearing habitat. Steelhead populations are documented from San Francisquito Creek, Green Valley Creek, Suisun Creek, San Pablo Creek, Coyote Creek, Steven's Creek, Guadalupe River, Corte Madera, Miller Creek, Novato Creek, Sonoma Creek, Napa River, Huichica Creek, Petaluma River, San Lorenzo Creek,

San Leandro Creek, and Alameda Creek, and they are known to sporadically migrate into and occasionally breed in smaller streams throughout the Bay Area.

The federally listed endangered California freshwater shrimp (*Syncaris pacifica*) occurs in low gradient, structurally diverse perennial streams in the northern Bay Area (U.S. Fish and Wildlife Service [USFWS] 1998). Of the 17 streams that support this species, those in the Bay Area include Sonoma Creek, the Napa River, and Huichica Creek, which drain to San Pablo Bay; and Laguna de Santa Rosa (Santa Rosa Creek) and its tributaries, which drain to the Russian River. The 1998 Recovery Plan for this species seeks the long-term protection of aquatic and riparian habitat as criteria for species delisting.

Bridges of various rivers and streams provide nesting opportunities for birds protected under the federal Migratory Bird Treaty Act and the California Fish and Game Code (see the Regulatory Setting later in this section), including barn swallows (*Hirundo rustica*) and cliff swallows (*Petrochelidon pyrrhonota*), and the purple martin (*Progne subis*), a California species of special concern. These species build cup- and gourd- shaped nests, respectively, using mud as their primary construction material. Bat colonies may also roost under bridges in the Bay Area, including *Myotis* species, Mexican free-tailed bats (*Tadarida brasiliensis*), and Townsend's big-eared bats. Breeding and non-breeding bat roosts are protected by California Fish and Game Code Section 4150.

The federally threatened California red-legged frog still breeds in the upper reaches of most Bay Area riparian corridors and in the lower reaches within select drainage systems and ponds. The greatest concentrations of this species in the Bay Area occur near Sears Point, several drainages and channels that traverse I-580 in the Livermore-Amador Valley, and in drainages on the San Francisco Peninsula, though potential and occupied habitat occur elsewhere throughout the region.

The federal- and State-listed endangered San Francisco garter snake (*Thamnophis sirtalis tetrataenia*) occurs on the San Francisco Peninsula, where riparian habitats meet open water and freshwater marshlands. Habitats within the Peninsula corridor occur in marshlands near San Francisco International Airport and in tributary streams to the Crystal Springs Reservoir (near Interstate 280). Some riparian habitats in the Bay Area also support small populations of western pond turtle (*Actinemys marmorata)*.

Special-status birds that use lacustrine habitat in the Bay Area include the State endangered and fully protected bald eagle (*Haliaeetus leucocephalus*) and osprey (*Pandion halietus*), protected under Section 3503.5 of the California Fish and Game Code (see the Regulatory Setting later in this section for further details). Migratory waterfowl species that forage, overwinter, rear their brood, or otherwise rely on lacustrine habitat in the Bay Area at some time during the year include the wood duck (*Aix sponsa*), gadwall (*Anas strepera*), American wigeon (*A. americana*), northern pintail (*A. acuta*), green-winged teal (*A. carolinensis*), canvasback (*Aythya valisineria*), bufflehead (*Bucephala albeola*), common goldeneye (*B. clangula*), hooded merganser (*Lophodytes cucullatus*), common merganser (*Mergus merganser americanus*), and ruddy duck (*Oxyura jamaicensis*). See **Table K1** in Appendix K for a complete list of special-status species with potential to occur in the Plan area.

San Francisco Bay Aquatic Resources

Natural Community Summary

The San Francisco Bay and Delta make up the Pacific Coast's largest estuary, encompassing roughly 1,600 square miles of waterways and draining over 40 percent of California's fresh water. The Sacramento and San Joaquin Rivers flow from Northern California's inland valleys into the Delta's winding system of islands, sloughs, canals, and channels, before emptying into San Francisco Bay and the Pacific Ocean. Major transportation corridors bridge the open waters of San Francisco Bay, and many others are located in close proximity to the Bay.

The marine environment varies widely between the six transportation corridors that cross the open waters of the San Francisco Bay. Most of the transbay corridors consist of open water habitat; that is, habitat below the low-tide line (also known as subtidal habitat).

Eelgrass (*Zostera marina*) may occur near the footings of bridges in the transbay corridors and is considered a sensitive habitat by CDFW. Eelgrass is an important habitat for many organisms and may influence benthic

community structure by stabilizing sediments, providing forage and detritus food sources, and creating a refuge and nursery for small organisms. Eelgrass beds also provide an important attachment substrate for Pacific herring eggs and thus support an important Bay Area commercial fishery (USFWS 1984). As the largest estuary on the west coast, the San Francisco Bay also supports millions of birds, which depend on the bay for rest and refueling on migratory routes.

More than 100 species of fish are described from the San Francisco Bay system (USFWS 1983). The majority of these are native species that live year-round in San Francisco Bay, though a few, such as striped bass (*Morone saxatilis*), have been introduced. Anadromous fish also use San Francisco Bay seasonally during their migrations to and from spawning grounds throughout the Bay Area and in California's Central Valley. The species composition within the Bay varies by season and regularly changing physical conditions created by the freshwater flow from the San Joaquin and Sacramento Rivers and other tributaries into San Francisco Bay. Native fish commonly found within the Bay include such diverse species as starry flounder (*Platichthys stellatus*), California halibut (*Paralichthys californicus*), leopard shark (*Triakis semifasciata*), tule perch (*Hysterocarpus traski*), Pacific herring (*Clupea harengus pallasi*), northern anchovy (*Engraulis mordax*), and sturgeons (*Acipenser* spp.). Non-native fish species in the Bay include largemouth bass (*Micropterus salmoides*), threadfin shad (*Dorosoma petenense*), and yellowfin goby (*Acanthogobius flavimanus*).

The benthic invertebrate community of the Bay is composed of various annelids, mysid shrimp, copepods, amphipods, shrimp, crabs, and other macroinvertebrates. All of these organisms provide important food sources for estuary fish and bird species.

Riprap occurs along many areas of the bay shore and can provide some, but not all, of the habitat values and functions that naturally occurring rocky shore habitat would provide, including a substrate for marine plant and sessile intertidal organisms such as mussels (*Mytilus* spp.) and barnacles. Rocky shore habitat also provides cover for invertebrates such as rock crabs (*Cancer antennarius* and *C. productus*) and for fish such as plainfin midshipmen (*Porichthys notatus*), which are known to seek cover and to spawn under concrete slabs. The marine plants, clams, mussels, barnacles, annelids, and crustaceans inhabiting rocky shore habitat are food sources for larger marine invertebrates, fishes, birds, and marine mammals.

Special-Status Wildlife

The two marine mammals most commonly found in San Francisco Bay are the California sea lion (*Zalophus californianus*) and the harbor seal (*Phoca vitulina*). Both species forage in the open waters of the Bay and bask on exposed rocks, piers, or wharves throughout the Bay. The Marine Mammal Protection Act protects both species.

The National Marine Fisheries Service (NMFS) recognizes several threatened and endangered species that occur in San Francisco Bay. These include the Steller sea-lion (*Eumetopias jubatus*), loggerhead sea turtle (*Caretta caretta*), leatherback turtle (*Dermochelys coriacea*), olive ridley sea turtle (*Lepidochelys olivacea*), and several fish species, including coho salmon, steelhead, delta smelt, and Sacramento splittail. The goby, smelt, and splittail are resident species; the salmonids, however, are only expected to use open water habitats of the Bay seasonally or infrequently. The brown pelican (*Pelecanus occidentalis*), although recently delisted, is still a fully protected species under the California Fish and Game Code.

Wetlands

Natural Community Summary

Coastal Marsh and Estuaries

Coastal salt marshes around San Francisco Bay (including historically diked tidal marshes) are dominated by perennial pickleweed (*Salicornia pacifica*), alkali heath (*Frankenia salina*), spearscale (*Atriplex triangularis*), marsh gumplant (*Grindelia stricta* var. *angustifolia*), saltgrass (*Distichlis spicata*), and other salt-tolerant plants that are also tolerant of regular inundation or soil saturation. Tidal salt marshes are typically bisected by a network of sloughs and small channels that facilitate tidal reach into the interior of the marsh. These channels are subject to more frequent and deeper flooding and therefore support different plant species, such as smooth

cordgrass (*Spartina foliosa*) and alkali bulrush (*Scirpus maritimus*). As tidal effects and salinity decrease coastal salt marsh intergrades with brackish marsh, especially in areas where larger rivers meet the Bay.

In more extensive slough systems, such as those in the North Bay and South Bay, the transition zones between sloughs and creeks are increasingly dominated by brackish and freshwater-adapted species such as California bulrush (*Scirpus californicus*) and cattails (*Typha* sp.). Extensive coastal marsh communities are present in the lower reaches of Sonoma Creek and the Napa River, and in patches along U.S. Highway 101 in Palo Alto and Mountain View.

There are relatively few terrestrial animals in the salt marsh, however, the non-native red fox (*Vulpes vulpes*) and house mouse (*Mus musculus*), as well as the native California vole (*Microtus californicus*) and black- tailed jackrabbit (*Lepus californicus*) can be found in marshes around the Bay. Resident bird species include marsh wren (*Cistothorus palustris*) and raptors typical of Bay Area salt marsh habitats include northern harrier (*Circus cyaneus*), red-tailed hawk (*Buteo jamaicensis*), and American kestrel (*Falco sparverius*). Migratory shorebirds that forage in the mudflats during low tide include black-necked stilt (*Himantopus mexicanus*), American avocet (*Recurvirostra americana*), long-billed curlew (*Numenius americanus*), marbled godwit (*Limosa fedoa*), and several sandpipers. During high tide, a few of the ducks that may be found in salt marsh environments include northern shoveler, American wigeon, northern pintail, gadwall (*Anas strepera*), and canvasback.

Freshwater Wetlands

Freshwater emergent wetlands, or marshes, occur along slow moving streams and rivers, along lakeshores, and in stockponds and other artificial waterbodies and are dominated by perennial vegetation such as cattails, bulrush, or spikerush. Freshwater marsh habitat provides nesting and foraging opportunities, as well as cover, for a number of bird species, amphibians, and small mammals. Species commonly associated with freshwater emergent wetlands include great blue heron, great egret, black phoebe (*Sayornis nigricans*), red-winged blackbird (*Agelaius phoeniceus*), raccoon, Sierran treefrog (*Pseudacris sierra*), and California vole. Larger mammals may use these wetlands for water or forage.

Freshwater seeps and wet meadows occur on permanently moist soil and are dominated by perennial grasses, sedges (*Carex* spp.), and rushes (*Juncus* spp.). In the Bay Area, these wetlands typically occur on grazed hillsides or at the base of grassland slopes. Seasonal wetland habitat consists of vernal pools, alkali marshes, alkali sink scrub habitats, and other seasonal wetlands with intermittent hydrologic conditions. Seasonal wetlands are dominated by herbaceous vegetation and pond surface water or maintain saturated soils at the ground surface for enough of the year to support facultative or obligate wetland plant species.

Vernal pools are seasonal freshwater pools that form in depressions over an impermeable soil layer (claypan or hardpan) or parent material. The vegetation in vernal pools consists primarily of annuals with low cover and a short life cycle. Vernal pools support a distinctive flora with a high number of endemic and rare species. Ephemeral seasonal wetlands habitat that supports vernal pool species occurs in the eastern Livermore-Amador Valley, Solano County, the city of Fremont, the Brentwood area, near the Napa County Airport, and the Santa Rosa Plain. In addition, alkali meadows and seeps in Contra Costa County support a similar assemblage of vernal pool endemic species.

Special-Status Plants

Special-status plants found in Bay Area salt marshes include Point Reyes bird's beak (*Chloropyron maritimum ssp. palustre*), soft bird's beak (*Chloropyron molle* ssp. *molle*), Humbodlt bay owl's clover (*Castiellja ambigua* ssp. *humboldtiensis*), and California seablite (*Suaeda californica*). Rare plants in brackish marshes include Delta tule pea (*Lathyrus jepsonii* var. *jepsonii*), Suisun thistle (*Cirsium hydrophilum* var. *hydrophilum*), and Suisun marsh aster.

Special-status plants of seasonal wetlands and vernal pools include Solano grass (*Tuctoria mucronata*), vernal pool smallscale (*Atriplex persistens*), San Joaquin saltbush (*Atriplex joaquiniana*), Congdon's tarplant *Centromadia parryi* ssp. *congdonii*), Contra Costa goldfields (*Lasthenia conjugens*), and alkali milk vetch (*Astragalus tener* var. *tener*). Several highly endangered species occur in vernal pools of the Santa Rosa Plain,

including Burke's goldfields (*Lasthenia burkei*), Sebastopol meadowfoam (*Limnanthes vinculans*), and Sonoma sunshine (*Blennosperma bakeri*), which are all listed as federal and State endangered species.

Special-Status Wildlife

Rare and endangered wildlife species that occur in tidal marshes of the Bay Area include California clapper rail (*Rallus longirostris obsoletus*), California black rail (*Laterallus jamaicensis coturniculus*), western snowy plover (*Charadrius alexandrinus nivosus*), Alameda song sparrow (*Melospiza melodia pusillula*), San Pablo song sparrow (*Melospiza melodia samuelis*), salt marsh common yellowthroat (*Geothlypis trichas sinuosa*), salt marsh harvest mouse (*Reithrodontomys raviventris*), San Pablo vole (*Microtus californicus sanpabloensis*), Suisun shrew (*Sorex ornatus sinuosus*), and salt marsh wandering shrew (*Sorex vagrans*).

Freshwater emergent wetlands and adjacent grassland habitats in Solano County support populations of the federal and State threatened giant garter snake (*Thamnophis gigas*). Freshwater emergent wetlands throughout the region support California red-legged frog and vernal pools and other seasonal wetlands of sufficient depth and duration of inundation support California tiger salamander in the Santa Rosa Plain, East Bay, and elsewhere. Special-status invertebrates found in seasonal wetlands and vernal pools, primarily in the East Bay and Solano County, include longhorn fairy shrimp (*Branchinecta longiantenna),* vernal pool fairy shrimp (*Branchinecta lynchi*), and vernal pool tadpole shrimp (*Lepidurus packardi*).

Jurisdictional Waters

As described in detail in the Regulatory Setting below, activities such as discharge of fill or alteration that would affect most streams, rivers, and wetlands in the Bay Area are regulated by the U.S. Army Corps of Engineers (USACE), the San Francisco Regional Water Quality Control Board (RWQCB), and CDFW. The Bay Conservation and Development Commission (BCDC) regulates activities in and adjacent to San Francisco Bay and the California Coastal Commission regulates activities along the California coast.

Jurisdictional wetlands in the Bay Area include tidal, brackish, and freshwater marshes, seasonal wetlands, seeps, and vernal pools. Rivers and streams are considered "other waters" and are regulated as such by the wetland permitting agencies. Compliance with regulations concerning wetlands and other waters would be required on a project-level basis under the proposed Plan.

Urban/Agricultural/Ruderal Natural Community Summary Urban

Urban development and landscaped areas support few biological resources and provide limited wildlife habitat but do provide foraging or nesting habitat for generalist,[3] and sometimes non-native, wildlife species that can tolerate human presence and activities. These include birds and small mammals such as western scrub jay, California towhee, house finch (*Carpodacus mexicanus*), English sparrow (*Passer domesticus*) raccoon, opossum (*Didelphis virginica*), and house mouse. Although these areas often do not provide suitable habitat for many specialized species of native wildlife because of higher human activity levels and the resources available, they may support a greater diversity of native wildlife species under appropriate conditions.

Agricultural

The Bay Area supports agricultural lands farmed for feed and grain, produce, orchards, vineyards and other crops, such as commercial nurseries. Agricultural lands do not typically provide habitat for a wide variety of species but when situated in proximity to undeveloped open space, rivers, and marshes may attract many of the wildlife species associated with these habitats to forage in croplands. Common species occurring in agricultural lands include small mammals such as voles and mice, and birds such as mourning doves, European starlings (*Sturnus vulgaris*), and several blackbird species. Croplands are also important foraging habitats for numerous raptors including the red-tailed hawk, northern harrier, and white-tailed kite.

Ruderal

Ruderal (disturbed and weedy) habitats are most prevalent in areas subject to frequent and often severe vegetation and soil disturbances including overgrazed rangeland, disked or fallow fields, construction sites, levees, vehicle parking lots, and railroad or other public utility rights of way. This habitat type occurs throughout

[3] "Generalist" species can occupy and thrive in a variety of natural or developed areas.

the region and is replacing annual grasslands where pressures are particularly high. Where vegetated, these sites are dominated by opportunistic, weedy non-native plant species such as perennial pepperweed, black mustard (*Brassica nigra*), mayweed (*Anthemis cotula*), and bristly ox-tongue (*Picris echioides*), wild radish (*Raphanus sativus*), yellow star thistle, Italian thistle (*Carduus pycnocephalus*), fennel, poison hemlock, pampas grass (*Cordateria jubata*), and bristly ox-tongue (*Helminthotheca echioides*).

Ruderal habitats provide limited foraging or nesting habitat for disturbance tolerant and non-native birds and small mammals such as English sparrow, European starling, house finch, mourning dove, golden- crowned sparrow (*Zonotrichia atricapilla*), Norway rat (*Rattus norvegicus*), house mouse (*Mus musculus*), and California ground squirrel (*Spermophilus beechyi*) and other rodents. Killdeer (*Charadrius vociferous*) commonly forage and nest on gravel or bare ground, including open dirt and fractured pavement. Ruderal habitat can also provide refuge for reptiles such as western fence lizard*,* alligator lizard (*Elgaria multicarinata)*, and gopher snake.

Special-Status Plants

Special-status plants are not expected to regularly occur in urban, agricultural, or ruderal environments because of the degree of disturbance to soils and vegetation, as well as habitat fragmentation, found in these areas. However, although these plants are not expected to regularly occur, they can occasionally be found within these areas.

Special-Status Wildlife

In general, most special-status wildlife species are not expected to occur in urban or other highly disturbed areas. The exception to this would be bats and birds. For example, bats could use underutilized or abandoned buildings in urban areas for roosting and raptors such as Cooper's hawk and red-tailed hawk are known to nest with regularity in urban areas as well. Bats and raptors are also known to forage in agricultural fields.

Special-Status Species

As noted previously, the high diversity of vegetation and wildlife found in the Bay Area is a result of soils, topographic, and micro-climate diversity that combine to promote relatively high levels of endemism.[4] This, in combination with the rapid pace of development in the region, has resulted in a relatively high degree of endangerment for local flora and fauna. Several species known to occur in the Bay Area are considered special-status species because of their recognized rarity or vulnerability to habitat loss or population decline. Some of these species are listed and receive specific protection defined in federal or State endangered species laws. Other species have not been formally listed as threatened or endangered, but have been designated as "rare" or "sensitive" on the basis of adopted policies and expertise of State resource agencies or organizations with acknowledged expertise, or policies adopted by local governmental agencies such as counties, cities, and special districts to meet local conservation objectives.

Generalized habitat for special-status plant and wildlife species listed above in the *Natural Community Summary* section and their listing status is provided in **Table K-1** in Appendix K. Occurrences of special- status species throughout the Bay Area region as documented in the California Natural Diversity Database (CNDDB) are shown in **Figures 2.9-1** through **2.9-4**.

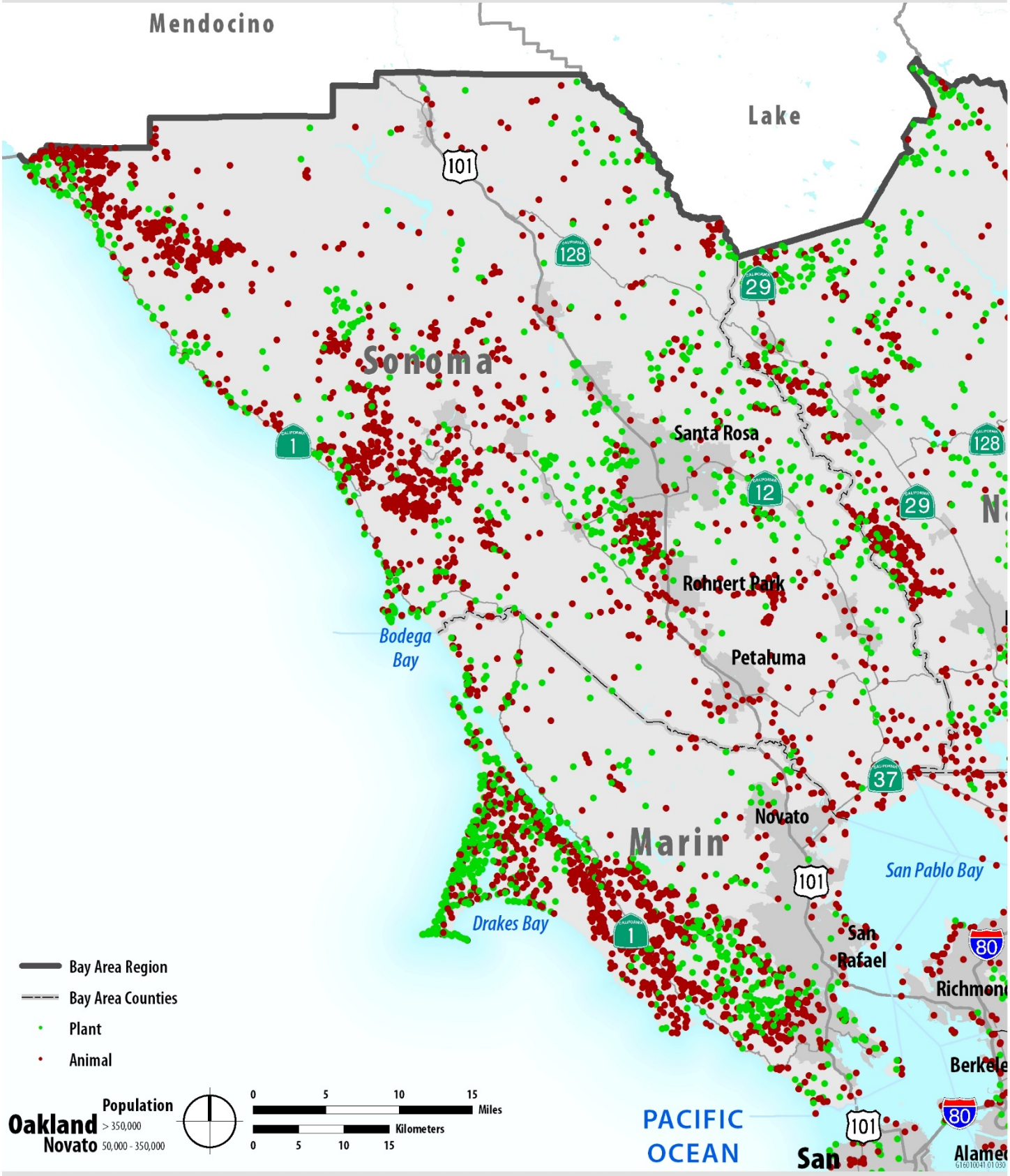
Critical Habitat

USFWS and NMFS designate critical habitat for certain species that they have listed as threatened or endangered. "Critical habitat" is defined in Section 3(5)(A) of the Federal Endangered Species Act as those lands (or waters) within a listed species' current range that contain the physical or biological features that are considered essential to the species' conservation, as well as areas outside the species' current range that are determined to be essential to its conservation. Critical habitat has been designated for 30 species in the Bay Area. Of these, critical habitat units for California red-legged frog, California tiger salamander, Central Coast steelhead, Alameda whipsnake, and marbled murrelet are the most widespread throughout the region.

See **Figures 2.9-5** through **2.9-8** for the locations of critical habitat units throughout the Bay Area and **Table 2.9-1** for a summary of critical habitat by county.

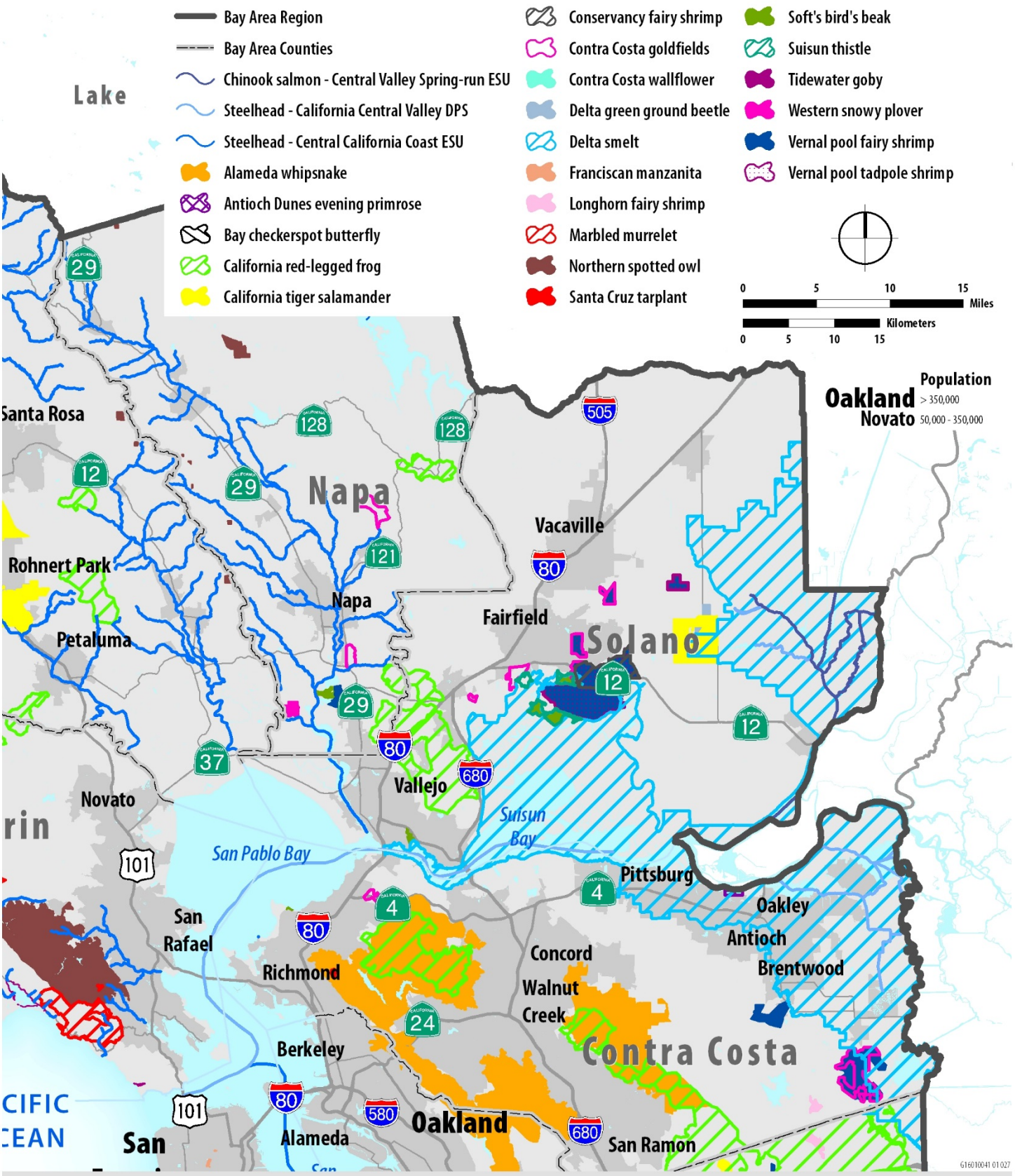
[4] Endemism refers to the degree to which organisms or taxa are restricted to a geographical region or locality and are thus individually characterized as endemic to that area.

Figure 2.9-1
CNDDB Documented Sensitive Biological Resources: Sonoma and Marin Counties



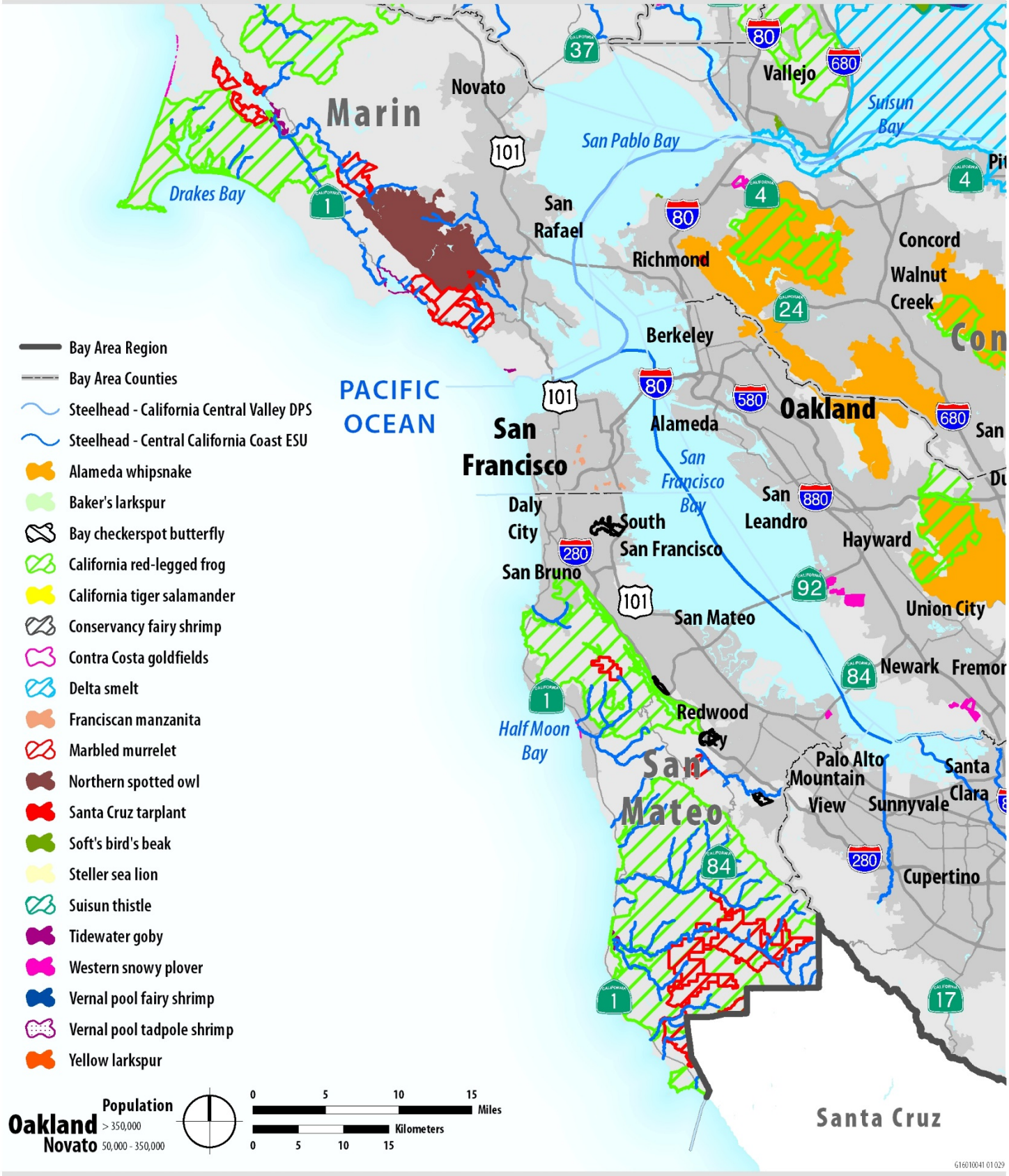
Map Data Sources: California Department of Fish and Wildlife (CDFW), 2016; Metropolitan Transportation Commission (MTC), 2016; Tom Tom North America, 2015.

Figure 2.9-2
CNDDB Documented Sensitive Biological Resources: Napa, Solano, and Contra Costa Counties



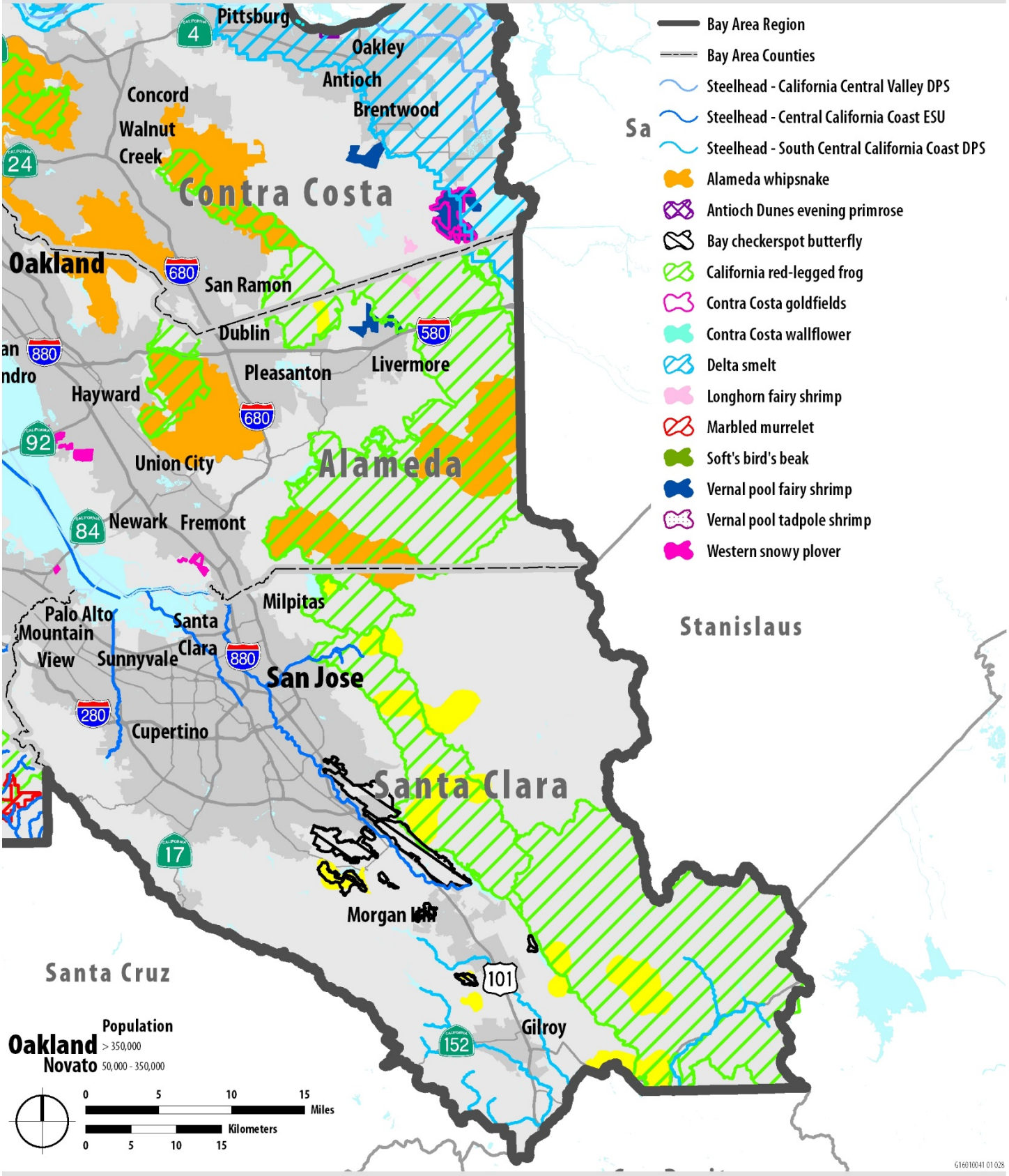
Map Data Sources: Metropolitan Transportation Commission (MTC), 2016; Tom Tom North America, 2015; U.S. Fish and Wildlife Service (USFWS), 2016.

Figure 2.9-3
CNDDB Documented Sensitive Biological Resources: San Mateo County



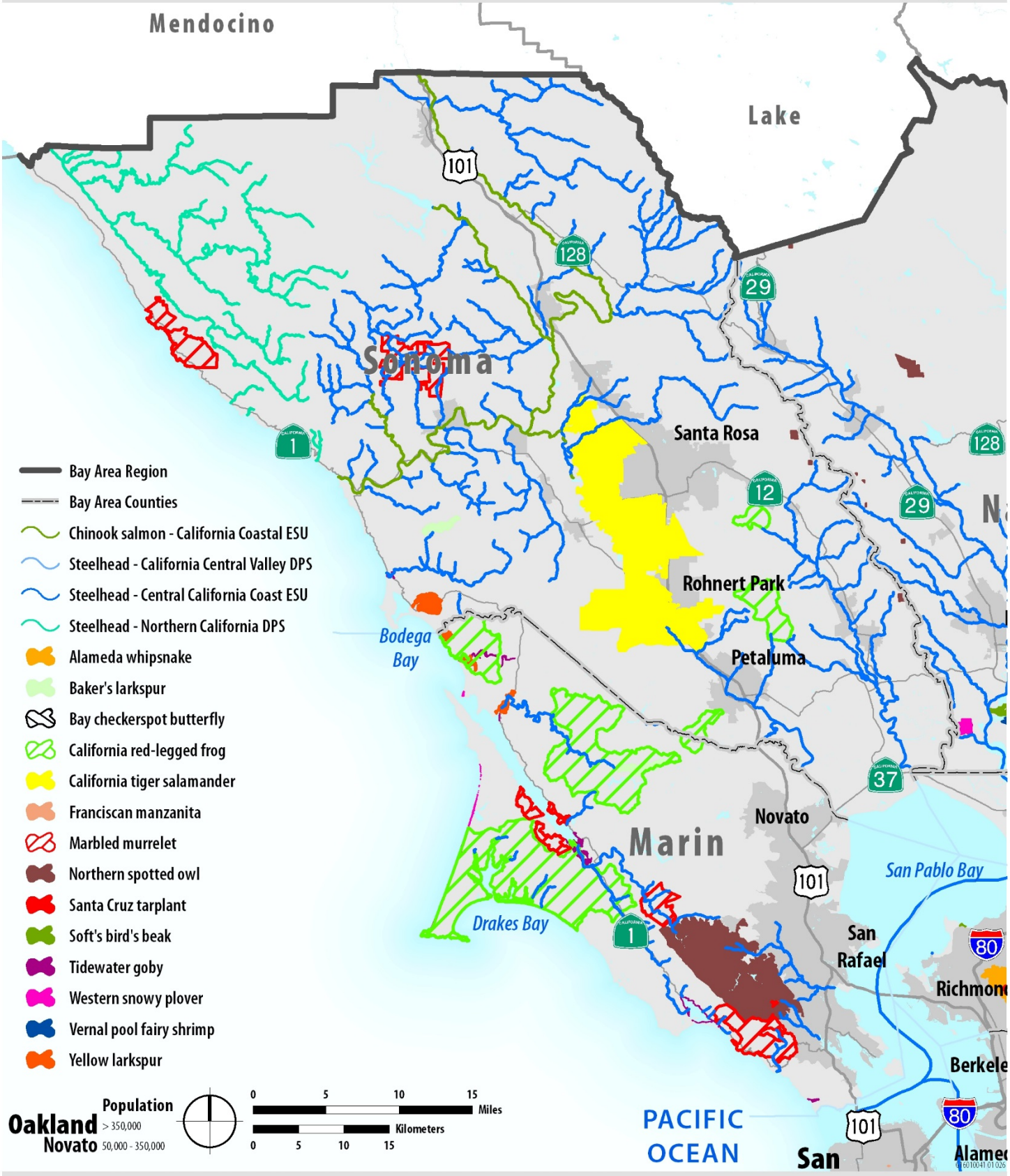
Map Data Sources: Metropolitan Transportation Commission (MTC), 2016; Tom Tom North America, 2015; U.S. Fish and Wildlife Service (USFWS), 2016.

Figure 2.9-4
CNDDB Documented Sensitive Biological Resources: Alameda and Santa Clara Counties



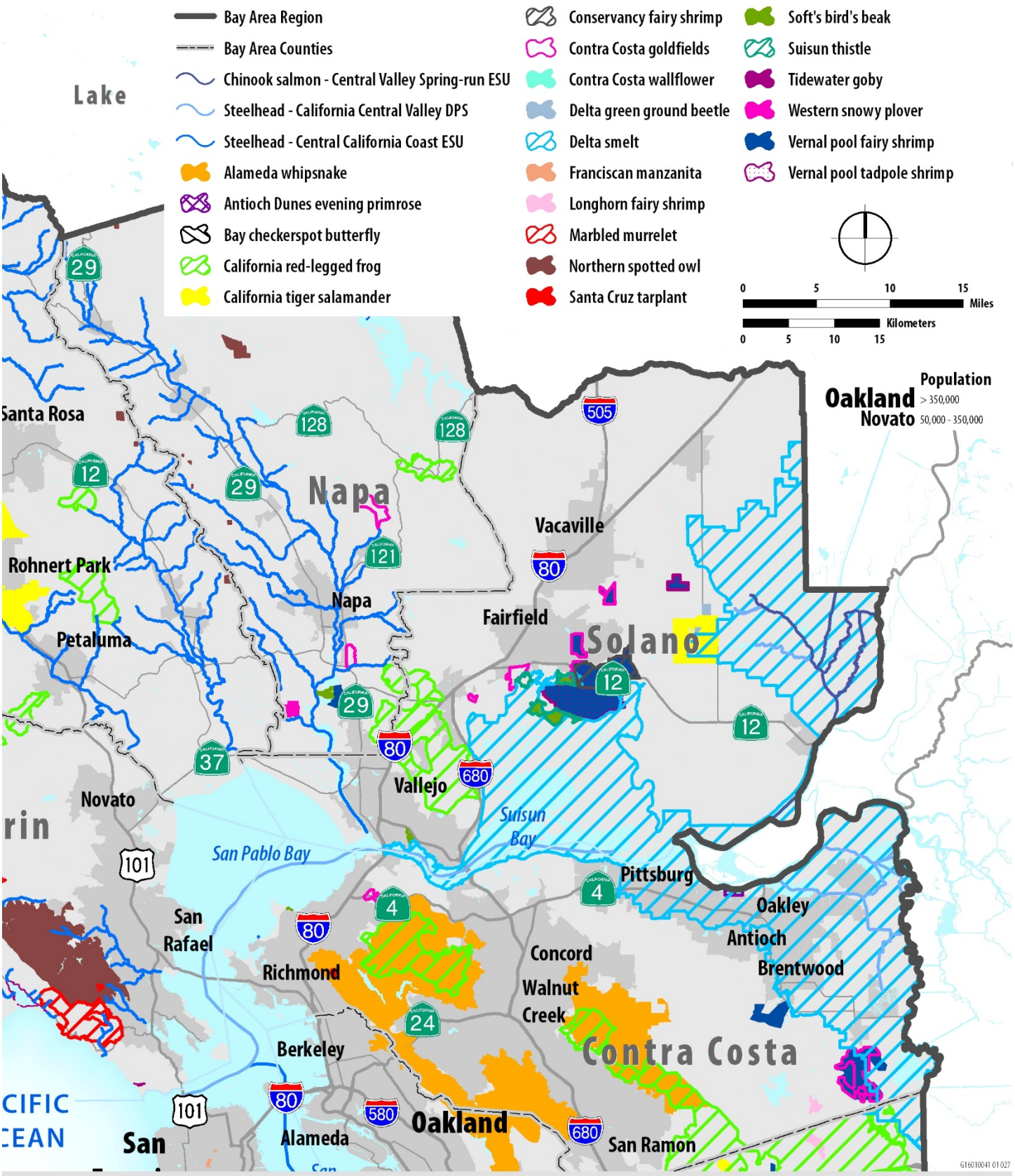
Map Data Sources: Metropolitan Transportation Commission (MTC), 2016; Tom Tom North America, 2015; U.S. Fish and Wildlife Service (USFWS), 2016.

Figure 2.9-5
Critical Habitat: Sonoma and Marin Counties



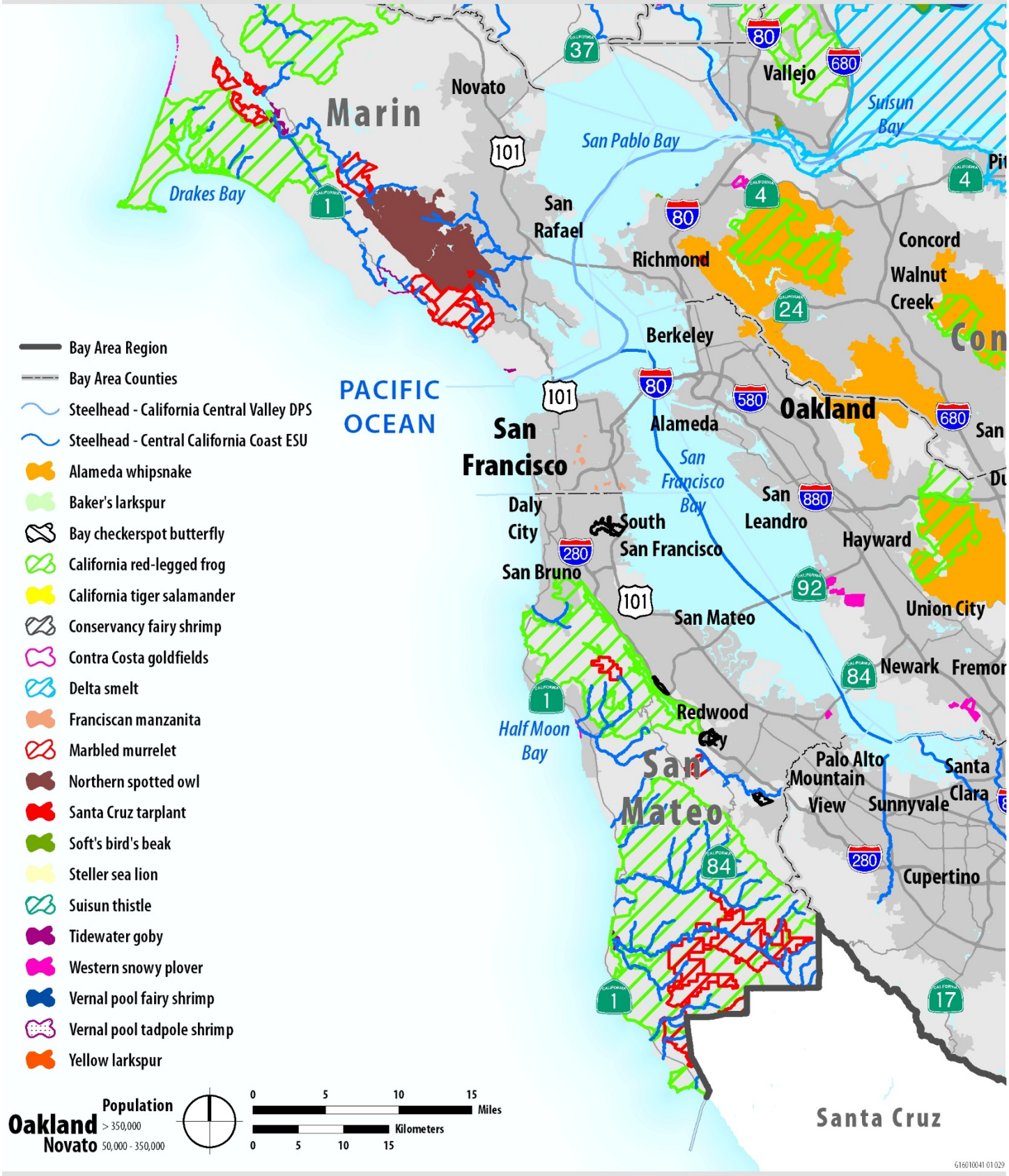
Map Data Sources: Metropolitan Transportation Commission (MTC), 2016; Tom Tom North America, 2015; U.S. Fish and Wildlife Service (USFWS), 2016.

Figure 2.9-6
Critical Habitat: Napa, Solano, and Contra Costa Counties



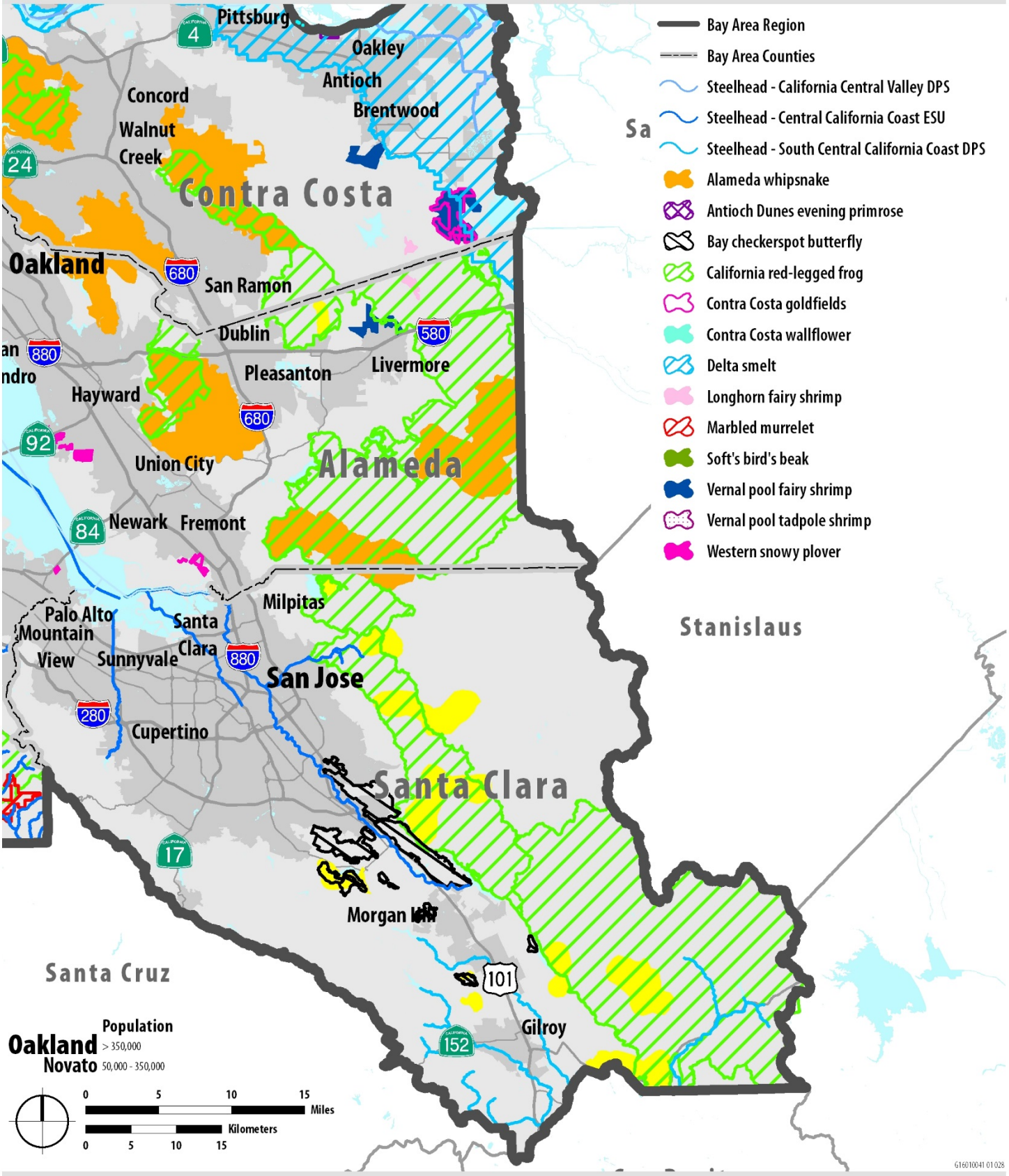
Map Data Sources: Metropolitan Transportation Commission (MTC), 2016; Tom Tom North America, 2015; U.S. Fish and Wildlife Service (USFWS), 2016.

Figure 2.9-7
Critical Habitat: San Mateo County



Map Data Sources: Metropolitan Transportation Commission (MTC), 2016; Tom Tom North America, 2015; U.S. Fish and Wildlife Service (USFWS), 2016.

Figure 2.9-8
Critical Habitat: Alameda and Santa Clara Counties



Map Data Sources: Metropolitan Transportation Commission (MTC), 2016; Tom Tom North America, 2015; U.S. Fish and Wildlife Service (USFWS), 2016.

Table 2.9-1 Critical Habitat in the Bay Area

Species	County								
	Contra Costa	Alameda	Santa Clara	San Mateo	San Francisco	Marin	Sonoma	Napa	Solano
Antioch Dunes evening primrose	√								
Baker's larkspur						√	√		
Contra Costa goldfields	√	√						√	√
Contra Costa wallflower	√								
Franciscan manzanita					√				
Santa Cruz tarplant	√								
Soft bird's beak	√							√	√
Suisun thistle									√
Yellow larkspur						√	√		
Delta smelt	√	√							√
Chinook salmon - CA Coastal ESU							√		
Chinook salmon – Central Valley Spring-run ESU									√
Steelhead - N. CA DPS							√		
Steelhead – South/Central CA Coast DPS			√						
Steelhead – Central CA Coast DPS			√	√		√	√	√	
Steelhead – CA Central Valley DPS	√								√
Tidewater goby				√		√	√		
Bay checkerspot butterfly			√	√					
Delta ground beetle									√
Conservancy fairy shrimp									√
Longhorn fairy shrimp	√	√							
Vernal pool fairy shrimp	√	√						√	√
Vernal pool tadpole shrimp		√							√
California red-legged frog	√	√	√	√		√	√	√	√
California tiger salamander		√	√				√		√
Alameda whipsnake	√	√	√						
Marbled murrelet				√		√	√		
Northern spotted owl						√	√	√	
Western snowy plover		√		√		√			
Stellar sea lion				√					

Special-Status Natural Communities

Sensitive natural communities are designated as such by various resource agencies, such as the CDFW, or in local policies and regulations, and are generally considered to have important functions or values for wildlife and/or are recognized as declining in extent or distribution, and are considered threatened enough to warrant some sort of protection. For example, oak woodlands are protected in California by state law and many local policies and plans, and federal, State, and most local agencies also consider wetlands and riparian habitat as sensitive communities. CDFW tracks communities it believes to be of conservation concern through its *List of California Terrestrial Communities* and the CNDDB, and these communities are typically considered special-status for the purposes of CEQA analysis (CDFW 2009, 2010). There is no statewide law that requires protection of all special-status natural communities, but CEQA requires consideration of the potential impacts of a project to biological resources of statewide or regional significance. Sensitive communities in the Bay Area include coastal salt marsh; brackish and freshwater wetlands including marshes, seasonal wetlands, and vernal pools; riparian forests and woodlands; and several types of coastal scrub, chaparral, and perennial grasslands.

Migratory Corridors and Linkages

The Bay Area encompasses large areas of wildlands that provide habitat for both common and rare plants and wildlife. Some of these areas were mapped as Essential Connectivity Areas (ECAs) for the California Essential Habitat Connectivity Project, which was commissioned by the California Department of Transportation (Caltrans) and CDFW with the purpose of making transportation and land-use planning more efficient and less costly, while helping reduce dangerous wildlife-vehicle collisions (Spencer et al. 2010). The ECAs were not developed for the purposes of defining areas subject to specific regulations by CDFW or other agencies.

The ECAs are not regulatory delineations but are identified as lands likely important to wildlife movement between large, mostly natural areas at the statewide level. The ECAs form a functional network of wildlands that are considered important to the continued support of California's diverse natural communities. The ECAs were not developed for the needs of particular species but were based primarily on the concept of ecological integrity, which considers the degree of land conversion, residential housing impacts, road impacts, and status of forest structure (for forested areas) (Spencer et al. 2010). The Conservation Land Network (CLN) has also been established as a scientifically based analysis that focuses on biodiversity and local migratory conditions previously unavailable in the Bay Area, and identifies the most essential lands needed to sustain biological diversity. The CLN analysis presents data at a somewhat finer resolution than the ECAs, which are shown in **Figure 2.9-9**. In addition, consideration was given to the degree of conservation protection and areas known to support high biological values, such as mapped critical habitat and hotspots of species endemism (Spencer et al. 2010). ECAs were mapped on a state-wide level and should be considered coarse-scale polygons that can inform land- planning efforts, but that should eventually be replaced by more detailed linkage designs, developed at finer resolution at the regional and ultimately local scale based on the needs of particular species and ecological processes. There are a total of 13 ECAs mapped within the nine-county Bay Area (see **Figure 2.9-9**). As seen in this figure, ECAs occur within all nine Bay Area counties and are typically centered along the region's mountain ranges. These areas are comprised primarily of wildlands, but may also include some agricultural and developed areas (mostly rural residential) and many are bisected by major roadways.

Figure 2.9-9
Essential Connectivity Areas

Map Data Sources: California Department of Fish and Wildlife (CDFW), 2010; Metropolitan Transportation Commission (MTC), 2016; Tom Tom North America, 2015.

2.9.2 Regulatory Setting

The regulations and policies of various federal and State agencies (e.g., the USACE, U.S. Environmental Protection Agency (EPA) and USFWS mandate protection of wetlands, special-status plant and wildlife species, and aquatic and terrestrial communities in the region. The USACE has primary federal responsibility for administering regulations that concern waters and wetlands, while the USFWS, NMFS, and CDFW have lead responsibility for determining potential project effects on federal- and State-listed species and other species of concern.

FEDERAL REGULATIONS

National Environmental Policy Act

The National Environmental Policy Act of 1969 (NEPA) was one of the first laws to establish a broad national framework for protecting the environment. Its purposes include: "To declare a national policy which will encourage productive and enjoyable harmony between man and his environment; [and] to promote efforts which will prevent or eliminate damage to the environment and biosphere and stimulate the health and welfare of man." NEPA assures that all branches of government give proper consideration to the environment before undertaking major federal actions that could significantly affect the environment.

Environmental assessments and environmental impact statements, which assess the likelihood of impacts from alternative courses of action, are required from all federal agencies and are the most visible NEPA requirements. The documents must include discussion of the environmental impacts of the alternatives, including the proposed action; any adverse environmental effects that cannot be avoided should the proposal be implemented; the relationship between short-term uses of the environment and the maintenance and enhancement of long-term productivity; and any irreversible or irretrievable commitments of resources that would be involved in the proposal should it be implemented.

Federal Endangered Species Act

Under the federal Endangered Species Act (ESA), the Secretary of the Interior and the Secretary of Commerce have joint authority to list a species as threatened or endangered (16 United States Code [USC] 1533[c]). Pursuant to the requirements of ESA, an agency reviewing a proposed project within its jurisdiction must determine whether any federally listed or proposed species may be present in the project region, and whether the proposed project would result in a "take"[5] of such species. In addition, the agency is required to determine whether the project is likely to jeopardize the continued existence of any species proposed to be listed under ESA, or result in the destruction or adverse modification of critical habitat proposed to be designated for such species (16 USC 1536[3][4]). Project-related impacts on these species or their habitats would be considered significant in this EIR. The "take" prohibition of ESA applies to any action that would adversely affect a single member of an endangered or threatened species.

Marine Mammal Protection Act

The Marine Mammal Protection Act (50 CFR 216) prohibits, with certain exceptions, the take of marine mammals in U.S. waters and by U.S. citizens on the high seas, and the importation of marine mammals and marine mammal products into the U.S. This act defines take as hunting, harassing, capturing, or killing any marine mammal or attempting to do so. Harassment is defined as any act of "pursuit, torment, or annoyance" which has the potential to injure a marine mammal or cause disruption of essential behavioral patterns including feeding, sheltering, migration, breeding, nursing, or breathing. The majority of the act's provisions are related to commercial fishing and subsistence hunting. The act also outlines procedures for obtaining

[5] "Take," as defined in Section 9 of the FESA, is broadly defined to include intentional or accidental "harassment" or "harm" to wildlife. "Harass" is further defined by the U.S. Fish and Wildlife Service as an intentional or negligent act or omission which creates the likelihood of injury to wildlife by annoying it to such an extent as to significantly disrupt normal behavioral patterns which include, but are not limited to, breeding, feeding, and sheltering. "Harm" is defined as an act which actually kills or injures wildlife. This may include significant habitat modification or degradation where it actually kills or injures wildlife by significantly impairing essential behavioral patterns, including breeding, feeding or sheltering.

permits for take of small numbers of marine mammals, incidental to otherwise legal activities. Under this act, NMFS has regulatory authority for the protection of sea lions, seals, dolphins, porpoises, and whales; and USFWS has authority regarding sea otters, walrus, manatees, and polar bears.

Migratory Bird Treaty Act and Bald and Golden Eagle Protection Act

The federal Migratory Bird Treaty Act (16 USC, Section 703, Supplement I, 1989) prohibits killing, possessing, or trading in migratory birds, except in accordance with regulations prescribed by the Secretary of the Interior. This act encompasses whole birds, parts of birds, and bird nests and eggs.

The federal Bald and Golden Eagle Protection Act prohibits persons within the United States (or other places subject to U.S. jurisdiction) from "possessing, selling, purchasing, offering to sell, transporting, exporting or importing any bald eagle or any golden eagle, alive or dead, or any part, nest or egg thereof." This act also prohibits "taking" of bald and golden eagles, which is defined as "pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, molest or disturb." Disturbance includes direct injury, decrease in productivity, or causing nest abandonment.

Clean Water Act

The Clean Water Act (CWA) is a 1977 amendment to the Federal Water Pollution Control Act of 1972, which set the basic structure for regulating discharges of pollutants to waters of the United States. Although the purpose of the act is primarily to maintain water quality for both human and environmental benefits, regulations developed pursuant to this act deal extensively with permitting of actions in wetlands. These regulations provide more specific protection for wetland habitats—most of which are important ecologically—than any other laws. EPA has primary authority under the Clean Water Act to set standards for water quality and for effluents, but USACE has responsibility for permitting dredge and fill in wetlands.

Section 404 of the CWA requires project proponents to obtain a permit from USACE before performing any activity that involves any discharge of dredged or fill material into waters of the United States, including wetlands. Waters of the United States include navigable waters of the United States, interstate waters, tidally influenced waters, and all other waters where the use, degradation, or destruction of the waters could affect interstate or foreign commerce, tributaries to any of these waters, and wetlands that meet any of these criteria or that are adjacent to any of these waters or their tributaries. Many surface waters and wetlands in California meet the criteria for waters of the United States.

In accordance with Section 401 of the CWA, projects that apply for a USACE permit for discharge of dredged or fill material must obtain water quality certification from the appropriate RWQCB indicating that the action would uphold state water quality standards.

Marine Protection, Research, and Sanctuaries Act of 1972

This legislation allowed for establishment of marine sanctuaries, such as the Cordell Bank, Gulf of the Farallones, and Monterey Bay National Marine Sanctuaries off the coast of Marin and Sonoma Counties and the San Francisco Peninsula, respectively. This act provides increased protection from a variety of human influences on the marine resources within the sanctuaries. Among their important uses, the National Marine Sanctuaries provide an essential fishery, recreational opportunities, and habitat for a myriad of rare and common shorebirds, marine mammals, and other wildlife. Section 103 of this act regulates the transportation of dredged materials in ocean waters. This act is implemented through a permit granted by USACE, which uses the EPA's ocean disposal criteria to regulate the disposal of dredged materials.

Rivers and Harbors Act of 1899

Section 10 of the Rivers and Harbors Act prohibits the obstruction or alteration of any navigable water of the United States. Under this act, USACE must authorize any excavation or deposition of materials into such waters, or for any work that could affect the course, location, condition, or capacity of such waters.

Coastal Zone Management Act of 1972

This act established the authority for creating coastal zone management areas and the California Coastal Commission. Coastal zone management criteria are established by the Commission and must be followed by federal, other government, or private entities performing any activities within the coastal zone.

STATE REGULATIONS

California Environmental Quality Act

The intent of the California Environmental Quality Act (CEQA) is to maintain "high-quality ecological systems and the general welfare of the people of the state." It is the policy of the State to "prevent the elimination of fish or wildlife species because of man's activities, ensure that fish and wildlife populations do not drop below self-perpetuating levels, and preserve for future generations representations of all plant and animal communities and examples of the major periods of California history." CEQA forbids agencies from approving projects with significant adverse impacts when feasible alternatives or feasible mitigation measures can substantially lessen such impacts.[6]

CEQA directs each State agency to consult with the California Department of Fish and Wildlife on any project an agency initiates that is not statutorily or categorically exempt from CEQA. CEQA *Guidelines* (Section 15065a) indicate that impacts to rare, threatened, or endangered plants or animals are significant. This finding of significance can be applied directly to State- and federally listed species. Impacts to other species that may generally meet these criteria but are not officially listed may be considered significant by the lead agency (for an EIR), depending on the applicability of other laws (e.g., Migratory Bird Treaty Act) and the discretion of the agency. The CDFW interprets Lists 1A, 1B, and 2 of the California Native Plant Society's *Inventory of Rare and Endangered Vascular Plants of California* to consist of plants that, in a majority of cases, would qualify for listing as rare, threatened, or endangered. However, the determination of whether an impact is significant is a function of the lead agency, absent the protection of other laws. Projects subject to CEQA review must specifically address the potential impact of the listed species and provide mitigation measures, if the impact is significant.

California Endangered Species Act

Under the California Endangered Species Act (CESA), the CDFW has the responsibility for maintaining a list of threatened and endangered species (California Fish and Game Code 2070). The CDFW also maintains a list of "candidate species," which are species formally noticed as being under review for addition to either the list of endangered species or the list of threatened species. In addition, CDFW maintains lists of "species of special concern," which serve as "watch lists." Pursuant to the requirements of CESA, an agency reviewing a proposed project within its jurisdiction must determine whether any State-listed endangered or threatened species could be present on the project site and determine whether the proposed project could have a potentially significant impact on such species. In addition, the CDFW encourages informal consultation on any proposed project that may impact a candidate species. Project- related impacts on species on the CESA endangered or threatened lists would be considered significant in this EIR. Impacts on "species of concern" would be considered significant under certain circumstances, discussed below.

California Fish and Game Code

Fully Protected Species

Protection of fully protected species is described in Sections 3511, 4700, 5050, and 5515 of the California Fish and Game Code. These statutes prohibit take or possession of fully protected species and do not provide for authorization of incidental take. CDFW has informed nonfederal agencies and private parties that their actions must avoid take of any fully protected species.

[6] CEQA also provides that a project might be approved in spite of residual, unmitigated significant impacts, by adoption of a statement of overriding social and economic considerations in situations where mitigations or alternatives are deemed infeasible.

Sections 3503 and 3503.5—Protection of Bird Nests and Raptors

Section 3503 of the Fish and Game Code states that it is unlawful to take, possess, or needlessly destroy the nest or eggs of any bird. Section 3503.5 of the California Fish and Game Code states that it is unlawful to take, possess, or destroy any raptors (i.e., species in the orders Falconiformes and Strigiformes), including their nests or eggs. Typical violations include destruction of active nests as a result of tree removal or disturbance caused by project construction or other activities that cause the adults to abandon the nest, resulting in loss of eggs and/or young.

Section 4150—Protection of Nongame Mammals

Section 4150 states that all mammals occurring naturally in California that are not game mammals, fully protected mammals, or fur-bearing mammals are "nongame mammals." Nongame mammals or parts thereof may not be taken or possessed except as provided in the Code or in accordance with regulations adopted by the California Fish and Game Commission. Non-game mammals that may be taken or possessed are primarily those that cause crop damage.

California Native Plant Protection Act

State listing of plant species began in 1977 with the passage of the California Native Plant Protection Act (NPPA), which directed the CDFW to carry out the legislature's intent to "preserve, protect, and enhance endangered plants in this state." The NPPA gave the California Fish and Game Commission the power to designate native plants as endangered or rare and to require permits for collecting, transporting, or selling such plants. The California Endangered Species Act expanded upon the original NPPA and enhanced legal protection for plants. CESA established threatened and endangered species categories, and grandfathered all rare animals—but not rare plants—into the act as threatened species. Thus, there are three listing categories for plants in California: rare, threatened, and endangered.

California Coastal Act

The California Legislature enacted the California Coastal Act in 1976 to regulate coastal development throughout the state. The Act created a "coastal management zone" that generally extends three miles seaward and up to five miles inland from the mean high tide line. In particularly important and generally undeveloped areas where there can be considerable impact on the coastline from inland development, the coastal zone may extend to a maximum allowable limit. In developed urban areas, the coastal zone generally extends inland for a much shorter distance. Each city or county government whose jurisdiction includes land in the coastal zone must develop a Local Coastal Program for the area, which guides planning, conservation, and use of coastal resources, must be consistent with the Coastal Act, and must be certified by the California Coastal Commission (CCC). Any person wishing to develop land within the coastal zone must obtain a permit from the relevant city or county, and the development plan must be consistent with the policies of the Act.

Oak Woodlands Conservation Act and California Senate Bill 1334

In 2001, the California legislature enacted the Oak Woodlands Conservation Act (AB 242), which established requirements for the preservation and protection of oak woodlands and trees, and allocated funding managed by the Wildlife Conservation Board. To qualify to use these funds, counties and cities must adopt an oak conservation management plan. In 2004, to expand these conservation efforts, the legislature passed SB 1334 (*Oak Woodlands Conservation: Environmental Quality*). This statute requires that a county must determine whether a project would result in a significant impact on oak woodlands and, if it is determined that a project may result in a significant impact on oak woodlands, then the County shall require one or more of the following mitigation measures:

- conserve oak woodlands through the use of conservation easements;
- plant an appropriate number of trees, including maintenance of plantings and replacement of failed plantings;
- contribute funds to the Oak Woodlands Conservation Fund for the purpose of purchasing oak woodlands conservation easements; or

- other mitigation measures developed by the county.

Z'berg-Nejedly Forest Practice Act

The Z'Berg-Nejedly Forest Practices Act (FPA) ensures that logging on privately owned lands in California is done in a manner that will preserve and protect fish, wildlife, forests, and streams. This act established a nine-member Board of Forestry whose mandate was the control over forest practices and forest resources in California. The Board of Forestry sets forest management policies that are implemented by the California Department of Forestry and Fire Protection (CAL FIRE).

The Forest Practice Act requires that a Timber Harvest Plan (THP) be prepared by a Registered Professional Forester for timber harvest on virtually all non-federal land. THPs are submitted to CAL FIRE for its review and approval. The THP process is the functional equivalent of an EIR under CEQA.

The FPA also established the requirement that all non-federal forests cut in the State be regenerated with at least three hundred stems per acre on high site lands, and one hundred fifty trees per acre on low site lands.

California Forest Practice Rules

Additional rules enacted by the State Board of Forestry are also enforced to protect fish, wildlife, forests and streams resources. The purpose of the Forest Practice Rules is to implement the provisions of the FPA in a manner consistent with other laws, including but not limited to, the Timberland Productivity Act of 1982, the CEQA of 1970, the Porter Cologne Water Quality Act, and the California Endangered Species Act. The provisions of the rules are followed by Registered Professional Foresters in preparing Timber Harvesting Plans, and by the Director in reviewing such plans to achieve the Forest Practice Act policies. CAL FIRE ensures that private landowners abide by these laws when harvesting trees. Although there are specific exemptions in some cases, compliance with the Forest Practice Act and Board rules apply to all commercial harvesting operations for landowners of small parcels, to ranchers owning hundreds of acres, and large timber companies with thousands of acres.

A THP that does not comply with all forestry and environmental regulations is returned to the RPF. It is only approved after the RPF and landowner agree to make the changes necessary to ensure compliance with all laws. CAL FIRE follows-up on approved THPs with site inspections and can shut down operations, cite or fine Registered Professional Foresters, Licensed Timber Operators, and landowners if illegal operations are found.

LOCAL REGULATIONS

Habitat Conservation Plans

East Contra Costa County Habitat Conservation Plan/Natural Community Conservation Plan

The East Contra Costa County Habitat Conservation Plan/Natural Community Conservation Plan (HCP/NCCP) (2006), overseen by the East Contra Costa County Habitat Conservancy, covers the eastern one-third of Contra Costa County (174,018 acres). It allows Contra Costa County, the Contra Costa County Flood Control and Water District, the East Bay Regional Park District, and the cities of Brentwood, Clayton, Oakley, and Pittsburg to streamline environmental permitting for activities and projects in the region that are covered by the HCP. The HCP also provides for comprehensive species, wetlands, and ecosystem conservation, and contributes to the recovery of endangered species in California, while allowing for limited take of 28 listed and non-listed ("covered") species. By implementing the HCP, the above-mentioned signatories will have a 30-year permit from USFWS and CDFW that authorizes take of covered species, and will avoid project-by-project permitting that is generally costly and time consuming.

Santa Clara Valley Habitat Plan

The City of San José, Santa Clara County, Santa Clara Valley Transportation Authority, Santa Clara Valley Water District, City of Gilroy, and City of Morgan Hill initiated a collaborative process to prepare and implement an HCP/NCCP for the Santa Clara Valley. The final HCP/NCCP and associated EIR were released in 2012. The

HCP/NCCP targets specific areas of the county where land development activities and the continued survival of endangered, threatened, or other species of concern are in conflict. The goal of this HCP/NCCP is to provide the means for conservation of these species, thereby contributing to their recovery while allowing for compatible and appropriate development to occur.

Conservation Strategies

East Alameda County Conservation Strategy

The East Alameda County Conservation Strategy (EACCS) is a collaborative effort to preserve endangered species by developing and adopting a guide to long-term protection of endangered species. The inventory area for this conservation strategy includes the cities of Dublin, Pleasanton, and Livermore, as well as unincorporated areas of eastern Alameda County. Annual grassland, seasonal and permanent wetlands, riparian woodland, oak woodland, and scrub communities within the inventory area are known to support several listed or sensitive wildlife species, including California tiger salamander (*Ambystoma californiense*), San Joaquin kit fox (*Vulpes macrotis mutica*), Alameda whipsnake (*Masticophis lateralis euryxanthus*), and California red-legged frog (*Rana draytonii*).

The EACCS describes current biological conditions in the region, which present a baseline for species habitat with which to compare future development. The EACCS also provides a long-term regional conservation strategy to protect species by prioritizing habitats that should be protected or restored.

From a regulatory perspective, the EACSS is intended to streamline and simplify the issuance of Section 404 permits for future projects. The EACCS standardizes avoidance, minimization, mitigation, and compensation requirements to comply with federal, State, and local laws and regulations relating to biological and natural resources in the study area. The core of the EACCS for the covered species is the application of standardized mitigation ratios for each species to offset project impacts. In May 2012, the USFWS issued a Programmatic Biological Opinion (Programmatic BO) for USACE permitted projects utilizing the EACCS for projects that may affect one or more of the species covered in the EACCS and Programmatic BO. The Programmatic BO is issued to USACE for permits, enforcement actions, or mitigation banks that are under their jurisdiction. Eligible projects may be appended to the Programmatic BO to obtain individual incidental take authorization. To be eligible, individual projects must be consistent with the EACCS and fall under the list of activities covered by the Programmatic BO. Covered activities include residential, commercial and industrial development and associated infrastructure (roads and utilities); infrastructure projects such as transmission lines, road construction and maintenance, trail construction and maintenance, bridge construction and maintenance, solar projects, wind energy projects, and culvert installation and maintenance; and restoration projects, including pond and stream restoration and enhancement, fish barrier removal and modification, and wetland construction and maintenance.

Santa Rosa Plain Conservation Strategy

The Santa Rosa Plain Conservation Strategy (2005) seeks to create a long-term program to mitigate potential adverse effects on listed species because of future development on the Santa Rosa Plain, which is located in central Sonoma County, bordered on the south and west by the Laguna de Santa Rosa, on the east by the foothills, and on the north by the Russian River. The Plain and adjacent areas are characterized by vernal pools, seasonal wetlands, and associated grassland habitat, which supports several species of flora and fauna that are listed by the FESA as threatened or endangered, including the federally threatened California tiger salamander (CTS) and four federally endangered plant species—Burke's goldfields (*Lasthenia burkei*), Sonoma sunshine (*Blennosperma bakeri*), Sebastapol meadowfoam (*Limnanthes vinculans*), and many-flowered navarretia (*Navarretia leucocephala* ssp. *plieantha*).

The Conservation Strategy was created to (1) provide a plan for local agencies, developers, and community groups that would preserve and enhance populations and habitat of the listed species; (2) support the issuance of a USFWS authorization for incidental take of CTS and listed plants that may occur in the course of carrying out a broad range of activities on the Plain; and (3) protect stakeholder's (public and private) interests. It is based in part on the Santa Rosa Plain Vernal Pool Ecosystem Preservation Plan (1995).

The Conservation Strategy addresses various aspects of urban and rural growth and its effects on the above-listed species, mitigation for impacts to these listed species and wetlands, and the conservation and recovery of the listed species and their habitat. The Conservation Strategy identified the Southwest Santa Rosa Preserve System and nine "Conservation Areas" throughout the Plain, where mitigation for project- related impacts to listed species and vernal pools should be directed. The designation of Conservation Areas is based on the following factors: (1) known distribution of CTS; (2) presence of suitable CTS habitat; (3) presence of large blocks of natural or restorable land; (4) adjacency to existing preserves; and known location of the listed plants. A critical component of the Conservation Strategy is that 350-900 acres of actual preserve land ultimately will be established within each Conservation Area.

While local jurisdictions participating in the conservation strategy have adopted the Santa Rosa Plain Conservation Strategy Planning Agreement, numerous important implementation issues still must be resolved before the Conservation Strategy can be put into full effect. However, the USFWS Programmatic Biological Opinion (2007) can still be invoked for projects that have suitable habitat for CTS, Burke's goldfields, Sonoma sunshine, Sebastapol meadowfoam, and many-flowered navarretia, and that impact wetlands in the Santa Rosa Plain.

California Wildlife Action Plan 2015

CDFW developed the State Wildlife Action Plan, 2015 Update (SWAP 2015) as comprehensive plan for conserving California's fish and wildlife and their vital natural habitats for future generations. SWAP 2015 establishes a strategic vision of the integrated conservation efforts needed to sustain the tremendous biodiversity of fish and wildlife resources found in the state. Significant climate-related changes to California's environment have been documented in the last decade, including sea level rise, natural community shifts, increased prevalence of invasive species, increased number and intensity of wildfires, and prolonged drought. SWAP 2015 has considered these climate-induced effects, as well as other pressures on wildlife populations and habitats, and identifies statewide and regional conservation strategies to protect the state's natural resources.

Employing an ecosystem approach to conserve and manage diverse habitats and species, SWAP 2015 provides a blueprint for actions necessary to address the highest priorities for conserving California's aquatic, marine, and terrestrial resources. Its implementation relies on making important and helpful conservation information more accessible to resource managers and the public, and on developing lasting partnerships with a broad array of governments, agencies, organizations, businesses, and citizens. SWAP 2015 describes key conservation factors crucial to the sustainability of California ecosystems, and for each geographic province, provides specific conservation strategies that will reduce or ameliorate adverse impacts to ecological systems or enhance the quality vital to the natural landscapes of California.

Bay Conservation and Development Commission Acts and Plans

Suisun Marsh Preservation Act of 1977 and Suisun Marsh Protection Plan

The *Nejedly-Bagley-Z'berg Suisun Marsh Act* was enacted in 1974 to require the San Francisco BCDC and the CDFW to prepare a plan (later called the *Suisun Marsh Protection Plan*) to preserve the integrity and assure continued wildlife use of the Suisun Marsh, approximately 85,000 acres of tidal marsh, managed wetlands, and waterways in southern Solano County, which is the largest remaining brackish wetland complex in San Francisco Bay, more than ten percent of California's remaining wetland area, and a wildlife habitat of international importance. The Suisun Marsh Preservation Act (Cal. Pub. Res. Code Sections 29000–29612) was enacted in 1977 to incorporate the findings and policies contained in the *Suisun Marsh Protection Plan* of 1976 into State law, and to empower BCDC to implement the plan through its regulatory authority.

The Suisun Marsh Protection Plan, in brief, proposes (1) a primary management area encompassing the 89,000 acres of tidal marsh, managed wetlands, adjacent grasslands, and waterways over most of which BCDC now has jurisdiction, and (2) a secondary management area of approximately 22,500 acres of significant buffer lands. Under specific guidelines in each area, Solano County would be responsible for preparing and administering a local protection program. BCDC would represent the State's interest, serving

as the land use permitting agency for major projects in the primary management area, and as an appellate body with limited functions in the secondary management area.

The San Francisco Bay Plan

The San Francisco Bay Plan (Bay Plan) was developed by the BCDC in 1968, and its provisions are currently maintained and carried out by the BCDC. Since the adoption of the Bay Plan, implementing legislation has been amended several times, but the general character, scope of authority, and area of jurisdiction are largely unchanged. The Bay Plan provides the findings and policies to guide future uses of the Bay and shoreline, certain waterways, salt ponds and managed wetlands, and the maps that apply these policies to the BCDC's jurisdiction.

City and County General Plans

The most comprehensive land use planning for the San Francisco Bay Area region is provided by city and county general plans, which local governments are required by State law (California Government Code Section 65300 et seq.) to prepare as a guide for future development. Issues pertaining to biological resources are described primarily in the conservation and open space elements of general plans. These elements typically address tree removal and protection policies, conservation of native vegetation, preservation of open space and wildlife habitat corridors, and protection of sensitive species.

2.9.3 Impact Analysis

SIGNIFICANCE CRITERIA

The following significance criteria are based on CEQA Guidelines Appendix G, as well as the thresholds used in the EIR for the 2013 Plan Bay Area, and professional judgment. Under these criteria, implementation of the proposed Plan would have a potentially significant adverse impact on biological resources if it would:

Criterion 1: Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as candidate, sensitive, or special-status in local or regional plans, policies, or regulations, or by CDFW or USFWS, or designated critical habitat for federally listed plant and wildlife species.

Criterion 2: Have a substantial adverse effect on riparian habitat, federally protected wetlands as defined by section 404 of the Clean Water Act (including but not limited to marsh, vernal pool, coastal.), or other sensitive natural community identified in local or regional plans, policies, or regulations, or by CDFW or USFWS, through direct removal, filling, hydrological interruption, or other means.

Criterion 3: Interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridor, or impede the use of native wildlife nursery sites.

Criterion 4: Conflict with adopted local conservation policies, such as a tree protection ordinance, or resource protection and conservation plans, such as a HCP, NCCP, or other adopted local, regional, or state habitat conservation plan.

Criterion 5: 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; or substantially reduce the number or restrict the range of an endangered, rare, or threatened species.

METHOD OF ANALYSIS

This program-level analysis generally evaluates potential regional and local impacts on biological resources based on the location of proposed land use growth footprints and transportation projects relative to the known and potential distribution of sensitive biological resources throughout the Bay Area. For this impact

assessment, a geographic information system was used to digitally overlay the projected land use growth footprint associated with forecasted development and the projected footprint associated with transportation projects onto documented locations of sensitive species, critical habitat for federal listed species, and wetlands and other waters. Potential impacts were determined by evaluating whether the projected growth and transportation project footprints would occur within the potential range of a special-status species, whether projected growth and projects would potentially directly encroach upon an area of ecological significance (e.g. sensitive natural community, designated critical habitat, important wildlife corridor, etc.), or whether the planned development and projects could involve the filling of wetlands. Resources used to identify potentially affected biological resources included the California Natural Diversity Database, National Wetland Inventory Maps, mapping by the California Essential Habitat Connectivity Project, published environmental impact reports and plans, and standard biological literature (see Appendix K).

A quantitative analysis of the potential for impacts (e.g., acres of critical habitat, number of documented special-status species occurrences, acres of mapped wetland types potentially affected) was performed when feasible. Potential effects on special-status species are reported as the number of mapped species occurrences that overlap with land use growth footprints and transportation project boundaries. More refined quantification, such as acreages of habitat affected, were not possible for special-status species because of limitations in the existing data on occurrences. Specifically, many special-status species occurrences from the CNDDB are mapped as non-specific polygons and simply indicate that a species was documented somewhere within the general area depicted.

The GIS-based approach for this programmatic analysis overestimates actual impacts because of the coarse level of the analysis and resource-mapping limitations. For example, as described previously, many special-status species occurrences from the CNDDB only indicate presence within a general area. In addition, many CNDDB species locations are historical and habitat no longer occurs for the species because of urbanization. Therefore, a land use growth footprint and transportation project polygon intersection with a special-status species polygon simply indicates that the species may, or did once, occur in that area and that projects within those areas may affect that species if habitat for the species still occurs within or adjacent to the specific project site.

This analysis assumes that impacts to biological resources would be most likely to occur where development and transportation projects could have an effect on ecologically sensitive or significant areas. Projects most likely to affect sensitive biological resources are those involving major ground-disturbing activity. Road widenings, highway extensions, interchange projects, bridges, and rail extensions in rural areas or over waterbodies or wetlands also have a higher likelihood of affecting sensitive biological resources. Laws and regulations protecting special-status species, areas of ecological significance, and wetland resources are effective incentives for project proponents to design alternatives that either avoid or substantially reduce impacts on these resources. Therefore, upon subsequent project-level review, it is anticipated that actual impacts of specific future projects will would generally be far less substantial than would be suggested by quantitative analysis at this stage.

The actual footprints and other design details of most proposed transportation projects are not known because the projects are in the early stages of planning. Transportation projects under the proposed Plan that would not directly expand transportation-dedicated lands were assumed to have minimal potential biological impacts. Such projects include signal and traffic operational improvements, rail extensions along existing rights-of-way, and road widening in urban areas or within existing rights of way. However, CEQA may require more detailed evaluations on a project-by-project basis at the time of project approval by local agencies to determine the exact resources found within proposed road or rail alignments. Because the specific details of many projects are not yet known, this assessment identifies general locations of potential adverse effects.

IMPACTS AND MITIGATION MEASURES

The first Impact Criterion is separated into two impact statements, each of which is directly related to impacts on special-status species. Impact Statement 2.9-1a addresses impacts on special-status species, Impact Statement 2.9-1b discusses impacts to critical habitat designated for federally-listed species.

Impact 2.9-1a: Implementation of the proposed Plan could have a substantial adverse effect, either directly or through habitat modifications, on species identified as candidate, sensitive, or special-status in local or regional plans, policies, or regulations, or by the California Department of Fish and Wildlife or U.S. Fish and Wildlife Service.

Special-status species with the greatest potential to be affected by the proposed Plan are listed in **Table K-1** in Appendix K. The list of species that would be potentially affected was generated from a GIS-based analysis of project proximity to documented special-status species occurrences, as well as proximity to critical habitat designated by USFWS and NMFS.[7] Additional, non-listed species (i.e., not listed under the FESA or CESA) that are not consistently tracked by CDFW in the CNDDB but are afforded protections under the California Fish and Game Code and/or the Migratory Bird Treaty Act were also considered.

Focused surveys to determine the locations and extent of special-status species populations have not been conducted in support of this programmatic EIR; detailed and site-specific surveys are more appropriately conducted when project-level detail is available. Therefore, this analysis conservatively assumes that special-status species would be present within the impact footprint of regional growth/land use changes or a transportation project if the project is mapped as occurring within or transecting a known species occurrence. Known occurrences are those mapped in reliable data sources (e.g., CNDDB). However, CNDDB includes historical occurrences for species that may no longer be extant at a given location and this likely leads to an overestimation of development impacts on special- status species in this EIR. Conversely, the CNDDB records are limited to those voluntarily reported and do not represent a comprehensive inventory of special-status species in an area. Tables K-1a through K-1d in Appendix K summarize the number of documented special-status-species occurrences that overlap land use growth footprints, as well as proposed transportation projects, that could affect special-status plant and/or wildlife species based on the GIS analysis. While less development is expected to occur outside TPAs, it would have the same general types of impacts. However, when situated in more rural areas where habitat is generally less degraded than in heavily urbanized areas, new development could have a greater effect relative to baseline conditions than would development in TPAs. For example, species and habitats within existing urban/commercial areas are generally already subject to higher levels of existing disturbances and habitat degradation than resources in more rural areas.

Impacts of Changes in Projected Land Use

As described in Section 1.2, "Project Description," growth forecasts for the Bay Area project that by 2040 the region will support an additional 2.1 million residents and 688,000 jobs, resulting in 666,000 new households. The proposed Plan calls for focused housing and job growth concentrated primarily in already urbanized areas and along existing transit corridors. As shown in Table 1.2-8 in Section 1.2, "Project Description," the land use growth footprint covers 18,700 acres of land in the Bay Area. Within that area 7,400, or approximately 40 percent of the land use growth footprint would be located in TPAs. In addition, the proposed Plan identifies Priority Conservation Areas (PCAs), which are regionally significant open space areas for which there is broad consensus regarding long-term protection but which face development pressures in the near-term. Protection of PCAs, if implemented in the future, could expand the regional greenbelt, protecting agricultural interests and wildlands that support special-status plants and wildlife. Nonetheless, implementation of the land use development pattern under the proposed Plan could result in regional impacts on special-status species. Approximately 84 percent of the land use growth footprints would occur in proximity to known special-status species occurrences (based on CNDDB data; **Table K-2** in Appendix K). Approximately 69 percent of these land use growth footprints are located in Alameda, Santa Clara, and San Francisco counties. Potential regional effects on special-status species could occur as a result of habitat fragmentation, increased human intrusion into wildland areas, introduction of invasive species, disruption of migratory corridors, and a resulting regional reduction in biological diversity.

Potential localized effects on special-status species include the temporary and permanent removal or conversion of vegetation and habitat necessary for species breeding, feeding, dispersal, or sheltering. Construction and/or ongoing operations could result in direct mortality of special-status plants and wildlife,

[7] California Natural Diversity Database, 2017; United States Fish and Wildlife Service, 2012; NMFS, 2005.

entrapment in open trenches, and general disturbance because of noise or vibration during pile- driving, earthmoving, and other construction activities. Construction-generated fugitive dust accumulation on surrounding vegetation and construction-related erosion, runoff, and sedimentation could degrade the quality of adjacent vegetation communities, affecting their ability to support special-status plants and wildlife. Habitat fragmentation and disruption of migratory corridors, could also occur on a local level, potentially affecting local populations by making them more vulnerable to extirpation.

Because land use changes under the proposed Plan could result in the disturbance or loss of special-status plant and wildlife species and habitats, this impact is considered potentially significant (PS).

Impacts of Transportation Projects

The implementation of proposed transportation projects would incrementally affect adjacent wetlands, woodlands, shrublands, and grasslands, as well as associated plant and wildlife species. Because the proposed transportation projects are mainly concentrated along existing transportation corridors, where existing conditions in adjacent habitat areas typically represent the result of past and ongoing disturbance, regional habitat loss and fragmentation is expected to be lower than if projects were entirely new construction or sited in previously undeveloped areas. Nonetheless, of the 196 individual transportation projects with mapped footprints in the Plan area, 174 (89 percent) were identified as occurring in proximity to known special-status species occurrences (based on CNDDB data; **Table K-3**). Approximately 87 percent of these projects are located in Alameda, Contra Costa, Santa Clara, San Mateo, and San Francisco counties. Additionally, these and other transportation projects could contribute to regional and local habitat loss and fragmentation.

Long-term increases in the volume of vehicular traffic and major expansions of existing roads or development of new roads in rural areas are expected to result in increased vehicle-related wildlife mortalities and injuries of common and special-status wildlife species. This effect would be most pronounced in rural areas, where roads traverse larger expanses of natural habitats.

Because the proposed Plan transportation projects may result in the disturbance or loss of special-status plant and wildlife species and habitats, this impact is considered potentially significant (PS).

Conclusion

Impacts of forecasted development and transportation projects, particularly with respect to habitat loss and degradation, would result in impacts on special-status species. Because the proposed Plan could result in the disturbance or loss of special-status plant and wildlife species and habitats, this impact is considered **potentially significant (PS)**. Mitigation Measure 2.9-1(a) addresses this impact is described below.

Mitigation Measures

2.9-1(a) Implementing agencies shall require project sponsors to prepare biological resource assessments for specific projects proposed in areas containing, or likely to contain, habitat for special-status plants and wildlife. The assessment shall be conducted by qualified professionals pursuant to adopted protocols and agency guidelines. Where the biological resource assessments establish that mitigation is required to avoid direct and indirect adverse effects on special-status plant and wildlife species, or compensate for unavoidable effects, mitigation shall be developed consistent with the requirements of CEQA, USFWS, CDFW, and local regulations and guidelines, in addition to requirements of any applicable and adopted HCP/NCCP or other applicable plans developed to protect species or habitat. Implementing agencies and/or project sponsors shall implement measures, where feasible and necessary based on project- and site-specific considerations that include, but are not limited to:

- In support of CEQA, NEPA, CDFW, and USFWS review and permitting processes for individual proposed Plan projects, pre-project biological surveys shall be conducted as part of the environmental review process to determine the presence and extent of sensitive habitats and/or species in the project vicinity. Surveys shall follow established methods and shall be conducted at times when the subject species is most likely to be identified. In cases where impacts to state- or federally-listed plant or wildlife species are possible, formal

protocol-level surveys may be required on a species-by-species basis to determine the local distribution of these species. Coordination with the USFWS and/or CDFW shall be conducted early in the planning process at an informal level for projects that could adversely affect federal or state candidate, proposed, threatened, or endangered species to determine the need for consultation or permitting actions. Projects shall obtain incidental take authorization from the permitting agencies as required before project implementation.

- Project designs shall be reconfigured, whenever practicable, to avoid special-status species and sensitive habitats. Projects shall minimize ground disturbances and transportation project footprints near sensitive areas to the extent practicable.

- Project activities in the vicinity of sensitive resources shall be completed during the period that best avoids disturbance to plant and wildlife species present to the extent feasible.

- Individual projects shall minimize the use of in-water construction methods in areas that support sensitive aquatic species, especially when listed species could be present.

- In the event that equipment needs to operate in any watercourse with flowing or standing water where special-status species may be affected, a qualified biological resource monitor shall be present to alert construction crews to the possible presence of such special-status species.

- If project activities involve pile driving or vibratory hammering in or near water, interim hydroacoustic threshold criteria for protected fish species shall be adopted as set forth by the Interagency Fisheries Hydroacoustic Working Group, as well as other avoidance methods to reduce the adverse effects of construction to sensitive fish, piscivorous birds, and marine mammal species.

- Construction shall not occur during the breeding season near riparian habitat, freshwater marshlands, and salt marsh habitats that support nesting bird species protected under the Endangered Species Act, Migratory Bird Treaty Act, or California Fish and Game Code (e.g., yellow warbler, tricolored blackbird, Ridgway's rail, etc.).

- A qualified biologist shall locate and fence off sensitive resources before construction activities begin and, where required, shall inspect areas to ensure that barrier fencing, stakes, and setback buffers are maintained during construction.

- For work sites located adjacent to special-status plant or wildlife populations, a biological resource education program shall be provided for construction crews and contractors (primarily crew and construction foremen) before construction activities begin.

- Biological monitoring shall be considered for areas near identified habitat for federal- and state-listed species, and a "no take" approach shall be taken whenever feasible during construction near special-status plant and wildlife species.

- Efforts shall be made to minimize the adverse effects of light and noise on listed and sensitive wildlife.

- Project activities shall comply with existing local regulations and policies, including applicable HCP/NCCPs, that exceed or reasonably replace any of the above measures protective of special-status species.

- Compensatory mitigation for unavoidable loss of habitat or other impacts to special-status species may be achieved in advance of impacts through the purchase or creation of mitigation credits or the implementation of mitigation projects through Regional Advance Mitigation Planning (RAMP), as deemed appropriate by the permitting agencies.

Significance after Mitigation

To the extent that an individual project adopts and implements all feasible mitigation measures described above, the impact would be less than significant with mitigation (LS-M) because these mitigation measures

would require pre-project surveys and biological monitoring, avoidance or minimization of project-related disturbance or loss of special-status species, and coordination with permitting agencies as required prior to project implementation.

Projects taking advantage of CEQA Streamlining provisions of SB 375 (Public Resources sections 21155.1, 21155.2, and 21159.28) must apply the mitigation measures described above, to address site-specific conditions. However, MTC/ABAG cannot require local implementing agencies to adopt the above mitigation measures, and it is ultimately the responsibility of a lead agency to determine and adopt mitigation. Therefore, this impact remains **significant and unavoidable (SU)** for purposes of this program-level review.

Impact 2.9-1b: Implementation of the proposed Plan could have substantial adverse impacts on designated critical habitat for federally listed plant and wildlife species.

Impacts of Changes in Projected Land Use

As shown in **Table K-4** in Appendix K, land use growth footprints within the Plan area overlap with areas that are designated by the USFWS as critical habitat for 10 federally listed species. Critical habitat for most species occurs within local units distributed throughout the region. Thus, were local impacts to occur, they could potentially aggregate to produce region-wide effects on the amount and quality of critical habitat. The majority of potential impacts are related to critical habitat for California tiger salamander on the Santa Rosa Plain in Sonoma County, California red-legged frog in Alameda County, and Delta smelt in Contra Costa and Solano Counties. Development could also potentially affect smaller amounts of critical habitat for several other species, including bay checkerspot butterfly, Contra Costa goldfields, vernal pool tadpole shrimp, and vernal pool fairy shrimp in Alameda, Santa Clara, and Solano counties. In addition, **Table K-4** in Appendix K shows that development located primarily in Santa Clara, Napa, Marin, and Sonoma counties could potentially affect critical habitat designated by NMFS for Central Coast steelhead. For projects with a federal nexus (i.e., federal involvement such as funding, approval, or permitting), Section 7(a)(2) of the ESA requires federal agencies to consult with USFWS and NMFS to ensure that they are not undertaking, funding, permitting, or authorizing actions likely to adversely modify designated critical habitat. Some examples of actions with a federal nexus are as follows: actions on federal land; actions that require a federal permit (such as a Clean Water Act Section 404 permit); actions that require a federal license; and actions using federal funds. Projects without a federal nexus may affect critical habitat and these effects could aggregate to significant levels under CEQA when considered on a regional basis.

As noted under the Method of Analysis, above, the GIS-based analysis overestimates the acreage of critical habitat likely to be affected, because it simply represents the intersection of areas where species are, or have been, present and areas where development is likely to occur. Because the analysis is at a programmatic level and necessarily very coarse-grained, the actual acreage anticipated to be affected by future development projects would likely be less than indicated in the tables, because of the potential absence of species and/or habitat from specific development sites.

Impacts on critical habitat could include temporary or permanent habitat loss. Degradation of areas that have high conservation value for these species could also occur in association with proposed Plan development, where such development occurs within or adjacent to critical habitat, through the introduction of night lighting, increases in ambient noise levels, and the introduction of invasive species and predators. Plan development could also result in the introduction of, or increases in, additional vehicular or recreational pressures in areas designated as critical habitat where they do not currently exist. Potential impacts on salmonid critical habitat could include stream degradation in association with increased impervious surfaces and surface runoff, decreases in water quality because of increased point source pollution, and erosion and sedimentation during construction.

Because the land use changes and development under the proposed Plan may result in the loss or degradation of designated critical habitat for federally-listed plant and wildlife species, this impact is considered potentially significant (PS).

Impacts of Transportation Projects

A total of 54 transportation projects included in the proposed Plan intersect areas that are designated by the USFWS as critical habitat for federally listed species (see **Table K-5**). As noted in the land use discussion above, critical habitat for some species occurs within local units distributed throughout the region and therefore local impacts could potentially combine to produce regional effects. The majority of potential impacts are related to critical habitat for California red-legged frog, California tiger salamander and Delta smelt. Impacts would occur primarily in Contra Costa County. Transportation projects could also potentially impact smaller amounts of critical habitat for several other species, including Alameda whipsnake, Contra Costa goldfields, vernal pool tadpole shrimp, and vernal pool fairy shrimp in Alameda, Santa Clara, San Mateo, Napa, Sonoma, and Solano Counties. In addition, implementation of nearly 33 transportation projects region-wide could potentially impact critical habitat designated by NMFS for Central Coast steelhead.

Potential effects of transportation projects on designated critical habitat are generally similar to those described above for development under the proposed Plan. In this case, most impacts to critical habitat for terrestrial species would occur in association with widening (or otherwise expanding) roads that are currently on the boundary of, or that traverse, critical habitat into the critical habitat unit. Potential impacts on salmonid habitat include numerous creek and stream crossings that are not expected to impede fish passage or reduce the critical habitat acreage, but which may have temporary, indirect adverse impacts to aquatic habitat if projects result in increased sedimentation or other fill into these waters during construction activities.

Because the proposed transportation projects may result in permanent and/or temporary disturbance or loss of designated critical habitat for federally-listed plant and wildlife species, this impact is considered potentially significant (PS).

Conclusion

Localized impacts of development and transportation projects, particularly with respect to habitat loss and degradation, could adversely affect critical habitat for one or more species on a regional scale. Because the proposed Plan projects may result in the disturbance or loss of critical habitat, this impact is considered **potentially significant (PS)**. Mitigation Measure 2.9-1(b) addresses this impact and is described below.

Mitigation Measures

2.9-1(b) Implementing agencies and/or project sponsors shall implement measures, where feasible and necessary based on project- and site-specific considerations that include, but are not limited to:

- Coordination with the USFWS and/or NMFS shall be conducted early in the environmental review process to determine the need for further mitigation, consultation, or permitting actions. Formal consultation is required for any project with a federal nexus when a species is likely to be adversely affected.

- Reconfigure project designs to avoid or minimize adverse effects on protected species within designated critical habitats.

- Compliance with existing local regulations and policies, including applicable HCP/NCCPs.

- Additionally, implementation of Mitigation Measure 2.9-1(a), above, which includes an initial biological resource assessment and, if necessary, compensatory mitigation for unavoidable loss of habitat or other impacts to special-status species. Compensatory mitigation may be achieved in advance of impacts through the purchase or creation of mitigation credits or the implementation of mitigation projects through Regional Advance Mitigation Planning (RAMP), as deemed appropriate by the permitting agencies.

Significance after Mitigation

To the extent that an individual project adopts and implements all feasible mitigation measures described above, the impact would be less than significant with mitigation (LS-M). These mitigation measures would require coordination or consultation with USFWS and/or NMFS for projects that could adversely affect critical

habitat, avoidance or minimization of adverse effects on protected species within critical habitats, and compliance with applicable regulations and policies that protect critical habitat.

Projects taking advantage of CEQA Streamlining provisions of SB 375 (Public Resources sections 21155.1, 21155.2, and 21159.28) must apply the mitigation measures described above, to address site-specific conditions. Further, because the measures are tied to existing regulations that are law and binding on responsible agencies and project sponsors, it is reasonable to determine that they would be implemented. Therefore, with the incorporation of Mitigation Measure 2.9(b), this impact would be **less than significant with mitigation (LS-M)**.

Impact 2.9-2: Implementation of the proposed Plan could have a substantial adverse effect on riparian habitat, federally protected wetlands as defined by Section 404 of the Clean Water Act (including but not limited to marsh, vernal pool, coastal), or other sensitive natural communities identified in local or regional plans, policies, or regulations, or by the California Department of Fish and Wildlife or U.S. Fish and Wildlife Service, through direct removal, filling, hydrological interruption, or other means.

Impacts of Changes in Projected Land Use

Tables K-6 and K-7 in Appendix K summarize the potential impacts that development within land use growth footprints could have on jurisdictional waters, including wetlands, "other waters" (e.g., streams, rivers, lakes, San Francisco Bay), and riparian habitat, based on National Wetland Inventory (NWI) mapping (NWI 2016). Approximately three percent of the land use growth footprint, located primarily in Alameda, Contra Costa, Santa Clara, and San Mateo Counties, was identified where future forecasted development could have the potential to directly or indirectly affect wetlands and other waters (**Table K-6** in Appendix K). The majority of potentially affected wetlands were associated with estuarine and marine deepwater habitats around San Francisco Bay and the Carquinez Strait, or freshwater emergent wetlands and freshwater ponds in a variety of locations. The jurisdictional waters impact summaries in these tables were developed using a GIS-based analysis that compared proximity of land use growth footprints to existing NWI-mapped wetland features, where the land use growth footprint either intersects, bridges, or could otherwise affect jurisdictional waters. Because the analysis examined only mapped streams and wetlands, numerous smaller features not included in the NWI mapping that could be affected are not reflected. Conversely, proximity of a land use growth footprint to jurisdictional waters provides only a coarse indicator of actual impacts.

Potential impacts on wetlands include the temporary disturbance, or permanent loss, of jurisdictional waters, including wetlands; loss or degradation of stream or wetland function; incremental degradation of wetland habitats; and fragmentation of streams and wetlands. Jurisdictional waters in the region vary from relatively small, isolated roadside areas, wet meadows, and vernal pools to major streams and rivers, bays and estuaries, to tidal, brackish, and freshwater marshes. Any fill of jurisdictional waters associated with proposed land development would be considered a significant impact.

In addition to direct habitat loss, implementation of forecasted development under the proposed Plan could increase the potential for stormwater runoff to carry a variety of pollutants into wetlands, rivers, streams, and San Francisco Bay through increases in impervious surfaces. Construction runoff often carries grease, oil, and heavy metals (because of ground disturbance) into natural drainages. Furthermore, particulate materials generated by construction could be carried by runoff into natural waterways and could increase sedimentation impacts. In accordance with USACE, EPA, USFWS, RWQCB, and CDFW guidelines, a goal of "no net loss" of wetland acreage and value is required, wherever possible, through avoidance of the resource. Where avoidance is not possible, mitigation for wetland impacts would be based on project-specific wetland mitigation plans, subject to approval by the USACE, RWQCB, CDFW, and the BCDC and CCC where applicable.

Table 2.9-2 summarizes the potential impacts that forecasted development within land use growth footprints could have on jurisdictional waters, including wetlands, "other waters" (e.g., streams, rivers, lakes, San Francisco Bay), and riparian habitat.

Table 2.9-2 Acreages of Mapped NWI-Mapped Wetland Features Within Land Use Growth Footprints, by Region, County, and TPAs

		Estuarine and Marine Deepwater	Estuarine and Marine Wetland	Freshwater Emergent Wetland	Freshwater Forested/ Shrub Wetland	Freshwater Pond	Lake	Riverine
Alameda	County Total	5	2	7	3	1		9
	Within TPAs	4	1	3		<1		5
Contra Costa	County Total	<1	30	20	10	9		20
	Within TPAs	<1	2		<1			3
Marin	County Total	<1	<1			1		2
	Within TPAs	<1						<1
Napa	County Total				<1			10
	Within TPAs							
San Francisco	County Total	5	1			5		
	Within TPAs	3	1			5		
San Mateo	County Total	5	9	3	<1	9	<1	4
	Within TPAs	<1	<1	<1		2		2
Santa Clara	County Total		6	10	7	10		10
	Within TPAs		6	8	5	3		2
Solano	County Total	<1	<1	6	2	6		10
	Within TPAs							
Sonoma	County Total	<1		<1	1	<1		4
	Within TPAs	<1						<1
Regional Total	**County Total**	***20***	***50***	***50***	***30***	***40***	***<1***	***80***
	Within TPAs	***8***	***10***	***10***	***5***	***10***		***10***

Note: Numbers less than 1 are shown as "<1"; Whole numbers have been rounded (between 0 and 10 to the nearest whole number, between 11 and 999 to the nearest 10).

Source: NWI 2016

In accordance with USACE, EPA, USFWS, RWQCB, and CDFW guidelines, a standard of "no net loss" of wetland acreage and value is required, wherever possible, through avoidance of the resource. Where avoidance is not possible, mitigation for wetland impacts would be based on project-specific wetland mitigation plans, subject to approval by USACE, RWQCB, CDFW, BCDC, and CCC where applicable. Impacts on jurisdictional waters could be potentially significant (PS).

Impacts of Transportation Projects

Table K-8 in Appendix K summarizes the potential impacts proposed transportation projects could have on jurisdictional waters, including wetlands, "other waters" (e.g., streams, rivers, lakes, San Francisco Bay), and riparian habitat. Based on the comprehensive project list, 106 transportation projects were identified that could have the potential to directly or indirectly affect wetlands and other waters. As described above, the jurisdictional waters impact summaries in the tables were developed using a GIS-based analysis that compared transportation project proximity to existing NWI-mapped wetland features, where the project either intersects, bridges, or could otherwise affect jurisdictional waters. Because the analysis examined only mapped streams and wetlands, numerous smaller features not included in the NWI mapping that could be affected are not reflected. Conversely, proximity of a transportation project to jurisdictional waters provides only a coarse indicator of actual impacts.

Potential transportation project effects are similar to those discussed above for land use changes and development. In accordance with USACE, EPA, USFWS, RWQCB, CDFW guidelines, a standard of "no net loss" of wetland acreage and value is required, wherever possible, through avoidance of the resource. Where avoidance is not possible, mitigation for wetland impacts would be based on project-specific wetland mitigation plans, subject to approval by the USACE, RWQCB, CDFW, and potentially CCC, and BCDC. Impacts on jurisdictional waters resulting from implementation of transportation projects would be potentially significant (PS).

Conclusion

As discussed above, projected development and implementation of transportation projects have the potential to affect jurisdictional waters and other sensitive habitats. The effects of land development and transportation projects increase the potential for impacts to jurisdictional waters throughout the region, resulting in a **potentially significant (PS)** impact. Mitigation Measure 2.9-2 addresses this impact and is discussed below.

Mitigation Measures

Implementing agencies and/or project sponsors shall implement measures, where feasible and necessary based on project- and site-specific considerations that include, but are not limited to:

2.9-2 Mitigation measures that shall be considered by implementing agencies and/or project sponsors based on project-and site-specific considerations include, but are not limited to:

- Implementing agencies shall require project sponsors to prepare biological resource assessments for specific projects proposed in areas containing, or likely to contain, jurisdictional waters and/or other sensitive or special-status communities. These assessments shall be conducted by qualified professionals in accordance with agency guidelines and standards.

- In keeping with the "no net loss" policy for wetlands and other waters, project designs shall be configured, whenever possible, to avoid wetlands and other waters and avoid disturbances to wetlands and riparian corridors to preserve both the habitat and the overall ecological functions of these areas. Projects shall minimize ground disturbances and transportation project footprints near such areas to the extent practicable.

- Where avoidance of jurisdictional waters is not feasible, project sponsors shall minimize fill and the use of in-water construction methods, and place fill only with express permit approval from the appropriate resources agencies (e.g., USACE, RWQCB, CDFW, BCDC, and CCC) and in accordance with applicable existing regulations, such as the Clean Water Act or local stream protection ordinances.

- Project sponsors shall arrange for compensatory mitigation in the form of mitigation bank credits, on-site or off-site enhancement of existing waters or wetland creation in accordance with applicable existing regulations and subject to approval by the USACE, RWQCB, CDFW, BCDC, and CCC. If compensatory mitigation is required by the implementing agency, the project sponsor shall develop a restoration and monitoring plan that describes how compensatory mitigation will be achieved, implemented, maintained, and monitored. At a minimum, the restoration and monitoring plan shall include clear goals and objectives, success criteria, specifics on restoration/creation/enhancement (plant palette, soils, irrigation, etc.), specific monitoring periods and reporting guidelines, and a maintenance plan. The following minimum performance standards (or other standards as required by the permitting agencies) shall apply to any wetland compensatory mitigation:

    - Compensation shall be provided at a minimum 1:1 ratio for restoration and preservation, but shall in all cases be consistent with mitigation ratios set forth in locally applicable plans (e.g., general plans, HCP/NCCPs, etc.), or in project-specific permitting documentation. Compensatory mitigation may be a combination of onsite restoration/creation/enhancement or offsite restoration, preservation, and/or enhancement. Compensatory mitigation may be achieved in advance of impacts through the purchase

or creation of mitigation credits or the implementation of mitigation projects through Regional Advance Mitigation Planning (RAMP), as deemed appropriate by the permitting agencies.

- In general, any compensatory mitigation shall be monitored for a minimum of five years and will be considered successful when at least 75 percent cover (or other percent cover considered appropriate for the vegetation type) of installed vegetation has become successfully established.

- In accordance with CDFW guidelines and other instruments protective of sensitive or special- status natural communities, project sponsors shall avoid and minimize impacts on sensitive natural communities when designing and permitting projects. Where applicable, projects shall conform to the provisions of special area management or restoration plans, such as the Suisun Marsh Protection Plan or the East Contra Costa County HCP, which outline specific measures to protect sensitive vegetation communities.

- If any portion of a special-status natural community is permanently removed or temporarily disturbed, the project sponsor shall compensate for the loss. If such mitigation is required by the implementing agency, the project sponsor shall develop a restoration and monitoring plan that describes how compensatory mitigation will be achieved, implemented, maintained, and monitored. At a minimum, the restoration and monitoring plan shall include clear goals and objectives, success criteria, specifics on restoration/creation/ enhancement (plant palette, soils, irrigation, etc.), specific monitoring periods and reporting guidelines, and a maintenance plan. The following minimum performance standards (or other standards as required by the permitting agencies) shall apply to any compensatory mitigation for special-status natural communities:

  - Compensation shall be provided at a minimum 1:1 ratio for restoration and preservation, but shall in all cases be consistent with mitigation ratios set forth in locally applicable plans (e.g., general plans, HCP/NCCPs, etc.) or in project-specific permitting documentation. Compensatory mitigation may be a combination of onsite restoration/creation/enhancement or offsite restoration, preservation, and/or enhancement. Compensatory mitigation may be achieved in advance of impacts through the purchase or creation of mitigation credits or the implementation of mitigation projects through Regional Advance Mitigation Planning (RAMP), as deemed appropriate by the permitting agencies.

  - In general, any compensatory mitigation shall be monitored for a minimum of five years and will be considered successful when at least 75 percent cover (or other percent cover considered appropriate for the vegetation type) of installed vegetation has become successfully established.

- Compliance with existing local regulations and policies, including applicable HCP/NCCPs. that exceed or reasonably replace any of the above measures protective of jurisdictional wetlands or special-status natural communities.

Significance after Mitigation

To the extent that an individual project adopts and implements all feasible mitigation measures described above, the impact would be less than significant with mitigation (LS-M). These measures would require that sensitive habitat be avoided to the extent feasible and that sensitive habitats that cannot be avoided are restored following construction, or if the habitat cannot be restored, that the project proponent compensates for unavoidable losses in a manner that results in no net loss of sensitive habitats and meets applicable regulatory requirements. Projects taking advantage of CEQA Streamlining provisions of SB 375 (Public Resources sections 21155.1, 21155.2, and 21159.28) must apply the mitigation measures described above, to address site-specific conditions. However, MTC/ABAG cannot require local implementing agencies to adopt the above mitigation measures, and it is ultimately the responsibility of a lead agency to determine and adopt mitigation. Therefore, this impact remains **significant and unavoidable (SU)** for purposes of this program-level review.

Impact 2.9-3: Implementation of the proposed Plan could interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridor, or impede the use of native wildlife nursery sites.

Impacts of Changes in Projected Land Use

As discussed in the Environmental Setting section, the Bay Area encompasses large areas of wildlands that provide habitat for both common and rare plants and wildlife and some of these areas were mapped as Essential Connectivity Areas (ECAs). The ECAs are not regulatory delineations but are identified as lands likely important to wildlife movement between large, mostly natural areas at the statewide level. ECAs were mapped on a state-wide level and should be considered coarse-scale areas that can inform land-planning efforts, but that should eventually be replaced by more detailed linkage designs, developed at finer resolution at the regional and ultimately local scale based on the needs of particular species and ecological processes. As seen in **Figure 2.9-9**, a total of 13 ECAs occur within the nine Bay Area counties and are typically centered along the region's mountain ranges. These areas are composed primarily of wildlands, but may also include some agricultural and developed areas (mostly rural residential) and many are bisected by major roadways.

Land use growth footprints in the Plan area overlap with approximately 1,040 acres of mapped ECAs, primarily in Santa Clara (550 acres), Napa (120 acres), and Alameda Counties (120 acres) (**Table K-9** in Appendix K). However, these land use growth footprints are located primarily in already urbanized corridors along major highways or other existing transportation routes where migratory corridors have already been fragmented and degraded to the point that their function as linkages is either limited or lost entirely. On a local level, areas including waterways, riparian corridors, and contiguous or semi-contiguous expanses of habitat, are likely to facilitate wildlife movement, even through urbanized areas throughout the region. In some cases, development projects may directly encroach on wildlife corridors, particularly when direct habitat removal occurs or when sites are located adjacent to open space or streams. Substantial encroachment on local wildlife corridors would be considered a potentially significant (PS) impact.

Impacts of Transportation Projects

Transportation projects could result in impacts on ECAs because of roadway and rail expansions in Napa, Sonoma, Solano, Contra Costa, Alameda, San Mateo, and Santa Clara counties. Transportation projects in the Plan area overlap with approximately 1,930 acres of mapped ECAs. The majority of potential effects would occur in Solano, Alameda, and Santa Clara counties. However, many of these transportation projects are expansions or enhancements of existing highways or other transportation routes with existing urban corridors established along them. In these areas, migratory corridors have already been fragmented and degraded to the point that their function as linkages is either limited or has been lost entirely.

As noted above, ECAs were mapped at the statewide level and further analysis is required on a regional and local level to identify landscape linkages at a finer scale more relevant to planning and identifying potential localized impacts. On a local level, areas including waterways, riparian corridors, and contiguous or semi-contiguous expanses of habitat, are likely to facilitate wildlife movement, even through urbanized areas throughout the region. As discussed for projected land development within land use growth footprints, proposed transportation projects may directly encroach on local wildlife corridors, particularly when direct habitat removal occurs or when sites are located adjacent to open space or streams. Substantial encroachment on local wildlife corridors would be considered a potentially significant (PS) impact.

Conclusion

Effects of land use changes and localized effects of both land and transportation development are considered potentially significant when considered separately and, therefore, this is considered **potentially significant (PS)**. Mitigation Measure 2.9-3 provides measures for the protection of special-status communities.

Mitigation Measures

2.9-3 Implementing agencies shall require project sponsors to prepare detailed analyses for specific projects affecting ECA lands to determine what wildlife species may use these areas and what habitats those species

require. Projects that would not affect ECA lands but that are located within or adjacent to open lands, including wildlands and agricultural lands, shall also assess whether or not significant wildlife corridors are present, what wildlife species may use them, and what habitat those species require. The assessment shall be conducted by qualified professionals and according to applicable agency standards.

Implementing agencies and/or project sponsors shall implement measures, where feasible and necessary based on project- and site-specific considerations that include, but are not limited to:

- constructing wildlife friendly overpasses and culverts;
- fencing major transportation corridors in the vicinity of identified wildlife corridors;
- using wildlife-friendly fences that allow larger wildlife such as deer to get over, and smaller wildlife to go under;
- limiting wildland conversions in identified wildlife corridors;
- retaining wildlife-friendly vegetation in and around developments; and
- complying with existing local regulations and policies, including applicable HCP/NCCPs, that exceed or reasonably replace any of the above measures to protect wildlife corridors.

Significance after Mitigation

To the extent that an individual project adopts and implements all feasible mitigation measures described above, the impact would be less than significant with mitigation (LS-M). These mitigation measures would require assessments of whether significant wildlife corridors are present in project areas, minimizing wildland conversions in identified wildlife corridors, implementing wildlife-friendly design features, and compliance with regulations and policies to protect wildlife corridors.

Projects taking advantage of CEQA Streamlining provisions of SB 375 (Public Resources sections 21155.1, 21155.2, and 21159.28) must apply the mitigation measures described above, to address site-specific conditions. However, MTC/ABAG cannot require local implementing agencies to adopt the above mitigation measures, and it is ultimately the responsibility of a lead agency to determine and adopt mitigation. Therefore, this impact remains **significant and unavoidable (SU)** for purposes of this program-level review.

Impact 2.9-4: Implementation of the proposed Plan could conflict with adopted local conservation policies, such as a tree protection ordinance, or resource protection and conservation plans, such as a Habitat Conservation Plan (HCP), Natural Community Conservation Plan (NCCP), or other adopted local, regional, or state habitat conservation plans.

Impacts of Changes in Projected Land Use

Local Ordinances

Most counties and cities in the region have local ordinances and policies in place that protect native and non-native trees in urban landscapes, as well as in unincorporated county lands. These ordinances and policies vary in their definitions of protected trees (e.g., certain species, minimum diameter at breast height [dbh], trees that form riparian corridors) and in the requirements for ordinance or policy compliance. Land use changes and development could result in removal of trees that are protected by local policies or ordinances. Implementation of the proposed Plan development and transportation projects have potential to conflict with other local policies or ordinances that protect locally significant biological resources, such as creek or wetland protection ordinances. However, for most development projects, ground disturbances would occur within urban areas, existing or likely future transportation corridors, and existing subdivisions. Because ground disturbances would be limited mostly to these existing disturbed areas, the potential removal of native trees and disturbances to other biological resources protected by local policies or ordinances are expected to be moderated.

All future development projects would be required to follow city and county development requirements, including compliance with local policies, ordinances, and applicable permitting procedures related to protection biological resources. Additionally, project-level planning, environmental analysis, and compliance with existing local regulations and policies would identify potentially significant tree removal or other potential conflicts with local policies; minimize or avoid those impacts through the design, siting, and permitting process; and provide mitigation for any significant effects as a condition of project approval and permitting. Therefore, the potential for approved development projects to conflict with local policies or ordinances protecting biological resources is considered less than significant (LS).

HCPs and Other Approved Plans

The San Bruno Mountain Area Habitat Conservation Plan (County of San Mateo 1982) was adopted by the County of San Mateo and the Cities of Brisbane, Daly City, and South San Francisco in 1982— however, no projects under the proposed Plan are located on lands covered under this HCP. Projects under the proposed Plan would occur on lands covered by several other adopted plans, as well as plans pending formal adoption, within the region. The East Contra Costa County Habitat Conservation Plan and Natural Community Conservation Plan (ECCC HCP/NCCP; ECCC HCPA 2006) was adopted by Contra Costa County and the Cities of Brentwood, Clayton, Oakley, and Pittsburg and went into effect in 2008. Some of the proposed Plan's land use growth footprint is located within the ECCC HCP/NCP urban development areas. Development within ECCC HCP/NCCP urban development areas, generally defined as the County urban limit line is a "covered activity." The Santa Clara Valley Habitat Plan (SCVHP; County of Santa Clara et al. 2012) was approved and adopted in 2013 by the County of Santa Clara, the Santa Clara Valley Transportation Authority, the Santa Clara Valley Water District, and the Cities of San Jose, Gilroy, and Morgan Hill. Development within TPAs and in the land use growth footprint under the proposed Plan in Santa Clara County may qualify for coverage under the SCVHP. The Santa Rosa Plain Conservation Strategy (USFWS 2005) and the East Alameda County Conservation Strategy (EACCSSC 2010) have not yet been adopted by their local agency partners, but nonetheless influence projects requiring Section 7 or 10 consultation under the FESA within their boundaries. Programmatic Biological Opinions have been issued in each case that guide the development of avoidance and minimization measures for projects within areas covered by each Conservation Strategy, as well as compensatory mitigation measures. Finally, several projects occur within the California Coastal Zone and are subject to the requirements of Local Coastal Plans.

Projects in the proposed Plan that fall within the ECCC HCP/NCCP and SCVHP boundaries must demonstrate consistency with the HCP/NCCP. For example, sponsors of covered projects are required to comply with the ECCC HCP/NCCP mitigation measures. For the ECCC HCP/NCCP, covered projects must submit a complete HCP/NCCP application package, submit required fees, fulfill the appropriate HCP survey requirements for wildlife, plants, wetland, and sensitive habitats, and comply with all applicable Conservation Measures, outlined in Chapter 6 of the HCP. Activities that are not covered under that plan, as well as other projects elsewhere in the region where plans are underway or have not yet formally been adopted must pursue individual project permitting for impacts to biological resources until such time as the specific activity/project is identified as a covered activity in an applicable plan. Typically, once a plan or conservation strategy has been developed for an area, wetland and wildlife agency permitting conditions and requirements for projects within that area will be consistent with that plan or strategy whether or not it has been adopted, as is the case for projects in the Santa Rosa Plain, for example. Because consistency with an adopted HCP or other conservation plan is a legal requirement, and because the design, approval, and permitting of future development projects within an area covered by an HCP or other conservation plan are intended and expected to comply with that requirement, the proposed land use impacts related to potential conflicts with the provisions of adopted HCPs, NCCPs, or other approved local, regional, or state habitat conservation plans is less than significant (LS).

Impacts of Transportation Projects

Local Ordinances and HCPS and Other Approved Plans

The discussions above under "Impacts of Changes in Projected Land Use" describe the potential impacts related to conflicts with local policies or ordinances protecting biological resources and to conflicts with Bay

Area HCPs and Conservation Strategies. These impacts are generally similar to those that could result from implementation of transportation projects (e.g., tree removal). Therefore, the land use change analyses also apply to transportation projects and impacts related to conflicts with local policies or ordinances protecting biological resources are considered less than significant (LS), for the same reasons discussed above for changes in projected land use.

Similarly, impacts related to potential conflicts of transportation projects with HCPs and Conservation Strategies are considered less than significant (LS), for the same reasons discussed above for changes in land use.

Conclusion

As discussed above, future development and transportation projects would be required to follow city and county development requirements, including compliance with local policies, ordinances, and applicable permitting procedures related to protection biological resources. Additionally, consistency with an adopted HCP or other conservation plan is a legal requirement; and, the design, approval, and permitting of future development and transportation projects within an area covered by an HCP or other conservation plan are intended and expected to comply with that requirement. Therefore, the potential for approved development and transportation projects to conflict with local policies or ordinances protecting biological resources, or with the provisions of adopted HCPs, NCCPs, or other approved local, regional, or state habitat conservation plans, is considered **less than significant (LS)**. No mitigation is required.

Mitigation Measures

None required.

Impact 2.9-5: Implementation of the proposed Plan could have the potential to 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; or substantially reduce the number or restrict the range of an endangered, rare, or threatened species.

Impacts of Changes in Projected Land Use and Transportation Projects

As described in Impacts 2.9-1a, 2.9-1b, and 2.9-2, implementation of the projected development and transportation projects under the proposed Plan could adversely affect special-status species and sensitive natural communities. This is considered a **potentially significant (PS)** impact**.** Mitigation Measure 2.9-5 is discussed below.

Mitigation Measures

2.9-5 Implementing agencies and/or project sponsors shall implement mitigation measures, where feasible and necessary based on project-specific and site-specific considerations that include but are not limited to:

> Implement Mitigation Measures 2.9-1(a), 2.9-1(b), 2.9-2, and 2.9-3.

Significance after Mitigation

To the extent that an individual project adopts and implements all feasible mitigation measures described above, the impact would be less than significant with mitigation (LS-M), for the same reasons described previously for implementation of Mitigation Measures 2.9-1(a), 2.9-1(b), 2.9-2, and 2.9-3 .

Projects taking advantage of CEQA Streamlining provisions of SB 375 (Public Resources sections 21155.1, 21155.2, and 21159.28) must apply the mitigation measures described above, to address site-specific conditions. However, MTC/ABAG cannot require local implementing agencies to adopt the above mitigation measures, and it is ultimately the responsibility of a lead agency to determine and adopt mitigation. Therefore, this impact remains **significant and unavoidable (SU)** for purposes of this program-level review

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2.10 VISUAL RESOURCES

This section describes the visual resources of the Bay Area and assesses the potential of the proposed Plan to affect the region's aesthetic environment. Aesthetic value is subjective, but it is typically used as a criterion for evaluating those elements that contribute to the quality that distinguishes an area. Most communities identify scenic resources as an important asset, although what is considered "scenic" may vary according to its environmental setting. It is useful to think of scenic resources in terms of "typical views" seen throughout the Bay Area because scenic resources are rarely encountered in isolation. A typical view may include several types of scenic resources, including both natural and man-made elements. The typical views seen in the Bay Area are outlined below.

It is important to distinguish between public and private views. Private views are those views seen from privately-owned land, including views from private residences, and are typically enjoyed by individuals. Public views are experienced by the collective public. These include views of significant landscape features such as the Golden Gate Bridge or Mount Diablo, as seen from public viewing spaces, not privately-owned properties. California Environmental Quality Act (CEQA) (Pub. Resources Code, § 21000 et seq.) case law has established that only public views, not private views, need be analyzed under CEQA. For example, in *Association for Protection etc. Values v. City of Ukiah (1991) 2 Cal. App. 4th 720 [3 Cal. Rptr.2d 488]* the court determined that "we must differentiate between adverse impacts upon particular persons and adverse impacts upon the environment of persons in general. As recognized by the court in *Topanga Beach Renters Assn. v. Department of General Services (1976) 58 Cal.App.3d 188 [129 Cal. Rptr. 739]:* '[A]ll government activity has some direct or indirect adverse effect on some persons. The issue is not whether [the project] will adversely affect particular persons but whether [the project] will adversely affect the environment of persons in general'" (California Environmental Quality Act 2011). Therefore, for this analysis, only public views will be considered when analyzing the visual impacts of implementing the proposed Plan.

Notice of Preparation comments were received on this topic and included concerns with cumulative impacts to visual resources within the Sacramento-San Joaquin Delta. The cumulative discussion can be found in Section 3.2, "CEQA Required Conclusions."

2.10.1 Environmental Setting

PHYSICAL SETTING

The Bay Area is characterized by the diversity of urban development and the combination of rural and agricultural landscapes, as well as the natural beauty and wildlife provided by the surrounding mountain ranges and rich wildlife habitats. It stretches along the central northern Pacific coast of California, with several branches of the Coast Mountain Range dividing it into valleys, plains, and water bodies. The largest of these valleys contains San Francisco Bay while at the eastern edge of the region is the great Central Valley, a flat plain lying between the Coast Range and the Sierra Nevada Mountains. The hills of the Coast Range provide expansive views of the valleys and plains below, revealing a variety of development types, including urban areas along the Bay plains and inland valleys, agricultural lands, and protected open space, and natural areas.

The landscapes of the San Francisco Bay Area are varied, unique, and recognized by many in the region and beyond. The basin formed by the coastal range, East Bay Hills, and the Bay itself are prominent physical features of the region. To the west, the Pacific Ocean and the Coastal Range dominate the visual setting, stretching from Mt. Tamalpais in the north to the Santa Cruz Mountains in the south. To the east, the Diablo Range, punctuated by Mount Diablo, provides a view of a different character. In the north, the vineyards of Napa and Sonoma counties are unique and draw visitors from around the world. Many built features in the Bay Area, the Golden Gate and Bay Bridges and the San Francisco skyline in particular, are also of international renown. Bay Area residents and tourists alike value the variety and quality of the visual experiences that are

found throughout the Bay Area, including urban and rural public spaces, regional parks, and transportation corridors in the region, including heavily traveled freeways, transit lines, and ferries, and narrow country roads through secluded forests and agricultural areas. Figure 2.10-1 depicts the locations of major scenic resources found in the Bay Area. Major land use and/or transportation projects may affect the visual experiences of travelers and the distinctive visual environment of the region.

Hills and Valleys

The region contains several distinct mountain ranges and hills. Along the peninsula between the Pacific Ocean and San Francisco Bay lie the coastal hills of San Mateo, Santa Clara, and north of the Golden Gate, the hills of Marin County. The East Bay Hills rise steeply from the urbanized plain along the eastern edge of the Bay forming a several mile-wide band that also defines the western edge of the Diablo and Livermore Valleys of Contra Costa and Alameda Counties. The rolling hills of the Diablo Range separate these valleys from the lowlands of the Central Valley. These hills converge at the south end of the Bay Area in Santa Clara County. To the north, several ranges frame the Napa, Sonoma, and Cotati valleys.

Between these ranges and hills are numerous valleys, both broad and narrow. San Francisco Bay, for example, is bordered along the east and west by a narrow, heavily urbanized plain. This plain widens in the south into the Santa Clara Valley, which, until World War II, was primarily agricultural. The East Bay and coastal hills, which are visible throughout these lowlands, orient viewers and give a sense of scale to the surrounding urban areas. Likewise, to the north, the hills forming the Sonoma, Napa, and Cotati valleys enclose these agricultural areas with urban pockets.

Landmarks and Gateways

Certain features of the Bay Area stand out as symbols and points of orientation (see Figure 2.10-1). These landmarks include the Golden Gate and Bay Bridges, San Francisco skyline, several large buildings in the East Bay Hills (the Campanile on the UC Berkeley campus, the Claremont Hotel and the Mormon Temple in Oakland, for example), and Mount Saint Helena at the northern end of the Napa Valley. These landmarks help visitors and residents locate themselves within the region, and in the case of the Golden Gate Bridge, symbolize the Bay Area for the rest of the world.

Waterways

The Bay Area is home to a number of bodies of water and waterways that flow through or reside in the region. Estuaries, creeks, and man-made waterways are found throughout the region, as well as the dominant body of water, the San Francisco Bay, which reaches out to the northern and southernmost counties of the Bay Area. Most rivers and streams originating in each of the nine counties of the Bay Area flow into the San Francisco Bay, which provides access to the Pacific Ocean. There are also many smaller man-made reservoirs in the Bay Area that provide notable landscape features, as well as a few larger reservoirs, notably Lake Berryessa in Napa County and Lake Sonoma in Sonoma County.

Views from Travel Corridors

Many roadways and rail lines that intersect the landscapes of the Bay Area provide expansive, regional views of surrounding areas, often because of their wide rights-of-way, location along high points, elevation of the facilities, or a combination of these factors. Examples include Interstate (I-) 280 along the Peninsula, State Route (SR) 92 as it crosses the coastal range, I-80 near Rodeo, I-580 over the Altamont Pass and above Oakland, and the SR 24 corridor. Similarly, the rest area on I-80 above Vallejo, the west end of the Caldecott Tunnel, southbound US 101 in Marin County, and portions of US 101 in San Francisco offer dramatic views of notable Bay Area landscapes. The bridges crossing San Francisco Bay and the Carquinez Strait offer similar experiences. Both the Bay and Golden Gate Bridges provide world-famous views of San Francisco while the Richmond-San Rafael Bridge includes sweeping views of the North Bay, including Mount Tamalpais and Angel Island. The Antioch Bridge allows views over the Sacramento Delta.

Figure 2.10-1
Major Bay Area Scenic Resources

Map Data Sources: California Conservation Easement Database, 2015; California Protected Areas Database, 2016; Metropolitan Transportation Commission (MTC), 2016; Tom Tom North America, 2015.

Similarly, rail facilities (including Bay Area Rapid Transit [BART]) can provide travelers with broad views of the region or portions of it. The elevated BART lines through the East Bay, for example, provide views of the East Bay Hills and the neighborhoods of Oakland, Berkeley, and El Cerrito. The Amtrak rail lines along San Pablo Bay and the San Joaquin River also provide broad views of the water with the hills beyond.

Roads and rail lines also provide more intimate views of forested hills or narrow valleys. SR 35 (along the crest of the San Mateo Peninsula) and SR 84 (through the narrows of Niles Canyon) are examples of such views. Similarly, SR 1 and Sir Francis Drake Boulevard run through the forests and grasslands of Marin County to the beaches, parks, and open space areas along the coast, up to and through Sonoma County. SR 29 and the Silverado Trail through the Napa Valley and SR 12 through the Sonoma Valley provide dramatic views of enclosing hills, adjoining vineyards, and wineries.

Finally, while carrying only a small proportion of the region's travelers, the Bay ferries provide unique viewing experiences of the Bay area.

Views of Roads, Rail, and Buildings

Because the Bay Area contains a wide variety of densely populated metropolitan and urban centers along with more rural communities, roads, buildings, and railways are also a part of the existing aesthetic landscape. Rural and natural landscapes can also be dramatically altered by the placement of roads, rail lines, and buildings. While roads and rail lines can provide access to views for travelers, these facilities can detract from or block public views. A new or expanded roadway along a hillside can be visible from a great distance, changing the impression of the hillside for the viewer, particularly if the hillside is undeveloped. Also, new roads and rail lines are sometimes built at elevations above the level of existing development, which can overshadow nearby homes and businesses and limit views to the surrounding hills and valleys. Similarly, buildings can enhance or detract from the overall visual environment based on their design, location, and relationship to other structures and natural features.

2.10.2 Regulatory Setting

FEDERAL REGULATIONS

U.S. Department of Transportation Act, Section 4(f)

Section 4(f) of the Department of Transportation Act (DOT Act) of 1966 (49 U.S.C. § 303) was enacted to preserve the natural beauty of the countryside and public park and recreation lands, wildlife and waterfowl refuges, and historic sites. Section 4(f) requires a comprehensive evaluation of all environmental impacts resulting from federal-aid transportation projects administered by the Federal Highway Administration, Federal Transit Administration, and Federal Aviation Administration that involve the use, or interference with use, of the following types of land:

- public park lands;
- recreation areas;
- wildlife and waterfowl refuges; and
- publicly- or privately-owned historic properties of federal, state, or local significance.

This evaluation, called the Section 4(f) statement, must be sufficiently detailed to permit the U.S. Secretary of Transportation to determine that:

- there is no feasible and prudent alternative to the use of such land;

- the program includes all possible planning to minimize harm to any park, recreation area, wildlife and waterfowl refuge, or historic site that would result from the use of such lands; or that

- if there is a feasible and prudent alternative, a proposed project using Section 4(f) lands cannot be approved by the Secretary; or if there is no feasible and prudent alternative, the proposed project must include all possible planning to minimize harm to the affected lands.

Detailed inventories of the locations and likely impacts on resources that fall into the Section 4(f) category are required in project-level environmental assessments.

In August 2005, Section 4(f) was amended to simplify the process for approval of projects that have only minimal impacts on lands affected by Section 4(f). Under the new provisions, the U.S. Secretary of Transportation may find such a minimal impact if consultation with the State Historic Preservation Officer (SHPO) results in a determination that a transportation project will have no adverse effect on the historic site or that there will be no historic properties affected by the proposed action. In this instance, analysis of avoidance alternatives is not required and the Section 4(f) evaluation process is complete.

STATE REGULATIONS

California Scenic Highway Program

Recognizing the value of scenic areas and views from roads in such areas, the State Legislature established the California Scenic Highway Program in 1963. This legislation preserves and protects scenic highway corridors from changes that would diminish the aesthetic value of lands adjacent to highways. The goal of the Scenic Highway Program is to preserve and enhance the natural beauty of California. Under this program, a number of State highways have been designated as eligible for inclusion as scenic routes. Once the local jurisdictions through which the roadway passes have established a corridor protection program and the Departmental Transportation Advisory Committee recommends designation of the roadway, the State may officially designate roadways as scenic routes. Interstate highways, State highways, and county roads may be designated as scenic under the program. The Master Plan of State Highways Eligible for Official Scenic Highway Designation maps designated highway segments, as well as those that are eligible for designation. Changes to the map require an act of the State legislature.

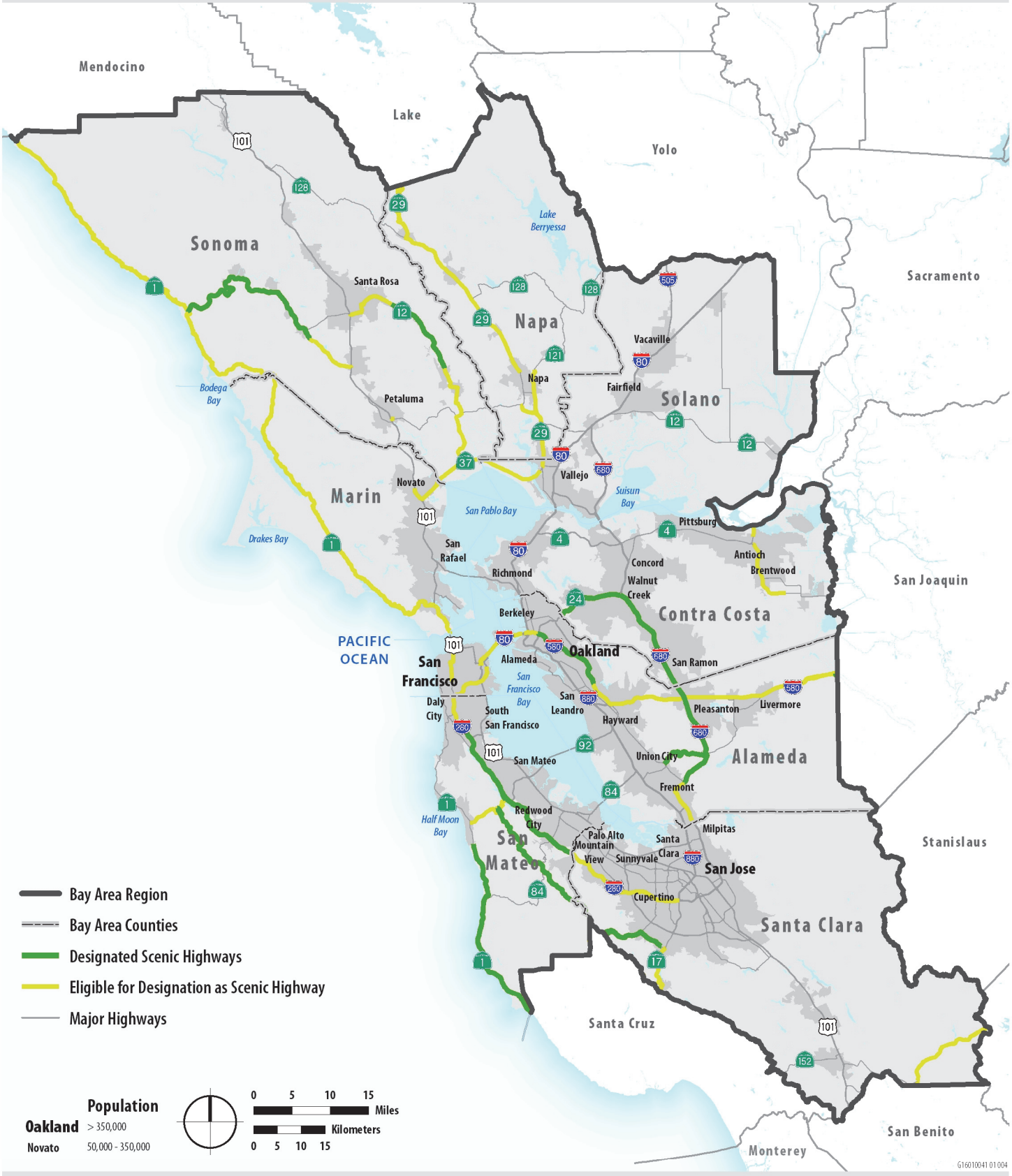
As noted, a corridor protection program must be adopted by the local governments with land use jurisdiction over the area through which the roadway passes as the first step in moving a road from "eligible" to "designated" status. Each designated corridor is monitored by the State and designation may be revoked if a local government fails to enforce the provisions of the corridor protection program. While there are no restrictions on scenic highway projects, local agencies and Caltrans must work together to coordinate transportation and development projects and ensure the protection of the corridor's scenic value to the greatest extent possible, including undergrounding all visible electric distribution and communication utilities within 1,000 feet of a Scenic Highway. In some cases, local governments have their own land use and site planning regulations in place to protect scenic values along a designated corridor. At a minimum, each corridor protection program must include:

- regulation of land use and density of development,
- detailed land and site planning,
- control of outdoor advertising devices,
- control of earthmoving and landscaping, and
- regulation of the design and appearance of structures and equipment.

The Master Plan of State Highways Eligible for Official Scenic Highway Designation requires that proposed realignments and route improvements be evaluated for their impact on the scenic qualities of the corridor.

The Bay Area includes numerous designated or eligible State Scenic Highways. Officially-designated State Scenic Highways are illustrated in **Figure 2.10-2**. All officially-designated and eligible State Scenic Highways in the Bay Area are listed in **Table 2.10-1**.

Figure 2.10-2
State Designated and Eligible Scenic Highways



Map Data Sources: California Department of Transporation (Caltrans), Landscape Architecture Program, 2014; Metropolitan Transportation Commission (MTC), 2016; Tom Tom North America, 2015.

Table 2.10-1 California State Scenic Highway System Officially Designated (OD) and Eligible (E) Routes in the Bay Area

Designation	Route	County	Location
OD	1	San Mateo	Santa Cruz County Line to S. City Limit Half Moon Bay
OD	9	Santa Clara	Santa Cruz County line/Saratoga Gap to Blaney Plaza Saratoga
OD	9	Santa Clara	Blaney Plaza in Saratoga to Los Gatos city limit
OD	12	Sonoma	Danielli Ave E. of Santa Rosa to London Way N. Agua Caliente
OD	24	Contra Costa	E. Portal Caldecott Tunnel to I-680 N. Walnut Creek
OD	35	San Mateo	Santa Cruz county line to Santa Clara county line
OD	35	San Mateo	Santa Clara county line to Half Moon Bay Road SR 92
OD	84	Alameda	SR 238 (Mission Blvd.) to I-680 near Sunol
OD	116	Sonoma	SR 1 to S. city limit of Sebastopol
OD	280	San Mateo	Santa Clara county line to N. city limit San Bruno
OD	580	Alameda	San Joaquin county line to SR 205
OD	580	Alameda	San Leandro city limit to SR 24 in Oakland
OD	680	Alameda	Mission Blvd. in Fremont to Bernal Ave near Pleasanton
OD	680	Alameda	Bernal Ave near Pleasanton to Contra Costa County Line
OD	680	Contra Costa	Alameda County Line to SR 24
E	1	Marin/ Sonoma/ Mendocino	SR 101 Near Marin City to SR 101 near Leggett
E	1	San Francisco	SR 35 in SF to SR 101 near Golden Gate Bridge in San Francisco
E	1	San Luis Obispo / San Mateo/ San Francisco	SR 101 Near San Luis Obispo to SR 35 near Daly City
E	4	Contra Costa	SR 160 Near Antioch to SR 84 near Brentwood
E	9	Santa Clara	SR 35 to SR 17 near Los Gatos
E	12	Sonoma	SR 101 near Santa Rosa to SR 121 near Sonoma
E	17	Santa Cruz/ Santa Clara	SR 1 near Santa Cruz to SR 9 near Los Gatos
E	24	Contra Costa	Alameda/Contra Costa county line to Rte. 680 in Walnut Creek
E	29	Napa/Lake	Trancas St. in Napa to SR 20 near Upper Lake
E	29	Solano/Napa	SR 37 near Vallejo to SR 221 near Napa
E	35	Santa Clara/ Santa Cruz/ San Mateo/San Francisco	SR 17 to SR 92/I-280/SR 1 in San Francisco
E	37	Marin	SR 251 near Nicasio to SR 101 near Novato
E	37	Marin/ Sonoma/ Solano	SR 101 near Ignacio to SR 29 near Vallejo
E	80	San Francisco/Alameda	I-280 near First Street in San Francisco to SR 61 in Oakland
E	92	San Mateo	SR 1 N. Half Moon Bay to I-280 N. Crystal Springs Lake
E	101	Marin	Opposite San Francisco to SR 1 in Marin City
E	101	Marin	SR 37 near Ignacio to SR 37 near Novato
E	116	Sonoma	SR 1 near Jenner to SR 101 near Cotati
E	121	Napa	SR 221 near Napa St. Hosp. to near Trancas St. Napa
E	121	Sonoma	SR 37 near Sears Point to SR 12 near Sonoma
E	152	Santa Clara/ Merced	SR 156 near San Felipe to I-5
E	156	Monterey/ San Benito/ Santa Clara	SR 1 near Castroville to SR 152 NE of Hollister
E	160	Contra Costa/ Sacramento	SR 4 near Antioch to Sacramento

Table 2.10-1 California State Scenic Highway System Officially Designated (OD) and Eligible (E) Routes in the Bay Area

Designation	Route	County	Location
E	221	Napa	SR 29 at Suscol Rd to SR 121 in Napa
E	239	Alameda/ Contra Costa	I-580 W. of Tracy to SR 4 near Brentwood
E	251	Marin	SR 37 near Nicasio to SR 1 near Point Reyes
E	280	Santa Clara/ San Mateo/ San Francisco	SR 17 to I-80 near First Street in San Francisco
E	580	San Joaquin/ Alameda	I-5 SW of Vernalis to I-80
E	680	Alameda/ Contra Costa	Santa Clara county line to SR 24 in Walnut Creek

Source: Caltrans website, http://www.dot.ca.gov/hq/LandArch/16_livability/scenic_highways/, accessed June 2016.

Caltrans Adopt-a-Highway Program

To improve and maintain the visual quality of California highways, Caltrans administers the Adopt-a-Highway program, which was established in 1989. The program provides an avenue for individuals, organizations, or businesses to help maintain sections of roadside within California's State Highway System. Groups have the option to participate as volunteers or to hire a maintenance service provider to perform the work on their behalf. Adoptions usually span a two-mile stretch of roadside, and permits are issued for five-year periods. Since 1989, more than 120,000 California residents have kept 15,000 shoulder miles of state roadways clean by engaging in litter removal, tree and flower planting, graffiti removal, and vegetation removal.

Open Space Easement Act of 1974

Cities and counties can use open space easements as a mechanism to preserve scenic resources if they have adopted open-space plans, as provided by the Open Space Easement Act of 1974 (Gov. Code, §§ 51070. 51097). According to this Act, a city or county may acquire or approve an open-space easement through a variety of means, including use of public money.

California Code of Regulations Title 24 Part 6

The California Energy Code (Cal. Code Regs., tit. 24 § 6) creates standards in an effort to reduce energy consumption. The type of luminaries and the allowable wattage of certain outdoor lighting applications are regulated.

Senate Bill 743 (Statues of 2013)

Senate Bill 743 provides that aesthetics impacts of a residential, mixed-use residential, or employment center project on an infill site are not considered significant environment impacts if three criteria are met: 1) the project is in a Transit Priority Area; 2) the project is on an infill site; and 3. the project is residential, mixed-use residential, or an employment center. These statutes are included in CEQA (Pub. Resources Code Sect. 21099).

REGIONAL AND LOCAL REGULATIONS

City and County General Plans

City and county general plans may include policies for protection of scenic resources, such as hillsides, natural areas, landmarks, roads, and historic districts. Such policies may restrict new development in areas that maintain scenic vistas or areas that contain important character-defining structures. Additionally, design guidelines established at the local level may establish specific standards for addressing development where local character and/or important visual resources may be impacted.

Counties and municipalities also may have scenic route components within their individual general plans. Policies usually encourage the designation of these roadways as scenic corridors, either by local action or

through the State program. Counties and municipalities may also establish regulatory programs or recommend corridor studies to determine the appropriate regulatory program to preserve scenic quality.

Issues pertaining to visual resources are typically addressed in the land use elements of general plans, but policies can also be found in the conservation and open space elements. The General Plan Guidelines, prepared by the California Office of Planning and Research, recommend that the land use element address: an inventory of scenic viewsheds and points of interest, definition of community scenic values, programs for protecting and promoting community aesthetics, and identification of scenic highways and byways (OPR 2003).

2.10.3 Impact Analysis

SIGNIFICANCE CRITERIA

The following significance criteria are based on CEQA Guidelines Appendix G, as well as the thresholds used in the EIR for the 2013 Plan Bay Area, and professional judgment. Under these criteria, implementation of the proposed Plan would have a potentially significant adverse impact if it would:

Criterion 1: Have a substantial adverse effect on a scenic vista.

Criterion 2: Substantially damage scenic resources, including but not limited to trees, rock outcropping, and historical buildings within a state scenic highway.

Criterion 3: Substantially degrade the existing visual character or quality of the site and its surroundings.

Criterion 4: Add a visual element of urban character to an existing rural or open space area or add a modern element to a historic area.

Criterion 5: Create a new source of substantial light or glare, which would adversely affect day or nighttime views in the area.

METHOD OF ANALYSIS

This program-level analysis generally evaluates potential impacts on visual resources based on the location of the projected land use growth footprint and transportation project footprint relative to the known distribution of visual resources throughout the Bay Area. For each impact, implementation of the proposed Plan is assessed on the regional and county (including PDA) level. Information provided by county includes both incorporated and unincorporated areas in the county. In addition, implementation of the proposed Plan is assessed in terms of its impacts to the region's Transit Priority Areas (TPAs). The analysis of aesthetic impacts also assesses the amount of growth (population, housing, and employment) projected for the region by county and in the TPAs by 2040 and how that growth might affect existing conditions. Where data is quantified, TPA data is a subset of county data. A brief description of the types of typical views found within the Plan area are discussed above in the environmental setting. These typical views are the basis of the impact analysis.

The proposed Plan includes different types of transportation projects that could have different effects on the aesthetic environment. This analysis examines categories of transportation investments for likely impacts. Generally, with regard to aesthetic impacts, the greater the change from existing conditions, the more noticeable the change to the aesthetic environment. For example, greenfield development usually has a greater visual impact on the surrounding area than infill development that occurs where similar land uses already exist or where long-range views are limited by existing development. Similarly, the construction of a new roadway generally has a greater impact on scenic resources than the widening of an existing one. Therefore, the general approach in this impact analysis is to characterize how implementation of the proposed Plan could potentially change the aesthetic environment from existing conditions and whether that change would have a potentially significant adverse effect based on the significance criteria.

IMPACTS AND MITIGATION MEASURES

Impact 2.10-1: Implementation of the proposed Plan could have a substantial adverse effect on a scenic vista.

Impacts of Changes in Projected Land Use

Effects on scenic vistas associated with changes in land use would relate to changes to important landscape features, such as the Golden Gate Bridge, or landforms, such as mountains, which would be experienced regionally. Generally, this type of impact would occur as a result of projects that would directly alter a feature or be placed in a location and have bulk such that views are obscured. Development and redevelopment projects that would be of similar style or type (e.g., apartment buildings) to surrounding areas would typically not cause a substantial change to long-range views of a scenic vista.

Construction activities in the Bay Area are common– particularly in the urban areas. The presence of construction equipment may cause changes to the existing physical environment by introducing elements that may be seen as visually intrusive (e.g., cranes, backhoes, staging areas, and stockpiling of materials). However, this would not be substantial because the types of projects are similar to those that occur under existing conditions (e.g., construction of housing and commercial space) and because projected growth would predominately occur in existing urbanized areas.

The proposed Plan identifies Priority Conservation Areas (PCAs), which are regional open space areas for which there is broad consensus for long-term protection but which face development pressures in the near-term, to consolidate development in compact areas while placing less development pressure on the region's open space areas. As shown in **Exhibit 1.2-2**, PCAs are located throughout the region, within developed and rural areas. The land use growth footprint generally avoids areas designated as PCAs; thus, existing scenic resources, including scenic views, located within PCAs are not expected to be subject to proposed Plan-related development following implementation. Furthermore, PCAs are designated by local jurisdictions, which impose development limits and standards, such as maintenance of important open spaces.

As shown in **Figures 1.2-2** through **1.2-5** (see Section 1.2, "Project Description") projected development would be located primarily within areas that are currently developed. New development (i.e., construction on land not designated as urban/built up land according to FMMP) is forecasted to occur on approximately 6,600 acres. That is, of the 18,700 acres of land associated with the land use growth footprint, approximately 35 percent would be located on land that is not currently developed. As shown in **Table 2.10-2**, the rate of increase in urban areas (designated as urban/built up land) would be less than 1 percent overall (increasing from approximately 17.8 percent to 18 percent). This indicates that development and redevelopment would occur almost entirely within existing urban areas. Thus, scenic vistas in the region would remain similar to the existing conditions. That is, long-range scenic vistas would not be substantially altered because landforms and areas of development would be similar to the existing conditions.

Table 2.10-2 Existing and Future Acreages in Urbanized Land by Land Use Growth Footprint, by Region, County, and TPAs

County	Land Acres	2015 Urban Acres[1]	2015 Percent Urban	Increase in Urban Acres within Land Use Growth Footprint[2,3,4]		2040 Urban Acres[2,3,4]	2040 Percent Urban
Alameda	470,600	146,900	31%	County Total	1,040	147,900	31%
				Within TPAs	260	147,200	31%
Contra Costa	459,600	153,100	33%	County Total	2,500	155,600	34%
				Within TPAs	270	153,400	33%
Marin	331,700	41,800	13%	County Total	40	41,800	13%
				Within TPAs	4	41,800	13%
Napa	483,700	24,000	5%	County Total	350	24,400	5%
				Within TPAs		24,000	5%

Table 2.10-2 Existing and Future Acreages in Urbanized Land by Land Use Growth Footprint, by Region, County, and TPAs

County	Land Acres	2015 Urban Acres[1]	2015 Percent Urban	Increase in Urban Acres within Land Use Growth Footprint[2, 3, 4]		2040 Urban Acres[2,3,4]	2040 Percent Urban
San Francisco	29,700	23,900	80%	County Total-	140	24,000	81%
				Within TPAs	140	24,100	81%
San Mateo	287,400	72,500	25%	County Total	190	72,700	25%
				Within TPAs	70	72,600	25%
Santa Clara	817,500	189,200	23%	County Total	1,000	190,200	23%
				Within TPAs	80	189,300	23%
Solano	529,300	60,300	11%	County Total	1,100	61,400	12%
				Within TPAs	1	60,300	11%
Sonoma	1,009,000	75,000	7%	County Total	220	75,200	7%
				Within TPAs	1	74,000	7%
Regional Total[5]	**4,419,000**	**787,000**	**18%**	**County Total**	**6,580**	**793,600**	**18%**
				Within TPAs	**830**	**787,800**	**18%**

Note:

[1] Based on Urban and Built Up Land from the Farmland Mapping and Monitoring Program 2012-2014. This source was used because it was determined to be the proxy for urbanized areas in the region.

[2] Future urbanized footprint is based on modeled growth footprint.

[3] TPA acreages are a subset of County acreages.

[4] Numbers less than 1 are shown as "<1"; Whole numbers have been rounded (between 0 and 10 to the nearest whole number, between 11 and 999 to the nearest 10, between 1,000 and 1,000,000 to the nearest 100, above 1,000,000 to the nearest 1,000).

[5] Figures may not sum because of independent rounding.

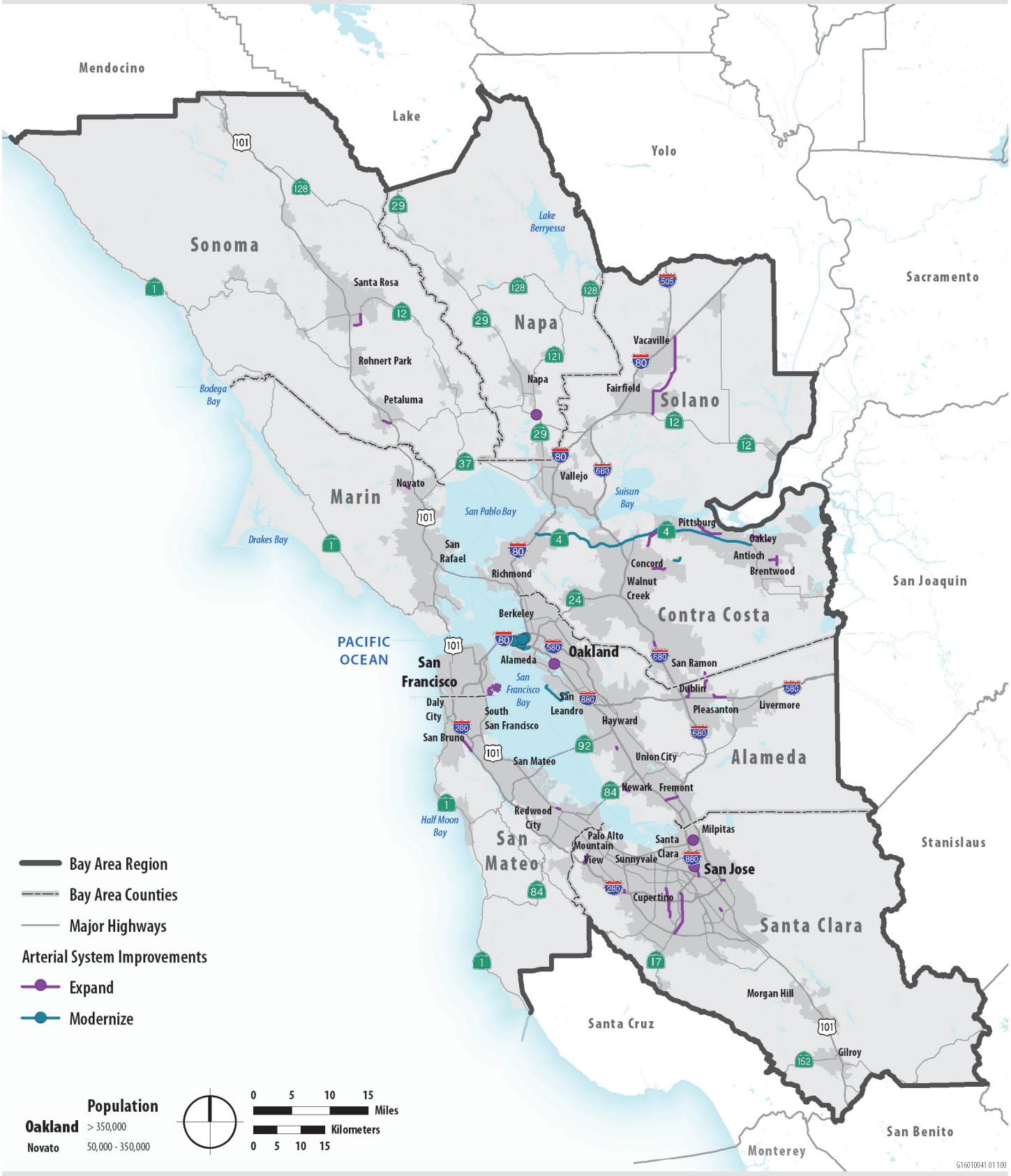
Source: data provided by MTC in 2016; Urban and Built Up Land, Farmland Mapping and Monitoring Program, Department of Conservation (2012-2014).

Changes to short-range views of scenic vistas would occur at a site-specific level and would consist of effects that would be experienced at discrete locations. The potential to affect scenic vistas is related to the specific vantage point of a viewer and the types of development that currently exist. Public views are protected to the extent that local land use policies and/or regulations address this matter. Future development projects would be subject to the requirements of local policies and regulations, and most jurisdictions have specific general plan policies to protect important scenic vistas and views of other scenic resources. Denser or more compact development in some parts of the region may block panoramic views or views of landscape features or landforms from public and individual properties because increasing densities on existing footprints could result in taller buildings and/or buildings placed more closely together. In addition, construction-related activities such as cranes, backhoes, staging areas, and stockpiling of materials could temporarily affect views of a scenic vista. Thus, depending on the location of the viewer, scenic vistas may be substantially altered, and short-range impacts on views of scenic vistas would be potentially significant (PS).

Impacts of Transportation Projects

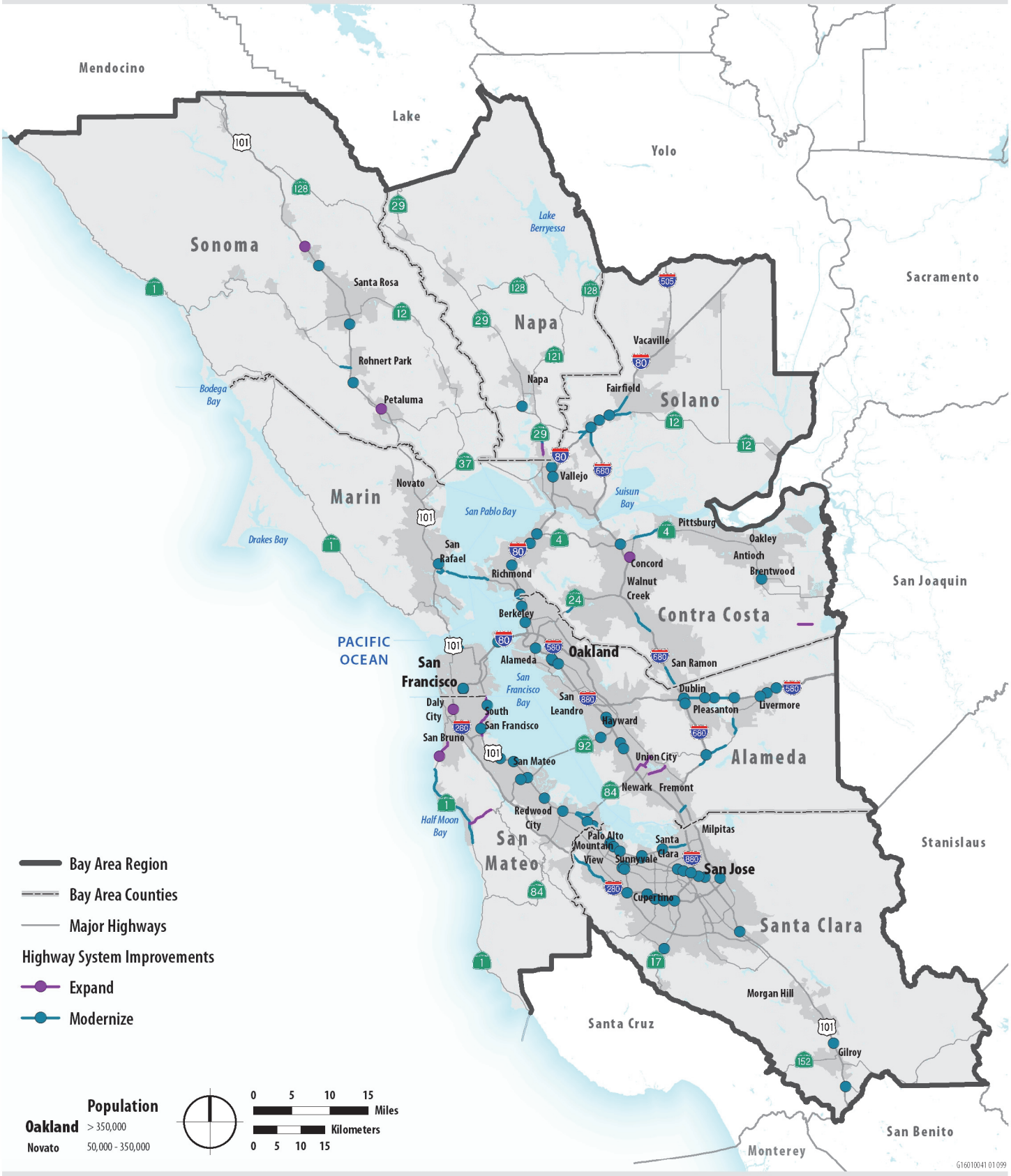
The Plan area includes a complex system of roadways and public transit that accommodates existing users. Roadway maintenance and roadway- and transit-related construction activities are common throughout the Plan area. Implementation of the proposed Plan would include transportation projects that would include: operation and maintenance of existing systems and expansion and modernization of arterials, highways, local and regional transit, and road pricing systems. Generally, these projects would be located within areas that are currently used as existing travel routes (see Figures 2.10-3 through 2.10-6). Many of the transportation projects in the proposed Plan would not result in substantial construction or operational impacts, as they involve transit route improvements, road operations and maintenance, and pedestrian and bicycle improvements.

Figure 2.10-3
Proposed Arterial Projects



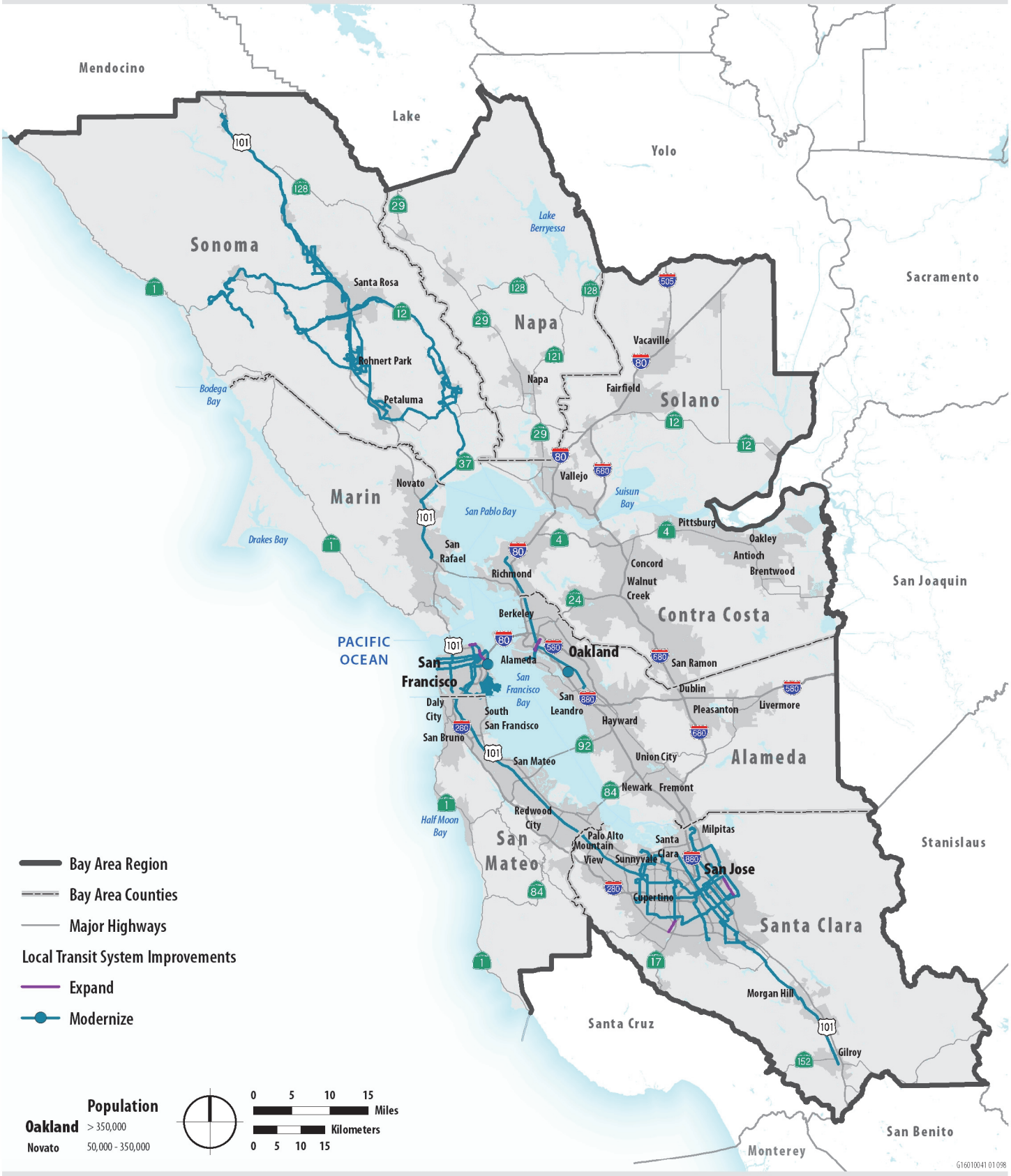
Map Data Sources: Metropolitan Transportation Commission (MTC), 2016, 2017; Tom Tom North America, 2015.

Figure 2.10-4
Proposed Highway System Projects



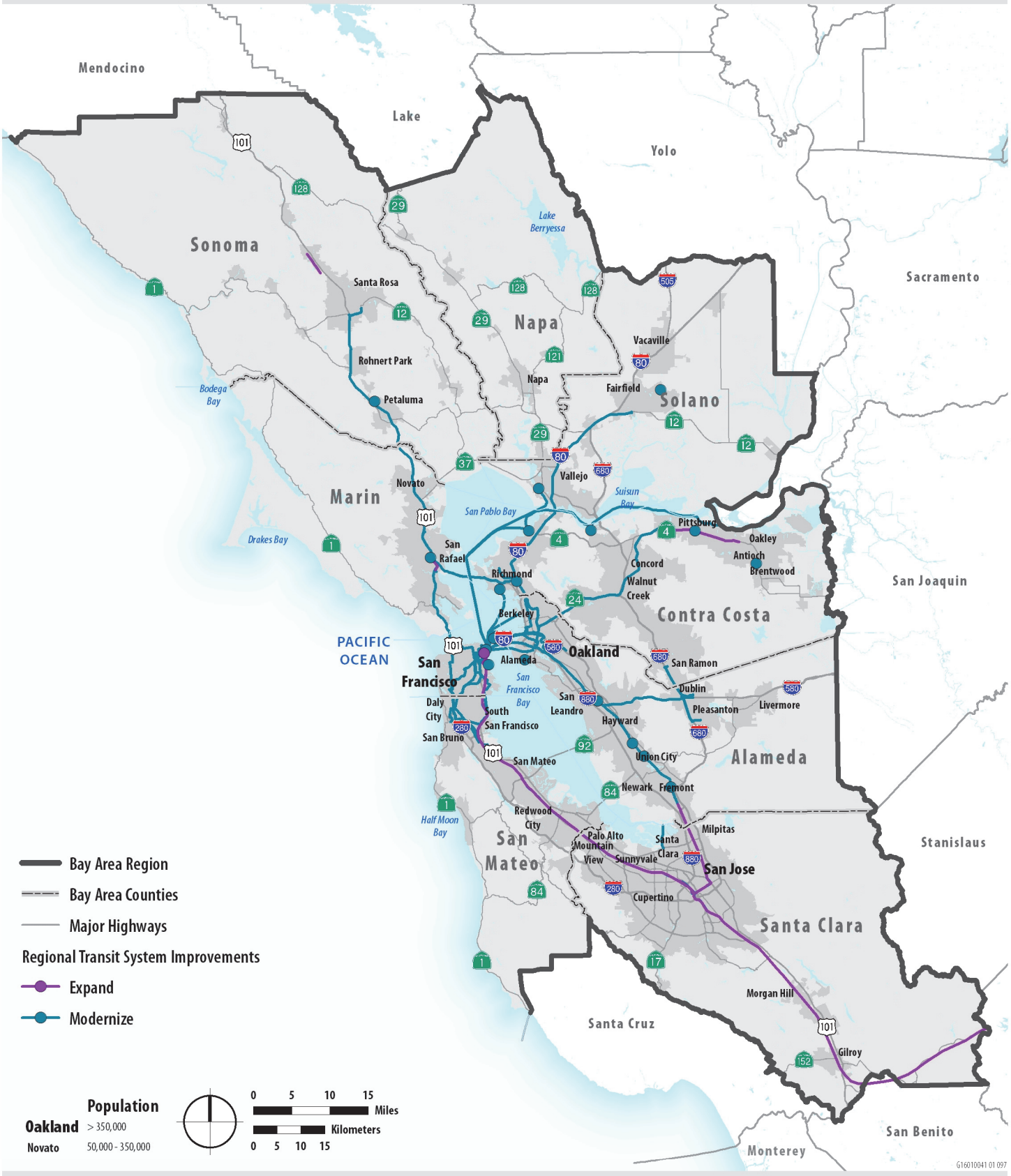
Map Data Sources: Metropolitan Transportation Commission (MTC), 2016, 2017; Tom Tom North America, 2015.

Figure 2.10-5
Proposed Local Transit Projects



Map Data Sources: Metropolitan Transportation Commission (MTC), 2016, 2017; Tom Tom North America, 2015.

Figure 2.10-6
Proposed Regional Transit Projects



Map Data Sources: Metropolitan Transportation Commission (MTC), 2016, 2017; Tom Tom North America, 2015.

Larger projects included in the proposed Plan are associated with BART, California High Speed Rail, and ferry services. These projects may include transit centers, train stations, parking structures, rail line extensions, and bus service expansion, which are common throughout the region. Construction and operation of these types of facilities would not substantially alter the Bay Area at a regional scale such that views could be substantially altered. That is, the expected appearance of arterials, highways, local and regional transit, and road pricing systems would remain generally the same at a regional scale as under the existing conditions. Thus, impacts on regional scenic vistas related to transportation projects would be less than significant (LS).

As discussed above for land use projects, localized effects on visual resources are associated with site-specific impacts, which are effects that could be experienced at discrete locations rather throughout the region. Transportation projects included in the proposed Plan could require the removal of landscaping, temporary traffic changes, temporary signage, and construction staging areas. Larger projects, such as expansion of regional transit lines, and construction of train stations and parking structure could take long periods of time (e.g., several years) to complete, require substantial grading activities, and the presence of construction equipment and stockpiling of materials. As shown in **Figures 2.10-3** through **2.10-6**, projects are clustered in Santa Clara County around the densely populated areas of Santa Clara, downtown San Jose, and Milpitas; in central and western Alameda County; and in San Francisco. There are also numerous projects along the US 101 corridor in Sonoma and Marin Counties, along the I-80 corridor in Solano County, and along the SR 4 corridor in Contra Costa County.

Construction of such projects could take several months to several years, and have the potential to result in long-term effects on views from discrete locations depending on the size of projects.

Upon completion, the extent to which there would be impacts on scenic vistas from new transportation projects would depend on the type of project and its location relative to viewers. For example, bicycle and pedestrian projects, such as sidewalk and roadway striping, are unlikely to have adverse impacts on scenic vistas because these types of projects would be similar to existing conditions. In contrast, expansion of transit lines could introduce new features into an existing view. New features could have a substantial adverse effect on scenic vistas through the introduction of rail lines, large signs, new intersections, and new transit centers in areas that do not currently have similar types of features, and they could contrast with the nature and character of the existing localized view. Thus, scenic vistas could be substantially altered because of the presence of construction activities and new transportation project features. This impact would be potentially significant (PS).

Conclusion

As discussed above, land use and transportation projects would not substantially change long-range views of scenic vistas in the Bay Area because long-range views of landforms and man-made features would remain similar to the existing conditions. However, impacts to scenic vistas would be substantial from discrete locations because of the presence of construction-related activities and introduction of new features or obstruction of views in a localized viewshed. Thus, impacts on scenic views would be **potentially significant (PS)**. Mitigation Measure 2.10-1 is described below. Per the requirements set forth in Pub. Resources Code Sect. 21099, visual impacts would not be considered significant in TPAs if projects are located in an infill site and consist of residential, mixed-use residential, or an employment center

Mitigation Measure

2.10-1 Implementing agencies and/or project sponsors shall implement measures where feasible and necessary based on project- and site-specific considerations that include, but are not limited to:

- reduce the visibility of construction staging areas by fencing and screening these areas with low contrast materials consistent with the surrounding environment, and by revegetating graded slopes and exposed earth surfaces at the earliest opportunity;

- site or design projects to minimize their intrusion into important viewsheds;

- use see-through safety barrier designs (e.g. railings rather than walls);
- develop interchanges and transit lines at the grade of the surrounding land to limit view blockage;
- design landscaping along highway corridors in rural and open space areas to add natural elements and visual interest to soften the hard edged, linear travel experience that would otherwise occur; and
- identify, preserve, and enhance scenic vistas to and from hillside areas and other visual resources.

Significance after Mitigation

Mitigation Measure 2.10-1 would reduce significant impacts to scenic vistas because it would modify site design and provide development recommendations that would minimize visual intrusion on important viewsheds. However, because site conditions are unique, it cannot be concluded with certainty that all significant viewshed impacts could be avoided. Therefore, there may still be instances in which viewshed impacts are significant and unavoidable (SU).

Projects taking advantage of CEQA Streamlining provisions of SB 375 (Public Resources sections 21155.1, 21155.2, and 21159.28) must apply the mitigation measures described above, to address site-specific conditions. However, MTC/ABAG cannot require local implementing agencies to adopt the above mitigation measures, and it is ultimately the responsibility of a lead agency to determine and adopt mitigation. Therefore, this impact remains **significant and unavoidable (SU)** for purposes of this program-level analysis.

Impact 2.10-2: Implementation of the proposed Plan could substantially damage scenic resources, including but not limited to trees, rock outcroppings, and historical buildings within a state scenic highway.

Impacts of Changes in Projected Land Use

Scenic resources that contribute to the visual character of scenic highways are, by nature, specific to their local context, and as such, impacts on these resources resulting from the development assumed as a part of the proposed Plan would occur at the local level. As shown in **Figure 2.10-2**, there are substantial stretches of roadways in the Bay Area that are designated as scenic highways or eligible for designation. The proposed Plan assumes that housing and employment growth in the region will occur primarily in existing urban areas, some of which are adjacent to designated and eligible scenic highways. Areas within the growth footprint adjacent to scenic highways include: sections of SR 24 near Walnut Creek; I-680 near San Ramon; I-580 near Oakland; and, I-280 near South San Francisco and Redwood City. Development and redevelopment is also planned for areas near eligible scenic highways, including: I-280 near Cupertino; I-580 near Dublin, Livermore, and Hayward; US 101 near San Francisco, SR 12 near Santa Rosa; and SR 4 near Antioch and Brentwood.

Development adjacent to scenic highways could cause short-term visual impacts resulting from construction equipment and scaffolding, temporary lighting, and exposed excavation and slope faces. In general, construction-related impacts to scenic highways would be the same as those under Impact 2.10-1 relating to the blockage of views. Large projects are most likely to have significant impacts on scenic highways, but small projects could have substantial impacts depending on their duration. In general, however, construction impacts are less than significant because of their temporary nature.

As under Impact 2.10-1, the greatest potential for visual impacts on scenic highways would result from high density residential and high intensity non-residential projects located in non-TPAs, and adjacent to scenic highways, which could damage scenic resources or create visual contrast between the project and existing conditions. The Scenic Highway Guidelines adopted by Caltrans to protect scenic highway corridors, which include certain limits on land uses adjacent to the roadway, are implemented at the local level. Caltrans requires that the nominating agency adopt a corridor protection program that includes regulation of land use and density of development; detailed land and site planning; control of outdoor advertising; careful attention to and control of earthmoving and landscaping; and the design and appearance of structures and equipment. These programs are included as part of the scenic highway designation, and Caltrans can revoke the

designation if these programs are not followed. Cities and counties also have policies (e.g., General Plan), regulations (e.g., zoning), and other guidance (e.g., design guidelines), that control the size and scale of new development to maintain visual compatibility with the natural and built environments. Thus, because existing regulations protect resources along scenic highways, this impact would be less than significant (LS).

Impacts of Transportation Projects

Scenic resources that contribute to the visual character of scenic highways are, by nature, specific to their local context, and as such, impacts on these resources resulting from the transportation projects assumed as a part of the proposed Plan would occur at the local level. Short- and long-term visual impacts on scenic highways resulting from transportation projects are the same as those discussed under Impact 2.10-1. Many of the transportation projects in the proposed Plan would involve transit route improvements, road operations and maintenance, and pedestrian and bicycle improvements, which all involve minimal construction. However, major capital projects that would introduce new structures or facilities have the potential to result in substantial visual impacts during construction. Construction of such projects could take several months to several years.

Proposed transportation projects overlap with SR 24, SR 84, I-280, I-580, and I-680, in portions that are designated as state scenic highways. In addition, eligible scenic highways that may be affected because of implementation of the proposed Plan include sections of: SRs 1, 24, 17, 35, 37, 160, and I-280, I-580, and I-680. These projects could have substantial adverse effects on the visual character of land adjacent to designated scenic highways or highways eligible for designation. The Scenic Highway Guidelines adopted by Caltrans to protect scenic highway corridors, which include certain limits on land uses adjacent to the roadway, are implemented at the local level (see discussion above). Cities and counties also have policies (e.g., General Plan), regulations (e.g. zoning), and other guidance (e.g., design guidelines), that control the size and scale of new development to maintain its visual compatibility with the natural and built environments; those along designated scenic highways also have adopted corridor protection programs. Implementing agencies or sponsors of transportation projects would coordinate with local jurisdictions to comply with local policies and regulations. Thus, because existing regulations protect resources along scenic highways, this impact would be less than significant (LS).

Conclusion

As discussed above, development and transportation projects both have the potential to affect visual resources within a state scenic highway. However, project sponsors and implementing agencies must follow standards included in locally-adopted corridor protection programs to minimize impacts on the quality of the views or visual experience that originally qualified the highway for scenic designation. Thus, because existing regulations protect resources along scenic highways, this impact would be **less than significant** (**LS**).

Mitigation Measure

None required.

Impact 2.10-3: Implementation of the proposed Plan could substantially degrade the existing visual character or quality of the site and its surroundings.

Impacts of Changes in Projected Land Use

Projected development resulting from the proposed Plan could cause substantial visual impacts by creating or increasing contrasts with the visual character of an existing community. At the regional scale, the greatest impacts would result from high density residential development and high intensity non-residential projects located within existing communities where the visual contrast between the project and existing conditions would be the most apparent. However, as discussed above under Impact 2.10-1, development and redevelopment would occur predominately within existing urban areas and outside of PCAs, which are regional open space areas for which there is broad consensus for long-term protection but which face development pressures in the near-term. Thus, long-range views in the region would remain similar to existing conditions. That is, long-range views of scenic vistas would not be substantially altered because landforms and areas of development would be similar to existing conditions.

Development resulting from the proposed Plan could cause substantial localized visual impacts by visually disrupting the local character of the built environment if new development intensity and densities are substantially higher than existing development. While local standards and design guidelines (discussed below) would ultimately be the primary tools in shaping neighborhood character, changes in density and intensity would also play an important role.

In growth areas where density and intensity is anticipated to increase substantially, new development—and in some cases, new *type*s of development—would be required to accommodate growth (see Figures 1.2-5 and 1.2-6). Development resulting from the proposed Plan could cast shadows in such a way as to substantially degrade the existing visual/aesthetic character or quality of a public place for a sustained period of time. Shadow impacts are greatest in existing urbanized areas with dense, proximate, multi-story structures, such as urban centers and downtowns. This impact is a tradeoff resulting from increased density and intensity of development in these areas, and is controlled and regulated through local regulations and design review.

Most cities and counties have policies (e.g., General Plan), regulations (e.g., zoning), and other guidance (e.g., design guidelines), that control the size and scale of new development to maintain its visual compatibility with the natural and built environments. Local jurisdictions maintain land use and design control over discretionary development projects and would be responsible for approving development plans. Local land use agencies are ultimately responsible for the approval of future urban development and would apply development standards and guidelines to maintain compatibility with existing communities, including site coverage, building height and massing, building materials and color, landscaping, and site grading in visually sensitive areas. However, implementation of the proposed Plan could increase density and intensity of growth in some locations to a level greater than currently planned, particularly in less urbanized areas. Therefore, the potential for impacts to visual character and quality is considered potentially significant (PS).

Impacts of Transportation Projects

The majority of the transportation projects in the proposed Plan include operations, maintenance, minor rehabilitation, signal and signage improvements, and local arterial projects, for example. MTC and ABAG provide input into local designs through the Priority Development Area (PDA) Planning Program. For example, MTC developed a Station Area Planning Manual that includes principles—such as street-level improvements and pedestrian connectivity— applicable to the design of transit station areas and minimize community interruption (MTC 2007). The Manual provides character profiles of place types that consider numerous physical factors—including but not limited to predominant transit mode, land use, population density, employment intensity, housing type, height, and bulk—in an effort to affect neighborhood change that is compatible with existing community fabric. However, major transportation projects could result in substantial effects on visual resources in the region. As discussed above and shown in **Figures 2.10-3** through **2.10-6**, new projects span all nine Plan area counties but are especially clustered in Santa Clara County around the densely-populated areas of Santa Clara, Downtown San Jose, and Milpitas; in central and western Alameda County; and in San Francisco. These new projects could potentially affect the character of an existing community. Some transportation projects in the proposed Plan that expand or extend existing rights-of-way could impact community character by increasing visual contrast in the community and therefore would constitute a potentially significant impact (PS).

Conclusion

As discussed above, transportation projects have the potential to produce significant impacts because changes to existing land uses could alter the visual character of a site. Impacts would be **potentially significant (PS).** Mitigation Measure 2.10-3 is described below. Per the requirements set forth in Pub. Resources Code Sect. 21099, visual impacts would not be considered significant in TPAs if projects are located in an infill site and consist of residential, mixed-use residential, or an employment center.

Mitigation Measure

2.10-3 Implementing agencies and/or project sponsors shall implement measures where feasible and necessary based on project- and site-specific considerations that include, but are not limited to:

- minimize impacts of design through compliance with MTC's Station Area Planning Manual;
- require that the scale, massing, and design of new development provide appropriate transitions in building height, bulk, and architectural style that are sensitive to the physical and visual character of surrounding areas;
- contour the edges of major cut and fill slopes to provide a finished profile that is appropriate to the surrounding context, using shapes, textures, colors, and scale to minimize contrasts between the project and surrounding areas; and
- implementing agencies shall require project sponsors to conduct shadow studies for four-story high (and higher) buildings and roadway facilities to identify and implement development strategies for reducing the impact of shadows on public open space, where feasible. Study considerations shall include, but are not limited to, the placement, massing, and height of structures, surrounding land uses, time of day and seasonal variation, and reflectivity of materials. Study recommendations for reducing shadow impacts shall be incorporated into the project design as feasible based on project- and site-specific considerations.

Significance after Mitigation

Mitigation Measure 2.10-3 would reduce significant impacts to visual character or quality because it would modify site design and provide development recommendations that would result in projects that would be consistent in appearance to their surroundings. To the extent that an individual project adopts and implements all feasible mitigation measures described above, the impact would be less than significant with mitigation (LS-M).

Projects taking advantage of CEQA Streamlining provisions of SB 375 (Public Resources sections 21155.1, 21155.2, and 21159.28) must apply the mitigation measures described above, to address site-specific conditions. However, MTC/ABAG cannot require local implementing agencies to adopt the above mitigation measures, and it is ultimately the responsibility of a lead agency to determine and adopt mitigation. Therefore, this impact remains **significant and unavoidable (SU)** for purposes of this program level analysis.

Impact 2.10-4: Implementation of the proposed Plan could add a visual element of urban character to an existing rural or open space area or add a modern element to a historic area.

Impacts of Changes in Projected Land Use

Development resulting from the proposed Plan could cause substantial visual impacts by adding a visual element of urban character to an existing rural or open space area or adding a modern element to a historic area. The greatest impacts at the regional scale would result from high density residential projects and high intensity non-residential projects located in low density, rural, or historic areas, where the visual contrast between the project and existing conditions would be the most apparent. In general, the proposed Plan focuses most new development within existing urban communities on infill sites where there would be less visual contrast with the immediate surroundings as compared to rural areas.

However, as noted in **Table 2.10-2**, approximately 6,600 acres of non-urbanized land would be converted to urbanized land as a result of the proposed Plan and to the extent that land use projects, in aggregate, would result in new development adjacent to important landscapes, these projects may result in a regional visual resources impact. In addition, projected development in the proposed Plan could result in individually minor visual impacts locally. As shown in Table 2.10-2, approximately 830 acres of the new non-urbanized land within the Plan area would occur within TPAs. In developed areas with historic districts or a large number of historic structures, density changes could result in a substantial change in local character (as discussed in Impact 2.10-3) or the introduction of a modern element to a historic area. While many local ordinances protect

historic resources, these ordinances would not in all cases reduce potential impacts from adding a modern element to a historic area. Further discussion of impacts to historic resources is included in Section 2.11, "Cultural Resources." Collectively, individually minor visual impacts may become substantial over time. This would be a potentially significant (PS) impact.

Impacts of Transportation Projects

The majority of the transportation projects include operations, maintenance, minor rehabilitation, signal and signage improvements, and local arterial projects, for example. However, approximately 24,000 acres of transportation projects have been identified in the proposed Plan that could result in substantial visual impacts in the region through the introduction of new facilities and infrastructure. Major projects span all nine Plan area counties, but are especially clustered in Santa Clara County around the densely-populated areas of Santa Clara, Downtown San Jose, and Milpitas; in central and western Alameda County; and in San Francisco. It is not expected that these transportation projects would have a substantial adverse visual impact in urbanized areas because of the location and nature of the work, as described above. Furthermore, many local projects would improve streetscape quality, appearance, and usability at the local level. However, a few of the transportation projects in the proposed Plan would introduce new roadways in rural, open space, or historic areas, which would constitute a substantial effect on the existing visual resources. These new projects could potentially affect the character of a historic district or neighborhood (see also, Impact 2.11-1 in Section 2.11, "Cultural Resources"). As explained under Impact 2.11-1, projects located in areas with known historical sites, or located in communities with established historic preservation programs, or involving activities that would introduce new visual elements or disturb the existing terrain have the potential to result in significant historic resource impacts. These projects could potentially reduce the aesthetic and physical integrity of historic districts and buildings which represent important examples of periods of California's history. A higher incidence of conflict with historical sites is expected to occur in urban areas with buildings that are more than 45 years old; this would include TPAs, which are located within urbanized areas. Projects located in or traversing rural lands could also have significant impacts through the introduction of new visual elements to a rural or open space area or related to sites that are singular examples of a historical setting or structures whose historic value and significance have not been previously evaluated and recognized. This would be a potentially significant (PS) impact.

Conclusion

As discussed above, development and transportation projects both have the potential to produce significant impacts where urban uses are introduced to non-urban areas. However, even where they are not individually significant, impacts could aggregate to produce **potentially significant (PS)** impacts to visual resources. Mitigation Measure 2.10-3 is described under Impact 2.10-3, and Mitigation Measure 2.10-4 is described below. Per the requirements set forth in Pub. Resources Code Sect. 21099, visual impacts would not be considered significant in TPAs if projects are located in an infill site and consist of residential, mixed-use residential, or an employment center

Mitigation Measure

In addition to Mitigation Measure 2.10-3, the following measure would apply to impacts on visual resources in rural or historic areas.

2.10-4 Implementing agencies and/or project sponsors shall implement measures where feasible and necessary based on project- and site-specific considerations that include, but are not limited to:

- Conduct project-specific review of new development in rural or historic areas to ensure that new development is compatible in scale and character with the surrounding area by:
  - promoting a transition in scale and architecture character between new buildings and established neighborhoods; and
  - requiring pedestrian circulation and vehicular routes to be well integrated.

- Where sound walls are proposed, require sound wall construction and design methods that account for visual impacts as follows:
  - use transparent panels to preserve views where sound walls would block views from residences;
  - use landscaped earth berm or a combination wall and berm to minimize the apparent sound wall height;
  - construct sound walls of materials whose color and texture complements the surrounding landscape and development;
  - design sound walls to increase visual interest, reduce apparent height, and be visually compatible with the surrounding area; and
  - landscape the sound walls with plants that screen the sound wall, preferably with either native vegetation or landscaping that complements the dominant landscaping of surrounding areas.

Significance after Mitigation

Mitigation Measure 2.10-4 would reduce significant impacts where urban uses are introduced to non-urban areas because it would result in site design modification and provide development recommendations that would result in projects that are compatible in scale and character with the surrounding area. To the extent that an individual project adopts and implements all feasible mitigation measures described above, the impact would be less than significant with mitigation (LS-M).

Projects taking advantage of CEQA Streamlining provisions of SB 375 (Public Resources sections 21155.1, 21155.2, and 21159.28) must apply the mitigation measures described above, to address site-specific conditions. However, MTC/ABAG cannot require local implementing agencies to adopt the above mitigation measures, and it is ultimately the responsibility of a lead agency to determine and adopt mitigation. Therefore, this impact remains **significant and unavoidable (SU)** for purposes of this program level analysis.

Impact 2.10-5: Implementation of the proposed Plan could create a new source of substantial light or glare, which would adversely affect day or nighttime views in the area.

Impacts of Changes in Projected Land Use

Projected development resulting from the proposed Plan could create new substantial sources of light and glare at the regional scale that cause a public hazard, disrupt scenic vistas, and brighten the night sky. In portions of the region with substantial existing development, increases would not cause a new public hazard or substantially degrade the visual character or quality of the area because existing sources of glare and light are already a dominant feature of the landscape. Thus, in urbanized areas,[1] this impact would be less than significant. In less developed areas of the region, where existing sources of light and glare are not as prevalent, the impact of new sources would be potentially significant (PS). Mitigation Measure 2.10(e) for rural areas is described below.

Development projects resulting from the proposed Plan could create new substantial sources of light and glare at the local scale. In addition, the introduction of new sources of light and glare could impact local visual resources by altering the local character of the built environment. High density residential and high intensity non-residential development, in particular, could have substantial increases in light and glare at the local level. Overall, the impact of new sources of light and glare would be less than significant (LS) in urbanized areas and potentially significant (PS) in rural areas.

[1] "Urbanized area" is defined in CEQA Guidelines, Section 15387. "Urbanized area" means a central city or a group of contiguous cities with a population of 50,000 or more, together with adjacent densely populated areas having a population density of at least 1,000 persons per square mile.

Impacts of Transportation Projects

It is not anticipated that transportation projects would substantially increase the amount of light and glare, because most improvements would take place on existing facilities that have existing sources of light and glare (see **Figures 2.10-3** through **2.10-6**). The limited number of new proposed facilities in rural areas could introduce a new source of light and glare. However, the marginal increases in light and glare from additional vehicle headlights, new reflective signage, new streetlights, new intersection control devices, and other lighting ancillary to transportation projects are considered less than significant because in most cases, new transportation projects would be aligned with forecasted development projects and existing facilities; however, several transportation projects in rural areas could introduce light and glare to areas where no sources existed previously, which would constitute a potentially significant impact (PS). Impacts in urbanized areas would be less than significant (LS).

Conclusion

As discussed above, development and transportation projects both have the potential to produce significant impacts related to the introduction of new sources of light and glare, primarily in rural areas. This impact would be **potentially significant (PS)**. Mitigation Measure 2.10-5 is described below. Per the requirements set forth in Pub. Resources Code Sect. 21099, visual impacts would not be considered significant in TPAs if projects are located in an infill site and consist of residential, mixed-use residential, or an employment center

Mitigation Measure

2.10-5 Implementing agencies and/or project sponsors shall implement measures where feasible and necessary based on project- and site-specific considerations that include, but are not limited to:

- Design projects to minimize light and glare from lights, buildings, and roadways facilities.
- Minimize and control glare from transportation projects through the adoption of project design features that reduce glare. These features include:
  - planting trees along transportation corridors to reduce glare from the sun;
  - landscaping off-street parking areas, loading areas, and service areas; and
  - shielding transportation lighting fixtures to minimize off-site light trespass.
- Minimize and control glare from land use and transportation projects through the adoption of project design features that reduce glare. These features include:
  - limiting the use of reflective materials, such as metal;
  - using non-reflective material, such as paint, vegetative screening, matte finish coatings, and masonry;
  - screening parking areas by using vegetation or trees; and
  - using low-reflective glass.
- Impose lighting standards that ensure that minimum safety and security needs are addressed and minimize light trespass and glare associated with land use development. These standards include the following:
  - minimizing incidental spillover of light onto adjacent private properties and undeveloped open space;
  - directing luminaries away from habitat and open space areas adjacent to the project site;
  - installing luminaries that provide good color rendering and natural light qualities; and
  - minimizing the potential for back scatter into the nighttime sky and for incidental spillover of light onto adjacent private properties and undeveloped open space.

Significance after Mitigation

Mitigation Measure 2.10-5 would reduce significant impacts to light and glare because it would result in the modification of site design and would provide standards that would minimize the effects of light and glare. To the extent that an individual project adopts and implements all feasible mitigation measures described above, the impact would be less than significant with mitigation (LS-M).

Projects taking advantage of CEQA Streamlining provisions of SB 375 (Public Resources sections 21155.1, 21155.2, and 21159.28) must apply the mitigation measures described above, to address site-specific conditions. However, MTC/ABAG cannot require local implementing agencies to adopt the above mitigation measures, and it is ultimately the responsibility of a lead agency to determine and adopt mitigation. Therefore, this impact remains **significant and unavoidable (SU)** for purposes of this program level analysis.

2.11 CULTURAL RESOURCES

This section evaluates the potential cultural resource impacts resulting from the implementation of the proposed Plan. Cultural resources are the material remains identified with either the prehistoric inhabitants of the area (any time before the arrival of the Spanish in the latter half of the 18th century) or with the historic inhabitants. The historic period begins with the arrival of the Spanish and continues up to 45 years, pursuant to CEQA.

Cultural resources in the Bay Area reflect centuries of human settlement in the region and document the changing character of economic, social, and spiritual activities. There are several kinds of cultural resources in the Bay Area, including historic buildings and bridges, prehistoric archaeological sites, Native American sacred sites, as well as sensitive locations where resources are likely to be identified in the future based on our existing knowledge of historic and prehistoric settlement patterns. Tribal cultural resources were added as a resource subject to review under CEQA (Public Resources Code [PRC] Section 21074), effective January 1, 2015. This is a new category of resources under CEQA and includes site features, places, cultural landscapes, and sacred places or objects, which are of cultural value to a Tribe. Cultural resources also include paleontological sites, which can consist of mineralized, partially mineralized, or unmineralized bones and teeth, soft tissues, shells, wood, leaf impressions, footprints, burrows, and microscopic remains that are more than 5,000 years old and occur mainly in Pleistocene or older sedimentary rock units.

Two comment letters regarding cultural resources were received in response to the Notice of Preparation. The Delta Protection Commission expressed interest in the cumulative impact of the three development scenarios on the cultural resources of the Delta; this comment is addressed in the analysis below. The Native American Heritage Commission requested Assembly Bill (AB) 52 and Senate Bill (SB) 18 compliance information; while SB 18 does not apply as there is no General Plan amendment (which is the trigger for SB 18 compliance), AB 52 compliance is described below. SB 18 could apply to subsequent projects, updates to county or city general plans or specific plans, that may be adopted by local jurisdictions in the future and compliance would occur at that time.

2.11.1 Environmental Setting

PHYSICAL SETTING

This section summarizes both historic and prehistoric resources and identifies the types of geographic areas within the Planning Area that may contain cultural resources.

Paleontological Setting

Important vertebrate and invertebrate fossils and unique geologic units have been documented throughout California. The fossil yielding potential of a particular area is highly dependent on the geologic age and origin of the underlying rocks (refer to geologic timescale in **Table 2.11-1**). Paleontological potential refers to the likelihood that a rock unit will yield a unique or significant paleontological resource. All sedimentary rocks, some volcanic rocks, and some low-grade metamorphic rocks have potential to yield significant paleontological resources. Depending on location, the paleontological potential of subsurface materials generally increases with depth beneath the surface, as well as with proximity to known fossiliferous deposits.

Pleistocene or older (older than 11,000 years) continental sedimentary deposits are considered to have a high paleontological potential while Holocene-age deposits (less than 10,000 years old) are generally considered to have a low paleontological potential because they are geologically immature and are unlikely to contain fossilized remains of organisms. Metamorphic and igneous rocks have a low paleontological potential, either because they formed beneath the surface of the earth (such as granite), or because they have been altered

under high heat and pressures, chaotically mixed or severely fractured. Generally, the processes that form igneous and metamorphic rocks are too destructive to preserve identifiable fossil remains.

Table 2.11-1 Divisions of Geologic Time

Era	Period	Time in Millions of Years Ago (approximately)	Epoch
Cenozoic	Quaternary	< 0.01	Holocene
		2.6	Pleistocene
	Tertiary	5.3	Pliocene
		23	Miocene
		34	Oligocene
		56	Eocene
		65	Paleocene
Mesozoic	Cretaceous	145	–
	Jurassic	200	–
	Triassic	251	–
Paleozoic	Permian	299	–
	Carboniferous	359	–
	Devonian	416	–
	Silurian	444	–
	Ordovician	488	–
	Cambrian	542	–
Precambrian		2,500	–

Source: U.S. Geological Survey 2010

Alameda County

Alameda County lies within the bounds of the Coast Ranges geomorphic province. The Coast Ranges geomorphic province includes the northwest trending belt of mountain ranges, valleys, and basins that parallel the California coastline from Point Conception north to the Oregon border. It is bounded on the north by the south flank of Mount Diablo, on the west by the San Francisco Bay, on the east by the San Joaquin Valley. and on the south by an arbitrary line from the Bay into the Diablo Range.

The bay plain and the valley areas of Alameda County are underlain by Quaternary (from the present to 2 to 3 million years ago) unconsolidated deposits which, in turn, are underlain by sedimentary metamorphic and igneous rocks of up to 150 million years in age. The Quaternary deposits consist primarily of alluvial and estuarine sediments. The alluvial sediments range from stream deposited sands, gravel, silts, clays and intermixtures to fine wind-blown sand. Estuarine sediments consist of silty clays and some sand and shell layers deposited in the bay and marshlands. Adjacent to the San Francisco Bay the younger alluvial deposits grade into younger bay mud, a variable, semi-fluid to firm silty clay with lenses of water-saturated fine sand. Younger bay mud is covered by landfills that vary from dense, engineered fills to trash accumulations of uncertain geotechnical properties. Bedrocks of various types and age underlie the areas within the Diablo Range. Almost all of the hills have a mantle of topsoil and weathered bedrock. These soil materials vary in depth from a few to many feet (Alameda County 2013:3).

Contra Costa County

The geology of Contra Costa County is dominated by several northwest trending fault systems that divide the county into large blocks of rock. For example, the Briones Hills are bounded by the Hayward fault on the west and elements of the Franklin-Calaveras fault system on the east. Within a particular block, the rock sequence consists of: (1) a basement complex of broken and jumbled pre-Tertiary sedimentary, igneous and

metamorphic rocks; (2) a section of younger Tertiary sedimentary rocks and some volcanic rocks (flows and tuffs) that locally interlock with and overlie the sedimentary section; and, (3) surficial deposits (i.e., near the surface) including stream alluvium, colluvium (slopewash deposits at the foot of steeper slopes), slides, alluvial fans, and Bay Plain deposits. The formation name, geologic age, and characteristics of each of these categories of rocks is summarized below:

- Alluvium (Quaternary Holocene & Pleistocene) - Includes all types of alluvial deposits. In Central Coast Range, it is separated from Contra Costa Group by an angular unconformity.

- Contra Costa Group, Moraga Formation, Orinda Formation (Tertiary Pliocene) - Conglomerate, sandstone, siltstone with minor amounts of limestone and tuff; rapid face changes. Some basalt and andesite (volcanic) flows. Clastics are semi-consolidated and contain montmorillonite clay. Topographic form highly variable.

- San Pablo Group (Miocene) - Predominantly marine sandstone with interbeds of shale, siltstone and minor conglomerate. Upper part includes some non-marine beds.

- Monterey Group (Miocene) - Siliceous shale and fine-grained sandstone. Some zones of rhythmically bedded chert and shale. Bituminous in places. Underlies moderately steep-to-steep hillsides in Briones Hills.

- San Ramon Formation (Oligocene) - Tuffaceous sandstone, tuff, minor conglomerate and siltstone.

- Markley Formation, Nortonville Shale, Domengine Sandstone, Meganos Formation (Eocene) - Predominately indurated bedrock including shale, siltstone and sandstone. Montmorillonitic clay shales, unstable.

- Martinez Formation (Paleocene) - Marine, Glauconite sandstone and shale. Shale similar to Ecocene.

- Great Valley Sequence (Cretaceous) - Massive beds of sandstone alternating with siltstone and shale. Minor conglomerate, limestone and lignite. Complex folding and faulting. Crops out in Briones Hills and Diablo Range.

- Franciscan Assemblage (Cretaceous-Jurassic) - Rhythmically bedded graywacke Jurassic Assemblage sandstones, shale, siltstones, radiolarian chert, and greenstone. Minor amounts of limestone and schist. Partially recrystallized and intruded by serpentine and associated igneous rocks. Strongly deformed (Contra Costa County 2005:10-4—10-5).

Marin County

Marin County is located in the central portion of the Coast Ranges, which is characterized by northwest-southeast trending ridges and valleys. This land pattern is typical of the Coast Ranges, which is dominated by one of the most prominent geologic features within the State of California: the San Andreas Fault Zone (SAFZ). The SAFZ is a junction within the earth's crust where one side is moving relative to the other, separating the Point Reyes Peninsula from the rest of Marin County.

In Marin County, the long-term movement of faults, especially the San Andreas Fault, and the dynamics of erosion and sedimentation have created geology that is varied and complex, evolving relatively quickly in geologic time. Because of the long-term movement on the San Andreas Fault, the geology on either side of the fault is quite different. East of the SAFZ, bedrock of the Franciscan Complex with unique mélange rocks dominates the geology. West of the SAFZ, the bedrock geology consists of granitic rocks overlain by younger sedimentary rocks. Much younger surficial deposits are located throughout the county on uplands and in the lowlands.

Paleontological remains are fairly common in Marin County. They include plants, invertebrates, and vertebrates ranging in age from approximately 140 million years to less than 8,000 years before the present.

Within the county, paleontological remains have been primarily recovered from the Pleistocene, Pilocene, Holocene and Miocene geologic time periods (Marin County 2007:4.7-1).

Napa County

Napa County is located in the Coast Ranges geomorphic province. The province, including Napa County, is the general northwest-southeast orientation of physiographic features such as valleys and ridgelines. Unconsolidated surficial deposits generally consist of unstratified, geologically very young materials (clay, silt, sand, rock fragments and gravel, and organic material) lying on bedrock (or older deposits or other sedimentary materials) at or near the Earth's surface. They are of Quaternary age (the last 2 million years). Relative to the underlying rock, they are most often weak, soft, loose, and generally susceptible to erosion. They are the product of weathering, erosion, and deposition. These deposits are of variable thickness and comprise valley alluvium, alluvial fans, levee deposits, estuarine deposits, colluvium, stream channel and terrace deposits, and various types of landslide deposits, and the soil horizons that have developed upon them. Within the County the larger and thicker of these deposits are principally found within the major valleys—Napa, Chiles and Pope (Napa County 2007:4.10-1).

San Francisco County

San Francisco rests primarily on a foundation of Franciscan formation bedrock in a northwest-trending band that cuts diagonally across the city. The Franciscan Formation is composed of many different types of rock including greywacke, shale, greenstone (altered volcanic rock), basalt, chert (ancient silica-rich ocean deposits), and sandstone that originated as ancient sea floor sediments. The formation name, geologic age, and characteristics of each of these categories of rocks is summarized below:

- Franciscan Complex, unit 1 (Coast Ranges) (Jurassic to Cretaceous) - Franciscan complex: Cretaceous and Jurassic sandstone with smaller amounts of shale, chert, limestone, and conglomerate. Includes Franciscan melange, except where separated.

- Quaternary sand deposits, unit 1 (coastal) (Quaternary) - Extensive marine and nonmarine sand deposits, generally near the coast or desert playas.

- Quaternary alluvium and marine deposits (Pliocene to Holocene) - Alluvium, lake, playa, and terrace deposits; unconsolidated and semi-consolidated. Mostly nonmarine, but includes marine deposits near the coast.

- Ultramafic rocks, chiefly Mesozoic, unit 3 (Coast Ranges and Western Klamath Mountains) (Middle to Late Jurassic) - Ultramafic rocks, mostly serpentine. Minor peridotite, gabbro, and diabase (USGS 2016a).

San Mateo County

The San Francisco Peninsula is a relatively narrow band of rock at the north end of the Santa Cruz Mountains separating the Pacific Ocean from San Francisco Bay. It represents one mountain range in a series of northwesterly-aligned mountains forming the Coast Ranges geomorphic province. In the San Francisco Bay area, most of the Coast Ranges have developed on a basement of tectonically mixed Cretaceous- and Jurassic-age (70- to 200-million years old) rocks of the Franciscan Complex. These basement rocks are capped locally by younger sedimentary and volcanic rocks. Most of the Coast Ranges are covered by younger surficial deposits that reflect geologic conditions for about the last million years.

In San Mateo County, the lithologic associations are divided into several assemblages of fault-bounded blocks that contain unique stratigraphic sequences. The major fault in the region is the San Andreas Fault. Lateral and vertical movement on the many splays of the San Andreas Fault system and other secondary faults has produced the dominant northwest-oriented structural and topographic trend seen today throughout the Coast Ranges (EDAW 2004:4.13-4).

Geologic units in San Mateo County consist primarily of the following:

- Pliocene marine rocks (Miocene to Pleistocene) - Sandstone, siltstone, shale, and conglomerate; in part Pleistocene and Miocene.
- Eocene marine rocks (Paleocene to Oligocene) - Shale, sandstone, conglomerate, and minor limestone; in part Oligocene and Paleocene.
- Miocene marine rocks (Oligocene to Pliocene) - Sandstone, shale, siltstone, conglomerate and breccia; in part Pliocene and Oligocene.
- Franciscan Complex, unit 1 (Coast Ranges) (Jurassic to Cretaceous) - Franciscan complex: Cretaceous and Jurassic sandstone with smaller amounts of shale, chert, limestone, and conglomerate. Includes Franciscan melange, except where separated--see KJfm.
- Mesozoic granitic rocks, unit 1 (Salinian Block) (Early to Late Cretaceous) - Mesozoic granite, quartz monzonite, granodiorite, and quartz diorite
- Quaternary alluvium and marine deposits (Pliocene to Holocene) - Alluvium, lake, playa, and terrace deposits; unconsolidated and semi-consolidated. Mostly nonmarine, but includes marine deposits near the coast.
- Franciscan melange (Jurassic to Cretaceous) - Melange of fragmented and sheared Franciscan complex rocks (USGS 2016b).

Santa Clara County

Santa Clara County, located at the southern end of San Francisco Bay, is flanked on the west by the Santa Cruz Mountains. The Santa Cruz Mountains are composed primarily of Franciscan Assemblage sandstone, shale, chert and serpentine with lesser amounts of Santa Clara, Purisima, San Lorenzo, Monterey, and Vaqueros formations of Tertiary age. The Franciscan Assemblage was deposited originally in a deep marine trench off the California Coast. As a result of convergence of the Pacific and North American plates, those sediments were folded, faulted, and accreted onto the continental margin, forming the Coast Ranges. During the Tertiary period, marine and non-marine sediments were deposited in portions of the Coast Ranges, creating the Tertiary formations mentioned above (Santa Clara County 1994:5.K-1).

Solano County

The county's diverse geological setting spans 144 million years, from the early Jurassic Period through present day. Geologically, the western portion of the county is made up of the north-south trending Sacramento and San Joaquin Valleys, as well as a small portion of the Northern California Coast Ranges. The Northern California Coast Range in Solano County is known as the Vaca Mountains, which consist of Cretaceous and Tertiary strata that has been uplifted and tilted eastward. A large predominantly Quaternary plain lies to the east of the Vaca Mountains. In the southwestern portion of the county, Pliocene and late Miocene volcanic deposits are commonly found. The Pleistocene Montezuma Hills lie just north of the confluence of the Sacramento and San Joaquin Rivers, where they drain to Suisun Bay. Suisun and Montezuma Sloughs mark a large tidal wetland that enters Grizzly Bay along the southern border of the county.

Along the northwestern border of the county, west of the Coast Range Fault, the Franciscan Complex (spanning in time the late Jurassic and early Cretaceous) can be found. The Jurassic-Cretaceous Franciscan Complex is juxtaposed with lower Cretaceous strata west of the Green Valley, the city of Benicia, and the city of Vallejo, and is separated from the Great Valley Group by the Coast Range Fault. East of the Napa Valley, Pliocene Sonoma Volcanics crop out. The Franciscan group consists of highly deformed, metamorphosed rocks attributed to the occurrence of an east-dipping subduction zone along the western North American plate margin.

The Vaca Mountains, adjacent to the Franciscan Complex, are east of the Green Valley Fault. Cretaceous and lower Tertiary rocks of the Vaca Mountains are interbedded and consist of marine sandstone and shale that belong to the Great Valley Sequence. Six geological formations have been identified in the Upper Cretaceous sediments; from oldest to youngest, these are the Fiske Creek, Venado, Yolo, Sites, Funks, Guinda, and Forbes Formations. The units are exposed along a north-south axis, dipping below the surface steeply towards the east. Tertiary rocks of the Eocene Capay Formation, the Miocene Neroly Formation and Putnam Peak basalt, the Pliocene-Pleistocene Tehama Formation, and the Pleistocene Putah Tuff overly the Great Valley strata in the east of the Vaca Mountains.

The Potrero Hills lie just east of the Sonoma Volcanics and north of Suisun Bay. These hills consist of Eocene Markley Sandstone, Nortonville Shale, and Capay Formation. East of the Potrero Hills are the Montezuma Hills in the southeast portion of the county. The Montezuma Hills are poorly consolidated clayey sands of the Early Pleistocene Montezuma Formation. Younger Quaternary alluvial deposits fill large portions of the scattered valleys throughout the entire county.

The east-central and northeastern parts of Solano County are relatively flat and characterized by a Holocene and Pleistocene alluvial plain with sporadic exposure of the Pliocene Tehama Formation. Fine-grained, organically rich Holocene intertidal deposits are found in the southern portion of the county where sediments form delta deposits along the bay margins (Solano County 2008:4.10-18).

Sonoma County

Paleontological remains are fairly common in Sonoma County. They include plants, invertebrates, and vertebrates ranging in age from approximately 140 million years to less than 8,000 years before the present. Within the county, paleontological remains have been primarily recovered from the following geologic formations:

- Franciscan complex (Jurassic) – This formation largely covers the northern part of the county, with the exception of the Alexander Valley and northern Santa Rosa plain;

- Wilson Grove Formation (Miocene-Pliocene) – This is a common location for Paleontological remains, and is largely located in the western part of the county, along with the Ohlson Ranch Formation (Miocene-Pliocene), and the Petaluma Formation. The boundaries of this area are Occidental, Sebastopol, Petaluma, and the Coast. These formations are also present around the base of the Sonoma Mountains; and

- Sonoma Volcanics (Miocene-Pliocene) – This is the formation of the Sonoma Mountains and the Sonoma/ Napa Mountains which form the western border of the count (Sonoma County 2006:4.10-1).

Prehistoric Resources and Ethnography

Prehistoric cultural resources are composed of Native American structures or sites of historical or archaeological interest. These may include districts, objects, landscape elements, sites, or features that reflect human occupations of the region, such as villages and burial grounds.

The moderate climate, combined with the abundant natural resources found throughout the nine-county region, has supported human habitation for several thousand years Before Present (BP). Some theories suggest that the prehistoric bay and river margins were inhabited as early as 10,000 years ago (EIP Associates 1993). Rising sea levels, the formation of the San Francisco Bay, and the resulting filling of inland valleys have covered these early sites, which were most likely located along the then existing bay shore and waterways. Existing evidence indicates the presence of many village sites from at least 5,000 years BP in the region. The arrival of Native Americans into the Bay Area is associated with documented cultural resources from circa 5,500 BP (U.S. Dept. of Interior 1990).

Six different groups of Native population, identified by their language, lived within the Bay Area, including Ohlone (Alameda, Contra Costa, San Francisco, San Mateo, Santa Clara, and Solano counties), Bay Miwok

(Contra Costa County), Patwin (Napa and Solano counties), Coast Miwok (Marin and Sonoma counties), Pomo (Sonoma County), and Wappo (Napa County). These Native populations periodically increased between 5,000 BP and the arrival of the Spanish in the late 18th century. Native villages and campsites were inhabited on a temporary basis and are found in several ecological niches because of the seasonal nature of their subsistence base.

By 1,000 BP, population densities had grown to the point where less favorable environmental settings were being used for habitation. Traditional tribal territorial boundaries thus usually overlap; this is particularly the case in the South Bay. Groups competed for hunting grounds, seed and acorn gathering areas, and other areas necessary to a hunting-and-gathering culture. Remains of these early peoples indicate that main villages, seldom more than 1,000 residents, were usually established along water courses and drainages. Remains of satellite villages have been found in areas used for the procurement of food or other resources. By the late 1760s, about 300,000 Native Americans lived in California (San Francisco Estuary Partnership 2016).

Ohlone

The Ohlone languages belong to the Utian family of the Penutian language stock and were spoken in a large area extending from the San Francisco Bay Area southward along the coast to Point Sur and inland to the Diablo Range and portions of the northern San Joaquin Valley. The basic Ohlone political unit was the "tribelet," an autonomous, self-governing, territorially defined unit over which recognized authority was given to one person, in most instances the leader or chief. Each tribelet was composed of one or more villages and a number of camps within its recognized and protected resource exploitation zone. Because of geographic barriers and distance between Ohlone tribelets, however, the integration of smaller political units into larger ones was the exception rather than the rule among the Ohlone (Pacific Legacy 2016).

The Ohlone were hunter-gatherers who occupied semi-permanent camps and villages from which they could take advantage of seasonal changes in resource availability. Dwellings at these habitation sites were dome-shaped, with pole frameworks and thatch for roof and walls. Other structures that could be found in an Ohlone village included: acorn granaries; sweat houses for the men, often located along stream banks; menstrual houses for women; and dance houses and assembly houses, generally located in the center of a village. The Ohlone people had a diverse diet. The single most important food item among the Ohlone was the acorn, at least four species of which were collected and processed into meal or flour. Birds and small mammals were hunted, clubbed, trapped, and snared. Fish were also hooked or caught by hand. Shellfish provided an important seasonal food resource (Pacific Legacy 2016).

Regional interaction among the Ohlone, and with neighboring cultures such as the Salinan and Yokuts, took place through trade, ceremonies, warfare, and intermarriage. Shell beads were widely used by the Ohlone as a form of currency in exchanges. Olivella shells, mussels, abalone shells, salt, dried abalone, woven baskets, and other items were traded for prized goods with nearby villages and with more distant villages located in dissimilar environmental zones. Among the items received by the Ohlone in such transactions were stores of the prized piñon nut and obsidian for tool-making (Pacific Legacy 2016).

The Spanish colonization of the region was accomplished through the introduction of the Hispanic mission system. Starting with Mission San Carlos and the Presidio of Monterey in 1770, several other missions were established over the next thirty years, each exerting their influence over the native people of the Plan area. The subjugation of the native people resulted in dramatic environmental changes after they could no longer influence the native landscape, while poor nutrition and repeated exposure to introduced European diseases and violence served to decimate the Ohlone. Ultimately, the people affiliated with the Plan area were dispersed among other tribesmen at Missions Santa Clara, San Juan Bautista, and Santa Cruz. Nonetheless, many survived and their descendants continue to live in the region (Midpeninsula Regional Open Space District 2014).

Bay Miwok

The Bay Miwok are known to have occupied the interior valleys of the East Bay, perhaps extending as far as the shoreline in the vicinity of present–day East Oakland, at least since 300 A.D., though their presence may

date back as far as 2500 B.C. Although mutually unintelligible, the Ohlone, Bay Miwok, and Coast Miwok languages all derive from Utian stock. Like other west–central California Native American Groups, the Bay Miwok were organized into autonomous territorial political groups. Each territorial group was a community of interrelated families; the size of most tribelet populations ranged between 200 and 400 people. The small villages were generally located near sources of fresh water such as creeks and springs, though they were also found on alluvial flats and along the first set of ridges between valleys and mountain ranges.

The Bay Miwok subsisted on the bountiful natural food resources that characterized the Bay Area. Staples of their diet included fish (principally salmon), shellfish, water fowl, tule elk and acorns. Acorns were pounded by mortar and pestle to form a mush that was often flavored with berries. Men contributed to the food supply by fishing and hunting for game. Larger animals were hunted with bows and obsidian–tipped arrows and traps and snares were set for smaller mammals such as rabbits. The Bay Miwok fished from creeks using nets and/or basket traps deployed from small rafts constructed of tule rushes, propelled by double–bladed paddles.

The Bay Miwok utilized local rock and mineral sources to manufacture cutting, scraping and other tools and local sandstone for grinding and pounding tools. Cinnabar and hematite could be used to barter with non–coastal groups for more exotic materials, such as obsidian. Animal remains were also particularly useful. In addition to the use of pelts and feathers for clothing and bedding, sinew was used for bow strings and teeth, bones, claws and beaks were employed as tools, including awls, pins, daggers, scrapers and knives. Feathers, bones and shells were used in a wide variety of personal ornamentation.

Infiltration of Europeans into the Bay Area rapidly led to the decimation of the Bay Miwok people. They were forced into servitude on the Spanish missions and large “rancherias” in northern Alameda and Contra Costa counties. Disease and overwork, as well as conflicts with other tribal groups, led to their decline. By the beginning of the American historical period (1848), the Bay Miwok had ceased to exist as an ethnic or linguistic entity (Contra Costa County 2009:4.D-3).

Patwin

The Patwin are Wintuan speakers. The Wintuan language is part of the larger Penutian language family, which also includes Miwok, Maidu, Ohlone, and Yokuts. The Patwin were organized into tribelets consisting of a primary village and several smaller associated villages. Numerous ethnographic village locations were reported for the Patwin; villages were located along the Sacramento River and all major drainages that drain the eastern and southern slopes of the Coast Ranges, including Putah, Ulatis, and Suisun Creeks. Permanent houses, typically of the semi-subterranean type, usually sheltered more than one household, each occupying different sides of the dwelling. Temporary shelters were often seasonally occupied when families were away from the permanent winter village. These temporary shelters, primarily used for protection against the summer sun and infrequent rains, consisted of a brush-covered shed, four corner posts, and a flat roof.

A variety of animals were taken by the Patwin, including deer, pronghorn, elk, rabbit, and various species of fish and birds. Deer, ducks, geese, quail, and mud hen were caught in various nets. Fish species including chub, salmon, sturgeon, hardhead, and trout. Steelhead were also taken with nets. Decoys were used to hunt ducks and deer; deer head decoys were worn by hunters to approach or attract their prey. Other animals, including most raptors and carnivores, were hunted for their feathers or pelts, which were used for ceremonial or utilitarian purposes. Seasonal vernal pools, a common feature in the southern half of Solano County, were likely part of an early spring subsistence strategy when other food sources were scarce. Lithic debitage, manos, millingstones, pestles used with wooden mortars, hammerstones, and mortars that have been identified at prehistoric sites near vernal pools, suggest Patwin resource exploitation.

In the late 18th and early 19th centuries, Spanish missionaries, and European and American trappers and explorers, entered Northern California. Spanish emissaries from Missions San Francisco de Asis, San Francisco Solano, and San Jose actively proselytized the Patwin people. The earliest historic records, beginning around 1800, consist of Spanish mission registers of baptisms, marriages, and deaths of Indian neophytes. During the 1830s and 1840s, the Patwin territory was taken over by Mexicans and Americans. By the 1860s, the few Patwin who had survived almost 100 years of epidemics and conflict with the Spanish, Mexican, and

Euro-Americans were either working as laborers for ranches, or were placed on small reservations established by the United States government.

Mission records provided tribelet names and locations. The Malacas lived east of today's Fairfield, on the plains of the north side of Suisun Bay. They had close ties with the Suisuns, who also resided in the vicinity of Fairfield. The Malacas moved to Mission Dolores from 1810 until 1816, at the same time as the Suisuns, and the Malacas may have been assumed to be Suisuns. The Tolenas, who lived in Green Valley north of the Suisun Plain, moved to Mission Dolores from 1815 until 1820. Nineteen Tolenas also moved to Mission San Jose. The Ululato, who lived in the vicinity of today's Vacaville, moved to Mission Dolores from 1815 until 1822, then to Mission San Francisco Solano from 1824 to 1833 (Solano County 2008:4.10-4—4.10-6).

Coast Miwok

Before the arrival of Europeans to the San Francisco Bay Area, Coast Miwok territory included the entire Marin Peninsula and stretched as far north as Duncan's Point and as far east as Sonoma. Linguistically, Miwok is one of the Penutian languages. Pre-contact population estimates for the Coast Miwok suggest that population density was low, with perhaps as few as 2,000 people living in the entire area. The settlement patterns of the Coast Miwok, similar to other native groups in the region, were largely dictated by the seasonal availability of important food resources. During the warmer summer months, villages were occupied along rivers, estuaries, and the coast. Winter villages were often located further inland and contained semi-permanent structures and food storage facilities.

The Coast Miwok created a diverse array of material culture. Because pottery was not used by most Native Californians, basketry was of particular importance and served a number of purposes including, cooking, serving, parching, carrying, and storage. Although baskets were primarily utilitarian in nature, some were multicolored and sported feather and shell ornaments. Lupine roots were used to make cordage for nets, and wooden objects included foot drums and paddles for use with the tule balsa, an important watercraft. Weaponry consisted of the bow and arrow, as well as the sling and a bola for hunting waterfowl. Arrow points were typically made from obsidian, although chert was used to make different types of flaked stone tools. Other types of stone were used as mortars and pestles. Shell was another important material, particularly abalone, commonly used for ornamentation.

The first contact between Coast Miwok and Europeans occurred over 400 years ago, presumably in 1579 when Sir Francis Drake made landfall somewhere in Coast Miwok territory. Drake remained in the area for six weeks marked by a number of amicable interactions with the local people. Sixteen years later, Sebastian Cermeño landed in what is today known as Drakes Bay. His galleon, the San Agustin, was wrecked by a storm, forcing Cermeño and his men to make the return trip to Acapulco by launch. Even before they left, however, the Coast Miwok began salvaging items from the larger vessel, and the Chinese porcelains and metal objects they recovered have been noted in archaeological assemblages from throughout the area (Marin County 2011:218).

Pomo

Groups speaking two closely related Pomoan languages, Southwestern Pomo and Southern Pomo, held most of the area which was to become Sonoma County. The Southwestern Pomo (Kashia/Kashaya) occupied about thirty miles of the northwestern Sonoma County coast, extending inland up to 13 miles. This territory consisted primarily of rocky coastline and unbroken redwood forest. Shellfish, sea mammals, and salmon were major resources. Village sites were situated along the coast and on inland ridges. The principle village was located near Fort Ross, where the main residences of the headmen and women were located. Other large principle villages and smaller subsidiary villages supported an estimated 1,500 people. During the summer, the communities moved to the coast where they gathered abalone, mussels, fish, and marine mammals as well as sea plants and sea salt. In the late fall they journeyed back inland to sheltered village locations. Kashia basketry is a ritual art and incorporates stone, bone, shell, horn, fibers and feathers in unique designs.

The history of the Kashia differs from other Pomo-speaking tribes in that their first direct contact with non-Native peoples was not with Spaniards, Mexicans, or Euroamericans, but rather with Russians. The Russian colony at Fort Ross operated from 1812 to 1842 and as a result many Kashia Pomo escaped missionization.

When the Russians left, Mexican and Euroamericans began to settle the coast and forced changes to the Kashia's traditional way of life. Beginning in the 1870s they lived in three villages, two of which were located on property owned by Charles Haupt, who was married to a Kashia woman. In 1914 Haupt petitioned the U.S. government on behalf of the Kashia for a 40-acre parcel near Stewarts Point.

The Southern Pomo territory spanned an area from the coastal town of Gualala, east to Cloverdale, and south towards Healdsburg, Santa Rosa, and Sebastopol. Three tribal units of the Southern Pomo occupied the region: the Kataictemi, the Konhomtara, and the Bitakomtara. The Southern Pomo were hunter-gatherers who lived in rich environments that allowed for dense populations with complex social structures. They settled in large, permanent villages about which were distributed seasonal camps and task-specific sites. Primary village sites were occupied continually throughout the year and other sites were visited to procure particular resources that were especially abundant or available only during certain seasons. Sites often were near freshwater sources and in ecotones where plant life and animal life were diverse and abundant (Sonoma County 2006:4.10-2; Sonoma County 2008:3.6-2; Sonoma County 2010:4.8-3).

Wappo

Wappo is a dialect of the Yukian language, which also includes Yuki, Coast Yuki, and Huchnom. Wappo is the name given to Wappo-speaking people by the Spanish. Wappo is derived from the Spanish word guapo, which may be translated as brave or handsome. The Spanish considered Wappo to be brave because of their resistance to Euroamerican incursion in Napa Valley during the eighteenth and nineteenth centuries. Wappo dialects were spoken in a territory that consisted of two divisions. The smaller division existed in a 5-square-mile territory south of Clear Lake. The larger division extended from just north of Napa and Sonoma in the south to Cloverdale and Middletown in the north.

Mission records reveal that Wappo unsuccessfully battled the Spanish; Wappo from villages at Canijolmano, Caymus, Chemoco, Huiluc, Locnoma, Mayacama, and Napa were brought to the mission at Sonoma between 1823 and 1834 to be used for labor. In 1854, the Wappo of the Russian River Valley, whose population likely included Wappo from territories within Napa County, were moved to a reservation in Mendocino. The population of Wappo in Napa Valley in 1855 is estimated to be 500. By 1856, nearly half the Wappo moved to Mendocino had died. The reservation was closed in 1867.

The acorn was the primary plant food, along with a variety of roots, bulbs, grasses, and other plant resources. Deer, elk, and antelope were the primary animal resources, but smaller mammals such as rabbits, squirrels, and birds were also important. Fish supplemented the diet, but may not have been as important as terrestrial animals, which were abundant in the grassy valleys. Wappo used stone in almost every aspect of their lives. Napa Glass Mountain, a regionally important obsidian site and quarry, and other local obsidian sources are located within Wappo territory. Other major obsidian sources are near Wappo territory (i.e., Borax Lake, Mount Konocti, and Annadel). Obsidian was used for projectile points, knives, scrapers, drills, and many other tool types. It was a valuable commodity in regional trade networks, and provided Wappo with a resource that could be traded for a variety of resources. Chert, found naturally throughout the north Coast Ranges, was also used for a wide range of tools, including projectile points, knives, scrapers, and cobble tools. Basalt was also used for tool manufacture, but it was not the preferred material. Bone tools were also used for awls, needles, whistles, and perforators. Wappo traded with their neighbors for a variety of goods such as marine shells, fish, and salt (Napa County 2007:4.12-4).

Historic Resources

Historic resources are standing structures of historic or aesthetic significance. Architectural sites dating from the Spanish Period (1529–1822) through the late 1960s are generally considered for protection if they are determined to be historically or architecturally significant. These may include missions, historic ranch lands, and structures from the Gold Rush and the region's early industrial era. More recent architectural sites may also be considered for protection if they could gain historic significance in the future.

The arrival of the Spanish and the development of the mission system in the latter half of the 18th century permanently disrupted the indigenous societies flourishing in the area. Native American settlements were

abandoned and replaced with agricultural land, housing, and military support for the missions. The San Francisco Mission (Mission San Francisco de Asisi or Mission Dolores) and the Presidio (Yerba Buena) were founded in 1776. Both the Mission Santa Clara and the Pueblo de San José de Guadalupe were founded in 1777 in Santa Clara County.

After the Mexican revolt against Spain in 1822, California lands came under Mexican rule, and large tracts of land, including the former missions, were granted to individual owners. It was during the Mexican era that most of the historic ranch lands and associated living quarters and operational structures originate.

Mexico ceded control of California to the United States at the end of the Mexican-American War (1846– 1848), and the discovery of gold in the late 1840s brought thousands of prospectors and settlers into California. The Bay Area became the gateway to the gold of the Sierra Nevada, with rapid growth occurring in several of the region's fledgling cities, focusing in San Francisco as a shipping and financial center. Today the structures and sites from this Gold Rush period are often considered to be of historic significance.

An era of increased agricultural production followed the Gold Rush, with much of the region's inland valley natural grasslands plowed for wheat, orchard, and vegetable cultivation. Construction of levees in the Sacramento/San Joaquin delta reclaimed wetland areas for field crops and orchards, and lumbering, begun during the gold rush to supply mining operations, continued to supply a growing population. The completion of the intercontinental railroad in San Francisco in 1888 assured the Bay Area's continued prominence as an economic and population center for the West in general and for California.

In the early 1900s, the Bay Area's economic base continued to grow and diversify, with a maritime industry developing around the Bay and manufacturing, trade, and the lumber industry aiding in the growth and development of the region. Urban areas continued to grow in accordance with transportation corridors. The rail lines of the early 1900s supported new development along their routes, with residential and commercial centers at their stops. The arrival of the automobile and roadway construction allowed population and economic centers to develop in more dispersed patterns throughout the region. Cultural resources from this manufacturing era include sites and structures associated with industrial development (i.e., railroad and maritime industries) and with prominent citizens of the time.

Alameda County

Spanish settlement occurred in the 18th century when Juan Bautista de Anza led an expedition of the area. Spanish settlers later constructed Mission San Jose, which is located in present day Fremont. Mexico gained control of the area after it achieved independence from Spain. As a result of the Mexican-American War, the area became a part of the United States in 1848, and in 1853 the boundaries of Alameda County were formed. The gold rush and the various economic opportunities that resulted from it brought Dutch, Anglo and Portuguese immigrants in the mid-19th century. The unincorporated areas of Alameda County remained largely rural until the post-World War II period when the communities of Ashland, Castro Valley, Cherryland, Fairview, Hillcrest Knolls, and San Lorenzo were transformed into suburban bedroom communities to accommodate population growth arising from the "baby boom" and influx of people to the area seeking work (Alameda County 2016).

Contra Costa County

Settlement by non-Native Americans did not begin until after the Mexican government began awarding land grants to prominent Mexican citizens in the late 1820s. Contra Costa County was one of the original 27 California counties when California became a state in 1850. Its boundaries included what is now Alameda County until 1852.

Until the 1960s, Contra Costa's population was greatest along the shorelines of San Francisco and Suisun bays, with shipping ports and rail lines creating jobs and the need for housing. In the valleys of central Contra Costa, farming and ranching dominated the landscape and economy. After World War II, residential commuter suburbs began to expand. In the past 45 years, Walnut Creek, Concord, and San Ramon have become major business and retail centers called "edge cities." The population of central and east Contra Costa County has nearly doubled since 1970 (Cerny 2007:339).

Marin County

Marin was not settled by the Spanish until 1817, when Mission San Francisco de Asis built Mission San Rafael Archangel, a hospital mission and refuge. With the exception of the areas along the coast, which were reserved for the military, today's Marin County belonged to Mission San Rafael. Beginning in 1834, the mission lands were subdivided into 21 Mexican ranchos.

When California became a state in 1850, Marin was divided into the townships of Sausalito, Bolinas, Novato, and San Rafael. Ranching and lumber were the foundations of Marin's early economy. John Reed built a sawmill in Mill Valley by 1834 and James Ross logged the area until his death in 1862. Logging on the west side of Mt. Tamalpais began in 1851, and the Bolinas Wharf was established to provide berthing for the sloops that would carry the lumber to San Francisco.

The first railroad to operate in Marin County was the San Rafael & San Quentin Railroad in 1870; the second was the North Pacific Coast Railroad in 1875 and ran from Sausalito to Tomales. The North Pacific Coast Railroad eventually expanded up to Duncan Mills on the Russian River, over to San Anselmo, and down to San Francisco. The railroad eventually became the Northwestern Pacific. The Golden Gate Bridge was opened in 1937, however the commuter suburbs did not grow until after World War II. After the filling and draining of the creeks and marshes on either side of Highway 101, the commercial developments began to appear along Highway 101 in the 1950s, replacing the dairy ranching in the area (Cerny 2007:459-461).

Napa County

The first non-Spanish settler in the Napa Valley area was George Calvert Yount. A North Carolina native, Yount was hired in 1833 to repair the buildings at the San Rafael and Sonoma missions and to complete carpentry work for Mexican General Mariano Vallejo. Yount became a Mexican citizen and was subsequently awarded Rancho Caymus in 1836 and Rancho La Jota on Howell Mountain in 1843, comprising 11,814 and 4,454 acres, respectively, where his business enterprises included a flour mill and sawmills.

Rancho Caymus, located in central Napa Valley in Wappo territory, included the northern fringe of the town of Yountville, which was named after Yount. The 8,865-acre Mexican land grant was awarded in 1841 by Governor pro-tem Manual Jimeno to Cayetano Juárez. Juárez was a California native and had served in the military under General Mariano Vallejo between 1828 and 1836. He was appointed mayordomo at Sonoma in 1836 and was elected alcalde of Sonoma in 1845. An adobe house built by Juárez circa 1847, now operated as a restaurant, stands today at the junction of Soscol Avenue and Silverado Trail.

Many emigrant American families settled in the Napa Valley region between 1840 and 1845. In 1847, the grid for Napa City was laid out by John Grigsby and Nathan Coombs on property they had acquired from Nicholas Higuera's Rancho Entre Napa. Originally comprising the land between Brown Street and the Napa River and extending 600 yards from Napa Creek to the steamboat landing at Third Street, the land from several ranchos was combined to form the present-day City of Napa. In 1850, the first steamboat navigated the Napa River from San Francisco.

Napa County was established in February 1850 and is one of California's original 27 counties. The City of Napa was incorporated in 1874 and has always been the county seat. The county and the city prospered in the wake of the Gold Rush as ranching, farming, and local businesses flourished. The Napa Valley Railroad was completed in 1865 and was extended to Napa Junction (now American Canyon) in 1869. After 1905, interurban rail service linked the city to Vallejo, San Francisco, and the Bay Area.

Napa Valley's world-renowned viticulture industry began with the Spanish padres, who established the final and northernmost Spanish mission (San Francisco Solano de Sonoma) in 1823 at what is now the town of Sonoma. The industry became well established when Charles Krug started making large quantities of wine in the late 1850s and early 1860s. The Charles Krug facility remains the valley's oldest operating winery. Also located in St. Helena, the Christian Brothers vintners built one of the world's largest stone wineries in 1889. By the end of the nineteenth century, there were more than 140 wineries in the valley (Natural Investigations Company 2016:14-15).

San Francisco County

Non-native explorers, settlers, and colonists began to arrive on the San Francisco Peninsula in the late 18th century. The government of Spain established a military outpost, or *presidio*, at the northern tip of the peninsula near the mouth of the Golden Gate in 1776. Concurrently, Catholic missionaries of the Franciscan order established the sixth *misión* in a chain that would eventually number 21 along the California coast. The permanent chapel of the Mission San Francisco de Asis (Mission Dolores) was completed in 1791 near present-day 16th and Dolores Streets. When Mexico won independence from Spain in 1821, Mexico secularized the missions and conferred vast, private rancho tracts across the entire San Francisco Peninsula and beyond. By 1835, a small civilian commercial port settlement, the Pueblo of Yerba Buena, was established in the area of California and Montgomery Streets, initially supported by the export of California hides and tallow and the import of goods from the eastern United States and Europe.

In 1839, the pueblo's first survey platted the area and established a rectangular grid of blocks aligned to the cardinal directions. In 1847, Market Street was laid out on a diagonal to the earlier street grid, with much of its route along an old path to the Mission. Soon thereafter, a survey platted the area south of Market Street on a street grid aligned diagonally with Market, and with quadruple-sized lots, conflicting with the grid to the north. This unconventional mismatch of surveys, platted at the birth of the City, is apparent today in the enduring street-and-block patterns north and south of Market Street.

In 1847, during the Mexican-American War, the U.S. changed the name of the settlement from Yerba Buena to San Francisco. The settlement changed dramatically with the discovery of gold in the Sierra Nevada foothills. San Francisco was the closest harbor to the strike, and by 1849 the city was growing exponentially. The population grew from 400 in 1848 to approximately 35,000 in 1852. The City boundary line was sequentially expanded southward and westward, ultimately reaching its current location (and merger with the County line) in 1856.

On April 18th, 1906, a massive earthquake struck San Francisco. Although the quake itself did relatively little damage, the many ruptured gas lines, overturned furnaces, and toppled brick chimneys soon produced scores of fires that quickly spread unchecked throughout the City, while damaged water mains made firefighting extraordinarily difficult. The physical rebuilding of the City began within months, and even days, of the 1906 disaster. The City's reconstruction, despite occurring without central planning or leadership, resulted in modernization of the financial and industrial bases, densification and expansion of residential neighborhoods, wholesale social and economic reorganization of the city, and ultimately a new San Francisco.

A nationwide economic surge during the 1920s correlated with another building boom in San Francisco as well as the enacting of the City's first Planning Code in 1921, mandating the geographic separation of land uses. The opening of streetcar tunnels in 1918 and 1928, and the adoption of mass automobile use beginning in the 1920s, spurred residential development in outlying areas of the City. During the 1930s and the economic downturn of the Great Depression, the City was provided with some of its finest public works projects. Major structures such as the San Francisco-Oakland Bay Bridge, the Golden Gate Bridge, Coit Tower, Rincon Annex, Aquatic Park, and numerous firehouses, libraries, police stations, and schools were constructed with the aid of New Deal federal funds.

After World War II, many military personnel and wartime workers stayed in San Francisco, swelling the population and prompting more residential construction in outlying areas where land was still available. The 1950s and 1960s brought federally funded, locally implemented urban renewal to San Francisco. Urban renewal projects cleared large sites in the City's core and redeveloped them with highly programmed landscapes. The Downtown area experienced dramatic growth in the 1970s and 1980s, driven by booming markets for office and commercial space. Mass transit was improved by completion of the Bay Area Rapid Transit regional rail system under Market and Mission Streets, and by a parallel Market Street subway for the City's local streetcar lines.

As the 20th century drew to a close, San Francisco's vast post-industrial districts located south of the Downtown core, long under-utilized and subject to deterioration, became the focus of physical redevelopment.

New demands for housing, commercial, and institutional space initiated transformations of former warehouses and factories, rail yards, and shipping facilities into high-density urban neighborhoods replete with public services and amenities (San Francisco Planning Department 2009).

San Mateo County

After the mission lands were secularized in 1835, seventeen land grants were carved out of what would become San Mateo County. The southern hill country between Woodside and Redwood City became a significant area for logging operations after gold was discovered in 1848 and early San Mateo industries focused on providing San Francisco with resources: agriculture, lumbering, oyster cultivation, shrimp fishing, whaling, and waterworks. After the completion of the San Francisco/San Jose Railroad in 1864, San Mateo County became the first railroad suburb west of the Mississippi where the elite of San Francisco's industrial and commercial circles established country estates. Large suburban estates, not subdivided until the first third of the twentieth century, retarded growth and gave San Mateo County a distinctive character.

The twentieth century brought considerable growth to San Mateo County. After the 1906 earthquake, there was a large migration to the peninsula. A newly constructed streetcar system from San Francisco all the way to San Mateo allowed the hamlets along the line to become home to a new middle-class suburbanite. The affordability and popularity of the automobile through the 1920s added to this growth. However, it was World War II that had the greatest impact on the built environment. San Francisco International Airport, termed a "mud hole" before the war, was improved to such an extent by the U.S. Army that it was handling one-tenth of all air traffic in the United States by 1946. Supporting businesses sprang up nearby. Partially because of the growth of the airport, a wartime electronics industry exploded onto the scene (Cerny 2007:117-119).

Santa Clara County

For seventy-five years the mission, pueblo, and an evolving rancho system developed under Spanish and then Mexican rule, transforming the fertile Santa Clara valley into a frontier agricultural region that exported beef and hides to world markets. After California's admission to the United States, Santa Clara County gained a worldwide reputation as an important agricultural region known as the "Valley of Heart's Delight." During the Gold Rush, the city of San Jose served as one of the supply centers for hopeful miners. Sawmills established in the Santa Cruz Mountains utilized an abundance of old-growth redwood that fueled construction in the valley until the beginning of the twentieth century.

A railroad was completed from San Francisco to San Jose in 1864, and distribution of Santa Clara County's agricultural products was further facilitated with a regional connection to the transcontinental railroad in 1869. By the late 1880s, fruit orchards supplanted grain as land was subdivided into smaller parcels. During the early twentieth century, large canneries and packing plants were built to process the abundant production of fruit.

World War II also had a major effect on Santa Clara County. The large naval air station at Moffett Field became a gateway to military activity in the Pacific, with thousands of personnel brought to the area for training and processing. Soon after the war, the local business community launched an active campaign to attract new nonagricultural-related industries. Cold war industries began to locate near Moffett Field in the Sunnyvale and Mountain View areas. When IBM settled in downtown San Jose in the early 1940s, the invention of the Winchester Disk Drive set the stage for the eventual creation of the place now known as Silicon Valley.

Between 1945 and 1964, orchards were subdivided further into residential tracts, industrial parks, shopping centers, and schools at an average rate of 17,000 acres per year. Within cities and their environs that constitute the urban topology of the county, some of the rural character that was once the "Valley of Heart's Delight" continues to exist, side by side with the modern constructions that house high-tech factories and think tanks (Cerny 2007:165-167).

Solano County

Solano County contained five confirmed Mexican land grants. The first of the land grants was Rancho Suisun. Rancho Tolenas, adjacent to Rancho Suisun, included part of Fairfield and extended north into Napa County. The patent was issued in 1840 to Jose Francisco and Antonio Armijo. Juan Felipe Peña and Juan Manuel Vaca

were granted Rancho de los Putos in the 1840s. Rancho de los Putos comprised almost 18,000 acres, including Lagoon Valley, Vaca Valley, and Vacaville. Rancho Rio de Los Putos, adjacent to Puta Creek in the northwestern portion of the county, was granted to William Wolfskill in 1842. Also called the Wolfskill Grant, Rancho Rio de los Putos was developed by four Wolfskill brothers, who planted extensive orchards, including a stand of olive trees that still remains today. Rancho Los Ulpinos was granted to John Bidwell in 1844. Bidwell's rancho was adjacent to the Sacramento River. Also in 1844, General Mariano Vallejo established a settlement named Eureka in a portion of his unconfirmed Rancho Suscol; later, this settlement was renamed Vallejo in his honor. Benicia and Cordelia were also within Rancho Suscol. Rancho Sobrante, another unconfirmed rancho, included today's towns of Montezuma, Birds Landing, Collinsville, and Denverton.

The primary economy during the Rancho Period was the hide and tallow trade. Large herds of cattle were raised and slaughtered for their hides, which were traded for goods and services. Each hide was worth one dollar in trade and referred to as a "California dollar." The hides were shipped to New England and used in the shoe and boot industry. Tallow was derived from the fat and used to make candles and soap. There was little value to the meat and dead carcasses littered fields and ports.

In the late 1840s and 1850s, former gold seekers and pioneers began settling Solano County, where they raised livestock and cultivated fruit orchards, vineyards, wheat, barley, and oats. Produce and livestock were transported overland by wagons to the many sloughs throughout the county, and then shipped by water to waiting markets. Twelve townships were established in Solano County between 1850 and 1871. Although the largest towns were adjacent to San Pablo and Suisun Bays, the majority of towns were situated at the ends of sloughs or channels that primarily ran through the eastern portion of the county. In 1868, the completion of the California Pacific Railroad through Solano County allowed the shipment of goods to East Coast markets, significantly bolstering economic development, agricultural production, and population growth. In 1913, the Oakland, Antioch, and Eastern Railway opened its 93-mile route from San Francisco to Sacramento, through largely unpopulated parts of Solano County. In 1928, the Sacramento Northern Railway purchased the railway, but the Depression and the popularity of the automobile contributed to the end of passenger service in 1940; by 1987 the railway had been abandoned (Solano County 2008:4.10-7).

Sonoma County

European settlement of Sonoma County began on the coast at Fort Ross (1812-1841). With concern over the Russian presence, the Sonoma Mission was founded in 1823. After secularization, General Mariano Guadalupe Vallejo established the Pueblo de Sonoma in 1835, the first town in the county. For his services, Vallejo received a land grant that extended from Petaluma to Solano County.

The San Francisco & North Pacific Railroad, the first Sonoma County railroad began operating in 1870, meeting ferries from San Francisco, just south of Petaluma. In 1875 the North Pacific Coast Railroad linked Sausalito to the coastal communities along Tomales Bay. Further east, the Sonoma Valley Railroad began operation in 1879. These lines merged in 1914 to form the Northwestern Pacific Railroad, which operated from Sausalito to Eureka, until the 1990s.

After statehood, logging along the coastal hills, cattle and dairy ranching, and potato farming supported the county. During the first half of the 20th century, the poultry industry, fruit and fruit processing and hops production were briefly profitable. Today wineries have replaced many of the ranches, most of which relocated to California's Central Valley (Cerny 2007:415-417).

RECORDED REGIONAL RESOURCES

Paleontological Resources

A search of the University of California Museum of Paleontology (UCMP) database at UC Berkeley was conducted on July 6, 2016. Records of paleontological finds maintained by the UCMP (UCMP 2016) state that there are approximately 5,735 sites at which fossil remains have been found in the Bay Area, with the greatest concentration of 2,561 occurring in Contra Costa County. San Mateo County has the second highest number

of paleontological sites at 925. Table 2.11-2 shows a breakdown of these paleontological resources by epoch of each site.

Table 2.11-2 Recorded Paleontological Sites in the Bay Area

Epoch/ Period of Site	Alameda County	Contra Costa County	Marin County	Napa County	San Francisco County	San Mateo County	Santa Clara County	Solano County	Sonoma County
Holocene	5	4	11	0	57	73	5	86	11
Pleistocene	74	72	23	1	35	120	19	12	15
Pliocene	5	82	49	5	9	203	7	4	82
Miocene	212	1146	24	11	3	46	52	9	22
Oligocene	0	136	0	0	0	5	2	0	0
Eocene	42	572	0	7	0	101	9	112	1
Paleocene	2	223	0	1	0	5	11	8	7
Cretaceous	50	110	0	76	1	51	29	35	9
Jurassic	13	2	1	23	0	0	9	0	1
Recent	47	90	240	3	83	305	8	8	376
Unknown	52	124	16	24	10	16	40	16	29
Total	**502**	**2561**	**364**	**151**	**198**	**925**	**191**	**290**	**553**

Source: UCMP 2016

Historic and Archeological Resources

The interpretations and designations of historic and archaeological resources in the Bay Area are documented at the Northwest Information Center (NWIC) at Sonoma State University. This information reflects the presence of known archaeological sites; known geological, soil, biological, hydrological, and topographical features; and the experience of archaeologists familiar with the field occurrences of such resources in the Bay Area.

As shown in Table 2.11-3, previous records searches in the Bay Area showed that approximately 8,118 pre-historic and historic cultural sites have been recorded in the Bay Area and are listed with the California Historical Resources Information System (CHRIS), maintained at the NWIC. If one counts all historic and prehistoric recorded sites, buildings, and structures, there are over 33,000 such sites, buildings, and structures in the Bay Area.

Of the 8,118 sites recorded in the nine-county Bay Area, there are 1,006 cultural resources listed on the California Register of Historic Resources (CRHR), meaning that they are significant at the local, State, or national level as specified under a set of established criteria (see details in Regulatory Setting below); of those, 744 are also listed on the National Register of Historic Places (NRHP). From this list, 249 resources are listed as California Historic Landmarks. The greatest concentration of historic resources listed on both the NRHP and the CRHR in the Bay Area occurs in San Francisco, with 181 resources. Alameda County has the second highest number of NRHP- and CRHR-listed historic resources, with 147.

Table 2.11-3 Recorded Archaeological and Historical Sites in the Bay Area

Source of Record	Alameda County	Contra Costa County	Marin County	Napa County	San Francisco County	San Mateo County	Santa Clara County	Solano County	Sonoma County
Total Recorded Resources (including buildings)[1]	11,242	3,060	2,775	1,517	4,873	2,252	2,599	747	4,304
Individually Listed Resources on both the NRHP and the CRHR[2]	147 BSO	39 BSO	41 BSO	78 BSO	181 BSO	51 BSO	104 BSO	22 BSO	64 BSO
	0 AS	0 AS	5 AS	0 AS	5 AS	1 AS	2 AS	0 AS	4 AS
Individually Listed Resources Only on the CRHR	302 BSO	18 BSO	25 BSO	18 BSO	242 BSO	32 BSO	121 BSO	66 BSO	59 BSO
	12 AS	41 AS	4 AS	11 AS	2 AS	0 AS	31 AS	5 AS	17 AS
California Historical Landmarks[3]	37	15	14	17	48	34	43	14	27
Historic Bridges Listed on the Caltrans Local Bridge Survey[4]	175	187	123	93	78	120	239	115	223

Abbreviations: BSO (Building, Site, or Object); AS (Archaeological Site).

Notes:

1 Number of all recorded sites including prehistoric and historic archaeological sites with and without trinomials, as well as recorded historic-period buildings and structures.

2 Not included here are resources that have been listed as *contributors to* an Archaeological or Historic District, or resources that have been determined to be *eligible* for listing (but not listed) on the NRHP or the CRHR.

3 State Office of Historic Preservation's California Landmarks By County, July 5, 2016, http://ohp.parks.ca.gov/?page_id=21387. BSO and AS are reported together.

4 Caltrans Local Bridge Survey, Update 2005, computer database, query only pre-1960 bridges. Please note, a previous "Category 3" used to compile prior RTP EIR listings no longer exists in this survey, with the result that this update may show lower totals compared to previous surveys reported in other EIRs.

Source: NMTC and ABAG 2013

Locations of Sensitivity

Dense concentrations of Native American archaeological sites occur along the historic margins of San Francisco and San Pablo Bays. In addition, archaeological sites have also been identified in the following environmental settings in all Bay Area counties: near sources of water such as vernal pools and springs; along ridgetops and on midslope terraces; and at the base of hills and on alluvial flats.

Native American archaeological sites have also been identified in the inland valleys of all Bay Area counties. Remains associated with a Native American archaeological site may include chert or obsidian flakes, projective points, mortars and pestles, and dark friable soil containing shell and bone dietary debris, heat-affected rock, or human burials.

Dense concentrations of historic resources are often found in large urban areas and smaller cities that experienced growth and development during the historic period. Historic resources are also found in rural settings where homesteads, ranches, or farms were once present. Historic remains may include stone or adobe foundations or walls, structures and remains with square nails, and refuse deposits often in old wells and privies.

Tribal Cultural Resources and Native American Coordination

AB 52 applies to those projects for which a lead agency had issued a NOP of an EIR or notice of intent to adopt a negative declaration or mitigated negative declaration on or after July 1, 2015. The NOP for the Plan was issued on May 16, 2016. Therefore, the requirements of AB 52 apply and MTC has initiated consultation with Tribes that have requested consultation and those that have been identified by NAHC to learn about any tribal cultural resources (TCRs) in the Plan area (TCRs, as defined in PRC Section 21074, are described under "Assembly Bill 52," below). Correspondence in compliance with AB 52 is provided in Appendix L of this Draft EIR and summarized in Table 2.11-4 below.

Table 2.11-4 Summary of AB 52 Consultation

Native American Contact Name	Native American Contact Group	Date of Initial Letter	Date(s) Reply Received	Comment
Mr. Gene Buvelot	Federated Indians of Graton Rancheria	August 12, 2016	September 30, 2016	Email from Federated to MTC noting that tribe has no comments but asking to be notified of any changes in the project.
Rosemary Cambra	Muwekrna Ohlone Indian Tribe of the San Francisco Bay Area	August 12, 2016	None	None
Tony Cerda	Coastanoan Rumsen Carmel Tribe	August 12, 2016	MTC letter returned as undeliverable	None
Reno Keoni Franklin	Kashia Band of Pomo Indians of the Stewarts Point Rancheria	August 12, 2016	None	None
Andrew Galvan	Ohlone Indian Tribe	August 12, 2016	None	None
Patricia Hermosillo	Cloverdale Rancheria of Pomo Indians	August 12, 2016	None	None
Raymond Hitchcock	Wilton Rancheria	August 12, 2016	None	None
Leland Kinter	Yocha Dehe Wintun Nation	August 12, 2016	October 10, 2016 letter from Yocha DeHe to MTC requesting consultation	October 21, 2016 email from MTC to Yocha DeHe requesting dates and location for consultation. November 14, 2016 email from MTC to follow up and confirm receipt of previous email. November 15, 2016 email from Yocha DeHe asking if any general project meetings have been planned. December 12, 2016 email from MTC to invite Yocha DeHe to the December 9, 2016, MTC/ABAG meeting to discuss the scoping feedback and alternatives received on the EIR for Plan Bay Area 2040.
Valentin Lopez	Amah Mutsun Tribal Band (Galt)	August 12, 2016	None	August 10, 2016 call from Amah Band to MTC requesting information. August 12, 2016 call from MTC to Amah Band notifying that August 12, 2016 letter was mailed and offering follow-up.
Marjorie Mejia	Lytton Rancheria	August 12, 2016	None	None
Katherine Erolinda Perez	North Valley Yokuts Tribe	August 12, 2016	None	None
Greg Sarris	Federated Indians of Graton Rancheria	August 12, 2016	September 30, 2016	Email from Federated to MTC noting that tribe has no comments but asking to be notified of any changes in the project.
Ann Marie Sayers	Indian Canyon Mutsun Band of Costanoan	August 12, 2016	None	None
Jose Simon, III	Middletown Rancheria of Pomo Indians	August 12, 2016	None	None

Table 2.11-4 Summary of AB 52 Consultation

Native American Contact Name	Native American Contact Group	Date of Initial Letter	Date(s) Reply Received	Comment
Charlie Wright	Cortina Rancheria	August 12, 2016	None	None
Chris Wright	Dry Creek Rancheria Band of Pomo Indians	August 12, 2016	None	None
Irene Zwierlein	Amah Mutsun Tribal Band of Mission San Juan Bautista	August 12, 2016	None	None
Randy Yonemura	Ione Band of Miwok Indians	March 2, 2016 Letter from Ione Band of Miwok Indians requesting consultation on pursuant to AB 52	None	March 31, 2016 Letter to Ione tribe from MTC offering to initiate consultation, requesting a meeting, and informing regarding upcoming NOP release May 24, 2016 Letter to Ione Tribe noting that no response to March 31st letter was received, providing copy of NOP, offering again to initiate consultation, inviting to scheduled open houses, inviting to scoping meetings, and inviting to Tribal Summit. July 13, 2016 Email received from Ione Tribe requesting information, details, records searches, survey results, and EIRs. August 11, 2016 Email response from MTC to Ione tribe explaining PBA 2040 is a plan level document and the specific information requested has not been produced. Email extended offer to meet and requested response by September 12, 2016.

In addition to AB 52 consultation, MTC sent a copy of the NOP to the following tribes on May 16, 2016.

- Cloverdale Rancheria of Pomo Indians
- Dry Creek Rancheria Band of Pomo Indians
- Federated Indians of Graton Rancheria
- Ione Band of Miwok Indians
- Kashia Band of Pomo Indians of the Stewarts Point Rancheria
- National Indian Justice Center
- Redwood Valley Rancheria
- Scotts Valley Band of Pomo Indians
- Torres Martinez Desert Cahuilla Indians

On May 26, 2016 MTC mailed invitations to a Tribal Summit that was held on June 13, 2016. A second Tribal Summit is scheduled for May 2017 and MTC mailed invitations on April 7, 2017. The invitations were sent to the following tribes:

- Amah Mutsun Tribal Band
- Amah Mutsun Tribal Band of Mission San Juan Bautista
- Big Valley Rancheria
- Cloverdale Rancheria of Pomo Indians
- Coastanoan Rumsen Carmel Tribe
- Cortina Band of Indians
- Cortina Rancheria
- Lytton Rancheria
- Middletown Rancheria of Pomo Indians
- Muwekma Ohlone Indian Tribe of the SF Bay Area
- National Indian Justice Center
- North Valley Yokuts Tribe
- Potter Valley Rancheria

- Coyote Valley Band of Pomo Indians
- Dry Creek Rancheria Band of Pomo Indians
- Federated Indians of Graton Rancheria
- Guidiville Rancheria
- Indian Canyon Mutsun Band of Costanoan
- Ione Band of Miwok Indians
- Kashia Band of Pomo Indians of the Stewarts Point Rancheria
- Lower Lake Rancheria Koi Nation
- Redwood Valley Little River Band of Pomo Indians
- Redwood Valley Rancheria
- River Rock Casino
- Robinson Rancheria
- Scotts Valley Band of Pomo Indians
- The Ohlone Indian Tribe
- Torres Martinez Desert Cahuilla Indians
- Wilton Rancheria
- Yocha Dehe Wintun Nation

2.11.2 Regulatory Setting

FEDERAL REGULATIONS

The National Historic Preservation Act

Among those statutes enacted by Congress that affect historic properties, the National Historic Preservation Act of 1966 (NHPA) is the most significant law that addresses historic preservation. One of the most important provisions of the NHPA is the establishment of the National Register of Historic Places (NRHP), the official designation of historical resources. Districts, sites, buildings, structures, and objects are eligible for listing in the Register. Nominations are listed if they are significant in American history, architecture, archeology, engineering, and culture. The NRHP is administered by the National Park Service. To be eligible, a property must be significant under criterion A through D (described below); and ordinarily be 50 years of age or more.

> A. Are associated with events that have made a significant contribution to the broad patterns of our history; or
>
> B. Are associated with the lives of persons significant in our past; or
>
> C. Embody the distinctive characteristics of a type, period, or method of installation, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction; or
>
> D. Have yielded, or may be likely to yield, information important in prehistory or history.

Listing in the NRHP does not entail specific protection or assistance for a property but it does guarantee recognition in planning for federal or federally-assisted projects, eligibility for federal tax benefits, and qualification for federal historic preservation assistance. Additionally, project effects on properties listed in the NRHP must be evaluated under CEQA.

Once a resource has been recorded and if it is determined to be significant, the potential impacts (or effects) of a project on a heritage property are assessed. Federal regulatory impact thresholds are contained in Section 106 of the NHPA and accompanying regulations (36 Code of Federal Regulations [CFR] Part 800). Section 106 requires that federal agencies consider the effects of their actions on significant archaeological properties before implementing a project or "undertaking." The criteria of effect are found in 36 CFR 800.0(a) and state that:

> An undertaking has an effect on a historic property when the undertaking may alter characteristics of the property that may qualify the property for inclusion in the National Register.

The Advisory Council's regulations require that the federal agency apply the criteria of adverse effect to historic properties that will be affected by a proposed undertaking (36 CFR 800.9b). An undertaking is considered to

have an adverse effect when the effect on a historic property may diminish the integrity of the property's location, design, setting, materials, workmanship, feeling, or association, or the quality of data suitable for scientific analysis. These seven aspects of integrity are described as:

- Location. Integrity of location refers to whether a property remains where it was originally constructed or was relocated.
- Design. Integrity of design refers to whether a property has maintained its original configuration of elements and style that characterize its plan, massing, and structure. Changes made after original construction can acquire significance in their own right.
- Setting. Integrity of setting refers to the physical environment surrounding a property that informs the characterization of the place.
- Materials. Integrity of materials refers to the physical components of a property, their arrangement or pattern, and their authentic expression of a particular time period.
- Workmanship. Integrity of workmanship refers to whether the physical elements of a structure express the original craftsmanship, technology and aesthetic principles of a particular people, place or culture at a particular time period.
- Feeling. Integrity of feeling refers to the property's ability to convey the historical sense of a particular time period.
- Association. Integrity of association refers to the property's significance defined by a connection to a particular important event, person or design.

Secretary of the Interior's Standards for the Treatment of Historic Properties

The Secretary of the Interior's Standards for the Treatment of Historic Properties (Weeks and Grimmer, 1995) are intended to promote responsible preservation practices for treatment of historic properties (buildings, structures, objects, districts, and landscapes). The advisory, not regulatory, standards do not, in and of themselves, prescribe decisions about which features of a historic property should be saved and which can be changed. But once a treatment is selected, the standards provide philosophical consistency and guidance to the work. The four treatment approaches, in order of priority are:

- Preservation, which places a high premium on the retention of all historic fabric through conservation, maintenance and repair. It reflects a property's continuum over time, through successive occupancies, and the respectful changes and alterations that are made.
- Rehabilitation, which emphasizes the retention and repair of historic materials, but more latitude is provided for replacement because it is assumed the property is more deteriorated before work. (Both preservation and rehabilitation standards focus attention on the preservation of those materials, features, finishes, spaces, and spatial relationships that, together, give a property its historic character.)
- Restoration, which focuses on the retention of materials from the most significant time in a property's history, while permitting the removal of materials from other periods.
- Reconstruction, which establishes limited opportunities to re-create a non-surviving site, landscape, building, structure, or object in all new materials.

The standards are an important reference under CEQA because CEQA Guidelines Sections 15064.5(b)(3) and 15126.4(b) specify that a project that may cause a substantial adverse change in the significance of a historical built environment resource that generally follows the Secretary of the Interior's Standards shall be considered as mitigated to a level of less than significant on the historical resource.

California Department of Transportation Act of 1966

Section 4(f) of the California Department of Transportation (DOT) Act, as amended and recodified in 1983 (49 U.S. Code, § 303), is triggered by projects funded or approved by a DOT agency, including the Federal Highway Administration, Federal Transit Administration, Federal Railroad Administration, and Federal Aviation Administration. Section 4(f) requires a comprehensive evaluation of all environmental impacts resulting from projects that involve the use, or interference with use, of the following types of land:

- publicly owned park lands that are open to the public;
- publicly owned recreation areas that are open to the public;
- publicly owned wildlife and waterfowl refuges that are open to the public; and
- publicly- or privately-owned historic sites of federal, state, or local significance that are eligible for listing in or are listed in the NRHP.

This evaluation, called the Section 4(f) statement, must be completed by proponents of federal-aid transportation projects in the RTP Plan area that affect Section 4(f) protected land, as defined above. To proceed with use of the above-referenced lands, the evaluation must be sufficiently detailed to permit the U.S. Secretary of Transportation to determine that:

- there is no feasible and prudent alternative to the use of such land;
- the program or project includes all possible planning to minimize harm to any park, recreation area, wildlife and waterfowl refuge, or historic site that would result from the use of such lands; and
- if there is a feasible and prudent alternative, a proposed project using Section 4(f) protected lands cannot be approved by the Secretary; or if there is no feasible and prudent alternative, the proposed project must include all possible planning to minimize harm to the affected lands.

Detailed inventories of the locations and likely impacts on resources that fall into the Section 4(f) category are required in project-level environmental assessments.

In August 2005, Section 4(f) was amended under the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU) to simplify the process and approval of projects that have only de minimis impacts on lands protected by Section 4(f). Under these provisions, the U.S. Secretary of Transportation may find such a de minimis impact if consultation with the State Historic Preservation Officer (SHPO) under Section 106 of the NHPA results in a determination that a transportation project will have no adverse effect on the historic site or that there will be no historic sites (i.e., historic properties) affected by the proposed action. In this instance, analysis of avoidance alternatives of Section 4(f) protected properties is not required and the Section 4(f) evaluation process is complete.

American Indian Religious Freedom Act of 1978

The American Indian Religious Freedom Act of 1978 (AIRFA) (42 U.S. Code, § 1996) pledges to protect and preserve the traditional religious rights of American Indians, Aleuts, Eskimos, and Native Hawaiians. The Act establishes a national policy that traditional Native American practices and beliefs, sites (and right of access to those sites), and the use of sacred objects shall be protected and preserved. If a place of religious importance to American Indians could be affected by a federal undertaking, AIRFA promotes consultation with Indian religious practitioners, which could be coordinated with Section 106 consultation. Amendments to Section 101 of NHPA in 1992 strengthened the interface between AIRFA and NHPA by clarifying the following: (1) properties of traditional religious and cultural importance to an Indian tribe or Native Hawaiian organization could be determined to be eligible for inclusion in the NRHP; and (2) in carrying out its responsibilities under Section 106, a federal agency shall consult with any Indian tribe or Native Hawaiian organization that attaches religious and cultural significance to properties described under (1).

Archeological Resources Protection Act of 1979

The Archeological Resources Protection Act of 1979 (ARPA) (43 Code Fed. Regs., § 7) establishes uniform definitions, standards, and procedures to be followed by all Federal land managers in providing protection for archaeological resources, located on public lands and Native American lands. Under ARPA, additional requirements could apply to agency action if federal or Indian lands are involved. ARPA: (1) prohibits unauthorized excavation on federal and Indian lands; (2) establishes standards for permissible excavation; (3) prescribes civil and criminal penalties; (4) requires agencies to identify archeological sites; and (5) encourages cooperation between federal agencies and private individuals.

Native American Graves Protection and Repatriation Act of 1990

The intent of the Native American Graves Protection and Repatriation Act of 1990 (NAGPRA) (25 U.S. Code, § 3001) is to identify Native American affiliation or lineal descent and ensure the rightful disposition, or repatriation, of Native American human remains, funerary objects, sacred objects, and items of cultural patrimony that are in federal possession or control. The regulations implementing the requirements of NAGPRA relating to the inadvertent discovery of human remains and objects of cultural patrimony of Native American origin on federal or tribal lands are described in 43 Code of Federal Regulations Section 10.4.

Omnibus Public Lands Management Act of 2009

The Omnibus Public Lands Management Act (16 U.S. Code, § 1132) contains provisions for the protection and preservation of paleontological resources. Under this law, the secretaries of the departments of Interior and Agriculture are directed to inventory, manage, and protect paleontological resources on the public lands they administer. In addition, the secretaries are directed to coordinate these efforts and to establish education programs to increase public awareness of the significance of paleontological resources. The law also prohibits the collection of paleontological resources from federal lands without a permit, except in the case of noncommercial collecting that complies with other regulations for that federal land.

STATE REGULATIONS

California Register of Historic Resources

The SHPO also maintains the CRHR. Historic properties listed, or formally designated for eligibility to be listed, on the NRHP are automatically listed on the CRHR (PRC Section 5024.1). State Landmarks and Points of Interest are also automatically listed. The CRHR can also include properties designated under local preservation ordinances or identified through local historic resource surveys.

For a historic resource to be eligible for listing on the CRHR, it must be significant at the local, State, or national level under one or more of the following four criteria:

1. It is associated with events that have made a significant contribution to the broad patterns of local or regional history, or the cultural heritage of California or the United States;

2. It is associated with the lives of persons important to local, California, or national history;

3. It embodies the distinctive characteristics of a type, period, region, or method of construction, or represents the work of a master or possesses high artistic values; or

4. It has yielded, or has the potential to yield, information important to the prehistory or history of the local area, California, or the nation.

California Environmental Quality Act

CEQA requires public agencies to consider the effects of their actions on both “historical resources” and “unique archaeological resources.” Pursuant to PRC Section 21084.1, a “project that may cause a substantial adverse change in the significance of an historical resource is a project that may have a significant effect on

the environment." Section 21083.2 requires agencies to determine whether proposed projects would have effects on unique archaeological resources.

Archaeological Resources

CEQA directs the lead agency on any project undertaken, assisted, or permitted by the State to include in its environmental impact report for the project a determination of the project's effect on unique archeological resources. PRC Section 21083.2 defines unique archeological resources; enables a lead agency to require an applicant to make reasonable effort to preserve or mitigate impacts to any affected unique archeological resource; sets requirements for the applicant to provide payment to cover costs of mitigation; and restricts excavation as a mitigation measure. PRC Section 21083.2, subdivision (g), states that "unique archaeological resource" means an archaeological artifact, object, or site about which it can be clearly demonstrated that, without merely adding to the current body of knowledge, there is a high probability that it meets any of the following criteria:

1. Contains information needed to answer important scientific research questions and that there is a demonstrable public interest in that information.

2. Has a special and particular quality such as being the oldest of its type or the best available example of its type.

3. Is directly associated with a scientifically recognized important prehistoric or historic event or person.

Historic Resources

CEQA establishes that an adverse effect on an historical resource qualifies as a significant effect on the environment. "Historical resource" is a term with a defined statutory meaning (PRC Section 21084.1; determining significant impacts to historical and archaeological resources is described in the State CEQA Guidelines, Sections 15064.5[a] and [b]). Under State CEQA Guidelines Section 15064.5(a), historical resources include the following:

1. A resource listed in, or determined to be eligible by the State Historical Resources Commission, for listing in the CRHR (PRC Section 5024.1).

2. A resource included in a local register of historical resources, as defined in Section 5020.1(k) of the PRC or identified as significant in a historical resource survey meeting the requirements of Section 5024.1(g) of the PRC, will be presumed to be historically or culturally significant. Public agencies must treat any such resource as significant unless the preponderance of evidence demonstrates that it is not historically or culturally significant.

3. Any object, building, structure, site, area, place, record, or manuscript which a lead agency determines to be historically significant or significant in the architectural, engineering, scientific, economic, agricultural, educational, social, political, military, or cultural annals of California may be considered to be a historical resource, provided the lead agency's determination is supported by substantial evidence in light of the whole record. Generally, a resource will be considered by the lead agency to be historically significant if the resource meets the criteria for listing in the CRHR (PRC Section 5024.1), including the following:

    a) Is associated with events that have made a significant contribution to the broad patterns of California's history and cultural heritage;

    b) Is associated with the lives of persons important in our past;

    c) Embodies the distinctive characteristics of a type, period, region, or method of construction, or represents the work of an important creative individual, or possesses high artistic values; or

    d) Has yielded, or may be likely to yield, information important in prehistory or history.

4. The fact that a resource is not listed in or determined to be eligible for listing in the CRHR, not included in a local register of historical resources (pursuant to Section 5020.1(k) of the PRC), or identified in a historical resources survey (meeting the criteria in Section 5024.1(g) of the PRC) does not preclude a lead agency from determining that the resource may be an historical resource as defined in PRC Section 5020.1(j) or 5024.1.

Mitigation of Cultural Resources Impacts

CEQA Guidelines Section 15126.4 states that "public agencies should, whenever feasible, seek to avoid damaging effects on any historical resources of an archaeological nature." The Guidelines further state that preservation-in-place is the preferred approach to mitigate archaeological resource impacts. However, according to Section 15126.4, if data recovery through excavation is "the only feasible mitigation," then a "data recovery plan, which makes provision for adequately recovering the scientifically consequential information from and about the historical resources, shall be prepared and adopted before any excavation being undertaken." Data recovery is *not* required for a resource of an archaeological nature if "the lead agency determines that testing or studies already completed have adequately recovered the scientifically consequential information from and about the archaeological or historical resource." The section further states that its provisions apply to those archaeological resources that also qualify as historic resources.

Paleontological Resources

Paleontological resources are afforded protection by CEQA. Appendix G (Part V) of the CEQA Guidelines provides guidance relative to significant impacts on paleontological resources, stating that a project will normally result in a significant impact on the environment if it will "directly or indirectly destroy a unique paleontological resource or site or unique geological feature." Section 5097.5 of the PRC specifies that any unauthorized removal of paleontological remains is a misdemeanor. Further, the California Penal Code Section 622.5 sets the penalties for the damage or removal of paleontological resources.

Tribal Cultural Resources

Pursuant to PRC Sections 21080.3.1, 21080.3.2, and 21082.3, lead agencies undertaking CEQA review must, upon written request of a California Native American Tribe, begin consultation before the release of an environmental impact report, negative declaration, or mitigated negative declaration. These provisions were enacted by Assembly Bill 52, signed by Governor Edmund G. Brown, Jr., in September of 2014, and established a new class of resources under CEQA: "tribal cultural resources" (TCRs).

To be considered a TCR, a resource must be either:

1. listed or determined to be eligible for listing, on the national, state, or local register of historic resources; or

2. a resource that the lead agency determines, in its discretion and supported by substantial evidence, to treat as a tribal cultural resource pursuant to the criteria in PRC Section 50241(c). PRC Section 5024.1(c) provides that a resource meets the criteria for listing as an historic resource in the CRHR if in meets any of the following:

   (1) Is associated with events that have made a significant contribution to the broad patterns of California's history and cultural heritage.

   (2) Is associated with the lives of persons important in our past.

   (3) Embodies the distinctive characteristics of a type, period, region, or method of construction, or represents the work of an important creative individual, or possesses high artistic values.

   (4) Has yielded, or may be likely to yield, information important in prehistory or history.

California Public Resources Code Section 5024.5 and State-owned Lands

Historical and archaeological resources on state-owned lands are subject to the requirements of PRC Section 5024.5. The provisions are intended to protect significant historical and prehistorical features by requiring notification of the SHPO during the planning process. If the SHPO determines that a proposed action would have an adverse effect on a listed historical resource, California State Parks and the SHPO shall adopt prudent and feasible measures that will eliminate or mitigate the adverse effects. California State Parks maintains written documentation of the SHPO's concurrence with proposed actions that would have an effect on an historical resource on the master list.

Native American Heritage Act

The Native American Heritage Act of 1976 established the Native American Heritage Commission (NAHC) and protects Native American religious values on State property (see PRC Section 5097.9).

Public Notice to California Native American Indian Tribes

Government Code, Section 65092 includes California Native American tribes that are on the contact list maintained by the NAHC in the definition of "person" to whom notice of public hearings shall be sent by local governments.

Health and Safety Code, Sections 7052 and 7050.5

Section 7052 of the Health and Safety Code states that the disturbance of Native American cemeteries is a felony. Section 7050.5 requires that construction or excavation be stopped in the vicinity of discovered human remains until the coroner can determine whether the remains are those of a Native American. If determined to be Native American, the coroner must contact the NAHC.

Public Resources Code, Section 5097

PRC Section 5097 specifies the procedures to be followed in the event of the unexpected discovery of human remains on nonfederal land. The disposition of Native American burial falls within the jurisdiction of the NAHC. Section 5097.5 of the PRC states the following:

> No person shall knowingly and willfully excavate upon, or remove, destroy, injure, or deface any historic or prehistoric ruins, burial grounds, archaeological or vertebrate paleontological site, including fossilized footprints, inscriptions made by human agency, or any other archaeological, paleontological or historical feature, situated on public lands, except with the express permission of the public agency having jurisdiction over such lands. Violation of this section is a misdemeanor.

Native American Graves Protection and Repatriation Act

Health and Safety Code Section 8010-8011 establishes a State repatriation policy intent that is consistent with and facilitates implementation of the federal Native American Graves Protection and Repatriation Act. The Act strives to ensure that all California Indian human remains and cultural items are treated with dignity and respect. It encourages voluntary disclosure and return of remains and cultural items by publicly funded agencies and museums in California. It also states the intent for the State to provide mechanisms for aiding California Indian tribes, including non-federally recognized tribes, in filing repatriation claims and getting responses to those claims.

Senate Bill 18

SB 18 (Stats. 2004, ch. 904; Gov. Code, §§ 65352.3-5) requires that, before the adoption or amendment of a city or county's general plan or specific plans, the city or county shall consult with California Native American tribes that are on the contact list maintained by the NAHC. The intent of this law is to preserve or mitigate impacts on places, features, and objects, as defined in PRC Sections 5097.9 and 5097.993, which are located within the city or county's jurisdiction. The law also states that the city or county shall protect the confidentiality of information concerning the specific identity, location, character, and use of those places, features, and objects identified by Native American consultation. Government Code Sections 65362.3 to 65362.5 apply to all general and specific plans adopted and/or amended after March 1, 2005.

REGIONAL AND LOCAL REGULATIONS

Historic Preservation Ordinances

In addition to national and State historic preservation legislation, many Bay Area counties and cities have adopted optional historic preservation general plan elements or enacted local ordinances that recognize and preserve historic sites. At least 20 Bay Area cities participate in the Certified Local Government Program (CLG) through the OHP. The CLG program is a partnership among local governments, the OHP, and the National Park Service, which is responsible for administering the National Historic Preservation Program. Participating cities include: Alameda, Benicia, Berkeley, Campbell, Danville, Los Altos, Los Gatos, Napa, Oakland, Palo Alto, Redwood City, Richmond, San Francisco, San José, Santa Clara, Saratoga, Sausalito, Sonoma, Sunnyvale, and Vallejo.

City and County General Plans

Most Bay Area counties and cities have general plan goals and policies that consider the protection and/or preservation of archaeological and historic resources. These goals and policies can be included in the open space and conservation elements of the general plan, or some general plans include a separate historic preservation element. Often these policies include the requirement the preservation, to the maximum extent feasible, archaeological sites with significant cultural, historical, or sociological merit; or the requirement that areas found to contain significant historic or prehistoric archaeological artifacts be examined by a qualified consulting archaeologist or historian for appropriate protection and preservation.

2.11.3 Impact Analysis

SIGNIFICANCE CRITERIA

The following significance criteria are based on CEQA Guidelines Appendix G, as well as the thresholds used in the EIR for the 2013 Plan Bay Area, and professional judgment. Under these criteria, implementation of the proposed Plan would have a potentially significant adverse impact on cultural resources if it would:

Criterion 1: Cause a substantial adverse change in the significance of a historic resource as defined in Guidelines Section 15064.5 or eliminate important examples of major periods of California history.

Criterion 2: Cause a substantial adverse change in the significance of a unique archaeological resource as defined in Guidelines Section 15064.5 or eliminate important examples of major periods of California history or prehistory.

Criterion 3: Destroy, directly or indirectly, a unique paleontological resource or site or unique geologic feature.

Criterion 4: Disturb any human remains, including those interred outside of dedicated cemeteries.

Criterion 5: Cause a substantial adverse change in the significance of a TCR as defined in PRC Section 21074.

METHOD OF ANALYSIS

This analysis identifies the potential impacts of implementation of the proposed Plan on archaeological, historical, and other cultural resources, including tribal cultural resources, within the Bay Area. The methodology related to assessment of land use development and transportation project-related impacts recognizes that important cultural resources may be encountered during ground-disturbing construction work under the proposed Plan. It also recognizes that projects associated with the operation and routine maintenance of the existing transportation system, such as signalization, equipment replacement, and asphalt-overlay, would not directly affect cultural resources, because in most instances there would be no related ground disturbances. Ground disturbance related to routine maintenance is generally limited to the

same depth as previous ground disturbance. Because the specific locations of some cultural resources are not mapped, and the exact extent of ground disturbance associated with forecasted land use growth and transportation projects under the proposed Plan is unknown at this time, it is not possible to assess impacts to specific cultural resources. Accordingly, neither project-specific reviews nor field studies are feasible or necessary for this program EIR. The analysis is based on a review of the type and location of forecasted growth and proposed transportation projects listed in the proposed Plan, and their potential to disturb both known and unknown cultural resources.

IMPACTS AND MITIGATION MEASURES

Impact 2.11-1: The proposed Plan could cause a substantial adverse change in the significance of a historic resource as defined in Guidelines Section 15064.5 or eliminate important examples of major periods of California history.

Impacts of Changes in Projected Land Use and Transportation Projects

The effects of development and transportation projects would be similar; therefore, the discussion of their impacts is combined below. Historic resources are specific to their local context, and as such, impacts on these resources resulting from the proposed Plan would occur at the local level. As shown in Table 2.11-3, the nine counties of the Plan area have numerous historic resources that have been listed on the NRHP, CRHR, designated as a California Historical Landmark, or listed on the Caltrans Local Bridge Survey. In the Plan area, there are 727 historic resources individually listed on the NRHP (which automatically lists them on the CRHR); 883 listed only on the CRHR; 249 historical landmarks, and 1,353 historic bridges identified on the Caltrans Local Bridge Survey. The greatest concentration of historic resources listed on both the NRHP and the CRHR occurs in San Francisco, with 181 resources. Alameda County has the second highest number of NRHP- and CRHR-listed historic resources, with 147. However, Alameda County has the highest number of historic resources listed only on the CRHR with 302, while San Francisco has the second highest number listed only on the CRHR with 242 resources.

Projects located in areas with known historical sites, or located in communities with established historic preservation programs, or involving activities that would introduce new visual elements or disturb the existing terrain have the potential to result in significant historic resource impacts. These projects could potentially reduce the aesthetic and physical integrity of historic districts and buildings which represent important examples of periods of California's history. A higher incidence of conflict with historical sites is expected to occur in urban areas with buildings that are more than 45 years old; this would include TPAs, which are located within urbanized areas. Projects located in or traversing rural lands could also have significant impacts related to sites that are singular examples of a historical setting or structures whose historic value and significance have not been previously evaluated and recognized.

Identification of the degree and extent of impact will require project-specific analysis that includes a determination of the importance—i.e., the eligibility for local, State, or national register listing—of any historic resource recognized within a proposed alignment or project area. Given the magnitude and location of new development and transportation improvements involving construction activities in the proposed Plan, it is possible that significant impacts on historic resources could occur. Examples of potential effects resulting from development or transportation projects include:

- damage to or destruction of a structure or property that is a designated historic resource, eligible for listing as a historic resource, or that has not yet been evaluated;
- infill development that is visually incompatible with a designated historic district; or
- roadway improvements that substantially alter the visual character of a designated historic structure or district.

Conclusion

Because proposed individual development projects have the potential to significantly affect historical resources on a regional and localized level thereby eliminating important examples of periods of California's history, these impacts are considered **potentially significant (PS)**. Mitigation Measure 2.11-1 is described below.

Mitigation Measure

2.11-1 Implementing agencies and/or project sponsors shall implement measures, where feasible and necessary based on project- and site-specific considerations that include, but are not limited to:

- Realign or redesign projects to avoid impacts on known historic resources where possible.
- Require a survey and evaluation of structures greater than 45 years in age within the area of potential effect to determine their eligibility for recognition under State, federal, or local historic preservation criteria. The evaluation shall be prepared by an architectural historian, or historical architect meeting the Secretary of the Interior's Standards and Guidelines for Archeology and Historic Preservation, Professional Qualification Standards. The evaluation should comply with CEQA Guidelines section 15064.5(b), and, if federal funding or permits are required, with Section 106 of the National Historic Preservation Act (NHPA) of 1966 (16 U.S.C. § 470 et seq.). Study recommendations shall be implemented.
- If avoidance of a significant architectural/built environment resource is not feasible, additional mitigation options include, but are not limited to, specific design plans for historic districts, or plans for alteration or adaptive re-use of a historical resource that follows the Secretary of the Interior's *Standards for the Treatment of Historic Properties with Guidelines for Preserving, Rehabilitation, Restoring, and Reconstructing Historic Buildings.*
- Comply with existing local regulations and policies that exceed or reasonably replace any of the above measures that protect historic resources.

Significance after Mitigation

Implementation of Mitigation Measure 2.11-1 would reduce impacts associated with historic resources because it would require the performance of professionally accepted and legally compliant procedures for the avoidance of known historic resources and the evaluation of previously undocumented historic resources. To the extent that an individual project adopts and implements all feasible mitigation measures described above, the impact would be less than significant with mitigation (LS-M).

Projects taking advantage of CEQA Streamlining provisions of SB 375 (PRC Sections 21155.1, 21155.2, and 21159.28) must apply the mitigation measures described above, to address site-specific conditions. However, MTC/ABAG cannot require local implementing agencies to adopt the above mitigation measures, and it is ultimately the responsibility of a lead agency to determine and adopt mitigation. Therefore, this impact remains **significant and unavoidable (SU)** for purposes of this program-level review.

Impact 2.11-2: The proposed Plan could cause a substantial adverse change in the significance of a unique archaeological resource as defined in Guidelines Section 15064.5 or eliminate important examples of major periods of California history or prehistory.

Impacts of Changes in Projected Land Use and Transportation Projects

Archaeological artifacts are by nature specific to their local context, and as such, impacts on these resources resulting from the proposed Plan would occur at the local level. New development and transportation projects could result in archaeological impacts if construction activities include the disturbance of previously-identified or unidentified archaeological resources. Projects involving excavation, grading, or soil removal in previously undisturbed areas have the greatest likelihood to encounter significant archaeological resources which could represent important examples of periods of California's prehistory. Likewise, the establishment of staging

areas, temporary roads, and other temporary facilities necessary for construction activities has the potential to impact these cultural resources.

As shown in Table 2.11-3, the nine counties of the Plan area have only a few archaeological sites that have been listed on either the NRHP or CRHR. Marin and San Francisco counties have five sites that are listed on both the NRHP and CRHR; Sonoma County has four; Santa Clara has two; and San Mateo has one. Archaeological sites only listed on the CRHR are slightly more numerous; Contra Costa County has 41: Santa Clara County has 31; Sonoma County has 17; Alameda County has 12; Napa County has 11; Solano County has five; Marin County has four; and San Francisco County has two.

Both rural land conversion and urban infill have the potential to disturb cultural resources, though impacts in rural areas are more likely to contain intact archaeological resources that are situated in their historic context; because these areas are less likely to have been subject to previous ground disturbance. Development anticipated as part of the proposed Plan would convert approximately 6,500 acres of non-urban land to urban uses over the course of the planning period. Table 2.11-5 indicates that the proportion of total land in the region that would be developed for urban uses is only expected to increase from 17.8 to 18.0 percent.

Table 2.11-5 Existing and Future Acreages in Urbanized Land by Land Use Growth Footprint, by Region, County, and TPAs

County	Land Acres	2015 Urban Acres[1]	2015 Percent Urban	Increase in Urban Acres within Land Use Growth Footprint[2,3,4]		2040 Urban Acres[2,3,4]	2040 Percent Urban
Alameda	470,600	146,900	31%	County Total	1,040	147,900	31%
				Within TPAs	260	147,200	31%
Contra Costa	459,600	153,100	33%	County Total	2,500	155,600	34%
				Within TPAs	270	153,400	33%
Marin	331,700	41,800	13%	County Total	40	41,800	13%
				Within TPAs	4	41,800	13%
Napa	483,700	24,000	5%	County Total	350	24,400	5%
				Within TPAs	–	24,000	5%
San Francisco	29,700	23,900	80%	County Total-	140	24,000	81%
				Within TPAs	140	24,100	81%
San Mateo	287,400	72,500	25%	County Total	190	72,700	25%
				Within TPAs	70	72,600	25%
Santa Clara	817,500	189,200	23%	County Total	1,000	190,200	23%
				Within TPAs	80	189,300	23%
Solano	529,300	60,300	11%	County Total	1,100	61,400	12%
				Within TPAs	1	60,300	11%
Sonoma	1,009,000	75,000	7%	County Total	220	75,200	7%
				Within TPAs	1	74,000	7%
Regional Total5	**4,419,000**	**787,000**	**18%**	**County Total**	**6,580**	**793,600**	**18%**
				Within TPAs	**830**	**787,800**	**18%**

Note:

[1] Based on Urban and Built Up Land from the Farmland Mapping and Monitoring Program 2012-2014. This source was used because it was determined to be the proxy for urbanized areas in the region.

[2] Future urbanized footprint is based on modeled growth footprint.

[3] TPA acreages are a subset of County acreages.

[4] Numbers less than 1 are shown as "<1"; Whole numbers have been rounded (between 0 and 10 to the nearest whole number, between 11 and 999 to the nearest 10, between 1,000 and 1,000,000 to the nearest 100, above 1,000,000 to the nearest 1,000). Figures may not sum because of independent rounding.

Source: DOC 2015

Projects in locations of sensitivity, such as the historic margins of San Francisco and San Pablo Bays, ridgetops, midslope terraces, hill bases, alluvial flats, and inland valleys are more likely to encounter cultural resources. Most transportation corridors typically follow valleys and drainage areas, which often correspond with historic settlement patterns. TPAs are located within urbanized areas, and infill development and transportation projects involving improvements within existing urban areas, within existing transportation corridors, or to existing infrastructure or operations are less likely to impact archaeological resources because these projects are generally located in already-disturbed areas that typically have been subject to previous cultural resource surveys; as described previously, historically-significant data is unlikely to be gained from archaeological materials located in areas that have been disturbed. Therefore, encountering intact, previously unknown archaeological resources, still associated with an archaeological site in its historic context, during ground-disturbing activities is less likely.

The degree and extent of impacts would depend upon project location. Project-specific analysis would be required to determine the precise area of impact and the value (i.e., the eligibility for local, State, or national register listing) of any archaeological resource identified within a proposed alignment or project area. Furthermore, all projects undertaken or overseen by Caltrans must abide by extensive procedures and policies, outlined in the *Caltrans Environmental Handbook, Volume 2*, that dictate the nature and extent of cultural resource protections consistent with state and federal law.

Conclusion

Because proposed individual development and transportation projects have the potential to adversely affect archaeological resources thereby eliminating important examples of periods of California's prehistory, these impacts are considered **potentially significant (PS)**. Mitigation Measure 2.11-2 is described below.

Mitigation Measures

2.11-2 Implementing agencies and/or project sponsors shall implement the following measures where feasible and necessary based on project- and site-specific considerations that include, but are not limited to:

- Before construction activities, project sponsors shall retain a qualified archaeologist to conduct a record search at the appropriate Information Center to determine whether the project area has been previously surveyed and whether resources were identified. When recommended by the Information Center, project sponsors shall retain a qualified archaeologist to conduct archaeological surveys before construction activities. Project sponsors shall follow recommendations identified in the survey, which may include activities such as subsurface testing, designing and implementing a Worker Environmental Awareness Program, construction monitoring by a qualified archaeologist, avoidance of sites, or preservation in place.

- In the event that evidence of any prehistoric or historic-era subsurface archaeological features or deposits are discovered during construction-related earth-moving activities (e.g., ceramic shard, trash scatters, lithic scatters), all ground-disturbing activity in the area of the discovery shall be halted until a qualified archaeologist can assess the significance of the find. If the find is a prehistoric archeological site, the appropriate Native American group shall be notified. If the archaeologist determines that the find does not meet the CRHR standards of significance for cultural resources, construction may proceed. If the archaeologist determines that further information is needed to evaluate significance, a data recovery plan shall be prepared. If the find is determined to be significant by the qualified archaeologist (i.e., because the find is determined to constitute either an historical resource or a unique archaeological resource), the archaeologist shall work with the project applicant to avoid disturbance to the resources, and if complete avoidance is not feasible in light of project design, economics, logistics, and other factors, follow accepted professional standards in recording any find including submittal of the standard DPR Primary Record forms (Form DPR 523) and location information to the appropriate California Historical Resources Information System office for the project area.

- Project sponsors shall comply with existing local regulations and policies that exceed or reasonably replace any of the above measures that protect archaeological resources.

Significance after Mitigation
Implementation of Mitigation Measure 2.11-1 would reduce impacts associated with archaeological resources because it would require the performance of professionally accepted and legally compliant procedures for the discovery of previously undocumented significant archaeological resources. To the extent that an individual project adopts and implements all feasible mitigation measures described above, the impact would be less than significant with mitigation (LS-M).

Projects taking advantage of CEQA Streamlining provisions of SB 375 (PRC Sections 21155.1, 21155.2, and 21159.28) must apply the mitigation measures described above, as feasible, to address site-specific conditions. However, MTC/ABAG cannot require local implementing agencies to adopt the above mitigation measures, and it is ultimately the responsibility of a lead agency to determine and adopt mitigation. Therefore, this impact remains **significant and unavoidable (SU)** for purposes of this program-level review.

Impact 2.11-3: The proposed Plan could have the potential to destroy, directly or indirectly, a unique paleontological resource or site or unique geologic feature.

Impacts of Changes in Projected Land Use and Transportation Projects
Paleontological and geological resources are by nature specific to their local context, and as such, impacts on these resources resulting from the proposed Plan would occur at the local level. Therefore, regional effects are not addressed. In general, potential impacts on paleontological or geologic resources would be similar to those identified for archaeological resources discussed under Impact 2.11-2. Projects involving excavation, grading, or soil removal in previously undisturbed areas have the greatest likelihood to encounter these resources.

Table 2.11-2 shows a breakdown of these paleontological resources by epoch and county. There are approximately 5,735 sites at which fossil remains have been found in the nine-county area, with the greatest concentration of 2,561 occurring in Contra Costa County and the second highest of 925 in San Mateo County. Napa County had the fewest paleontological sites at 151. Most paleontological resources were from the Miocene epoch (1,525), while the fewest were found from the Jurassic period (49).

The degree and extent of impacts would depend upon project location, and as such, project-specific analysis would be required to determine the precise area of impact and the importance of any paleontological or geologic resource identified within a proposed alignment or project area. As noted under Impact 2.11-2, all projects undertaken or overseen by Caltrans must abide by procedures and policies outlined in the *Caltrans Environmental Handbook, Volume 2*.

Conclusion
Because proposed individual development projects have the potential to adversely affect paleontological and geologic resources on a regional and localized level, these impacts are considered **potentially significant (PS)**. Mitigation Measure 2.11-3 is described below.

Mitigation Measures
2.11-3 Implementing agencies and/or project sponsors shall implement measures where feasible and necessary based on project- and site-specific considerations that include, but are not limited to:

- Before construction activities, project sponsors shall conduct a record search using an appropriate database, such as the UC Berkeley Museum of Paleontology to determine whether the project area has been previously surveyed and whether resources were identified.

- If record searches indicate that the project is located in an area likely to contain important paleontological, and/or geological resources, such as sedimentary rocks which have yielded significant terrestrial and other fossils, project sponsors shall retain a qualified paleontologist to train all construction personnel involved with earthmoving activities about the possibility of encountering fossils. The appearance and types of fossils

likely to be seen during construction will be described. Construction personnel will be trained about the proper notification procedures should fossils be encountered.

- If paleontological resources are discovered during earthmoving activities, the construction crew will be directed to immediately cease work in the vicinity of the find and notify the implementing agencies and/or project sponsors. The project sponsor will retain a qualified paleontologist for identification and salvage of fossils so that construction delays can be minimized. The paleontologist will be responsible for implementing a recovery plan which could include the following:

  - in the event of discovery, salvage of unearthed fossil remains, typically involving simple excavation of the exposed specimen but possibly also plaster-jacketing of large and/or fragile specimens, or more elaborate quarry excavations of richly fossiliferous deposits;

  - recovery of stratigraphic and geologic data to provide a context for the recovered fossil remains, typically including description of lithologies of fossil-bearing strata, measurement and description of the overall stratigraphic section, and photographic documentation of the geologic setting;

  - laboratory preparation (cleaning and repair) of collected fossil remains to a point of curation, generally involving removal of enclosing rock material, stabilization of fragile specimens (using glues and other hardeners), and repair of broken specimens;

  - cataloging and identification of prepared fossil remains, typically involving scientific identification of specimens, inventory of specimens, assignment of catalog numbers, and entry of data into an inventory database;

  - transferal, for storage, of cataloged fossil remains to an appropriate repository, with consent of property owner;

  - preparation of a final report summarizing the field and laboratory methods used, the stratigraphic units inspected, the types of fossils recovered, and the significance of the curated collection; and

  - project sponsors shall comply with existing local regulations and policies that exceed or reasonably replace any of the above measures that protect paleontological or geologic resources.

Significance after Mitigation

Implementation of Mitigation Measure 2.11-3 would reduce impacts associated with paleontological resources because construction workers would be alerted to the possibility of encountering paleontological resources, and professionally accepted and legally compliant procedures for the discovery of paleontological resources would be implemented in the event of a find. To the extent that an individual project adopts and implements all feasible mitigation measures described above, the impact would be less than significant with mitigation (LS-M).

Projects taking advantage of CEQA Streamlining provisions of SB 375 (PRC Sections 21155.1, 21155.2, and 21159.28) must apply the mitigation measures described above, as feasible, to address site-specific conditions. However, MTC/ABAG cannot require local implementing agencies to adopt the above mitigation measures, and it is ultimately the responsibility of a lead agency to determine and adopt mitigation. Therefore, this impact remains **significant and unavoidable (SU)** for purposes of this program-level review.

Impact 2.11-4: The proposed Plan could have the potential to disturb human remains, including those interred outside dedicated cemeteries.

Impacts of Changes in Projected Land Use and Transportation Projects

Ground-disturbing effects of development and transportation projects would be similar, and therefore the discussion of their impacts is combined below. Impacts to human remains are by nature specific to their local

context, and as such, impacts on these resources resulting from the proposed Plan would occur at the local level. Therefore, regional effects are not addressed. In general, potential impacts on human remains would be similar to those discussed for archaeological resource impacts discussed under Impact 2.11-2. New development and transportation improvements involving construction activities that would disturb native terrain, including excavation, grading, or soil removal, would have the greatest likelihood to encounter human remains.

California law recognizes the need to protect Native American human burials, skeletal remains, and items associated with Native American burials from vandalism and inadvertent destruction. The procedures for the treatment of Native American human remains are contained in California Health and Safety Code Sections 7050.5 and 7052 and California Public Resources Code Section 5097, et seq.

If human remains are discovered during any construction activities, potentially damaging ground-disturbing activities in the area of the remains shall be halted immediately, and the project applicant shall notify the appropriate county coroner and the NAHC immediately, according to Section 5097.98 of the State Public Resources Code and Section 7050.5 of California's Health and Safety Code. If the remains are determined by the NAHC to be Native American, the guidelines of the NAHC shall be adhered to in the treatment and disposition of the remains. Following the coroner's findings, the archaeologist, and the NAHC-designated MLD shall determine the ultimate treatment and disposition of the remains and take appropriate steps to ensure that additional human interments are not disturbed. The responsibilities for acting upon notification of a discovery of Native American human remains are identified in California Public Resources Code Section 5097.94.

Compliance with California Health and Safety Code Sections 7050.5 and 7052 and California Public Resources Code Section 5097 would provide an opportunity to avoid or minimize the disturbance of human remains, and to appropriately treat any remains that are discovered.

Conclusion

This impact is **less than significant (LS)** because there are existing state regulations and oversight in place that would effectively reduce the potential to disturb human remains to an acceptable level.

Mitigation Measures

None required.

Impact 2.11-5: The proposed Plan could cause a substantial adverse change in the significance of a TCR as defined in PRC Section 21074.

Impacts of Changes in Projected Land Use and Transportation Projects

TCRs are by nature specific to their local context, and as such, impacts on these resources resulting from the proposed Plan would occur at the local level. Therefore, regional effects are not addressed.

As part of the 2013/2014 legislative session, AB 52 established a new class of resources under CEQA, TCRs, and requires that lead agencies undertaking CEQA review must, upon written request of a California Native American Tribe, begin consultation once the lead agency determines that the application for the project is complete. As detailed above in section 2.11.2, Regulatory Setting, MTC sent letters to 17 Native American Tribes in compliance with AB 52. Only the Yocha Dehe Wintun Nation replied to the August 12, 2016 letter. Independent of the letters sent by MTC, the Ione Band of Miwok Indians and the Amah Mutsun Tribal Band sent letters requesting consultation pursuant to AB 52. MTC requested consultation meetings with all three tribes; however, no tribes responded. Consequently, no tribal concerns or TCRs have been identified.

Subsequent discretionary projects may be required to prepare site-specific project-level analysis to fulfill CEQA requirements, which may include additional AB 52 consultation that could lead to the identification of TCRs.

Conclusion

Although no resources within the Plan area have been identified as meeting any of the PRC Section 5024.1(c) criteria, it is possible that TCRs could be identified during analysis of subsequent projects. Therefore, the proposed Plan would have a **potentially significant (PS)** impact on TCRs as defined in PRC Section 21074. Mitigation Measure 2.11-5 is described below.

Mitigation Measures

2.11-5 If the implementing agency determines that a project may cause a substantial adverse change to a TCR, and measures are not otherwise identified in the consultation process required under PRC Section 21080.3.2, implementing agencies and/or project sponsors shall implement the following measures where feasible and necessary to address site-specific impacts to avoid or minimize the significant adverse impacts:

- Within 14 days of determining that a project application is complete, or to undertake a project, the lead agency must provide formal notification, in writing, to the tribes that have requested notification of proposed projects in the lead agency's jurisdiction. If it wishes to engage in consultation on the project, the tribe must respond to the lead agency within 30 days of receipt of the formal notification. The lead agency must begin the consultation process with the tribes that have requested consultation within 30 days of receiving the request for consultation. Consultation concludes when either: 1) the parties agree to measures to mitigate or avoid a significant effect, if a significant effect exists, on a tribal cultural resource, or 2) a party, acting in good faith and after reasonable effort, concludes that mutual agreement cannot be reached.

- Public agencies shall, when feasible, avoid damaging effects to any TCR (PRC Section 21084.3 (a).). If the lead agency determines that a project may cause a substantial adverse change to a tribal cultural resource, and measures are not otherwise identified in the consultation process, new provisions in the PRC describe mitigation measures that, if determined by the lead agency to be feasible, may avoid or minimize the significant adverse impacts (PRC Section 21084.3 (b)). Examples include:

  (1) Avoidance and preservation of the resources in place, including, but not limited to, planning and construction to avoid the resources and protect the cultural and natural context, or planning greenspace, parks, or other open space, to incorporate the resources with culturally appropriate protection and management criteria.

  (2) Treating the resource with culturally appropriate dignity taking into account the tribal cultural values and meaning of the resource, including, but not limited to, the following:

  (A) Protecting the cultural character and integrity of the resource
  (B) Protecting the traditional use of the resource
  (C) Protecting the confidentiality of the resource.

  (3) Permanent conservation easements or other interests in real property, with culturally appropriate management criteria for the purposes of preserving or utilizing the resources or places.

  (4) Protecting the resource.

Significance after Mitigation

Implementation of Mitigation Measure 2.11-5 would reduce impacts associated with TCRs because it would require the performance of professionally accepted and legally compliant procedures for the identification of TCRs associated with subsequent projects. To the extent that an individual project adopts all feasible mitigation measures described above, the impact would be less than significant (LS-M).

Projects taking advantage of CEQA Streamlining provisions of SB 375 (PRC sections 21155.1, 21155.2, and 21159.28) must apply the mitigation measure(s) described above to address site-specific conditions. However, MTC/ABAG cannot require local implementing agencies to adopt the above mitigation measures, and it is ultimately the responsibility of a lead agency to determine and adopt mitigation. Therefore, this impact remains **significant and unavoidable (SU)** for purposes of this program-level review.

2.12 PUBLIC UTILITIES AND FACILITIES

This section describes the environmental setting and assesses the potential for Plan Bay Area to impact public utilities, facilities, and services within the nine counties of the Bay Area. The public utilities, facilities, and services included in this EIR include water supply, wastewater (sanitary sewer), stormwater, and solid waste. The analysis is focused on those areas where demand for services may increase as a result of growth anticipated by the proposed Plan. For a discussion of water quality, see Section 2.8, "Water Resources."

Comments received in response to the Notice of Preparation expressed concerns about the additional strain placed on existing public utilities infrastructure from the proposed land use growth footprint. These items are addressed in this chapter.

2.12.1 Environmental Setting

PHYSICAL SETTING

This section describes the existing water-, wastewater-, and solid waste-related infrastructure within the Plan Area and provides data regarding existing capacity.

Water Supply

Climatic conditions and annual precipitation are described in Section 2.8, "Water Resources."

San Francisco Bay Hydrologic Region

As defined by the San Francisco Bay Regional Water Quality Control Board (RWQCB), the San Francisco Bay Hydrologic Region (Bay Region) encompasses numerous individual watersheds that drain into the San Francisco Bay and directly into the Pacific Ocean. It covers approximately 4,550 square miles and includes portions of all nine Bay Area counties as well as Santa Cruz County. Bay Region watersheds are listed in **Table 2.12-1** and the largest watersheds are depicted in **Figure 2.12-1**.

Table 2.12-1 Watersheds of the San Francisco Bay Hydrologic Region

North Bay	Corte Madera Creek watershed
	Novato Creek watershed Petaluma River watershed Sonoma Creek watershed Napa River watershed
	Marin and North Bay Coastal drainages (including Lagunitas Creek, Arroyo Corte Madera Creek, Miller Creek, etc.)
Suisun Bay	Green Valley/Suisun Creeks watersheds
	Walnut Creek watershed
	San Pablo/Wildcat Creeks watersheds
	Suisun Bay drainages (including Sulphur Springs Creek, Laurel Creek, Mt Diablo Creek, etc.)
East Bay	San Leandro Creek watershed
	San Lorenzo Creek watershed
	Alameda Creek watershed
	East Bay drainages (including Rodeo Creek, Cordonices Creek, Claremont Creek, Peralta Creek, Lake Merritt watershed, etc.)
South Bay	Coyote Creek watershed
	Guadalupe River watershed
	West Santa Clara Valley drainages (including Stevens Creek, Permanente Creek, Saratoga Creek, etc.)
Peninsula	San Francisquito Creek watershed
	San Mateo Creek watershed
	San Mateo and Peninsula Coastal drainages (including Cordilleras Creek, Colma Creek, Pilarcitos Creek, Pescadero Creek, San Gregorio Creek, etc.)

Source: RMC 2006

Figure 2.12-1
Major Local Watersheds in the SF Bay Hydrologic Region

Map Data Sources: Calwater 2.2.1, Department of Forestry and Fire Protection, State of California, 2004; Metropolitan Transportation Commission (MTC), 2016; Tom Tom North America, 2015.

Water Supply Agencies

Water supply for each county is provided by its respective water supply department or agency. Some counties contain several water providers. The focus of this EIR is on a regional analysis of water supply. According to the 2013 San Francisco Bay Integrated Regional Water Management Plan, the agencies and departments included in this description are the major contributors to the water sources in each Bay Area county (Kennedy/Jenks Consultants 2013).

Alameda County Water District

The Alameda County Water District (ACWD) serves the cities of Fremont, Newark, and Union City. ACWD is a retail water purveyor that allocates 67 percent of its water to residential customers and approximately 33 percent to commercial, industrial, institutional, and large landscape customers. In the 2014-2015 fiscal year, it provided water for a total of 83,007 customers, or over 344,300 individuals (ACWD 2016).

Contra Costa Water District

The Contra Costa Water District (CCWD) provides water to approximately 520,000 people in Contra Costa County, covering a total area of 140,000 acres. It operates and maintains a complex system of water transmission, treatment, and storage facilities to supply both treated and untreated (raw) water to its customers. It provides treated water to approximately 200,000 customers in Clayton, Clyde, Concord, Pacheco, Port Costa and parts of Martinez, Pleasant Hill, and Walnut Creek. In addition, CCWD provides wholesale treated water to the City of Antioch, the Golden State Water Company in Bay Point, the Diablo Water District in Oakley, and the City of Brentwood. It also sells untreated water to the cities of Antioch, Martinez and Pittsburg, as well as to industrial and irrigation customers. CCWD pumps water from four intakes in the Sacramento- San Joaquin Delta. The intakes are located at Rock Slough, on Old River, on Victoria Canal and at Mallard Slough. The backbone of the district's water conveyance system is the 48-mile Contra Costa Canal, which starts at Rock Slough and ends at the Martinez Reservoir. In 2015, the CCWD served approximately 119,000 acre-feet of water to its customers (CCWD 2016).

East Bay Municipal Utility District

The East Bay Municipal Utility District (EBMUD) serves Alameda, Alamo, Albany, Berkeley, Castro Valley, Crockett, Danville, Diablo, El Cerrito, El Sobrante, Emeryville, Hayward, Hercules, Kensington, Lafayette, Moraga, Oakland, Orinda, Piedmont, Pinole, Pleasant Hill, Richmond, Rodeo, San Leandro, San Lorenzo, San Pablo, San Ramon, Selby and Walnut Creek. EBMUD's principal water source is the Mokelumne River Basin in the Sierra Nevada Range. EBMUD has water rights and facilities to divert up to 325 million gallons per day (mgd) from the Mokelumne River, which comprises approximately 90 percent of the agency's water supply. The other 10 percent originates as runoff from the watershed lands in the East Bay Area. EBMUD's Mokelumne River facilities include Pardee Dam and Reservoir located near Valley Springs, and Camanche Dam and Reservoir located ten miles downstream of Pardee. Snowmelt from Alpine, Calaveras and Amador counties that feeds the upper Mokelumne River is collected in Pardee and Camanche Reservoirs, where it is stored for use by EBMUD. Overall, the Basin serves approximately 1.4 million people throughout areas of Alameda and Contra Costa counties, including services to residential, industrial, commercial, institutional, and irrigation waters (EBMUD 2016).

Marin Municipal Water District

The Marin Municipal Water District (MMWD) serves the populous eastern corridor of Marin from the Golden Gate Bridge northward up to, but not including, Novato, and is bounded by the San Francisco Bay on the east, and stretches through the San Geronimo Valley in the west. The incorporated cities and towns of San Rafael, Mill Valley, Fairfax, San Anselmo, Ross, Larkspur, Corte Madera, Tiburon, Belvedere and Sausalito are within the District's service area. The district covers approximately 147 square miles and serves a population of approximately 190,000 through about 61,000 service connections. MMWD's potable water distribution system includes approximately 941 miles of water mains, 90 pump stations, and 124 treated water storage tanks with a total storage capacity of 82 million gallons (MG). Current demand for potable and raw water is 22,610 acre-feet of water per year (AFY) (MMWD 2016).

City of Napa Water Department

The City of Napa is a major water supply source in Napa County, receiving its annual State Water Project entitlement through the Napa County Flood Control and Water Conservation District, which is the contract administrator. The designated water service areas include most of the lower Napa Valley, the Rural Urban Limit Line, and all areas within the city limits of the City of Napa. The City exports water to the cities of American Canyon, St. Helena and Calistoga, the Town of Yountville, and the California Veterans Home. The predominant use of land in the area is residential development. As of 2010, the population served by the City of Napa Water Department was 86,743. The City of Napa currently meets its demands by supplying water from three major sources: Lake Hennessey, the Milliken Reservoir, and the State Water Project, as delivered through the North Bay Aqueduct (City of Napa 2011).

San Francisco Public Utilities Commission

The San Francisco Public Utilities Commission (SFPUC) operates the Regional Water System (RWS) that provides water to nearly 2. 6 million people within San Francisco, San Mateo, Santa Clara, Alameda, and Tuolumne counties. The RWS consists of more than 280 miles of pipeline and 60 miles of tunnels, 11 reservoirs, five pump stations, and two water treatment plans. The SFPUC provides water to both retail and wholesale customers, totaling approximately 35 and 65 percent, respectively (SFPUC 2016).

The Tuolumne River watershed on the western slope of the central Sierra Nevada, which provides water to the RWS, is comprised of three regional water supply and conveyance systems—the Hetch Hetchy System, the Alameda System, and the Peninsula System. The amount of Tuolumne River supplies delivered depends on annual water conditions. In normal years, approximately 80 to 85 percent of SFPUC water supply is provided by runoff from the upper Tuolumne River watershed (RMC 2006). This percentage may be reduced in dry years, based on the severity and timing of drought conditions. Three major reservoirs collect runoff: Hetch Hetchy Reservoir, Lake Lloyd, and Lake Eleanor. Water is diverted from the Hetch Hetchy reservoir into a series of tunnels, aqueducts, and pipelines (the Hetch Hetchy System) that cross the San Joaquin Valley to facilities located in Alameda County (the Alameda System). The Alameda System includes conveyance facilities that connect the Hetch Hetchy System to facilities located in the San Francisco Peninsula (the Peninsula System), which also connects to the City and County of San Francisco's distribution system. This water supply serves customers in San Francisco, as well as 28 wholesale customers located in Alameda, Santa Clara, and San Mateo counties.

Reservoirs and tanks within San Francisco have the capacity to hold approximately 413 million gallons of water. The SFPUC estimates this capacity to be a five-day supply at the current average water consumption rate for the city. In addition, there is an emergency supply of existing non-potable water immediately available within the city at Lake Merced, which currently holds approximately 1.9 billion gallons of water. In 2015, the total retail demand for water in the city was 65.6 million gallons per day, and the non-residential demand was 23.6 million gallons per day (SFPUC 2016).

The primary water source for San Mateo County is SFPUC's Peninsula System. The system utilizes two reservoirs, Crystal Springs and San Andreas, which collect runoff from the San Mateo Creek Watershed. Water from the Pilarcitos Reservoir, on Pilarcitos Creek, directly serves one of the wholesale customers, the Coastside County Water District (which serves Half Moon Bay, Miramar, Princeton By The Sea, and El Granada), and can also deliver water to Crystal Springs and San Andreas Reservoirs. Wholesale customers of the SFPUC Peninsula System include: the cities of Burlingame, Daly City, East Palo Alto, Menlo Park, Millbrae, San Bruno, Redwood City, the Town of Hillsborough, the Coastside County Water District, the Mid-Peninsula Water District, and the North Coast County Water District. It also serves the California Water Service Company Bear Gulch and Bayshore Districts.

Santa Clara Valley Water District

The Santa Clara Valley Water District (SCVWD) is the county's primary water provider, serving Santa Clara County's population of 1,918,044 (U.S. Census 2015). The SCVWD encompasses all of the county's 1,300 square miles and serves its 15 cities. Although the City of Palo Alto and the Purissima Hills Water District are located within the County of Santa Clara and SCVWD's service area, most of the current water supply to these

two agencies is from SFPUC. Both agencies, however, benefit from the comprehensive water management programs and services provided by SCVWD.

The SCVWD manages groundwater and provides comprehensive water management as authorized by the Santa Clara Valley District Act. The SCVWD's water supply system is comprised of storage, conveyance, recharge, treatment, and distribution facilities that include 11 local reservoirs, the groundwater basin, groundwater recharge facilities, treatment plants, imported supply, and raw treated water conveyance facilities. The primary source of water for the SCVWD is the use of groundwater and surface water stored in the reservoirs. The reservoirs store up to 25 percent of Santa Clara County's water supply. The capacity of all the local reservoirs of the SCVWD is 169,009 acre-feet, with 122, 924 acre-feet of restricted capacity (SCVWD 2016).

About half of the county's water supply currently comes from local sources and about half comes from imported water sources. Groundwater pumping provides up to half of the county's water supply during normal years. The SCVWD utilizes conjunctive use methods–the practice of storing surface water in a groundwater basin in wet years and withdrawing from the basin in the dry years–to ensure proper protection of groundwater aquifers in Santa Clara County. The SCVWD manages two groundwater subbasins that transmit, filter, and store water—the Santa Clara Subbasin and the Llagas Subbasin. The County of Santa Clara also imports water supplies from the Sacramento-San Joaquin Delta through three main pipelines: the South Bay Aqueduct, which carries water from the State Water Project (SWP), and the Santa Clara Conduit and Pacheco Conduit, both of which bring water from the federal Central Valley Project (CVP). The SCVWD is contracted to import 152,500 AFY and 100,000 AFY from the CVP and SWP, respectively (SCVWD 2016).

Solano County Water Agency

The Solano County Water Agency (SCWA) is a wholesale water agency that provides untreated water to cities and agricultural districts in Solano County and parts of Yolo County from the Federal Solano Project and the North Bay Aqueduct (NBA) of the SWP. The SCWA's service area population in 2010 was 413,300. It has water contracts to deliver water to Fairfield, Suisun City, Vacaville, Vallejo, Solano Irrigation District, Maine Prairie Water District, the University of California, Davis, and the California State Prison in Solano. The SWP has rights to water originating from the Sacramento and San Joaquin Rivers, and it stores water on Lake Oroville on the Feather River. The SWP provides water to the SCWA through the NBA, a 27-mile long pipeline that delivers untreated municipal water from Barker Slough in the Sacramento-San Joaquin delta to Napa and Solano Counties.

The major facilities of the Solano Project are the Monticello Dam, which captures water from Putah Creek in Lake Berryessa, the Putah Diversion Dam, which diverts water out of lower Putah Creek, and the Putah South Canal, which delivers water to local agencies. The Putah South Canal is 33 miles long.

The SCWA has contracted with the California Department of Water Resources (DWR) for an ultimate allocation of 47,756 AFY from the SWP. In 2010, the SCWA delivered a total of 195,361 acre- feet of water to its respective agencies (SCWA 2011).

Sonoma County Water Agency

The Sonoma County Water Agency (SMCWA) serves a large portion of Sonoma County as well as the northern portion of Marin County. The primary water source for the Sonoma County Water Agency is the Russian River. The Russian River originates in central Mendocino County and discharges into the Pacific Ocean near Jenner, about 20 miles west of Santa Rosa, and is approximately 110 miles in length. Additionally, the Santa Rosa Plain provides groundwater. Groundwater is an important source of water in Sonoma County because it provides the domestic water supply for most of the unincorporated portion of the County, and is a primary source of water for agricultural users. Three water agency wells located along the Russian River- Cotati Intertie Pipeline in the Santa Rosa Plain also provide a portion of the Water Agency's water supply. The Water Agency diverts water from the Russian River and delivers it to customers through a transmission system. The transmission system consists of six radial collector wells at the Wohler and Mirabel production facilities adjacent to the Russian River. In 2010, SMCWA provided 44,733 AFY to its customers and contractors (including surplus and non-surplus customers) (SMCWA 2016).

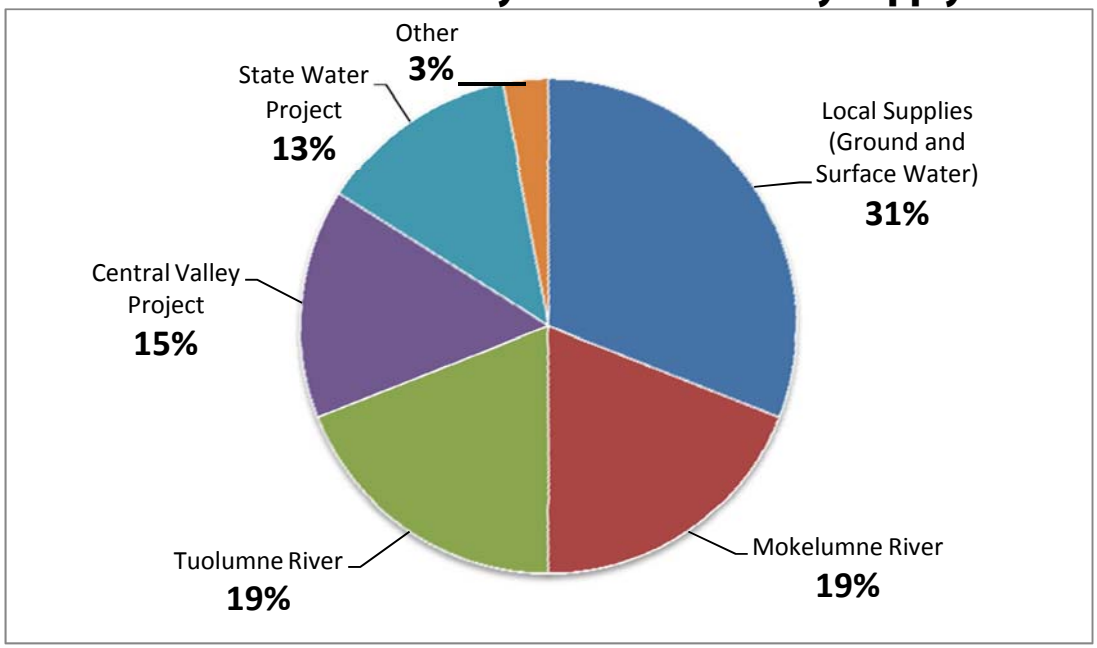
Zone 7 Water Agency

The Zone 7 Water Agency (Zone 7) water service area is located about 40 miles southeast of San Francisco, and encompasses an area of approximately 425 square miles of the eastern portion of Alameda County, including the Livermore-Amador Valley, Sunol Valley, and portions of the Diablo Range. The Zone 7 service area also overlies the Alameda Creek Watershed. This watershed encompasses almost 700 square miles, and extends from Altamont Pass to the east, San Francisco Bay to the west, Mount Diablo to the north, and Mount Hamilton to the south. Zone 7 is the water wholesaler for the Livermore-Amador Valley as well as the area's flood control agency. It supplies untreated water for agriculture and treated drinking water to the California Water Service Company, Dublin San Ramon Services District, the City of Livermore, and the City of Pleasanton (Zone 7 2016).

Regional Water Supply

To service the region's residential, commercial, and agricultural water needs, Bay Area water agencies must manage a diverse range of water supplies. These include supplies from local and imported sources, as well as through methods such as desalination and recycled water. **Figure 2.12-2** shows the breakdown of typical Bay Area water use by source of supply.

Figure 2.12-2
Bay Area Water Use by Supply Source



Source: Kennedy/Jenks Consultants 2013

Local Water

Local water supplies come from two interconnected sources: surface water and ground water. Surface water is water that collects above ground in a stream, river, lake, wetland, or ocean. Ground water is water that has infiltrated into the subsurface that completely fills (saturates) the void space of rocks or sediment. They are physically connected in the hydrologic cycle when, at certain locations or times of the year, water infiltrates the bed of a stream to recharge ground water or, at others, ground water discharges, contributing to the base flow of a stream. A long-term threat to ground water sources is overdraft. Overdraft is the condition of a groundwater basin in which the amount of water withdrawn by pumping over the long term exceeds the amount of water that recharges the basin. Overdraft is characterized by groundwater levels that decline over a period of years and never fully recover, even in wet years. Overdraft can lead to increased extraction costs, land subsidence, water quality degradation, and environmental impacts. Although the Bay Region was not identified in DWR's last statewide report on groundwater sources in 2003 as an area that is at short-term risk for

widespread overdraft conditions, many strategies identified in the Bay Area Integrated Regional Water Management Plan aim to reduce the likelihood of overdraft (DWR 2003).

Together, surface water and ground water currently supply approximately 31 percent of Bay Area water (Kennedy/Jenks Consultants 2013). Surface water from local rivers and streams (including the Delta) is an important source for all Bay Area water agencies, but particularly so in the North Bay counties, where access to imported water is more limited because of infrastructure limitations. The Bay Area has 28 primary groundwater basins, which underlie approximately 30 percent of the region (see **Figure 2.12-3**). The basins that are most intensively used for water supply are the Santa Clara, Napa-Sonoma Valley, Petaluma Valley, Niles Cone, and Livermore Valley basins (DWR 2013).

Imported Water

The greatest proportion of Bay Area water is imported from Sierra Nevada and Delta sources, comprising approximately 66 percent of supply. As described under the agency descriptions of the SFPUC and EBMUD above, the primary Sierra Nevada sources are the Mokelumne River and Tuolumne River watersheds. Several Bay Area water agencies receive Delta water through the SWP and CVP, which comprise a vast network of canals and aqueducts for the delivery of water throughout the Bay Area and the Central Valley. Major water conveyance infrastructure delivering water through the SWP and CVP is described in the infrastructure section below.

Recycled Water

In the 1990s, a number of local agencies joined with the DWR and the United States Bureau of Water Reclamation to study the feasibility of using high-quality recycled water to augment water supplies and help the Bay-Delta ecosystem. This cooperative effort, known as the Bay Area Regional Water Recycling Program (BARWRP), produced a Master Plan for regional water recycling in 1999 for the five South Bay counties. Since then, local water agencies have built a number of projects consistent with BARWRP and recycled water has come to be widely used in the Bay Area for a number of applications, including landscape irrigation, agricultural needs, commercial and industrial purposes, and as a supply to the area's wetlands. In 2010, the Bay Area recycled approximately 60,000 AFY, almost 10 percent of the wastewater effluent generated, and supply is expected to more than double over the next 20 years (Kennedy/Jenks Consultants 2013).

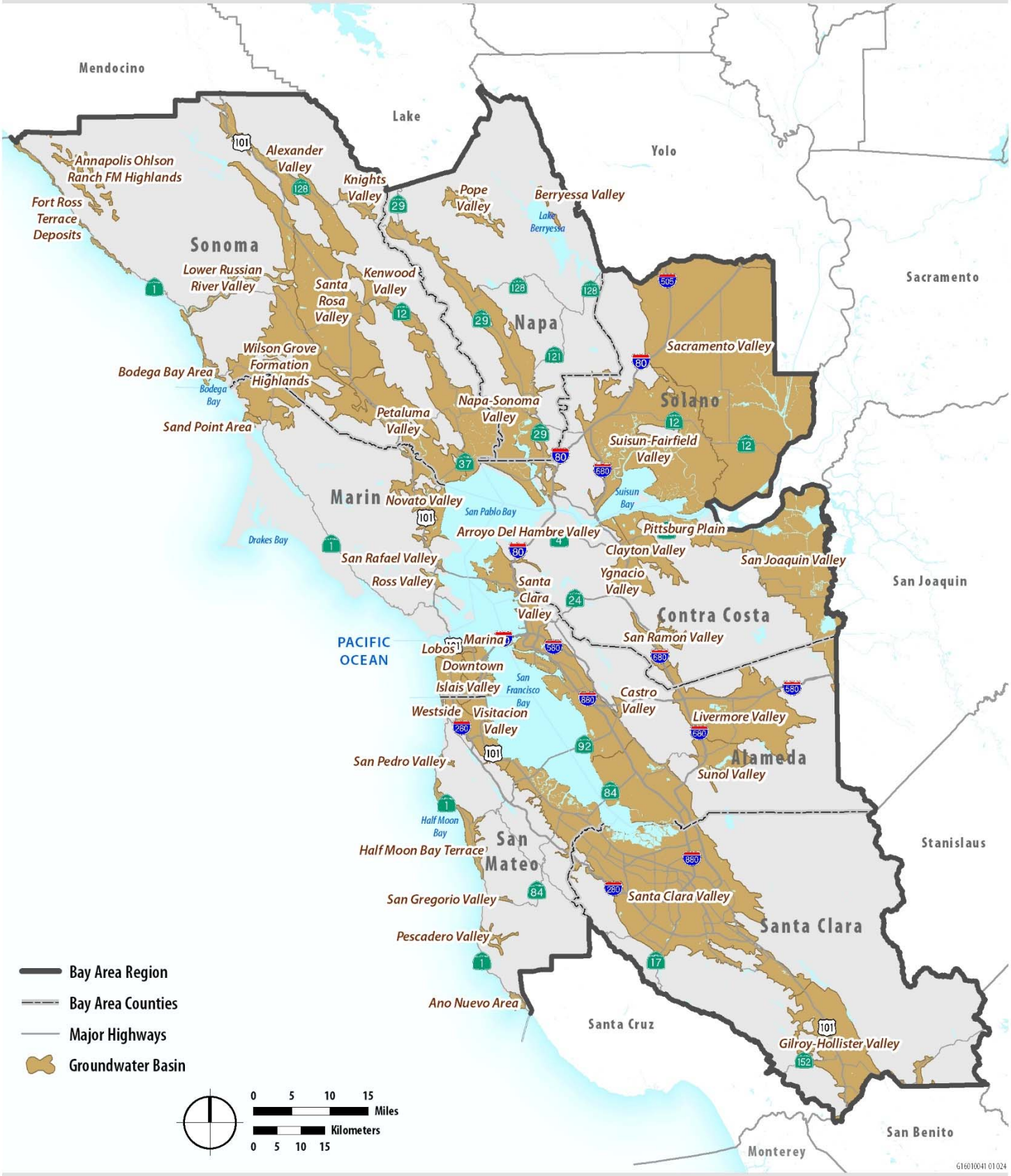
Desalination

Bay Area agencies have increasingly been exploring desalination as an alternative source of drinking water. In 2003, a number of water agencies formed the Northern California Salinity Coalition to formally join together to research and identify regional approaches for addressing salinity impacts as well as the use and application of desalination. In 2005-2006, MMWD operated a desalination pilot plant, enabling it to conduct environmental studies, test equipment, refine operating costs, and demonstrate the technology to MMWD customers. The agency used the results of the pilot plant operations to refine the design requirements and costs of a full-scale desalination facility. This project is not currently being pursued.

In 2003, the ACWD opened the Newark Desalination Facility, the first brackish water desalination facility in Northern California, with a capacity of 5 mgd and it doubled the production to 10 mgd for a total blended production of 12.5 mgd to the distribution system. The five largest water agencies in the Bay Area (CCWD, EBMUD, SFPUC, SCVWD, and Zone 7) are currently studying the feasibility of constructing a 10 to 20 mgd desalination facility at CCWD's Mallard Slough Pump Station in eastern Contra Costa County. The proposed Bay Area Regional Desalination Project (BARDP) would operate continuously in all year-types (i.e., wet and drought), with the possibility of storing water (including by exchange or transfer) in CCWD's Los Vaqueros Reservoir when demand from the parties is less than plant capacity.

Storage in Los Vaqueros Reservoir could provide flexibility to optimize the BARDP yield. Based on studies conducted, the agencies have determined the BARDP is technically feasible. The next step is to revisit the role of the project within the context of each agency's changing water supply and demand picture through 2030 (BARDP 2016).

Figure 2.12-3
Bay Area Groundwater Basins



Map Data Sources: Department of Water Resources, State of California, 2003, 2010; Metropolitan Transportation Commission (MTC), 2016; Tom Tom North America, 2015.

Water Transfers

Water transfers allow suppliers with excess water supplies to sell their water to those agencies in need. In addition, agriculture-to-urban transfers can allow agricultural districts with marginal lands to be fallowed (taken out of production). Water transfers also provide reduced vulnerability to water shortages resulting from drought, catastrophic events, and system security breaches. Bay Area water agencies have a number of transfer agreements to improve water supply in the region.

Water Conservation

Reducing water demand through conservation is a key component of improving water supply reliability in the Bay Area. All of the ten major water agencies in the region are members of the California Urban Water Conservation Council, which promotes the development and implementation of conservation best management practices (BMPs) such as metering, public information programs, conservation pricing, and washing machine rebates. Many local water agencies are also implementing conservation projects and programs that extend beyond these baseline BMPs. It is anticipated that regional water agencies will see more than 150,000 AFY of conservation-related savings by 2020 (RMC 2006).

Water Supply Infrastructure

As noted above, approximately two-thirds of the water used by Bay Area water agencies comes from non-local sources, primarily the Sierra Nevada and the Sacramento-San Joaquin Delta (Delta). As a result, the region relies on a diverse network of water infrastructure including aqueducts and storage facilities to convey supplies to its residents. Major facilities include (Kennedy/Jenks Consultants 2013):

- **Contra Costa Canal.** Originally constructed to serve agricultural needs, the Contra Costa Canal now comprises the backbone of the CCWD transmission system. The canal spans 48 miles, conveying water from the Delta to CCWD's treatment facilities and raw water customers.

- **Delta-Mendota Canal.** The Delta-Mendota Canal is a 120-mile segment of the Central Valley Project, which provides water to much of the Central Valley. It runs south along the western edge of the San Joaquin Valley and conveys water to the San Luis reservoir, which stores water supplies for Santa Clara Valley Water District customers.

- **Hetch Hetchy Aqueduct.** The 156-mile Hetch Hetchy Aqueduct roughly parallels the Tuolomne River, conveying San Francisco Public Utilities Commission supplies from the Hetch Hetchy Reservoir across the San Joaquin River and San Francisco Bay, up the peninsula and into Upper Crystal Springs Reservoir, located north of Redwood City.

- **Mokelumne Aqueducts.** The three aqueducts which comprise the Mokelumne Aqueduct System convey most of East Bay Municipal Utility District's supply 87 miles from Pardee Reservoir on the Mokelumne River to Walnut Creek.

- **North Bay Aqueduct.** The NBA is an underground pipeline operated remotely by DWR. The NBA extends from the Delta to Napa County, Vallejo, and Benicia. Solano County Water Agency and the Napa County Flood Control Water and Conservation District, which includes the City of Napa as a member agency, receive Delta supplies through the NBA.

- **Russian River Transmission Facilities.** Sonoma County Water Agency operates diversion facilities at the Russian River and an aqueduct system comprised of pipelines, pumps, and storage tanks.

- **South Bay Aqueduct.** The South Bay Aqueduct conveys water from the Delta through over 40 miles of pipelines and canals. Alameda County Water District, Zone 7 Water Agency, and Santa Clara Valley Water District receive State Water Project supplies conveyed through the South Bay Aqueduct.

A schematic of these facilities and major rivers located in and around the Bay Area is presented in **Figure 2.12-4.** In addition to pipelines and aqueducts, each Bay Area water agency has its own extensive network of surface water storage reservoirs, groundwater extraction wells, water treatment plants, and distribution pipelines.

Regional Demographics and Water Demand

While numerous factors influence water demand, including employment growth, socio-economic characteristics, geographic distribution of the population, variation in precipitation levels, and water conservation practices, overall population growth is the most important factor. In general, demand management strategies will allow Bay Area water agencies to continue to meet projected demand through 2030 in average years. For example, between 1986 and 2008, demand management and conservation programs helped keep the overall increase of water use in the Bay Area stable, despite an increasing population (see **Figure 2.12-5**).

Table 2.12-2 shows the projected water supplies and demands from the most recent urban water management plans (UWMPs) for normal years in the near future (2020) and over the next twenty years (2035 or 2040). All of the water districts will be able to provide adequate water supplies to meet projected demand in a year of normal precipitation, although doing so requires some districts to acquire additional supplies. As noted in **Table 2.12.-2**, projections for future water demand for Solano County Water Agency are only available up to 2030. It is possible that demand in 2040 could exceed the County's supply; which would require the County to acquire additional sources from other counties in the region or elsewhere. EBMUD sets supply equal to demand for normal years, storing any additional supply. EBMUD notes that it "can meet customer demands through the year 2040 during normal year conditions; therefore, the available supply is considered equal to or greater than demand.

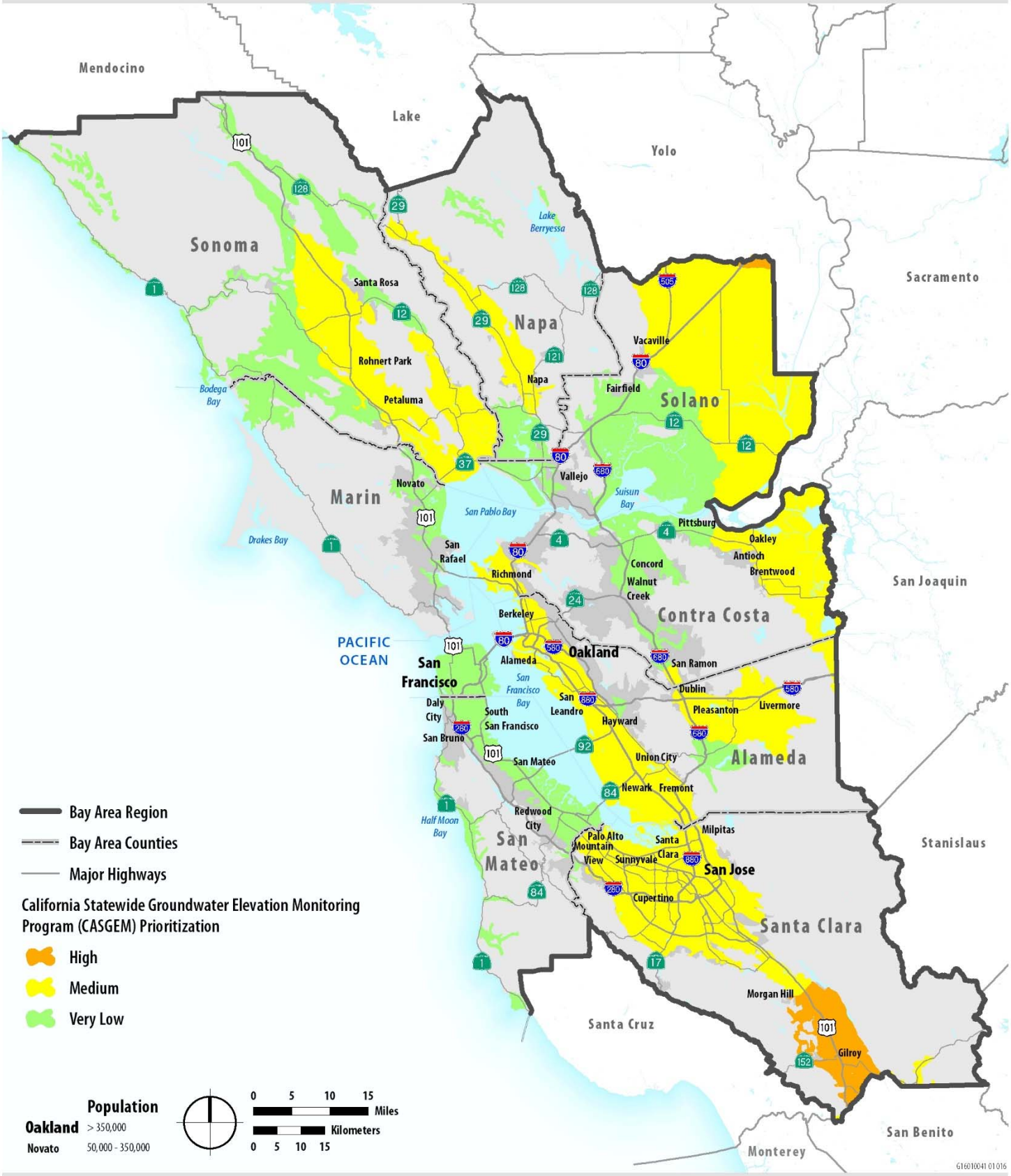
Table 2.12-2 Projected Normal Year Supply and Demand (AF/YEAR)

	Current Supply (2020)	Current Demand (2020)	Future Supply (2040)	Future Demand (2040)
Alameda County WD	78,000	63,400	78,000	70,300
Contra Costa WD	329,200	264,000	362,800	303,900
East Bay Municipal Utility District	243,000	243,000	258,000	258,000
Marin Municipal WD	151,000	42,000	153,000	42,000
City of Napa[1]	52,000	14,000	52,000	15,000
San Francisco PUC	87,000	87,000	101,000	101,000
Santa Clara Valley WD	390,000	376,000	442,000	435,000
Solano County WA[1]	255,000	255,000	255,000	255,000
Sonoma County WA	66,000	66,000	76,000	76,000
Zone 7 WA[1]	79,000	72,000	100,000	93,000

Note: [1] Future supply and demand projections are for the year 2030.

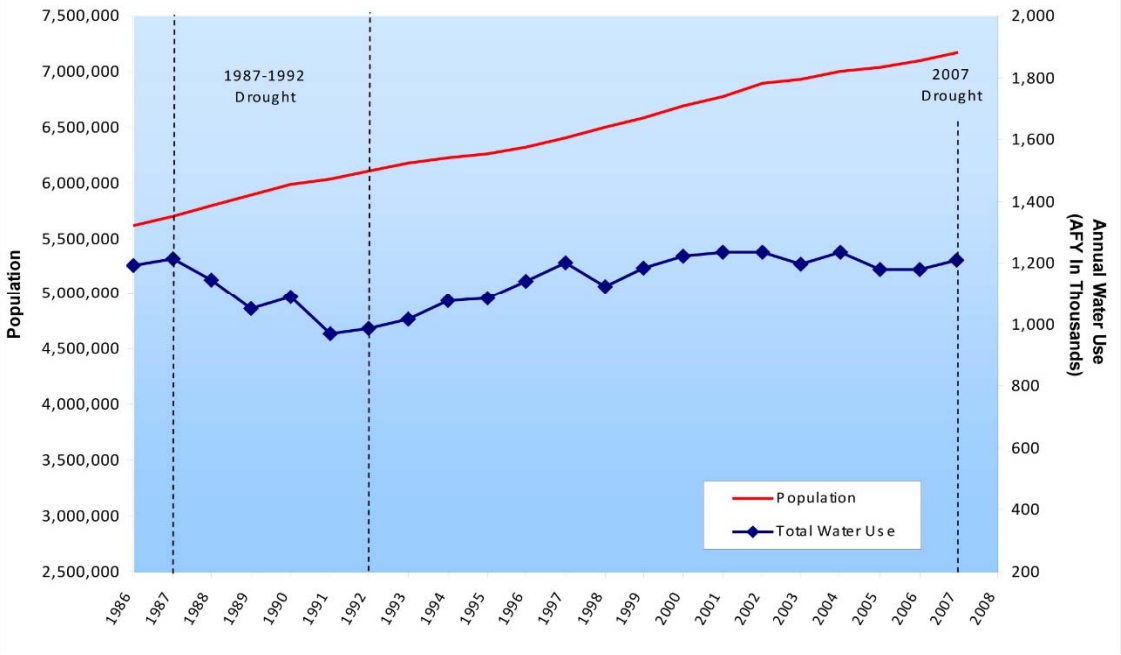
Sources: ACWD 2016, CCWD 2016, EBMUD 2016, MMWD 2016, City of Napa 2011, SFPUC 2016, SCVWD 2016, SCWA 2011, SMCWA 2016, Zone 7 2016

Figure 2.12-4
Major Water Infrastructure Serving the Bay Area



Map Data Sources: California Statewide Groundwater Elevation Monitoring Program (CASGEM), 2014; Metropolitan Transportation Commission (MTC), 2016; Tom Tom North America, 2015; U.S. Geologic Survey (USGS), 2011.

Figure 2.12-5
Population and Water Demand Trends



Source: Kennedy/Jenks Consultants 2013

Some Bay Area water agencies are projecting future water supply shortfalls in dry years, and some are already seeing such shortfalls, as shown in Table 2.12-3. Other agencies anticipate being able to handle a single dry year, largely because of reservoirs or other storage capacity. The severity and timing of dry year shortfalls differ greatly among the agencies because of the wide variation of supply sources, types of use, and climates within the region.

Table 2.12-3 Year of Projected Water Shortages (Single Dry Year)

Agency	First year in which demand is expected to outpace supply during single dry years
Alameda County Water District	2020
Contra Costa Water District	none
East Bay Municipal Utility District	Now (2015)
Marin Municipal Water District	none
City of Napa Water Department	Now (2015)
San Francisco Public Utilities Commission	none
Santa Clara Valley Water District	2040
Solano County Water Agency	Now (2015)
Sonoma County Water Agency	2025
Zone 7 Water Agency	none

Sources: ACWD 2016, CCWD 2016, EBMUD 2016, MMWD 2016, City of Napa 2011, SFPUC 2016, SCVWD 2016, SCWA 2011, SMCWA 2016, Zone 7 2016

Drought

California has experienced a number of prolonged droughts, specifically (in recent times) in 1973, 1976 through 1977, 1987 through 1991, 2007 through 2009, and 2012 through 2016. During the most recent drought, in June of 2015, statewide reservoirs were at between 18 and 67 percent of normal (ABAG 2015). The drought began to ease in the winter of 2017, as many parts of California saw dramatically improved hydrologic conditions (State Water Resources Control Board [SWRCB] 2017). In February of 2017, reservoirs were at between 48 and 182 percent of historical averages (DWR 2017). However, groundwater basins in some areas of the state remain depleted because of prolonged drought (SWRCB 2017).

In May 2015, SWRCB adopted a water conservation regulation in response to historic drought conditions and an executive order issued by the Governor in April 2015. Under that regulation, SWRCB set specific conservation targets for large urban water suppliers, required reporting of water production information, prohibited wasteful water practices, and gave urban water agencies additional enforcement authority to prevent those practices. The regulations were adjusted in February of 2016 to further recognize regional differences and investments in new drinking water supplies. Public water use was reduced by almost 25 percent through April 2016 as compared to 2013. In May 2016, following the end of the rainy season and the Governor's direction to adjust the standards in light of improved conditions for many water agencies, SWRCB revised its statewide drought emergency water conservation approach. The new regulation allowed urban water suppliers to establish local conservation standards based on need and availability during continued drought (SWRCB 2017).

During the winter of 2016-2017, an atmospheric river deposited precipitation substantial enough to exceed the historical averages of several reservoirs through the state (i.e., Trinity, Shasta, Oroville, Melones, Don Pedro, McClure, Castaic, and San Luis) (DWR 2017). This level of precipitation lessened the severity of the recent drought (2012-2016) and the SWRCB amended the previous May 2016 regulation in February 2017. The amended regulation allows certain suppliers the opportunity to submit or resubmit their water supply reliability assessments by March 15, 2017 and it does not require mandatory conservation unless water suppliers determine there would be a shortfall.

Climate change is expected to increase the number and severity of future droughts (ABAG 2015). For this reason, SWRCB and other State agencies have developed a plan for implementing permanent water use efficiency targets based on the premise that efficient water use helps California better prepare for longer and more severe droughts caused by climate change. It develops long-term water conservation measures to help provide all communities with sufficient water supplies (SWRCB 2017).

Shortages in precipitation in the Sierra Nevada can have more pronounced effects on water supply in the region than a drought in the Bay Area itself because of the reliance of the region of water from the Tuolumne and Mokelumne watersheds. Thus, drought is not a hazard that can be depicted in map form. Further, there is no current data on the probability of drought that would be comparable to the maps available on the probability of earthquakes in the region, or 100-year flood hazard zones (ABAG 2010:C-48).

Wastewater Treatment

Wastewater is generated by residential, commercial, and industrial sources throughout the Bay Area. Treatment of wastewater provides protection for human health and receiving water bodies, preservation of the health of aquatic and riparian species, as well as improved supply reliability through the removal of harmful pollutants from discharges.

Urbanized and unincorporated areas of cities and counties throughout the Bay Area provide wastewater treatment facilities. These facilities include systems made up of pipelines, pipe stations, interceptor stations and discharge stations. Treatment plants send wastewater through up to three treatment processes (primary, secondary, tertiary) depending on treatment requirements established by the pertinent RWQCB for the particular plant. The level of treatment is often dictated by where treated effluent is discharged (land, water body) and if there is an end use that requires higher treatment levels (recycling). Many of the Bay Area's wastewater treatment plants include primary and secondary treatment for wastewater, as well as recycled

water programs that require tertiary treatment. In many cases, secondary effluent is discharged into the San Francisco Bay, and wastewater from Solano County is pumped into the Delta. Wastewater is also recycled for other uses such as agriculture, irrigation, or landscaping. Treatment requirements are promulgated by the RWQCB and are typically reviewed, along with treatment capacity, every five years. As a result of this process, planning and upgrading of treatment plants is a virtually on-going process for each plant.

Wastewater treatment in the Bay Area is provided by various agencies as well as individual city and town wastewater treatment systems. Bay Area Wastewater Treatment Facilities are listed in Table 2.12-4. Some treatment plants serve individual cities while others serve multiple jurisdictions. More than 50 agencies provide wastewater treatment throughout the Bay Area. Each plant is typically sized to accommodate growth over a 15- to 20-year horizon. Because of the dynamic nature of treatment plant planning/upgrading/ expansion, it is not practical, at this regional and programmatic level of analysis, to characterize treatment plant technology, flows and capacity.

Table 2.12-4 Wastewater Treatment Facilities in the Region

Treatment Agency	Service Area
Alameda County	
City of Hayward	City of Hayward
City of Livermore	Livermore city limits, Ruby Hills in Pleasanton, Lawrence Livermore and Sandia National Laboratories
City of San Leandro, Environmental Services Division	City of San Leandro
Dublin San Ramon Services District	Cities of Pleasanton and Dublin
East Bay Municipal Utility District	Cities of Alameda, Albany, Berkeley, Emeryville, Oakland Piedmont
Oro Loma Sanitary District	San Lorenzo, Ashland, Cherryland, Fairview, and portions of Castro Valley, San Leandro and Hayward
Union Sanitary District	Cities of Fremont, Newark and Union City
Contra Costa County	
Central Contra Costa Sanitary District	Alamo, Clayton, Concord, Danville, Lafayette, Moraga Orinda, Pleasant Hill, San Ramon, Walnut Creek
City of Brentwood	Brentwood
City of Hercules / City of Pinole	City of Hercules
City of Richmond Municipal Services District	Central Richmond
Crockett-Valona Sanitary District	Unincorporated Town of Crockett
Delta Diablo Sanitation District	Area bounded by Antioch, Pittsburg, Bay Point and the San Joaquin River
East Bay Municipal Utility District	
Ironhorse Sanitary District	Oakley, Bethel Island
Mt. View Sanitary Eastern District	Martinez and unincorporated parts of the City of Martinez bordered by Pine Street, Bush, Vine Hill Way and Waterbird Way
Rodeo Sanitation	Unincorporated Rodeo area District
West County Wastewater District	Northern portions of Richmond, El Sobrante
Marin County	
Central Marin Sanitation Agency	Area bounded by San Rafael, Fairfax and Corte Madera
Las Gallinas Valley Sanitary District	Northern half of San Rafael, plus county area south of Novato
Marin County Sanitary District #5	Tiburon Peninsula
Novato Sanitary District	City of Novato, Bel Marin, Ignacio and Hamilton

Table 2.12-4 Wastewater Treatment Facilities in the Region

Treatment Agency	Service Area
Sausalito Marin City Sanitary District	Marin City and the City of Sausalito
Sewerage Agency of Southern Marin	Mill Valley and surrounding unincorporated areas
Napa County	
City of American Canyon	American Canyon
City of Calistoga	City of Calistoga
City of St. Helena	City of St. Helena
Napa Sanitation District	Napa city limits, Silverado Country Club area, and the Napa Industrial Park area
Town of Yountville	Yountville
San Francisco	
San Francisco Public Utilities Commission	City and County of San Francisco
San Mateo County	
City of Burlingame	Cities of Burlingame and Hillsborough, and Burlingame Hills
City of Millbrae	Area north of Burlingame and south of San Bruno
City of Pacifica	City of Pacifica
City of San Mateo	City of San Mateo and Foster City
Cities of South San Francisco-San Bruno	Cities of South San Francisco, San Bruno, Colma, southern part of Daly City
North San Mateo County Sanitation District	Daly City and parts of Westborough
Sewer Authority Mid- Coastside	City of Half Moon Bay, Granada, Moss Beach and Montero
San Francisco Public Utilities Commission	Brisbane, portions of Daly City
South Bayside System Authority	Belmont, San Carlos, Redwood City, Menlo Park, Atherton, Portola Valley and Woodside
San Clara County	
City of Sunnyvale Water Pollution Control Plant	Area bounded by Highway 85, Highway 280 and Great American Parkway
Palo Alto Regional Water Quality Control Plant	East Palo Alto, Los Altos, Los Altos Hills, Mountain View, Palo Alto and Stanford University
San José/ Santa Clara County Water Pollution Control Plant	West Valley Sanitation District including City of San José, Sanitation Districts 2 and 3, Campbell, Saratoga, Monte Sereno, Los Gatos, Burbank and Sunol Sanitary Districts, Cupertino, and Milpitas
South County Regional Waste Water Authority	Morgan Hill, Gilroy
Solano County	
City of Benicia	City of Benicia
City of Dixon	Dixon
City of Rio Vista	Rio Vista
City of Vacaville	City of Vacaville
Fairfield-Suisun Sewer District	Fairfield and Suisun
Vallejo Sanitation and Flood Control District	Vallejo area
Sonoma County	
City of Cloverdale	Cloverdale
City of Petaluma	Petaluma and Pengrove
Sonoma County Water Agency	The Town of Sonoma, Guerneville, Geyserville, and surrounding unincorporated areas

Table 2.12-4 Wastewater Treatment Facilities in the Region

Treatment Agency	Service Area
Sub-regional Reclamation Facility/ Laguna Treatment Plant	Cities of Santa Rosa, Rohnert Park, Sebastopol and Cotati
Town of Windsor	Windsor

Data by county includes both incorporated cities and unincorporated areas of the county.

Stormwater Treatment

Stormwater has been identified as urban runoff by the U.S. Environmental Protection Agency (EPA). After a precipitation event, polluted runoff is discharged over land or through storm sewer systems, often untreated with direct flow into water bodies. If left uncontrolled, this polluted water can result in the destruction of wildlife and aquatic ecosystems and can threaten public health. The National Pollutant Discharge Elimination System (NPDES) permitting program provides implementation measures for controlling potentially harmful pollutants found in stormwater runoff from entering water bodies or affecting public health. Additionally, stormwater capture systems assist in maintaining flood protection and create opportunities for ecosystem protection and restoration.

The Bay Area regulates stormwater at the regional, county, and city level. In the early 1990s, RWQCB issued countywide municipal stormwater permits to operators of municipal separate storm sewer systems (MS4s) serving populations over 100,000. Subsequently, in 2015, the RWQCB re-issued these countywide municipal stormwater permits as one Municipal Regional Stormwater NPDES Permit to regulate stormwater discharges from municipalities and local agencies in Alameda, Contra Costa, San Mateo, and Santa Clara Counties, as well as the cities of Fairfield, Suisun City, and Vallejo. MS4s are defined as conveyance systems that are owned by cities or other public entities, designed to collect, or convey stormwater (including gutters, storm drains, pipes, ditches, etc.), and are not part of a combined sewer or a publicly owned sewage treatment plant.

Additionally, a General Permit for Discharge of Stormwater from small MS4s regulates the discharge of stormwater for the following municipalities: Marin County and its cities, Napa County and its cities, the City and County of San Francisco, Solano County and the City of Benicia, and Sonoma County and the Cities of Petaluma and Sonoma.

Additionally, each county has its own stormwater pollution prevention programs (SWPPPs), which aim to facilitate compliance with State and federal regulations through coordination with local municipalities, local residents, businesses, and schools. These programs provide initiatives for preventing stormwater pollution, protecting and enhancing water quality in watersheds, waterways, creeks, and wetlands, as well as water pollution prevention in the San Francisco Bay and Pacific Ocean.

Solid Waste Disposal

Each Bay Area county, plus the cities of Berkeley, Pittsburg, and San José, has a local enforcement agency (LEA) covering all solid waste facilities in the region. LEA's are responsible for ensuring the correct operation and closure of solid waste facilities in the state, as well as for guaranteeing the proper storage and transportation of solid wastes. In concurrence with the California Department of Resources Recycling and Recovery (CalRecycle), LEA's issue operating permits to facilities including landfills, transfer stations, material recovery, and composting facilities.

Solid waste is the garbage, refuse, and other discarded solid materials generated by residential, commercial, and industrial activities. CalRecycle identifies 10 categories of wastes: paper, glass, metal, electronics, plastic, other organic, construction and demolition (C&D), household hazardous waste, special waste, and mixed residue. Solid waste generation is measured by disposal and diversion. The California Public Resources Code Section 40192 defines disposal as "the final deposition of solid wastes onto land, into the atmosphere, or into the waters of the state." Solid waste that is disposed in landfills is measured in volume (cubic yards) and weight (tons). Diversion includes programs and practices such as waste prevention and source reduction, recycling, reuse, and composting that reduce the total amount of waste that requires disposal.

Landfills

The Bay Area is currently served by sixteen privately operated landfills and one operated by the Sonoma County Public Works Department. The sixteen landfills have a total remaining capacity of 261,889,000 cubic yards, a total daily throughput of 41,804 tons per day, and an estimated average of 51 percent remaining capacity. Table 2.12-5 shows the remaining capacity of landfills located in the Bay Area and their estimated date of closure.

Collection, Transfer, Recycling, and Material Recovery Facilities

There are 54 transfer stations in the Bay Area that receive solid waste and transfer it into containers or vehicles before it is finally disposed of in a landfill or transformation facility. The total maximum combined daily throughput capacity of transfer stations in the Bay Area is 46,449 tons per day. Table 2.12-6 identifies the daily throughput of transfer facilities in the region. Several of the listed facilities also handle recycling services.

Composting, Chipping, and Grinding

There are 47 active composting facilities in the region that collect, grind, mix, pile, and add moisture and air to organic materials to speed natural decay and produce a soil amendment. Another 18 chipping and grinding facilities in the region are designed to reduce the size of compostable material (CalRecycle 2017). Recycling, composting, chipping, and grinding all reduce the amount of solid waste that must be disposed of in a landfill.

Construction and Demolition and Inert Debris Facilities

Construction and Demolition (C&D) materials include lumber, drywall, metals, masonry (brick, concrete, etc.), carpet, plastic, pipe, rocks, dirt, paper, cardboard, or green waste related to land development. Metals are the most commonly recycled material while lumber makes up the majority of debris that still goes to a landfill. There are 16 C&D recyclers and inert fill-disposal operations in the Bay Area (CalRecycle 2017).

Table 2.12-5 Active Bay Area Landfills

Facility	Operator	SWIS Number	Estimated Closure Date[1]	Max. Through- put (tons/day)	Total Capacity (Cu Yd)	Remaining Capacity (Cu Yd)	% Capacity Remaining
Altamount Landfill	Waste Management of Alameda County	01-AA-0009	01/01/2025	11,500	62,000,000	45,720,000	74%
Vasco Road Landfill	Republic Services of California Inc.	01-AA-0010	12/31/2022	2,518	32,970,000	7,959,000	24%
Acme Landfill	Acme Fill Corporation	07-AA-0002	07/01/2021	1,500	6,195,000	507,00	8%
Keller Canyon Landfill	Keller Canyon Landfill Co.	07-AA-0032	12/31/2030	3,500	75,018,000	63,408,000	85%
USS-Posco Industries Unit II	US Steel – Posco Industries	07-AC-0042	01/01/2018	8	86,000	not available	not available
Redwood Landfill	Redwood Landfill Inc.	21-AA-0001	01/01/2039	2,300	19,100,000	26,000,000	136%2
Clover Flat Landfill	Clover Flat Landfill Inc.	28-AA-0002	01/01/2047	600	4,900,000	2,870,000	59%
Ox Mountain Sanitary Landfill	Browning Ferris Industries of CA, Inc.	41-AA-0002	01/01/2018	3,598	69,000,000	22,180,000	32%
Zanker Material Processing Facility	Zanker Road Resource Management Ltd.	43-AN-0001	11/01/2025	350	640,000	640,000	100%
Newby Island Sanitary Landfill	International Disposal Corporation	43-AN-0003	01/01/2041	4,000	57,500,000	21,200,000	37%
Zanker Road Class III Landfill	Zanker Road Resource Management Ltd.	43-AN-0007	08/01/2015	1,300	1,300,000	360,000	28%
Kirby Canyon Recycling and Disposal Facility	Waste Management of California Inc.	43-AN-0008	12/31/2022	2,600	36,400,000	16,192,000	45%
Guadalupe Sanitary Landfill	Guadalupe Rubbish Disposal Co, Inc.	43-AN-0015	01/01/2048	1,300	28,600,000	11,055,000	39%
Recology Hay Road	Recology Hay Road	48-AA-0002	01/01/2077	2,400	37,000,000	30,433,000	82%
Potrero Hills Landfill	Potrero Hills Landfill Inc.	48-AA-0075	02/14/2048	4,330	83,100,000	13,872,000	17%
Central Disposal Site	Republic Services of Sonoma County, Inc.	49-AA-0001	01/01/2034	2,500	32,650,000	9,076,760	28%
TOTAL[2]				**41,804**	**513,809,000**	**261,889,000**	**51%**

Notes:

[1] Date is found in or estimated from information in the current permit or permit application, including the approved closure plan for the facility. Some facilities may still be active even if estimated closure date has expired. Permitted amounts; design amounts not yet permitted.

[2] Figures may not sum because of independent rounding

Source: CalRecycle 2017

Table 2.12-6 Active Bay Area Transfer/Processing Facilities

Facility	Operator	SWIS Number	Max. Throughput (tons/day)
Pleasanton Garbage Service Solid Waste Transfer Station	Pleasanton Garbage Service, Inc.	01-AA-0003	720
Davis Street Transfer Station/Resource Recovery Complex	Waste Management of Alameda County	01-AA-0007	5,600
Alameda County Industries Direct Transfer Facility	Alameda County Industries	01-AA-0290	412
Fremont Recycling and Transfer Station	BLT Enterprises of Fremont, Inc.	01-AA-0297	2,400
Commercial Waste & Recycling, LLC	Commercial Waste & Recycling, LLC	01-AA-0302	360
Hayward Transfer Station LLC	Hayward Transfer Station LLC	01-AA-0318	174
City of Berkeley Solid Waste Transfer Station	City of Berkeley Solid Waste Management Division	01-AC-0029	560
Contra Costa TS And Recovery	Allied Waste Industries, Inc.	07-AA-0027	1,900
Central Processing Facility	West County Resource Recovery Inc.	07-AA-0034	1,200
WCCSLF Organic Materials Processing	West Contra Costa Sanitary Landfill Inc.	07-AA-0044	196
Brentwood Transfer Station	City of Brentwood, Public Service Dept.	07-AA-0068	400
Golden Bear Waste Recycling Center	Golden Bear Transfer Services, Inc.	07-AA-0056	1,000
Recycling Center and Transfer Station	Contra Costa Waste Services, Inc.	07-AC-0043	1,500
El Cerrito Recycling Center	City of El Cerrito	07-AA-0063	99
Marin Sanitary Service Transfer Station	Marin Sanitary Service	21-AA-0005	2,640
Devlin Road Transfer Station	Napa-Vallejo Waste Management Authority	28-AA-0027	1,440
City of Napa Material Diversion Facility	Napa Recycling and Waste Services, LLC	28-AA-0030	360
Steele Canyon Road Transfer Operation	Berryessa Garbage Service, Inc	28-AA-0034	not available
Pacific Union College Transfer Facility	Pacific Union College	28-AA-0036	90
San Francisco Solid Waste Transfer and Recycling Center	Sanitary Fill Company	38-AA-0001	3,000
Recycle Central at Pier 96	Recology Properties Inc.	38-AA-0012	2,100
Oliver Padilla Small Volume CD/I Operation	OP Trucking CDI Operations	38-AA-0021	25
San Francisco Recycling and Disposal, Inc.	San Francisco Recycling and Disposal, Inc.	38-AA-0017	275
Big for Hauling and Demolitions	Big for Hauling and Demolitions	38-AA-0018	25
Smart Demolition	Smart Demolition	38-AA-0019	25
S F Recovery, Inc.	S F Recovery, Inc.	38-AA-0020	25
Excess Recovery LLC	Excess Recovery LLC	38-AA-0022	not available
San Bruno Transfer Station	San Bruno Garbage Company, Inc	41-AA-0014	120
Shoreway Environmental Center	South Bay Recycling, LLC	41-AA-0016	3,000
Blue Line MRF and TS	Blue Line Transfer, Inc.	41-AA-0185	1,200
Pescadero Transfer Station	Browning-Ferris Industries, San Carlos	41-AA-0018	10
Peninsula Sanitary Services Direct Transfer Facility	Peninsula Sanitary Services, Inc.	43-AA-0032	149
Recology San Martin Transfer Station	Recology South Valley	43-AA-0003	500
Sunnyvale MRF and Transfer Station	Bay Counties Waste Services	43-AA-0009	1,500
Z-Best Composting Facility	Zanker Road Resource Management, Ltd.	43-AA-0015	1,500
Zanker Material Processing Facility	Zanker Road Resource Management, Ltd.	43-AN-0001	1,800
Zanker Road Class III Landfill	Zanker Road Resource Management, Ltd.	43-AN-0007	1,300

Table 2.12-6 Active Bay Area Transfer/Processing Facilities

Facility	Operator	SWIS Number	Max. Throughput (tons/day)
BFI Newby Island Recyclery	Browning-Ferris Industries of California	43-AN-0014	1,600
Guadalupe Sanitary Landfill	Guadalupe Rubbish Disposal Co, Inc.	43-AN-0015	3,650
Greenwaste Recovery Facility	Green Waste Recovery	43-AN-0019	2,000
Premier Recycling Facility	Premier Recycling	43-AN-0023	550
California Waste Solutions, Inc.	California Waste Solutions, Inc.	43-AN-0024	530
Pacific Coast Recycling	Pacific Coast Recycling, Inc.	43-AA-0021	100
Rogers Avenue Transfer Station	Recology Silicon Valley	43-AN-0025	99
Recology Vallejo	Recology Vallejo	43-AA-0089	514
Guerneville Transfer Station	Republic Services of Sonoma County, Inc.	49-AA-0139	160
Sonoma Transfer Station	Republic Services of Sonoma County, Inc.	49-AA-0144	760
Healdsburg Transfer Station	Republic Services of Sonoma County, Inc.	49-AA-0245	720
Global Materials Recovery Systems	Global Materials Recovery Systems	49-AA-0390	544
Central Transfer Station	Republic Services of Sonoma County, Inc.	49-AA-0404	1,500
Sonoma Vermiculture	Sonoma Vermiculture, LLC	49-AA-0405	15
West College Transfer Station	City of Santa Rosa	49-AA-0391	99
Novato Disposal Services	Novato Disposal Services	49-AA-0406	99
Annapolis Transfer Station	Republic Services of Sonoma County, Inc.	49-AA-0364	99
TOTAL[1]			46,449

Note: [1] Excludes Steele Canyon Road Transfer Operation and Excess Recovery because of missing data.

Source: CalRecycle 2017.

2.12.2 Regulatory Setting

FEDERAL REGULATIONS

Safe Drinking Water Act

Passed in 1974 and amended in 1986 and 1996, the Safe Drinking Water Act (SDWA) gives the EPA the authority to set drinking water standards. Drinking water standards apply to public water systems, which provide water for human consumption through at least 15 service connections, or regularly serve at least 25 individuals. There are two categories of drinking water standards, the National Primary Drinking Water Regulations (NPDWR) and the National Secondary Drinking Water Regulations. The NPDWR are legally enforceable standards that apply to public water systems. NPDWR standards protect drinking water quality by limiting the levels of specific contaminants that can adversely affect public health and are known or anticipated to occur in water.

Clean Water Act

Section 402 of the Clean Water Act establishes the NPDES permit program to regulate the discharge of pollutants from point sources. The Clean Water Act defines point sources of water pollutants as "any discernible, confined, and discrete conveyance" that discharges or may discharge pollutants. These are sources from which wastewater is transmitted in some type of conveyance (pipe and channel) to a waterbody, and are classified as municipal or industrial. Municipal point sources consist primarily of domestic treated

sewage and processed water, including municipal sewage treatment plant outfalls and stormwater conveyance system outfalls. These outfalls contain harmful substances that are emitted directly into waters of the U.S. Without a permit, the discharge of pollutants from point sources into navigable waters of the U.S. is prohibited. NPDES permits require regular water quality monitoring. In California, the NPDES permit program is administered by the State Water Resources Control Board.

Provision C.3

On May 17, 1996, EPA published an Interpretive Policy Memorandum on Reapplication Requirements for Municipal Separate Storm Sewer Systems, which provided guidance on permit application requirements for regulated MS4s. MS4 permits include requirements for post-construction control of stormwater runoff in what is known as Provision C.3. The goal of Provision C.3 is for the Permittees to use their planning authorities to include appropriate source control, site design, and stormwater treatment measures in new development and redevelopment projects to address both soluble and insoluble stormwater runoff pollutant discharges and prevent increases in runoff flows from new development and redevelopment projects. This goal is to be accomplished primarily through the implementation of low impact development (LID) techniques.

Resource Recovery and Conservation Act of 1976

The Resource Recovery and Conservation Act of 1976, Subtitle D (Subtitle D) focuses on state and local governments as the primary planning, regulating, and implementing entities for the management of nonhazardous solid waste, such as household garbage and nonhazardous industrial solid waste. To promote the use of safer units for solid waste disposal, Subtitle D provides regulations for the generation, transportation, and treatment, storage, or disposal of hazardous wastes. EPA developed federal criteria for the proper design and operation of municipal solid waste landfills and other solid waste disposal facilities, but state and local governments are the primary planning, permitting, regulating, implementing, and enforcement agencies for management and disposal subject to approval by EPA. EPA approved the State of California's program, a joint effort of the CIWMB, SWRCB, RWQCBs, and LEAs, on October 7, 1993.

STATE REGULATIONS

Porter-Cologne Water Quality Control Act

The Porter-Cologne Water Quality Control Act established the State Water Resources Control Board and divided the state into nine regions, each overseen by a RWQCB. Each RWQCB region is required to prepare and update a Basin Plan for their jurisdictional area. The RWQCBs also issue waste discharge requirements for discharges of privately- or publicly-treated domestic wastewater to locations other than surface water, such as groundwater basins. The Planning Area is largely within the San Francisco Bay RWQCB, with portions in the North Coastal, Central Coastal, and Central Valley RWQCBs.

Construction General Permit

The California Construction Stormwater Permit (Construction General Permit), adopted by the State Water Resources Control Board, regulates construction activities that include clearing, grading, and excavation resulting in soil disturbance of at least one acre of total land area. The Construction General Permit authorizes the discharge of stormwater to surface waters from construction activities. It prohibits the discharge of materials other than stormwater and authorized non-stormwater discharges and all discharges that contain a hazardous substance in excess of reportable quantities, unless a separate NPDES Permit has been issued to regulate those discharges. The Construction General Permit requires that all developers of land where construction activities will occur over more than one acre do the following:

- complete a Risk Assessment to determine pollution prevention requirements pursuant to the three Risk Levels established in the General Permit;
- eliminate or reduce non-stormwater discharges to storm sewer systems and other waters of the Nation;

- develop and implement a SWPPP, which specifies BMPs that will reduce pollution in stormwater discharges to the Best Available Technology Economically Achievable/Best Conventional Pollutant Control Technology standards; and

- perform inspections and maintenance of all BMPs.

To obtain coverage under the NPDES Construction General Permit, the Legally Responsible Person must electronically file all Permit Registration Documents with the SWRCB before the start of construction. Permit Registration Documents must include:

- Notice of Intent,
- Risk Assessment,
- Site Map,
- SWPPP,
- Annual Fee, and
- Signed Certification Statement.

Typical BMPs contained in Stormwater Pollution Prevention Plans are designed to minimize erosion during construction, stabilize construction areas, control sediment, control pollutants from construction materials, and address post construction runoff quantity (volume) and quality (treatment). The Stormwater Pollution Prevention Plan must also include a discussion of the program to inspect and maintain all BMPs.

California Department of Transportation NPDES Permit

The California Department of Transportation (Caltrans) was originally issued a statewide NPDES permit (Order 99-06-DWQ) in 1999, which requires Caltrans to regulate nonpoint source discharge from its properties, facilities, and activities. The Caltrans permit requires development of a program for communication with local agencies, and coordination with other MS4 programs where those programs overlap geographically with Caltrans facilities. As part of the permit, Caltrans is required to create and annually update a stormwater management plan (SWMP) that is used to outline the regulation of pollutant discharge caused by current and future construction and maintenance activities. SWMP requirements apply to discharges from Caltrans stormwater conveyances, including catch basins and drain inlets, curbs, gutters, ditches, channels, and storm drains. The SWMP applies to discharges consisting of stormwater and non-stormwater resulting from the following:

- maintenance and operation of state-owned highways, freeways, and roads;
- maintenance facilities;
- other facilities with activities that have the potential for discharging pollutants;
- permanent discharges from subsurface dewatering;
- temporary dewatering; and
- construction activities.

The discharges addressed by the SWMP flow through municipal stormwater conveyance systems or flow directly to surface water bodies in the state. These surface water bodies include creeks, rivers, reservoirs, lakes, wetlands, lagoons, estuaries, bays, and the Pacific Ocean and tributaries.

This SWMP applies to the oversight of outside agencies' or non-Caltrans entities' (third parties) activities performed within Caltrans' MS4 to ensure compliance with stormwater regulations. Non-Caltrans activities include highway construction and road improvement projects, as well as residential use and business operations on leased property.

The SWMP must be approved by the SWRCB and, as specified in the permit, it is an enforceable document. Compliance with the permit is measured by implementation of the SWMP. Caltrans' policies, manuals, and other guidance related to stormwater are intended to facilitate implementation of the SWMP. Caltrans also requires all contractors to prepare and implement a program to control water pollution effectively during the construction of all projects.

In lieu of the more recently adopted General Construction Permit as described above, Caltrans continues to modify its current policies and procedures to be consistent with the new permit.

California Administrative Code, Title 22

Under Title 22, the State Department of Health establishes State-wide effluent bacteriological and treatment reliability standards for recycled water uses. The standards are based on the potential for human contact with recycled water. The regional water quality control board (RWQCB) has established and enforces requirements for the application and use of recycled water. Permits are required from a RWQCB for any recycling operation. Applicants for a permit are required to demonstrate that the proposed recycled water operation is in compliance with Title 22 and will not exceed the ground and surface water quality objectives in the regional basin management plan.

The Water Conservation Act of 2009

These sections of the Water Code, enacted as SB X7-7—The Water Conservation Act of 2009, set water conservation targets and efficiency improvements for urban and agricultural water suppliers, Sections 10608.16 and Sections 10608.48, respectively. The legislation establishes a State-wide target to reduce urban per capita water use by 20 percent by 2020. Urban retail water suppliers are required, individually or on a regional basis, to develop an urban water use target by December 31, 2010, to meet their target by 2020, and to meet an interim target (half of their 2020 target) by 2015. Urban water suppliers cannot impose conservation requirements on process water (water used in production of a product) and are required to employ two critical efficient water management practices—water measurement and pricing. Urban retail water suppliers must include in a water management plan, to be completed by July 2011, the baseline daily per capita water use, water use target, interim water use target, and compliance daily per capita water use.

California Urban Water Management Planning Act

This part of the State Water Code (Section 10610) states that each urban water supplier that provides water to 3,000 or more customers, or that provides over 3,000 AF of water annually, should make every effort to ensure the appropriate level of reliability in its water service sufficient to meet the needs of its various categories of customers during normal, dry, and multiple dry years by preparing a UWMP and updating it every five years. The Act describes the contents of UWMPs, and requires each agency's UWMP to assess the reliability of the agency's water resources over a 20-year planning horizon.

California Senate Bill 610

Referred to as SB 610, the intent of this part of the State Water Code is to ensure that sufficient water supplies are available for growing communities. Water Code Section 10910 requires any project subject to CEQA of a specified minimum size to require a local public water provider with more than 3,000 service connections to prepare a water supply assessment (WSA) for the project. The WSA must document sources of water supply, quantify water demands, and compare future water supply and demand to show that sufficient water will be available to serve the development project. Water supply must be assessed for normal, single dry, and multiple dry water years during a 20-year forecast. If supplies are found to be insufficient to serve the project, the WSA must include plans for acquiring sufficient supplies. The WSA must be included in the CEQA document for the project.

California Senate Bill 221

SB 221 applies to subdivisions of more than 500 dwelling units (Water Code Section 10912). Like SB 610, it is intended to ensure an adequate water supply for new development. SB 221 requires that approval of a tentative map showing the design and improvement of a proposed subdivision shall include a requirement that a sufficient water supply is available.

California Groundwater Management Act

The Groundwater Management Act (AB 3030, Water Code Sections 10750 et seq.) provides guidance for applicable local agencies to develop voluntary groundwater management plans (GMP) in State- designated

groundwater basins. GMPs can allow agencies to raise revenue to pay for measures influencing the management of the basin, including extraction, recharge, conveyance, facilities' maintenance and water quality.

State Water Resources Control Board and Regional Water Quality Control Boards

The SWRCB issues individual and general NPDES permits for wastewater and stormwater through the authorization of EPA. Discharges that may impact surface or groundwater, and which are not regulated by an NPDES permit, are issued a waste discharge requirement (WDR) that serves as a permit under the authority of the California Water Code. The RWQCBs issue Land Disposal WDRs that permit certain solid and liquid waste discharges to land to ensure that wastes do not reach surface water or groundwater. Land Disposal WDRs contain requirements for liners, covers, monitoring, cleanup, and closure. The RWQCBs also permit certain point source discharges of waste to land that have the potential to affect surface or groundwater quality. This category of discharges, known as "Non-15" WDR, are the most diverse and include sewage sludge and biosolids, industrial wastewater from power plants, wastes from water supply treatment plants, treated wastewater for aquifer storage and recovery, treated groundwater from cleanup sites, and many others.

Related to wastewater collection and treatment facilities, stormwater drainage facilities, and landfills the SWRCB has issued the following regulations:

- Caltrans NPDES Permit (Order 99-06-DWQ): Requires Caltrans to regulate nonpoint source discharge from its properties, facilities, and activities. Among other requirements, Caltrans must annually update an enforceable SWMP.

- Statewide General Waste Discharge Requirements for Sanitary Sewer Systems (Order No. 2006- 0003-DWQ): Requires all federal and State agencies, municipalities, counties, districts, and other public entities that own, operate, or are otherwise responsible for sanitary sewer systems greater than one mile in length that collect and/or convey untreated wastewater to a publicly owned treatment facility in California to prepare sewer system management plans and report all sanitary sewer overflows (SSOs) to the SWRCB. Order No. WQ 2008-0002-EXEC, amended the statewide Monitoring and Reporting Program for SSOs that reach surface waters or storm drains. The RWQCB issued Order No. R9-2007-0005 to reaffirm the prohibition of SSOs upstream of a wastewater treatment facility.

AB 885 - On-Site Wastewater Treatment Systems

AB 885 (Chapter 781, Statutes of 2000) required the SWRCB to draft and implement regulations for siting, installation, operation, and maintenance of on-site wastewater treatment systems. Proposed regulations were issued in 2009 and adopted in June 2012.

Integrated Waste Management Act of 1989

The Integrated Waste Management Act of 1989 (AB 939 or IWMA) was enacted by the California legislature to reduce dependence on landfills as the primary means of solid waste disposal, and to ensure an effective and coordinated approach to safe management of all solid waste generated within the State. The IWMA establishes a hierarchy of preferred waste management practices: (1) source reduction (waste prevention), to reduce the amount of waste generated at its source; (2) recycling (or reuse) and composting; (3) transformation; and (4) disposal by landfilling. The IWMA required disposal of waste by the local jurisdictions to be cut by 25 percent by 1995 and by 50 percent by 2000. Waste disposal levels from the year 1990 were used as the base, adjusted for population and economic conditions.

The IWMA also requires the preparation of a Countywide Integrated Waste Management Plan (CIWMP), including a Countywide Siting Element that must demonstrate a remaining landfill disposal capacity of at least 15 years to serve all the jurisdictions in the county. The Countywide Siting Element includes a combination of strategies to demonstrate adequate capacity, including existing, proposed, and tentative landfills or expansions; increased diversion efforts; and the export of solid waste for disposal. As part of the CIWMP, the IWMA also requires that each jurisdiction (cities and the county) prepare a Source Reduction and Recycling Element, a Household Hazardous Waste Element, and a Non-Disposal Facility Element.

Title 14, California Code of Regulations

CalRecycle regulations pertaining to nonhazardous waste management in California include minimum standards for solid waste handling and disposal; regulatory requirements for composting operations; standards for handling and disposal of asbestos containing waste; resource conservation programs; enforcement of solid waste standards and administration of solid waste facility permits; permitting of waste tire facilities and waste tire hauler registration; special waste standards; used oil recycling program; electronic waste recovery and recycling; planning guidelines and procedures for preparing, revising, and amending countywide IWMP; and solid waste cleanup program.

Title 27, California Code of Regulations

CalRecycle and the SWRCB jointly issue regulations pertaining to waste disposal on land, including criteria for all waste management units, facilities and disposal sites; documentation and reporting; enforcement, financial assurance; and special treatment, storage, and disposal units.

California Department of Water Resources

The DWR is responsible for the planning, construction, and operation of SWP facilities. It also sets conditions on use of SWP facilities. In addition, DWR is responsible for statewide water planning, evaluating urban water management plans, overseeing dam safety and flood control, and transfer of certain water rights permits (e.g., pre-1914).

California Model Water Efficient Landscape Ordinance

The California Model Water Efficient Landscape Ordinance (MWELO) sets restrictions on outdoor landscaping. Because the City of Lincoln is a "local agency" under the MWELO, it must require project applicants to prepare plans consistent with the requirements of the MWELO for review and approval by the City. The MWELO was most recently updated by the Department of Water Resources and approved by the California Water Commission on July 15, 2015. All provisions became effective on February 1, 2016. The revisions, which apply to new construction with a landscape area greater than 500 square feet, reduced the allowable coverage of high-water-use plants to 25 percent of the landscaped area. The MWELO also requires use of a dedicated landscape meter on landscape areas for residential landscape areas greater than 5,000 square feet or non-residential landscape areas greater than 1,000 square feet, and requires weather-based irrigation controllers or soil-moisture based controllers or other self-adjusting irrigation controllers for irrigation scheduling in all irrigation systems.

California Green Building Standards Code, Construction Waste Reduction Requirements

The 2016 California Green Building Standards Code (CALGreen) requires builders/owners to divert 65 percent of the waste from covered projects (i.e., new construction, demolition, and/or addition to non-residential and residential structures requiring construction or building permit). This can be met through three methods: 1) develop and submit a waste management plan to the jurisdiction's enforcement agency that identifies materials and facilities to be used and document diversion, 2) use a waste management company, approved by the enforcing agency, that can document 65 percent diversion, or 3) use the disposal reduction alternative, as appropriate for the type of project. If the waste management plan option is used, the plan should be developed before construction begins, and project managers should use the project's planning phase to estimate materials that will be generated and identify diversion strategies for those materials. The California Department of Housing and Community Development has developed suggested methods and compliance forms as options for residential builders and owners to demonstrate compliance with the 65 percent or greater construction waste reduction requirement.

Governor's Executive Order B-29-15 issued on April 1, 2015

Key provisions of Executive Order B-29-15 included ordering the State Water Resources Control Board to impose restrictions to achieve a 25-percent reduction in potable urban water usage through February 28, 2016; directing DWR to lead a statewide initiative, in partnership with local agencies, to collectively replace 50 million square feet of lawns and ornamental turf with drought tolerant landscapes, and directing the

California Energy Commission to implement a statewide appliance rebate program to provide monetary incentives for the replacement of inefficient household devices.

REGIONAL AND LOCAL REGULATIONS

Planning for water management, wastewater and stormwater management, and solid waste disposal are prepared by local agencies to support their long-term resource planning and ensure adequate service to meet existing and future demands. In addition to federal and state regulations governing these planning efforts, cities, counties, and water districts may also provide regulatory advisement on water resources, treatment, and solid waste disposal. Many jurisdictions incorporate goals and policies relating to these topic areas in their municipal codes, general plans, development standards, or other regulations (e.g., utility master plans, solid waste management plans).

2.12.3 Impact Analysis

SIGNIFICANCE CRITERIA

The following significance criteria are based on CEQA Guidelines Appendix G, as well as the thresholds used in the EIR for the 2013 Plan Bay Area, and professional judgment. Under these criteria, implementation of the proposed Plan would have a potentially significant adverse impact if the proposed Plan would:

Criterion 1: Result in insufficient water supplies available to serve development implemented as part of the Plan from existing entitlements and resources.

Criterion 2: Result in a determination by the wastewater treatment provider which serves or may serve development implemented as part of the Plan that it has inadequate capacity to serve the project's projected demand in addition to the provider's existing commitments.

Criterion 3: Require or result in the construction of new stormwater drainage facilities or expansion of existing facilities, the construction of which could cause significant environmental effects.

Criterion 4: Require or result in the construction of new water or wastewater treatment facilities or expansion of existing facilities, the construction of which could cause significant environmental effects.

Criterion 5: Be served by a landfill with sufficient permitted capacity to accommodate the project's solid waste disposal needs and comply with federal, state, and local statutes and regulations related to solid waste.

METHOD OF ANALYSIS

This analysis includes a program-level, qualitative assessment of impacts related to water supply, wastewater/stormwater, and solid waste. The assessment of available water supply considers the current regional demand and supply of water based on analyses available in current UWMPs for major water providers (e.g., East Bay Municipal Utilities District, San Francisco Public Utilities Commission, Santa Clara Valley Water District, Sonoma County Water Agency, Marin Municipal Water District, etc.). The projections included in the applicable UWMPs inform where additional demand may exceed the capacity of water districts as well as which water districts may have additional capacity. The EIR identifies areas where: 1) there is an existing forecasted shortage in long-term supplies that would need to be met by imported water or additional water conservation, reuse, and recycling; or 2) where the proposed Plan projects population or jobs beyond what is assumed in current UWMPs and could result in a potential shortage.

Impacts related to wastewater, stormwater, and solid waste are more localized in nature, and therefore the analysis is qualitative and focuses on the existing regulations, standards, and policy measures to address these localized impacts.

IMPACTS AND MITIGATION MEASURES

Impact 2.12-1: Implementation of the proposed Plan could result in insufficient water supplies available to serve development implemented as part of the Plan from existing entitlements and resources.

Impacts of Changes in Projected Land Use

As shown in Table 2.12-2, the major water suppliers in the region are projected to be able to supply adequate water for their projected service populations through 2040 during normal years, with the exception of Solano County Water Agency which expects to meet water demand projections up to 2030, but has not analyzed beyond that horizon. The ability to provide adequate water supply for many districts is dependent on successful achievement of water conservation targets and the completion of supply expansion projects, such as new water contracts, land acquisition, groundwater recharge, and reclaimed water distribution. In some areas, such as the City and County of San Francisco and the Santa Clara Valley, adequate supply through 2040 depends on substantial water conservation efforts. In San Francisco, the ability for supply projects to move forward depends on multiple factors such as environmental review, permitting requirements, public acceptance, and the availability of funding. Water suppliers are pursuing the water conservation targets set by the State under SB X7-7 (2009) and regularly updating their UWMPs. Future development projects would be required to comply with Water Code Section 10910 and Section 10912, as described above in the Regulatory Setting under Senate Bill 610 and Senate Bill 221, respectively. The enforcement of these regulations by local jurisdictions would ensure that a water supply assessment is prepared to demonstrate that sufficient water would be available to serve development projects before their approval.

Some water suppliers should be able to meet demands of growth under the proposed Plan, such as the Alameda County Water District, City of Napa, and San Francisco PUC, although these would need to take measures to address water conservation during dry years. Other water suppliers, such as the Solano County Water Agency, would likely need to pursue additional sources to accommodate expected growth. Portions of the region may also have a difficult time providing adequate water supplies during a single dry year. As shown in Table 2.12-3, major water supply agencies such as Alameda County Water District, EBMUD, City of Napa Water Department, Santa Clara Valley Water District, Solano County Water Agency, and Sonoma County Water Agency expect demand to exceed supply during a single dry year before the time horizon of the proposed Plan (2040). Therefore, in localized parts of the region, there is an existing forecasted shortage in long-term supplies during a single dry year that will need to be met through additional water conservation, reuse, and recycling, and additional water supply sources.

The combined population projections of the water supply agencies for 2040 (9,883,000) exceed the 2040 regional population projections for the proposed Plan (approximately 9,627,500), as shown in Table 2.12-7. As a result, there may be adequate water supplies across the entire region to serve expected growth under the proposed Plan. For example, EBMUD identified a potential dry year shortage in 2015, although water supply is expected to meet demand during regular years. San José, served by the Santa Clara Valley Water District, projects 2040 as the year wherein a water shortage may occur during a single dry year. San Francisco, served by the San Francisco Public Utilities Commission, does not project water shortages during a single dry year during the buildout period of the proposed Plan, largely because of supplies from reservoir storage. Projected growth under the proposed Plan would not occur evenly around the region; therefore, the proposed Plan could result in population or job growth beyond what is assumed in current UWMPs and could result in a localized water supply shortage.

Locally, as shown in Tables 2.12-2 and 2.12-3, land development through 2040 served by the Contra Costa Water District, Marin Municipal Water District, San Francisco Public Utilities Commission, Santa Clara Valley Water District, or Zone 7 Water Agency would have adequate water supplies in both regular and single dry years. However, at a regional level, changes in land use projected development from the proposed Plan may result in insufficient water supplies requiring the acquisition of additional water sources and the imposition of conservation requirements. Further, as discussed in Section 2.12.1, "Environmental Setting," California,

including the Plan area, may face future water supply challenges associated with climate change-related periods of drought. The increase in population-, household-, and jobs-related demand on water supply coupled with potentially reoccurring drought conditions may result in insufficient water supply to serve the Plan area. For these reasons, these impacts are considered potentially significant (PS).

Table 2.12-7 Projected Service Area Population of Major Bay Area Water Agencies

Agency	Projected 2040 Population[1]
Alameda County Water District	416,000
Contra Costa Water District	654,000
East Bay Municipal Utility District	1,751,000
Marin Municipal Water District	211,000
City of Napa Water Department	94,000
San Francisco Public Utilities Commission[3]	3,330,000
Santa Clara Valley Water District	2,424,000
Solano County Water Agency	548,000
Sonoma County Water Agency[3]	531,000
Zone 7 Water Agency	286,000
TOTAL	**9,883,000**

Notes: Except where noted, projections are from 2013 ABAG population projections. Sum of population figures from Table 3-3 and Table 3-4 of the SFPUC UWMP. Sonoma County Water Agency is a wholesale water provider to MMWD. However, the agencies' service populations are listed separately. California Department of Finance 2015; projected 2040 population.

Sources: ACWD 2016, CCWD 2016, EBMUD 2016, MMWD 2016, City of Napa 2011, SFPUC 2016, SCVWD 2016, SCWA 2011, SMCWA 2016, Zone 7 2016

Impacts of Transportation Projects

The construction of new roadway capacity, bicycle and pedestrian facilities, transit facilities; maintenance on existing transportation facilities; and operation of new and existing facilities could increase the demand for water for construction activities such as concrete mixing or dust control and operational activities such as landscape irrigation or services such as restrooms and drinking fountains. Although these increases in demand are anticipated to be small on a per project basis, the collective demand from all of the projects taken together could increase water demand in such a way as to exceed water supply agencies' projected demand. Because transportation projects under the proposed Plan may be constructed in locations with constrained water supplies, especially during a dry year, these impacts are considered potentially significant (PS).

Conclusion

Almost all of the potential impacts on water supplies could come from assumed land development under the proposed Plan. Given the relatively small permanent demand on potable water supplies required by transportation projects, it is unlikely that they would contribute to a significant impact. It is possible that the construction phase of a transportation project (water for mixing concrete, watering down topsoil, initial irrigation needs) could exceed local water supplies on a temporary basis, however, especially during dry years. It is also possible that a transportation project that features significant landscaping that is not drought-resistant could significantly impact local water supplies over a longer term. Because the proposed Plan overall may result in insufficient water supplies, requiring the acquisition of additional water sources and the imposition of conservation requirements, these impacts are considered **potentially significant (PS)**. Mitigation Measures 2.12-1(a), 2.12-1(b), and 2.12-1(c) are described below.

Mitigation Measures

2.12-1(a) Implementing agencies and/or project sponsors shall implement measures, where feasible and necessary based on project- and site-specific considerations that include, but are not limited to:

- For projects that could increase demand for water , project sponsors shall coordinate with the relevant water service provider to ensure that the provider has adequate supplies and infrastructure to accommodate the increase in demand. If the current infrastructure servicing the project site is found to be inadequate, infrastructure improvements shall be identified in each project's CEQA documentation.

- Implement water conservation measures which result in reduced demand for potable water. This could include reducing the use of potable water for landscape irrigation (such as through drought-tolerant plantings, water-efficient irrigation systems, the capture and use of rainwater) and the use of water-conserving fixtures (such as dual-flush toilets, waterless urinals, reduced flow faucets).

- Coordinate with the water provider to identify an appropriate water consumption budget for the size and type of project, and designing and operating the project accordingly.

- For projects located in an area with existing reclaimed water conveyance infrastructure and excess reclaimed water capacity, use reclaimed water for non-potable uses, especially landscape irrigation. For projects in a location planned for future reclaimed water service, projects should install dual plumbing systems in anticipation of future use. Large developments could treat wastewater onsite to tertiary standards and use it for non-potable uses onsite.

2.12-1(b) Implementing agencies and/or project sponsors shall require the construction phase of transportation projects to connect to reclaimed water distribution systems for non-potable water needs, when feasible based on project- and site-specific considerations.

2.12-1(c) Implementing agencies and/or project sponsors shall require transportation projects with landscaping to use drought-resistant plantings or connect to reclaimed water distribution systems for irrigation and other non-potable water needs when available and feasible based on project- and site-specific considerations.

Significance after Mitigation

Implementation of Mitigation Measures 2.12-1(a), 2.12-1(b), and 2.12-1(c) would reduce impacts associated with water supply because they would require that land use and transportation project sponsors coordinate with water suppliers to ensure adequate water supplies exist or comply with project-level CEQA review and incorporate on-site water conservation strategies, water budgeting, and incorporation of recycled water for non-potable use. To the extent that an individual project adopts and implements all feasible mitigation measures described above, the impact would be less than significant with mitigation (LS-M).

Projects taking advantage of CEQA Streamlining provisions of SB 375 (Public Resources sections 21155.1, 21155.2, and 21159.28) must apply the mitigation measures described above, to address site-specific conditions. However, MTC/ABAG cannot require local implementing agencies to adopt the above mitigation measures, and it is ultimately the responsibility of a lead agency to determine and adopt mitigation. Therefore, this impact remains **significant and unavoidable (SU)** for purposes of this program-level review.

Impact 2.12-2: Implementation of the proposed Plan could result in a determination by the wastewater treatment provider which serves or may serve development implemented as part of the Plan that it has inadequate capacity to serve the project's projected demand in addition to the provider's existing commitments.

Impacts of Changes in Projected Land Use

Increased volumes of wastewater from forecasted growth under the proposed Plan could exceed the wastewater treatment capacity of individual treatment facilities, if not properly planned. Generation of additional wastewater as a result of forecasted development would be tied to the location of growth rather than spread evenly across the entire system. In counties where forecasted growth is greater under the proposed Plan (e.g., San Jose, San Francisco, Oakland), the rate of increase could exceed current wastewater treatment capacity. Generally, capacity planning is undertaken in advance of need. Funding for new and expanded facilities is typically provided through developer impact fees, and through the rates customers pay for treatment. Building occupancy is not allowed if wastewater service is not available. Therefore, exceedance of the capacity of a wastewater treatment plant is not expected.

Previous estimates of the total remaining wastewater treatment capacity in the entire Bay Area is 500.55 mgd, or approximately 44 percent of the dry weather capacity of all facilities (MTC/ABAG 2013, 2.1-27). Wastewater generation rates are closely tied to population growth, and the total population is expected to grow by approximately 27 percent across the Bay Area by 2040; therefore, wastewater generation could increase by up to 27 percent, which would be within the existing regional capacity. Furthermore, wastewater generation per capita would be expected to decrease by 2040 as compared to baseline conditions because of implementation of regional- and state-wide water conservation measures. However, wastewater is not conveyed between different treatment agencies (this would require construction of an extensive network of major pipelines). One wastewater facility could approach its treatment capacity and require expansion, whereas other plants in the region may have substantial available capacity. This is a localized issue and, potential local impacts are discussed below.

Under the proposed Plan, population and job growth would be concentrated in existing urban locations. Overall, the proposed Plan would result in a population growth of 27 percent and a household growth of 24 percent from 2015 to 2040. Some counties are projected to grow households by more than the regionwide rate of 24 percent, such as Santa Clara County at 33 percent, while most others would grow less, such as Napa County at 12 percent and San Mateo County at 17 percent. Areas with the most growth also are most likely to need additional wastewater treatment capacity. Therefore, the counties wherein growth would be focused, such as Alameda County (29 percent), Contra Costa County (27 percent), San Francisco County (29 percent), and Santa Clara County (33 percent), also are the locations where treatment plant expansion is most likely.

It is likely that some treatment facilities would need to expand their capacity to meet expected population growth, or to respond to RWQCB requirements to provide capacity to receive their NDPES permit, during the timeframe of the proposed Plan. Because the changes to the land use pattern under the proposed Plan may result in insufficient wastewater treatment capacity, these impacts are considered potentially significant (PS).

Impacts of Transportation Projects

Transportation projects would not affect wastewater treatment capacity, except in circumstances where an area has a combined stormwater and wastewater conveyance system. In those instances, extra stormwater runoff caused by additional impervious surface from roadway and some transit projects may require additional wastewater treatment capacity in localized locations. As a result of the possibility of impacts on combined drainage systems resulting in insufficient wastewater treatment capacity, these impacts are considered potentially significant (PS). In this case, mitigation of stormwater drainage system capacity impacts would mitigate this impact. Mitigation for stormwater runoff into wastewater systems from transportation projects is discussed under Impact 2.12-3.

Transportation projects could cause impacts on wastewater treatment capacity in cases where excess stormwater runoff is combined into a wastewater/stormwater conveyance system. Therefore, mitigation of stormwater drainage system capacity impacts would also serve to mitigate wastewater treatment capacity impacts. Mitigation for stormwater runoff into wastewater systems from transportation projects is discussed under Impact 2.12-3; mitigation measures 2.12-3(b) and 2.12-3(c) would mitigate these impacts.

Conclusion

Almost all of the potential impacts on wastewater treatment capacity relate to land development under the proposed Plan. Given the relatively small permanent generation of wastewater by transportation projects, it is unlikely that they could contribute to a significant impact; the exception could be if stormwater runoff was collected by a combined wastewater/storm sewer system. These would result in impacts that are **potentially significant (PS).** Mitigation Measure 2.12-2 is described below.

Mitigation Measure

2.12-2 Implementing agencies and/or project sponsors shall implement mitigations measures, where feasible and necessary based on project- and site-specific considerations that include, but are not limited to:

- During the design and CEQA review of individual future projects, implementing agencies and project sponsors shall determine whether sufficient wastewater treatment capacity exists for a proposed project. These CEQA determinations must ensure that the proposed development can be served by its existing or planned treatment capacity. If adequate capacity does not exist, project sponsors shall coordinate with the relevant service provider to ensure that adequate public services and utilities could accommodate the increased demand, and if not, infrastructure improvements for the appropriate public service or utility shall be identified in each project's CEQA documentation. The relevant public service provider or utility shall be responsible for undertaking project-level review as necessary to provide CEQA clearance for new facilities.

- Implementing agencies and/or project sponsors shall also require compliance with Mitigation Measure 2.12(a), and MTC shall require implementation of Mitigation Measures 2.12(b), and/or 2.12(c) listed under Impact 2.12-1, as feasible based on project- and site-specific considerations to reduce water usage and, subsequently, wastewater flows.

Significance after Mitigation

Implementation of Mitigation Measure 2.12-2 would reduce impacts related to exceedance of existing wastewater capacity because application of this mitigation would require that land use and transportation projects comply with project-level CEQA review and incorporate on-site water conservation strategies, water budgeting, and incorporation of recycled water for non-potable use as mandated by Mitigation Measures 2.12-1(b), 2.12-1(c), and 2.12-2 listed above, which would reduce the generation of wastewater. To the extent that an individual project adopts and implements all feasible mitigation measures described above, the impact would be less than significant with mitigation (LS-M).

Projects taking advantage of CEQA Streamlining provisions of SB 375 (Public Resources sections 21155.1, 21155.2, and 21159.28) must apply the mitigation measures described above, to address site-specific conditions. Further, because the measures are tied to existing regulations that are law and binding on responsible agencies and project sponsors, it is reasonable to determine that they would be implemented. Therefore, with the incorporation of mitigation measure 2.12-2, this impact would be **less than significant with mitigation (LS-M)**.

Impact 2.12-3: Implementation of the proposed Plan could require or result in the construction of new stormwater drainage facilities or expansion of existing facilities, the construction of which could cause significant environmental impacts.

Impacts of Changes in Projected Land Use

The total land use growth footprint of the proposed Plan covers 18,726 acres including an increase in the total urban footprint of 6,581 acres, a roughly 0.2 percent increase over existing conditions. Development of the

remaining acres outside of existing urban areas could be composed of a variety of land uses and impervious surfaces (paved areas, building rooftops, parking lots, etc.) that could result in incremental increases in the volume and rate of stormwater runoff, and possibly require the expansion or construction of new stormwater drainage facilities.

Urban infill can also increase impervious surfaces by converting permeable vacant or underused parcels into land with more paving or structures; some redevelopment can reduce the amount of impervious surface, however, by converting pavement or buildings into permeable paving or landscape. Redevelopment can also increase the amount and rate of runoff by discharging greater amounts of water on a site than exists before development, typically because of excessive landscape irrigation. Because TPAs are already urbanized, most of the land use changes in these areas would be redevelopment, infill, and intensification of existing land uses. Infrastructure upgrades would accommodate the stormwater and water quality treatment needs of the individual development.

The successful and continued implementation of Provision C.3 requirements should help mitigate increases in runoff flows from new development and redevelopment projects through post-construction controls such as LID techniques. As required by Provision C.3, for new development that would introduce 10,000 square feet of new impervious surfaces, the specific project applicant would incorporate LID strategies, such as stormwater reuse, onsite infiltration, and evapotranspiration as initial stormwater management strategies. Secondary methods that could be incorporated include the use of natural, landscape based stormwater treatment measures, as identified by Provision C.3. For a complete discussion of water quality impacts associated with stormwater runoff, see Section 2.8, "Water Resources."

The infill nature of the proposed Plan's development pattern, combined with existing stormwater regulations, would result in less-than-significant impacts on the stormwater capacity of existing systems. However, development outside of urbanized areas could require the construction of new stormwater drainage systems, and this impact would be potentially significant (PS).

Impacts of Transportation Projects

Development of new roadway projects as part of the proposed Plan could create new impervious areas by converting existing permeable surfaces into impervious surfaces through the expansion of existing roadways and construction of new traffic lanes. The proposed Plan calls for the addition of approximately 500 lane miles, consisting of freeway, expressway, and arterial lane-miles, to be constructed in the region, a two percent increase over existing conditions (see Table 2.1-12 in Section 2.1, "Transportation"). Any projects undertaken by Caltrans, or by a third party operating within its stormwater system, are subject to its Stormwater Management Plan which regulates discharges from Caltrans stormwater conveyances.

Transit projects may also increase impervious surfaces, although many rail systems are below ground (subways), use existing roadways (light rail), or are elevated, and so make little to no contribution to impervious surfaces; some at-grade rail lines may be largely permeable.

As with land development, the construction activities associated with transportation projects can be a source of additional stormwater runoff. In locations with a combined stormwater and wastewater conveyance system, this increase in runoff could impact wastewater treatment capacity as well, as discussed under Impact 2.12-2. Regulations already exist to mitigate stormwater runoff from transportation projects, however:

- Transportation projects that fall under Caltrans jurisdiction would be covered by the Caltrans NPDES Stormwater Program. As described in the regulatory setting for the State Water Board, this NPDES permit regulates all stormwater discharges from Caltrans-owned conveyances, maintenance facilities and construction activities. Caltrans also has a Storm Water Management Plan that describes the procedures and practices used to reduce or eliminate the discharge of pollutants to storm drainage systems and receiving waters. Guidance documents have also been developed by Caltrans to implement stormwater BMPs in the design, construction, and maintenance of highway facilities.

- Transportation projects where local agencies are the lead agency are subject to local and state regulations for post-construction runoff management requirements. The NPDES permit requirements described in the land use discussion above (project design including general site design control measures, LID features, treatment control measures, ordinances, and regulations) also apply to transportation impacts to reduce the discharge of sediments and other pollutants.

Overall, while existing regulations would apply to transportation project construction to minimize these effects, the more stringent and effective Caltrans NPDES Stormwater Regulations only apply to some transportation projects. In addition, new roadway lane miles in areas lacking adequate stormwater drainage capacity could require expanded systems. As a result, the potential stormwater capacity impacts related to transportation improvements from implementation of the proposed Plan are considered potentially significant (PS).

Conclusion

Development outside of urbanized areas could require the construction of new stormwater drainage systems, and this impact would be potentially significant (PS). Transportation projects that aren't subject to Caltrans NPDES Stormwater Regulations or in areas lacking adequate stormwater drainage capacity could result in impacts that are **potentially significant (PS)**. Mitigation Measures 2.12-3(a), 2.12-3(b), and 2.12-3(c) are described below.

Mitigation Measures

2.12-3(a) Implementing agencies and/or project sponsors shall implement measures, where feasible and necessary based on project-and site-specific considerations that include, but are not limited to:

- During the design and CEQA review of individual future projects, implementing agencies and project sponsors shall determine whether sufficient stormwater drainage facilities exist for a proposed project. These CEQA determinations must ensure that the proposed development can be served by its existing or planned drainage capacity. If adequate stormwater drainage facilities do not exist, project sponsors shall coordinate with the appropriate utility and service provider to ensure that adequate facilities could accommodate the increased demand, and if not, infrastructure and facility improvements shall be identified in each project's CEQA determination. The relevant public service provider or utility shall be responsible for undertaking project-level review as necessary to provide CEQA clearance for new facilities.

- For projects of greater than 1 acre in size, reduce stormwater runoff caused by construction by implementing stormwater control best practices, based on those required for a SWPPP.

- Model and implement a stormwater management plan or site design that prevents the post-development peak discharge rate and quantity from exceeding pre-development rates.

2.12-3(b) Implementing agencies and/or project sponsors shall implement measures, where feasible and necessary based on project- and site-specific considerations that include, but are not limited to:

- Transportation projects shall incorporate stormwater control, retention, and infiltration features, such as detention basins, bioswales, vegetated median strips, and permeable paving, early into the design process to ensure that adequate acreage and elevation contours are planned.

2.12-3(c) Implementing agencies and/or project sponsors shall implement measures, where feasible and necessary based on project- and site-specific considerations that include, but are not limited to:

- Transportation projects implemented by Caltrans or subject to Caltrans review shall adhere to Caltrans' Stormwater Management Plan, which includes best practices to reduce the volume of stormwater runoff and pollutants in the design, construction and maintenance of highway facilities.

Significance after Mitigation

Implementation of Mitigation Measures 2.12-3(a), 2.12-3(b), and 2.12-3(c) would reduce impacts associated with exceedances of existing stormwater drainage capacity because application of such mitigation would require that land use and transportation projects comply with project-level CEQA review, incorporate on-site stormwater control practices, and develop and implement stormwater management plans or stormwater control design features. To the extent that an individual project adopts and implements all feasible mitigation measures described above, the impact would be less than significant with mitigation (LS-M).

Projects taking advantage of CEQA Streamlining provisions of SB 375 (Public Resources sections 21155.1, 21155.2, and 21159.28) must apply the mitigation measures described above, to address site-specific conditions. However, MTC/ABAG cannot require local implementing agencies to adopt the above mitigation measures, and it is ultimately the responsibility of a lead agency to determine and adopt mitigation. Therefore, this impact remains **significant and unavoidable (SU)** for purposes of this program-level review.

Impact 2.12-4: Implementation of the proposed Plan could require or result in the construction of new or expanded water and wastewater treatment facilities, the construction of which could cause significant environmental effects.

Impacts of Changes in Projected Land Use

It is possible that the increase in population, households, and jobs in the region would result in a need for new or expanded water and wastewater treatment facilities to accommodate demand that exceeds the capacity at existing facilities, as described under Impacts 2.12-1 and 2.12-2. Much of the new treatment capacity is likely to be through expansion of existing facilities, because 99 percent of projected development is expected to occur within the existing urban footprint (see Table 1.2-8 in Section 1.2, "Project Description") and therefore could connect to existing conveyance and treatment systems.

Some wastewater treatment facilities could face challenges expanding their discharge capacity because of pollutant load restrictions in receiving waters. In these instances, wastewater treatment capacity may need to be expanded along with the use of advanced treatment technology, reclaimed water distribution, or groundwater recharge.

Environmental impacts could occur from both the construction process and the conversion of undeveloped land to accommodate expanded facilities. The construction process could result in other environmental effects including air quality, stormwater runoff, and noise. The conversion of underdeveloped land could result in the loss of agricultural land, increased stormwater runoff, loss of habitat, and damage to visual and cultural resources, among other impacts. Because site specific information is needed to assess impacts, project level environmental review will be required for construction of new water and wastewater facilities. Typically, improvements are identified in regional master plans well in advance of the need for expansion, and environmental review follows with mitigation based on impacts of the expansion project. These are typically provided at a regional or, at least, citywide scale.

Because the land use pattern of the proposed Plan may result in construction of new or expanded water and wastewater treatment facilities, the construction of which may have site specific impacts, these impacts are considered potentially significant (PS).

Impacts of Transportation Projects

It is not anticipated that transportation projects would have an effect on water treatment demand and therefore would not require new or expanded facilities. It is not anticipated that transportation projects could have an effect on wastewater treatment demand, except in circumstances where an area has a combined stormwater and wastewater conveyance system, where these impacts are considered potentially significant (PS).

Conclusion

Potential impacts on water and wastewater treatment facilities capacity would occur primarily from projected development under the changes in land use assumed by the proposed Plan. Impacts from transportation projects would only occur in the case of a combined stormwater and wastewater conveyance system. As discussed above, the impact would be considered **potentially significant (PS)**. Mitigation Measure 2.12-4 is described below

Mitigation Measures

2.12-4 Implementing agencies and/or project sponsors shall implement measures, where feasible and necessary based on project- and site-specific considerations that include, but are not limited to:

- For projects that could increase demand on water and wastewater treatment facilities, project sponsors shall coordinate with the relevant service provider to ensure that the existing public services and utilities could accommodate the increase in demand. If the current infrastructure servicing the project site is found to be inadequate, infrastructure improvements for the appropriate public service or utility shall be identified in each project's CEQA documentation. The relevant public service provider or utility shall be responsible for undertaking project-level review as necessary to provide CEQA clearance for new facilities.

Further, Mitigation Measures 2.12-1(a), 2.12-1(b), 2.12-1(c), and 2.12-2 would reduce water demand and wastewater generation, and subsequently reduce the need for new or expanded water and wastewater treatment facilities. Mitigation Measures 2.12-3(a), 2.12-3(b), and 2.12-3(c) would also mitigate the impact of additional stormwater runoff from land use and transportation projects on existing wastewater treatment facilities.

Significance after Mitigation

Implementation of Mitigation Measure 2.12-4 would reduce impacts associated with exceeding existing water and wastewater treatment capacity because application of such mitigation would require that land use and transportation projects comply with project-level CEQA review. Additionally, as stated above, implementation of Mitigation Measures 2.12-1(a), 2.12-1(b), 2.12-1(c), and 2.12-2 would lower water demand and wastewater generation, thus reducing the potential need to for facilities. To the extent that an individual project adopts and implements all feasible mitigation measures described above, the impact would be less than significant with mitigation (LS-M).

Projects taking advantage of CEQA Streamlining provisions of SB 375 (Public Resources sections 21155.1, 21155.2, and 21159.28) must apply the mitigation measures described above, to address site-specific conditions. However, MTC/ABAG cannot require local implementing agencies to adopt the above mitigation measures, and it is ultimately the responsibility of a lead agency to determine and adopt mitigation. Therefore, this impact remains **significant and unavoidable (SU)** for purposes of this program-level review.

Impact 2.12-5: The proposed Plan would be served by a landfill with sufficient permitted capacity to accommodate the project's solid waste disposal needs and comply with federal, state, and local statutes and regulations related to solid waste.

Impacts of Changes in Projected Land Use

The existing population and employment uses in the region will continue to generate solid waste that requires disposal in a licensed and regulated landfill. The expected growth in the region's population would result in an increase in solid waste production to accommodate future growth, which is expected to increase from 7,609,000 to 9,522,300 during the buildout of the proposed Plan (2015-2040). CalRecycle estimates that the average resident in California disposes of 4.7 pounds of trash per day as of 2015 (CalRecycle 2017). Assuming an average diversion (to recycling) rate of 50 percent, as required by AB 939, the region's solid waste generation would increase from approximately 8,940 tons of solid waste per day and 3.3 million tons per year, to approximately 11,190 tons per day and 4.08 million tons per year. Further, assuming California meets its goal of achieving the 75 percent diversion rate initiative by 2020, future rates of disposal post 2020 would be 5,594

tons per day and 2.04 million tons per year. In addition, the construction of new housing and non-residential uses would generate solid waste from activities such as demolition, grading, and excavation.

Landfill closure dates typically reflect the year a landfill is projected to reach capacity and take many factors into account, including rates of solid waste generation, rates of diversion, and projected growth. All but five (i.e., Clover Flat Landfill, Newby Island Sanitary Landfill, Guadalupe Sanitary Landfill, and Recology Hay Road) of the seventeen landfills active in the region, listed in **Table 2.12-5**, have an estimated closure date before the year 2040. It is unlikely these four remaining landfills, which make up around 18 percent of the region's existing remaining capacity, could accommodate the solid waste disposal needs of the entire region.

The 2016 CalGreen code contains construction waste management requirements for certain new construction and additions, and demolition of non-residential (i.e., state-owned buildings; and commercial, industrial, and medical facilities) and residential buildings. Effective starting January 1, 2016, the aforementioned construction activities must adhere to a 65 percent diversion standard and may be required to submit a construction waste management plan, or contract with a waste management company. Projected development under the proposed Plan would be subject to the standards defined in the 2016 CalGreen code, as well as any future updates.

Countywide Integrated Waste Management Plans must demonstrate a remaining landfill disposal capacity of at least 15 years to serve all the jurisdictions in the county, so landfill capacities are updated on a continuing basis to identify insufficient capacity. Future growth in the region may require the expansion of existing facilities or construction of new landfills, the identification of waste disposal capacity outside of the region, and/or larger reductions in solid waste generation or diversion rates to serve the projected level of development. Because the land use pattern of the proposed Plan may result in insufficient landfill capacity, these impacts are considered potentially significant (PS).

Impacts of Transportation Projects

Roadway and transit construction and maintenance projects in the proposed Plan have the potential to generate a substantial amount of solid waste during construction. This waste can come from typical construction activities, such as grading, excavation, and removal of existing structures. The operation of transportation facilities may also generate solid waste. The amount of this waste is difficult to predict, but it could result in an exceedance of local landfill capacities for transportation projects constructed in the future closer to expected closure dates of the landfills These impacts are considered potentially significant (PS).

Conclusion

The solid waste generated by both land use and transportation projects could reduce the capacity of existing landfills, leading to earlier closure dates than currently anticipated and a need for increased landfill capacity. This impact is considered **potentially significant (PS)**. Mitigation Measures 2.12-5 is described below.

Mitigation Measures

2.12-5 Implementing agencies and/or project sponsors shall implement measures, where feasible and necessary based on project- and site-specific considerations that include, but are not limited to:

- providing an easily accessible area that is dedicated to the collection and storage of non-hazardous recycling materials
- maintaining or re-using existing building structures and materials during building renovations and redevelopment
- using salvaged, refurbished or reused materials, to help divert such items from landfills
- for transportation projects, diverting construction waste from landfills, where feasible, through means such as:

- the submission and implementation of a construction waste management plan that identifies materials to be diverted from disposal
- establishing diversion targets, possibly with different targets for different types and scales of development
- helping developments share information on available materials with one another, to aid in the transfer and use of salvaged materials; and

- applying the specifications developed by the Construction Materials Recycling Association (CMRA) to assist contractors and developers in diverting materials from construction and demolition projects, where feasible (RMC 2006).

Significance after Mitigation

Implementation of Mitigation Measure 2.12-5 would reduce impacts associated with solid waste generation because it would require that land use and transportation projects apply landfill diversion strategies including re-using building materials, maintaining structures where applicable, developing construction waste management plans, and using guidance from CMRA. To the extent that an individual project adopts and implements all feasible mitigation measures described above, the impact would be less than significant with mitigation (LS-M).

Projects taking advantage of CEQA Streamlining provisions of SB 375 (Public Resources sections 21155.1, 21155.2, and 21159.28) must apply the mitigation measures described above, to address site-specific conditions. However, MTC/ABAG cannot require local implementing agencies to adopt the above mitigation measures, and it is ultimately the responsibility of a lead agency to determine and adopt mitigation. Therefore, this impact remains **significant and unavoidable (SU)** for purposes of this program-level review.

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2.13 HAZARDS

This section evaluates the potential impacts related to hazards resulting from the implementation of the proposed Plan. This section describes the existing conditions for hazardous materials, airports, emergency planning, and wildland fires in the Bay Area. Environmental impacts associated with implementation of the proposed Plan as they relate to these conditions are provided below. Impacts due to emission of toxic air contaminants along transportation routes are addressed in Section 2.2, "Air Quality."

No comments regarding potential hazards were received in response to the Notice of Preparation.

2.13.1 Environmental Setting

PHYSICAL SETTING

Generation and Disposal of Hazardous Materials and Waste

Materials and waste may be considered hazardous if they are poisonous (toxicity); can be ignited by open flame (ignitability); corrode other materials (corrosivity); or react violently, explode, or generate vapors when mixed with water (reactivity). The term "hazardous material" is defined in the State of California's Health and Safety Code (HSC), Chapter 6.95, Section 25501(o) as any material that, because of quantity, concentration, or physical or chemical characteristics, poses a significant present or potential hazard to human health and safety or to the environment. In some cases, past industrial or commercial uses on a site have resulted in spills or leaks of hazardous materials and petroleum that caused contamination of underlying soil and groundwater. Federal and State laws require that soils and groundwater having concentrations of contaminants that are higher than certain acceptable levels are handled and disposed as hazardous waste during excavation, transportation, and disposal. The California Code of Regulations (CCR), Title 22, Sections 66261.20–24 contains technical descriptions of characteristics that would cause a soil to be classified as a hazardous waste. The use of hazardous materials and disposal of hazardous wastes are subject to numerous laws and regulations at all levels of government (see the Regulatory Setting section below).

Various hazardous materials are commonly transported, stored, used, and disposed of in activities such as construction, industry (both light and heavy), dry cleaning, film processing, landscaping, automotive maintenance and repair, and common residential/commercial maintenance activities. The use, transport, storage, and disposal of hazardous materials is regulated by the U.S. Environmental Protection Agency (EPA) and California EPA (Cal/EPA) plus six boards, departments and offices: California Air Resources Board (ARB), California Department of Pesticide Regulation, California Department of Toxic Substances Control (DTSC), Office of Environmental Health Hazard Assessment (OEHHA), State Water Resources Control Board (SWRCB), and the Department of Public Health Center for Environmental Health. State and local regulatory agencies closely monitor businesses and industry in the control of hazardous materials. Hazardous materials require special methods of disposal, storage, and treatment, and any unintentional release of hazardous materials requires an immediate response to protect human health and safety, and the environment.

Transportation of Hazardous Materials and Waste

Hazardous materials, hazardous wastes, and petroleum products are a subset of the goods routinely shipped along the transportation corridors in the Plan area. In California, unless specifically exempted, it is unlawful for any person to transport hazardous wastes unless the person holds a valid registration issued by the DTSC. The DTSC maintains a list of active registered hazardous waste transporters throughout California, and the California Department of Public Health regulates the haulers of hazardous waste. Three agencies maintain searchable databases that track hazardous material releases in reportable quantities: EPA maintains the Hazardous Materials Incident Report System that contains data on hazardous material spill incidents reported to the U.S. Department of Transportation (USDOT); the California Office of Emergency Services (OES) maintains the California Hazardous Materials Incident Report System that contains information on reported hazardous material accidental releases or spills; and SWRCB's Site Cleanup Program maintains information on reported

hazardous material accidental releases or spills. USDOT also provides grants to local agencies for preparation and training for hazardous materials incidents through its Hazardous Materials Emergency Preparedness Program administered by OES.

Shipments of hazardous materials and wastes include a wide variety of chemicals, such as petroleum products, medical waste, and radioactive materials. Each movement of hazardous materials/wastes implies a degree of risk, depending on the material being moved, the mode of transport, and numerous other factors. On a tonnage basis, petroleum products make up the majority—more than 80 percent—of hazardous material moved around the State.

Truck

The transport of hazardous materials by truck is regulated by USDOT. **Figure 2.13-1** maps the hazardous materials routes established by USDOT in the Plan area. Hazardous materials transported by truck use many of the same freeways, arterials, and local streets as other traffic.

Railroads

The transport of hazardous materials rail is also regulated by USDOT. Freight railroads have employee safety training requirements and operating procedures that govern the handling and movement of hazardous goods, including crude oil. Federal regulations and self-imposed safety practices dictate train speeds, equipment and infrastructure inspections, and procedures for how to handle and secure trains carrying hazardous materials. The freight rail industry provides instruction to local public safety officials at the Transportation Technology Center's Security and Emergency Response Training Center, and individual railroads conduct additional local training for first responders (Association of American Railroads [AAR] 2015). Freight railroads also work with State emergency planning committees and local first responders to develop emergency response plans. In accordance with a February 2014 agreement between the USDOT and AAR, railroads have developed an inventory of emergency response resources and provided the USDOT with information on the deployment of those resources. This information is available upon request to appropriate emergency responders (AAR 2015). The Pipeline and Hazardous Materials Safety Administration's (PHMSA) 2012 Emergency Response Guidebook establishes an initial evacuation zone within 0.5 mile of rail corridors for train derailments involving flammable liquids and gases.

Ship

The Plan area includes several marine oil terminals and shipping routes used for the transport of various hazardous materials. The California State Lands Commission regulates marine oil terminals throughout California.

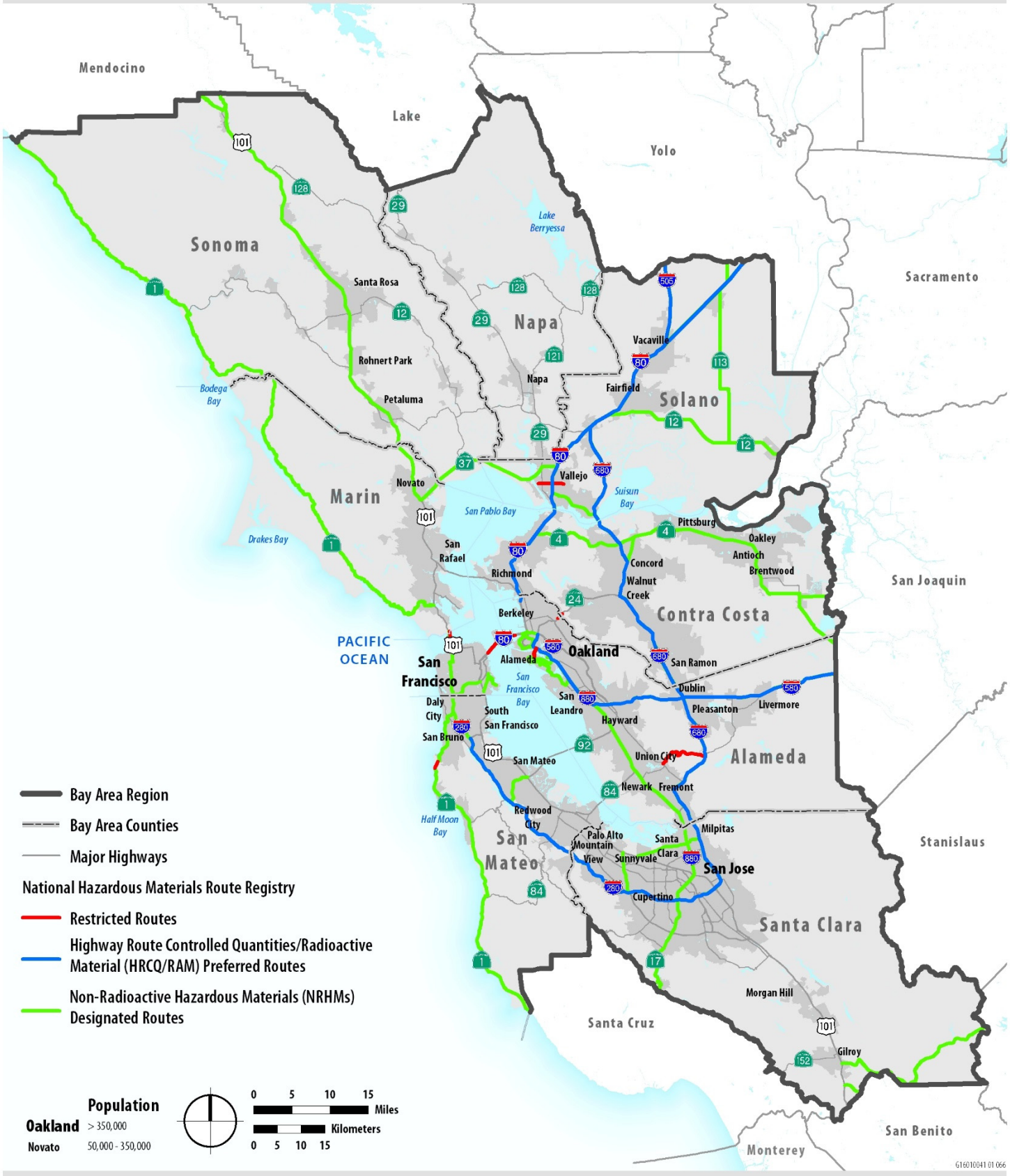
Transmission Pipelines

Underground (and in isolated instances, aboveground) pipelines are used to transport a variety of potentially hazardous substances throughout the Plan area. The American Petroleum Institute recommends setbacks of 50 feet from petroleum and hazardous liquids lines for new homes, businesses, and places of public assembly. It also recommends 25 feet for garden sheds, septic tanks, and water wells; and 10 feet for mailboxes and yard lights. The Transportation Research Board encourages the use of zoning regulations to minimize casualties in the event of a catastrophic rupture. Possible land use techniques include, for example, establishing setbacks; regulating or prohibiting certain types of structures and uses near transmission pipelines; and encouraging, through site and community planning, other types of activities and facilities (e.g., mini-storage businesses, linear parks, recreational paths) within or in the vicinity of pipeline rights-of-way.

Potential Presence of Hazardous Materials in Soil and Groundwater

Hazardous materials, including pesticides and herbicides, heavy metals, volatile organic compounds, and oil and gas, may be present in soil and groundwater in areas where land uses have resulted in leaking fuel or chemical storage tanks, or other releases of hazardous materials have occurred. Land uses that typically involve the handling of hazardous materials include commercial or industrial operations, as well as agricultural areas where soils may contain pesticides and herbicides.

Figure 2.13-1
Hazardous Material Routes



Map Data Sources: Metropolitan Transportation Commission (MTC), 2016; Tom Tom North America, 2015; U.S. Department of Transportation Federal Motor Carrier Safety Administration (FMCSA), 2015.

Various federal, State, and local regulatory agencies maintain lists of hazardous materials sites where soil and/or groundwater contamination is known or suspected to have occurred. These facilities are readily identified through regulatory agency database searches, such as SWRCB's GeoTracker online database, the DTSC's EnviroStor online database, and several other federal, State, and local regulatory agency databases. These databases include closed sites that have been fully remediated; sites where contamination is contained but land use restrictions are in place; and sites under evaluation, active remediation, and monitoring. Sites listed on these databases are generally located in more densely populated areas with a history of light and heavy industrial uses. For the Bay Area, there is a large number of sites listed on these databases. The quantity of sites listed on two key databases (Geotracker and Envirostor) are summarized by county in **Table 2.13-1**.

Table 2.13-1 Selected Documented Hazardous Materials Sites in the Bay Area

County	Alameda	Contra Costa	Marin	Napa	San Francisco	San Mateo	Santa Clara	Solano	Sonoma
Geotracker Cleanup Sites	4,025	1,651	618	464	2,411	1,965	3,918	908	2,713
EnviroStor Cleanup Sites	695	462	118	37	195	243	868	128	181

Note: Sites may be listed on both databases.

Source: DTSC and SWRCB. Databases accessed July 2016.

To address the potential for documented and undocumented hazards on a site, the American Society for Testing and Materials has developed widely accepted practice standards for the preliminary evaluation of site hazards (E-1527-05). Phase I Environmental Site Assessments (ESAs) include an on-site visit to determine current conditions; an evaluation of possible risks posed by neighboring properties; interviews with persons knowledgeable about the site's history; an examination of local planning files to check prior land uses and permits granted; file searches with appropriate agencies having oversight authority relative to water quality and/or soil contamination; examination of historic aerial photography of the site and adjacent properties; a review of current topographic maps to determine drainage patterns; and an examination of chain-of-title for environmental lines and/or activity and land use limitations. If a Phase I ESA indicates the presence, or potential presence of contamination, a site-specific Phase II ESA is generally conducted to test soil and/or groundwater. Based on the outcome of a Phase II ESA, remediation of contaminated sites under federal and State regulations may be required prior to development. Phase I ESAs can also be used to identify the potential for presence of hazardous building materials in situations where older structures intended for demolition could contain lead-based paint, asbestos containing materials, mercury, or polychlorinated biphenyls. The Preliminary Endangerment Assessment (PEA) process, which is typically conducted for sites with DTSC oversight, is similar, but includes screening evaluations and public participation.

Naturally Occurring Asbestos

Asbestos is not a formal mineralogical term, but rather a commercial and industrial term historically applied to a group of silica-containing minerals that form long, very thin mineral fibers (termed amphiboles), which generally form in bundles, that were once widely used in commercial products. Naturally occurring asbestos (NOA) includes minerals in their natural state, such as in bedrock or soils. NOA, which was identified as a toxic air contaminant by ARB in 1986, is of concern due to potential exposures to the tiny fibers that can become airborne if asbestos-bearing rocks are disturbed by natural erosion or human activities such as road building, excavations, and other ground disturbing activities. Once disturbed, microscopic fibers can become lodged in the lungs, which can potentially lead to serious health problems.

All nine Bay Area counties contain reported NOA and/or ultramafic rocks, such as serpentinite, that can contain asbestos fibers (USGS 2011). As shown in **Figure 2.13-2**, most of the reported asbestos occurrences are located in San Francisco and Marin counties, while ultramafic rock occurrences are most prominent in Napa County. In general, NOA fibers do not pose a threat unless disturbed and introduced into the air as fugitive dust.

Schools

Children are particularly susceptible to long-term effects from emissions of hazardous materials. Therefore, locations where children spend extended periods of time, such as schools, are particularly sensitive to hazardous air emissions and accidental release associated with the handling of extremely hazardous materials, substances, or wastes. There are nearly 2,000 public schools located throughout the Bay Area with over 1 million students, as described further in Section 2.14, "Public Services and Recreation."

Airports

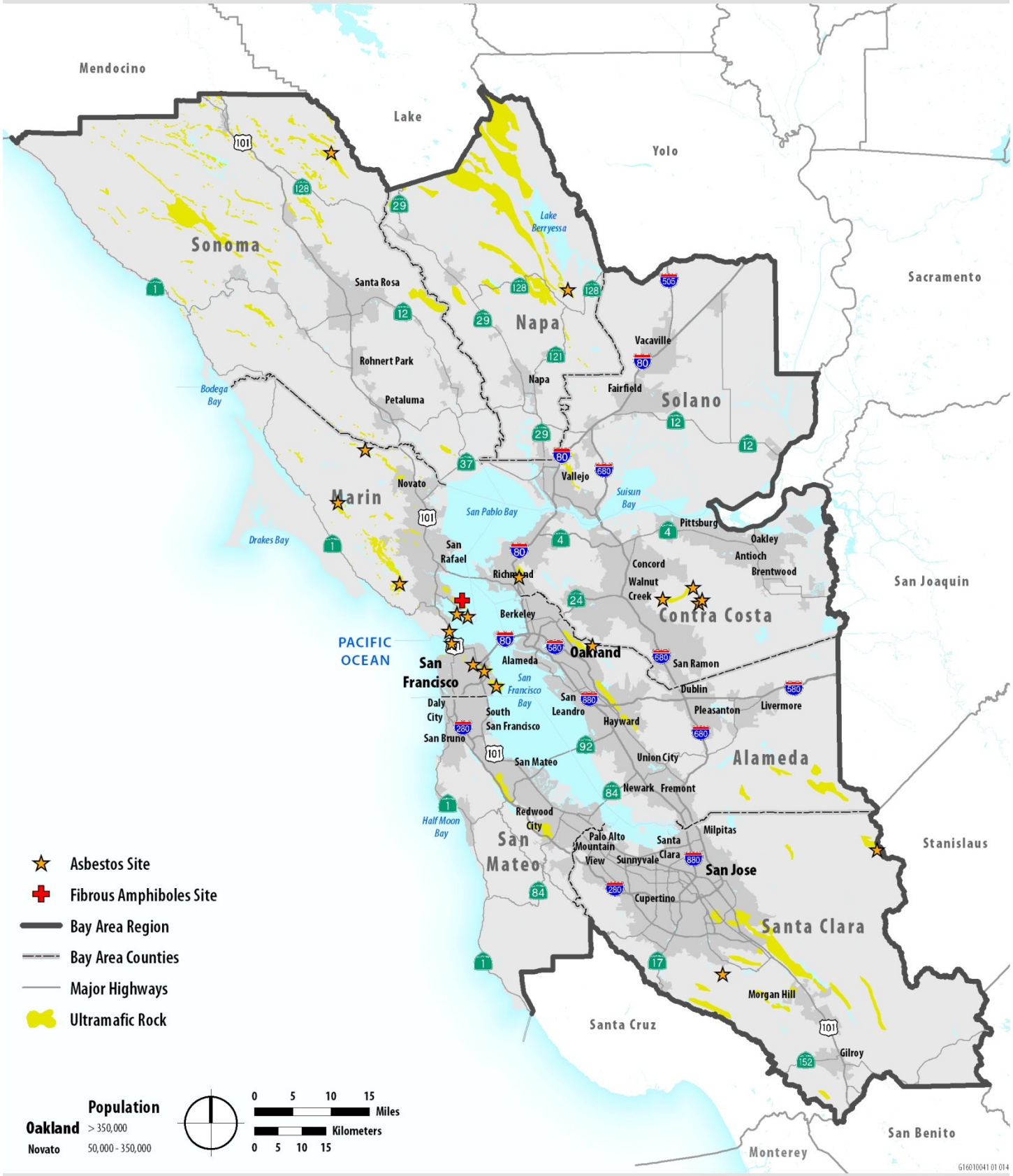
There are 26 public use airports in the Bay Area that serve commercial and general aviation users (see **Table 2.13-2** and **Figure 2.13-3**). This regional airport system forms an integral part of the Bay Area's transportation network by providing links to communities throughout the United States and abroad. Bay Area communities must consider housing and economic development along with airport interests in making decisions concerning the amount and type of new development to allow in and near airport flight corridors. Potential hazards in relationship to airport operations are generally regulated by the Federal Aviation Administration (FAA), with local planning and evaluation of proposed projects (in terms of a proposed project's compatibility in relationship to air and ground operations and the safety of the public) under the authority of the applicable airport land use commission (ALUC) through airport land use compatibility plans (ALUCPs). Private Airstrips are listed in **Table 2.13-3**.

Table 2.13-2 Public Use Airports and Military Airfields in the San Francisco Bay Area

County	Airport Name	Caltrans Classification
Alameda	Hayward Executive Airport	Metropolitan
Alameda	Livermore Municipal Airport	Metropolitan
Alameda	Oakland International Airport	Commercial/Primary
Contra Costa	Buchanan Field	Metropolitan
Contra Costa	Byron Airport	Community
Marin	Gnoss Field	Regional
Napa	Angwin Parrett Field Airport	Limited Use*
Napa	Napa County Airport	Regional
San Mateo	Half Moon Bay Airport	Regional
San Mateo	San Carlos Airport	Metropolitan
San Mateo	San Francisco International Airport**	Commercial/Primary
Santa Clara	Moffett Federal Airfield	Military/NASA
Santa Clara	Norman Y. Mineta San José International Airport	Commercial/Primary
Santa Clara	Palo Alto Airport of Santa Clara County	Metropolitan
Santa Clara	Reid-Hillview Airport	Metropolitan
Santa Clara	San Martin Airport	Regional
Solano	Nut Tree Airport	Regional
Solano	Rio Vista Municipal Airport	Regional
Solano	Travis Air Force Base	Military/NASA
Solano	University Airport	Community
Sonoma	Charles M. Schulz - Sonoma County Airport	Commercial/Primary
Sonoma	Cloverdale Municipal Airport	Community
Sonoma	Healdsburg Municipal Airport	Community
Sonoma	Petaluma Municipal Airport	Regional
Sonoma	Sonoma Skypark	Community
Sonoma	Sonoma Valley Airport	Community

Notes: There are no public use airports within the City and County of San Francisco.
* Privately-owned airport that is open to the general public. Owned by Pacific Union College.
** The City and County of San Francisco owns and operates San Francisco International Airport.
Source: FAA 2017

Figure 2.13-2
Naturally Occurring Asbestos and Ultramafic Rocks



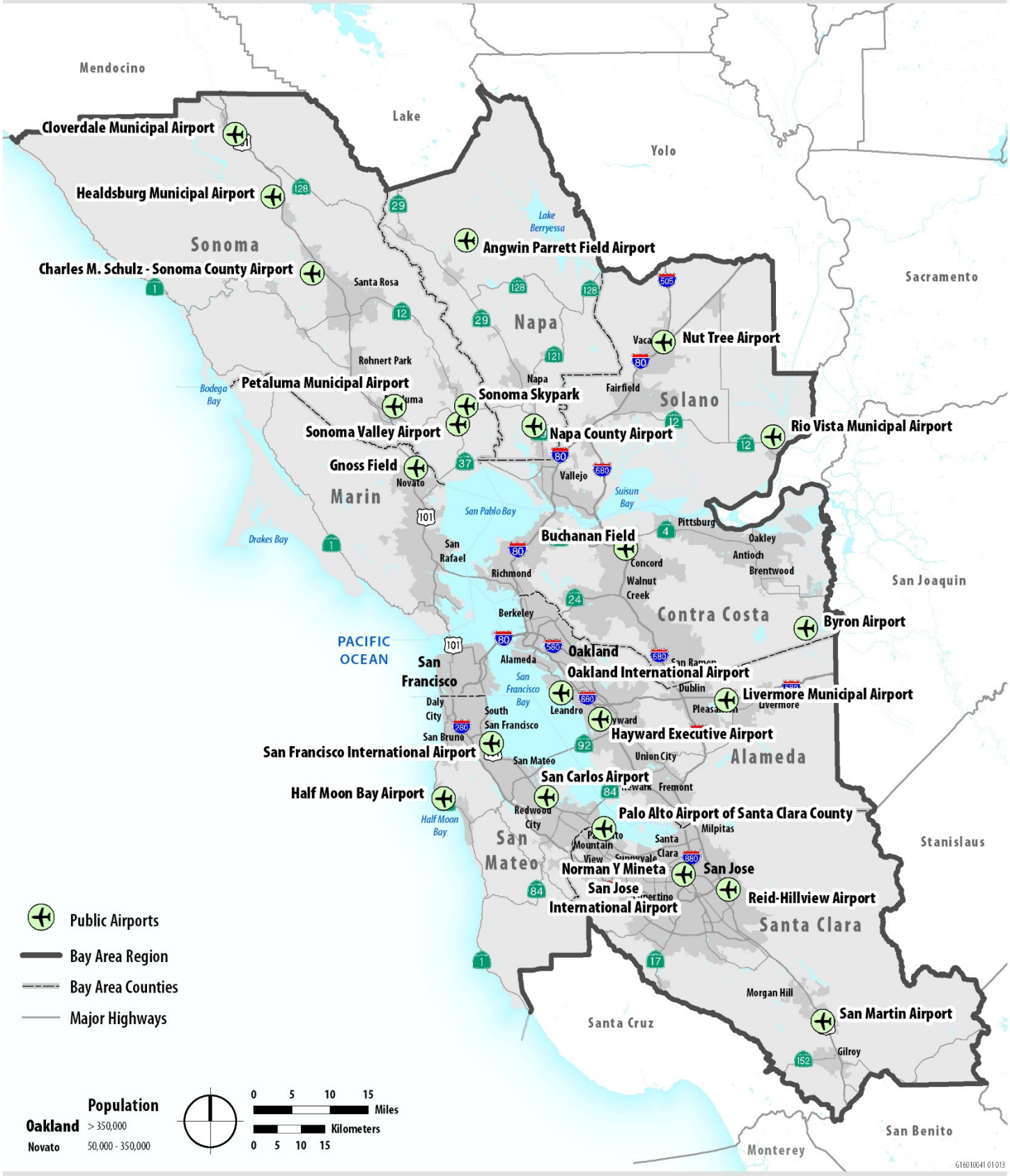
Map Data Sources: Krevor et al., 2009; Metropolitan Transportation Commission (MTC), 2016; Tom Tom North America, 2015; U.S. Geologic Survey (USGS), 2011.

Table 2.13-3 Private Airstrips in the San Francisco Bay Area

County	Airport Name
Alameda	Sutter Medical Center Castro Valley
Alameda	First Interstate Bank Operations Center
Alameda	Washington Hospital
Alameda	Meadowlark Field
Alameda	PG&E Livermore Training Center
Alameda	Children's Hospital Oakland
Alameda	Camp Parks
Contra Costa	Funny Farm
Contra Costa	Las Serpientes
Contra Costa	Doctors Medical Center
Contra Costa	John Muir Walnut Creek Medical Center
Marin	Marin Ranch Airport
Marin	San Rafel Private
Marin	Commodore Center
Marin	Red Roof
Marin	Shangrila
Marin	Ermis-Ridgeview
Marin	Crivitz Muni
Marin	Bay Area Medical Center
Marin	Larson
Marin	Maverick Field
Marin	Tachick Field
Marin	Lazy River
Napa	Queen of the Valley Hospital
Napa	Mysterious Valley
Napa	Pope Valley
Napa	River Meadow Farm
Napa	Napa County Fire Department
Napa	St Helena Hospital
San Francisco	Alcatraz
San Francisco	Hall of Justice
San Francisco	Police Pistol Range
San Francisco	San Francisco VA Medical Center
San Francisco	USCF Medical Center at Mission Bay
Santa Clara	St Louise Regional Hospital
Santa Clara	Stanford University Hospital Center
Santa Clara	County Medical Center
Santa Clara	Regional Medical Center
Santa Clara	Santa Clara Towers
Solano	Maine Prairie
Solano	Blake Sky Park
Solano	Kaiser Medical Center Vacaville
Solano	Vaca Valley Hospital
Sonoma	Redwood Coast Medical Services
Sonoma	Graywood Ranch
Sonoma	Santa Rosa Memorial Hospital
Sonoma	Vintage Airport
Sonoma	Infineon Raceway
Sonoma	The Sea Ranch

Notes: There are no private use airports within the County of San Mateo.
Source: FAA 2017

Figure 2.13-3
Public Use Airports



Map Data Sources: Metropolitan Transportation Commission (MTC), 2016; Tom Tom North America, 2015.

WILDLAND FIRE

In California, responsibility for wildfire prevention and suppression is shared by federal, State, and local agencies. Federal agencies are responsible for federal lands in Federal Responsibility Areas. The State of California has determined that some non-federal lands in unincorporated areas with watershed value are of statewide interest and have classified those lands as State Responsibility Areas (SRAs), which are managed by the California Department of Forestry and Fire Projection (CAL FIRE). All incorporated areas and other unincorporated lands are classified as Local Responsibility Areas (LRAs).

While all of California is subject to some degree of wildfire hazard, there are specific features that make certain areas more hazardous. CAL FIRE is required by law to map areas of significant fire hazards based on fuels, terrain, weather, and other relevant factors (Public Resources Code [PRC] 4201-4204 and Government Code 51175-89). Factors that increase an area's susceptibility to fire hazards include slope, vegetation type and condition, and atmospheric conditions. CAL FIRE has identified two types of wildland fire risk areas: 1) Wildland Areas That May Contain Substantial Forest Fire Risks and Hazards, and 2) Very High Fire Hazard Severity Zones. Each risk area carries with it code requirements to reduce the potential risk of wildland fires. Under State regulations, areas within very high fire hazard risk zones must comply with specific building and vegetation management requirements intended to reduce property damage and loss of life within these areas.

Throughout the Bay Area, there is a full range of conditions and fire hazards as indicated in **Figure 2.12-4**, with all Bay Area counties except San Francisco having areas of High and Very High Fire Hazard in areas of CAL FIRE responsibility. The areas of greatest wildfire hazard are concentrated in the hillside areas of San Mateo, Santa Clara, Sonoma, and Napa counties, with smaller hazard areas in Marin County, the East Bay Hills of Alameda and Contra Costa counties, and on the slopes of Mount Diablo. CAL FIRE has also mapped Very High Fire Hazard Severity Zones in LRAs to provide guidance to local agencies (CAL FIRE 2016).

Development that has spread into less densely populated, often hilly areas has increased the number of people living in heavily-vegetated areas that are prone to wildfire. This area where wildlands meet urban development is referred to as the wildland-urban interface and is subject to urban wildfire. The 1991 Oakland Hills fire above Berkeley and Oakland is an example of an urban wildfire. A fire along the wildland-urban interface can result in major losses of property and structures.

2.13.2 Regulatory Setting

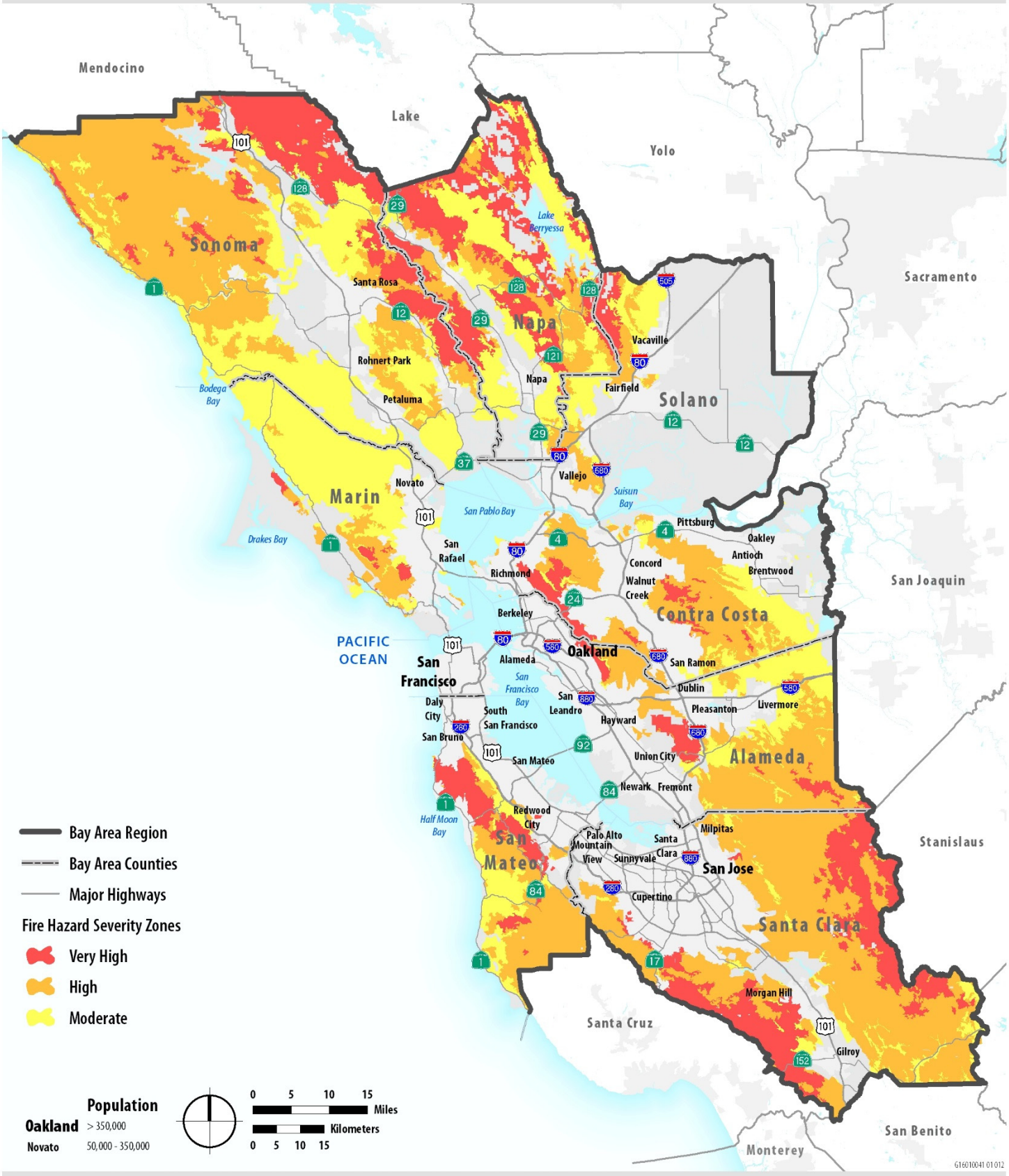
FEDERAL REGULATIONS

The EPA is the lead agency responsible for enforcing federal regulations that affect public health or the environment. The primary federal laws and regulations include the Resource Conservation and Recovery Act of 1976 (RCRA) and the Hazardous and Solid Waste Amendments enacted in 1984; the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA); and the Superfund Act and Reauthorization Act of 1986 (SARA). Federal statutes pertaining to hazardous materials and wastes are contained in the Code of Federal Regulations (CFR), Title 40 - Protection of the Environment.

Resource Conservation and Recovery Act

RCRA Subtitle C regulates the generation, transportation, treatment, storage and disposal of hazardous waste by "large-quantity generators" (1,000 kilograms per month or more) through comprehensive life cycle or "cradle to grave" tracking requirements. The requirements include maintaining inspection logs of hazardous waste storage locations, records of quantities being generated and stored, and manifests of pick-ups and deliveries to licensed treatment/storage/disposal facilities. RCRA also identifies standards for treatment, storage, and disposal, which is codified in CFR Title 40 Part 260.

Figure 2.13-4
Fire Hazards



Map Data Sources: CalFire, 2007 and 2008; Metropolitan Transportation Commission (MTC), 2016; Tom Tom North America, 2015.

Comprehensive Environmental Response Compensation and Liability Act

Congress enacted CERCLA, setting up what has become known as the Superfund program, in 1980 to establish prohibitions and requirements concerning closed and abandoned hazardous waste sites; provide for liability of persons responsible for releases of hazardous waste at these sites; and establish a trust fund to provide for cleanup when no responsible party can be identified. Generally, CERCLA authorizes two kinds of response actions:

- Short-term removals, where actions may be taken to address releases or threatened releases requiring prompt response.
- Long-term remedial response actions that permanently and significantly reduce the dangers associated with releases or threats of releases of hazardous substances that are serious, but not immediately life threatening.

Superfund Amendments and Reauthorization Act

SARA amended the CERCLA in 1986, emphasizing the importance of permanent remedies and innovative treatment technologies to clean up hazardous waste sites; requiring Superfund actions to consider the standards and requirements found in other State and federal environmental laws and regulations; providing new enforcement authorities and settlement tools; increasing involvement of the states in every phase of the Superfund program; increasing the focus on human health problems posed by hazardous waste sites; encouraging greater citizen participation in making decisions on how sites should be cleaned up; and increasing the size of the trust fund to $8.5 billion.

Emergency Planning Community Right-to-Know Act

The Emergency Planning Community Right-to-Know Act (EPCRA), or SARA Title III, was enacted in October 1986. SARA Title III requires any infrastructure at the State and local levels to plan for chemical emergencies, including identifying potential chemical threats. Reported information is then made publicly available so that interested parties may become informed about potentially dangerous chemicals in their community. EPCRA Sections 301 through 312 are administered by EPA's Office of Emergency Management. EPA's Office of Information Analysis and Access implements EPCRA's Section 313 program. In California, SARA Title III is implemented through the California Accidental Release Prevention Program (CalARP).

Code of Federal Regulations, Title 14, Part 77

FAA's primary role is to promote aviation safety and control the use of airspace. Public use airports that are subject to the FAA's grant assurances must comply with specific FAA design criteria, standards, and regulations. Land use safety compatibility guidance from the FAA is limited to the immediate vicinity of the runway, the runway protection zones at each end of the runway, and the protection of navigable airspace. The FAA enforces safety standards and investigates and corrects violations, as appropriate.

Title 14, Part 77 of the CFR, *Safe Efficient Use and Preservation of the Navigable Airspace,* establishes the federal review process for determining whether proposed development activities in the vicinity of an airport have the potential to result in a hazard to air navigation. 14 CFR Part 77 identifies criteria that govern which projects require notice to be filed with the FAA, as well as identifying standards for determining whether a proposed project would represent an obstruction "that may affect safe and efficient use of navigable airspace and the operation of planned or existing air navigation and communication facilities." Objects that are identified as obstructions based on these standards are presumed to be hazards until an aeronautical study conducted by the FAA determines otherwise.

14 CFR Part 77.9, *Construction or Alteration Requiring Notice*, indicates that notice must be filed with the FAA for any construction or alteration of objects within 20,000 feet of a public use airport runway when the height of the objects exceeds (i.e., is taller than) an imaginary surface with a 100:1 (1 foot upward per 100 feet horizontally) slope from the nearest point of the nearest runway. This requirement applies when the airport has at least one runway that exceeds 3,200 feet in length; for shorter runways, the notification surface has a

50:1 slope and extends 10,000 feet from the runway. For heliports, the notification surface has a 25:1 slope and extends 5,000 feet from the helicopter takeoff and landing area, commonly referred to as final approach and takeoff area. The notification requirements apply to all public-use airports, military airports, and heliports. When FAA notification is required, it must be provided using FAA Form 7460-1, Notice of Proposed Construction or Alteration.

Federal Disaster Mitigation Act

The Disaster Mitigation Act of 2000 provided a new set of mitigation plan requirements that encourage state and local jurisdictions to coordinate disaster mitigation planning and implementation. States are encouraged to complete a "Standard" or an "Enhanced" Natural Mitigation Plan. "Enhanced" plans demonstrate increased coordination of mitigation activities at the state level and, if completed and approved, increase the amount of funding through the Hazard Mitigation Grant Program.

Federal Response Plan

The Federal Response Plan of 1999 is a signed agreement among 27 federal departments and agencies, including the American Red Cross, that (1) provides the mechanism for coordinating delivery of federal assistance and resources to augment efforts of state and local governments overwhelmed by a major disaster or emergency; (2) supports implementation of the Robert T. Stafford Disaster Relief and Emergency Act, as well as individual agency statutory authorities; and (3) supplements other federal emergency operations plans developed to address specific hazards. The Federal Response Plan is implemented in anticipation of a significant event likely to result in a need for federal assistance or in response to an actual event requiring federal assistance under a Presidential declaration of a major disaster or emergency.

Hazardous Materials Transportation Act

The transportation of hazardous materials is regulated by the Hazardous Materials Transportation Act (HMTA), which is administered by the Research and Special Programs Administration of USDOT. HMTA provides USDOT with a broad mandate to regulate the transport of hazardous materials, with the purpose of adequately protecting the nation against risk to life and property, which is inherent in the commercial transportation of hazardous materials. The HMTA governs the safe transportation of hazardous materials by all modes. USDOT regulations that govern the transportation of hazardous materials are applicable to any person who transports, ships, causes to be transported or shipped, or who is involved in any way with the manufacture or testing of hazardous materials packaging or containers. USDOT regulations govern every aspect of the movement, including packaging, handling, labeling, marking, placarding, operational standards, and highway routing. Additionally, USDOT is responsible for developing curriculum to train for emergency response, and administers grants to states and Indian tribes for ensuring the proper training of emergency responders.

Code of Federal Regulations, Title 49

Title 49 – Transportation, of the CFR includes hazardous materials regulations in the volume containing Parts 100-185 and governs the transport of hazardous materials in all modes of transportation – air, highway, rail, and water. Hazardous materials regulations are subdivided by function into four basic areas: Procedures and/or Policies (49 CFR Parts 101, 106, and 107), Material Designations (49 CFR Part 172), Packaging Requirements (49 CFR Parts 173, 178, 179, and 180), and Operational Rules (49 CFR Parts 171, 173, 174, 175, 176, and 177).

Pipeline and Hazardous Materials Safety Administration Hazardous Materials Regulations

PHMSA is the federal regulator for the movement of hazardous materials by rail. Regulations cover product classification, operating rules, and tank car standards.

Federal Railroad Administration Office of Railroad Safety

FRA's Office of Railroad Safety promotes and regulates safety throughout the Nation's railroad industry. The regional offices enforce compliance with regulations related to hazardous materials, motive power equipment, operating practices, signal and train control, and tracks. California is in Region 7, which is headquartered in Sacramento, California (FRA 2015).

International Fire Code

The International Fire Code (IFC), created by the International Code Council, is the primary means for authorizing and enforcing procedures and mechanisms to ensure the safe handling and storage of any substance that may pose a threat to public health and safety. The IFC regulates the use, handling, and storage requirements for hazardous materials at fixed facilities. The IFC and the International Building Code use a hazard classification system to determine what protective measures are required for fire and life safety. These measures may include construction standards, separations from property lines, and specialized equipment. To ensure that these safety measures are met, the IFC employs a permit system based on hazard classification. The IFC is updated every 3 years, and is the basis for the California Fire Code (CFC; also updated triennially). Local jurisdictions, including Bay Area cities and counties, then adopt the CFC, in some cases with local amendments.

National Fire Plan

The Department of the Interior's National Fire Plan is intended to ensure an appropriate federal response to severe wildland fires, reduce fire impacts to rural communities, and ensure sufficient firefighting capacity in the future. The Rural Fire Assistance program is funded to enhance the fire protection capabilities of rural fire districts and safe and effective fire suppression in the wildland/urban interface. The program promotes close coordination among local, state, tribal, and federal firefighting resources by conducting training, equipment purchase, and prevention activities on a cost-shared basis.

STATE REGULATIONS

California Fire Code

The CFC is Chapter 9 of CCR Title 24. It is the primary means for authorizing and enforcing procedures and mechanisms to ensure the safe handling and storage of any substance that may pose a threat to public health and safety. The CFC regulates the use, handling, and storage requirements for hazardous materials at fixed facilities. The CFC and the California Building Code use a hazard classification system to determine what protective measures are required to protect fire and life safety. These measures may include construction standards, separations from property lines, and specialized equipment. To ensure that these safety measures are met, the CFC employs a permit system based on hazard classification. The CFC is updated every 3 years.

California Unified Program Administration

The Unified Program consolidates, coordinates, and makes consistent the administrative requirements, permits, inspections, and enforcement activities of six environmental and emergency response programs, as listed below:

- Hazardous Materials Release Response Plans and Inventories (Business Plans),
- CalARP,
- Underground Storage Tank Program,
- Aboveground Petroleum Storage Act Program,
- Hazardous Waste Generator and Onsite Hazardous Waste Treatment (tiered permitting) Programs, and
- California Uniform Fire Code: Hazardous Material Management Plans and Hazardous Material Inventory Statements

The State agency partners involved in the Unified Program have the responsibility of setting program element standards, working with Cal/EPA on ensuring program consistency, and providing technical assistance to the certified unified program agencies. The following State agencies are involved with the Unified Program:

- **California Environmental Protection Agency.** The Secretary of the Cal/EPA is directly responsible for coordinating the administration of the Unified Program. The Secretary certifies Unified Program Agencies.
- **Department of Toxic Substances Control.** DTSC provides technical assistance and evaluation for the hazardous waste generator program including onsite treatment (tiered permitting).
- **Governor's Office of Emergency Services.** OES is responsible for providing technical assistance and evaluation of the Hazardous Material Release Response Plan (Business Plan) Program and the CalARP Programs.
- **Office of the State Fire Marshal.** The Office of the State Fire Marshal is responsible for ensuring the implementation of the Hazardous Material Management Plans and the Hazardous Material Inventory Statement Programs. These programs tie in closely with the Business Plan Program.
- **State Water Resources Control Board.** The SWRCB provides technical assistance and evaluation for the underground storage tank program in addition to handling the oversight and enforcement for the aboveground storage tank program.

Under CCR Title 22 and the California Hazardous Waste Control Law, Chapter 6.5, DTSC regulates the generation, transportation, treatment, storage, and disposal of hazardous waste. Both RCRA and the Hazardous Waste Control Law impose "cradle to grave" regulatory systems for handling hazardous waste in a manner that protects human health and the environment. Cal/EPA has delegated some of its authority under the Hazardous Waste Control Law to county health departments and other Certified Uniform Program Agencies (CUPAs). Specific CUPAs in the Bay Area are identified in **Table 2.13-4**.

Table 2.13-4 Bay Area CUPAs

County	CUPA(s)
Alameda	Alameda County Department of Environmental Health Berkley City Toxics Management Department Fremont City Fire Department Hayward City Fire Department Livermore-Pleasanton Fire Department City of San Leandro Union City Environmental Programs
Contra Costa	Contra Costa Health Services Department
Marin	Marin County Department of Public Works
Napa	Napa County Department of Environmental Management
San Francisco	San Francisco City & County Public Health Department
San Mateo	San Mateo County Environmental Health
Santa Clara	Gilroy City Fire Department Santa Clara City Fire Department Santa Clara County Environmental Health Sunnyvale Department of Public Safety
Solano	Solano County Environmental Health
Sonoma	Healdsburg/Sebastopol Joint Powers Authority Petaluma City Fire Department Santa Rosa City Fire Department Sonoma County Fire and Emergency Services Department

Source: Cal/EPA 2016

California Human Health Screening Levels

The California Human Health Screening Levels (CHHSLs) were developed as a tool to assist in the evaluation of contaminated sites for potential adverse threats to human health. Preparation of the CHHSLS was required by the California Land Environmental Restoration and Reuse Act of 2001. The CHHSLs were developed by OEHHA, an agency under the umbrella of Cal/EPA, and are contained in its report entitled *Human-Exposure-Based Screening Numbers Developed to Aid Estimation of Cleanup Costs for Contaminated Soil*[1] (OEHHA and Cal/EPA 2005). The thresholds of concern used to develop the CHHSLs are an excess lifetime cancer risk of one in 1 million and a hazard quotient of 1.0 for noncancer health effects. The CHHSLs were developed using standard exposure assumptions and chemical toxicity values published by EPA and Cal/EPA. The CHHSLs can be used to screen sites for potential human health concerns where releases of hazardous chemicals to soils have occurred. Under most circumstances, the presence of a chemical in soil, soil gas, or indoor air at concentrations below the corresponding CHHSLs can be assumed to not pose a significant health risk to people who may live (residential CHHSLs) or work (commercial/ industrial CHHSLs) at the site.

California Accidental Release Prevention Program

CalARP addresses facilities that contain specified hazardous materials, known as "regulated substances," that, if involved in an accidental release, could result in adverse off-site consequences. CalARP defines regulated substances as chemicals that pose a threat to public health and safety or the environment because they are highly toxic, flammable, or explosive.

Asbestos Regulations

In 1990, ARB issued an Airborne Toxic Control Measure (ATCM), which prohibited the use of serpentine aggregate for surfacing if the asbestos content was 5 percent or more. In July 2000, ARB adopted amendments to the existing ATCM prohibiting the use or application of serpentine, serpentine-bearing materials and asbestos-containing ultramafic rock for covering unpaved surfaces unless it has been tested using an approved asbestos bulk test method and determined to have an asbestos content that is less than 0.25 percent. In July 2001, ARB adopted a new ATCM for construction, grading, quarrying, and surface mining operations in areas with serpentine or ultramafic rocks. These regulations are codified in Title 17, Section 93105 of the CCR. The regulations require preparation and implementation of an Asbestos Dust Mitigation Plan for construction or grading activities on sites greater than 1 acre in size with known NOA soils. The air districts enforce this regulation.

In October 2000, the Governor's Office of Planning and Research (OPR) issued a memorandum providing guidance to lead agencies in analyzing the impacts of NOA on the environment through the California Environmental Quality Act (CEQA) review process. In November 2000, the California Department of Real Estate added a section to subdivision forms that includes questions related to NOA on property proposed for development. In 2004, as part of its school-site review program, the DTSC's School Property Evaluation and Cleanup Division released interim guidance on evaluating NOA at school sites.

In addition, HSC Section 19827.5 prohibits issuance of demolition permits by local and State agencies assessment of the potential for the structure to contain asbestos.

California State Aeronautics Act

The purpose of the California State Aeronautics Act pursuant to Public Utilities Code Section 21001 et seq. "is to protect the public interest in aeronautics and aeronautical progress." The California Department of Transportation (Caltrans), Division of Aeronautics, administers much of this statute.

California Environmental Quality Act

Pursuant to PRC Section 21098 lead agencies must provide notice to the military service for certain projects with specified proximity to a low-level flight path, military impact zone, or special use airspace. Similarly,

[1] OEHHA and Cal/EPA. Human-Exposure-Based Screening Numbers Developed to Aid Estimation of Cleanup Costs for Contaminated Soil. Prepared November 2004, Revised January 2005.

Government Code Section 65352 requires that, prior to taking certain actions, the lead agency shall refer the proposed action to the appropriate branch of the United States Military if a project would be:

- located within 1,000 feet of a military installation,
- located beneath a low-level flight path, or
- within special use airspace as defined in CEQA Section 21098.

Pursuant to PRC Section 21151.4, projects that can be reasonably anticipated to produce hazardous air emissions or handle extremely hazardous materials, substances, or waste within 0.25 mile of an existing or proposed school must consult with the potentially affected school district and provide written notification not less than 30 days prior to the proposed certification or approval of an environmental document. Where a school district proposes property acquisition or the construction of a school, the environmental document must address existing environmental hazards, and written findings must be prepared regarding existing pollutant sources (see PRC Section 21151.8; Appendix G of the CEQA Guidelines). PRC Section 21151.2 requires school districts to notify the applicable planning commission before acquiring property for a new school or expansion to identify potential land use conflicts.

California Education Code

Sections 17071.13, 17072.13, 17210, 17210.1, 17213.1-3, and 17268 of the California Education Code became effective January 1, 2000. Together, they establish requirements for assessments and approvals regarding toxic and hazardous materials that school districts must follow before receiving final site approval from the Department of Education and funds under the School Facilities Program. These requirements are consistent with those described above for certification or approval of an environmental document under CEQA.

For example, the site approval package must include written determinations regarding the presence of hazardous wastes or pipelines carrying hazardous substances on the site (the adopted CEQA document is often used for these purposes). In addition, Section 17213(b) requires the local education agency to consult with the applicable air district to identify facilities within 0.25 mile of the proposed site that might reasonably be anticipated to emit hazardous air emissions or handle hazardous materials, substances, or wastes and prepare written findings that either there are not such facilities, the facilities do not pose a health risk, or corrective measures will be taken (consistent PRC Section 21151.8). The code also requires that a Phase I ESA is conducted according to the American Society of Testing and Materials standards (ASTM E-1527-2000) and transmitted to DTSC. If the Phase I ESA concludes that further investigation is needed or DTSC requires it, a PEA must be completed under DTSC oversight and review. See the discussion above, under "Potential Presence of Hazardous Materials in Soil and Groundwater" for additional information regarding Phase I ESAs and PEAs.

Hazardous Air Emissions and Facilities Within a Quarter Mile of a School

As required under Education Code Section 17213(b) and Public Resources Code Section 21151.8(a)(2), the local educational agency (LEA) shall consult with the administering agency and the local air pollution control district or air quality management district to identify facilities within 0.25 mile of a proposed school site that might reasonably be anticipated to emit hazardous air emissions or handle hazardous materials, substances, or wastes and shall provide written notification of those findings.

The LEA shall make the finding either that no such facilities were identified or that they do exist but that the health risks do not or will not constitute an actual or potential endangerment of public health at the site or that corrective measures will be taken that will result in emissions mitigation to levels that will not constitute endangerment. In the final instance, the LEA should make an additional finding that emissions will be mitigated before occupancy of the school. These written findings, as adopted by the LEA governing board, must be submitted to the Department of Education as a part of the site approval package. Often this information is included in the Phase I ESA and in the adopted CEQA document.

Title 14 Division 1.5 of the California Code of Regulations

CCR Title 14 Division 1.5 establishes the regulations for CAL FIRE and is applicable in all SRAs. Among other things, Title 14 establishes minimum standards for emergency access, fuel modification, setback to property line, signage, and water supply.

Government Code Section 65962.5

Government Code Section 65962.5 is commonly referred to as the "Cortese List" (after the Legislator who authored the legislation that enacted it). The list, or a site's presence on the list, has bearing on the local permitting process, as well as on compliance with the CEQA. However, because this statute was enacted over twenty years ago, some of the provisions refer to agency activities that are no longer being implemented and, in some cases, the information to be included in the Cortese List does not exist. While Government Code Section 65962.5 makes reference to the preparation of a "list," many changes have occurred related to web-based information access since 1992 and this information is now largely available on the Internet sites of the responsible organizations. A centralized list is no longer compiled and those requesting a copy of the Cortese "list" are now referred directly to the appropriate information resources contained on the Internet sites of the boards or departments that are referenced in the statute.

California Emergency Services Act

The California Emergency Services Act of 2008 merged the duties, powers, purposes, and responsibilities of the Governor's Office of Emergency Services and the Governor's Office of Homeland Security into a new cabinet-level agency, the California Emergency Management Agency (Cal EMA). The legislation authorizes Cal EMA to prepare a Standard Emergency Management System (SEMS) program, which sets forth measures by which a jurisdiction should handle emergency disasters. Cal EMA serves as the lead State agency for emergency management and coordinates the State response to major emergencies in support of local government. SEMS provides the mechanism by which local governments request assistance from Cal EMA, and as such, Cal EMA maintains oversight of the State's mutual aid system. Non-compliance with SEMS could result in the State withholding disaster relief from the non-complying jurisdiction in the event of an emergency disaster.

California Multi-Hazard Mitigation Plan

OES is responsible to the development and maintenance of the State's plan for hazard mitigation. The State's multi-hazard mitigation plan was last approved by the Federal Emergency Management Agency (FEMA) as an Enhanced State Mitigation Plan in 2013. The plan is designed to reduce the effects of disasters caused by natural, technological, accidental, and adversarial/human-caused hazards. The State of California is required to review and revise its mitigation plan and resubmit for FEMA approval at least every 3 years to ensure continued funding eligibility for certain federal grant programs.

Lempert-Keene-Seastrand Oil Spill Prevention and Response Act

The Lempert-Keene-Seastrand Oil Spill Prevention and Response Act of 1990 granted the Office of Spill Prevention and Response (OSPR) the authority to direct prevention, removal, abatement, response, containment, and cleanup efforts with regard to all aspects of any oil spill in marine waters of California. OSPR implements the California Oil Spill Contingency Plan, consistent with the National Contingency Plan, which pays special attention to marine oil spills and impacts to environmentally- and ecologically-sensitive areas. In 2014, the OSPR program was expanded to cover all statewide surface waters at risk of oil spills from any source, including pipelines and the increasing shipments of oil transported by railroads.

California Public Utilities Code Sections 309.7

The California Public Utilities Commission (CPUC) is the State regulatory agency with legal authority for rail safety within California. The Railroad Operations and Safety Branch is responsible for enforcing state and federal laws, regulations, General Orders, and directives relating to the transportation of persons and commodities by rail. Several California Public Utilities Code Sections prescribe CPUC responsibilities. In particular, under Section 309.7, CPUC is responsible for inspection, surveillance, and investigation of the rights-of-way, facilities, equipment, and operations of railroads. Public Utilities Code Sections 309.7 and

765.5(d) require CPUC to employ a sufficient number of federally-certified Inspectors to ensure that all main and branch line tracks are inspected at least every 12 months.

Local Community Rail Security Act

The Local Community Rail Security Act of 2006 (Public Utilities Code Sections 7665-7667) requires all rail operators to provide security risk assessments to CPUC, the Director of Homeland Security, and the Catastrophic Event Memorandum Account that describe the following:

- location and function of each rail facility,
- types of cargo stored at or typically moved through the facility,
- hazardous cargo stored at or moved through the facility,
- frequency of hazardous movements or storage,
- a description of sabotage-terrorism countermeasures,
- employee training programs,
- emergency response procedures, and
- emergency response communication protocols.

REGIONAL AND LOCAL REGULATIONS

Local Hazard Mitigation Plan

Under the auspices of the Disaster Mitigation Act of 2000, ABAG has adopted a multi-jurisdictional FEMA-approved 2010 Local Hazard Mitigation Plan Update, which cities and counties can adopt and use, in full or in part, in lieu of preparing all or part of a Local Hazard Mitigation Plan themselves. Participating local county and city governments in the Bay Area prepare an Annex to this plan to explain how the plan specifically applies to that agency.

San Francisco Bay Area Regional Emergency Coordination Plan

The Bay Area Regional Emergency Coordination Plan (RECP) was prepared by Cal OES, the nine Bay Area counties (as well as Santa Cruz County), and the cities of Oakland and San Jose to provide a framework for collaboration and coordination during regional events. The RECP defines procedures for regional coordination, collaboration, decision-making, and resource sharing among emergency response agencies in the Bay Area. The RECP provides critical linkages to ensure that existing Bay Area emergency response systems work together effectively during the response to an event. In addition, the RECP complies with the requirements of the National Incident Management System and is consistent with the National Preparedness Goal.

City and County General Plans

Local planning policies related to hazards and hazardous materials are established in each jurisdiction's general plan, generally in the Safety Element or equivalent chapter. Safety Elements are required to address geologic hazards, fire hazards, dam failure, evacuation routes, flooding, and emergency response among other issues. For emergency services, relevant policies may include coordinating with other agencies that are responsible for planning medical facilities to meet the health care needs of residents in the region, retaining hospitals, evaluating medical facility proposals, providing emergency response services, and participating in mutual-aid agreements.

As of January 1, 2014, Senate Bill 1241 requires that, upon the next revision of the housing element, jurisdictions review and update the Safety Element as necessary to address the risk of fire in SRAs and very-high fire hazard severity zones. These revisions must take into account specified considerations, including the provisions outlined in "Fire Hazard Planning" by OPR.

Airport Land Use Commissions and Airport Land Use Compatibility Plans

An ALUC is an agency that is required by State law in counties where there is an airport operated for the benefit of the general public. The purpose of the ALUC is to protect public health, safety, and welfare by ensuring the orderly development of airports and the adoption of land use measures that minimize the public's exposure to

excessive noise and safety hazards within areas around public airports to the extent that these areas are not already devoted to incompatible uses. The ALUC is responsible for developing and maintaining ALUCPs for areas around each airport. A list of the ALUCs in the Plan area is provided in Table 2.14-5.

ALUCs may request that all or selected land use actions (e.g., general plan, specific plan, zoning ordinance, building regulation, land acquisition, annexation, large development project) within an airport influence area (AIA) be submitted for review for consistency with the ALUCP. An AIA is the area in which current or future airport-related noise, over flight, safety, and/or airspace protection factors may affect land uses or necessitate restrictions on those uses. The ALUC establishes its jurisdictional authority by designating one or more AIAs. If the ALUC has not designated an AIA, then a boundary 2 miles from a public airport is used (Public Utilities Code Section 21675.1(b)). City and county zoning and planning are required to conform to the ALUCP unless the city or county governing body specifically overrides the ALUCP by supermajority vote.

Table 2.13-5 Airport Land Use Commissions and Adopted Airport Land Use Compatibility Plans in the Plan Area

County	Airport Land Use Commission	Airport Land Use Compatibility Plans (year adopted)
Alameda	Alameda County Planning Department	Alameda County Airport Land Use Policy Plan (1986, last amended 2012)
Contra Costa	Contra Costa County Department of Conservation and Development, Community Development Division	Contra Costa County Airport Land Use Compatibility Plan (2000)
Marin	Marin County Community Development Agency, Planning Department	Marin County ALUP (1991)
Napa	Napa County Conservation, Development, and Planning Department	Napa County ALUCP (1999)
San Francisco	*No airport*	*Not applicable*
San Mateo	City/County Association of Governments of San Mateo County	San Mateo Comprehensive Airport Land Use Plan (adopted 1996, last updated 2012)
Santa Clara	Santa Clara County Department of Planning and Development	Comprehensive Land Use Plan Santa Clara County: Norman Y. Mineta San Jose International Airport (2011, last amended 2016) Comprehensive Land Use Plan Santa Clara County: Reid-Hillview Airport (2007, last amended 2016) Comprehensive Land Use Plan Santa Clara County: Moffett Federal Airfield (2012, last amended 2016) Comprehensive Land Use Plan Santa Clara County: Palo Alto Airport (2008, last amended 2016) Comprehensive Land Use Plan Santa Clara County: South County Airport (2008, last amended 2016) Comprehensive Land Use Plan Santa Clara County: Heliports (2015)
Solano	Solano County Department of Resource Management	Travis Air Force Base Land Use Compatibility Plan (2015) Airport/Land Use Compatibility Plan: Rio Vista Municipal (sic.) Airport, New Rio Vista Airport (1988)
Sonoma	Sonoma County Permit and Resource Management Department	Comprehensive Airport Land Use Plan for Sonoma County (2002)

Source: Caltrans 2015, Santa Clara County 2017, Solano County 2017

2.13.3 Impact Analysis

SIGNIFICANCE CRITERIA

The following significance criteria are based on CEQA Guidelines Appendix G, as well as the thresholds used in the EIR for the 2013 Plan Bay Area, and professional judgment. Under these criteria, implementation of the proposed Plan would have a potentially significant adverse impact if it would:

Criterion 1: Create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials.

Criterion 2: 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.

Criterion 3: Emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within 0.25 mile of an existing or proposed school.

Criterion 4: 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 create a significant hazard to the public or the environment.

Criterion 5: Result in a safety hazard for people residing or working in the planning area for projects located within an airport land use plan or, where such a plan has not been adopted, within 2 miles of a public airport or public use airport.

Criterion 6: Result in a safety hazard for people residing or working in the planning area for projects within the vicinity of a private airstrip.

Criterion 7: Impair implementation of, or physically interfere with an adopted emergency response plan or emergency evacuation plan.

Criterion 8: Expose people or structures to a significant risk of loss, injury, or death involving wildland fires, including where wildlands are adjacent to urbanized areas or where residences are intermixed with wildlands.

METHOD OF ANALYSIS

The following evaluation is based on a review of documents and publicly available information about hazardous and potentially hazardous conditions in the Plan area to determine the potential for project implementation to result in an increased health or safety hazard to people or the environment. This includes city and county planning documents, and SWRCB and DTSC hazardous materials database information. Due to the large area covered by the proposed Plan, known sites of current or former contamination were not evaluated in detail, and physical surveys were not conducted. Rather, this program-level analysis is based on hazards typically associated with certain land uses and an overall understanding of the key safety concerns that could result from implementation of the proposed Plan.

For select hazards (i.e., presence of potential for NOA and wildland fire hazards), a geographic information system was used to digitally overlay the land use growth footprint associated with projected development and the footprint associated with transportation projects onto available resource maps. Quantitative results are presented for the region (i.e., the entire growth footprint, often summarized by county) and for the portions of the growth footprint specifically within the transit priority areas (TPAs; this figure is a subset of the regional and county totals). Information provided by county includes both incorporated and unincorporated areas in the county. The actual transportation project footprints and other design details of most proposed transportation projects are not known because the projects are in the early stages of planning. Transportation projects (e.g., road widenings, new roads, new or expanded interchanges, and new rail transit infrastructure),

were spatially analyzed by calculating buffer areas around the center line or center point of proposed roadway and transit projects. In practice, many of the transportation projects would not use the entire buffer area. The net result is that the acres of impact described in the tables presented in this section are conservative and avoid risks of underestimating the impacts resulting from the implementation of the Plan.

The evaluation of hazards and hazardous materials impacts assumes that the construction and development under the proposed Plan would adhere to the latest federal, State, and local regulations, and conform to the latest required standards in the industry, as appropriate for individual projects. As explained in Chapter 2, "Introduction to the Analysis," of this Draft EIR, where existing regulatory requirements or permitting requirements exist, since these regulations are law and binding on responsible agencies and project sponsors, it is reasonable to determine that they would be implemented, thereby reducing impacts to less than significant where relevant.

Impact 2.13-1: Implementation of the proposed Plan could create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials.

Impacts of Changes in Projected Land Use

Construction activities associated with implementation of the proposed Plan would temporarily increase the regional transport, use, storage, and disposal of hazardous materials and petroleum products (such as diesel fuel, lubricants, paints and solvents, and cement products containing strong basic or acidic chemicals) that are commonly used at construction sites. Hazardous waste generated during construction may consist of welding materials, fuel and lubricant containers, paint and solvent containers, and cement products containing strong basic or acidic chemicals.

Figure 2.13-1 maps the hazardous materials routes established by USDOT in the Plan area. Hazardous materials transported by truck use many of the same freeways, arterials, and local streets as other traffic. This creates a risk of accidents and associated release of hazardous materials for other drivers and for people along these routes. Although the transportation of hazardous materials could result in accidental spills, leaks, toxic releases, fire, or explosion, the USDOT Office of Hazardous Materials Safety prescribes strict regulations for the safe transportation of hazardous materials, as described in Title 49 of the CFR. These standard accident and hazardous materials recovery training and procedures are enforced by the State and followed by private State-licensed, certified, and bonded transportation companies and contractors.

Development associated with the proposed Plan would increase population, jobs, and households and a variety of land uses including residential, commercial, and industrial. Specific uses such as dry cleaners, gas stations, and certain industrial uses, would involve routine transport, use, and disposal of hazardous materials such as household hazardous wastes (e.g., paints, cleaning supplies, solvents, and petroleum products) and commercial and industrial hazardous waste. Routine transportation, use, or disposal of hazardous materials poses a potential risk to residents within the planning area by using trucks, rail, and other modes that are shared with the public, through direct contact, inhalation, or ingestion. Exposure to hazardous materials could cause various short-term and/or long-term health effects. Possible health effects could be acute (immediate, or of short-term severity), chronic (long-term, recurring, or resulting from repeated exposure), or both. Acute effects, often resulting from a single exposure, could result in nausea, vomiting, headache, dizziness, or burns. Chronic exposure could result in systemic damage or damage to organs, such as the lungs, liver, or kidneys. Health effects would be specific to each hazardous material.

Projected growth and development associated with the proposed Plan could also involve the use of hazardous materials or petroleum products. The operation of businesses that use, create, or dispose of hazardous materials is regulated and monitored by federal, State, and local regulations that provide a high level of protection to the public and the environment from the hazardous materials manufactured within, transported to, and disposed within the region. As an example, many uses in the Plan area, including commercial and industrial operations, must prepare and implement hazardous materials plans, such as the following, to avoid occurrences, and minimize the effects of, hazardous materials spills and releases:

- California hazardous materials business plan (pursuant to HSC Section 25500), which specifies requirements for material inventory management, inspections, training, recordkeeping, and reporting.

- Spill prevention, containment, and countermeasures plan (pursuant to 40 CFR 112) or, for smaller quantities, a spill prevention and response plan, which identifies best management practices for spill and release prevention and provides procedures and responsibilities for rapidly, effectively, and safely cleaning up and disposing of any spills or releases.

RCRA, Title 22 of the CCR, and the Hazardous Waste Control Law regulate the generation, transportation, treatment, storage, and disposal of hazardous waste. These laws impose regulatory systems for handling hazardous waste in a manner that protects human health and the environment, including requirements for the classification of materials, packaging, hazard communication, Cal/EPA oversees the regulation and management of hazardous materials on a statewide level through DTSC. Use of hazardous materials requires permits and monitoring to avoid hazardous waste release through the local CUPA. DTSC is responsible for the enforcement and implementation of hazardous waste laws and regulations, codified in Title 22 of the CCR. Additionally, businesses that generate hazardous waste are required to have an EPA identification number to monitor and track hazardous waste activities.

In addition, as noted above, FRA and PHMSA closely regulate the rail transport of crude oil and other hazardous materials. The transport of hazardous materials by rail is subject to requirements for handling, loading and unloading, and the placement of placards to alert emergency response teams as to the contents of each car. FRA routinely inspects the facilities of shippers and railroads to ensure that all regulatory requirements are being met. The USDOT Office of Hazardous Materials Safety prescribes strict regulations for the safe transportation of hazardous materials, as described in Title 49 of the CFR.

As discussed above, it is assumed that affected land uses will comply with the RCRA, CCR Title 22, California Hazardous Waste Control Law, Cal/EPA requirements, hazardous materials training requirements, and any local regulations such as city or county Hazardous Materials Management Plans regulating the generation, transportation, treatment, storage, and disposal of hazardous materials and waste. Because these regulations are law and binding on responsible agencies and project sponsors, it is reasonable to expect they would be implemented. Therefore, hazardous materials impacts related to implementation of the proposed Plan at the regional and local level are less than significant (LS) for Impact 2.13-1.

Impacts of Transportation Projects

Construction activities associated with Implementation of the proposed Plan would involve the short-term use and storage of hazardous materials (e.g., asphalt, fuel, lubricants, paint) typical of transportation projects and similar to those identified above for land use projects. Transportation projects in the proposed Plan include a variety of transportation modifications such as new express lanes, auxiliary lanes, roadway widening, increased transit service and expansion, and other maintenance and rehabilitation projects. The proposed projects may increase the capacity of roadways to transport hazardous materials. Roadway projects in the proposed Plan would also improve road safety, as well as pedestrian and bicycle safety, thereby potentially reducing transportation-related hazardous materials risks because fewer accidents would occur on safer roads. Based on the requirements of Title 49 of the CFR Parts 171–180, construction and operation of transportation projects would provide for the safe transport and disposal of hazardous waste.

Hazardous materials impacts related to transportation projects assumed in the proposed Plan are less than significant (LS) for Impact 2.13-1. Transportation projects are subject to the same federal, State, and local regulations and oversight as described for land use development. This impact is less than significant (LS) because there are existing federal, state, and local regulations and oversight in place that would effectively reduce the inherent hazard associated with these activities to an acceptable level.

Conclusion

Both changes in planned land use and transportation projects could increase the routine transport, use, storage, and disposal of hazardous wastes in the region. Because of the existing federal, state, and local regulations and oversight in place that would effectively reduce the inherent hazard associated with these activities, the impact would be a **less than significant (LS)**. No mitigation is required.

Mitigation Measures

None required.

Impact 2.13-2: Implementation of the proposed Plan could 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.

Impacts of Changes in Projected Land Use

Construction associated with implementation of the proposed Plan could result in impacts related to use of hazardous materials and disturbance of potentially hazardous materials, including NOA. The most likely incidents involving construction-related hazardous materials are generally associated with minor spills or drips. Small fuel or oil spills are possible, but would have a negligible impact on public health. All hazardous materials would be stored, handled, and disposed of according to the manufacturers' recommendations, and spills would be cleaned up in accordance with applicable regulations. Hazardous materials spills or releases, including petroleum products such as gasoline, diesel, and hydraulic fluid, regardless of quantity spilled, must be immediately reported if the spill has entered or threatens to enter a water of the State, including a stream, lake, wetland, or storm drain, or has caused injury to a person or threatens injury to public health. Immediate notification must be made to the local emergency response agency, or 911, and the Governor's Office of Emergency Services Warning Center. For non-petroleum products, additional reporting may be required if the release exceeds federal reportable quantity thresholds over a release period of 24 hours as detailed in HSC Section 25359.4 and Title 40, Section 302.4 of the CFR.

The disturbance of undocumented hazardous wastes could also result in hazards to the environment and human health. Grading and excavation activities may expose construction workers and the public to hazardous substances present in the soil or groundwater, but which may not have been anticipated based on information about existing conditions. Potential hazards to human health include ignition of flammable liquids or vapors, inhalation of toxic vapors in confined spaces such as trenches, and skin contact with contaminated soil or water.

As described above, NOA is a carcinogen that is associated with rock formations found throughout the Plan area. The acreage of the land use growth footprint that could be located on ultramafic rocks is provided in **Table 2.13-6.** People exposed to low levels of asbestos may be at elevated risk of lung cancer and mesothelioma. Airborne exposure to soil dust containing asbestos can occur under a variety of scenarios, including children playing in the dirt, dust raised from unpaved roads and driveways covered with crushed serpentine, grading and earth disturbance associated with construction activity, rock blasting, quarrying, gardening, and other human activities. The Asbestos ATCM requires preparation and implementation of an asbestos dust mitigation plan for construction or grading activities on sites greater than 1 acre in size with known NOA soils, as determined through the geotechnical investigations discussed in Section 2.7, "Geology and Seismicity," the asbestos dust mitigation plan would incorporate the recommendations of the geotechnical investigation to avoid effects to nearby populations. Typical aspects of the plan would include provisions for sampling soils exported to the project site during construction, prohibition of rock crushing where materials may contain asbestos, standard track-out control measures, and limits on fugitive dust. In addition, HSC Section 19827.5 requires that local agencies not issue demolition or alteration permits until an applicant has demonstrated compliance with notification requirements under applicable federal regulations regarding hazardous air pollutants, including asbestos.

Table 2.13-6 Acreage of Ultramafic Rock within the Land Use Growth Footprint, by Region, County, and TPA

County		Total (acres)[1,2]
Alameda	County Total	10
	Within TPAs	<1
Contra Costa	County Total	<1
	Within TPAs	0
Marin	County Total	0
	Within TPAs	0
Napa	County Total	0
	Within TPAs	0
San Francisco	County Total	340
	Within TPAs	330
San Mateo	County Total	4.
	Within TPAs	0
Santa Clara	County Total	3
	Within TPAs	<1
Solano	County Total	0
	Within TPAs	0
Sonoma	County Total	0
	Within TPAs	0
Regional Total[3]	County Total	**350**
	Within TPAs	**330**

Notes: TPA acreages are a subset of County acreages.

[1]Numbers less than 1 are shown as "<1."

[2]Whole numbers have been rounded (between 0 and 10 to the nearest whole number, between 11 and 999 to the nearest 10).

[3] Figures may not sum due to independent rounding.

Source: MTC 2016 and Krevor et. al. 2009

NOA is less of a concern during operation because soil with 0.25 to less than 1 percent asbestos cannot be used for surfacing in California. Soils containing 1 percent or more asbestos are considered to be asbestos containing material and, if disposed of offsite, must be managed as a hazardous waste with transport subject to Caltrans regulations. Compliance with ARB regulations and local policies for control of NOA would reduce the exposure of sensitive receptors during operation.

During operation, businesses that store hazardous materials could potentially experience accidents or upset conditions that result from their routine use. These businesses are required to prepare spill prevention, containment, and countermeasures plans (pursuant to 40 CFR 112) or, for smaller quantities, a spill prevention and response plan, that identify best management practices for spill and release prevention and provide procedures and responsibilities for rapidly, effectively, and safely cleaning up and disposing of any spills or releases. Oversight is provided by the CUPA. As discussed above, the severity of potential effects varies with the activity conducted and the concentration and type of hazardous materials involved; however, most minor spills associated with vehicle maintenance would be remediated immediately pursuant to the requirements and liabilities of applicable regulations and would not pose a substantial hazard to the public or

the environment. The possible adverse effects on the public or environment from these and other activities would more likely be acute (immediate, or of short-term severity) as a result of short-term exposure.

There could also be increased urbanization along transportation corridors. Construction and operation of land use projects adjacent to new roadway segments, including where TPPs can be constructed, would not increase the hazard associated with operation of highways and railroads, but could increase the number of people potentially exposed to hazardous conditions. To be declared a sustainable communities project under PRC Section 21155.1, projects in TPAs must demonstrate that there would not be an "unusually high" risk of fire or explosion from materials stored or used on or near the property and the project would not result in a risk of exposure to a potentially hazardous material at levels that exceed state and federal standards. This would occur on a project-specific basis, and does not affect the other streamlining strategies and statutes under the Sustainable Communities Act.

As noted above, FRA and PHMSA closely regulate the rail transport of crude oil and other hazardous materials. Although the risk of upset conditions is moderated through compliance with various federal, State, and industry regulations, there is a hazard associated with the potential for train accidents and spill of hazardous materials. Regulatory requirements for transport of crude oil by rail are evolving in response to the recent increase in the volume of crude oil being shipped by rail. In 2014, the USDOT issued an emergency order in response to the "propensity for rail accidents involving trains transporting crude oil to occur, and the subsequent releases of large quantities of crude oil into the environment and the imminent hazard those releases present" (USDOT 2014). The order requires railroads to take actions to assist emergency responders to address what the USDOT considers the imminent hazard of environmental damage from such a release. Other recent developments include changes to rail car design standards and operation restrictions.

Rupture of train cars carrying crude oil is a safety hazard because the spilled material could explode if exposed to an ignition source. Future development associated with the proposed Plan would include development in existing urban locations and near existing rail infrastructure and would most likely add people to the initial evacuation zone adjacent to operating rail lines. Standard safety procedures would result in evacuation of these individuals immediately following derailment of a railcar carrying flammable liquid or gas, while standard response to release of other potentially hazardous materials (e.g., organophosphates, fertilizers) is to shelter in place. Contemporary building standards require construction of residences that are sufficiently contained (e.g., with doors and windows that seal) to allow sheltering in place to occur without substantial potential for harm to residents. For a discussion of the impacts on emergency services response times and service ratios, see also Section 2.14, "Public Services and Recreation."

Changes in planned land use are not anticipated to increase the potential for train accidents because they would not affect the alignment of the tracks and would not change sight lines or visibility. Any new or improved rail crossings would be subject to review by the affected railroads. Further, regulations are in place through which the railroads would address the potential hazards associated with unauthorized use or pedestrian crossing of the track, any changes to volume of train transport that may indirectly result from the Plan, and any necessary changes to the speed of travel on segments of track adjacent to areas where changes in land use occur.

Local government jurisdictions are required to adopt emergency plans, which are considered to be extensions of the California Emergency Plan, established in accordance with the Emergency Services Act. The Cal EMA administers the Emergency Response Plan to respond to hazardous materials incidents that may occur. CalARP, established by the EPA, applies to a wide variety of facilities that contain regulated substances and aims to prevent accidental releases of hazardous materials into the environment through adoption of proper storing, containing, and handling procedures. Implementation of federal, State, and local requirements such as CalARP, the RECP, USDOT, and Caltrans regulations would minimize potential exposure to the public and the environment from accidental releases. Therefore, although development would occur in proximity to major transportation corridors that are used to transport hazardous and flammable materials, construction and operation of these projects would not increase the hazard associated with their operation. Hazardous materials impacts related to land use changes from implementation of the proposed Plan at the regional, County, and TPA level are considered less than significant (LS).

Impacts of Transportation Projects

Implementation of the proposed Plan would include earthwork activities that would disturb underlying soils and possibly groundwater during construction; potentially resulting in exposure to previously released hazardous materials. Land adjacent to roadways may also contain elevated concentrations of lead in exposed surface soils, which could pose a health hazard to construction workers and users of the properties. Lead is a State-recognized carcinogen and reproductive toxicant. Exposure of construction workers or future site occupants to lead in soil could result in adverse health effects, depending on the duration and extent of exposure. Substantial quantities of aerially-deposited lead are understood to be generally confined to within 30 feet of a roadway. Other potential contaminants, including herbicides associated with weed abatement and contaminated ballast rock, are generally confined to the immediate transportation right-of-way. As with land use projects and development, exposure to these hazardous materials and wastes from construction of transportation projects could cause adverse effects to construction workers, the public, or the environment.

Nearly 700 acres associated with nine of the transportation projects identified in the proposed Plan would be located in areas with ultramafic rock (see Table 2.13-7). As discussed above, existing regulations address potential hazards associated with construction on ultramafic soils. During operation, improved road and rail systems would not create a significant hazard to the public because there would be limited soil disturbance and few opportunities for the public to inhale any airborne fibers.

Table 2.13-7 Acreage of Ultramafic Rock within the Transportation Project Footprint, by Region and County

County	Total (acres)
Alameda	20
Contra Costa	0
Marin	0
Napa	0
San Francisco	630
San Mateo	0
Santa Clara	50
Solano	0
Sonoma	0
Regional Total	**700**

Notes: Whole numbers have been rounded (between 0 and 10 to the nearest whole number, between 11 and 999 to the nearest 10). Figures may not sum due to independent rounding.

Source: Krevor et al. 2009, MTC 2016

The proposed transportation projects involve the expansion or extension of the transportation system (e.g., new express lanes, auxiliary lanes, roadway widening, increased transit service, and other maintenance and rehabilitation projects), which may increase the capacity of roadways to transport hazardous materials. Transportation projects that expand the transportation system and extend it to new areas may expose more adjoining land uses to risks associated with upset on the roadway, highway, or railroad. As discussed above for land use and growth, implementation of federal, State, and local requirements such as CalARP, the RECP, USDOT, and Caltrans regulations would minimize potential exposure to the public and the environment from accidental releases. The Plan also includes transportation investments that would result in improvements to rail crossing safety. Any new or improved rail crossings would be subject to review by the affected railroads. Hazardous materials impacts related to transportation projects from implementation of the proposed Plan at a regional and County level would be less than significant (LS).

Conclusion

The changes in planned land use and transportation projects could increase the potential for unintentional upset and accident conditions. Existing regulations effectively reduce the potential for individual projects to create a hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials. Therefore, the proposed Plan would have a **less-than-significant** (LS) impact because there are existing federal, state, and local regulations and oversight in place that would effectively reduce the inherent hazard associated with these activities to an acceptable level. No mitigation is required.

Mitigation Measures

None required.

Impact 2.13-3: Implementation of the proposed Plan could result in hazardous emissions or handling of hazardous or acutely hazardous materials, substances, or waste within 0.25 mile of an existing or proposed school.

Impacts of Changes in Projected Land Use

Implementation of the proposed Plan would result in increased population, jobs, and housing throughout the region. This could result in an increase in hazardous materials use, which in turn increases the potential for accidental release of hazardous materials within 0.25 mile of an existing or proposed school. Further, population growth would result in a corresponding demand for public services, including schools. As noted in Table 2.14-1 in Section 2.14, "Public Services and Recreation," there were 1,994 public schools in the Plan area during the 2014-2015 school year. Children are particularly susceptible to long-term impacts from emissions of hazardous materials, including those from high-volume motor vehicle travel on roadways near schools. The potential effects on sensitive land uses, including schools, associated with potentially hazardous emissions from stationary sources and exposure to air contamination related to roadways is addressed in Section 2.2, "Air Quality."

Any new commercial or industrial operations in proximity to existing schools would be required to comply with regulations related to the routine use, storage, and transport of hazardous materials. Proposed projects that would generate emissions or involve the handling of extremely hazardous materials, substances, or waste within 0.25 mile of an existing school would notify the affected school district (pursuant to PRC Section 21151.4). As discussed in detail above, compliance with existing regulations would reduce the exposure to potential hazards associated with these land uses.

For new schools that may be developed to address the land use changes that result from implementation of the Plan, the California Education Code, including Education Code Section 17213(b), establishes requirements for assessments and approvals that address the potential for existing contamination on the site, and whether nearby land uses might reasonably be anticipated to emit hazardous air emissions or handle hazardous materials. Assessment of existing contamination is conducted in coordination with DTSC's School Property Evaluation and Cleanup Division, which is responsible for assessing, investigating, and cleaning up proposed school sites. This Division ensures that selected properties are free of contamination or, if the properties were previously contaminated, that they have been cleaned up to a level that protects the students and staff who will occupy a new school. All proposed school sites that will receive State funding for acquisition or construction are required to go through a rigorous environmental review and cleanup process under DTSC's oversight. Therefore, hazardous materials impacts related to land use changes from the projected development are considered less than significant (LS).

Impacts of Transportation Projects

Implementation of the proposed Plan could include transportation system expansions or other improvements near schools. These transportation projects may increase the capacity to transport hazardous materials. However, all materials must be used, stored, and disposed of in accordance with applicable federal, State, and local laws, which would effectively reduce the potential impacts associated with hazardous emissions or

handling of hazardous or acutely hazardous materials, substances, or waste within 0.25 mile of an existing or proposed school. Roadway projects in the proposed Plan may also improve road safety, thereby reducing the potential for accidents in proximity of schools related to hazardous materials.

As discussed above, the state school siting process requires that emissions of hazardous materials, substances, or waste within 0.25 mile of a proposed school be addressed (PRC Section 21151.2; Education Code Section 17210 et seq.). Additionally, individual hazardous materials emitters or handlers must adhere to permitting requirements (PRC Section 21151.4) that require evaluation and notification where potential materials handling and emissions could occur within 0.25-mile proximity of an existing school. Therefore, the hazardous materials impacts related to existing and proposed schools from implementation of the proposed transportation projects are considered less than significant (LS).

Conclusion

During construction, demolition, and excavation activities, the changes in planned land use and transportation projects could potentially produce hazardous air emissions or involve the handling of extremely hazardous wastes. During operation, land use projects could use and produce hazardous materials that may be transported on roadways included in this Plan. As discussed above, all projects would comply with federal and state regulations that are designed to reduce the potential for the release of large quantities of hazardous materials and wastes into the environment to an acceptable level, and in particular to protect schools. Existing federal, state, and local regulations and oversight would be sufficient to ensure that hazardous materials stored, used, transported, and disposed of under the proposed Plan would not pose a substantial hazard to the public or the environment, including children at schools, under normal conditions. Therefore, the proposed Plan would have a **less-than-significant (LS)** impact. No mitigation is required.

Mitigation Measures

None required.

Impact 2.13-4: Implementation of the proposed Plan could result in projects 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 create a significant hazard to the public or the environment.

Impacts of Changes in Projected Land Use

Throughout the Plan area there are many sites where historical releases of hazardous materials or wastes have occurred; these are listed in environmental databases pursuant to Government Code Section 65962.5. As indicated in **Table 2.13-1**, above, there are approximately 21,600 documented sites of contamination in some stage of DTSC or SWRCB oversight in the Plan area. These sites range from small releases that have had localized effects on private property and have already been remediated to large scale releases from long-term historical industrial practices that have had wider ranging effects on groundwater. Specific sites of documented contamination are not evaluated in this analysis because this is a programmatic level document. Further, because the precise locations of future land use projects are unknown, an evaluation of the potential for specific sites of known contamination within the Plan area to be affected by project activities cannot be conducted at this time. However, land use can be used to generally characterize the potential for release of hazardous materials (i.e., hazardous materials releases are more likely to have occurred in areas that currently or historically supported industrial uses). In addition, construction activities that disturb subsurface materials could encounter previously unidentified contamination from past practices or placement of undocumented fill or even unauthorized disposal of hazardous wastes. Encountering these hazardous materials could expose workers, the public or the environment to adverse effects depending on the volume, materials involved, and concentrations.

A common practice that is typically required by lending institutions when properties change hands is for a Phase I ESA to be prepared to research and disclose the prior uses of the site and the likelihood that residual hazardous materials and/or waste might be present in underlying soil and/or groundwater. Also, in many

instances implementing agencies require submittal of a Phase I ESA prior to approval or implementation of a project. These studies include research in a variety of government databases to determine whether the site has had prior underground tanks or other industrial uses that could result in hazardous materials on or below the ground surface.

To be declared a sustainable communities project under PRC Section 21155.1(a)(3), projects in TPAs must demonstrate that they are not located on any list of facilities and sites compiled pursuant to Section 65962.5 of the Government Code, and the site must be subject to a PEA, which is a type of environmental document typically prepared for sites with DTSC oversight. Overall, PEA requirements are more comprehensive than the requirements for Phase I ESAs. Although they require similar background information, they also include site-specific human health and ecological screening evaluations, public participation requirements, data collection, and scoping activities. Note, however, that this is only applicable to potential exemptions under the sustainable communities strategy provisions of CEQA and does not affect the other streamlining strategies under the Sustainable Communities Act.

With the notable exceptions for streamlining projects in TPAs and siting public schools, as discussed above, there are no general regulatory requirements to conduct a Phase I ESA or PEA, or subsequent investigation of potential contamination. Therefore, because it cannot be assumed these practices would regularly occur, the impacts related to changes in land use from implementation of the proposed Plan are considered potentially significant (PS).

Impacts of Transportation Projects

As discussed above, there are many known sites of contamination in the Plan area. Specific sites of documented contamination are not evaluated in this analysis because it is a programmatic level document. A standard industry practice is to perform a Phase I ESA to identify hazardous conditions on site proposed for development; however, these types of assessments are not uniformly required. The hazard associated with construction and operation of transportation projects on known sites of contamination at the regional level are considered potentially significant (PS) for Impact 2.13-4 for the same reasons identified above for land use projects.

Conclusion

The potential for encountering hazardous materials or wastes would be dependent on site-specific conditions. The impact is considered **potentially significant (PS)** for both changes in land use and transportation projects. Mitigation Measure 2.13-4 is discussed below.

Mitigation Measures

2.13-4 Implementing agencies and/or project sponsors shall implement measures, where feasible and necessary based on project- and site-specific considerations that include, but are not limited to:

- If the project is located on or near a hazardous materials and/or waste site pursuant to Government Code Section 65962.5, or has the potential for residual hazardous materials and/or waste as a result of location and/or prior uses, the project sponsor shall prepare a Phase I ESA in accordance with the American Society for Testing and Materials' E-1527-05 standard. For work requiring any demolition or renovation, the Phase I ESA shall make recommendations for any hazardous building materials survey work that shall be done. All recommendations included in a Phase I ESA prepared for a site shall be implemented. If a Phase I ESA indicates the presence or likely presence of contamination, the implementing agency shall require a Phase II ESA, and recommendations of the Phase II ESA shall be fully implemented.

Significance after Mitigation

Preparation of, and compliance with, a Phase I ESA for properties at risk of potential hazardous materials and/or waste contamination would avoid adverse impacts associated with build-out. Soil management plans or soil contingency plans required by Mitigation Measure 2.13-4 would include procedural measures to protect and isolate suspected contaminated materials to avoid adverse effects to the workers or public. To the extent

that an individual project adopts and implements all feasible mitigation measures described above, the impact would be less than significant with mitigation (LS-M).

Projects taking advantage of CEQA Streamlining provisions of SB 375 (Public Resources sections 21155.1, 21155.2, and 21159.28) must apply the mitigation measures described above, as applicable, to address site-specific conditions. However, MTC/ABAG cannot require local implementing agencies to adopt the above mitigation measures, and it is ultimately the responsibility of a lead agency to determine and adopt mitigation. Therefore, this impact remains **significant and unavoidable (SU)** for purposes of this program-level review.

Impact 2.13-5: Implementation of the proposed Plan could result in a safety hazard for people residing or working in the planning area for projects located within an airport land use plan or, where such a plan has not been adopted, within 2 miles of a public airport or public use airport.

Impacts of Changes in Projected Land Use

As noted above in the setting, there are 23 public use airports in the Bay Area that serve commercial and general aviation users (shown in **Table 2.13-2** and **Figure 2.13-3**). Land development associated with implementation of the proposed Plan would predominately occur in existing urban areas and may result in the development of residential and non-residential land uses in and near airport flight corridors and within areas subject to policies contained in an ALUCP. Development that is not compatible with aviation activity (e.g., tall structures, land uses that produce light/glare, land uses that attract wildlife that can be hazardous to aircraft, noise sensitive land uses) may lead to conflict between an airport operator and surrounding communities, as well as create long-term operational problems for the airport.

To prevent incompatible uses in areas of higher aircraft hazard potential, the ALUC has adopted ALUCPs with land use policies and criteria. The policies identify what types of land uses are allowed around airports and are intended to protect the safety of people, property, and aircraft on the ground and in the air in the vicinity of the airport. The policies also protect airports from encroachment by new incompatible land uses that could restrict their operations. Structure replacement and infill development are generally permitted under ALUCPs. Implementing agencies are responsible for analyzing compliance with ALUCPs as a part of their land use approval authority.

There are also several military airfields in the Bay Area. The Department of Defense requires military airfields to adopt Air Installation Compatibility Use Zone studies, which assess compatible land uses in the vicinity of a military air station in a way equivalent to ALUCPs. PRC Section 21098 reduces hazards associated with development near military airports by requiring lead agencies to submit a notice to the military service that would be affected by a proposed general plan amendment or significant project located within specific boundaries of a low-level flight path, military impact zone, or special use airspace.

The FAA requires notice of proposed construction for projects located within 20,000 feet (less for runways under 3,200 feet in length) of a public use airport, and other projects that may pose a potential hazard for people residing or working in the project area, due to height, visual hazard, or the attraction of wildlife. Development projects associated with the Plan would be subject to FAA evaluation, and the FAA would be notified of proposed development pursuant to Section 77.11 of the FAA regulations. The notification provides the basis for the FAA to evaluate the proposed development projects for obstruction hazards and potential hazards to air safety.

Implementing agencies would require project sponsors to comply with any applicable ALUCP requirements, as well as any FAA requirements (14 CFR Part 77). Projects within an airport land use plan or, where such a plan has not been adopted, within 2 miles of a public airport or public use airport would not be approved by local agencies until project design plans have been reviewed and approved by the appropriate ALUC. Because existing regulations and laws related to development near a public airport prohibit the approval of incompatible projects and case law supports reliance on existing regulations or the permitting requirements of independent regulatory agencies to address potential project effects, potential adverse aviation hazard impacts related to

land use changes from implementation of the proposed Plan are considered less than significant (LS) for Impact 2.13-5.

Impacts of Transportation Projects

Transportation projects are located within 2 miles of all three major airports (San Francisco, Oakland, and San José) as well as Hayward, Reid-Hillview in San Jose, San Carlos, Livermore, Buchanan, Gnoss Field, San Martin, Nut Tree, Napa, Palo Alto, Byron, Sonoma, Petaluma, and Half Moon Bay. The transportation projects would be subject to the regulations described above for land use projects. Implementing agencies would require project sponsors to comply with any applicable ALUCP requirements, as well as any FAA requirements (14 CFR Part 77). Projects within an airport land use plan or, where such a plan has not been adopted, within 2 miles of a public airport or public use airport would not be approved by local agencies until project design plans have been reviewed and approved by the appropriate ALUC. Case law supports reliance on existing regulations or the permitting requirements of independent regulatory agencies to address potential project effects. Therefore, potential adverse hazard impacts related to transportation projects from the proposed Plan are considered less than significant (LS) for Impact 2.13-5.

Conclusion

Both land use development and transportation projects would have **less-than-significant (LS)** impacts because there are existing federal, state, and local regulations and oversight in place that would effectively reduce the inherent hazard associated with development near airports to an acceptable level. No mitigation is required.

Mitigation Measures

None required.

Impact 2.13-6: Implementation of the proposed Plan could result in a safety hazard for people residing or working in the planning area for projects within the vicinity of a private airstrip.

Impacts of Changes in Projected Land Use

Implementation of the proposed Plan could result in development located in the vicinity of private airstrips, creating hazards from tall structures, glare-producing objects, bird and wildlife attractants, radio waves from communication centers, or other features that have the potential to interfere with take-off or landing procedures and pose a risk to aircrafts and the public. However, the activity level and accessibility of private airstrips is typically very limited, and these airstrips affect less land than public airports. **Table 2.13-3** lists the private use airports registered with the FAA. Many of these are helipads associated with medical facilities. There may also be small, agricultural airstrips in the Plan area not included in this list. These facilities are generally subject to local land use control in the form of conditional use permits.

Within the vicinity of a private airstrip, implementing agencies would require project sponsors to comply with applicable local land use regulations and federal aviation guidelines, as well as any FAA (14 CFR Part 77) requirements applicable to projects located within 2 miles of a private airstrip. Projects would not be approved by local agencies until project design plans can demonstrate compliance with subject airstrip, local, and FAA requirements. These existing regulations and FAA procedures would ensure compatibility between land uses and airports and reduce the potential for aircraft accidents.

Adherence to State and local permits, existing regulations, and FAA requirements would reduce the potential for a safety hazard for people residing or working in the vicinity of private airstrips. Therefore, the potential for adverse private airstrip impacts related to land use changes from implementation of the proposed Plan at the regional and local level is considered less than significant (LS) for Impact 2.13-6.

Impacts of Transportation Projects

Transportation projects located in the vicinity of private airstrips could create hazards from tall structures or glare-producing objects; however, they are unlikely to include bird and wildlife attractants, radio waves from communication centers, or other features that have the potential to interfere with take-off or landing procedures and pose a risk to aircrafts and the public. The activity level and accessibility of private airstrips is

typically very limited, and these airstrips affect less land than public airports. Table 2.13-3 lists the private use airports registered with the FAA. Many of these are helipads associated with medical facilities. There may also be small, agricultural airstrips in the Plan area not included in this list. These facilities are generally subject to local land use control in the form of conditional use permits.

Within the vicinity of a private airstrip, implementing agencies would require project sponsors of transportation projects to comply with applicable local land use regulations and federal aviation guidelines, as well as any FAA (14 CFR Part 77) requirements applicable to projects located within 2 miles of a private airstrip. Transportation projects would not be approved by local agencies until project design plans can demonstrate compliance with subject airstrip, local, and FAA requirements. These existing regulations and FAA procedures would ensure compatibility between land uses and airports and reduce the potential for aircraft accidents.

In general, the proposed transportation projects would not have elements that could affect airstrip operations and increase safety hazards. Projects (such as roadway widening and addition of express lanes) would not result in tall structures or changes in land uses. As described above, existing regulations would adequately reduce potential safety hazards associated with implementation of transportation projects near private airstrips. The potential for adverse impacts related to implementation of the proposed transportation projects near private airstrips is considered less than significant (LS) for Impact 2.13-6 at the regional and local level.

Conclusion

Implementing agencies are responsible for analyzing safety and compatibility issues associated with approval of land use and transportation projects proximate to private airstrips. Furthermore, Caltrans requires operators of private airstrips to obtain a permit from the Division of Aeronautics prior to air operations, and FAA regulation (14 CFR Section 77) includes provisions that apply to public, as well as private, airstrips. Adherence to state and local permits, existing regulations, and FAA requirements would reduce the potential for a safety hazard for people residing or working in the vicinity of private airstrips. Potential impacts related to land use and transportation projects located in the vicinity of private airstrips would be **less than significant (LS)** because there are existing federal, state, and local regulations and oversight in place that would effectively reduce the inherent hazard associated with these activities to an acceptable level. No mitigation is required.

Mitigation Measures

None required.

Impact 2.13-7: Implementation of the proposed Plan could impair implementation of, or physically interfere with, an adopted emergency response plan or emergency evacuation plan.

Impacts of Changes in Projected Land Use

Construction associated with implementation of the proposed Plan does not have the potential to substantially hinder emergency response activities or physically interfere with established evacuation routes. Although increased projected development and changes in land use are proposed, emergency response plans are regularly updated to reflect changing conditions. Projects requiring encroachment permits for temporary construction activities in public roadways that could be used for emergency response or evacuation are generally required to prepare traffic mitigation plans that address traffic control during the period the project is occurring within public right of way. To address any temporary road closures that would be required during construction, standard construction mitigation includes notification of emergency responders.

By 2040, the region is projected to support approximately two million more residents than in 2015 and approximately 688,000 new jobs. Implementation of the proposed Plan would focus growth in existing urbanized areas, which would result in more dense and intense development compared to existing conditions. Development that proposes large concentrations of people (such as a shopping center or stadium) or would site individuals that require special assistance (such as a hospital or senior facility) in an area with identified hazards could cause adverse effects related to the implementation of countywide and jurisdictional emergency plans because there would be more individuals potentially subject to these hazards. This may overburden adopted evacuation routes and other emergency response resources. Further, new structures

could physically interfere with the implementation of emergency response, for example if the height of the structure interferes with the ability of emergency air support services to carry out missions associated with an emergency response, or if other conditions prevent emergency responders from accessing the area.

Emergency response and emergency evacuation plans are designed by the Office of Emergency Services for each county in the region to respond to a possible emergency situation (e.g., fires, floods, earthquakes). These plans cover all of the land within the region, including both incorporated and unincorporated areas, and provide a process for evacuating people from danger and preventing or minimizing loss of life and property. In addition, the Bay Area RECP provides a framework for collaboration and coordination during regional events, as well as critical linkages to ensure that existing Bay Area emergency response systems work together. The management of emergency response and emergency evacuation plans includes regular updates to these plans that incorporate new or proposed developments.

Therefore, although development under the proposed Plan would increase population, residential densities, and non-residential intensities, changes in land use would be reflected in updated emergency and evacuation plans. The potential for construction activities or development to impair implementation of, or physically interfere with, an adopted emergency response plan or emergency evacuation plan is less than significant (LS) for Impact 2.13-7.

Impacts of Transportation Projects

As discussed above, temporary road closures required during construction could impair implementation of, or physically interfere with, an adopted emergency response plan or emergency evacuation plan. However, standard construction mitigation includes notification of emergency responders where road closures are required. Because road closures are temporary and would be coordinated with emergency responders so that alternative evaluation routes could be developed and employed, these activities are considered to be less-than-significant.

The proposed transportation projects would generally increase mobility and circulation capacity and, thereby, have the potential to improve response times for police, fire, and emergency service providers, especially in heavily-congested areas. Overall, congestion for the region is projected to increase over the proposed Plan time horizon, with the average commute trip for single-occupant commuters and carpoolers expected to increase by 2 percent and 1 percent, respectively and average non-commute trips expected to increase by 3 percent (see Tables 2.1-14 and 2.1-14 in Section 2.1, "Transportation." These increases in commute and non-commute trips would be less than one minute increases. Regardless, emergency and evacuation plans are regularly updated to incorporate current conditions. Also, with implementation of the proposed transportation projects that include improved transit opportunities, more people would be able to move through the regional transportation system, and implementation of the proposed transportation projects would result in the construction of roadway projects that coincide with new housing and employment developments, thereby facilitating efficient access to these developments by public service providers.

Therefore, with the improved transportation system efficiency, the potential for adverse effects related to implementation of emergency response and evacuation plans is considered less than significant (LS) for Impact 2.13-7.

Conclusion

Both land use and transportation projects would be subject to implementation of State and federal regulations, as well as local/regional requirements for adequate emergency response and emergency evacuation plans, such as those required by the California Emergency Services Act and Cal EMA. Emergency and evacuation plans are periodically updated to accommodate growth and would continue to be updated for growth and changes in projected development associated with the proposed Plan. Therefore, potential impacts related to interference with emergency response and evacuation plans would be **less than significant (LS)**. No mitigation is required.

Mitigation Measures

None required.

Impact 2.13-8: Implementation of the proposed Plan could expose people or structures to a significant risk of loss, injury, or death involving wildland fires, including where wildlands are adjacent to urbanized areas or where residences are intermixed with wildlands.

Impacts of the Changes in Projected Land Use

Wildfire prevention is a shared responsibility between federal, State, and local agencies including local city and county fire departments. Federal lands fall under Federal Responsibility Areas, most of the unincorporated areas of the Bay Area are SRAs, and generally all incorporated areas and some unincorporated lands are classified as LRAs that are typically addressed by city and county fire departments. The National Fire Plan provides the necessary coordination between agencies in areas of federal lands. However, the majority of the Plan area is covered by CAL FIRE and local fire agencies.

New construction is subject to the CFC, which includes safety measures to minimize the threat of fire. Title 14 of the CCR sets forth the minimum development standards for emergency access, fuel modification, setback, signage, and water supply, which help prevent damage to structures or people by reducing wildfire hazards.

Land development under the proposed Plan could result in exposure of people to loss, injury, or death and damage to property adjacent to wildlands or where residences are intermixed with wildlands. In total, the growth footprint for the land uses assumed in the proposed Plan include approximately 860 acres of land classified as having a moderate, high, or very high fire hazard. This is approximately 5 percent of the growth footprint. Over half of the total area of the growth footprint in fire hazard zones is land with a moderate fire hazard located in Alameda County (see Table 2.13-8).

Table 2.13-8 Acreage of Fire Hazard Zones within the Land Use Growth Footprint, by Region, County, and TPA

County		Moderate (Acres)[1,2]	High (Acres)[1,2]	Very High (Acres)[1,2]	Total (Acres)[1,2]
Alameda	Within County	520	0	<1	520
	Within TPAs	0	0	0	0
Contra Costa	Within County	50	60	10	120
	Within TPAs	0	0	0	0
Marin	Within County	11	0	1	10
	Within TPAs	0	0	1	1
Napa	Within County	130	<1	0	130
	Within TPAs	0	0	0	0
San Francisco	Within County	0	0	0	0
	Within TPAs	0	0	0	0
San Mateo	Within County	0	2	10	10
	Within TPAs	0	<1	0	0
Santa Clara	Within County	0	1	1	2
	Within TPAs	0	0	0	0
Solano	Within County	30	0	0	30
	Within TPAs	0	0	0	0

Table 2.13-8 Acreage of Fire Hazard Zones within the Land Use Growth Footprint, by Region, County, and TPA

County		Moderate (Acres)[1,2]	High (Acres) [1,2]	Very High (Acres) [1,2]	Total (Acres) [1,2]
Sonoma	Within County	40	0	0	40
	Within TPAs	0	0	0	0
Regional Total[4]	Within County	**780**	**60**	**20**	**860**
	Within TPAs	**0**	**<1**	**1**	**1**

Notes: TPA acreages are a subset of County acreages.

[1]Numbers less than 1 are shown as "<1."

[2]Whole numbers have been rounded (between 0 and 10 to the nearest whole number, between 11 and 999 to the nearest 10, between 1,000 and 4,000 to the nearest 100).

[4] Figures may not sum due to independent rounding.

Source: CAL FIRE 2007; MTC 2016

Of the acreage of fire hazard areas falling within the land use growth footprint, development specific to the TPAs could affect development in two of the nine counties; less than 1 acre of land with high fire hazard in San Mateo County and 1 acre of land with very high fire hazard in Marin County. Projects located on land identified by CAL FIRE as subject to wildland fire hazard would not qualify as a sustainable communities project under PRC Section 21155.1 unless the applicable general plan or zoning code contains provisions to mitigate the risk of a wildland fire hazards (PRC Section 21155.1[a][6][A]). Policies 15.26 through 15.35 of the *San Mateo County General Plan* contain policies intended to mitigate the risk of fire hazards, including determining the presence of a fire hazard zone on a site-specific basis, policies related to development density and clustering, standards for water supply, vehicle access, and policies regarding vegetation management (San Mateo County 1986). The *Marin Countywide Plan* includes Policies EH 4.3 through EH4.5, which have provisions to adopt and implement a fire management plan, ensure adequate emergency response, and use land use regulations as a means of protecting people and property from wildfire hazards (Marin County 2007). Note, however, that this is only applicable to potential exemptions under the sustainable communities strategy provisions of CEQA and does not affect the other streamlining strategies under the Sustainable Communities Act.

The potential for wildland fire hazard impacts related to land use changes from implementation of the proposed Plan at the regional and local level are considered less than significant (LS) for Impact 2.13-8 because there are the existing federal, state, and local regulations and oversight in place that would effectively reduce the inherent hazard associated with these activities to an acceptable level.

Impacts of Transportation Projects

The proposed transportation projects generally involve the expansion or extension of the transportation system, which is not typically considered to be at risk from wildland fires in terms of potential injury, loss of life, or damage to improvements. Transportation projects that expand the transportation system into new areas or areas closer to open spaces with higher fire hazards, however, can expose land uses on the urban-edge to risks associated with wildland fires, although they would also provide better access to evacuate should a wildfire occur. There are 630 acres of transportation projects proposed in moderate fire hazard areas and 480 acres of projects proposed on high fire hazard areas (see **Table 2.13-9**). A total of 110 acres of land classified as very high fire hazard could be developed due to four projects: SR 84 widening, Highway 1 operational and safety improvements, widening SR 92 between SR 1 and Pilarcitos Creek, and the BART Metro Program and Bay Fair Connector. The full list of transportation projects located within wildfire hazard zones ranging from moderate to very high is provided in Appendix M. As discussed above for land use projects, implementing agencies would require project sponsors to comply with safety measures that minimize the threat of fire as stated in the CFC; as well as compliance with CCR Title 14, Division 1.5 to minimize exposing

people and structures to loss, injury, or death and damage. Projects would not be approved by local agencies until project design plans demonstrate compliance with fire safety requirements.

Table 2.13-9 Acreage of Fire Hazard Zones within the Transportation Projects Growth Footprint, by Region and County

County	Moderate (acres)	High (acres)	Very High (acres)
Alameda	160	130	<1
Contra Costa	50	80	30
Marin	130	0	0
Napa	<1	0	0
San Francisco	0	0	0
San Mateo	30	20	80
Santa Clara	150	200	0
Solano	0	50	0
Sonoma	120	0	0
Regional Total	**630**	**480**	**110**

Notes: Whole numbers have been rounded (between 0 and 10 to the nearest whole number, between 11 and 999 to the nearest 10). Figures may not sum due to independent rounding.

Source: CAL FIRE 2007; MTC 2016

Transportation projects, especially capacity improvements, generally improve the transportation network to move people more efficiently, in case there is a need to evacuate due to a wildfire. The potential for wildfire hazard impacts related transportation projects in the proposed Plan at the regional and local level is considered less than significant (LS) for Impact 2.13-8.

Conclusion

Both land use development and transportation projects would have **less-than-significant (LS)** impacts because there are existing state and local regulations and oversight in place that would effectively reduce the inherent hazard associated with development of areas with a high wildfire hazard to an acceptable level. No mitigation is required.

Mitigation Measures

None required.

2.14 PUBLIC SERVICES AND RECREATION

This section evaluates the potential impacts on schools, police protection, fire protection, emergency medical response, recreation facilities, and other government services (e.g., libraries, prisons, social services) that could result from the implementation of the proposed Plan.

Comments received in response to the Notice of Preparation expressed concerns about the capacity of police, fire protection, emergency medical and vector services, animal control, libraries, and recreational resources to serve Planned Development Areas (PDAs). Comments also expressed concern regarding the potential effects of development to Priority Conservation Areas (PCAs), the Santa Clara Parks system, and regional trail routes. Issues related to vector services, animal control, and libraries were considered less than significant through the NOP and scoping process and are not discussed further.

The effects of potential changes in demand for public utilities such as water and wastewater (sanitary sewer) services are addressed in Section 2.12, "Public Utilities." The effects of potential changes in demand for electricity and natural gas are addressed in Section 2.4, "Energy." For a discussion of emergency management/disaster preparedness and plans, see Section 2.14, "Hazards."

2.14.1 Environmental Setting

PHYSICAL SETTING

Schools

Although the California public school system is under the policy direction of the Legislature, the California Department of Education relies on local control for the management of school districts. School district governing boards and district administrators allocate resources among the schools of the district and set educational priorities for their schools. Each jurisdiction in the nine-county region of the Bay Area provides residents with local public education facilities and services, including elementary, middle, secondary, and post-secondary schools, as well as special and adult education.

As of the 2015-2016 school year, there were 2,018 public and charter schools in the Bay Area, with 1,019,853 enrolled students, and 51,702 teachers. **Table 2.14-1** lists the number of K-12 public and charter schools within each county.

Table 2.14-1 Bay Area Public Schools and Enrollment by County, 2015-16

Area[1]	K-12 Schools	K-12 Enrollment	K-12 Teachers[2]
Alameda County	446	225,925	11,658
Contra Costa County	284	176,413	8,401
Marin County	78	33,638	1,858
Napa County	46	210,817	1,063
San Francisco County	142	59,759	3,618
San Mateo County	190	95,502	5,053
Santa Clara County	484	274,948	13,187
Solano County	109	63,707	2,962
Sonoma County	239	71,131	3,902
Regional Total	2,018	1,211,840	51,702

[1] Includes both incorporated cities and unincorporated areas of the county.
[2] Full-Time Equivalent Teachers, which include those assigned to a particular type of school; district and county office of education teachers not associated with a school are excluded. Most recent data available from 2014-2015.
Source: Education Data Partnership 2017

Emergency Services

This section provides information on emergency services in the Bay Area, including existing police protection, fire protection, and emergency medical services (e.g., paramedics, emergency medical technicians).

Police Protection

Police services are provided on the state, county, and local levels. Police services provide law enforcement in areas such as crime prevention, traffic and congestion control, safety management, emergency response, and homeland security.

The California Highway Patrol (CHP) is responsible for police protection along the sections of the interstate highway system that traverse the Bay Area. It provides services for the management of traffic, emergency accident response, and protection of the highway system through safety enforcement on interstate roads. CHP services also include various programs and initiatives aimed at improving road safety and awareness for many categories of drivers. Through collaboration with local, State, and federal public safety agencies, its purpose is to minimize exposure of the public to unsafe conditions resulting from emergency accidents and highway impediments (CHP 2017).

Each of the nine counties in the Bay Area has its own sheriff's department responsible for police protection in unincorporated areas of each county. Additionally, each incorporated city and town has a police department responsible for police protection within its own jurisdiction. Unincorporated areas or areas such as transit districts may also contract with county sheriff departments for police services instead of providing their own. Cities and towns may also contract with the county sheriff department to provide law enforcement services.

Police service performances vary by jurisdiction, but are typically measured in terms of response times, calculated in minutes it takes a police officer to respond to an incident.

Fire Protection

The Bay Area faces a number of fire threats, including urban, wildland-urban interface, and wildland fires. According to the California Department of Forestry and Fire Protection (CAL FIRE), fire threat in the region ranges from low to extreme depending on factors such as fuel rank, topography, presence of urban development, and expected fire frequency (CAL FIRE 2007). For a detailed discussion of fire hazard risk in the Bay Area, see Section 2.13, "Hazards."

Fire protection services are managed at the local level, typically by municipalities, counties, fire protection districts, or volunteer fire companies. California Government Code Section 38611 states that general law cities must establish a fire department unless it is included within the boundaries of an established fire protection district. State and federal lands are generally served by State and federal fire agencies (e.g., CAL FIRE, National Park Service), and in some cases, businesses and native tribes manage their own fire departments. Each fire protection agency is responsible for serving its own prescribed area, but mutual aid agreements are in wide use across the region such that agencies can rely on assistance from neighboring agencies in the case of overwhelming demand. In an effort to prevent fire-related emergencies altogether, most fire departments and agencies sponsor prevention programs (e.g., public education, vegetation clearance, etc.) and enforce fire code regulations in built structures.

Fire protection service performance is typically measured by emergency response times or the ratio of service personnel to service area population. Due to the varying needs and challenges of each jurisdiction, however, performance measures differ among agencies, particularly when comparing urban and rural agencies. Fire departments are assigned a Public Protection Classification (PPC™) from ISO, a private company that provides information about insurance risk. To assess fire protection agencies, ISO uses information about emergency dispatch, the number and location of engine companies, the amount of water needed to fight a fire, as well as local water supply, pressure, and flow. Local fire departments receive a classification from one to ten; a classification of one being the highest, and a classification of ten indicating that fire suppression capabilities do not meet ISO's minimum standard.

Emergency Medical Services

Each county of the nine counties in the Bay Area, including incorporated cities and towns within those counties, provide emergency medical services to their residents through the training and certification of paramedics and emergency medical technicians. The various departments charged with administering emergency medical services (e.g., Napa County Emergency Medical Services Agency, San Francisco County Department of Emergency Management) contract with private ambulance services and local fire departments to deploy emergency medical services within their service areas.

Libraries

The San Francisco Bay region is served by several public libraries including the Alameda Free Library, Alameda County Library, Berkeley Public Library, Contra Costa County Library, Livermore Public Library, Oakland Public Library, Pleasanton Public Library, Richmond Public Library, San Francisco Public Library, and Sonoma County Library. Publicly funded libraries in California are required to maintain a certain amount of local funding depending on population of a library's service area; however, there are no established standards with which California public libraries must comply (California State Library 2017).

Prisons

The Bay Area contains three state prisons: the California Medical Facility and California State Prison Solano, both located in Vacaville, Solano County; and San Quentin State Prison in unincorporated Marin County. The California Medical Facility is a male-only state prison medical facility with a capacity of approximately 2,300 inmates and, as of 2012, exceeded its capacity by 2.3 percent. The California State Prison is also a male-only prison facility and has a capacity of about 2,600 inmates. The most recent evaluation of the prison in 2012 showed an exceedance of 58 percent with approximately 4,100 inmates. San Quentin State Prison, the oldest prison in California, serves male-only inmates and hosts the state's only death-row for male inmates. The prison currently exceeds its maximum capacity of about 3,000 inmates by 37 percent. The Bay Area does not contain any federal prisons.

Social Services

Social services are provided by government agencies, private non-profit organizations, and private for-profit organizations. The following types of social services currently available in the proposed Plan area include:

- **Alcohol, Drug, and Mental Health Services:** provides alcohol and drug abuse prevention and treatment services to adults and juveniles, and mental health services to seriously mentally ill adults, youths, and families.

- **Adult Education and Job Training:** provides educational and job training opportunities to give adult students the knowledge and skills necessary to participate effectively as citizens, employees, parents, and family members.

- **Child Support Services:** determines parentage, establishes orders for support and medical coverage, and collects and distributes funds from absent parents who have a financial responsibility to support their children.

- **Civic Buildings and Community Centers:** includes libraries, community centers, and other public buildings not otherwise classified.

- **Courts and Parole Officers:** hears and gives rulings on the following types of court cases: appeals, civil, criminal, family and children, juvenile, and traffic. Parole officers coordinate parole hearings and supervise defendants not yet sentence to a term of incarceration and offenders released from incarceration.

- **Health and Disabled Services:** provides programs for the medically indigent, older adults, the disabled, and detainees; communicable disease prevention and control; protection of food and water; waste and vector control; vital records; nutrition and safety education; and public health nursing services.

- **Homeless and Housing Assistance:** provides temporary shelter, food assistance, mental health services, and transitional housing assistance to adults, juveniles, and families.

- **Human Assistance:** administers various federal, state, and local government programs designed to provide cash assistance, food stamps, and other social services not otherwise classified.

- **Veteran Affairs:** provide medical, mental health, vocational rehabilitation, and employment, educational, and other training to veterans.

Recreation

The Bay Area contains over one million acres of parks and open space across its nine counties (see **Table 2.14-2** and **Figure 2.3-4** in Section 2.3, "Land Use"). According to the Bay Area Protected Areas Database complied by the Bay Area Open Space Council and GreenInfo Network, about 265,000 acres of new parkland were added to the region's open space inventory between 2002 and 2013 (the most recent year for which a full dataset is available), representing a 26 percent increase (Bay Area Open Space Council 2014). Additionally, approximately 200,000 acres of privately owned land are held in permanent reserve as of 2013 (the most recent year for which this dataset is available). While access by the general public to these reserve areas is restricted, they are important for the preservation of wildlife habitats and the protection of the environmental and rural characteristics of various parts of the region.

Parks and open space are generally categorized according to their size and amenities. Smaller parks such as pocket parks, neighborhood parks, community parks, urban forests, and community gardens serve local communities, typically are located in urbanized areas, and often include a wide range of improvements from playing fields and picnic areas to playgrounds and fitness trails. These parks are most often managed by local park districts or municipalities, which typically set minimum standards for park acreage based on their population. Larger open space areas such as regional parks, greenbelts, trails and pathways, natural and wildlife preserves, some private farmlands, some public rangelands, State parks, and federal parks serve a broader geographic range, typically are located outside of major urbanized areas, and generally include fewer improvements. Management of these parks is divided among a range of organizations and agencies including regional park districts, State and federal government, private individuals, and non-profit land trusts.

Table 2.14-2 Bay Area Parks and Open Space

Location	Parks and Open Space (acres)[1]
Alameda County[2]	120,000
Contra Costa County[2]	142,000
Marin County[2]	212,000
Napa County[2]	145,000
San Francisco County[2]	6,000
San Mateo County[2]	118,000
Santa Clara County[2]	246,000
Solano County[2]	78,000
Sonoma County[2]	218,000
Regional Total	**1,286,000**

Note: Figures may not sum due to independent rounding.
[1] Includes publicly owned lands and privately owned lands that are accessible to the public. The most recent year that a full dataset is available is 2013.
[2] Includes both incorporated cities and unincorporated areas of the county
Source: Bay Area Open Space Council 2014

2.14.2 Regulatory Setting

FEDERAL REGULATIONS

Executive Order 12148

Executive Order 12148 was enacted by President Jimmy Carter on July 20, 1979, to merge many of the separate disaster-related responsibilities into FEMA. FEMA includes the Federal Insurance Administration, the National Fire Prevention and Control Administration, the National Weather Service Community Preparedness Program, the Federal Preparedness Agency of the General Services Administration, and other emergency-related programs. In March 2003, FEMA joined 22 other federal agencies, programs, and offices to become the U.S. Department of Homeland Security. FEMA's continuing mission within the new department is to lead the effort to prepare the nation for all hazards and effectively manage federal response and recovery efforts following any national incident. FEMA also initiates proactive mitigation activities, trains first responders, and manages the National Flood Insurance Program and the U.S. Fire Administration.

Disaster Mitigation Act of 2000

The Disaster Mitigation Act of 2000 (DMA 2000) (Public Law 106-390) provides the legal basis for FEMA mitigation planning requirements for State, local, and Indian Tribal governments as a condition of mitigation grant assistance. DMA 2000 amended the Robert T. Stafford Disaster Relief and Emergency Assistance Act by repealing the previous mitigation planning provisions and replacing them with a new set of requirements that emphasize the need for State, local, and Indian Tribal entities to closely coordinate mitigation planning and implementation efforts. The requirement for a State mitigation plan is continued as a condition of disaster assistance, adding incentives for increased coordination and integration of mitigation activities at the State level through the establishment of requirements for two different levels of State plans. DMA 2000 also established a new requirement for local mitigation plans and authorized up to 7 percent of Hazard Mitigation Grant Program funds available to a state for development of State, local, and Indian Tribal mitigation plans.

U.S. Department of Transportation Act of 1966, Section 4(f) (amended 2005)

The U.S. Department of Transportation Act (DOT Act) of 1966 included a special provision - Section 4(f) - which stipulated that the Federal Highway Administration and other DOT agencies cannot approve the use of land from publicly owned parks, recreational areas, wildlife and waterfowl refuges, or public and private historical sites unless the following conditions apply:

- there is no feasible and prudent alternative to the use of land, and
- the action includes all possible planning to minimize harm to the property resulting from use.

The first substantive revision to Section 4(f) since enactment of the DOT Act was made in 2005; it simplified the process and approval of projects that have only minimal impacts on lands protected by Section 4(f). Under the new provisions, once DOT determines that a transportation use of Section 4(f) property results in a minimal impact, analysis of avoidance alternatives is not required and the Section 4(f) evaluation process is complete.

Land and Water Conservation Fund Act, Section 6(f)(3)

Section 6(f)(3) of the Land and Water Conservation Fund Act (LWCF Act) of 1965 (16 U.S.C. § 460l et seq.) contains provisions to protect federal investments in park and recreation resources and the quality of those assisted resources. The law recognizes the likelihood that changes in land use or development may make park use of some areas purchased with LWCF Act funds obsolete over time, particularly in rapidly changing urban areas, and provides for conversion to other use pursuant to certain specific conditions.

Section 6(f)(3) states that no property acquired or developed with assistance under Section 6(f)(3) shall, without the approval of the Secretary, be converted to other than public outdoor recreation uses. The Secretary shall approve such conversion only if he or she finds it to be in accordance with the then existing comprehensive statewide outdoor recreation plan and only upon such conditions as he or she deems

necessary to assure the substitution of other recreation properties of at least equal fair market value and of reasonably equivalent usefulness and location.

This requirement applies to all parks and other sites that have been the subject of LWCF Act grants of any type, and includes acquisition of park land and development or rehabilitation of park facilities. If a transportation project would have an effect upon a park or site that has received LWCF Act funds, the requirements of Section 6(f)(3) would apply.

STATE REGULATIONS

California Government Code Section 65995

California Government Code Section 65995 is found in Title 7, Chapter 4.9 of the California Government Code and authorizes school districts to collect impact fees from developers of new residential and commercial/industrial building space. Senate Bill 50 (SB 50), discussed below, amended Government Code Section 65995 in 1998.

Senate Bill 50 (Leroy Greene School Facilities Act of 1998)

The Leroy Greene School Facilities Act of 1998 (Ed. Code, §§ 17070.10-17079.30) eliminated the ability for cities and counties to require full mitigation of school impacts and replaced it with the ability for school districts to assess fees directly to offset the costs associated with increasing school capacity as a result of new development. The Act states that payment of developer fees is "deemed to be complete and full mitigation" of the impacts related to planning, new development, or change in government organization relating to educational facilities.

Assembly Bill 2926

In 1986, Assembly Bill No. 2926 (Statutes of 1986, ch. 887) (AB 2926) authorized the levy of statutory development fees, as well as placed a cap on the number of fees that could be levied, on new residential and commercial/industrial development in order to pay for school facilities. Its overall purpose was to enable school districts to impose developer fees to pay for new school construction (Government Code 53080).

Class Size Reduction Kindergarten-University Public Education Facilities Bond Act of 1998

Proposition 1A, the Class Size Reduction Kindergarten-University Public Education Facilities Bond Act of 1998 (Ed. Code, §§ 100400 - 100405) is a school construction funding measure that was approved by the voters on the November 3, 1998 ballot. The Act created the School Facility Program that allowed eligible school districts to obtain State bond funds for the construction and modernization of educational facilities and accommodate for growth and overcrowding in educational facilities.

California Education Code

School facilities and services in California are subject to the rules and regulations of the California Education Code and governance of the State Board of Education (SBE). SBE is the eleven-member governing and policy making body of the California Department of Education (CDE) that sets K-12 education policy relating to standards, instructional materials, assessment, and accountability. CDE and the State Superintendent of Public Instruction are responsible for enforcing education law and regulations; and for continuing to reform and improve public elementary school, secondary school, and child care programs, as well as adult education and some preschool programs. CDE's mission is to provide leadership, assistance, oversight, and resources so that every Californian has access to an education that meets world-class standards (CDE 2015a). The core purpose of CDE is to lead and support the continuous improvement of student achievement, with a specific focus on closing achievement gaps (CDE 2015b).

California Emergency Services Act

In 2008, Governor Schwarzenegger signed AB 38, the California Emergency Services Act, which merged the duties, powers, purposes, and responsibilities of the Governor's Office of Emergency Services and the

Governor's Office of Homeland Security into a new cabinet-level agency, Cal EMA. The legislation authorizes Cal EMA to prepare a Standard Emergency Management System (SEMS) program, which sets forth measures by which a jurisdiction should handle emergency disasters. Non-compliance with SEMS could result in the State withholding disaster relief from the non-complying jurisdiction in the event of an emergency disaster.

Cal EMA serves as the lead State agency for emergency management and coordinates the State response to major emergencies in support of local government. The primary responsibility for emergency management resides with local government. SEMS provides the mechanism by which local government requests assistance from Cal EMA, and as such, Cal EMA maintains oversight of the State's mutual aid system. Cal EMA may task State agencies to perform work outside their day-today and statutory responsibilities and serves as the lead agency for obtaining federal resources.

California Fire Code

Title 24, Part 9 of the California Code of Regulations (CCR) is the California Fire Code, which sets forth regulations regarding building standards, fire protection and notification systems, fire protection devices such as fire extinguishers and smoke alarms, high-rise building standards, and fire suppression training. The most recent California Building Standards Code was released in 2013 and became effective on January 1, 2014. The general purpose of the update is principally intended to update and codify a new edition of the California Building Standards Code (California Code of Regulations, Title 24) that adopts by reference more current editions of the model codes. Development under the proposed Plan would be subject to applicable regulations of the California Fire Code.

Quimby Act

The 1975 Quimby Act (California Government Code section 66477) authorized cities and counties to pass ordinances requiring that developers set aside land, donate conservation easements, or pay fees for park improvements. The Act states that the dedication requirement of parkland can be a minimum of three acres per thousand residents or more, up to five acres per thousand residents if the existing ratio is greater than the minimum standard. Revenues generated through in lieu fees collected under the Quimby Act cannot be used for the operation and maintenance of park facilities. In 1982, the Act was substantially amended. The amendments further defined acceptable uses of or restrictions on Quimby funds, provided acreage/population standards and formulas for determining the exaction, and indicated that the exactions must be closely tied (nexus) to a project's impacts as identified through studies required by the California Environmental Quality Act (CEQA).

State Open Space Standards

State planning law (Government Code Section 65560) provides a structure for the preservation of open space by requiring every city and county in the State to prepare, adopt, and submit to the Secretary of the Resources Agency a "local open-space plan for the comprehensive and long-range preservation and conservation of open-space land within its jurisdiction." The following open space categories are identified for preservation:

- *Open space for public health and safety,* including, but not limited to, areas that require special management or regulation due to hazardous or special conditions.
- *Open space for the preservation of natural resources,* including, but not limited to, natural vegetation, fish and wildlife, and water resources.
- *Open space for resource management and production,* including, but not limited to, agricultural and mineral resources, forests, rangeland, and areas required for the recharge of groundwater basins.
- *Open space for outdoor recreation,* including, but not limited to, parks and recreational facilities, areas that serve as links between major recreation and open space reservations (such as trails, easements, and scenic roadways), and areas of outstanding scenic and cultural value.

- *Open space for the protection of Native American sites,* including, but not limited to, places, features, and objects of historical, cultural, or sacred significance such as Native American sanctified cemeteries, places of worship, religious or ceremonial sites, or sacred shrines located on public property (further defined in California Public Resources Code Sections 5097.9 and 5097.993).

State Public Park Preservation Act of 1971

The primary instrument for protecting and preserving parkland is the State Public Park Preservation Act of 1971 (Pub. Resources Code, Section 5400-5409). Under the Act, cities and counties may not acquire any real property that is in use as a public park for any non-park use unless compensation or land, or both, are provided to replace the parkland acquired. This ensures no net loss of parkland and facilities.

REGIONAL AND LOCAL REGULATIONS

City and County General Plans

State law requires every city and county to adopt a general plan that expresses the community's development goals and embodies public policy relative to the distribution of future land uses, both public and private (Office of Planning and Research 2003). Included in the general plan are potential hazards, policies, and mitigation measures related to recreation as well as public services and safety. The elements contained in the general plan aim to promote the highest quality of life in a given jurisdiction.

Each general plan is required to have an open space element that guides the comprehensive and long- range preservation and conservation of "open space land." A wide range of topics are addressed in the open-space element, including: open space for the preservation of natural resources; open space used for the managed production of resources; open space for outdoor recreation; open space for public health and safety; demands for trail-oriented recreational use; the retention of all publicly owned corridors for future use; and the feasibility of integrating city and county trail routes with appropriate segments of the California Recreational Trails System. Policies and strategies for parks and recreation may include standards for park acreage and requirements for the provision of parks in new residential developments.

Each general plan is also required to have a safety element, which describes plans to promote safety within the jurisdiction as well as the services available to maintain safety. The purpose of the safety element is to reduce the possible risks related to death, injuries, property damage, and economic and social dislocation resulting from fired, floods, earthquakes, landslides, and other hazards. Included in the safety element is the emergency response section, which describes the service areas of emergency services, including fire, police, medical, and an evaluation of the adequacy of the existing service and the demand for additional emergency services.

General plan policies relating to library services may involve the library level of service, capital facility funding, and library siting. In additional, general plans can evaluate proposed library facilities for consistency with library mast plans and explore methods for financing new, expanded, or upgraded library facilities.

In addition, CCR Section 65302 (g) states that a city may adopt a county's safety element, "to the extent that the county's safety element is sufficiently detailed and contains appropriate programs and policies for adoption by a city."

Emergency Operations Plans

Local jurisdictions maintain emergency operations plans that detail how emergency and disaster situations are to be handled within that jurisdiction. Jurisdictions may also have Multi-Hazard Emergency Plans that address various threats to the jurisdiction.

Fire District Master Plans

Many jurisdictions and fire districts in the region have adopted or are planning to adopt Fire Department (District) Master Plans. A master plan addresses staffing needs, facility needs, and service goals for the service area and serves as a guiding document for the organization and daily functions of the department.

Recreation and Parks Master Plans

Recreation and park master plans outline projected recreation facility needs and strategies for fulfilling those needs. The main purpose of the plans is to provide guidance for addressing preservation, use, development, and administration of recreation facilities. These policy and action documents ensure the preservation of the naturalistic environment, while providing developments to facilitate human enjoyment of the parks and recreation areas. Plans can target goals and future actions for a specific park or be generalized to a collection of parks in a larger system.

2.14.3 Impact Analysis

SIGNIFICANCE CRITERIA

The following significance criteria are based on CEQA Guidelines Appendix G, as well as the thresholds used in the EIR for the 2013 Plan Bay Area, and professional judgment. Under these criteria, implementation of the proposed Plan would have a potentially significant adverse impact if it would:

Criterion 1: Result in the need for new or modified facilities, the construction of which causes significant environmental impacts, in order to maintain acceptable service ratios, response times or other performance objectives for schools, police protection, fire protection, emergency medical, and other public facilities.

Criterion 2: Result in the need for new or modified facilities, the construction of which causes significant environmental impacts; or may result in significant increase in use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated.

METHOD OF ANALYSIS

This analysis includes a qualitative assessment of impacts related to construction of new or modification/expansion of existing facilities to maintain adequate service ratios, response times or other performance objective for schools, police and fire protection, emergency medical, other public facilities, and park and recreation services as a result of implementation of the proposed Plan. The analysis assesses the amount and location of assumed land uses and transportation projects under the proposed Plan, as compared to existing conditions, and considers how that growth might impact the provision of services as it relates to requiring new or modified/expanded facilities. This analysis is qualitative in nature, addressing generally the types of impacts (not site specific) that could result from construction or modification of facilities needed to meet local service levels. The analysis also considers potential impacts from increased use of existing parks and recreational facilities that could be caused by change in development patterns under the proposed Plan.

IMPACTS AND MITIGATION MEASURES

Impact 2.14-1: Implementation of the proposed Plan could result in the need for new or modified facilities, the construction of which causes significant environmental impacts, in order to maintain acceptable service ratios, response times or other performance objectives for schools, police protection, fire protection, emergency medical, and other public facilities.

Impacts of Changes in Projected Land Use

Between 2015 and 2040, MTC/ABAG projects the Bay Area to grow by approximately 2 million people, 688,000 jobs, and 666,000 households (see Table 2.14-3). Implementation of the proposed Plan would convert approximately 5,800 acres of undeveloped land to urban uses, which represents an approximately 0.2 percent increase in the amount of developed land over 2015 conditions (see Table 1.2-9 in Section 1.2, Project Description," in this Draft EIR). Comparatively, the projected household growth represents a 24 percent increase under Plan buildout (2040) over 2015 household conditions, and the projected number of jobs represents a 17 percent increase under 2040 buildout over 2015 conditions, indicating that implementation of the proposed Plan would result in more dense and intense development than existing conditions, largely as infill development. In many areas, therefore, service areas for existing service providers may not expand, at least not substantially. This type of growth pattern would allow jurisdictions to leverage existing facilities and absorb some of the increased demand with facilities more efficiently than if new development was more dispersed. However, implementation of the proposed Plan would also increase overall population in the region and each county, which would result in increased demand for services. As the population grows, demand for schools and other general government services and facilities (e.g., libraries, jails, animal control) would increase. Increases in residential and non-residential land uses would increase the number of service calls for emergency services and police and fire protection.

Overall, the higher density and intensity of new growth in the region should limit the need for new/modified facilities, such as police and fire stations, needed to maintain adequate levels of service, relative to more dispersed growth, because service providers' response times would be lower as they would need to travel less distance to serve the increased population; however, existing emergency service organizations may need to expand their capacity and increase their fleet of ambulances, police cars, firetrucks, and other emergency-related resources (e.g., lifeboats, helicopters) to compensate for additional growth, and in cases where demand exceeds capacity, new facilities may be required. In many cases, particularly police, fire, and emergency medical, adequate service includes consideration of response times, in addition to service ratios.

Depending on the growth and housing patterns, some school and other general government services and facilities could exceed their capacity. With respect to increased demand for school-related services, the composition of residential land uses (e.g., single family residences, multi-family residences) from proposed changes in land use would vary as future development or redevelopment occurs. The generation of additional primary and secondary school-age children and the ability of individual schools to accommodate them is dependent on the type of housing, demographics, and the available capacity of the elementary, middle, and high schools that would accommodate them. This is a dynamic condition that changes over time as population characteristics and other dynamics change. Therefore, it would be speculative at this time to estimate the number of additional (or fewer) students that would be assigned to individual schools. In the cases where increased growth exceeds the capacity of schools and other government-related services and facilities, implementation of the proposed Plan could require additional or modified facilities to ensure acceptable levels of service.

Table 2.14-3 Forecasted Change in Households and Jobs at Plan Buildout, by Region, County, and TPA

Location		Year 2015 (Households)	Year 2015 (Jobs)	Year 2040 (Households)	Year 2040 (Jobs)	Change from 2015-2040 (Households)	Changes from 2015-2040 (Jobs)
Alameda	County Total[1]	585,000	829,000	734,000	953,000	149,000	124,000
	Within TPAs	304,000	473,000	411,000	534,000	107,000	61,000
Contra Costa	County Total[1]	387,000	408,000	475,000	498,000	89,000	90,000
	Within TPAs	50,000	86,000	71,000	95,000	21,000	9,000
Marin	County Total [1]	107,000	133,000	112,000	135,000	5,000	2,100000
	Within TPAs	11,000	41,000	11,000	41,000	<1	<1
Napa	County Total [1]	49,000	70,000	55,000	83,000	6,000	14,000
	Within TPAs	<1	<1	<1	<1	<1	<1
San Francisco	County Total [1]	389,000	746,000	484,000	872,000	95,000	126,000
	Within TPAs	385,000	746,000	484,000	872,000	99,000	126,000
San Mateo	County Total[1]	271,000	396,000	318,000	472,000	47,000	76,000
	Within TPAs	108,000	162,000	140,000	198,000	32,000	26,000
Santa Clara	County Total[1]	649,000	1,068,000	861,000	1,290,000	212,000	222,000
	Within TPAs	253,000	555,000	396,000	684,000	143,000	129,000
Solano	County Total[1]	141,000	137,000	169,000	151,000	28,000	14,000
	Within TPAs	7,000	14,000	8,000	14,000	1,000	<1
Sonoma	County Total[1]	183,000	223,000	219,000	244,000	36,000	20,000
	Within TPAs	13,000	25,000	15,000	26,000	2,000	1,000
Regional Total[2]	**County Total[1]**	**2,760,000**	**4,010,000**	**3,427,000**	**4,698,400**	**666,000**	**688,200**
	Within TPAs	**1,312,000**	**2,085,000**	**1,542,000**	**2,490,000**	**230,000**	**405,000**

Notes: TPAs=transit priority areas

[1] Includes both incorporated cities and unincorporated areas of the county.

[2] Values are rounded to the nearest 1,000, therefore county totals don't exactly sum to the regional total due to independent rounding.

Source: data provided by MTC in 2016, DOF 2016.

Table 2.14-3 illustrates the projected increase in households and jobs within the Plan area by 2040 as compared to 2015 conditions. As shown below, the region is anticipated to experience a 17 percent increase in total jobs. This increase could indirectly place additional demand on police, fire, and emergency medical services as additional jobs would locate workers within the region during peak work hours, which may affect service ratios and response times.

At the regional scale, it is not possible to quantify separate effects on each public service in separate jurisdictions because of the large number of jurisdictions (nine counties, over 100 cities) in the Plan area and the differing service standards for each service across jurisdictions. Public service standards, performance measures, and policies related to police, fire, emergency protection, and other governmental facilities and services are established by local jurisdictions and agencies. For schools, standards relating to class size are primarily determined via state policy, although local school districts are responsible for the planning and construction of school facilities and some schools diverge from state policy under overcrowding and scarce funding scenarios.

The following public service standards, performance measures, and related policies are applicable throughout the region:

- **Schools:** School standards related to class size are predominately set at the state level, with school districts also planning for school facilities. Funding for new school construction is provided through state and local revenue sources in the form of development fees. SB 50 (1998) governs impact fee from new development for the school funding. Payment of fees authorized by this legislation e is deemed "full and complete mitigation," and, as such, agencies cannot require additional mitigation for any school impacts. School impacts fees would be used in combination with state and other funds to construct new schools. Therefore, SB 50 restricts the ability of local agencies to apply local standards for school impacts, or, deny project approvals based on school impacts, or require mitigation on the basis that public school facilities are inadequate. Because proposed projects would be required to pay applicable school fees up to the maximum amount authorized by statute to mitigate potential impacts, such projects would result in a less-than-significant impact on the need for school facilities.

- **Police Protection, Fire Protection, and Emergency Medical Services Response:** Level of service standards for emergency services usually include average response times for service calls and personnel ratios per 1,000 residents. Some individual jurisdictions adopt fire or police master plans that include additional information supporting these goals and policies.

- **Libraries:** Library facilities typically use a service standard of facility feet or acres per capita or per 1,000 residents.

- **Social Services:** Performance measures for social services are subjective and service standards vary depending on the type of service offered and the jurisdiction where services are provided.

The proposed Plan projects the general location of future land uses, and future residential densities and building intensities in the region consistent with the SCS beyond the horizon year of most local general plans in the Plan Area (2040). Projected development under the proposed Plan could result in increases in demand for public services that exceed existing service capabilities. To meet increased demand for these facilities, existing facilities could require additional personnel and equipment to maintain adequate service levels. In some cases, depending on the pattern of development, it would be necessary to construct new facilities or modify existing facilities to maintain adequate capital capacity, equipment, and personnel. Because MTC and ABAG do not have land use authority to adopt local land use plans or approve local land use projects, development of these projections is ultimately controlled by local governments throughout the jurisdiction. Future development projects would be required to undergo (or can be assumed to have already undergone) an evaluation of their contribution to demand on public services prior to approval. In cases where a project results in increased demand, many jurisdictions require developers to pay impact fees to fund increased demand for public services; however, the amount and extent to which a project must mitigate additional demand would differ on a project-by-project basis depending on size and location, and would be the responsibility of the implementing agency/project applicant.

In cases where regional growth results in the need for new facilities to meet increased demand, short-term construction impacts could occur on a project-by-project basis. For example, the construction of a new school may cause adverse short-term traffic impacts or short-term air quality impacts associated with the use of heavy-duty equipment. However, these potential impacts would be evaluated on a project-by-project basis prior to initiating construction activities. Environmental review would be conducted by the appropriate lead agency, and mitigation would be incorporated as needed. For the purposes of this analysis, it is assumed that the construction of new or modified public service facilities resulting from the implementation of the proposed Plan could result in adverse environmental effects; however, there is inherent uncertainty surrounding the location and size of future facilities. Further, the application of mitigation measures would be applied on a project-by-project basis and is not within the purview of MTC and ABAG.

Therefore, impacts related to schools, police, fire, emergency medical, and other government services are considered potentially significant (PS).

Impacts of Transportation Projects

Under the proposed Plan, transportation projects would include improvements to freeways, express lanes, and local roadway systems, including arterial and collector streets. Projects that increase capacity, such as road widenings, newly constructed roads and bike lanes, and express lanes, have the potential to improve access to public facilities by reducing congestion and improving connectivity on local roads adjacent to these public facilities. For example, projects funded under the former Transportation Alternatives Program (or Transportation Alternative Set-Aside projects), such as "safe routes to schools" projects would improve pedestrian and bicycle facilities surrounding schools, thereby providing non-motorized access for schoolchildren. Similarly, implementation of the region's transit projects would increase access to public services by increasing the frequency of transit service and expanding the service area to include new/modified public service facilities.

An increase in roadway capacity could affect the provision of police, fire, and emergency services. Expanded roadway capacity could result in increased vehicle use and the potential for increased levels of traffic and/or accidents, which may impede the access by police, fire, and other emergency services; however, consistent with the goals of the proposed Plan, overall vehicle miles traveled would be reduced at the regional level through incorporation of transportation demand strategies, complete streets, improved transit systems, and other strategies designed to reduce automobile travel. Further, transportation facility improvements could also result in less demand for services per vehicle mile because of better traffic flow or improved road surfaces. Transportation projects that reduce levels of congestion and/or improve emergency access would improve response times for police, fire, and emergency medical services.

Schools, libraries, parks, and social services would not be needed to support the transportation facilities themselves, only the increase in population, as described and analyzed in the land use discussion above. Implementation of the proposed Plan would result in a regional decrease in vehicle miles traveled as compared to baseline conditions (2015), and improvements to alternative forms of transportation (e.g., walking, bicycling, public transit) could reduce the number of vehicles on roadways. For example, the proposed Plan would increase the availability capacity (measured in seat-miles) for buses, light rail, commuter rail, and ferry services. This is expected to result in an increased use of transit per typical weekday (see Tables 2.1-12 and 2.1-13 in Section 2.1, "Transportation"). This, combined with expanding roadway capacity, could result in improved response times.

The impacts on public services as a result of transportation improvements in the proposed Plan are considered less than significant (LS).

Conclusion

While impacts from transportation projects are expected to be less than significant, development projects related to changes in land uses could result in **potentially significant (PS)** impacts related to public service provision. Mitigation Measure 2.14-1 is discussed below.

Mitigation Measure

2.14-1 Implementing agencies and/or project sponsors shall implement measures, where feasible and necessary based on project- and site-specific considerations that include but are not limited to:

- Prior to approval of new development projects, local agencies shall ensure that adequate public services, and related infrastructure and utilities, will be available to meet or satisfy levels identified in the applicable local general plan or service master plan, through compliance with existing local policies related to minimum levels of service for schools, police protection, fire protection, medical emergency services, and other government services (e.g., libraries, prisons, social services). Compliance may include requiring projects to either provide the additional services required to meet service levels, or pay fees towards the project's fair share portion of the required services pursuant to adopted fee programs and State law.

Significance after Mitigation

To the extent that an individual project adopts and implements all feasible mitigation measures described above, the impact would be less than significant with mitigation (LS-M) because it would require project-specific evaluations of public services in order to meet additional demand with the provision of additional services or a project's contribution toward provisions of additional services.

Projects taking advantage of CEQA Streamlining provisions of SB 375 (Public Resources sections 21155.1, 21155.2, and 21159.28) must apply the mitigation measure described above to address site-specific conditions. However, MTC/ABAG cannot require local implementing agencies to adopt the above mitigation measure, and it is ultimately the responsibility of a lead agency to determine and adopt mitigation. Therefore, this impact remains **significant and unavoidable (SU)** for purposes of this program-level review.

Impact 2.14-2: Implementation of the proposed Plan could result in the need for new or modified facilities, the construction of which causes significant environmental impacts; or may result in significant increase in use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated.

Impacts of Changes in Projected Land Use

Currently, the nine-county Bay Area contains approximately 1,286,000 acres of open space and parkland containing networks of trails, and approximately 7,571,000 people, resulting in about 170 acres per thousand residents, with acreage per resident varying substantially by county, as shown in **Table 2.14-4**. Open space resources, however, are variable and some (such as large open space reserves) serve residents from throughout the region. For instance, large open space preserves in Marin, Napa, and San Mateo counties serve residents throughout the region. Smaller parks and playgrounds are intended, on the other hand, to serve immediate neighborhoods. Implementation of the proposed Plan would increase the number of residents making use of existing parkland and could cause accelerated physical deterioration of parks, trails, and recreational facilities as a result. Most local jurisdictions have their own goals and standards for acceptable amounts of parkland, typically in terms of acres per 1,000 residents (e.g. 5 acres per thousand population) or per capita. Often, park acreage requirements are established with variable amounts dedicated to local parks, regional parks, and regional open spaces. Local jurisdictions strive to ensure that new developments make adequate provisions for new parkland. However, regional goals are variable for each jurisdiction. **Table 2.14-4** lists the acreage of existing bay area parks and open space in 2013 (the most recent year that data is available) per 1,000 residents by region and county based on 2015 population estimates.

Table 2.14-4 Bay Area Parks and Open Space and Acreage per 1,000 Residents, by Region and County in 2015

Location	Parks and Open Space (acres)[1]	2015 Population[2]	2015 Acres Per 1,000 Residents[1]
Alameda County	120,000	1,619,000	74
Contra Costa County	143,000	1,093,000	130
Marin County	212,000	257,000	823
Napa County	145,000	137, 000	1,060
San Francisco County	6,000	906,000	6
San Mateo County	118,000	757,000	156
Santa Clara County	246,000	1,905,000	129
Solano County	78,000	414,000	189
Sonoma County	218,000	483,000	452
Regional Total	1,286,000	7,571,000	170

[1] Includes publicly owned lands and privately owned lands that are accessible to the public. The most recent data available is from 2013.

[2] Population is rounded to the nearest thousand; most recent data is from 2015.

Source: Bay Area Open Space Council 2014, data provided by MTC in 2016

Historically, local jurisdictions have accommodated increases in demand for parks and recreation facilities by constructing new facilities and leveraging existing facilities, equipment, and personnel as available. Future increases in demand would likely be handled in the same way. Funding for new parks and trails may be generated at the local level through in lieu fees collected pursuant to applicable policies and regulations (described above in the Regulatory Setting). The timing, siting, and project-specific details of individual development projects would dictate the necessity of increasing recreational services in existing service areas or expanding service to new areas.

Development of the proposed Plan included consideration of PCAs, identified as regional open space areas for which there is broad consensus for long-term protection but which face development pressures in the near-term, to consolidate development in compact areas while placing less development pressure on the region's open space areas. As shown in Exhibit 1.2-2, PCAs are located throughout the region, within developed and rural areas. The land use growth footprint generally avoids areas designated as PCAs; thus, existing recreation resources located within PCAs are not expected to be adversely affected due to implementation of the projected development. Furthermore, PCAs are designated by local jurisdictions, which impose development limits and standards, such as maintenance of important open spaces and recreation areas.

Thus, while land use development could increase demand on recreational services, land use and public parks development is regulated by local jurisdictions, which often have differing goals, standards, and policies related to the provision of parks and recreation facilities. Because of the existing state requirements regarding development of a complete general plan including Open Space and Conservation Elements, impacts to recreational facilities would be managed at the local level, and facilities would be required to comply with general plan elements. For these reasons, impacts to recreational resources related to projected development would be less than significant (LS).

Impacts of Transportation Projects

New and expanded capacity roadway projects, bicycle and pedestrian improvements, and increased transit service have the potential to improve access to existing neighborhood and regional parks or other recreational facilities for residents in the region. Better access could lead to increased use and, as discussed under land use impacts above, result in an accelerated rate of deterioration of these facilities; however, increases in park use would be a result of regional growth (which is discussed above) rather than the addition of improved access. Further, as stated above, through their general plans, local governments regulate their recreational resources in response to growth. Therefore, the impacts on parks and recreational facilities as a result of transportation improvements in the proposed Plan are considered less than significant (LS).

Conclusion

Changes in projected land use development could directly increase additional demand on recreational services associated with increases in regional growth. Transportation projects could improve access to recreational facilities. Because impacts to open space and recreational facilities would be managed at the local level, and existing recreational areas and facilities located within PCAs would not be subject to Plan-related development, the impact would be **less than significant (LS)**. No mitigation is required.

Mitigation Measures

None required.

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3.1 ALTERNATIVES TO THE PROPOSED PLAN

This chapter documents the alternatives development and screening process, describes the alternatives, and analyzes the four alternatives to the proposed Plan. Key features of each alternative are presented, and potential impacts are discussed and compared to the impacts of the proposed Plan.

The State CEQA Guidelines require EIRs to describe a range of reasonable potentially feasible alternatives to a proposed project or program 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" (CEQA Guidelines Section 15126.6[a]). "Feasible" means that the alternatives "are capable of being accomplished in a successful manner within a reasonable period of time, taking into account economic, environmental, legal, social and technological factors" (CEQA Guidelines Section 15364). Objectives for the proposed Plan are provided in Section 1.2, "Project Description" and related goals and performance targets are provided in the draft *Plan Bay Area 2040*. CEQA also requires that the EIR evaluate the No Project Alternative, which allows decision makers to compare the impacts of approving the project with the impacts of not approving the project.

Quantified information on the alternatives is presented where available and qualitative analysis is provided where possible. Where the analysis indicates that the alternatives would have significant environmental impacts, including impacts that would not otherwise occur under the proposed Plan, this is indicated in the EIR.

The CEQA Guidelines require each EIR to identify the environmentally superior alternative among the alternatives analyzed. If the No Project Alternative is the environmentally superior alternative, the EIR must select another alternative from among the alternatives analyzed. This discussion is provided herein.

3.1.1 Alternatives Screening

MTC and ABAG conducted a screening process to identify potential Plan alternatives and to ultimately identify a range of reasonable alternatives for evaluation in this EIR. This process involved initial alternative analysis to develop Plan alternatives, public input, and development of a preferred Plan alternative.

Transportation and land use alternative analyses were conducted between 2015 and 2017 by MTC and ABAG to inform development of the proposed Plan. The alternative development process began in early 2015 with open houses to solicit public input on updated goals and performance targets. Through these open houses, MTC Commissioners and ABAG's Executive Board members considered and approved a list of *Plan Bay Area 2040* goals and targets. These goals and targets were used to inform three alternatives illustrating the effects of different housing, land use, and transportation strategies for development of the proposed Plan. The alternatives were also based on transportation projects submitted during the call for projects, and shaped by the regional growth and revenue forecasts.

The three alternatives were included in Attachment A of the Notice of Preparation (NOP) for this EIR (see Appendix A) and are briefly summarized as follows:

Main Street Scenario: This alternative disperses future household and job growth into the downtowns of all Bay Area communities, and emphasizes the expansion of express lanes, increases in highway capacity, and increases to suburban bus service to dispersed job centers.

Connected Neighborhood Scenario: The Connected Neighborhood Scenario emphasizes expected growth in population and jobs in areas near major transit corridors, and emphasizes transit efficiency investments, the most cost-effective transit expansion projects in the highest-growth areas, and includes a limited set of highway efficiency investments.

Big Cities Scenario: This alternative concentrates future household and job growth into the Bay Area's three largest cities: San Jose, San Francisco, and Oakland, and emphasizes core capacity and connectivity by expanding the South Bay transit system and linking regional rail systems into the heart of San Francisco and San Jose.

MTC staff evaluated these alternatives against adopted performance targets to measure how well they addressed regional goals including climate protection, transportation system effectiveness, economic vitality and equitable access. Based upon performance, and in response to feedback from the MTC Commission, ABAG Executive Board, the public, and many different stakeholder organizations, MTC and ABAG developed and adopted a Final Proposed Plan Scenario (the proposed Plan). MTC staff also determined that the Main Street and Big Cities Scenarios were appropriate to bring forward as CEQA alternatives to the proposed Plan for analysis in the EIR because they could avoid or lessen significant effects of the project, meet most of the project objectives, and are potentially feasible. In addition, based on comment letters received in response to the NOP, the Plan alternatives includes the Equity, Environment, and Jobs (EEJ) alternative. These alternatives, as well as the No Project Alternative, are described in Section 3.3, below.

SCOPING FEEDBACK

On May 15, 2016, in accordance with the CEQA Guidelines, MTC filed the Notice of Preparation (NOP) of the EIR for Plan Bay Area 2040. The purpose of the NOP was to seek comments about the scope and content of the EIR. The NOP identified that three planning alternatives (Main Streets, Connected Neighborhoods, and Big Cities) had been developed and indicated that one or some combination of the planning alternatives would be identified as the proposed Plan. The NOP indicated that some or all of the planning alternatives would be carried forward in the CEQA analysis as project alternatives.

During the months of May and June, staff conducted three public scoping meetings across the region. In total, staff received 69 written and oral comments. While there were no comments received on the proposed CEQA alternatives, three additional CEQA alternatives were proposed by commenters. The proposed alternatives included:

- Environment, Equity and Jobs Alternative proposed by 6 Wins,
- Modified Big Cities-Alternative proposed by TRANSDEF, and
- Modified No-Project Alternative proposed by the City of Livermore.

For a summary of all EIR scoping comments, please see Attachment A and for more information on the proposed alternatives see Attachment B. For additional information on the EIR development, visit http://www.planbayarea.org/the-plan/environmental-impact-report.html.

EIR ALTERNATIVES

CEQA requires that a range of reasonable alternatives to the proposed plan be studied in the EIR. It is up to the lead agency to determine an appropriate range of alternatives in compliance with CEQA. There are generally three factors for consideration of any given alternative from a CEQA perspective:

- Will the alternative potentially avoid or lessen significant impacts of the project?

  The required CEQA environmental issue areas include: aesthetics and visual resources; agriculture and forestry resources; air quality; biological resources; cultural resources; geology, seismicity, soils, and mineral resources; energy consumption; climate change and greenhouse gases; hazards and hazardous materials; hydrology and water quality; land use; noise and vibration; population and housing; public services and recreation; transportation; utilities and other service systems.

  In the 2013 EIR, impacts in the following areas were identified as significant and unavoidable: transportation; air quality; land use (agricultural and forest resources); climate change and greenhouse

gases (sea level rise); noise; biological resources; and visual resources. In identifying alternatives for the 2017 EIR, consideration was given to alternatives that would result in less impact in these areas.

- Can the alternative attain most of the project objectives?

  In September and November 2015, the Commission and the Executive Board jointly adopted thirteen performance targets to guide the proposed plan's development. Primary objectives include meeting GHG targets established by the California Air Resources Board and providing a plan that houses 100 percent of the region's growth by income level with no increase in in-commuters. Additionally, the thirteen performance targets are used in the EIR to inform the project objectives, in satisfaction of CEQA Guidelines Section 15124(b). They are included in Attachment C.

- Is the alternative potentially feasible?

  Among the factors that may be taken into account when addressing the feasibility of alternatives are site suitability, economic viability, availability of infrastructure, general plan consistency, other plans or regulatory limitations, jurisdictional boundaries, and whether the proponent can reasonably acquire, control or otherwise have access to the alternative site.

MTC and ABAG staff proposed analysis of four alternatives in addition to the proposed Plan in the EIR as summarized below:

- No Project Alternative,
- Main Streets Alternative,
- Big Cities Alternative, and
- Equity, Environment and Jobs (EEJ) Alternative.

These alternatives are defined by unique land use development patterns and transportation investment strategies. Each of the alternatives maintain the same growth forecast, and forecast of reasonably available transportation revenues. This is important to ensure the alternatives analysis provides an "apples to apples" comparison with the proposed plan. These recommended alternatives represent a reasonable range of alternatives to the proposed plan.

Five other alternatives were considered, but were not recommended for further analysis. These alternatives and the reason for not recommending further analysis include:

- Connected Neighborhoods Alternative – expected to perform similar to proposed Plan,
- Modified Big Cities Alternative – expected to perform similar to the Big Cities Alternative,
- Modified No Project Alternative – inconsistent with legal requirements,
- Plan Bay Area (2013 RTP/SCS) alternative – inconsistent with legal requirements, and
- Aspirational Alternative – inconsistent with legal requirements and would not contribute to a reasonable range of alternatives.

Additional details on all recommended and considered alternatives can be found in Section 3.3.6, below.

3.1.2 Approach to Assessing Alternatives

MODELING

See Section 1.2, "Project Description," for a detailed overview of the modeling methodology.

Land Use Forecasting Model – BaY Area UrbanSim

ABAG developed regional control totals—forecasted numbers of households, jobs and population—for 2040, as described in Section 1.2, "Project Description." Bay Area UrbanSim, the regional land use forecasting model, relied upon these regional control totals as model inputs. Based on the assumed levels of household and job growth in the region, Bay Area UrbanSim analyzed the impact of specific policy inputs for each of the alternatives, such as zoning, fees, incentives, and growth boundaries, on the regional development pattern.

Travel Demand Forecasting Model – Travel Model One

The MTC travel demand model, Travel Model One, is a regional activity-based travel model for the San Francisco Bay Area. This model produced all of the key outputs used in assessing the significance of transportation impacts for all alternatives, including outputs such as vehicle miles traveled (VMT), vehicle hours of delay, and accessibility, as well as other outputs such as volume to capacity ratios and level of service.

Integration of Travel Model One and Bay Area UrbanSim

To appropriately consider the integrated relationship of transportation and land use, Bay Area UrbanSim and Travel Model One are unified in an integrated model framework. This allows for analysis of how transportation projects affect the surrounding land use pattern, as well as how changes to household and employment locations affect transportation demand—the evaluation required of a Sustainable Communities Strategy. See Section 1.2, "Project Description," for more detail on this process.

For calculations relying on outputs from Travel Model One and population totals (i.e., per capita VMT or per capita energy use), model-simulated population levels were used to ensure consistency. Simulated population may be slightly different than overall population forecasts for the proposed Plan and alternatives due to slight variability in modeling tools.

3.1.3 Alternatives Analyzed in this EIR

As described above, this EIR evaluates four alternatives. The descriptions of the alternatives are provided below, followed by an analysis that compares the environmental impacts of each alternative to the proposed Plan. The alternatives are listed and referred to in the following order:

1. Alternative 1: No Project Alternative,
2. Alternative 2: Main Streets Alternative,
3. Alternative 3: Big Cities Alternative, and
4. Alternative 4: EEJ Alternative.

ALTERNATIVE 1: NO PROJECT

The No Project Alternative is required under CEQA (CEQA Guidelines, § 15126.6(e).) The purpose of the No Project Alternative is to allow a comparison of the environmental impacts of approving the proposed project with the effects of not approving it. This alternative represents a future land use pattern and transportation network if the proposed Plan is not adopted.

The No Project Alternative illustrates trends assumed under adopted local general plans and zoning without an adopted regional SCS plan, and assuming no new transportation projects beyond those currently under construction or those that have both full funding and environmental clearance.

This alternative would result in substantially lower levels of household growth in PDAs and TPAs than the proposed Plan, lower levels of job growth in PDAs, and similar levels of job growth in TPAs. Growth would, therefore, be more dispersed than under the proposed Plan.

In comparison to the proposed Plan, the No Project Alternative would result in higher household growth in Peninsula and South Bay counties, and higher job growth in South Bay counties.

No Project Alternative: Land Use Modeling Assumptions

In comparison to the proposed Plan, there are no regional strategies in the No Project Alternative to focus growth into specific geographic areas within the region. Instead, growth would occur consistent with current general plans and zoning, and without consideration of a consolidated strategy that considers all nine counties and 101 cities in the Bay Area. Assumptions include:

- Zoning: assumes current (baseline) zoning.
- Expands current growth boundaries at historic trends.
- Retains existing development caps and inclusionary zoning policies.

No Project Alternative: Transportation Investments

The No Project Alternative includes substantially lower funding for all types of transportation projects than the proposed Plan. This alternative would result in a substantially smaller transportation project footprint than the proposed Plan.

ALTERNATIVE 2: MAIN STREETS ALTERNATIVE

The Main Streets Alternative was analyzed as part of the Plan Bay Area 2040 plan development process.

This alternative aims to reduce adverse environmental impacts by dispersing future household and job growth into the downtowns of all Bay Area communities. This scenario offers the most dispersed growth pattern (excluding the No Project), meaning cities outside of the region's largest — Oakland, San Jose and San Francisco — are likely to see higher levels of growth. An emphasis on multi-family and mixed-use development in downtowns would provide opportunities for households of all incomes to live near a mix of jobs, shopping, services, and other amenities.

This alternative assumes higher levels of household growth in PDAs than the proposed Plan, and lower levels of household growth in TPAs, job growth in PDAs, and job growth in TPAs.

In comparison to the proposed Plan, the Main Streets Alternative would result in higher household growth in North Bay and South Bay counties, and higher job growth in East Bay counties.

Main Streets Alternative Land Use Modelling Assumptions

In comparison to the proposed Plan, the Main Streets Alternative includes strategies to disperse growth into the downtowns of all Bay Area communities. Assumptions include:

- zoning: assign higher densities than currently allowed by cities in select suburban areas,
- expands current growth boundaries faster than historical trends,
- assume for-profit housing developments make 5 percent of units deed-restricted in perpetuity in high-opportunity cities,
- reduce the cost of building in PDAs along regional rail transit through eased parking minimums and (in TPAs) streamlined environmental clearance,

- reduce the cost of building in PDAs and TPAs through eased parking minimums and (in TPAs) streamlined environmental clearance (same as proposed Plan),
- assume subsidies stimulate housing and commercial development within PDAs (same as proposed Plan),
- assess commercial development fee based on VMT to improve jobs-housing ratio and to fund affordable housing in PDAs (same as proposed Plan), and
- assumes imposition of other tax policies to subsidize affordable units in PDAs.

Main Streets Alternative Transportation InvestmentS

To support this growth pattern and not adversely impact the transportation system performance, the Main Streets Alternative emphasizes the expansion of express lanes, increases in highway capacity, and increases to suburban bus service to dispersed job centers. This scenario also includes significant investment for maintaining roadways. Strategies include:

- Highway capacity: Invest in strategic highway capacity increases to accommodate this scenario's growth pattern.
- Express lanes: Leverage technological advances to use roadway capacity more efficiently, while emphasizing freeway-focused pricing like Express Lanes / Managed Lanes as complementary strategies.
- Transit service increases: Pursue strategic transit investments, especially bus improvements, to provide access to increasingly dispersed job centers.
- State of good repair: Emphasize investment into state of good repair (particularly for highways and local streets across all nine counties).
- Climate strategies: Includes technological advancements (e.g. clean vehicles) and incentive programs to encourage travel options that help meet GHG emissions reduction targets.

ALTERNATIVE 3: BIG CITIES ALTERNATIVE

The Big Cities Alternative was analyzed as part of the Plan Bay Area 2040 development process.

This alternative aims to reduce adverse environmental impacts by concentrating future household and job growth into the Bay Area's three largest cities (San Jose, San Francisco and Oakland) and their neighboring communities well served by transit. This alternative offers the most compact growth pattern, meaning cities that are distant from the region's largest — Oakland, San Jose and San Francisco — are likely to see the lowest levels of growth. This alternative relies on the region's largest urban communities to accommodate even more compact growth to enable residents and workers to take transit, bike or walk to clusters of jobs, stores, services, and other amenities.

This alternative assumes lower levels of household and job growth in PDAs than the proposed Plan, and higher levels of household and job growth in TPAs.

In comparison to the proposed Plan, the Big Cities Alternative would result in substantially higher household growth in Peninsula and South Bay counties, and higher job growth in South Bay counties.

Big Cities Alternative Land Use Modeling Assumptions

In comparison to the proposed Plan, the Big Cities Alternative includes strategies to focus more growth in the Bay Area's three largest cities than the proposed Plan. Assumptions include:

- zoning: assign higher densities than currently allowed by cities in select PDAs, TPAs, and opportunity sites with high transit access (with an emphasis on San Jose, San Francisco, Oakland, and their neighbors);
- keep current urban growth boundaries in place (same as proposed Plan);
- eliminate office space caps in San Francisco;
- assume for-profit housing developments make 20 percent of units deed-restricted in San Jose, San Francisco, and Oakland;
- reduce the cost of building in the three big cities and neighboring communities through eased parking minimums and (in TPAs) streamlined environmental clearance (same as proposed Plan);
- assume subsidies stimulate housing and commercial development within PDAs (same as proposed Plan); and
- assess residential development fee based on VMT to improve jobs-housing ratio and to fund affordable housing in PDAs.

Big Cities Alternative Transportation Investments

To support this growth pattern and not adversely impact the transportation system performance, the Big Cities Alternative would emphasize core capacity and connectivity by expanding the South Bay transit system and linking regional rail systems into the heart of San Francisco and San Jose. This scenario also includes congestion pricing in San Francisco and significant investment in transit maintenance. Strategies include:

- Core capacity and connectivity: Pursues expansion of the South Bay transit system to support high-density development across Silicon Valley, while at the same time prioritizing investment in core capacity projects in San Francisco and Oakland to enable high-density development.
- Transit enhancements and expansion: Links regional rail systems into the heart of the Bay Area's two largest cities – San Francisco and San Jose – while boosting service frequencies to support increasingly-urban commute patterns.
- Congestion pricing: Supports urban development in San Francisco by implementing cordon pricing and leveraging motorists' tolls to pay for robust and time-competitive transit services.
- State of good repair: Aligns operating and maintenance funds to prioritize investments into high-growth cities and high-ridership systems.
- Climate strategies: Includes technological advancements (e.g. clean vehicles) and incentive programs to encourage travel options that help meet GHG emissions reduction targets.

ALTERNATIVE 4: ENVIRONMENT, EQUITY, AND JOBS

The Environment, Equity, and Jobs (EEJ) Alternative was analyzed in the original Plan Bay Area EIR in 2013. It has been updated to reflect input submitted during the NOP process and to adhere to the planning assumptions in the proposed Plan (e.g., regional forecasts and transportation projects) to create a second version of the EEJ Alternative.

This alternative aims to reduce the risk of displacement in urban communities of concern and reduce adverse environmental impacts due to the expansion of the transportation system.

The EEJ Alternative includes similar levels of household growth in PDAs and TPAs as the proposed Plan, and lower levels of job growth in PDAs but higher levels of job growth in TPAs.

In comparison to the proposed Plan, the EEJ Alternative would result in higher household growth in East Bay and South Bay counties, and higher job growth in East Bay and Peninsula counties.

EEJ Land Use Modeling Assumptions

In comparison to the proposed Plan, the EEJ Alternative includes strategies to focus more growth in high-opportunity areas than the proposed Plan. Assumptions include:

- zoning: assign higher densities than currently allowed by cities in select PDAs, TPAs, and suburban communities with high-quality schools and low levels of crime (i.e., high-opportunity areas);
- keep current urban growth boundaries in place (same as proposed Plan);
- preserve office space caps in job-rich cities (same as proposed Plan);
- assume for-profit housing developments make 20 percent of units deed-restricted in perpetuity in select cities with PDAs or TPAs and high-opportunity cities;
- reduce the cost of building in PDAs and TPAs through eased parking minimums and (in TPAs) streamlined environmental clearance (same as proposed Plan); and
- assume subsidies stimulate housing and commercial development within PDAs (same as proposed Plan).

EEJ Transportation Investments

To support this growth pattern and not adversely impact the transportation system performance, the EEJ alternative emphasizes investment in local bus operations in suburban high-opportunity areas to serve lower-income residents, and reduces funding for highway expansion and modernization. This alternative assumes imposition of a two-cent-per-mile vehicle-miles-traveled (VMT) tax on higher-income travelers. Strategies include:

- Transit service expansion: Pursue strategic transit investments, especially bus improvements, to provide access to increasingly dispersed job centers.
- Transit expansion projects in lieu of highway expansion projects: Build the same suite of transit expansion projects as the proposed Plan, but eliminate all road projects (except for maintenance, congestion pricing, and the Columbus Day Initiative (and related efficiency programs).
- VMT tax: Implement a two-cent-per-mile vehicle-miles-traveled tax on higher-income travelers.
- State of good repair: Increase local streets maintenance funding beyond the proposed Plan and prioritize transit maintenance for funding as well.
- Climate strategies: includes technological advancements (e.g. clean vehicles) and incentive programs to encourage travel options that help meet GHG emissions reduction targets.

ALTERNATIVES COMPARISONS

Comparative Demographic Forecasts

All of the alternatives are designed to accommodate the same population and employment in the year 2040 based on forecasts developed by ABAG, with varying locational distributions of growth. Growth forecasts from 2015 through 2040 are provided in **Table 3.1-1**.

Table 3.1-1 Forecasted Employment, Population, and Household

	Year 2015	Year 2040 All Alternatives
Total Population	7,571,000	9,628,000
Total Employment	4,010,000	4,698,000
Total Employed Residents	4,027,000	4,664,000
Total Households	2,760,000	3,427,000

Source: Compiled by MTC in 2017

Households

Table 3.1-2 compares the household distribution in the years 2015 and 2040 for each alternative, along with each county's proportion of the region's population, as modeled by Bay Area UrbanSim after taking each alternative's land use and transportation policies and transportation projects into account. Growth in areas outside of PDAs and the distribution within PDAs were modeled by Bay Area UrbanSim.

At the county scale, household growth patterns would remain similar to the 2015 conditions. That is, the greatest number of households would be located in Santa Clara, Alameda, and San Francisco counties. Distribution of households would change slightly among the alternatives. Notable differences in distribution, compared to the proposed Plan, are summarized as follows.

- Under the No Project Alternative, there would be a greater proportion of households in Contra Costa County and less in Alameda, San Francisco and Santa Clara. Each county is projected to gain households between 2015 and 2040 in every alternative, although by varying degrees. A few outcomes of note:
  - Under the Main Streets Alternative, a greater number of households would be located in Santa Clara and less in Alameda.
  - Under the Big Cities Alternative, a greater proportion of households would be located in Santa Clara and San Francisco counties, and less in Alameda and Contra Costa counties.
  - The EEJ Alternative would have similar distribution to the proposed Plan, with minimal differences anticipated in the county-by-county totals.

Table 3.1-2 Year 2040 Households by County

	Year 2015		Year 2040									
			Proposed Plan	% of Total	No Project	% of Total	Main Streets	% of Total	Big Cities	% of Total	EEJ	% of Total
Alameda	585,347	21	734,071	21	687,975	20	715,518	21	673,827	20	741,352	22
Contra Costa	386,780	14	475,412	14	559,660	16	472,158	14	428,219	12	480,302	14
Marin	106,786	4	111,584	3	121,952	4	110,013	3	109,116	3	113,801	3
Napa	48,812	2	54,694	2	57,970	2	54,855	2	52,893	2	54,835	2
San Francisco	388,556	14	483,686	14	458,549	13	480,539	14	513,070	15	472,741	14
San Mateo	270,672	10	317,968	9	311,864	9	311,869	9	314,296	9	313,795	9
Santa Clara	649,007	24	860,925	25	840,229	25	886,729	26	979,736	29	865,513	25
Solano	141,041	5	169,294	5	174,622	5	161,582	5	152,535	4	168,601	5
Sonoma	183,478	7	219,066	6	213,879	6	233,437	7	203,008	6	215,760	6
Regional Total	**2,760,479**	**100**	**3,426,700**	**100**	**3,426,700**	**100**	**3,426,700**	**100**	**3,426,700**	**100**	**3,426,700**	**100**

The relative location of households and employment centers in the region informs characteristic of residents, such as auto ownership. This is due to numerous reasons, such as access to transit, income, and parking available. The results of the different growth pattern on auto ownership are included below in Table 3.1-3.

Table 3.1-3 Bay Area Auto Ownership Forecasts (2015-2040)

	Year 2015	Year 2040								
		Proposed Plan	No Project	Difference from Proposed Plan	Main Streets	Difference from Proposed Plan	Big Cities	Difference from Proposed Plan	EEJ	Difference from Proposed Plan
Households with Zero Autos	10%	11%	9%	-18%	10%	-9%	11%	0%		
Households with One Auto	33%	34%	33%	-3%	34%	0%	34%	0%		
Households with Multiple Autos	57%	55%	58%	5%	56%	2%	55%	0%		
Average Vehicles per Household	1.74	1.7	1.75	3%	1.71	1%	1.69	-1%		

Source: Compiled by MTC in 2017

Jobs

Similar to population and household growth, the alternatives all accommodate the same number of jobs in the year 2040. Table 3.1-4 shows the projected job distribution by county for each alternative. As with households, each county gains jobs in every alternative and generally maintains its 2015 proportion of the region's jobs. The relative portion of jobs would be similar (i.e. less than one percent different) under each of the alternatives in 2040.

Table 3.1-4 Year 2040 Jobs by County

	Year 205		Year 2040									
	Baseline	% of Total	Proposed Plan	% of Total	No Project	% of Total	Main Streets	% of Total	Big Cities	% of Total	EEJ	% of Total
Alameda	829,055	21	953,128	20	954,182	20	926,207	20	953,549	20	972,669	21
Contra Costa	407,738	10	497,925	11	496,772	11	539,870	11	487,457	10	485,407	10
Marin	132,865	3	134,960	3	135,116	3	134,953	3	135,760	3	135,193	3
Napa	69,806	2	83,364	2	77,873	2	76,464	2	78,075	2	77,310	2
San Francisco	746,356	19	872,499	19	870,318	19	856,649	18	887,073	19	864,509	18
San Mateo	396,183	10	472,056	10	471,098	10	486,510	10	450,733	10	482,959	10
Santa Clara	1,067,633	27	1,289,873	27	1,295,783	28	1,286,682	27	1,307,736	28	1,286,099	27
Solano	137,068	3	150,981	3	151,703	3	152,248	3	153,144	3	150,889	3
Sonoma	223,431	6	243,588	5	245,529	5	238,791	5	244,847	5	243,339	5
Regional Total	**4,010,135**	**100**	**4,698,374**	**100**	**4,698,374**	**100**	**4,698,374**	**100**	**4,698,374**	**100**	**4,698,374**	**100**

Household and Employment Growth in TPAs

Table 3.1-5 and Table 3.1-6 show the expected distribution of household growth and employment growth for each alternative.

Table 3.1-5 Total Households and Household Growth by Share in TPAs

Alternative	Total Households	Total Households in TPAs	% of Households in TPAs	New Regional Household Growth	New Household Growth in TPAs	% of New Household Growth in TPAs
Year 2015	2,760,000	1,135,000	41%	666,000	NA	NA
Year 2040, Proposed Plan	3,427,000	1,537,000	45%	666,000	402,000	60%
Year 2040, No Project	3,427,000	1,371,000	40%	666,000	236,000	35%
Year 2040, Main Streets	3,427,000	1,505,000	44%	666,000	370,000	56%
Year 2040, Big Cities	3,427,000	1,631,000	48%	666,000	496,000	74%
Year 2040, EEJ	3,427,000	1,541,000	45%	666,000	406,000	61%

Table 3.1-6 Total Jobs and Job Growth by Share in TPAs

Alternative	Total Jobs	Total Jobs in TPAs	% of Jobs in TPAs	New Regional Job Growth	New Job Growth in TPAs	% of New Job Growth in TPAs
Year 2015	4,010,000	2,098,000	52%	688,000	NA	NA
Year 2040, Proposed Plan	4,698,000	2,472,000	53%	688,000	374,000	54%
Year 2040, No Project	4,698,000	2,457,000	52%	688,000	359,000	52%
Year 2040, Main Streets	4,698,000	2,408,000	51%	688,000	310,000	45%
Year 2040, Big Cities	4,698,000	2,494,000	53%	688,000	396,000	58%
Year 2040, EEJ	4,698,000	2,493,000	53%	688,000	395,000	57%

Compared to the proposed Plan, job growth in TPAs would generally be less under the No Project and Main Streets Alternative and greater under the Big Cities and EEJ Alternatives.

Land Use Growth Footprint

The land use growth footprint would differ between the alternatives. As shown in Table 3.1-7 the alternatives vary between total land use growth footprint area, land use growth footprint area within TPAs, and overall increase in urban land (i.e., projected development in areas not considered urban and built up, according to FMMP).

Table 3.1-7 Land Use Growth Footprints by Alternative

	Land Use Growth Footprint	Proposed Plan	No Project	Main Streets	Big Cities	EEJ
Alameda	Total Area	3,700	4,500	3,500	2,000	3,700
	in TPA	2,000	1,600	2,000	1,200	2,000
	New Urban	1,000	1,400	470	480	700
Contra Costa	Total Area	4,100	18,400	3,600	1,900	5,000
	in TPA	600	650	830	340	670
	New Urban	2,400	14,100	1,900	1,400	3,300
Marin	Total Area	210	1,500	200	30	230
	in TPA	50	100	40	4	100
	New Urban	50	1,100	100	10	40

Table 3.1-7 Land Use Growth Footprints by Alternative

	Land Use Growth Footprint	Proposed Plan	No Project	Main Streets	Big Cities	EEJ
Napa	Total Area	460	750	370	190	500
	in TPA	-	-	-	-	-
	New Urban	350	380	310	150	330
San Francisco	Total Area	1,500	1,400	1,600	1,700	1,400
	in TPA	1,400	1,300	1,600	1,700	1,300
	New Urban	140	140	120	150	130
San Mateo	Total Area	1,400	2,100	1,400	860	1,400
	in TPA	700	640	750	560	790
	New Urban	180	450	270	120	190
Santa Clara	Total Area	4,800	10,800	5,500	5,800	4,900
	in TPA	2,500	2,100	2,700	3,900	2,700
	New Urban	1,000	6,700	1,600	300	1,100
Solano	Total Area	1,600	3,600	1,000	500	1,400
	in TPA	20	9	3	-	50
	New Urban	1,100	2,800	700	200	900
Sonoma	Total Area	1,100	1,300	1,200	600	1,000
	in TPA	140	80	180	80	120
	New Urban	220	310	120	130	220
Regional	Total Area	18,700	44,400	18,300	13,600	19,600
	in TPA	7,400	6,500	8,000	7,800	7,800
	New Urban	6,600	27,500	5,600	3,000	6,900

Notes: Numbers less than 1 are shown as "<1" Whole numbers have been rounded (between 0 and 10 to the nearest whole number, between 11 and 999 to the nearest 10, between 1,000 and 1,000,000 to the nearest 100, above 1,000,000 to the nearest 1,000). Figures may not sum due to independent rounding.

Transportation Projects

As discussed above, each alternative would focus on different types of transportation projects based on the land use strategy. Table 3.1-8 presents the relative funding for highways, regional transit, local transit, and other projects under each alternative.

Table 3.1-8 Relative Funding of Transportation Projects under each Alternative

	Proposed Plan	No Project	Main Streets	Big Cities	EEJ
Highways	**	*	***	*	*
Regional Transit	**	*	*	***	***
Local Transit	**	*	*	***	***
Other[1]	**	*	***	*	*

Notes: [1] Other projects include: express lane improvements, roadway pricing, and intelligent transportation systems

Source: Data provided by MTC in 2017

The funding levels shown above indicates the relative investment in roadway lane miles and total daily transit seat miles. As shown in Table 3.1-9, there would be substantially less investment in roadway lane miles under the No Project, Big Cities, and EEJ alternatives compared to the proposed Plan, and a slightly greater increase to roadway lane miles under the Main Streets Alternative. In terms of total daily transit seat miles, there would be a greater investments in capacity of daily transit seat miles under the EEJ and Big Cities alternatives compared to the proposed Plan, and substantially lower added capacity of daily transit seat miles under the No Project and Main Streets alternatives.

Table 3.1-9 Added Transportation System Capacity under each Alternative

	Proposed Plan	No Project	Main Streets	Big Cities	EEJ
Freeway Lane-Miles	6,121	5,675	6,278	5,790	5,664
Expressway Lane-Miles	1,129	1,046	1,096	1,039	1,047
Arterial Lane-Miles	8,702	8,658	8,678	8,610	8,642
Collector Lane-Miles	5,520	5,494	5,483	5,494	5,497
Total Roadway Lane-Miles	**21,472**	**20,873**	**21,534**	**20,933**	**20,849**
Daily Local Bus Seat-Miles	16,300,036	14,052,038	15,600,019	16,862,241	17,754,368
Daily Express Bus Seat-Miles	3,533,561	2,896,500	3,389,193	3,680,431	4,028,966
Daily Light Rail-Express Bus Seat-Miles	4,484,664	3,387,526	3,667,567	5,178,176	4,520,700
Daily Heavy Rail Seat-Miles	27,488,010	20,988,593	20,988,593	28,053,649	27,488,010
Daily Commuter Rail Seat-Miles	9,594,318	7,548,209	7,548,209	8,659,709	9,600,004
Daily Ferry Seat-Miles	2,496,394	2,105,611	2,105,611	2,510,137	2,510,137
Total Daily Transit Seat-Miles	**63,896,983**	**50,978,478**	**53,299,193**	**64,944,343**	**65,902,186**

Source: Data provided by MTC in 2017

Figures may not sum due to independent rounding.

The relative comparison of acreage associated with each alternative is provided in Table 3.1-10.

Table 3.1-10 Acreage of Transportation Projects Footprint under each Alternative

	Proposed Plan	No Project	Main Streets	Big Cities	EEJ
Acres	16,400	980	11,000	12,000	11,600

This analysis considers the major transportation projects (i.e., projects that cost greater than $100 million) when comparing the alternatives. Table 3.1-11 provides a breakdown of the major projects associated with the alternatives.

Table 3.1-11 Breakdown of Major Projects Across Alternatives

	No Project (Committed Project, assumed in all Alternatives)	Proposed Plan	Main Streets	Big Cities	Environment, Equity and Jobs
Regional Transit	BART to Silicon Valley – Phase 1 eBART – Phase 1 Richmond-San Francisco Ferry SMART – Initial Operating Segment	BART Metro Program BART to Silicon Valley – Phase 2 Irvington BART Infill Station Caltrain Modernization – Phase 1 Caltrain to Transbay Transit Center Alameda Point-San Francisco Ferry Antioch-Martinez-Hercules-San Francisco Ferry Berkeley-San Francisco Ferry Oakland-Alameda-San Francisco Ferry Frequency Improvements Vallejo-San Francisco + Richmond-San Francisco Ferry Frequency Improvements ACE Alviso Double-Tracking Golden Gate Transit Frequency Improvements I-680 Express Bus Frequency Improvements Solano County Express Bus Network Managed Lanes Implementation Plan – Express Bus and PNR	Solano County Express Bus Network	BART Metro Program BART to Silicon Valley – Phase 2 Irvington BART Infill Station Caltrain Modernization – Phase 1 Caltrain Modernization – Phase 2 Caltrain to Transbay Transit Center Alameda Point-San Francisco Ferry Berkeley-San Francisco Ferry Oakland-Alameda-San Francisco Ferry Frequency Improvements Vallejo-San Francisco + Richmond-San Francisco Ferry Frequency Improvements Express Bus Bay Bridge Contra Flow Lane Golden Gate Transit Frequency Improvements San Francisco Express Bus Network	BART Metro Program BART to Silicon Valley – Phase 2 Irvington BART Infill Station Caltrain Modernization – Phase 1 Caltrain to Transbay Transit Center Alameda Point-San Francisco Ferry Berkeley-San Francisco Ferry Oakland-Alameda-San Francisco Ferry Frequency Improvements Vallejo-San Francisco + Richmond-San Francisco Ferry Frequency Improvements ACE Alviso Double-Tracking Golden Gate Transit Frequency Improvements I-680 Express Bus Frequency Improvements San Francisco Express Bus Network Solano County Express Bus Network
Local Transit	East Bay BRT Central Subway Van Ness BRT	AC Transit Service Frequency Improvements (scaled back) San Pablo BRT Better Market Street Geary BRT Geneva-Harney BRT Muni Forward Program Muni Service Frequency Improvements Southeast Waterfront Transportation Improvements Capitol Expressway LRT – Phase 2 El Camino Real BRT Stevens Creek BRT Sonoma County Service Frequency Improvements Vasona LRT – Phase 2 VTA Service Frequency Improvements	Geary BRT Muni Forward Sonoma County Service Frequency Improvements Suburban Bus Service Frequency Improvements	AC Transit Service Frequency Improvements San Pablo BRT 19th Avenue Subway Better Market Street Geary BRT Geneva-Harney BRT + Corridor Improvements Muni Forward Program Muni Service Frequency Improvements Southeast Waterfront Transportation Improvements Broadway Streetcar Capitol Expressway LRT – Phase 2 Downtown San Jose Subway El Camino Real BRT	AC Transit Service Frequency Improvements San Pablo BRT Better Market Street Geary BRT Geneva-Harney BRT + Corridor Improvements Muni Forward Program Muni Service Frequency Improvements Southeast Waterfront Transportation Improvements Capitol Expressway LRT – Phase 2 El Camino Real BRT Stevens Creek BRT Vasona LRT – Phase 2 VTA Service Frequency Improvements

Table 3.1-11 Breakdown of Major Projects Across Alternatives

	No Project (Committed Project, assumed in all Alternatives)	Proposed Plan	Main Streets	Big Cities	Environment, Equity and Jobs
		El Camino Real Rapid Bus		North Bayshore LRT Stevens Creek LRT Tasman West LRT Realignment Vasona LRT – Phase 2 VTA Express Bus Network VTA Service Frequency Improvements	El Camino Real Rapid Bus Sonoma County Service Frequency Improvements Suburban Local Bus Service Frequency Improvements
Highways	SR-4 Bypass SR-4 Widening	Columbus Day Initiative SR-4 Auxiliary Lanes I-680/SR-4 Interchange Improvements I-80/680/SR-12 Interchange Improvements Lawrence Expressway Upgrades SR-262 Widening SR-84 Widening + I-680/SR-84 Interchange Improvements US-101 Marin-Sonoma Narrows HOV Lanes – Phase 2 I-580 Integrated Corridor Management US 101 & I-280 HOV Lanes in San Francisco	Columbus Day Initiative SR-4 Auxiliary Lanes I-680/SR-4 Interchange Improvements I-80/680/SR-12 Interchange Improvements Lawrence Freeway SR-262 Widening SR-84 Widening + I-680/SR-84 Interchange Improvements US-101 Marin-Sonoma Narrows HOV Lanes – Phase 2 I-580 Integrated Corridor Management SR-4 Widening Tri-Link Tollway + Expressways I-680/SR-4 HOV Direct Connector	Columbus Day Initiative (in Big 3 Cities only)	Columbus Day Initiative
Arterials		East-West Connector Jepson Parkway	East-West Connector Jepson Parkway		
Pricing		East and North Bay Express Lane Network (scaled-back network) Santa Clara County Express Lane Network (full network) US 101 Express Lanes in San Mateo County Downtown San Francisco Congestion Pricing Treasure Island Congestion Pricing	Managed Lanes Implementation Program (full network) East and North Bay Express Lane Network (full network) Santa Clara County Express Lane Network (full network) US 101 & I-280 Express Lanes in San Francisco US 101 Express Lanes in San Mateo County	Downtown San Francisco Congestion Pricing Treasure Island Congestion Pricing	Downtown San Francisco Congestion Pricing Treasure Island Congestion Pricing

ALTERNATIVES CONSIDERED BUT NOT RECOMMENDED FOR ANALYSIS

Additional alternatives were considered during scoping of the proposed Plan, including suggestions from stakeholders. The CEQA Guidelines section 15126.6(c) includes three factors that may be used to eliminate alternatives from detailed consideration in an EIR: "i. failure to meet most of the basic project objectives; ii. infeasibility, or iii. inability to avoid significant environmental impact." "Feasible" is defined as "capable of being accomplished within a reasonable period of time, taking into account economic, environmental, legal, social, and technological factors" (CEQA Guidelines Section 15364). The feasibility of an alternative may be determined based on a variety of factors, including but not limited to economic viability, availability of infrastructure, and other plans or regulatory limitations (CEQA Guidelines Section15126.6(f)(1)). The following discussion briefly describes each alternative and describes the reason why they have not been included for analysis.

Connected Neighborhoods

Summary of Alternative

This alternative was developed and analyzed as part of the planning alternatives leading to the identification and adoption of the proposed Plan, and was identified as a possible CEQA alternative in the NOP.

The Connected Neighborhoods Alternative places future population and employment growth in medium-sized cities and provides increased access to the region's major rail services, such as BART and Caltrain. It would place most of the growth in areas that cities determine as having room for growth, with some additional growth in the biggest cities. There would be no development on open spaces outside the urban footprint. This alternative includes a similar land use distribution and a similar mix of transportation projects and programs relative to the proposed Plan.

Feasibility

This alternative is similar to the proposed Plan, and therefore is not expected to avoid significant environmental impacts or substantially reduce the severity of significant environmental impacts relative to the proposed Plan. Thus, it does not meet the requirements to consider alternatives under CEQA and was rejected from further analysis.

Modified Big Cities Alternative (TRANSDEF)

Summary of Alternative

This alternative was recommended in scoping comments received from TRANSDEF, a non-profit environmental organization. Compared to the proposed plan, this alternative emphasizes implementing strategies to make driving more expensive and transit more attractive, including less investments in roads, and more investments in transit.

It includes the same land use growth pattern as the Big Cities Alternative, but includes two transportation sub-alternatives resulting in a different mix of transportation project and program investments, relative to the proposed Plan and other alternatives. Due to its consistency with and reliance on the Big Cities land use pattern, this alternative is expected to perform very similarly to the Big Cities Alternative across the CEQA topic areas. As a result, this proposed alternative does not contribute to a reasonable range of alternatives and was rejected from further analysis.

Feasibility

TRANSDEF previously proposed a version of the modified Big Cities Alternative (then called the TRANSDEF Smart Growth Alternative) that was analyzed in the 2005 EIR for MTC's *Transportation 2030 Plan*. In its Findings adopting the *Transportation 2030 Plan* and certifying the 2005 EIR, MTC rejected the TRANSDEF Smart Growth Alternative based on its inability to meet the goals and objectives of the plan because it did not provide the full transportation benefits of the plan, as well as its failure to reduce environmental impacts in the areas of transportation, geology, and land use. In addition, the findings concluded that the TRANSDEF

Smart Growth Alternative was less feasible than the *Transportation 2030 Plan* because it included funding reallocations that would require voter approval or rejection of prior voter mandates, and because it included pricing strategies that had not been tested legislatively or legally, or in some cases were expressly limited in application by state law. These considerations still apply to the TRANSDEF Modified Big Cities Alternative proposed during the NOP comment period for the proposed Plan, and it was therefore not identified for further study in the EIR.

Modified No Project (City of Livermore)

Summary of Alternative

This alternative was recommended in scoping comments received from the City of Livermore and is a variation of the No Project Alternative. Compared to the other alternatives, this alternative has a lower amount of anticipated growth of households.

Feasibility

This alternative may avoid or reduce some significant environmental impacts relative to the proposed Plan due to the lower amount of housing development assumed. However, this alternative is inconsistent with Performance Target 2, "House 100 percent of the region's projected growth by income level without displacing current low-income residents and with no increase in in-commuters over the Plan baseline year." The requirement to house 100 percent of the region's projected growth is a regulatory requirement under SB 375 and is also required under the settlement agreement with BIA. This alternative proposed a different housing control total than what was adopted. As a result, this proposed alternative is not identified for further study in the EIR because it would not meet some of the project objectives and because it would be legally infeasible.

Plan Bay Area (2013 RTP/SCS)

Summary of Alternative

This alternative is a variation of the No Project Alternative. It assumes that implementation of the previous Plan Bay Area would continue to be in effect.

This alternative includes a similar land use distribution and a similar mix of transportation projects and programs, relative to the proposed Plan. However, compared to all the other alternatives, this alternative has a lower amount of anticipated growth of households and employment, as well as a lower amount of transportation revenues for investments in highways and transit.

Feasibility

This alternative is expected to result in a similar magnitude of environmental impacts as the proposed Plan. However, due to the lower amount of assumed development and infrastructure investment, this alternative is not consistent with the requirement of SB 375 that the RTP/SCS be updated every four years, nor does it meet the requirement to house 100 percent of the region's projected growth. As a result, this alternative is not identified for further study in the EIR because it would not reduce or avoid significant environmental impacts relative to the proposed Plan and because it would be legally infeasible.

Aspirational Alternative

Summary of Alternative

This alternative was recommended in scoping comments received from Sierra Club, a non-profit environmental organization, based on information presented by MTC staff at the May 2016 Planning Committee meeting about "what it would take" to achieve all of the performance targets developed as part of the planning process for the proposed Plan. This "aspirational alternative" would emphasize implementing strategies to achieve performance targets related to health, equity, access to jobs/non-auto mode share, and state of good repair.

Indeed, the Aspirational Alternative is essentially a hypothetical scenario, primarily because the majority of the performance targets are themselves aspirational – particularly given the timeframe of the plan. For example,

to meet targets related to health, there would likely need to be substantial demolition and reconstruction of the development pattern and transportation system throughout the Bay Area. In addition, attainment of equity targets could need to occur through substantial increases in development of housing units, which may be manifested through the doubling of projected households. These actions would require the market to respond by substantially increasing the number of vacant units and thereby driving down the cost of housing. However, it is unknown if such a supply could be provided, and if so, if reduced real estate values would occur and lead to the attainment of equity targets or if it would simply encourage additional growth. Essentially, because implementation of a fully aspirational alternative would require a substantial amount of tearing-down and re-building of the Bay Area, such an alternative is not reasonably feasible to consider. Thus, it is a detailed analysis of a potential land use plan and accompanying transportation plan that would attain each performance target was not provided.

Feasibility

This alternative includes assumptions related to increased funding of programs, and market response beyond what is reasonable to consider. In addition, this alternative would not be fiscally constrained, and therefore would not meet one of the legal requirements for an RTP/SCS. Moreover, due to the assumed substantial degree of teardown and construction activities that would be needed to implement the aspirational alternative, significant environmental impacts would likely not be reduced—and more likely would be substantially increased–relative to the proposed Plan. As such, this proposed alternative does not contribute to a reasonable range of alternatives and was rejected from further analysis.

3.1.4 Project Objectives

The California Environmental Quality Act (CEQA) Guidelines state that an EIR shall describe a range of reasonable alternatives to the Project, or to the location of 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, and evaluate the comparative merits of the alternatives" (CEQA Guidelines Section 15126.6). This discussion describes the objectives of the proposed Plan and the alternatives ability to meet them.

MTC and ABAG developed 13 performance targets associated with the goals for the proposed Plan (**Table 3.1-12**). Senate Bill 375 mandates two of these performance targets. These are the primary objectives of the Plan:

- The proposed Plan must address climate change by reducing CO_2 emissions: the regional plan must meet or exceed a seven percent reduction in per-capita emissions from cars and light-duty trucks by 2020 and a 15 percent reduction by 2035 relative to 2005 levels.

- The proposed Plan must house 100 percent of the region's projected growth by income level without displacing low-income residents, and with no increase in in-commuters over the proposed Plan baseline year. As calculated for the proposed Plan pursuant to the agreement with the BIA, the Regional Housing Control total is 820,400.

In addition to these objectives, MTC and ABAG voluntarily adopted 11 additional targets. Key goals for Plan Bay Area 2040 included tackling the Bay Area's inequities through improved affordability and lessened displacement risk, ensuring a robust economy and protecting the environment for future generations. These targets are aggressive and somewhat aspirational. Yet, they reflect MTC and ABAG's commitment to take a more holistic view of the possibilities of integrated regional planning by going beyond the plan's legal requirements.

Table 3.1-12 Year 2040 Goals and Performance Targets

Goal	Performance Target/Project Objectives
Climate Protection	Reduce per-capita CO2 emissions from cars and light-duty trucks by 15 percent
Adequate Housing	House 100 percent of the region's projected growth by income level without displacing current low-income residents and with no increase in in-commuters over the Plan baseline year
Healthy and Safe Communities	Reduce adverse health impacts associated with air quality, road safety, and physical inactivity by 10 percent
Open Space and Agricultural Preservation	Direct all non-agricultural development within the urban footprint (existing urban development and UGBs)
Equitable Access	Decrease housing and transportation (H+T) costs share for lower-income households
	Increase the share of affordable housing in PDAs, TPAs or high-opportunity areas by 15 percent
	Do not increase the share of low- and moderate-income renter households in PDAs, TPAs, or high-opportunity areas that are at risk of displacement
Economic Vitality	Increase by 20 percent the share of jobs accessible within 30 minutes by auto or within 45 minutes by transit in congested conditions
	Increase by 38 percent the number of jobs in predominantly middle-wage industries
	Reduce per-capita delay on the Regional Freight Network by 20 percent
Transportation System Effectiveness	Increase non-auto mode share by 10 percent
	Reduce vehicle operations and maintenance costs due to pavement conditions by 100 percent
	Reduce per-rider transit delay due to aged infrastructure by 100 percent

Note: The base year for the targets, unless specified under target methodology documentation, is 2005, Additional information is available in MTC Resolution 4204, Revised and associated methodology memoranda.[1] The Adequate Housing target relates to the Regional Housing Control Total per the settlement agreement signed with the Building Industry Association (BIA), which increases the housing forecast by the housing equivalent to in-commute growth.

The following provides a comparative analysis of how the alternatives meet the performance targets for the Plan. As shown under performance target 1 and 2 below, the proposed Plan, Big Cities Alternative, and EEJ Alternative would meet the primary objectives of the plan (GHG emissions reduction goals and adequate housing).

PERFORMANCE TARGET 1 (-15 PERCENT COMPARED WITH 2005 BASELINE): CLIMATE PROTECTION

No Project: -2 percent
Main Streets: -14 percent
Big Cities: -17 percent
Proposed Plan: -16 percent
EEJ: -17 percent

The Big Cities Alternative, proposed Plan, and EEJ Alternative would meet performance target 1, which is also a legal requirement and a primary objective of the Plan (a decrease of per capita CO_2 emissions from cars and light duty trucks of 15 percent by 2035). The No Project Alternative and Main Streets Alternative would not meet performance target 1.

PERFORMANCE TARGET 2 (100 PERCENT): ADEQUATE HOUSING

No Project: 100 percent
Main Streets: 100 percent
Big Cities: 100 percent
Proposed Plan: 100 percent
EEJ: 100 percent

All of the alternatives would meet targets associated with adequate housing (100 percent). This target is a legal requirement and a primary objective of the plan.

PERFORMANCE TARGET 3 (-10 PERCENT COMPARED WITH 2015 BASELINE): HEALTHY AND SAFE COMMUNITIES

No Project: -0 percent
Main Streets: -1 percent
Big Cities: -1 percent
Proposed Plan: -1 percent
EEJ: -1 percent

None of the alternatives met performance target 3, which seeks to reduce adverse health impacts associated with air quality, road safety, and physical inactivity by 10 percent. The proposed Plan and Main Streets, Big Cities, and EEJ alternatives performed similarly, although only slightly better than the No Project Alternative.

PERFORMANCE TARGET 4 (100 PERCENT): OPEN SPACE AND AGRICULTURAL PRESERVATION

No Project: 84 percent
Main Streets: 98 percent
Big Cities: 100 percent
Proposed Plan: 100 percent
EEJ: 100 percent

The Big Cities Alternative, Proposed Plan, and EEJ Alternative would meet performance target 4, which would direct non-agricultural development within the urban footprint. The Main Streets Alternative and No Project Alternative would not meet this target. Note that all alternatives do include some greenfield development within urban growth boundaries.

PERFORMANCE TARGET 5 (-10 PERCENT COMPARED WITH 2015 BASELINE): EQUITABLE ACCESS (AFFORDABILITY)

No Project: +15 percent
Main Streets: +13 percent
Big Cities: +13 percent
Proposed Plan: +13 percent
EEJ: +12 percent

No alternative would meet performance target 5. Strategies boosting housing production in transportation-efficient locations generate more naturally-affordable and deed-restricted housing in all alternatives except for No Project Alternative. Furthermore, the proposed Plan and Big Cities and EEJ alternatives all reduce dependence on automobiles, the most expensive mode for system users, and encourage transit, walking, and bicycling instead through multimodal investments. Combined, these policies reduce the rise of combined housing & transportation costs by several percentage points. The EEJ Alternative does the best in this regard, primarily due to housing strategies like a greater inclusionary requirement for new developments.

PERFORMANCE TARGET 6 (+15 PERCENT COMPARED WITH 2015 BASELINE): EQUITABLE ACCESS (AFFORDABLE HOUSING)

No Project: -0 percent
Main Streets: +2 percent
Big Cities: +1 percent
Proposed Plan: +3 percent
EEJ: +3 percent

All alternatives except for the No Project Alternative would make progress towards performance target 6, which means the number of affordable units would grow faster than housing growth overall. Main Streets, Big Cities Alternatives, and the proposed Plan all boosted the number of deed-restricted units in PDAs, TPAs, and HOAs. However, in terms of naturally-affordable units, the proposed Plan performs the strongest. The proposed Plan and EEJ Alternative would have the strongest performance on this target.

PERFORMANCE TARGET 7 (0 PERCENT): EQUITABLE ACCESS (DISPLACEMENT RISK)

No Project: +18 percent
Main Streets: +6 percent
Big Cities: +9 percent
Proposed Plan: +5 percent
EEJ: +5 percent

Displacement risk would be the highest in the No Project Alternative, as it lacked any substantive policies such as expanded inclusionary zoning to help mitigate displacement of existing residents and businesses. Furthermore, it produces more housing at the periphery and less in the region's core, where housing is most needed to alleviate the imbalance between supply and demand. The proposed Plan and EEJ Alternative performed the best on this target. While neither achieved the goal of mitigating all growth in displacement risk, they performed better than the Big Cities Alternative which funneled a greater level of growth into the urban core with a more limited inclusionary zoning policy.

PERFORMANCE TARGET 8 (+20 PERCENT COMPARED WITH 2015 BASELINE): ECONOMIC VITALITY (ACCESS TO JOBS)

No Project: -3 percent
Main Streets: -1 percent
Big Cities: -1 percent
Proposed Plan: -0 percent
EEJ: -1 percent

All alternatives would result in some loses in the share of regional jobs accessible to the typical Bay Area resident through 2040, although the proposed Plan came closest to meeting this target. The proposed Plan would perform the best due to its investment in all modes, which improved some of the rising congestion expected in a growth alternative while also providing a robust suite of transit options. In addition, it focused growth in existing job centers well-served by transit, rather than distributing jobs across the region. The No Project Alternative performed the worst – due to its lack of transportation investments, both in terms of highways and transit.

PERFORMANCE TARGET 9 (+38 PERCENT COMPARED WITH 2015 BASELINE): ECONOMIC VITALITY (JOBS/WAGES)

No Project: +43 percent
Main Streets: +43 percent
Big Cities: +43 percent
Proposed Plan: +43 percent
EEJ: +43 percent

All of the alternatives and the proposed Plan would achieve the same performance for this target, which relies on the regional control totals and associated forecasts. The target results indicate that jobs in middle-wage industries are expected to grow at a rate faster than overall job growth.

PERFORMANCE TARGET 10 (-20 PERCENT COMPARED WITH 2015 BASELINE): ECONOMIC VITALITY (GOODS MOVEMENT)

No Project: +38 percent
Main Streets: -25 percent
Big Cities: -33 percent
Proposed Plan: -29 percent
EEJ: -15 percent

While the No Project Alternative would perform the worst because only committed projects advance in this alternative, the Big Cities Alternative outperformed all other alternatives, as a result of its urban-focused land use pattern and investment in alternative modes. These policies reduced automobile demand for long-distance freight corridors, smoothing flow for trucks and remaining motorists. The EEJ Alternative fell short on this target due to increased congestion related to greater suburb-to-suburb commuting and elimination of all highway expansion projects. The proposed Plan, Main Streets Alternative, and Big Cities Alternatives all met the 20 percent per-capita reduction target.

PERFORMANCE TARGET 11 (+10 PERCENT COMPARED WITH 2015 BASELINE): TRANSPORTATION SYSTEM EFFECTIVENESS (MODE SHARE)

No Project: +2 percent
Main Streets: +2 percent
Big Cities: +4 percent
Proposed Plan: +3 percent
EEJ: +4 percent

Targets associated with non-automobile mode share would not be met under any of the alternatives, however, they each made progress in terms of increasing the regional mode share by 10 percentage points by 2040. The Big Cities Alternative and EEJ Alternative came closest to meeting this target, with a 4 percent increase due to their denser land use patterns, which result in greater competitiveness for non-auto modes and greater investments in bus and rail networks across the Bay Area. Bike and walk mode shares are relatively consistent across all alternatives; increased transit ridership forecasts accounted for the bulk of the non-auto mode share growth.

PERFORMANCE TARGET 12 (-100 PERCENT COMPARED WITH 2015 BASELINE): TRANSPORTATION SYSTEM EFFECTIVENESS (STATE OF GOOD REPAIR FOR ROADS)

No Project: +53 percent
Main Streets: -59 percent
Big Cities: +8 percent
Proposed Plan: +6 percent
EEJ: +10 percent

While the No Project Alternative would perform the worst due to the lack of regional discretionary dollars being put towards highway and road maintenance, there would be a substantial improvement under the Main Streets Alternative, likely because of its focus on highway maintenance. Regional discretionary funds were only allocated towards state highway maintenance in this alternative. While local street maintenance was also funded, it was the heavily-used highway network where funding allowed the region to achieve ideal conditions and make very significant progress towards the target. The other alternatives were relatively similar in terms of impacts on drivers from highway and road maintenance, with the proposed Plan seeing a slight uptick not evident in draft model runs (due to failure of select ballot measures and updates to reflect year 2040 pavement conditions).

PERFORMANCE TARGET 13 (-100 PERCENT COMPARED WITH 2015 BASELINE): TRANSPORTATION SYSTEM EFFECTIVENESS (STATE OF GOOD REPAIR FOR PUBLIC TRANSIT)

No Project: -57 percent
Main Streets: -77 percent
Big Cities: -78 percent
Proposed Plan: -75 percent
EEJ: -76 percent

Due to the strategic priorities set in the MTC's Transit Capital Prioritization policy, which prioritize vehicles and other critical infrastructure first, all of the alternatives would make substantial improvements related to reducing delay due to vehicle and non-vehicle system breakdowns from aged assets. Marginal differences exist across alternatives due to slight variation in funding levels, as well as the ridership levels of each system. For example, the transportation and land use pattern under the EEJ Alternative results in higher levels of BART ridership (a system where not all SGR funding needs for assets with operational impacts are met), resulting in slightly weaker performance than in the Big Cities Alternative.

3.1.5 Comparative Impact Analysis of Alternatives

The following discussion provides a discussion of impacts of the alternatives compared to the proposed Plan. This analysis provides sufficient information to allow for a meaningful analysis and comparison with the proposed Plan. Quantified data is provided to the extent it is available. Each of these alternatives is intended to accommodate projected growth and transportation projects, with one alternative (No Project, Alternative 1) reflecting projected development without an RTP/SCS in place and the other alternatives reflecting various modifications to the proposed Plan. The format of this analysis is structured to examine how impacts from each alternative would compare to impacts of the proposed Plan. The analysis compares impacts of the alternatives to the proposed Plan assuming no mitigation is in place. Mitigation measures presented in the impact discussions for the proposed Plan should be implemented for any alternative selected to reduce the severity of significant impacts. However, MTC/ABAG cannot require local implementing agencies to adopt mitigation measures, and it is ultimately the responsibility of the implementing agencies to adopt mitigation.

Where quantified information or analysis is provided, the same source or method was followed as was used for presenting information and analysis on the proposed Plan (see Chapter 2.0, "Approach to Analysis."). The analysis compares the land use growth footprint of each alternative and the major transportation projects associated with each alternative. The major transportation projects are defined as those that would cost over $100 million. Projects that require investment of less than $100 million would be the same across all alternatives.

TRANSPORTATION

Transportation is addressed in Section 2.1, and includes an analysis of the impacts related to changes in per-trip commute and non-commute travel times, traffic congestion (specifically, vehicle miles traveled on congested facilities), vehicle miles traveled per capita, transit utilization, goods movement, and construction activities.

Bay Area travel behavior under baseline (Year 2015) conditions and Year 2040 conditions with the proposed Plan and each alternative, is summarized in **Table 3.1-13. Table 3.1-14** shows differences in per-trip commute travel time between the various alternatives relative to the proposed Plan. **Table 3.1-15** shows differences in per-trip non-commute travel time between the various alternatives relative to the proposed Plan. **Table 3.1-16** shows differences in regional AM peak period, PM peak period, and daily per-capita congested VMT between the various alternatives relative to the proposed Plan. **Table 3.1-17** shows differences in AM peak period, PM peak period, and daily per-capita congested VMT by county for the various alternatives relative to the proposed Plan. **Table 3.1-18** summarizes a comparison of significant impacts for the various alternatives at the regional and county level. **Table 3.1-19** shows differences in daily per-capita VMT between the various alternatives by county relative to the proposed Plan. **Table 3.1-20** shows percent utilization of public transit systems, by technology. **Table 3.1-20** shows AM peak period, PM peak period, and daily transit utilization for each of the alternatives.

Table 3.1-13 Bay Area Travel Behavior (2015-2040)

Metric	Year 2015	Year 2040 Proposed Plan	Year 2040 No Project	% Difference from Proposed Plan	Year 2040 Main Streets	% Difference from Proposed Plan	Year 2040 Big Cities	% Difference from Proposed Plan	Year 2040 EEJ	% Difference from Proposed Plan
Daily[1] Transit Boardings	2,279,000	3,208,900	2,666,100	-17%	2,831,000	-12%	3,460,300	8%	3,376,900	5%
Daily Vehicle Miles of Travel (VMT)[2]	158,406,800	191,528,600	195,759,300	2%	195,437,200	2%	187,145,000	-2%	187,138,400	-2%
Daily[z] Vehicle Miles of Travel[2] per Capita[3]	20.9	20.0	20.5	2%	20.4	2%	19.6	-2%	19.6	-2%
Total Daily Vehicle Trips	**21,227,800**	**26,018,900**	**26,438,400**	**2%**	**26,325,200**	**1%**	**25,717,000**	**-1%**	**25,796,100**	**-1%**
Daily Vehicle Hours of Recurring Delay	353,200	531,100	953,400	80%	604,700	14%	687,600	29%	659,400	24%
Daily Vehicle Hours of Recurring Delay (Freeways)	222,800	323,400	497,000	54%	324,200	0%	306,300	-5%	369,800	14%
Daily Vehicle Hours of Recurring Delay (Expressways and Arterials)	99,200	126,400	370,200	193%	167,500	33%	309,100	145%	210,200	66%
Daily Vehicle Hours of Recurring Delay (Other Facilities)	31,300	81,300	86,200	6%	113,000	39%	72,200	-11%	79,400	-2%
Daily Vehicle Hours of Non-Recurrent Delay[3]	144,900	188,000	275,800	47%	192,400	2%	189,500	1%	223,000	19%
Total Daily Vehicle Hours of Delay	**498,100**	**719,100**	**1,229,200**	**71%**	**797,100**	**11%**	**877,100**	**22%**	**882,400**	**23%**
Average Delay per Vehicle (Minutes) **Typical Weekday Personal Trips**	**25,889,800**	**31,907,300**	**31,923,600**	**0%**	**31,976,600**	**0%**	**31,746,800**	**-1%**	**31,841,300**	**0%**

Notes:

1 Daily metrics are measured for a typical weekday.

2 Only reflects interzonal trips (assigned directly to the highway network); includes intraregional, interregional, commercial vehicle trips, and trips to and from the airport and high-speed rail stations.

3 Total daily VMT is calculated using Travel Model One; therefore, to calculate per-capita VMT, it is essential to use simulated population levels to ensure consistency. Simulated population may be slightly different than overall population forecasts for Plan Bay Area EIR alternatives due to slight variability in modeling tools. Further clarification on this issue can be found in the Plan Bay Area EIR technical appendices.

4 Only includes non-recurrent delay on freeway facilities.

Source: Metropolitan Transportation Commission Travel Forecasts, 2015. Data provided by MTC in 2017.

Table 3.1-14 Per-Trip Commute Travel Time, by Mode (2015-2040)

Mode	Year 2015	Year 2040 Proposed Plan	Year 2040 No Project	% Difference from Proposed Plan	Year 2040 Main Streets	% Difference from Proposed Plan	Year 2040 Big Cities	% Difference from Proposed Plan	Year 2040 EEJ	% Difference from Proposed Plan
Drive Alone	19.6	19.9	23.1	16%	20.5	3%	20.1	1%	20.3	2%
Carpool	21.8	22.0	26.3	19%	22.7	3%	22.1	0%	22.6	3%
Transit	38.9	38.1	39.7	4%	39.4	3%	38.6	1%	38.2	0%
Walk	21.5	21.2	21.3	0%	21.2	0%	21.2	0%	21.3	0%
Bike	13.4	13.4	13.5	1%	13.5	1%	13.6	1%	13.5	1%
All Modes	**22.3**	**22.6**	**25.4**	**12%**	**23.1**	**2%**	**23.0**	**1%**	**23.1**	**2%**

Source: Metropolitan Transportation Commission Travel Forecasts, 2015. Data provided by MTC in 2017.

Table 3.1-15 Per-Trip Non-Commute Travel Time, by Mode (2015-2040)

Mode	Year 2015	Year 2040 Proposed Plan	2040 No Project	% Difference from Proposed Plan	Year 2040 Main Streets	% Difference from Proposed Plan	Year 2040 Big Cities	% Difference from Proposed Plan	Year 2040 EEJ	% Difference from Proposed Plan
Drive Alone	11.5	11.9	12.2	3%	12.0	1%	12.4	5%	11.8	0%
Carpool	11.1	11.4	11.7	2%	11.6	1%	12.1	5%	11.4	0%
Transit	33.9	33.2	34.9	5%	34.4	4%	34.4	3%	33.3	0%
Walk	17.9	17.9	18.1	2%	17.9	0%	17.8	0%	18.0	1%
Bike	10.9	11.0	11.0	0%	11.0	0%	11.0	0%	11.0	0%
All Modes	**12.9**	**13.3**	**13.5**	**1%**	**13.4**	**1%**	**13.9**	**5%**	**13.3**	**0%**

Source: Metropolitan Transportation Commission Travel Forecasts, 2015. Data provided by MTC in 2017.

Table 3.1-16 Regional Per-capita Vehicle Miles of Travel by Level of Service (2015-2040)

LOS[1] (V/C Ratio)	Year 2015	Year 2040 Proposed Plan	Year 2040 No Project	% Difference from Proposed Plan	Year 2040 Main Streets	% Difference from Proposed Plan	Year 2040 Big Cities	% Difference from Proposed Plan	Year 2040 EEJ	% Difference from Proposed Plan
AM Peak Period (6 AM to 10 AM)										
A-C (< 0.75)	3.48	3.09	2.74	-11%	3.09	0%	2.86	-7%	2.80	-9%
D-E (0.75-1.00)	1.32	1.30	1.40	8%	1.47	13%	1.45	12%	1.39	7%
F (> 1.00)	**0.23**	**0.22**	**0.57**	**159%**	**0.21**	**-5%**	**0.17**	**-23%**	**0.29**	**32%**
Total	5.01	4.60	4.70	2%	4.75	3%	4.47	-3%	4.47	-2%
PM Peak Period (3 PM to 7 PM)										
A-C (< 0.75)	3.85	3.31	2.98	-10%	3.38	2%	3.09	-6%	2.98	-10%
D-E (0.75-1.00)	1.43	1.65	1.78	8%	1.73	5%	1.71	4%	1.76	7%
F (> 1.00)	**0.15**	**0.22**	**0.44**	**100%**	**0.20**	**-9%**	**0.24**	**9%**	**0.26**	**18%**
Total	5.43	5.18	5.2	0%	5.31	3%	5.04	-3%	5.00	-3%
Daily										
A-C (< 0.75)	15.85	14.52	13.99	-1%	14.69	1%	13.81	-5%	13.68	-6%
D-E (0.75-1.00)	3.02	3.46	3.80	10%	3.67	6%	3.76	9%	3.70	7%
F (> 1.00)	**0.38**	**0.44**	**1.05**	**139%**	**0.46**	**5%**	**0.42**	**-5%**	**0.58**	**32%**
Total	19.25	18.42	18.84	2%	18.82	2%	17.99	-2%	17.96	-2%

Notes:

1 LOS (level of service) measures traffic density with a range of A to F. LOS A-C reflect free-flow conditions with minimal delay. LOS D-E reflects somewhat congested conditions with some possible delays. LOS F reflects very congested conditions with significant volumes greater than roadway capacity, leading to significant delays.

2 Total daily VMT is calculated using Travel Model One; therefore, to calculate per-capita VMT, it is essential to use simulated population levels to ensure consistency. Simulated population may be slightly different than overall population forecasts for Plan Bay Area EIR alternatives due to slight variability in modeling tools.

Source: Metropolitan Transportation Commission Travel Forecasts, 2015. Data provided by MTC in 2017.

Table 3.1-17 Per-capita Vehicle Miles of Travel by Level of Service and County (2015-2040)

LOS[1] (V/C Ratio)	County	Year 2015	Year 2040 Proposed Plan	Year 2040 No Project	% Difference from Proposed Plan	Year 2040 Main Streets	% Difference from Proposed Plan	Year 2040 Big Cities	% Difference from Proposed Plan	Year 2040 EEJ	% Difference from Proposed Plan
AM Peak Period (6 AM to 10 AM)											
A-C (< 0.75)	Alameda	0.79	0.63	0.59	-6%	0.65	3%	0.59	-6%	0.59	-6%
	Contra Costa	0.43	0.42	0.37	-12%	0.43	2%	0.40	-5%	0.38	-10%
	Marin	0.13	0.12	0.09	-25%	0.10	-17%	0.12	0%	0.11	-8%
	Napa	0.09	0.07	0.07	0%	0.07	0%	0.07	0%	0.07	0%
	San Francisco	0.18	0.14	0.14	0%	0.14	0%	0.14	0%	0.14	0%
	San Mateo	0.43	0.38	0.34	-11%	0.38	0%	0.36	-5%	0.34	-11%
	Santa Clara	0.88	0.87	0.70	-20%	0.81	-7%	0.73	-16%	0.72	-17%
	Solano	0.29	0.25	0.23	-8%	0.28	12%	0.24	-4%	0.24	-4%
	Sonoma	0.24	0.20	0.20	0%	0.21	5%	0.20	0%	0.20	0%
	Adjacent Counties	0.02	0.01	0.01	0%	0.02	100%	0.01	0%	0.01	0%
	Regional Total	**3.48**	**3.09**	**2.74**	**-11%**	**3.09**	**0%**	**2.86**	**-7%**	**2.80**	**-9%**
D-E (0.75-1.00)	Alameda	0.36	0.44	0.36	-18%	0.45	2%	0.46	5%	0.44	0%
	Contra Costa	0.25	0.21	0.23	10%	0.23	10%	0.20	-5%	0.21	0%
	Marin	0.07	0.04	0.07	75%	0.07	75%	0.05	25%	0.05	25%
	Napa	0.01	0.01	0.01	0%	0.01	0%	0.01	0%	0.01	0%
	San Francisco	0.06	0.06	0.07	17%	0.08	33%	0.08	33%	0.07	17%
	San Mateo	0.11	0.10	0.12	20%	0.10	0%	0.10	0%	0.11	10%
	Santa Clara	0.31	0.27	0.36	33%	0.38	41%	0.38	41%	0.33	22%
	Solano	0.09	0.11	0.12	9%	0.08	-27%	0.11	0%	0.11	0%
	Sonoma	0.06	0.06	0.06	0%	0.07	17%	0.06	0%	0.06	0%
	Adjacent Counties	0.00	0.00	0.00	0%	0.00	0%	0.00	0%	0.00	0%
	Regional Total	**1.32**	**1.30**	**1.40**	**8%**	**1.47**	**13%**	**1.45**	**12%**	**1.39**	**7%**
F (> 1.00)	Alameda	0.08	0.08	0.19	138%	0.06	-25%	0.05	-38%	0.08	0%
	Contra Costa	0.05	0.04	0.15	275%	0.03	-25%	0.01	-75%	0.09	125%
	Marin	0.01	0.02	0.03	50%	0.02	0%	0.00	-100%	0.02	0%
	Napa	0.00	0.00	0.00	0%	0.00	0%	0.00	0%	0.00	0%
	San Francisco	0.02	0.02	0.02	0%	0.02	0%	0.02	0%	0.02	0%
	San Mateo	0.01	0.01	0.01	0%	0.01	0%	0.01	0%	0.01	0%
	Santa Clara	0.04	0.03	0.14	367%	0.05	67%	0.07	133%	0.05	67%
	Solano	0.01	0.01	0.02	100%	0.01	0%	0.01	0%	0.01	0%

Table 3.1-17 Per-capita Vehicle Miles of Travel by Level of Service and County (2015-2040)

LOS[1] (V/C Ratio)	County	Year 2015	Year 2040 Proposed Plan	Year 2040 No Project	% Difference from Proposed Plan	Year 2040 Main Streets	% Difference from Proposed Plan	Year 2040 Big Cities	% Difference from Proposed Plan	Year 2040 EEJ	% Difference from Proposed Plan
	Sonoma	0.01	0.01	0.01	0%	0.01	0%	0.00	-100%	0.01	0%
	Adjacent Counties	0.00	0.00	0.00	0%	0.00	0%	0.00	0%	0.00	0%
	Regional Total	**0.23**	**0.22**	**0.57**	**159%**	**0.21**	**-5%**	**0.17**	**-23%**	**0.29**	**32%**
AM Peak Period Total		**5.01**	**4.60**	**4.70**	**2%**	**4.75**	**3%**	**4.47**	**-3%**	**4.47**	**-3%**
PM Peak Period (3 PM to 7 PM)											
A-C (< 0.75)	Alameda	0.84	0.64	0.57	-11%	0.66	3%	0.64	0%	0.60	-6%
	Contra Costa	0.50	0.49	0.43	-12%	0.48	-2%	0.47	-4%	0.44	-10%
	Marin	0.16	0.12	0.11	-8%	0.12	0%	0.14	17%	0.12	0%
	Napa	0.08	0.07	0.07	0%	0.07	0%	0.07	0%	0.07	0%
	San Francisco	0.21	0.14	0.16	14%	0.16	14%	0.13	-7%	0.14	0%
	San Mateo	0.46	0.40	0.36	-10%	0.39	-3%	0.37	-8%	0.37	-8%
	Santa Clara	0.97	0.93	0.77	-17%	0.91	-2%	0.77	-17%	0.76	-18%
	Solano	0.36	0.28	0.27	-4%	0.35	25%	0.27	-4%	0.25	-11%
	Sonoma	0.25	0.22	0.22	0%	0.22	0%	0.22	0%	0.21	-5%
	Adjacent Counties	0.02	0.02	0.02	0%	0.02	0%	0.01	-100%	0.02	0%
	Regional Total	**3.85**	**3.31**	**2.98**	**-10%**	**3.38**	**2%**	**3.09**	**-7%**	**2.98**	**-10%**
D-E (0.75-1.00)	Alameda	0.42	0.55	0.50	-9%	0.57	4%	0.50	-9%	0.53	-4%
	Contra Costa	0.24	0.21	0.26	24%	0.23	10%	0.19	-10%	0.23	10%
	Marin	0.06	0.07	0.08	14%	0.08	14%	0.05	-29%	0.07	0%
	Napa	0.01	0.01	0.01	0%	0.01	0%	0.01	0%	0.01	0%
	San Francisco	0.06	0.10	0.10	0%	0.11	10%	0.12	20%	0.10	0%
	San Mateo	0.12	0.12	0.14	17%	0.14	17%	0.14	17%	0.13	8%
	Santa Clara	0.40	0.41	0.50	22%	0.46	12%	0.52	27%	0.48	17%
	Solano	0.05	0.11	0.11	0%	0.04	-64%	0.11	0%	0.13	18%
	Sonoma	0.07	0.07	0.08	14%	0.09	29%	0.07	0%	0.08	14%
	Adjacent Counties	0.00	0.00	0.00	0%	0.00	0%	0.00	0%	0.00	0%
	Regional Total	**1.43**	**1.65**	**1.78**	**8%**	**1.73**	**5%**	**1.71**	**4%**	**1.76**	**7%**

Table 3.1-17 Per-capita Vehicle Miles of Travel by Level of Service and County (2015-2040)

LOS[1] (V/C Ratio)	County	Year 2015	Year 2040 Proposed Plan	Year 2040 No Project	% Difference from Proposed Plan	Year 2040 Main Streets	% Difference from Proposed Plan	Year 2040 Big Cities	% Difference from Proposed Plan	Year 2040 EEJ	% Difference from Proposed Plan
F (> 1.00)	Alameda	0.05	0.08	0.16	100%	0.05	-38%	0.07	-13%	0.10	25%
	Contra Costa	0.02	0.03	0.10	233%	0.03	0%	0.01	-67%	0.04	33%
	Marin	0.00	0.00	0.01	0%	0.01	0%	0.00	0%	0.00	0%
	Napa	0.00	0.00	0.00	0%	0.00	0%	0.00	0%	0.00	0%
	San Francisco	0.02	0.05	0.03	-40%	0.03	-40%	0.05	0%	0.05	0%
	San Mateo	0.01	0.01	0.02	100%	0.01	0%	0.01	0%	0.01	0%
	Santa Clara	0.03	0.03	0.09	200%	0.05	67%	0.09	200%	0.04	33%
	Solano	0.01	0.01	0.02	100%	0.01	0%	0.01	0%	0.01	0%
	Sonoma	0.01	0.01	0.01	0%	0.01	0%	0.00	-100%	0.01	0%
	Adjacent Counties	0.00	0.00	0.00	0%	0.00	0%	0.00	0%	0.00	0%
	Regional Total	**0.15**	**0.22**	**0.44**	**100%**	**0.20**	**-9%**	**0.24**	**9%**	**0.26**	**18%**
PM Peak Period Total		**5.43**	**5.18**	**5.20**	**0%**	**5.31**	**3%**	**5.04**	**-3%**	**5.00**	**-3%**
Daily											
A-C (< 0.75)	Alameda	3.75	3.25	3.09	-5%	3.31	2%	3.12	-4%	3.13	-4%
	Contra Costa	2.10	2.04	2.07	1%	2.06	1%	1.91	-6%	1.95	-4%
	Marin	0.63	0.55	0.51	-7%	0.53	-4%	0.56	2%	0.53	-4%
	Napa	0.31	0.28	0.27	-4%	0.27	-4%	0.27	-4%	0.28	0%
	San Francisco	0.87	0.69	0.72	4%	0.72	4%	0.70	1%	0.68	-1%
	San Mateo	1.74	1.59	1.48	-7%	1.58	-1%	1.49	-6%	1.47	-8%
	Santa Clara	4.02	3.92	3.69	-6%	3.90	-1%	3.63	-7%	3.52	-10%
	Solano	1.37	1.23	1.20	-2%	1.34	9%	1.19	-3%	1.18	-4%
	Sonoma	1.00	0.90	0.89	-1%	0.92	2%	0.88	-2%	0.88	-2%
	Adjacent Counties	0.06	0.07	0.07	0%	0.06	-14%	0.06	-14%	0.06	-14%
	Regional Total	**15.85**	**14.52**	**13.99**	**-4%**	**14.69**	**1%**	**13.81**	**-5%**	**13.68**	**-6%**
D-E (0.75-1.00)	Alameda	0.85	1.16	1.09	-6%	1.17	1%	1.14	-2%	1.15	-1%
	Contra Costa	0.50	0.44	0.53	20%	0.48	9%	0.40	-9%	0.46	5%
	Marin	0.13	0.12	0.15	25%	0.15	25%	0.11	-8%	0.13	8%
	Napa	0.02	0.02	0.02	0%	0.02	0%	0.02	0%	0.02	0%
	San Francisco	0.17	0.27	0.27	0%	0.29	7%	0.30	11%	0.27	0%
	San Mateo	0.25	0.24	0.32	33%	0.27	13%	0.29	21%	0.30	25%
	Santa Clara	0.82	0.81	1.01	25%	0.98	21%	1.13	40%	0.94	16%

Table 3.1-17 Per-capita Vehicle Miles of Travel by Level of Service and County (2015-2040)

LOS[1] (V/C Ratio)	County	Year 2015	Year 2040 Proposed Plan	Year 2040 No Project	% Difference from Proposed Plan	Year 2040 Main Streets	% Difference from Proposed Plan	Year 2040 Big Cities	% Difference from Proposed Plan	Year 2040 EEJ	% Difference from Proposed Plan
	Solano	0.14	0.24	0.25	4%	0.13	-46%	0.23	-4%	0.26	8%
	Sonoma	0.13	0.15	0.15	0%	0.17	13%	0.13	-13%	0.16	7%
	Adjacent Counties	0.01	0.01	0.01	0%	0.01	0%	0.01	0%	0.01	0%
	Regional Total	**3.02**	**3.46**	**3.80**	**10%**	**3.67**	**6%**	**3.76**	**9%**	**3.70**	**7%**
F (> 1.00)	Alameda	0.13	0.17	0.35	106%	0.11	-35%	0.12	-29%	0.19	12%
	Contra Costa	0.07	0.07	0.25	257%	0.06	-14%	0.02	-71%	0.13	86%
	Marin	0.02	0.02	0.04	100%	0.03	50%	0.00	-100%	0.02	0%
	Napa	0.00	0.00	0.00	0%	0.01	-	0.00	0%	0.01	-
	San Francisco	0.04	0.07	0.05	-29%	0.05	-29%	0.07	0%	0.07	0%
	San Mateo	0.01	0.02	0.03	50%	0.03	50%	0.02	0%	0.02	0%
	Santa Clara	0.07	0.06	0.27	350%	0.12	100%	0.17	183%	0.10	67%
	Solano	0.02	0.01	0.03	200%	0.02	100%	0.01	0%	0.02	100%
	Sonoma	0.02	0.02	0.02	0%	0.03	50%	0.01	-50%	0.02	0%
	Adjacent Counties	0.00	0.00	0.01	0%	0.00	0%	0.00	0%	0.00	0%
	Regional Total	**0.38**	**0.44**	**1.04**	**136%**	**0.46**	**5%**	**0.42**	**-5%**	**0.58**	**32%**
Daily Total		**19.25**	**18.42**	**18.84**	**2%**	**18.82**	**2%**	**17.99**	**-2%**	**17.96**	**-2%**

Notes: "-" indicates value not applicable or cannot be calculated.

1 LOS (level of service) measures traffic density with a range of A to F. LOS A-C reflect free-flow conditions with minimal delay. LOS D-E reflects somewhat congested conditions with some possible delays. LOS F reflects very congested conditions with significant volumes greater than roadway capacity, leading to significant delays.

2 VMT is calculated using Travel Model One; therefore, to calculate per-capita VMT, it is essential to use simulated population levels to ensure consistency. Simulated population may be slightly different than overall population forecasts for Plan Bay Area EIR alternatives due to slight variability in modeling tools.

Source: Metropolitan Transportation Commission Travel Forecasts, 2015. Data provided by MTC in 2017.

Table 3.1-18 Summary of Per-Capita Congested Vehicle Miles Traveled Impacts

Time Period / County	Year 2040 Proposed Plan	Year 2040 No Project	Year 2040 Main Streets	Year 2040 Big Cities	Year 2040 EEJ
Regional					
AM Peak Period		X			
PM Peak Period	X	X	X	X	X
Daily		X	X	X	X
County					
Alameda	X	X		X	X
Contra Costa	X	X	X		X
Marin		X	X		X
Napa	X	X	X		X
San Francisco	X	X	X	X	X
San Mateo	X	X	X	X	X
Santa Clara		X	X	X	X
Solano		X	X	X	X
Sonoma		X	X		

Notes: "X" and shading indicates impact identified.

Source: Metropolitan Transportation Commission Travel Forecasts, 2015. Data provided by MTC in 2017.

Table 3.1-19 Daily Vehicle Miles of Travel Per Capita, by County (2015-2040)

Metric	County	Year 2015	Year 2040 Proposed Plan	2040 No Project	% Difference from Proposed Plan	Year 2040 Main Streets	% Difference from Proposed Plan	Year 2040 Big Cities	% Difference from Proposed Plan	Year 2040 EEJ	% Difference from Proposed Plan
Daily[1] Vehicle Miles of Travel (VMT)[2]	Alameda	38,343,700	46,927,300	46,339,500	-1%	47,084,300	0%	44,915,300	-4%	45,942,100	-2%
	Contra Costa	22,212,100	26,892,800	30,036,700	12%	27,339,700	2%	24,588,900	-9%	26,741,800	-1%
	Marin	6,453,600	7,182,600	7,287,600	1%	7,290,200	1%	6,914,600	-4%	7,077,200	-1%
	Napa	2,838,400	3,303,900	3,194,500	-3%	3,283,300	-1%	3,133,700	-5%	3,258,400	-1%
	San Francisco	8,734,100	10,527,400	10,637,900	1%	10,855,500	3%	10,889,000	3%	10,449,100	-1%
	San Mateo	16,429,700	19,138,100	18,897,500	-1%	19,352,600	1%	18,567,000	-3%	18,637,000	-3%
	Santa Clara	40,657,200	50,081,100	51,889,800	4%	52,202,000	4%	51,762,200	3%	47,894,900	-4%
	Solano	12,328,200	15,114,500	15,094,600	0%	15,122,900	0%	14,550,500	-4%	14,904,600	-1%
	Sonoma	9,867,100	11,609,800	11,550,500	-1%	12,162,100	5%	11,086,300	-5%	11,467,800	-1%
	Regional Total	**157,864,100**	**190,777,500**	**194,928,600**	**2%**	**194,692,600**	**2%**	**186,407,500**	**-2%**	**186,372,900**	**-2%**
Simulated Population[3]	Alameda	1,630,800	2,084,300	1,942,200	-7%	2,040,700	-2%	1,923,100	-8%	2,109,500	1%
	Contra Costa	1,075,500	1,362,800	1,602,700	18%	1,348,000	-1%	1,221,100	-10%	1,373,300	1%
	Marin	255,700	273,000	295,000	8%	268,900	-2%	264,100	-3%	278,300	2%
	Napa	137,600	157,100	165,800	6%	158,200	1%	151,600	-4%	164,800	5%
	San Francisco	920,000	1,170,100	1,101,200	-6%	1,154,500	-1%	1,245,400	6%	1,175,900	0%
	San Mateo	759,500	904,900	879,300	-3%	881,100	-3%	896,400	-1%	905,000	0%
	Santa Clara	1,900,000	2,522,000	2,501,300	-1%	2,595,700	3%	2,861,000	13%	2,476,400	-2%
	Solano	410,200	495,400	507,100	2%	478,900	-3%	448,600	-9%	487,500	-2%
	Sonoma	481,200	591,100	571,900	-3%	637,100	8%	542,700	-8%	588,700	0%
	Regional Total	**7,570,500**	**9,560,700**	**9,566,500**	**0%**	**9,563,100**	**0%**	**9,554,000**	**0%**	**9,559,400**	**0%**

Table 3.1-19 Daily Vehicle Miles of Travel Per Capita, by County (2015-2040)

Metric	County	Year 2015	Year 2040 Proposed Plan	2040 No Project	% Difference from Proposed Plan	Year 2040 Main Streets	% Difference from Proposed Plan	Year 2040 Big Cities	% Difference from Proposed Plan	Year 2040 EEJ	% Difference from Proposed Plan
Daily[a] Vehicle Miles of Travel[2] per Capita[3]	Alameda	23.5	22.5	23.9	6%	23.1	2%	23.4	4%	21.8	-3%
	Contra Costa	20.7	19.7	18.7	-5%	20.3	3%	20.1	2%	19.5	-1%
	Marin	25.2	26.3	24.7	-6%	27.1	3%	26.2	0%	25.4	-3%
	Napa	20.6	21.0	19.3	-8%	20.8	-1%	20.7	-2%	19.8	-6%
	San Francisco	9.5	9.0	9.7	7%	9.4	5%	8.7	-3%	8.9	-1%
	San Mateo	21.6	21.1	21.5	2%	22.0	4%	20.7	-2%	20.6	-3%
	Santa Clara	21.4	19.9	20.7	4%	20.1	1%	18.1	-9%	19.3	-3%
	Solano	30.1	30.5	29.8	-2%	31.6	4%	32.4	6%	30.6	0%
	Sonoma	20.5	19.6	20.2	3%	19.1	-3%	20.4	4%	19.5	-1%
	Regional Total	**20.9**	**20.0**	**20.5**	**2%**	**20.4**	**2%**	**19.6**	**-2%**	**19.6**	**-2%**

Notes:

1 Daily metrics are measured for a typical weekday.

2 Only reflects interzonal trips (assigned directly to the highway network); includes intraregional, interregional, commercial vehicle trips, and trips to and from the airport and high-speed rail station. Trips within adjacent counties are not reported. These trips amount to less than 0.5 percent of the total regional vehicle miles travel under each scenario.

3 Total daily VMT is calculated using Travel Model One; therefore, to calculate per-capita VMT, it is essential to use simulated population levels to ensure consistency. Simulated population may be slightly different than overall population forecasts for Plan Bay Area EIR alternatives due to slight variability in modeling tools. Further clarification on this issue can be found in the Plan Bay Area EIR technical appendices.

Source: Metropolitan Transportation Commission Travel Forecasts, 2015. Data provided by MTC in 2017.

Table 3.1-20 Percent Utilization1 of Public Transit Systems, By Technology (2015-2040)

Technology	Year 2015	Year 2040 Proposed Plan	2040 No Project	Year 2040 Main Streets	Year 2040 Big Cities	Year 2040 EEJ
AM Peak Period (6 AM to 10 AM)						
Local bus	36%	42%	40%	39%	44%	43%
Light rail[2]	57%	55%	73%	72%	74%	64%
Ferry	36%	49%	32%	30%	33%	40%
Express bus	51%	37%	49%	55%	36%	43%
Heavy rail[3]	60%	49%	68%	57%	47%	52%
Commuter rail[4]	7%	15%	6%	5%	9%	4%
All technologies	41%	40%	46%	42%	41%	42%
PM Peak Period (3 PM to 7 PM)						
Local bus	34%	42%	39%	38%	43%	43%
Light rail[2]	56%	55%	72%	70%	77%	63%
Ferry	24%	30%	21%	18%	17%	22%
Express bus	49%	39%	46%	51%	36%	42%
Heavy rail[3]	46%	40%	53%	45%	38%	42%
Commuter rail[4]	6%	12%	5%	4%	8%	3%
All technologies	**35%**	**36%**	**39%**	**37%**	**36%**	**37%**
Daily						
Local bus	26%	33%	30%	30%	35%	34%
Light rail[2]	44%	41%	56%	56%	57%	47%
Ferry	17%	24%	15%	13%	15%	18%
Express bus	41%	31%	40%	43%	32%	36%
Heavy rail[3]	37%	33%	42%	36%	31%	35%
Commuter rail[4]	5%	12%	4%	4%	7%	3%
All technologies	**29%**	**30%**	**33%**	**30%**	**30%**	**31%**

Notes:

1. Percent utilization measures the passenger seat-miles required by forecasted transit patrons as a percentage of total passenger seat-miles provided by transit operators (i.e. the percentage of seats on transit vehicles filled with passengers). Utilization levels greater than 80 percent reflect conditions where passengers either would have difficulty finding a seat or would have to stand during all or part of their ride.
2. Reflects utilization of Muni Metro and VTA light rail systems.
3. Reflects utilization of BART heavy rail system.
4. Reflects utilization of Caltrain, SMART, Capitol Corridor, and ACE commuter rail systems.

Source: Metropolitan Transportation Commission Travel Demand Forecasts, 2015. Data provided by MTC in 2017.

Alternative 1, No Project

Under the No Project Alternative, impacts associated with per-trip commute travel times would be significant and unavoidable because the thresholds for drive alone and carpool modes would be exceeded. Overall, compared to the proposed Plan, the average per-trip commute travel time would be 12 percent longer on average and would be 16 percent longer for drive alone and 19 percent longer for carpool modes. Compared to existing (Year 2015) conditions, per-trip commute travel time would be 18 percent longer for drive alone and 21 percent longer for carpool trips. The No Project Alternative would result in a significant impact associated with per-trip commute travel time because the alternative would cause a greater than 5 percent increase in per-trip non-commute travel time for drive alone and carpool trips, relative to existing conditions. This impact would be significant and unavoidable, and **greater** than the proposed Plan (Impact 2.1-1 is less than significant under the proposed Plan).

Under the No Project Alternative, impacts associated with per-trip non-commute travel times would be significant and unavoidable because the thresholds for drive alone and carpool modes would be exceeded. Overall, compared to the proposed Plan, the average per-trip non-commute travel time would be about 1 percent longer on average. Compared to existing conditions, per-trip non-commute travel time would be 6 percent longer for drive alone and about 5 percent longer for carpool modes. The No Project Alternative would result in a significant impact associated with per-trip non-commute travel time because the alternative would cause a greater than 5 percent increase in per-trip non-commute travel time for drive alone and carpool trips, relative to existing conditions. This impact would be significant and unavoidable, and **greater** than the proposed Plan (Impact 2.1-2 is less than significant under the proposed Plan).

Under the No Project Alternative, impacts associated with per-capita congested VMT would be significant and unavoidable because the thresholds would be exceeded at the regional and county levels during at least one analysis period. Compared to the proposed Plan, the No Project Alternative would result in impacts to the five Bay Area counties impacted under the proposed Plan (Alameda, Contra Costa, Marin, San Francisco, and San Mateo) and two additional counties (Santa Clara and Solano) during at least one time period. The No Project Alternative would not exceed thresholds for per-capita congested VMT in Napa or Sonoma counties. The No Project Alternative would result in a significant impact associated with per-capita congested VMT because the alternative would cause a greater than 5 percent increase in per-capita congested VMT, relative to existing conditions, in seven of the nine Bay Area counties during at least one time period. This impact would be significant and unavoidable, and **greater** than the proposed Plan.

Under the No Project Alternative, impacts associated with per-capita VMT would be less than significant because the thresholds for per-capita VMT would not be exceeded. Overall, compared to the proposed Plan, the regional average per-capita VMT would be 2 percent higher on average. Average per-capita VMT would be between 4 percent and 5 percent higher in Alameda County, San Francisco County, San Mateo County, Santa Clara County, and Sonoma County and would be between 2 percent and 8 percent lower in the remaining counties. The No Project Alternative would result in a less than significant impact associated with per-capita VMT because the alternative would not cause a greater than 5 percent increase in per-capita VMT for the region or any individual county, relative to existing conditions. This impact would be less than significant for the reasons described under Impact 2.1-4, and **similar** to the proposed Plan.

Under the No Project Alternative, impacts associated with transit utilization would be less than significant because the thresholds for transit utilization would not be exceeded. Overall, compared to the proposed Plan, the average utilization of light rail would increase by between 15 and 17 percentage points and utilization would approach 75 percent during the AM peak period and PM peak period. Additionally, compared to the proposed Plan, the average utilization of express bus and heavy rail technologies would increase by up to 12 and 19 percentage points, respectively, during the AM peak period. Ferry utilization would decrease by up to 17 percentage points (from 49 percent to 32 percent) during the AM peak period. Commuter rail utilization would decrease by between 7 and 9 percentage points during each analysis period. This impact would be less than significant for the reasons described under Impact 2.1-5, and **similar** to the proposed Plan.

Under the No Project Alternative, the impacts associated with goods movement would be less than significant because the thresholds for goods movement would not be exceeded. This impact would be less than significant for the reasons described under Impact 2.1-6, and **similar** to the proposed Plan.

Under the No Project Alternative, the specific construction activities have not yet been finalized and cannot be certain at this time. However, transportation-related impacts could occur from travel lane closures, detours, and/or congestion resulting from increased truck traffic on local roads as construction vehicles and workers travel to and from project sites. Therefore, this impact would be significant and unavoidable for the reasons described under Impact 2.1-7, and **similar** to the proposed Plan.

Alternative 2, Main Streets

Under the Main Streets Alternative, impacts associated with per-trip commute travel times would be less than significant because the thresholds would not be exceeded. Overall, compared to the proposed Plan, the average per-trip commute travel time would be 2 percent longer on average and would be 3 percent longer for drive alone, commute, and transit trips, and 1 percent longer for bike trips. No individual travel mode would experience a significant impact (greater than 5 percent increase) on per-trip commute travel time compared to existing conditions, as a result of the Main Streets Alternative. This impact would be less than significant for the reasons described under Impact 2.1-1, and **similar** to the proposed Plan.

Under the Main Streets Alternative, impacts associated with per-trip non-commute travel times would be less than significant because the thresholds would not be exceeded. Overall, compared to the proposed Plan, the average per-trip non-commute travel time would be 1 percent longer on average and would be 4 percent longer for transit trips, and 1 percent longer for drive alone and commute trips. No individual travel mode would experience a significant impact (greater than 5 percent increase) on per-trip non-commute travel time compared to existing conditions, as a result of the Main Streets Alternative. This impact would be less than significant for the reasons described under Impact 2.1-2, and **similar** to the proposed Plan.

Under the Main Streets Alternative, impacts associated with per-capita congested VMT would be significant and unavoidable because the thresholds would be exceeded at the regional and county levels during at least one analysis period. Compared to the proposed Plan, the Main Streets Alternative would result in impacts to four of the five Bay Area counties impacted under the proposed Plan (Contra Costa, Marin, San Francisco, and San Mateo) and two additional counties (Santa Clara and Sonoma) during at least one time period. The Main Streets Alternative would not exceed thresholds for per-capita congested VMT in Alameda, Napa, or Solano counties. The Main Streets Alternative would result in a significant impact associated with per-capita congested VMT because the alternative would cause a greater than 5 percent increase in per-capita congested VMT, relative to existing conditions, in six of the nine Bay Area counties during at least one time period. This impact would be significant and unavoidable for the reasons described under Impact 2.1-3, and **greater** than the proposed Plan.

Under the Main Streets Alternative, impacts associated with per-capita VMT would be significant and unavoidable because the thresholds for per-capita VMT would be exceeded for Marin County. Overall, compared to the proposed Plan, the regional average per-capita VMT would be 2 percent higher on average. Average per-capita VMT would be between 1 percent and 5 percent higher in Alameda County, Contra Costa County, Marin County, San Francisco County, San Mateo County, Santa Clara County, and Solano County and would be 1 percent lower in Napa County and 3 percent lower in Sonoma County. The Main Streets Alternative would result in a significant impact associated with per-capita VMT because the alternative would cause an 8 percent increase in per-capita congested VMT in Marin County, relative to existing conditions, and would exceed the established 5 percent threshold. This impact would be significant and unavoidable, and **greater** than the proposed Plan (Impact 2.1-4 is less than significant under the proposed Plan).

Under the Main Streets Alternative, impacts associated with transit utilization would be less than significant because the thresholds for transit utilization would not be exceeded. Overall, compared to the proposed Plan, the average utilization of light rail would increase by between 15 and 17 percentage points and utilization would approach 75 percent during the AM peak period and PM peak period. Additionally, compared to the

proposed Plan, the average utilization of express bus would increase by up to 18 percentage points during the AM peak period. Ferry utilization would decrease by up to 19 percentage points (from 49 percent to 30 percent) during the AM peak period. Commuter rail utilization would decrease by between 8 and 10 percentage points during each analysis period. This impact would be less than significant for the reasons described under Impact 2.1-5, and **similar** to the proposed Plan.

Under the Main Streets Alternative, the impacts associated with goods movement would be less than significant because the thresholds for goods movement would not be exceeded. This impact would be less than significant for the reasons described under Impact 2.1-6, and **similar** to the proposed Plan.

Under the Main Streets Alternative, the specific construction activities have not yet been finalized and cannot be certain at this time. However, transportation-related impacts could occur from travel lane closures, detours, and/or congestion resulting from increased truck traffic on local roads as construction vehicles and workers travel to and from project sites. Therefore, this impact would be significant and unavoidable for the reasons described under Impact 2.1-7, and **similar** to the proposed Plan.

Alternative 3, Big Cities

Under the Big Cities Alternative, impacts associated with per-trip commute travel times would be less than significant because the thresholds would not be exceeded. Overall, compared to the proposed Plan, the average per-trip commute travel time would be 2 percent longer on average and would be 1 percent longer for drive alone, transit, and bike trips. No individual travel mode would experience a significant impact (greater than 5 percent increase) on per-trip commute travel time compared to existing conditions, as a result of the Big Cities Alternative. This impact would be less than significant for the reasons described under Impact 2.1-1, and **similar** to the proposed Plan.

Under the Big Cities Alternative, impacts associated with per-trip non-commute travel times would be significant and unavoidable because the thresholds for drive alone and carpool modes would be exceeded. Overall, compared to the proposed Plan, the average per-trip non-commute travel time would be about 1 percent longer on average. Compared to existing conditions, per-trip non-commute travel time would be 6 percent longer for drive alone and about 5 percent longer for carpool modes. The Big Cities Alternative would result in a significant impact associated with per-trip non-commute travel time because the alternative would cause a greater than 5 percent increase in per-trip non-commute travel time for drive alone and carpool trips, relative to existing conditions. This impact would be significant and unavoidable, and **greater** than the proposed Plan (Impact 2.1-2 is less than significant under the proposed Plan).

Under the Big Cities Alternative, impacts associated with per-capita congested VMT would be significant and unavoidable because the thresholds would be exceeded at the regional and county levels during at least one analysis period. Compared to the proposed Plan, the Big Cities Alternative would result in impacts to three of the five Bay Area counties impacted under the proposed Plan (Alameda, San Francisco, and San Mateo) and one additional county (Santa Clara) during at least one time period. The Big Cities Alternative would not exceed thresholds for per-capita congested VMT in Contra Costa, Marin, Napa, Solano, or Sonoma counties. The Big Cities Alternative would result in a significant impact associated with per-capita congested VMT because the alternative would cause a greater than 5 percent increase in per-capita congested VMT, relative to existing conditions, in four of the nine Bay Area counties during at least one time period. This impact would be significant and unavoidable for the reasons described under Impact 2.1-3, and **similar** to the proposed Plan.

Under the Big Cities Alternative, impacts associated with per-capita VMT would be significant and unavoidable because the thresholds for per-capita VMT would be exceeded for Solano County. Overall, compared to the proposed Plan, the regional average per-capita VMT would be 2 percent lower on average. Average per-capita VMT would be between 2 percent and 6 percent higher in Alameda County, Contra Costa County, Solano County, and Sonoma County and would be between 2 percent and 9 percent lower in Napa County, San Francisco County, San Mateo County, and Santa Clara County. There would be no change in per-capita VMT in Marin County. The Big Cities Alternative would result in a significant impact associated with per-capita VMT because the alternative would cause an 8 percent increase in per-capita congested VMT in Solano County,

relative to existing conditions, and would exceed the established 5 percent threshold. This impact would be significant and unavoidable, and **greater** than the proposed Plan (Impact 2.1-4 is less than significant under the proposed Plan).

Under the Big Cities Alternative, impacts associated with transit utilization would be less than significant because the thresholds for transit utilization would not be exceeded. Overall, compared to the proposed Plan, the average utilization of light rail would increase by between 16 and 22 percentage points and utilization would approach the threshold of 80 percent during the PM peak period. Compared to the proposed Plan, the average utilization of express bus would increase by up to 18 percentage points (from 37 percent to 55 percent) during the AM peak period. Commuter rail utilization would decrease by between 8 and 10 percentage points during each analysis period. This impact would be less than significant for the reasons described under Impact 2.1-5, and **similar** to the proposed Plan.

Under the Big Cities Alternative, the impacts associated with goods movement would be less than significant because the thresholds for goods movement would not be exceeded. This impact would be less than significant for the reasons described under Impact 2.1-6, and **similar** to the proposed Plan.

Under the Big Cities Alternative, the specific construction activities have not yet been finalized and cannot be certain at this time. However, transportation-related impacts could occur from travel lane closures, detours, and/or congestion resulting from increased truck traffic on local roads as construction vehicles and workers travel to and from project sites. Therefore, this impact would be significant and unavoidable for the reasons described under Impact 2.1-7, and **similar** to the proposed Plan.

Alternative 4, EEJ

Under the EEJ Alternative, impacts associated with per-trip commute travel times would be less than significant because the thresholds would not be exceeded. Overall, compared to the proposed Plan, the average per-trip commute travel time would be 2 percent longer on average and would be 3 percent longer for carpool trips, 2 percent longer for drive alone trips, and 1 percent longer for bike trips. No individual travel mode would experience a significant impact (greater than 5 percent increase) on per-trip commute travel time compared to existing conditions, as a result of the EEJ Alternative. This impact would be less than significant for the reasons described under Impact 2.1-1, and **similar** to the proposed Plan.

Under the EEJ Alternative, impacts associated with per-trip non-commute travel times would be less than significant because the thresholds would not be exceeded. Overall, compared to the proposed Plan, the average per-trip commute travel time would not change and would be 1 percent longer for walk trips. No individual travel mode would experience a significant impact (greater than 5 percent increase) on per-trip commute travel time, compared to existing conditions, as a result of the EEJ Alternative. This impact would be less than significant for the reasons described under Impact 2.1-2, and **similar** to the proposed Plan.

Under the EEJ Alternative, impacts associated with per-capita congested VMT would be significant and unavoidable because the thresholds would be exceeded at the regional and county levels during at least one analysis time period. Compared to the proposed Plan, the EEJ Alternative would result in impacts to all of the five Bay Area counties impacted under the proposed Plan (Alameda, Contra Costa, Marin, San Francisco, and San Mateo) and one additional county (Santa Clara) during at least one time period. The EEJ Alternative would not exceed thresholds for per-capita congested VMT in Napa, Solano, or Sonoma counties. The EEJ Alternative would result in a significant impact associated with per-capita congested VMT because the alternative would cause a greater than 5 percent increase in per-capita congested VMT, relative to existing conditions, in six of the nine Bay Area counties during at least one time period. This impact would be significant and unavoidable for the reasons described under Impact 2.1-3, and **greater** than the proposed Plan.

Under the EEJ Alternative, impacts associated with per-capita VMT would be less than significant because the thresholds for per-capita VMT would not be exceeded. Overall, compared to the proposed Plan, the regional average per-capita VMT would be 2 percent lower on average. Average per-capita VMT would not change in Solano County and would be between 1 percent and 6 percent lower in the remaining eight Bay Area counties.

The EEJ Alternative would result in a less than significant impact associated with per-capita VMT because the alternative would not cause a greater than 5 percent increase in per-capita VMT for the region or any individual county, relative to existing conditions. This impact would be less than significant for the reasons described under Impact 2.1-4, and **similar** to the proposed Plan.

Under the EEJ Alternative, impacts associated with transit utilization would be less than significant because the thresholds for transit utilization would not be exceeded. The average utilization of each transit technology would be within 11 percentage points of the proposed Plan during each analysis period. This impact would be less than significant for the reasons described under Impact 2.1-5, and **similar** to the proposed Plan.

Under the EEJ Alternative, the impacts associated with goods movement would be less than significant because the thresholds for goods movement would not be exceeded. This impact would be less than significant for the reasons described under Impact 2.1-6, and **similar** to the proposed Plan.

Under the EEJ Alternative, the specific construction activities have not yet been finalized and cannot be certain at this time. However, transportation-related impacts could occur from travel lane closures, detours, and/or congestion resulting from increased truck traffic on local roads as construction vehicles and workers travel to and from project sites. Therefore, this impact would be significant and unavoidable for the reasons described under Impact 2.1-7, and **similar** to the proposed Plan.

AIR QUALITY

Air quality is addressed in Section 2.2, which includes an analysis of: criteria air pollutant emissions and toxic air contaminants (TACs). The relative magnitude of differences in the impacts between alternatives is generally related to modeling outputs using EMFAC 2014. The comparison of non-quantified impacts are discussed qualitatively, below.

Alternative 1, No Project

Key themes embedded in the 2010 and draft 2017 Clean Air Plans include: the need to reduce motor vehicle emissions by driving cleaner, driving smarter, and driving less; reducing per capita VMT and promoting policies that enable families to reduce their motor vehicle ownership; designing communities where people can walk, bike, or use transit on a convenient basis; and ensuring that focused growth in priority areas is planned and designed to protect people from both existing sources and new sources of emissions. The proposed Plan include the Climate Policy Initiative and several transportation projects that would meet these goals. The same programs and projects are not included in the No Project Alternative. Thus, it is not expected that the No Project Alternative would meet the 2017 Clean Air Plan. This impact would be significant. Available mitigation measures would require a program similar to the Climate Initiatives Program included under the proposed Plan. However, the Climate Initiative Program is not anticipated to reduce impacts to a less-than-significant level. Thus, this impact would be significant and unavoidable, and **greater** than the proposed Plan (Impact 2.2-1 is less than significant for the proposed Plan).

Impacts of the proposed Plan related to construction-related emissions are generally regional in nature. Construction equipment and processes are generally similar between land use and transportation projects, except that transportation projects could result in more paving and concrete activity and tend to be larger than land use projects. Under the No Project Alternative enough housing would be developed to accommodate projected growth as well as various transportation projects. Although EPA and ARB have adopted stringent air diesel PM emission regulations for construction equipment, these regulations alone cannot assure that all projects consistent with the proposed Plan would use only the lowest emissions-generating construction equipment due primarily to the fleet averaging component of the compliance requirements. Additionally, dust emissions from construction activity would occur from the disturbance of unpaved sites and material handling. Construction could also occur at any point under the Plan build-out period and could potentially occur over a short period of time, resulting in substantial construction-related emissions on a daily basis. Thus, this impact would be significant and unavoidable for the reasons described under Impact 2.2-2, and **similar** to the proposed Plan.

The area-source emissions of criteria pollutants and precursors would increase over the planning horizon of the Plan due to the net increase in land use development and transportation projects. As shown in **Table 3.1-21**, there would be greater criteria air pollutant emissions under the No Project Alternative compared to the proposed Plan. Thus, this impact would be significant and unavoidable for the reasons described under Impact 2.2-3, and **greater** than the proposed Plan.

Table 3.1-21 Net Mobile- and Area-Source Emissions Anticipated by Alternative (tons/day)

Alternative	Source	ROG	NO_X[2]	CO	PM_{10}	$PM_{2.5}$
Proposed Plan	Mobile	-36.9	-75.9	-302.3	5.1	0.1
	Area	15.9	4.9	68.4	7.1	7.1
	Total	-21.0	-71.0	-233.9	12.2	7.2
No Project	Mobile	-36.2	-75.3	-296.9	6.3	0.4
	Area	16.2	5.5	69.0	7.3	7.3
	Total	-20.0	-69.8	-227.9	13.6	7.7
	Percent Change from Proposed Plan	**4.7%**	**1.7%**	**2.6%**	**11.0%**	**6.2%**
Main Streets	Mobile	-36.5	-75.4	-299.8	5.9	0.3
	Area	15.8	4.8	68.0	7.1	7.1
	Total	-20.7	-70.7	-231.8	12.9	7.4
	Percent Change from Proposed Plan	**1.4%**	**0.4%**	**0.9%**	**6.0%**	**1.7%**
Big Cities	Mobile	-37.2	-76.7	-304.4	4.3	-0.1
	Area	16.0	4.6	67.9	6.9	6.9
	Total	-21.3	-72.0	-236.5	11.2	6.8
	Percent Change from Proposed Plan	**-1.4%**	**-1.5%**	**-1.1%**	**-8.3%**	**-5.4%**
EEJ	Mobile	-37.3	-76.6	-304.3	4.2	-0.1
	Area	15.9	4.9	68.4	7.1	7.1
	Total	-21.4	-71.6	-235.9	11.3	7.0
	Percent Change from Proposed Plan	**-2.1%**	**-0.9%**	**-0.9%**	**-7.1%**	**-2.7%**

Various State regulations control TAC emissions, including: the Toxic Air Contaminant Identification and Control Act, the Air Toxics "Hot Spots" Information and Assessment Act, and requirements for the California Air Resources Board and local Air Districts to identify control measures for PM. Other state regulations that reduce smog or other pollutants also reduce TACs, such as the standards for low emission vehicles, clean fuels, reformulated gasoline, diesel fuel specifications, and ARB's Heavy Duty Diesel Inspection Programs discussed above. In addition, there are a number of programs in place to address PM in general and TACs in particular, including ARB, BAAQMD, and Port of Oakland's Bay Area Goods Movement Program that provides financial incentives to owners of equipment used in freight movement to upgrade to cleaner technologies, and numerous Port of Oakland Clean Air Programs such as the Maritime Air Quality Improvement Plan, Comprehensive Truck Management Plan, Truck Air Quality Project, Vision 2000 Program and Air Emissions, and West Oakland Particulate Air Quality Monitoring Program. These programs are expected to reduce TAC emissions from the 2015 to 2040 period. Thus, this impact would be less than significant for the reasons described under Impact 2.2-4, and **similar** to the proposed Plan.

Although exhaust-related emissions would decrease in the region between 2015 and 2040, the CARE communities in the region would experience higher total $PM_{2.5}$ emissions between 2015 and 2040 in comparison with non-CARE portions of the County. Total $PM_{2.5}$ emissions would also increase in the Plan area as a whole. Mapping of sensitive receptors was not completed for the No Project Alternative; however, it is assumed that TAC emissions would increase in CARE communities due to increase population levels and vehicle usage through 2040. Thus, this impact would be significant and unavoidable for the reasons described under Impact 2.2-5, and **similar** to the proposed Plan.

The proposed Plan could locate sensitive receptors in areas where TACs or fine particulate matter ($PM_{2.5}$) concentrations result in cancer risk levels greater than 100 in a million or a concentration of $PM_{2.5}$ greater than 0.8 micro grams (µg) per cubic meter (m^3). Mapping of sensitive receptors was not completed for the No Project Alternative; however, it is assumed that TAC emissions would increase due to increased population levels and vehicle usage through 2040. Thus, this impact would be significant and unavoidable for the reasons described under Impact 2.2-6, and **similar** to the proposed Plan.

Alternative 2, Main Streets

Key themes embedded in the 2010 and draft 2017 Clean Air Plans include: the need to reduce motor vehicle emissions by driving cleaner, driving smarter, and driving less; reducing per capita VMT and promoting policies that enable families to reduce their motor vehicle ownership; designing communities where people can walk, bike, or use transit on a convenient basis; and ensuring that focused growth in priority areas is planned and designed to protect people from both existing sources and new sources of emissions. The Main Streets Alternative includes the Climate Initiatives Program, transportation projects, and a projected development pattern that would result in reduced emissions. This impact would be less than significant for the reasons described under Impact 3.5-1, and **similar** to the proposed Plan.

Impacts of the proposed Plan related to construction-related emissions are generally regional in nature. Construction equipment and processes are generally similar between land use and transportation projects, except that transportation projects could result in more paving and concrete activity and tend to be larger than land use projects. Under the Main Streets Alternative enough housing would be developed to accommodate projected growth as well as various transportation projects. Thus, this impact would be significant and unavoidable for the reasons described under Impact 2.2-2, and **similar** to the proposed Plan.

The area-source emissions of criteria pollutants and precursors would increase over the planning horizon of the Plan due to the net increase in land use development and transportation projects. As shown in **Table 3.1-21**, there would greater criteria air pollutant emissions under the Main Streets Alternative compared to the proposed Plan. Thus, this impact would be significant and unavoidable for the reasons described under Impact 2.2-3, and **greater** than the proposed Plan.

Various State regulations control TAC emissions, including: the Toxic Air Contaminant Identification and Control Act, the Air Toxics "Hot Spots" Information and Assessment Act, requirements for the California Air Resources Board and local Air Districts to identify control measures for PM, and numerous other state regulations. These programs are expected to reduce TAC emissions from the 2015 to 2040 period. Thus, this impact would be less than significant for the reasons described under Impact 2.2-4, and **similar** to the proposed Plan.

Although exhaust-related emissions would decrease in the region between 2015 and 2040, the CARE communities in the region would experience higher total $PM_{2.5}$ emissions between 2015 and 2040 in comparison with non-CARE portions of the County. Total $PM_{2.5}$ emissions would also increase in the Plan area as a whole. Mapping of sensitive receptors was not completed for the Main Streets Alternative, however, it is assumed that TAC emissions will increase in CARE communities due to increase population levels and vehicle usage through 2040. Thus, this impact would be significant and unavoidable for the reasons described under Impact 2.2-5, and **similar** to the proposed Plan.

The proposed Plan could locate sensitive receptors in areas where TACs or fine particulate matter ($PM_{2.5}$) concentrations result in cancer risk levels greater than 100 in a million or a concentration of $PM_{2.5}$ greater than 0.8 micro grams (µg) per cubic meter (m^3). Mapping of sensitive receptors was not completed for the Main Streets Alternative; however, it is expected that TAC emissions would increase due to increased population levels and vehicle usage through 2040. Thus, this impact would be significant and unavoidable for the reasons described under Impact 2.2-6, and **similar** to the proposed Plan.

Alternative 3, Big Cities

Key themes embedded in the 2010 and draft 2017 Clean Air Plans include: the need to reduce motor vehicle emissions by driving cleaner, driving smarter, and driving less; reducing per capita VMT and promoting policies

that enable families to reduce their motor vehicle ownership; designing communities where people can walk, bike, or use transit on a convenient basis; and ensuring that focused growth in priority areas is planned and designed to protect people from both existing sources and new sources of emissions. The Big Cities Alternative includes the Climate Initiatives Program, transportation projects, and a projected development pattern that would result in reduced emissions. This impact would be less than significant for the reasons described under Impact 2.2-1, and **similar** to the proposed Plan.

Impacts of the proposed Plan related to construction-related emissions are generally regional in nature. Construction equipment and processes are generally similar between land use and transportation projects, except that transportation projects could result in more paving and concrete activity and tend to be larger than land use projects. Under the Big Cities Alternative enough housing would be developed to accommodate projected growth as well as various transportation projects. Thus, this impact would be significant and unavoidable for the reasons described under Impact 2.2-2, and **similar** to the proposed Plan.

The area-source emissions of criteria pollutants and precursors would increase over the planning horizon of the Plan due to the net increase in land use development and transportation projects. As shown in **Table 3.1-21**, there would less criteria air pollutant emissions under the Big Cities Alternative compared to the proposed Plan. Thus, this impact would be significant and unavoidable for the reasons described under Impact 2.2-3, and **less** than the proposed Plan.

Various State regulations control TAC emissions, including the Toxic Air Contaminant Identification and Control Act, the Air Toxics "Hot Spots" Information and Assessment Act, requirements for the California Air Resources Board and local Air Districts to identify control measures for PM, and numerous other state regulations. These programs are expected to reduce TAC emissions from the 2015 to 2040 period. Thus, this impact would be less than significant for the reasons described under Impact 2.2-4, and **similar** to the proposed Plan.

The proposed Plan could locate sensitive receptors in areas where TACs or fine particulate matter ($PM_{2.5}$) concentrations result in cancer risk levels greater than 100 in a million or a concentration of $PM_{2.5}$ greater than 0.8 micro grams (µg) per cubic meter (m^3). Although exhaust-related emissions would decrease in the region between 2015 and 2040, the CARE communities in the region would experience higher total $PM_{2.5}$ emissions between 2015 and 2040 in comparison with non-CARE portions of the County. Total $PM_{2.5}$ emissions would also increase in the Plan area as a whole. Mapping of sensitive receptors was not completed for the Big Cities Alternative; however, it is expected that TAC emissions overall and in CARE communities would increase due to increased population levels and vehicle usage through 2040. Thus, this impact would be significant and unavoidable for the reasons described under Impact 2.2-5, and **similar** to the proposed Plan.

The proposed Plan could locate sensitive receptors in areas where TACs or fine particulate matter ($PM_{2.5}$) concentrations result in cancer risk levels greater than 100 in a million or a concentration of $PM_{2.5}$ greater than 0.8 micro grams (µg) per cubic meter (m^3). Mapping of sensitive receptors was not completed for the Big Cities Alternative; however, it is expected that TAC emissions would increase due to increased population levels and vehicle usage through 2040. Thus, this impact would be significant and unavoidable for the reasons described under Impact 2.2-6, and **similar** to the proposed Plan.

Alternative 4, EEJ

Key themes embedded in the 2010 and draft 2017 Clean Air Plans include: the need to reduce motor vehicle emissions by driving cleaner, driving smarter, and driving less; reducing per capita VMT and promoting policies that enable families to reduce their motor vehicle ownership; designing communities where people can walk, bike, or use transit on a convenient basis; and ensuring that focused growth in priority areas is planned and designed to protect people from both existing sources and new sources of emissions. The EEJ Alternative includes the Climate Initiatives Program, transportation projects, and a projected development pattern that would result in reduced emissions. This impact would be less than significant for the reasons described under Impact 2.2-1, and **similar** to the proposed Plan.

Impacts of the proposed Plan related to construction-related emissions are generally regional in nature. Construction equipment and processes are generally similar between land use and transportation projects, except that transportation projects could result in more paving and concrete activity and tend to be larger than land use projects. Under the EEJ Alternative enough housing would be developed to accommodate projected growth as well as various transportation projects. Thus, this impact would be significant and unavoidable for the reasons described under Impact 2.2-2, and **similar** to the proposed Plan.

The area-source emissions of criteria pollutants and precursors would increase over the planning horizon of the Plan due to the net increase in land use development and transportation projects. As shown in **Table 3.1-21**, there would less criteria air pollutant emissions under the EEJ Alternative compared to the proposed Plan. Thus, this impact would be significant and unavoidable for the reasons described under Impact 2.2-3, and **less** than the proposed Plan.

Various State regulations control TAC emissions, including: the Toxic Air Contaminant Identification and Control Act, the Air Toxics "Hot Spots" Information and Assessment Act, requirements for the California Air Resources Board and local Air Districts to identify control measures for PM, and numerous other state regulations. These programs are expected to reduce TAC emissions from the 2015 to 2040 period. Thus, this impact would be less than significant for the reasons described under Impact 2.2-4, and **similar** to the proposed Plan.

Although exhaust-related emissions would decrease in the region between 2015 and 2040, the CARE communities in the region would experience higher total $PM_{2.5}$ emissions between 2015 and 2040 in comparison with non-CARE portions of the County. Total $PM_{2.5}$ emissions would also increase in the Plan area as a whole. Mapping of sensitive receptors was not completed for the EEJ Alternative, however, it is assumed that TAC emissions will increase in CARE communities due to increase population levels and vehicle usage through 2040. Thus, this impact would be significant and unavoidable for the reasons described under Impact 2.2-5, and **similar** to the proposed Plan.

The proposed Plan could locate sensitive receptors in areas where TACs or fine particulate matter ($PM_{2.5}$) concentrations result in cancer risk levels greater than 100 in a million or a concentration of $PM_{2.5}$ greater than 0.8 micro grams (µg) per cubic meter (m^3). Mapping of sensitive receptors was not completed for the EEJ Alternative, however, it is assumed that TAC emissions will increase due to increase population levels and vehicle usage through 2040. Thus, this impact would be significant and unavoidable for the reasons described under Impact 2.2-6, and **similar** to the proposed Plan.

LAND USE AND PHYSICAL DEVELOPMENT

Land use and physical development is addressed in Section 2.3, which includes an analysis of: displacement of substantial numbers of people and housing; physical division to an established community; conflicts with land use plans, policies, or regulations, and loss or conversion of farmland, open space, and forest land.

Effects associated with displacement, summarized below, are based on information provided in the Equity Analysis Report, a supplemental report to the proposed Plan. The Equity Analysis Report contains quantitative analyses of 6 performance targets (i.e., the targets associated with equitable access and economic vitality goals) shown above in Section 3.4, "Project Objectives." The analyses compare the relative performance of the proposed Plan and the alternatives by comparing model outputs for the No Project Alternative, proposed Plan, Main Streets Alternative, Big Cities Alternative, and EEJ Alternative. The risk of displacement is associated with performance target 7, and is referenced below to compare the relative magnitude of effects related to Impact 2.3-1. The risk of displacement associated with each alternative in the Equality Analysis Report is reported as follows: increase of 18 percent for the No Project Alternative; increase of 6 percent for the Main Streets Alternative; increase of 9 percent for the Main Streets Alternative; increase of 5 percent for the proposed Plan; and increase of 5 percent for the EEJ Alternative. The full Equality Analysis Report is available for review online at 2040.planbayarea.org.

The relative magnitude of differences in the impacts between alternatives is generally related to the land use growth footprint and transportation projects footprint that would be anticipated under each alternative. Tables 3.1-22 through 3.1-24 show the differences in the calculated acreages of effects on farmland, protected open space, and forestland between the proposed Plan and the alternatives. The comparison of non-quantified impacts are discussed qualitatively, below.

Table 3.1-22 Farmland Acres that Overlap with the Land Use Growth Footprint and Transportation Projects Footprint, by Alternative

Alternative	Prime	State Importance	Local Importance	Unique	Grazing	Williamson Act
Land Use Growth Footprint						
Proposed Plan	410	140	890	20	3,600	200
No Project Alternative	7,700	1,110	5,100	610	8,700	4,400
Main Streets Alternative	700	60	540	110	2,500	470
Big Cities Alternative	20	20	610	90	1,500	30
EEJ Alternative	480	140	1,700	80	2,900	150
Transportation Projects Footprint						
Proposed Plan	30	2	90	9	650	10
No Project Alternative	0	0	0	0	0	0
Main Streets Alternative	360	20	400	80	1,200	140
Big Cities Alternative	0	0	0	1	100	<1
EEJ Alternative	0	0	0	0	100	<1

Notes: Numbers less than 1 are shown as "<1"; Whole numbers have been rounded (between 0 and 10 to the nearest whole number, between 11 and 999 to the nearest 10, between 1,000 and 1,000,000 to the nearest 100, above 1,000,000 to the nearest 1,000). This data represent a subset of the transportation projects analyzed in Chapter 2 of this EIR (i.e., those that cost greater than $100 million).

Source: DOC 2015, MTC 2017

Table 3.1-23 Protected Open Space Acres that Overlap with the Land Use Growth Footprint and Transportation Projects Footprint, by Alternative

Alternative	Land Use Growth Footprint	Transportation Projects Footprint
Proposed Plan	450	490
No Project Alternative	1,400	3
Main Streets Alternative	440	420
Big Cities Alternative	220	350
EEJ Alternative	450	370

Notes: Numbers less than 1 are shown as "<1"; Whole numbers have been rounded (between 0 and 10 to the nearest whole number, between 11 and 999 to the nearest 10, between 1,000 and 1,000,000 to the nearest 100, above 1,000,000 to the nearest 1,000). This data represent a subset of the transportation projects analyzed in Chapter 2 of this EIR (i.e., those that cost greater than $100 million).

Source: Bay Area Open Space Council 2014, MTC 2017

Table 3.1-24 Forestland Acres that Overlap with the Land Use Growth Footprint and Transportation Projects Footprint, by Alternative

Alternative	Land Use Growth Footprint	Transportation Projects Footprint
Proposed Plan	470	50
No Project Alternative	2,500	0
Main Streets Alternative	400	2
Big Cities Alternative	100	50
EEJ Alternative	500	50

Notes: Numbers less than 1 are shown as "<1"; Whole numbers have been rounded (between 0 and 10 to the nearest whole number, between 11 and 999 to the nearest 10, between 1,000 and 1,000,000 to the nearest 100, above 1,000,000 to the nearest 1,000). This data represent a subset of the transportation projects analyzed in Chapter 2 of this EIR (i.e., those that cost greater than $100 million).

Source: USDA 2016, MTC 2017

Alternative 1, No Project

The No Project Alternative assumes enough housing in the region to meet forecasted demand. Development of the proposed Plan included preparation of the Equity Report (referenced previously). This report includes an analysis of equitable access, or displacement risk, for communities of concern (populations that are minority, low-income, senior, or disabled and people with limited English proficiency; zero-vehicle and rent-burdened households; and single-parent families) and the region as a whole. The proposed Plan increases the risk of displacement by 5 percent, while the No Project Alternative increases the displacement risk by 18 percent (see the Equity Analysis Supplemental Report for Plan Bay Area 2040 for more information). The displacement risk was higher under the No Project Alternative compared to the proposed Plan despite assuming the same housing number because it lacked any coordinated regional policies – such as inclusionary zoning – to help reduce displacement. Furthermore, it produces more housing at the periphery of urban areas and less in the region's core, where housing is most needed to alleviate the imbalance between supply and demand. The impact related to displacement of housing would be significant and unavoidable for the reasons described under Impact 2.3-1, and **greater** than the proposed Plan.

The land use growth footprint under the No Project Alternative would be consistent with existing local general plans, and thus would not be expected to physically divide established communities. Compared to the proposed Plan, there would be fewer transportation projects that could require the acquisition of land in existing communities, but some projects could still divide established communities. This impact would be significant and unavoidable for the reasons described under Impact 2.3-2 for the impacts of transportation projects, and **less** than the proposed Plan.

Implementation of The No Project Alternative assumes that the land use growth footprint would be consistent with general plan policies and zoning districts. The transportation improvements in the proposed Plan are not expected to conflict with the land use designations of current general plans or other planning documents. Thus, this impact would be less-than-significant for the reasons described under Impact 2.3-3 and **similar** to the proposed Plan.

As shown in **Tables 3.1-22 and 3.1-23**, the No Project Alternative land use growth footprint would result in substantially more overlap with farmland and grazing land (23,100 acres) compared to the proposed Plan (5,100 acres), land under Williamson Contract (4,400 acres) compared to the proposed Plan (200 acres); and, open space (1,440 acres) compared to the proposed Plan (450 acres). The transportation projects footprint under the No Project Alternative would overlap in less (0 acres) acres of farmland and grazing land than the proposed Plan (780 acres); less (0 acres) overlap with Williamson Act compared to the proposed Plan (10 acres); and, less (3 acres) overlap over open space compared to the proposed Plan (490 acres). Overall, the No Project Alternative would affect a greater area of agricultural, grazing, and open space land (approximately 24,500 acres) compared to the proposed Plan (approximately 7,000 acres). Thus, this impact would be significant and unavoidable for the reasons described under Impact 2.3-4, and **greater** than the proposed Plan.

As shown in **Table 3.1-24**, the No Project Alternative would have a substantially greater land use growth footprint that overlaps with forestland (2,500 acres) than the proposed Plan (470 acres). Forestland that overlaps with the No Project Alternative transportation project footprint would be less (0 acres) than under the proposed Plan (50 acres). Overall, the No Project Alternative would affect a greater area of forestland (2,500 acres) than the proposed Plan (520 acres). Thus, this impact would be significant and unavoidable for the reasons described under Impact 2.3-5, and **greater** than the proposed Plan.

Alternative 2, Main Streets

The Main Streets Alternative would include provision for enough housing in the region to meet forecasted demand. Similar to the proposed Plan, this could cause displacement. An analysis of the displacement factors indicates that this risk of displacement would be greater under the Main Street Alternative (6 percent) than the proposed Plan (5 percent) (see the Equity Analysis Supplemental Report for more information). Thus, this impact would be significant and unavoidable for the reasons described under Impact 2.3-1, and **greater** than proposed Plan.

The land use growth footprint under the Main Streets Alternative would result in the majority of growth within the region's downtowns of all Bay Area communities. This would result in the most dispersed growth pattern, with an emphasis on multi-family and mixed-use development in downtowns. Compared to the proposed Plan, there would be more investments in highways and road pricing projects, a similar level in arterials, and less in local and regional transit. While the land use growth footprint associated with projected development under the Main Streets Alternative would create more centralized communities, transportation projects could require the acquisition of land in existing communities, which may divide established communities. The types of transportation projects that may divide established communities would be the same for the Main Streets Alternative as the proposed Plan. Thus, impacts would be significant and unavoidable for the reasons described under Impact 2.3-2, and **similar** to the proposed Plan

Because it requires intensification of land uses, implementation of the Main Streets Alternative could result in forecasted development in areas with incompatible zoning or land use designations. As described above under the Main Streets Alternative, land use compatibility would be further addressed during subsequent environmental review as individual projects are implemented and detailed project design or specific plans resolve land use inconsistencies. Thus, this impact would be less-than-significant for the reasons described under Impact 2.3-3, and **similar** to the proposed Plan.

As shown in **Tables 3.1-22 and 3.1-23**, the Main Streets Alternative land use growth footprint would result in less overlap with farmland and grazing land (3,900 acres) compared to the proposed Plan (5,100 acres); more land under Williamson Contract (470 acres) compared to the proposed Plan (200 acres); and less open space (440 acres) compared to the proposed Plan (450 acres). The transportation projects footprint under the Main Street Alternative would overlap with more (2,100 acres) acres of farmland and grazing land than the proposed Plan (800 acres); greater (140 acres) overlap with Williamson Act compared to the proposed Plan (10 acres); and, less (420 acres) overlap over open space compared to the proposed Plan (490 acres). Overall, the Main Street Alternative would affect a greater area of farmland, grazing land, and open space land (approximately 6,900 acres) compared to the proposed Plan (approximately 6,800 acres). Thus, this impact would be significant and unavoidable for the reasons described under Impact 2.3-4, and **greater** than the proposed Plan.

As shown in **Table 3.1-24**, the Main Streets Alternative would have a less land use growth footprint that overlaps with forestland (400 acres) than the proposed Plan (470 acres). Forestland that overlaps with the Main Street Alternative transportation project footprint would be less (2 acres) than under the proposed Plan (50 acres). Overall, the Main Street Alternative would affect less area of forestland (approximately 400 acres) than the proposed Plan (520 acres). Thus, this impact would be significant and unavoidable for the reasons described under Impact 2.3-5, and **less** than the proposed Plan.

Alternative 3, Big Cities

The Big Cities Alternative would include provision for enough housing in the region to meet forecasted demand. However, this could cause displacement as described for the proposed Plan. An analysis of the displacement factors for the Big Cities Alternative indicates that the risk of displacement would be greater under the Big

Cities Alternative (9 percent) than the proposed Plan (5 percent) (see the Equity Analysis Supplemental Report for more information). Thus, this impact would be significant and unavoidable for the reasons described under Impact 2.3-1, and **greater** than the proposed Plan.

The land use growth footprint associated with projected development under the Big Cities Alternative would result in the majority of growth within the region's largest cities: Oakland, San Jose, and San Francisco. Compared to the proposed Plan, there would be more investments in local and regional transit, and less for highways, arterials, and road pricing projects. While the land use growth footprint would create more centralized communities, transportation projects could require the acquisition of land in existing communities, which may divide established communities. This impact would be significant and unavoidable for the reasons described under Impact 2.3-2, and **similar** to the proposed Plan.

Because it requires intensification of land uses, projected development under the Big Cities Alternative could result in development in areas with incompatible zoning or land use designations. Land use compatibility would be further addressed during subsequent environmental review as individual projects are implemented and detailed project design or specific plans resolve land use inconsistencies. Thus, this impact would be less than significant for the reasons described under Impact 2.3-3, and **similar** to the proposed Plan.

As shown in **Tables 3.1-22 and 3.1-23**, the Big Cities Alternative land use growth footprint would result in less overlap with farmland and grazing land (2,300 acres) compared to the proposed Plan (5,100acres); less land under Williamson Contract (30 acres) compared to the proposed Plan (200 acres); and less open space (220 acres) compared to the proposed Plan (450 acres). The transportation projects footprint under the Big Cities Alternative would overlap with less (100 acres) acres of farmland than the proposed Plan (580 acres); less (<1 acres) overlap with Williamson Act compared to the proposed Plan (10 acres); and, less (350 acres) overlap over open space compared to the proposed Plan (490 acres). Overall, the Big Cities Alternative would affect less area of farmland, grazing land, and open space land (approximately 2,970 acres) compared to the proposed Plan (approximately 6,840 acres). Thus, this impact would be significant and unavoidable for the reasons described under Impact 2.3-4, and **less** than the proposed Plan.

As shown in **Table 3.1-24**, the Big Cities Alternative would have a smaller land use growth footprint that overlaps with forestland (100 acres) than the proposed Plan (470 acres). Forestland that overlaps with the Big Cities Alternative land use growth footprint would be less (50 acres) than under the proposed Plan (50 acres). Overall, the Big Cities Alternative would affect less area of forestland (150 acres) than the proposed Plan (520 acres). Thus, this impact would be significant and unavoidable for the reasons described under Impact 2.3-5, and **less** than the proposed Plan.

Alternative 4, EEJ

The EEJ Alternative would include provision for enough housing in the region to meet forecasted demand. It would result in greater household growth in the East Bay and South Bay counties, and higher job growth in the East Bay and Peninsula. An analysis of the displacement factors for the Alternatives, indicates that the risk of displacement would be similar under the EEJ Alternative as the proposed Plan (see the Equity Analysis Supplemental Report for more information). Thus, this impact would be significant and unavoidable for the reasons described under Impact 2.3-1, and **similar** to the proposed Plan.

The land use growth footprint under the EEJ Alternative would result in greater forecasted household growth in the East Bay and South Bay counties, and higher job growth in the East Bay and Peninsula. A goal of this alternative is to reduce the risk of displacement in urban communities of concern and limit expansion of the transportation system. Compared to the proposed Plan, there would be fewer transportation projects that could require the acquisition of land in existing communities, which may divide established communities. This impact would be significant and unavoidable for the reasons described under Impact 2.3-2, and **less** than the proposed Plan.

Because it requires intensification of land uses, projected development under the EEJ Alternative could result in development in areas with incompatible zoning or land use designations. Land use compatibility would be further addressed during subsequent environmental review as individual projects are implemented and

detailed project design or specific plans resolve land use inconsistencies. Thus, this impact would be less than significant for the reasons described under Impact 2.3-3, and **similar** to the proposed Plan.

As shown in **Tables 3.1-22 and 3.1-23**, the EEJ Alternative land use growth footprint would result in greater overlap with farmland and grazing land (5,300 acres) compared to the proposed Plan (5,100 acres); less land under Williamson Contract (150 acres) compared to the proposed Plan (200 acres); and the same amount of open space as to the proposed Plan (450 acres). The transportation projects footprint under the EEJ Alternative would overlap with less (100 acres) acres of farmland than the proposed Plan (800 acres); less (<1 acres) overlap with Williamson Act compared to the proposed Plan (10 acres); and, less (370 acres) overlap over open space compared to the proposed Plan (490 acres). Overall, the EEJ Alternative would affect less area of agricultural, grazing, and open space land (approximately 2,800 acres) compared to the proposed Plan (approximately 6,800 acres). Thus, this impact would be significant and unavoidable for the reasons described under Impact 2.3-4, and **less** than the proposed Plan.

As shown in **Table 3.1-24**, the EEJ Alternative would have a greater land use growth footprint that overlaps with forestland (500 acres) than the proposed Plan (470 acres). Forestland that overlaps with the EEJ Alternative land use growth footprint would be less (50 acres) than under the proposed Plan (50 acres). Overall, the EEJ Alternative would affect a greater area of forestland (550 acres) than the proposed Plan (520 acres). Thus, this impact would be significant and unavoidable for the reasons described under Impact 2.3-5, and **greater** than the proposed Plan.

ENERGY

Energy is addressed in Section 2.4, and includes an analysis of: overall per capita energy consumption and reliance on fossil fuels such as coal, natural gas, and oil; and reliance on renewable energy sources.

The relative magnitude of differences in the impacts between alternatives is generally related to electricity and natural gas consumption associated with the proposed Plan and alternatives. **Table 3.1-25** shows the differences in the energy consumption between the proposed Plan and the alternatives. The comparison of non-quantified impacts are discussed qualitatively, below.

Table 3.1-25 Energy Consumption by Alternative

	Proposed Plan	No Project	Main Streets	Big Cities	EEJ
Electricity Use (MWh/year)	4,773,600	5,935,800	4,462,600	4,377,000	4,760,900
Natural Gas Use (MMBTU/year)	11,710,000	15,840,300	10,723,900	10,112,900	11,851,300

Alternative 1, No Project

Consideration of per capita energy consumption associated with the proposed Plan and alternatives is related to electricity and natural gas use and per capita VMT, which is directly related to use of petroleum-based fuels. As shown in **Table 3.1-25**, the No Project Alternative would use more electricity and natural gas than the proposed Plan. In addition, VMT per capita would be greater under the No Project Alternative than under the proposed Plan. Although per capita energy use would be greater under the No Project Alternative than the proposed Plan, VMT per capita is projected to decrease in 2040 relative to 2015 (**Table 3.1-13**), which indicates that transportation-related energy efficiency would improve. However, the projected development pattern would result in substantially greater use of electricity (approximately 24 percent) and natural gas (approximately 35 percent) relative to the proposed Plan, as well as the other alternatives. Given that the proposed Plan and three build alternatives have similar levels of natural gas and electricity demand, it is reasonable to conclude that the No Project Alternative's pattern of projected development would result in energy use considered to be less energy efficient and more wasteful. This impact would be significant. Available mitigation measures would require a program similar to the Climate Initiatives Program included under the proposed Plan. However, the Climate Initiative Program is not anticipated to reduce impacts to a

less-than-significant level. Thus, this impact would be significant and unavoidable, and **greater** than the proposed Plan (Impact 2.4-1 is less than significant for the proposed Plan).

The No Project Alternative does not include strategies that support the use of renewable energy and energy efficient measures. As discussed above, the No Project Alternative would result in energy use considered to be inefficient, wasteful, and unnecessary. Thus, the No Project Alternative would fail to incorporate feasible renewable energy or energy efficiency measures into building design, equipment use, transportation, or other project features, or otherwise fail to increase reliance on renewable energy sources. Thus, this impact would be significant. Mitigation measures that would require changes to the pattern of projected development are not feasible. Thus, this impact would be significant and unavoidable, and **greater** than the proposed Plan (Impact 2.4-2 is less than significant for the proposed Plan).

Alternative 2, Main Streets

As shown in **Table 3.1-25**, the Main Streets Alternative would use less electricity and natural gas than the proposed Plan. VMT per capita would be greater under the Main Streets Alternative than under the proposed Plan; however, it would decrease in 2040 relative to 2015 (**Table 3.1-13**), which indicates that transportation-related energy efficiency would improve. For the reasons described under Impact 2.4-1, this impact would be less than significant, and **less** than the proposed Plan.

The Main Streets Alternative includes technological advancements, such as clean vehicles, and incentive programs to encourage travel options that help meet GHG emissions reduction targets. Because GHG reduction targets related to program and travel options are generally related to reduced energy consumption, it is reasonable to assume that the Main Streets Alternative would include feasible renewable energy or energy efficiency measures into building design, equipment use, transportation, or other project features, or otherwise fail to increase reliance on renewable energy sources. Thus, for the reasons described under Impact 2.4-2, this impact would be less than significant and **similar** to the proposed Plan.

Alternative 3, Big Cities

As shown in **Table 3.1-25**, the Big Cities Alternative would use approximately the same levels of electricity and natural gas as the proposed Plan. VMT per capita would be less under the Big Cities Alternative than under the proposed Plan (**Table 3.1-13**). For the reasons described under Impact 2.4-1, this impact would be less than significant and **less** than the proposed Plan.

The Big Cities Alternative includes technological advancements, such as clean vehicles, and incentive programs to encourage travel options that help meet GHG emissions reduction targets. Because GHG reduction targets related to program and travel options are generally related to reduced energy consumption, it is reasonable to assume that the Big Cities Alternative would include feasible renewable energy or energy efficiency measures into building design, equipment use, transportation, or other project features, or otherwise fail to increase reliance on renewable energy sources. Thus, for the reasons described under Impact 2.4-2, this impact would be less than significant and **similar** to the proposed Plan.

Alternative 4, EEJ

As shown in **Table 3.1-25**, the EEJ Alternative would use electricity and natural gas than the proposed Plan. VMT per capita would be less under the EEJ Alternative than under the proposed Plan (**Table 3.1-13**). For the reasons described under Impact 2.4-1, this impact would be less than significant and **less** than the proposed Plan.

The EEJ Alternative includes technological advancements, such as clean vehicles, and incentive programs to encourage travel options that help meet GHG emissions reduction targets. Because GHG reduction targets related to program and travel options are generally related to reduced energy consumption, it is reasonable to assume that the EEJ Alternative would include feasible renewable energy or energy efficiency measures into building design, equipment use, transportation, or other project features, or otherwise fail to increase reliance on renewable energy sources. Thus, for the reasons described under Impact 2.4-2, this impact would be less than significant and **similar** to the proposed Plan.

CLIMATE CHANGE

Climate Change is addressed in Section 2.2, which includes an analysis of criteria air pollutant emissions and toxic air contaminants (TACs). The relative magnitude of differences in the climate change impacts between alternatives is generally related to modeling outputs that examine CO2e emissions related to natural gas and electricity use. **Table 3.1-26** provides net mobile and land use source GHG emissions anticipated for each alternative. The comparison of non-quantified impacts are discussed qualitatively, below.

Table 3.1-26 Net Mobile- and Land Use-Source GHG Emissions Anticipated by Alternative ($MTCO_2e$/year)

Source	Proposed Plan	No Project	Main Streets	Big Cities	EEJ
Mobile	-8,113,000	-5,069,000	-8,487,000	-7,832,000	-23,427,000
Land Use	1,464,400	1,966,100	1,272,100	1,265,400	1,478,900
Total	-6,648,600	-3,102,900	-7,214,900	-6,566,600	-21,948,100
Difference in Net Emissions from Proposed Plan	0	3,545,700	-566,400	81,900	-15,299,500
% Difference from Proposed Plan	0%	53%	-9%	1%	-230%

Source: MTC 2017

As discussed above under Section 3.4, Project Objectives, the Big Cities Alternative, proposed Plan, and EEJ Alternative would meet performance target 1, which is also a legal requirement and a primary objective of the Plan (a decrease of per capita CO_2 emissions from cars and light duty trucks of 15 percent by 2035). The No Project Alternative and Main Streets Alternative would not meet performance target 1. GHG emissions reductions are as follows:

No Project: -2 percent
Main Streets: -14 percent
Big Cities: -17 percent
Proposed Plan: -16 percent
EEJ: -17 percent

Alternative 1, No Project

As shown above, the No Project Alternative would not meet the SB 375 target of reducing GHG emissions by 15 percent by 2040. This impact would be significant. Available mitigation measures would require a program similar to the Climate Initiatives Program included under the proposed Plan. However, the Climate Initiative Program is not anticipated to reduce impacts to a less-than-significant level. Thus, this impact would be significant and unavoidable, and **greater** than the proposed Plan (Impact 2.5-1 is less than significant for the proposed Plan).

Construction-related GHG emissions from implementation of both projected land use development and transportation projects would contribute to GHG emissions, but would not likely result in a net increase in GHG emissions. As shown in **Table 3.1-26**, implementation of the No Project Alternative would result in decreased GHG emissions in 2040 relative to existing conditions. This decrease would not be a great as under the proposed Plan. This impact would be less than significant for the reasons described under Impact 2.5-2, and **greater** than the proposed Plan.

In the absence of State and local jurisdictional action (e.g., city and county CAPs targeted to 2030 and beyond) it is not possible to demonstrate compliance with the SB 32 GHG reduction targets and, similarly it is not possible to meet the long-term targets under S-03-05. Therefore, the No Project Alternative may conflict with an applicable plan, policy, or regulation adopted to reduce emissions of GHGs. This impact would be significant and unavoidable for the reasons described under Impact 2.5-3, and **similar** to the proposed Plan.

Projected development facilitated by the proposed Plan is not expected to conflict with any climate action plans and General Plans of cities and counties located in the jurisdiction of MTC/ABAG, or any local regulations adopted with the intent to reduce GHG emissions. This impact would be less than significant for the reasons described under Impact 2.5-4, and **similar** to the proposed Plan.

The No Project Alternative would result in portions of some transportation projects being constructed in areas projected to be inundated by sea level rise. This impact would be significant and unavoidable for the reasons described under Impact 2.5-5, and **similar** to the proposed Plan.

The No Project Alternative would result in portions of some development projects being constructed in areas projected to be inundated by sea level rise. This impact would be significant and unavoidable for the reasons described under Impact 2.5-6, and **similar** to the proposed Plan.

Alternative 2, Main Streets

As shown above, SB 375 targets would not be met under the Main Streets Alternative. This impact would be significant. Available mitigation measures would be similar to the Climate Initiatives Program included under the proposed Plan. However, it would need to contain substantially more actions to reduce emissions, and it is unknown if feasible mitigation measures are available. Thus, this impact would be significant and unavoidable, and **greater** than the proposed Plan.

As shown in **Table 3.1-26**, implementation of the Main Streets Alternative would result in decreased GHG emissions in 2040 relative to the existing conditions. This decrease would be greater than under the proposed Plan. This impact would be less than significant for the reasons described under Impact 2.5-2, and **less** than the proposed Plan.

In the absence of State and local jurisdictional action (e.g., city and county CAPs targeted to 2030 and beyond) it is not possible to demonstrate compliance with the SB 32 GHG reduction targets and, similarly it is not possible to meet the long-term targets under S-03-05. Therefore, the Main Streets Alternative may conflict with an applicable plan, policy, or regulation adopted to reduce emissions of GHGs. This impact would be significant and unavoidable for the reasons described under Impact 2.5-3, and **similar** to the proposed Plan.

Projected development facilitated under the Main Streets Alternative is not expected to conflict with any climate action plans and General Plans of cities and counties located in the jurisdiction of MTC/ABAG, or any local regulations adopted with the intent to reduce GHG emissions. This impact would be less than significant for the reasons described under Impact 2.5-4, and **similar** to the proposed Plan.

The Main Streets Alternative would result in portions of some transportation projects being constructed in areas projected to be inundated by sea level rise. This impact would be significant and unavoidable for the reasons described under Impact 2.5-5, and **similar** to the proposed Plan.

The Main Streets Alternative would result in portions of some development projects being constructed in areas projected to be inundated by sea level rise. This impact would be significant and unavoidable for the reasons described under Impact 2.5-6, and **similar** to the proposed Plan.

Alternative 3, Big Cities

As shown above, SB 375 targets would be met under the Big Cities Alternative. Reductions in GHG emissions would be greater under the Big Cities Alternative than under the proposed Plan. This impact would be less than significant for the reasons described under Impact 2.5-1, and **less** than the proposed Plan.

As shown in **Table 3.1-26**, implementation of the Big Cities Alternative would result in decreased GHG emissions in 2040 than relative to the existing conditions. This decrease would be less than the proposed Plan. This impact would be less than significant for the reasons described under Impact 2.5-2, and **greater** than the proposed Plan.

In the absence of State and local jurisdictional action (e.g., city and county CAPs targeted to 2030 and beyond) it is not possible to demonstrate compliance with the SB 32 GHG reduction targets and, similarly it is not possible to meet the long-term targets under S-03-05. Therefore, the Big Cities Alternative may conflict with an applicable plan, policy, or regulation adopted to reduce emissions of GHGs. This impact would be significant and unavoidable for the reasons described under Impact 2.5-3, and **similar** to the proposed Plan.

Projected development facilitated under the Big Cities Alternative is not expected to conflict with any climate action plans and General Plans of cities and counties located in the jurisdiction of MTC/ABAG, or any local regulations adopted with the intent to reduce GHG emissions. This impact would be less than significant for the reasons described under Impact 2.5-4, and **similar** to the proposed Plan.

The Big Cities Alternative would result in portions of some transportation projects being constructed in areas projected to be inundated by sea level rise. This impact would be significant and unavoidable for the reasons described under Impact 2.5-5, and **similar** to the proposed Plan.

The Big Cities Alternative would result in portions of some development projects being constructed in areas projected to be inundated by sea level rise. This impact would be significant and unavoidable for the reasons described under Impact 2.5-6, and **similar** to the proposed Plan.

Alternative 4, EEJ

As shown above, SB 375 targets would be met under the EEJ Alternative. Reductions in GHG emissions would be greater under the EEJ Alternative than under the proposed Plan. This impact would be less than significant for the reasons described under Impact 2.5-1, and **less** than the proposed Plan.

As shown in **Table 3.1-26**, implementation of the EEJ Alternative would result in decreased GHG emissions in 2040 than relative to the existing conditions. This decrease would be greater than the proposed Plan. This impact would be less than significant for the reasons described under Impact 2.5-2, and **less** than the proposed Plan.

In the absence of State and local jurisdictional action (e.g., city and county CAPs targeted to 2030 and beyond) it is not possible to demonstrate compliance with the SB 32 GHG reduction targets and, similarly it is not possible to meet the long-term targets under S-03-05. Therefore, the EEJ Alternative may conflict with an applicable plan, policy, or regulation adopted to reduce emissions of GHGs. This impact would be significant and unavoidable for the reasons described under Impact 2.5-3, and **similar** to the proposed Plan.

Projected development facilitated under the EEJ Alternative is not expected to conflict with any climate action plans and General Plans of cities and counties located in the jurisdiction of MTC/ABAG, or any local regulations adopted with the intent to reduce GHG emissions. This impact would be less than significant for the reasons described under Impact 2.5-4, and **similar** to the proposed Plan.

The EEJ Alternative would result in portions of some transportation projects being constructed in areas projected to be inundated by sea level rise. This impact would be significant and unavoidable for the reasons described under Impact 2.5-5, and **similar** to the proposed Plan.

The EEJ Alternative would result in portions of some development projects being constructed in areas projected to be inundated by sea level rise. This impact would be significant and unavoidable for the reasons described under Impact 2.5-6, and **similar** to the proposed Plan.

NOISE

Noise is addressed in Section 2.6, and includes an analysis of: construction noise and vibration, traffic-related noise, and transit-related noise and vibration, and noise from aircraft.

As discussed in Section 2.6, a noise impact would be significant based on several conditions: if a project results in noise levels in excess of thresholds, if an increase in dBA of greater than or equal to 1.5 occurs where the threshold is exceeded; or if an increase in dBA of greater than or equal to 3 occurs where the existing threshold is not exceeded. The thresholds are 65 for arterial and collector streets, and 70 for freeways and expressways. Table 3.1-27 shows roadway types that exceed thresholds (in bold text) for each alternative, and the average change in noise levels for each alternative compared to existing (2015) conditions.

Table 3.1-27 Transportation Noise Levels by Roadway Type under the Alternatives (significant impacts shown in bold)

County	Roadway Type	2015	Proposed Plan		No Project Alternative		Main Streets Alternative		Big Cities Alternative		EEJ Alternative	
			2040 Noise Level	Change from Baseline	2040 Noise Level	Change from Baseline	2040 Noise Level	Change from Baseline	2040 Noise Level	Change from Baseline	2040 Noise Level	Change from Baseline
Alameda	Freeway	**75.9**	**76.1**	0.3	**76.3**	0.4	**71.4**	-4.5	**76.1**	0.3	**76.4**	0.5
	Expressway	69.1	**70.3**	1.2	**70.3**	1.2	65.3	-3.8	**70.3**	1.2	69.9	0.8
	Major Arterial	61.2	**65.5**	**4.3**	61.8	0.6	60.3	-0.8	**65.5**	**4.3**	62.1	0.9
	Collector and Other	54.4	59.0	**4.6**	54.9	0.5	53.6	-0.8	59.0	4.6	55.3	1.0
Contra Costa	Freeway	**74.6**	**74.8**	0.2	**75.3**	0.7	69.1	-5.5	**74.8**	0.2	**75.2**	0.6
	Expressway	69.2	69.8	0.6	**70.0**	0.8	59.5	-9.7	69.8	0.6	68.0	-1.2
	Major Arterial	60.3	61.1	0.7	61.8	1.5	58.7	-1.6	61.1	0.7	61.5	1.2
	Collector and Other	53.8	54.3	0.5	54.8	1.0	51.9	-1.9	54.3	0.5	54.8	1.0
Marin	Freeway	**74.5**	**74.8**	0.3	**74.8**	0.3	**72.4**	-2.1	**74.8**	0.3	**74.8**	0.3
	Major Arterial	61.2	61.5	0.3	61.5	0.3	61.0	-0.2	61.5	0.3	61.3	0.1
	Collector and Other	55.1	55.4	0.4	55.8	0.7	55.0	-0.1	55.4	0.4	55.4	0.3
Napa	Freeway	**74.4**	**74.8**	0.3	**74.4**	0.0	**70.6**	-3.8	**74.8**	0.3	**74.9**	0.5
	Expressway	**71.2**	**71.5**	0.4	**70.8**	-0.4	67.6	-3.6	**71.5**	0.4	**71.6**	0.4
	Major Arterial	60.8	61.1	0.3	60.2	-0.5	59.6	-1.1	61.1	0.3	61.2	0.4
	Collector and Other	53.6	54.1	0.5	52.9	-0.8	53.0	-0.6	54.1	0.5	54.2	0.6
San Francisco	Freeway	**73.8**	**74.5**	0.7	**74.1**	0.4	**71.3**	-2.5	**74.5**	0.7	**74.4**	0.6
	Expressway	67.8	69.8	2.0	68.5	0.8	68.7	0.9	69.8	2.0	69.8	2.0
	Major Arterial	63.4	64.2	0.8	64.1	0.6	63.9	0.5	64.2	0.8	64.1	0.6
	Collector and Other	55.3	57.0	1.8	56.3	1.0	55.9	0.7	57.0	1.8	56.7	1.5
San Mateo	Freeway	**72.8**	**73.2**	0.4	**73.2**	0.4	**74.1**	1.2	**73.2**	0.4	**73.3**	0.5
	Expressway	68.7	69.7	1.1	69.3	0.6	68.8	0.2	69.7	1.1	69.8	1.1
	Major Arterial	60.0	60.6	0.7	60.5	0.5	60.2	0.3	60.6	0.7	60.7	0.8
	Collector and Other	54.3	55.3	1.0	55.5	1.2	55.1	0.7	55.3	1.0	55.4	1.0
Santa Clara	Freeway	**74.3**	**74.7**	0.5	**74.8**	0.5	**71.7**	-2.6	**74.7**	0.5	**74.7**	0.4
	Expressway	68.9	**70.0**	1.1	69.8	0.8	67.3	-1.7	**70.0**	1.1	69.7	0.7
	Major Arterial	60.6	61.9	1.3	61.7	1.1	60.5	-0.1	61.9	1.3	61.7	1.1
	Collector and Other	54.9	56.2	1.3	55.8	0.9	54.5	-0.4	56.2	1.3	56.0	1.1
Solano	Freeway	**75.3**	**76.0**	0.7	**75.9**	0.6	68.7	-6.7	**76.0**	0.7	**76.0**	0.7
	Expressway	67.9	68.6	0.6	68.2	0.3	65.0	-3.0	68.6	0.6	68.5	0.5
	Major Arterial	57.6	58.4	0.8	58.4	0.8	55.6	-2.0	58.4	0.8	58.8	1.2
	Collector and Other	52.1	52.5	0.3	51.9	-0.2	49.4	-2.7	52.5	0.3	52.7	0.5
Sonoma	Freeway	**72.4**	**72.8**	0.4	**72.8**	0.4	69.7	-2.6	**72.8**	0.4	**72.8**	0.4
	Expressway	**70.5**	**72.4**	**1.9**	**71.0**	0.4	69.1	-1.5	**72.4**	**1.9**	**71.2**	0.6
	Major Arterial	60.1	60.8	0.7	60.8	0.7	60.3	0.2	60.8	0.7	60.8	0.7
	Collector and Other	57.3	58.2	0.9	58.1	0.8	57.5	0.2	58.2	0.9	58.0	0.7
Average Change in Noise Level from 2015				1.0		0.5		-1.7		1.0		0.7

Source: Ascent Environmental 2017, MTC 2017

Alternative 1, No Project

Under the No Project Alternative, construction of planned development, including transportation projects, could result in temporary noise and vibration impacts associated with grading, excavating, earthmoving, paving, building construction, and other related activities. Construction activities would require the use of various noise-generating construction equipment such as dozers, loaders, forklifts, cranes, jackhammers, pile drivers, paving equipment, trucks, and various other equipment. The magnitude of noise is related to a receptors proximity to the construction equipment, which is associated with individual projects. This impact would be expected to be significant and unavoidable for the reasons described under Impact 2.6-1, and **similar** to the proposed Plan.

Modeling was completed to assess the noise levels based on the average daily trips along roadways, including: freeways, expressways, major arterials, and collectors. Under the No Project Alternative, impacts associated with traffic noise would be significant and unavoidable because the thresholds for freeways and expressways would be exceeded. Overall, compared to the existing (2015) conditions, the average change in noise throughout the Bay Area for freeways, expressway, major arterials, collectors and other types of roadways would be less than the proposed Plan by 0.5 dBA (**Table 3.1-27**). Thus, this impact would be significant and unavoidable for the reasons described under Impact 2.6-2, and **less** than the proposed Plan.

Locating residential land uses in proximity to transit could result in exposure of future residents to noise levels in excess of land use compatibility standards established for this analysis (i.e., 70 dBA CNEL exterior and 45 dBA CNEL interior). Under the No Project Alternative, there would be substantially less funding for all types of transportation projects compared to the proposed Plan. As shown in **Table 3.1-9**, there would be a smaller increase to daily transit seat miles under the No Project Alternative (approximately 3.6 million) compared to the proposed Plan (approximately 16.5 million), notably in relation to bus trips, heavy rail and commuter rail. Information is not available to assess the relative difference to transit-related noise levels under the No Project Alternative as it would relate to individual routes. However, the increase in capacity to daily heavy and commuter rail transit would be over four times greater under the proposed Plan compared to the No Project Alternative. Thus, there would likely be an increase to the number of trips along some routes in the Bay Area, which would be noticeable to a greater degree under the proposed Plan compared to the No Project Alternative (e.g., as a result of increased number in trips per day along the same routes where noise standards are already exceeded). This impact would be expected to be significant and unavoidable for the reasons described under Impact 2.6-3, and **less** than the proposed Plan.

In addition to exposure to excessive noise levels, locating residential land uses in proximity to transit could also result in exposure of the future residents to vibration levels in excess of standards established by FTA or Caltrans. New households included in the land use growth footprint forecast could exceed the recommended threshold for human disturbance of 72 VdB for sensitive receptors that are exposed to a frequent amount of vibration events. As discussed above, there would be substantially less added daily transit seat miles under the No Project Alternative compared to the proposed Plan. Information is not available to assess the relative difference to transit-related vibration levels under the No Project Alternative; however, it is reasonable to assume that the number of trips along transit routes would be greater under the proposed Plan than the No Project Alternative. Thus, there would likely be a smaller increase in transit-related vibration under the No Project Alternative compared to the proposed Plan. This impact would be significant and unavoidable for the reasons described under Impact 2.6-4, and would be expected to be **less** than the proposed Plan.

The long-term exposure of sensitive receptors to increased operational stationary source noise levels from forecasted land use would come from typical community noise sources such as small mechanical devices (e.g., lawn mowers, leaf blowers), parks and playgrounds, restaurants and bars, commercial uses, and industrial plants. Stationary sources may include HVAC units, delivery trucks loading and unloading at commercial land uses, and other equipment associated with commercial and industrial land uses (e.g., pumps, back-up generators, auto body shops). Based on the noise modeling conducted, projected land use development under the No Project Alternative could place new sensitive land uses in areas where existing ambient noise exceeds the land use compatibility thresholds of 70 dBA CNEL (exterior) and 45 dBA CNEL (interior). Overall, compared to the existing (2015) conditions, the average change in noise throughout the Bay

Area for freeways, expressway, major arterials, collectors and other types of roadways would be less than the proposed Plan by 0.5 dBA (**Table 3.1-27**). Thus, this impact would be significant and unavoidable for the reasons described under Impact 2.6-5, and **less** than the proposed Plan.

There are 38 airports, including public, private, and military airports throughout the Bay Area. Projected development could potentially be located in close proximity to existing airports such that applicable exterior and interior noise standards would be exceeded. Local land use compatibility standards contained in City and County General Plans, would typically discourage or require specific site review for construction of sensitive land uses in areas potentially impacted by aircraft noise. However, it is possible that planned development could be exposed to exterior and interior noise levels from existing airports or airstrips that exceed applicable standards. The relative magnitude of airport-related noise associated with the No Project compared to the proposed Plan cannot be assessed in detail because there is not enough information available to determine the number of residents or workers who may be located where excessive airport-related noise levels would occur. This impact would be significant and unavoidable for the reasons described under Impact 2.6-6, and **similar** to the proposed Plan.

Alternative 2, Main Streets

Under the Main Streets Alternative, construction of planned development, including transportation projects, could result in temporary noise and vibration impacts associated with grading, excavating, earthmoving, paving, building construction, and other related activities. Construction activities would require the use of various noise-generating construction equipment such as dozers, loaders, forklifts, cranes, jackhammers, pile drivers, paving equipment, trucks, and various other equipment. The magnitude of noise is related to a receptors proximity to the construction equipment, which is associated with individual projects. This impact would be expected to be significant and unavoidable for the reasons described under Impact 2.6-1, and **similar** to the proposed Plan.

Under the Main Streets Alternative, impacts associated with traffic noise would be significant and unavoidable because the thresholds for freeways and expressways would be exceeded. Overall, compared to the existing (2015) conditions, the average change in noise throughout the Bay Area for freeways, expressway, major arterials, collectors and other types of roadways would be less than existing conditions overall, by 1.7 dBA, whereas the proposed Plan results in an overall increase of 1.0 dBA (**Table 3.1-27**). This impact would be significant and unavoidable because some locations would exceed thresholds described under Impact 2.6-2, and **less** than the proposed Plan.

As shown in **Table 3.1-9**, there would be a smaller increase to daily transit seat miles under the Main Streets Alternative (approximately 5.9 million) compared to the proposed Plan (approximately 16.5 million), notably in relation to bus trips, heavy rail and commuter rail. Information is not available to assess the relative difference to transit-related noise levels under the Main Streets Alternative as it would relate to individual routes, such that changes to noise levels could be assessed. However, the increase in capacity to daily heavy and commuter rail transit would be over four times greater under the proposed Plan compared to the Main Streets Alternative. Thus, there would likely be an increase to the number of trips along some routes in the Bay Area, which would be noticeable to a greater degree under the proposed Plan compared to the Main Streets Alternative (e.g., as a result of increased number in trips per day along the same routes where noise standards are already exceeded). This impact would be expected to be significant and unavoidable for the reasons described under Impact 2.6-3, and **less** than the proposed Plan.

As discussed above, there would be substantially less added daily transit seat miles under the Main Streets Alternative compared to the proposed Plan. Information is not available to assess the relative difference to transit-related vibration levels under the Main Streets Alternative; however, it is reasonable to assume that the number of trips would along transit routes would be greater under the proposed Plan than the Main Streets Alternative. Thus, there would likely be a smaller increase in transit-related vibration under the Main Streets Alternative compared to the proposed Plan. Thus, this impact would be significant and unavoidable for the reasons described under Impact 2.6-4, and would be **less** than the proposed Plan.

This impact assesses the long-term exposure of sensitive receptors to increased operational stationary source noise levels from forecasted land use. Overall, compared to the existing (2015) conditions, the average change in noise throughout the Bay Area for freeways, expressway, major arterials, collectors and other types of roadways would be less than existing conditions overall, by 1.7 dBA, whereas the proposed Plan results in an overall increase of 1.0 dBA (**Table 3.1-27**). This impact would be significant and unavoidable for the reason described under Impact 2.6-5, and **less** than the proposed Plan.

The relative magnitude of airport-related noise associated with the Main Streets Alternative compared to the proposed Plan cannot be assessed in detail because there is not enough information available to determine the number of residents or workers who may be located where excessive airport-related noise levels would occur. This impact would be significant and unavoidable for the reasons described under Impact 2.6-6, and **similar** to the proposed Plan.

Alternative 3, Big Cities

Under the Big Cities Alternative, construction of planned development, including transportation projects, could result in temporary noise and vibration impacts associated with grading, excavating, earthmoving, paving, building construction, and other related activities. Construction activities would require the use of various noise-generating construction equipment such as dozers, loaders, forklifts, cranes, jackhammers, pile drivers, paving equipment, trucks, and various other equipment. The magnitude of noise is related to a receptors proximity to the construction equipment, which is associated with individual projects. This impact would be expected to be significant and unavoidable for the reasons described under Impact 2.6-1, and **similar** to the proposed Plan.

Under the Big Cities Alternative, impacts associated with traffic noise would be significant and unavoidable because the thresholds for freeways, expressways, and major arterials would be exceeded. Overall, compared to the existing (2015) conditions, the average change in noise throughout the Bay Area for freeways, expressway, major arterials, collectors and other types of roadways would result in the same average increase for the Big Cities as for the proposed Plan (**Table 3.1-27**). Thus, this impact would be significant and unavoidable for the reasons described under Impact 2.6-2, and **similar** to the proposed Plan.

Under the Big Cities Alternative, there would be increased funding for local and regional transit compared to the proposed Plan. This increase in funding would result in a greater increase in added daily transit seat miles capacity (approximately 17.5 million) compared to the proposed Plan (16.5 million). This represents an increase of approximately 6 percent (**Table 3.1-9**). Because this is a small difference in increased capacity, there is not likely to be a noticeable change in noise levels between the Big Cities Alternative and proposed Plan. Thus, this impact would be expected to be significant and unavoidable for the reasons described under Impact 2.6-3, and **similar** to the proposed Plan.

As discussed above, the Big Cities Alternative would result in a slight increase of daily transit seat miles compared to the proposed Plan. Because this is a small difference in increased capacity, there is not likely to be a noticeable change in vibration levels between the Big Cities Alternative and proposed Plan. This impact would be significant and unavoidable for the reasons described under Impact 2.6-4, and would be expected to be **similar** to the proposed Plan.

This impact assesses the long-term exposure of sensitive receptors to increased operational stationary source noise levels from forecasted land use. Overall, compared to the existing (2015) conditions, the average change in noise throughout the Bay Area for freeways, expressway, major arterials, collectors and other types of roadways would result in the same average increase for the Big Cities as for the proposed Plan (**Table 3.1-27**). Thus, this impact would be significant and unavoidable for the reasons described under Impact 2.6-5, and **similar** to the proposed Plan.

The relative magnitude of airport-related noise associated with the Big Cities Alternative compared to the proposed Plan cannot be assessed in detail because there is not enough information available to determine the number of residents or workers who may be located where excessive airport-related noise levels would

occur. This impact would be significant and unavoidable for the reasons described under Impact 2.6-6, and **similar** to the proposed Plan.

Alternative 4, EEJ

Under the EEJ Alternative, construction of planned development, including transportation projects, could result in temporary noise and vibration impacts associated with grading, excavating, earthmoving, paving, building construction, and other related activities. Construction activities would require the use of various noise-generating construction equipment such as dozers, loaders, forklifts, cranes, jackhammers, pile drivers, paving equipment, trucks, and various other equipment. The magnitude of noise is related to a receptors proximity to the construction equipment, which is associated with individual projects. This impact would be expected to be significant and unavoidable for the reasons described under Impact 2.6-1, and **similar** to the proposed Plan.

Under the EEJ Alternative, impacts associated with traffic noise would be significant and unavoidable because the thresholds for freeways and expressways would be exceeded. Overall, compared to the existing (2015) conditions, the average change in noise throughout the Bay Area for freeways, expressway, major arterials, collectors and other types of roadways would be less than the proposed Plan by 0.3 dBA (**Table 3.1-27**). Thus, this impact would be significant and unavoidable for the reasons described under Impact 2.6-2, and **less** than the proposed Plan.

Under the EEJ Alternative, there would be increased funding for local and regional transit compared to the proposed Plan. Although there would be an increase in funding, there would nevertheless be a smaller increase in added daily transit seat miles capacity (approximately 18.5 million) compared to the proposed Plan (16.5 million) (**Table 3.1-9**). This represents a decrease of approximately 12 percent. Because this is a small difference in increased capacity, there is not likely to be a noticeable change in noise levels between the EEJ Alternative and proposed Plan. Thus, this impact would be expected to be significant and unavoidable for the reasons described under Impact 2.6-3, and **similar** to the proposed Plan.

As discussed above, the EEJ Alternative would result in a slight decrease of daily transit seat miles compared to the proposed Plan. Because this is a small difference in increased capacity, there is not likely to be a noticeable change in vibration levels between the EEJ Alternative and proposed Plan. This impact would be significant and unavoidable for the reasons described under Impact 2.6-4, and would be expected to be **similar** to the proposed Plan.

This impact assesses the long-term exposure of sensitive receptors to increased operational stationary source noise levels from forecasted land use. Overall, compared to the existing (2015) conditions, the average change in noise throughout the Bay Area for freeways, expressway, major arterials, collectors and other types of roadways would be less than the proposed Plan by 0.3 dBA (**Table 3.1-27**). Thus, this impact would be significant and unavoidable for the reasons described under Impact 2.6-5, and **less** than the proposed Plan.

The relative magnitude of airport-related noise associated with the EEJ Alternative compared to the proposed Plan cannot be assessed in detail because there is not enough information available to determine the number of residents or workers who may be located where excessive airport-related noise levels would occur. This impact would be significant and unavoidable for the reasons described under Impact 2.6-6, and **similar** to the proposed Plan.

GEOLOGY AND SEISMICITY

Geology and seismicity is addressed in Section 2.7, which includes an analysis of: exposure to people or structures to risks associated with fault rupture, ground shaking, seismic-related ground failure, landslides, substantial soil erosion, loss of topsoil, landslide, lateral spreading, subsidence, liquefaction, or collapse. Additionally, this section addresses the loss of availability of mineral resources.

The relative magnitude of impacts among the Plan alternatives is related to the projected land use growth footprint and transportation projects footprint associated with conversion of non-urban land to urban uses. Tables 3.1-28 through 3.1-31 provide quantifiable data related to geology and seismicity impacts.

Table 3.1-28 Acres within Alquist Priolo Zones that Overlap with the Land Use Growth Footprint and Transportation Projects Footprint, by Alternative

Alternative	Land Use Growth Footprint	Transportation Projects Footprint
Proposed Plan	160	220
No Project Alternative	150	0
Main Streets Alternative	110	210
Big Cities Alternative	120	60
EEJ Alternative	140	60

Notes: Numbers less than 1 are shown as "<1"; Whole numbers have been rounded (between 0 and 10 to the nearest whole number, between 11 and 999 to the nearest 10, between 1,000 and 1,000,000 to the nearest 100, above 1,000,000 to the nearest 1,000).

Source: CGS 2015, MTC 2017

Table 3.1-29 Acres within Areas Potentially Subject to Violent Ground Shaking that Overlap with the Land Use Growth Footprint and Transportation Projects Footprint, by Alternative

Alternative	Strong - MMI 7	Very Strong - MMI 8	Violent - MMI 9
Land Use Growth Footprint			
Proposed Plan	0	4,900	2,500
No Project Alternative	1,600	32,700	10,200
Main Streets Alternative	340	12,000	5,900
Big Cities Alternative	200	11,000	2,400
EEJ Alternative	350	14,400	4,800
Transportation Projects Footprint			
Proposed Plan	0	0	3,500
No Project Alternative	0	0	200
Main Streets Alternative	560	3,700	3,000
Big Cities Alternative	0	360	2,700
EEJ Alternative	0	0	2,600

Notes: Numbers less than 1 are shown as "<1"; Whole numbers have been rounded (between 0 and 10 to the nearest whole number, between 11 and 999 to the nearest 10, between 1,000 and 1,000,000 to the nearest 100, above 1,000,000 to the nearest 1,000).

Source: ABAG and USGS 2013, MTC 2017

Table 3.1-30 Acres subject to Liquefaction that Overlap with the Land Use Growth Footprint and Transportation Projects Footprint, by Alternative

Alternative	Very Low	Low	Medium	High	Very High	Water
Land Use Growth Footprint						
Proposed Plan	5,200	1,800	8,300	690	2,600	80
No Project Alternative	14,700	4,300	14,800	7,200	3,100	240
Main Streets Alternative	4,000	2,000	8,700	730	2,800	80
Big Cities Alternative	2,400	820	7,400	410	2,500	50
EEJ Alternative	5,300	1,980	8,900	760	2,600	70
Transportation Projects Footprint						
Proposed Plan	2,400	1,200	4,900	150	2,500	780
No Project Alternative	40	210	190	0	60	0
Main Streets Alternative	1,800	1,600	4,800	420	1,000	100
Big Cities Alternative	2,000	870	3,100	70	2,000	120
EEJ Alternative	1,900	850	2,900	70	1,900	120

Notes: Numbers less than 1 are shown as "<1"; Whole numbers have been rounded (between 0 and 10 to the nearest whole number, between 11 and 999 to the nearest 10, between 1,000 and 1,000,000 to the nearest 100, above 1,000,000 to the nearest 1,000).
Source: ABAG and USGS 2013, MTC 2017

Table 3.1-31 Acres subject to Landslides that Overlap with the Land Use Growth Footprint and Transportation Projects Footprint, by Alternative

Alternative	Few[1]	Mostly[2]
Land Use Growth Footprint		
Proposed Plan	3,500	310
No Project Alternative	10,900	2,100
Main Streets Alternative	2,300	330
Big Cities Alternative	12,200	260
EEJ Alternative	3,600	370
Transportation Projects Footprint		
Proposed Plan	1,600	220
No Project Alternative	20	1
Main Streets Alternative	1,300	280
Big Cities Alternative	1,300	130
EEJ Alternative	1,300	130

Notes: Numbers less than 1 are shown as "<1"; Whole numbers have been rounded (between 0 and 10 to the nearest whole number, between 11 and 999 to the nearest 10, between 1,000 and 1,000,000 to the nearest 100, above 1,000,000 to the nearest 1,000).
[1] Few Landslides: areas characterized by scattered small landslides or location near large landslides
[2] Mostly Landslides: areas where substantial landslides have been mapped
Source: MTC 2017, USGS 1997

Alternative 1, No Project

Surface fault rupture could occur along any of the active fault traces or within the associated Alquist-Priolo Zone for the active faults within the Plan area. Although fault rupture is not entirely confined to the boundaries

of an Alquist-Priolo Zone, the likelihood of rupture occurring outside of these zones is very low based on historical evidence and geologic records. The land use growth footprint under the No Project Alternative overlaps with a slightly smaller portion of Alquist-Priolo Zones (150 acres) than the proposed Plan (160 acres) (see **Table 3.1-28**); and less acres of land (0 acres) compared to the proposed Plan (220 acres) associated with the transportation projects footprint. Overall, the No Project Alternative would have less area associated with Alquist-Priolo Zones compared to the proposed Plan. Regulatory agencies with oversight of development associated with the proposed Plan have developed regulations and engineering design specifications that address and substantially reduce hazards associated with site-level geological and seismic conditions. Thus, this impact would be less than significant for the reasons described under Impact 2.7-1, and **less** than the proposed Plan.

According to modeling conducted by USGS in conjunction with CGS, the Bay Area is predicted to experience at least one major earthquake (greater than moment magnitude 6.7 [see footnote 3 on page 2.7-3]) within the next 20 years. The intensity of such an event would depend on the causative fault and the distance to the epicenter, the magnitude, the duration of shaking, and the characteristics of the underlying geologic materials. The entire Bay Area is classified as potentially experiencing strong to violent ground shaking (MMI 7-9). **Table 3.1-29** quantifies the area within the land use growth footprint based on this data. As shown, the No Project Alternative would have a greater area of land use growth footprint (44,500 acres) located within areas subject to violent ground shaking compared to the proposed Plan (7,400 acres); the transportation projects footprint for the No Project Alternative is located within a smaller area (200 acres) subject to violent ground shaking than the proposed Plan (3,500 acres). Overall, the No Project Alternative would have a larger footprint within areas potentially subject to violet ground shaking. However, existing regulatory requirements specify mandatory actions that must occur during project development. Thus, this impact would be less than significant for the reasons described under Impact 2.7-2, and **greater** than the proposed Plan

Liquefaction typically occurs in areas underlain with loose, saturated, cohesion-less soils within the upper 50 feet of subsurface materials. These soils, when subjected to ground shaking, can lose their strength due to buildup of excess pore water pressure, causing them to function in a manner closer to a liquefied state. **Table 3.1-30** shows the area of land use growth footprint that would be subject to potential liquefaction. As shown, the No Project Alternative would have a greater area of land use growth footprint within very high (3,100 acres) and high (2,800 acres) liquefaction potential zones compared to the proposed Plan (2,600 and 690 acres, respectively). There would be less area of transportation project footprint within high and very high risk of liquefaction (60 acres) compared to the proposed Plan (2,650 acres) in high and very high liquefaction risk zones. Overall, the No Project Alternative would have a larger footprint within areas potentially subject to liquefaction. However, subsequent development would be required to conform to the current seismic design provisions of the CBC to reduce potential losses from ground failure as a result of an earthquake. These future projects would also be required to adhere to the local general plans and local building code requirements that contain seismic safety policies to resist ground failure through modern construction techniques. Thus, this impact would be less than significant for the reasons described under Impact 2.7-3, and **greater** than the proposed Plan.

The Plan area includes a wide range of topographical conditions, and landslide hazards vary from very low in low lying areas to very high in some upland areas, especially areas with slopes that exceed 15 percent. **Table 3.1-31** shows acreage of land use growth footprint where there is potential for landslides. As shown, the No Project Alternative would have a greater risk for landslides than the proposed Plan (2,100 versus 310 for land rated as mostly). There would be less area of transportation project footprint within high and very high risk of liquefaction (1 acre) compared to the proposed Plan (220 acres) in areas rate mostly subject to landslides. Overall, the No Project Alternative would have a larger footprint within areas potentially subject to landslides. Thus, this impact would be less than significant for the reasons described under Impact 2.7-4, and **greater** than the proposed Plan.

Buildout of the land use growth footprint and construction of transportation projects would include earthwork activities that could expose soils to the effects of erosion or loss of topsoil. Once disturbed, either through removal of vegetation, asphalt, or demolition of a structure, stockpiled soils may be exposed to the effects of

wind and water. However, construction activities are required to adhere to NPDES permit requirements for construction, as well as any local grading ordinance requirements that may include erosion prevention measures. As shown in **Table 3.1-7**, the No Project Alternative would result in a greater area of land being converted from non-urban to urban uses (27,500 acres versus 6,600). This impact would be less than significant for the reasons described under Impact 2.7-5, and **greater** than the proposed Plan.

Both the proposed changes in land use and transportation projects would be located on a range of different geologic materials and conditions. Hazards associated with unstable soils or geologic units are dependent on site- specific conditions, as well as the specific nature of the individual project proposed. With adherence to grading permit and building code requirements, including seismic design criteria as required by the CBC, Caltrans, Special Publication 117A, and local building code requirements, all improvements and development associated with both the land use development and transportation projects would be designed to minimize potential risks related to unstable soils and geologic units. Existing regulatory requirements specify mandatory and relatively prescriptive actions that must occur during project development, and would effectively reduce the inherent hazard. As shown in **Table 3.1-7**, the No Project Alternative would result in a greater area of land being converted from non-urban to urban uses (27,500 acres versus 6,600). This impact would be less than significant for the reasons described under Impact 2.7-6, and **greater** than the proposed Plan.

Local jurisdictions have general plan policies to manage mineral resources and are required under SMARA to consider significant mineral deposits identified by CGS. Local general plans, specific plans, and other land use plans include policies to protect existing and planned future mineral production and extraction activities from surrounding uses, and require that future projects near mining activities have compatible land uses. As shown in **Table 3.1-7**, the No Project Alternative would result in a greater area of land being converted from non-urban to urban uses (27,500 acres versus 6,600). This impact would be less than significant for the reasons described under Impact 2.7-7, and **greater** than the proposed Plan.

Alternative 2, Main Streets

Surface fault rupture could occur along any of the active fault traces or within the associated Alquist-Priolo Zone for the active faults within the Plan area. Although fault rupture is not entirely confined to the boundaries of an Alquist-Priolo Zone, the likelihood of rupture occurring outside of these zones is very low based on historical evidence and geologic records. The land use growth footprint under the Main Streets Alternative overlaps with a smaller portion of Alquist-Priolo Zones (110 acres) than the proposed Plan (160 acres) ; and less acres of land (210 acres) compared to the proposed Plan (220 acres) associated with the transportation projects footprint. Overall, the Main Streets Alternative would have less area associated with Alquist-Priolo Zones compared to the proposed Plan (see **Table 3.1-28**). Transportation projects would also be located within Alquist-Priolo Zones. Regardless, regulatory agencies with oversight of development associated with the proposed Plan have developed regulations and engineering design specifications that address and substantially reduce hazards associated with site-level geological and seismic conditions. Thus, this impact would be less than significant for the reasons described under Impact 2.7-1, and **less** than the proposed Plan.

As described above, the Bay Area is predicted to experience at least one major earthquake (greater than moment magnitude 6.7 [see footnote 3 on page 2.7-3]) within the next 20 years. The entire Bay Area is classified as potentially experiencing strong to violent ground shaking (MMI 7-9). **Table 3.1-29** quantifies the area within the land use growth footprint based on this data. As shown, the Main Streets Alternative would have a greater area of land use growth footprint (18,240 acres) located within areas subject to violent ground shaking compared to the proposed Plan (7,400 acres); the transportation projects footprint for the Main Streets Alternative is located within a larger area 7,260 acres) subject to violent ground shaking than the proposed Plan (3,500 acres). Overall, the Main Streets Alternative would have a larger footprint within areas potentially subject to violet ground shaking. However, existing regulatory requirements specify mandatory actions that must occur during project development. Thus, this impact would be less than significant for the reasons described under Impact 2.7-2, and **greater** than the proposed Plan

Table 3.1-30 shows the area of land use growth footprint that would be subject to potential liquefaction. As shown, the Main Streets Alternative would have a greater area of land use growth footprint within very high

(2,800 acres) and high liquefaction (730 acres) potential zones compared to the proposed Plan (2,600 and 690 acres, respectively). There would be less area of transportation project footprint within high and very high risk of liquefaction (1,400 acres) compared to the proposed Plan (2,700 acres) in high and very high liquefaction risk zones. Overall, the Main Streets Alternative would have a smaller footprint within areas potentially subject to liquefaction. However, subsequent development would be required to conform to the current seismic design provisions of the CBC to reduce potential losses from ground failure as a result of an earthquake. These future projects would also be required to adhere to the local general plans and local building code requirements that contain seismic safety policies to resist ground failure through modern construction techniques. Thus, this impact would be less than significant for the reasons described under Impact 2.7-3, and **less** than the proposed Plan

Per **Table 3.1-31**, the Main Streets Alternative would have a greater risk for landslides than the proposed Plan (i.e., a greater acreage designated as "mostly" of 330 acres versus 310 acres). There would be a smaller area of transportation project footprint within high and very high risk of liquefaction (280 acre) compared to the proposed Plan (220 acres) in areas rate mostly subject to landslides. Overall, the Main Streets Alternative would have a larger footprint within areas potentially subject to landslides. This impact would be less than significant for the reasons described under Impact 2.7-4, and **greater** than the proposed Plan.

Buildout of the land use growth footprint and construction of transportation projects would include earthwork activities that could expose soils to the effects of erosion or loss of topsoil. Once disturbed, either through removal of vegetation, asphalt, or demolition of a structure, stockpiled soils may be exposed to the effects of wind and water. However, construction activities are required to adhere to NPDES permit requirements for construction, as well as any local grading ordinance requirements that may include erosion prevention measures. As shown in **Table 3.1-7**, the Main Streets Alternative would result in a smaller area of land being converted from non-urban to urban uses (5,600 acres versus 6,600). This impact would be less than significant for the reasons described under Impact 2.7-5, and **less** than the proposed Plan.

Both the proposed changes in land use and transportation projects would be located on a range of different geologic materials and conditions. Existing regulatory requirements specify mandatory and relatively prescriptive actions that must occur during project development, and would effectively reduce the inherent hazard. As shown in **Table 3.1-7**, the Main Streets Alternative would result in a smaller area of land being converted from non-urban to urban uses (5,600 acres versus 6,600). This impact would be less than significant for the reasons described under Impact 2.7-6, and **less** than the proposed Plan.

Local jurisdictions have general plan policies to manage mineral resources and are required under SMARA to consider significant mineral deposits identified by CGS. Local general plans, specific plans, and other land use plans include policies to protect existing and planned future mineral production and extraction activities from surrounding uses, and require that future projects near mining activities have compatible land uses. As shown in **Table 3.1-7**, the Main Streets Alternative would result in a smaller area of land being converted from non-urban to urban uses (5,600 acres versus 6,600). This impact would be less than significant for the reasons described under Impact 2.7-7, and **less** than the proposed Plan.

Alternative 3, Big Cities

The land use growth footprint under the Big Cities Alternative overlaps with a smaller portion of Alquist-Priolo Zones than the proposed Plan (120 versus 160 acres, respectively, for the land use growth area; and, 60 versus 220 associated with the transportation projects footprint see **Table 3.1-28**). Overall, the Big Cities Alternative would have less area associated with Alquist-Priolo Zones compared to the proposed Plan Transportation projects would also be located within Alquist-Priolo Zones. Regardless, regulatory agencies with oversight of development associated with the proposed Plan have developed regulations and engineering design specifications that address and substantially reduce hazards associated with site-level geological and seismic conditions. Thus, this impact would be less than significant for the reasons described under Impact 2.7-1, and **less** than the proposed Plan.

The Big Cities Alternative would have a greater area of land use growth footprint located within areas subject to violent ground shaking compared to the proposed Plan (13,600 acres within MMI7 – MMI9 versus 7,400 acres within MMI7 – MMI9); the transportation projects footprint for the Big Cities Alternative is located within a smaller area 3,100 acres) subject to violent ground shaking than the proposed Plan (3,500 acres). Overall, the Big Cities Alternative would have a larger footprint within areas potentially subject to violet ground shaking. However, existing regulatory requirements specify mandatory actions that must occur during project development. Thus, this impact would be less than significant for the reasons described under Impact 2.7-2, and **greater** than the proposed Plan

As shown in **Table 3.1-30**, the Big Cities Alternative would have a smaller area of land use growth footprint within very high (2,500 acres versus 2,600 acres) and high (410 acres versus 690 acres) liquefaction potential zones than the proposed Plan. There would be less area of transportation project footprint within high and very high risk of liquefaction (2,100 acres) compared to the proposed Plan (2,700 acres) in high and very high liquefaction risk zones. Overall, the Big Cities Alternative would have a smaller footprint within areas potentially subject to liquefaction. However, subsequent development would be required to conform to the current seismic design provisions of the CBC to reduce potential losses from ground failure as a result of an earthquake. These future projects would also be required to adhere to the local general plans and local building code requirements that contain seismic safety policies to resist ground failure through modern construction techniques. Thus, this impact would be less than significant for the reasons described under Impact 2.7-3, and **less** than the proposed Plan

Table 3.1-31 shows acreage of land use growth footprint where there is potential for landslides. As shown, the Big Cities Alternative would have a smaller risk for landslides than the proposed Plan (260 acres versus 310 acres of land in mostly landslide zone). There would be a smaller area of transportation project footprint within high and very high risk of liquefaction (130 acre) compared to the proposed Plan (220 acres) in areas rate mostly subject to landslides. Overall, the Big Cities Alternative would have a smaller footprint within areas potentially subject to landslides. This impact would be less than significant for the reasons described under Impact 2.7-4, and **less** than the proposed Plan.

Buildout of the land use growth footprint and construction of transportation projects would include earthwork activities that could expose soils to the effects of erosion or loss of topsoil. Once disturbed, either through removal of vegetation, asphalt, or demolition of a structure, stockpiled soils may be exposed to the effects of wind and water. However, construction activities are required to adhere to NPDES permit requirements for construction, as well as any local grading ordinance requirements that may include erosion prevention measures. As shown in **Table 3.1-7**, the Big Cities Alternative would result in a smaller area of land being converted from non-urban to urban uses (3,000 acres versus 6,600). This impact would be less than significant for the reasons described under Impact 2.7-5, and **less** than the proposed Plan.

Both the proposed changes in land use and transportation projects would be located on a range of different geologic materials and conditions. Existing regulatory requirements specify mandatory and relatively prescriptive actions that must occur during project development, and would effectively reduce the inherent hazard. As shown in **Table 3.1-7**, the Big Cities Alternative would result in a smaller area of land being converted from non-urban to urban uses (3,000 acres versus 6,600). This impact would be less than significant for the reasons described under Impact 2.7-6, and **less** than the proposed Plan.

Local jurisdictions have general plan policies to manage mineral resources and are required under SMARA to consider significant mineral deposits identified by CGS. Local general plans, specific plans, and other land use plans include policies to protect existing and planned future mineral production and extraction activities from surrounding uses, and require that future projects near mining activities have compatible land uses. As shown in **Table 3.1-7**, the Big Cities Alternative would result in a smaller area of land being converted from non-urban to urban uses (3,000 acres versus 6,600). This impact would be less than significant for the reasons described under Impact 2.7-7, and **less** than the proposed Plan.

Alternative 4, EEJ

The land use growth footprint under the EEJ Alternative overlaps with a smaller portion of Alquist-Priolo Zones than the proposed Plan (140 acre versus 160 acres; and less acres of land (60 acres) compared to the proposed Plan (220 acres) associated with the transportation projects footprint, see **Table 3.1-28**). Overall, the EEJ Alternative would have less area associated with Alquist-Priolo Zones compared to the proposed Plan Transportation projects would also be located within Alquist-Priolo Zones. Regardless, regulatory agencies with oversight of development associated with the proposed Plan have developed regulations and engineering design specifications that address and substantially reduce hazards associated with site-level geological and seismic conditions. Thus, this impact would be less than significant for the reasons described under Impact 2.7-1, and **less** than the proposed Plan.

Per **Table 3.1-29**, the EEJ Alternative would have a greater area of land use growth footprint located within areas subject to violent ground shaking compared to the proposed Plan (19,550 versus 7,400 acres in MMI 7-9); the transportation projects footprint for the EEJ Alternative is located within a smaller area 2,600 acres) subject to violent ground shaking than the proposed Plan (3,500 acres). Overall, the EEJ Alternative would have a larger footprint within areas potentially subject to violet ground shaking. However, existing regulatory requirements specify mandatory actions that must occur during project development. Thus, this impact would be less than significant for the reasons described under Impact 2.7-2, and **greater** than the proposed Plan

As shown in **Table 3.1-30**, The EEJ Alternative would have a same area of land use growth footprint within very high (2,600 acres), and a greater area of within high (760 acres), liquefaction potential zones compared to the proposed Plan. There would be less area of transportation project footprint within high and very high risk of liquefaction (2,000 acres) compared to the proposed Plan (2,700 acres) in high and very high liquefaction risk zones. Overall, the EEJ Alternative would have a smaller footprint within areas potentially subject to liquefaction. However, subsequent development would be required to conform to the current seismic design provisions of the CBC to reduce potential losses from ground failure as a result of an earthquake. These future projects would also be required to adhere to the local general plans and local building code requirements that contain seismic safety policies to resist ground failure through modern construction techniques. Thus, this impact would be less than significant for the reasons described under Impact 2.7-3, and **less** than the proposed Plan

Table 3.1-31 shows acreage of land use growth footprint where there is potential for landslides. As shown, the EEJ Alternative would have a greater risk for landslides than the proposed Plan (370 acres versus 310 acres rated as mostly landslides). There would be a smaller area of transportation project footprint within high and very high risk of liquefaction (130 acre) compared to the proposed Plan (220 acres) in areas rate mostly subject to landslides. Overall, the EEJ Alternative would have a smaller footprint within areas potentially subject to landslides. This impact would be less than significant for the reasons described under Impact 2.7-4, and **greater** than the proposed Plan.

Buildout of the land use growth footprint and construction of transportation projects would include earthwork activities that could expose soils to the effects of erosion or loss of topsoil. Once disturbed, either through removal of vegetation, asphalt, or demolition of a structure, stockpiled soils may be exposed to the effects of wind and water. However, construction activities are required to adhere to NPDES permit requirements for construction, as well as any local grading ordinance requirements that may include erosion prevention measures. As shown in **Table 3.1-7**, the EEJ Alternative would result in a greater area of land being converted from non-urban to urban uses (6,900 acres versus 6,600). This impact would be less than significant for the reasons described under Impact 2.7-5, and **greater** than the proposed Plan.

Both the proposed changes in land use and transportation projects would be located on a range of different geologic materials and conditions. Existing regulatory requirements specify mandatory and relatively prescriptive actions that must occur during project development, and would effectively reduce the inherent hazard. As shown in **Table 3.1-7**, the EEJ Alternative would result in a greater area of land being converted from non-urban to urban uses (6,900 acres versus 6,600). This impact would be less than significant for the reasons described under Impact 2.7-5, and **greater** than the proposed Plan.

Local jurisdictions have general plan policies to manage mineral resources and are required under SMARA to consider significant mineral deposits identified by CGS. Local general plans, specific plans, and other land use plans include policies to protect existing and planned future mineral production and extraction activities from surrounding uses, and require that future projects near mining activities have compatible land uses. As shown in Table 3.1-7, the EEJ Alternative would result in a greater area of land being converted from non-urban to urban uses (6,900 acres versus 6,600). This impact would be less than significant for the reasons described under Impact 2.7-5, and **greater** than the proposed Plan.

WATER RESOURCES

Water resources are addressed in Section 2.8, which includes an analysis of: water quality standards, waste and stormwater discharge requirements, groundwater recharge, alterations to drainage patterns, non-point pollution of stormwater runoff and construction discharges, increased rates of runoff that could cause flood hazards and affect water quality, and exposure to risks associated with flooding, seiche, tsunami, or mudflow.

Impacts that are associated with changes to impervious surfaces and the effects on other water resources issues are related to forecasted land use growth footprints. As shown in Table 3.1-32, acres of land use growth footprint within the 100-year floodplain varies among the Alternatives. Impacts are also assessed based on their increase from non-urban land to urban uses.

Table 3.1-32 Acreage within the 100-year Floodplain that Overlap with the Land Use Growth Footprint and Transportation Projects Footprint, by Alternative

Alternative	Land Use Growth Footprint	Transportation Projects Footprint
Proposed Plan	930	1,100
No Project Alternative	5,300	30
Main Streets Alternative	970	780
Big Cities Alternatives	950	260
EEJ Alternative	1,000	330

Notes: Numbers less than 1 are shown as "<1"; Whole numbers have been rounded (between 0 and 10 to the nearest whole number, between 11 and 999 to the nearest 10, between 1,000 and 1,000,000 to the nearest 100, above 1,000,000 to the nearest 1,000).

Source: FEMA 2016, MTC 2017

Alternative 1, No Project

Land development and construction of transportation projects would increase the amount of impervious surface in the region, such as new paved areas, building rooftops, and parking lots. This increase in impervious surface has the potential to generate additional stormwater runoff. Compared to the proposed Plan, the No Project Alternative has a greater area of land use growth footprint in land not designated as urban (Table 3.1-7) and could thus result in a greater increase of impervious surfaces. Regional growth and land use changes associated with the proposed Plan would not substantially degrade water quality in violation of water quality standards. Although individual projects under the proposed Plan have the potential to adversely affect water quality at a project-specific level, these impacts are considered less than significant because future projects associated with land use development would adhere to existing regulations and would operate under the oversight of applicable regulatory agencies. Thus, this impact would be less than significant for the reasons described under Impact 2.8-1, and **greater** than the proposed Plan.

Infiltration rates can vary and largely depend on the characteristics of the exposed overlying soils and vegetation. In general, sandy soils have higher infiltration rates and can contribute to groundwater recharge; clay soils tend to have lower percolation potentials; and impervious surfaces such as pavement substantially reduce infiltration capacity. Compared to the proposed Plan, the No Project Alternative has a greater land use growth footprint in land not designated as urban (see Table 3.1-7) and could thus result in a greater increase of impervious surfaces. Activities would be implemented under California regulations governing use of groundwater, including Executive Order B-29-15 and the Groundwater Management Act, as well as

groundwater provisions of applicable local general plans. Taken as a whole, these regulations are intended to reduce groundwater use and subsequent overdraft of groundwater basins. This impact would be less than significant for the reasons described under Impact 2.8-2, and **greater** than the proposed Plan.

Development of the land use growth footprint and construction of transportation projects that have the potential to alter drainage patterns would be subject to local stormwater drainage master plans, regional MS4 permit requirements, and any Caltrans drainage requirements. These requirements would include BMPs and drainage requirements that minimize exposed soils and the potential for offsite transport of sediments. As shown in **Table 3.1-7**, the No Project Alternative would result in a greater area of land being converted from non-urban to urban uses (27,500 acres versus 6,600). This impact would be less than significant for the reasons described under Impact 2.8-3, and **greater** than the proposed Plan.

The effects of both the land development and transportation projects would have the potential to increase stormwater pollutants in runoff. However, individual projects under the proposed Plan would be subject to regulations that provide adequate analysis of potential impacts and preventative measures to limit or avoid substantial release of pollutants during project operation. As shown in **Table 3.1-7**, the No Project Alternative would result in a greater area of land being converted from non-urban to urban uses (27,500 acres versus 6,600). This impact would be less than significant for the reasons described under Impact 2.8-4, and **greater** than the proposed Plan.

Construction and earth-moving activities associated with development and transportation projects could increase erosion and sedimentation, and could result in sediment loading in local waterways and subsequent effects on water quality. Prior to commencement of major construction activities, project applicants would submit a SWPPP to the SWRCB that identifies the BMPs that would be used in construction of the planned project. The applicant must receive approval of the SWPPP and submit a Notice of Intent prior to initiating construction. Individual development and transportation projects are expected to adopt BMPs appropriate to local conditions. As shown in **Table 3.1-7**, the No Project Alternative would result in a greater area of land being converted from non-urban to urban uses (27,500 acres versus 6,600). This impact would be less than significant for the reasons described under Impact 2.8-5, and **greater** than the proposed Plan.

All projects implemented under the proposed Plan would be required to adhere to the appropriate local and State requirements that are designed to ensure that flooding conditions are not exacerbated and water quality is not adversely affected. Based on existing regulations, implementation of the proposed Plan is not anticipated to increase the rate or amount of surface runoff in a manner that would result in on- or offsite flooding, or substantial erosion or siltation. As shown in **Table 3.1-7**, the No Project Alternative would result in a greater area of land being converted from non-urban to urban uses (27,500 acres versus 6,600). This impact would be less than significant for the reasons described under Impact 2.8-6, and **greater** than the proposed Plan.

Despite efforts to improve regional drainage control infrastructure, there are locations throughout the Plan area that are susceptible to flooding during heavy storm events. **Table 3.1-32** shows 100-year flood hazard areas that are located within the region. As shown, the No Project Alternative would have a greater area of the land use growth footprint within the 100-year flood hazard area compared to the proposed Plan (5,300 acres versus 930 acres). The transportation project footprint would be less under the No Project Alternative (30 acres) compared to the proposed Plan (1,100 acres). Overall, there would be greater area of footprint within the 100-year floodplain under the No Project Alternative than the proposed Plan. Land development and transportation projects would be subject to implementation of local, State, and federal flood protection regulations. This impact would be less than significant for the reasons described under Impact 2.8-7, and **greater** than the proposed Plan.

As discussed above, there would be a greater area of the land use growth footprint and transportation projects footprint within the 100-year flood hazard area under the No Project Alternative compared to the proposed Plan. Land development and transportation projects would both be subject to implementation of local, State, and federal floodplain regulations and project-level review. Thus, this impact would be less than significant for the reasons described under Impact 2.8-8, and **greater** than the proposed Plan.

Alternative 2, Main Streets

Compared to the proposed Plan, the Main Streets Alternative has a smaller area of land use growth footprint in land not designated as urban (see **Table 3.1-7**) and could thus result in a greater increase of impervious surfaces. Regional growth and land use changes associated with the proposed Plan would not substantially degrade water quality in violation of water quality standards. Although individual projects under the proposed Plan have the potential to adversely affect water quality at a project-specific level, these impacts are considered less than significant because future projects associated with land use development would adhere to existing regulations and would operate under the oversight of applicable regulatory agencies. Thus, this impact would be less than significant for the reasons described under Impact 2.8-1, and **less** than the proposed Plan.

Compared to the proposed Plan, the Main Streets Alternative has a smaller area of land use growth footprint in land not designated as urban (see **Table 3.1-7**) and could thus result in a greater increase of impervious surfaces. Activities would be implemented under California regulations governing use of groundwater, including Executive Order B-29-15 and the Groundwater Management Act, as well as groundwater provisions of applicable local general plans. Taken as a whole, these regulations are intended to reduce groundwater use and subsequent overdraft of groundwater basins. Thus, this impact would be less than significant for the reasons described under Impact 2.8-2, and **less** than the proposed Plan.

Development of the land use growth footprint and construction of transportation projects that have the potential to alter drainage patterns, would be subject to local stormwater drainage master plans, regional MS4 permit requirements, and any Caltrans drainage requirements. These requirements would include BMPs and drainage requirements that minimize exposed soils and the potential for offsite transport of sediments. As shown in **Table 3.1-7**, the Main Streets Alternative would result in a smaller area of land being converted from non-urban to urban uses (5,600 acres versus 6,600). This impact would be less than significant for the reasons described under Impact 2.8-3, and **less** than the proposed Plan.

The effects of both the land development and transportation projects would have the potential to increase stormwater pollutants in runoff. However, individual projects under the proposed Plan would be subject to regulations that provide adequate analysis of potential impacts and preventative measures to limit or avoid substantial release of pollutants during project operation. As shown in **Table 3.1-7**, the Main Streets Alternative would result in a smaller area of land being converted from non-urban to urban uses (5,600 acres versus 6,600). This impact would be less than significant for the reasons described under Impact 2.8-4, and **less** than the proposed Plan.

Construction and earth-moving activities associated with development and transportation projects could increase erosion and sedimentation, and could result in sediment loading in local waterways and subsequent effects on water quality. Prior to commencement of major construction activities, project applicants would submit a SWPPP to the SWRCB that identifies the BMPs that would be used in construction of the planned project. The applicant must receive approval of the SWPPP and submit a Notice of Intent prior to initiating construction. Individual development and transportation projects are expected to adopt BMPs appropriate to local conditions. As shown in **Table 3.1-7**, the Main Streets Alternative would result in a smaller area of land being converted from non-urban to urban uses (5,600 acres versus 6,600). This impact would be less than significant for the reasons described under Impact 2.8-5, and **less** than the proposed Plan.

All projects implemented under the proposed Plan would be required to adhere to the appropriate local and State requirements that are designed to ensure that flooding conditions are not exacerbated and water quality is not adversely affected. Based on existing regulations, implementation of the proposed Plan is not anticipated to increase the rate or amount of surface runoff in a manner that would result in on- or offsite flooding, or substantial erosion or siltation. As shown in **Table 3.1-7**, the Main Streets Alternative would result in a smaller area of land being converted from non-urban to urban uses (5,600 acres versus 6,600). This impact would be less than significant for the reasons described under Impact 2.8-6, and **less** than the proposed Plan.

Table 3.1-32 shows 100-year flood hazard areas that are located within the region. As shown, the Main Streets Alternative would have a greater area of the land use growth footprint within the 100-year flood hazard area (970 acres) than the proposed Plan (930 acres). The transportation project footprint would be less under the Main Street Alternative (780 acres) compared to the proposed Plan (1.100 acres). Overall, there would be smaller area of footprint within the 100-year floodplain under the Main Streets Alternative than the proposed Plan. Land development and transportation projects would be subject to implementation of local, State, and federal flood protection regulations. Thus, this impact would be less than significant for the reasons described under Impact 2.8-7, and **less** than the proposed Plan.

As discussed above, there would be a smaller area of the land use growth footprint and transportation projects footprint within the 100-year flood hazard area under the Main Streets Alternative compared to the proposed Plan. Land development and transportation projects would both be subject to implementation of local, State, and federal floodplain regulations and project-level review. Thus, this impact would be less than significant for the reasons described under Impact 2.8-8, and **less** than the proposed Plan.

Alternative 3, Big Cities

Compared to the proposed Plan, the Big Cities Alternative has a smaller area of land use growth footprint in land not designated as urban (Table 3.1-7) and could thus result in a greater increase of impervious surfaces. Regional growth and land use changes associated with the proposed Plan would not substantially degrade water quality in violation of water quality standards. Although individual projects under the proposed Plan have the potential to adversely affect water quality at a project-specific level, these impacts are considered less than significant because future projects associated with land use development would adhere to existing regulations and would operate under the oversight of applicable regulatory agencies. Thus, this impact would be less than significant for the reasons described under Impact 2.8-1, and **less** than the proposed Plan.

Regarding groundwater recharge, activities would be implemented under California regulations governing use of groundwater, including Executive Order B-29-15 and the Groundwater Management Act, as well as groundwater provisions of applicable local general plans. Taken as a whole, these regulations are intended to reduce groundwater use and subsequent overdraft of groundwater basins. Thus, this impact would be less than significant for the reasons described under Impact 2.8-2, and **less** than the proposed Plan.

Development of the land use growth footprint and construction of transportation projects that have the potential to alter drainage patterns, would be subject to local stormwater drainage master plans, regional MS4 permit requirements, and any Caltrans drainage requirements. These requirements would include BMPs and drainage requirements that minimize exposed soils and the potential for offsite transport of sediments. As shown in Table 3.1-7, the Big Cities Alternative would result in a smaller area of land being converted from non-urban to urban uses (3,000 acres versus 6,600). This impact would be less than significant for the reasons described under Impact 2.8-3, and **less** than the proposed Plan.

The effects of both the land development and transportation projects would have the potential to increase stormwater pollutants in runoff. However, individual projects under the proposed Plan would be subject to regulations that provide adequate analysis of potential impacts and preventative measures to limit or avoid substantial release of pollutants during project operation. As shown in Table 3.1-7, the Big Cities Alternative would result in a smaller area of land being converted from non-urban to urban uses (3,000 acres versus 6,600). This impact would be less than significant for the reasons described under Impact 2.8-4, and **less** than the proposed Plan.

Construction and earth-moving activities associated with development and transportation projects could increase erosion and sedimentation, and could result in sediment loading in local waterways and subsequent effects on water quality. Prior to commencement of major construction activities, project applicants would submit a SWPPP to the SWRCB that identifies the BMPs that would be used in construction of the planned project. The applicant must receive approval of the SWPPP and submit a Notice of Intent prior to initiating construction. Individual development and transportation projects are expected to adopt BMPs appropriate to local conditions. As shown in Table 3.1-7, the Big Cities Alternative would result in a smaller area of land being

converted from non-urban to urban uses (3,000 acres versus 6,600). This impact would be less than significant for the reasons described under Impact 2.8-5, and **less** than the proposed Plan.

All projects implemented under the proposed Plan would be required to adhere to the appropriate local and State requirements that are designed to ensure that flooding conditions are not exacerbated and water quality is not adversely affected. Based on existing regulations, implementation of the proposed Plan is not anticipated to increase the rate or amount of surface runoff in a manner that would result in on- or offsite flooding, or substantial erosion or siltation. As shown in **Table 3.1-7**, the Big Cities Alternative would result in a smaller area of land being converted from non-urban to urban uses (3,000 acres versus 6,600). This impact would be less than significant for the reasons described under Impact 2.8-6, and **less** than the proposed Plan.

As shown in **Table 3.1-32**, the Big Cities Alternative would have a greater area of the land use growth footprint within the 100-year flood hazard area (950 acres) than under the proposed Plan (930 acres). Land development and transportation projects would be subject to implementation of local, State, and federal flood protection regulations. The transportation project footprint would be less under the Big Cities Alternative (260 acres) compared to the proposed Plan (1,100 acres). Overall, there would be smaller area of footprint within the 100-year floodplain under the Big Cities Alternative than the proposed Plan. Thus, this impact would be less than significant for the reasons described under Impact 2.8-7, and **less** than the proposed Plan.

As discussed above, there would be a smaller area of the land use growth footprint and transportation projects footprint within the 100-year flood hazard area under the Big Cities Alternative compared to the proposed Plan. Land development and transportation projects would both be subject to implementation of local, State, and federal floodplain regulations and project-level review. Thus, this impact would be less than significant for the reasons described under Impact 2.8-8, and **less** than the proposed Plan.

Alternative 4, EEJ

Compared to the proposed Plan, the EEJ Alternative has a greater area of land use growth footprint in land not designated as urban (**Table 3.1-7**) and could thus result in a greater increase of impervious surfaces. Regional growth and land use changes associated with the proposed Plan would not substantially degrade water quality in violation of water quality standards. Although individual projects under the proposed Plan have the potential to adversely affect water quality at a project-specific level, these impacts are considered less than significant because future projects associated with land use development would adhere to existing regulations and would operate under the oversight of applicable regulatory agencies. Thus, this impact would be less than significant for the reasons described under Impact 2.8-1, and **greater** than the proposed Plan.

Compared to the proposed Plan, the EEJ Alternative has a greater area of land use growth footprint in land not designated as urban (**Table 3.1-7**) and could thus result in a greater increase of impervious surfaces. Regarding groundwater recharge, activities would be implemented under California regulations governing use of groundwater, including Executive Order B-29-15 and the Groundwater Management Act, as well as groundwater provisions of applicable local general plans. Taken as a whole, these regulations are intended to reduce groundwater use and subsequent overdraft of groundwater basins. Thus, this impact would be less than significant for the reasons described under Impact 2.8-2, and **greater** than the proposed Plan.

Development of the land use growth footprint and construction of transportation projects that have the potential to alter drainage patterns would be subject to local stormwater drainage master plans, regional MS4 permit requirements, and any Caltrans drainage requirements. These requirements would include BMPs and drainage requirements that minimize exposed soils and the potential for offsite transport of sediments. As shown in **Table 3.1-7**, the EEJ Alternative would result in a greater area of land being converted from non-urban to urban uses (6,900 acres versus 6,600). This impact would be less than significant for the reasons described under Impact 2.8-3, and **greater** than the proposed Plan.

The effects of both the land development and transportation projects would have the potential to increase stormwater pollutants in runoff. However, individual projects under the proposed Plan would be subject to regulations that provide adequate analysis of potential impacts and preventative measures to limit or avoid

substantial release of pollutants during project operation. As shown in **Table 3.1-7**, the EEJ Alternative would result in a greater area of land being converted from non-urban to urban uses (6,900 acres versus 6,600). This impact would be less than significant for the reasons described under Impact 2.8-4, and **greater** than the proposed Plan.

Construction and earth-moving activities associated with development and transportation projects could increase erosion and sedimentation, and could result in sediment loading in local waterways and subsequent effects on water quality. Prior to commencement of major construction activities, project applicants would submit a SWPPP to the SWRCB that identifies the BMPs that would be used in construction of the planned project. The applicant must receive approval of the SWPPP and submit a Notice of Intent prior to initiating construction. Individual development and transportation projects are expected to adopt BMPs appropriate to local conditions. As shown in **Table 3.1-7**, the EEJ Alternative would result in a greater area of land being converted from non-urban to urban uses (6,900 acres versus 6,600). This impact would be less than significant for the reasons described under Impact 2.8-5, and **greater** than the proposed Plan.

All projects implemented under the proposed Plan would be required to adhere to the appropriate local and State requirements that are designed to ensure that flooding conditions are not exacerbated and water quality is not adversely affected. Based on existing regulations, implementation of the proposed Plan is not anticipated to increase the rate or amount of surface runoff in a manner that would result in on- or offsite flooding, or substantial erosion or siltation. As shown in **Table 3.1-7**, the EEJ Alternative would result in a greater area of land being converted from non-urban to urban uses (6,900 acres versus 6,600). This impact would be less than significant for the reasons described under Impact 2.8-6, and **greater** than the proposed Plan.

As shown in **Table 3.1-32**, the EEJ Alternative would have a greater area of the land use growth footprint within the 100-year flood hazard area (1,000 acres) than the proposed Plan (930 acres). Land development and transportation projects would be subject to implementation of local, State, and federal flood protection regulations. The transportation project footprint would be less under the EEJ Alternative (330 acres) compared to the proposed Plan (1,100 acres). Overall, there would be smaller area of footprint within the 100-year floodplain under the EEJ Alternative than the proposed Plan. Thus, this impact would be less than significant for the reasons described under Impact 2.8-7, and **less** than the proposed Plan.

As discussed above, there would be a smaller area of the land use growth footprint and transportation projects footprint within the 100-year flood hazard area under the EEJ Alternative compared to the proposed Plan. Land development and transportation projects would both be subject to implementation of local, State, and federal floodplain regulations and project-level review. Thus, this impact would be less than significant for the reasons described under Impact 2.8-8, and **less** than the proposed Plan.

BIOLOGICAL RESOURCES

Biological resources are addressed in Section 2.9, which includes an analysis of: special-status species, sensitive natural communities, movement or migration of wildlife, local conservation policies, and fish and wildlife habitat. The relative magnitude of impacts compared to the proposed Plan is generally based on the area of land use growth footprint under the proposed Plan and each alternative.

Quantifiable impacts are presented below in **Tables 3.1-33 through 3.1-35**.

Table 3.1-33 Acreage of Critical Habitat within the Land Use Growth Footprint and Transportation Projects Footprint, by Alternative

Alternative	Marbled murrelet	Alameda whipsnake (=striped racer)	California tiger Salamander	California red-legged frog	Delta smelt	Tidewater goby	Bay checkerspot butterfly	Conservancy fairy shrimp	Vernal pool fairy shrimp	Vernal pool tadpole shrimp	Contra Costa goldfields	Contra Costa wallflower	Antioch Dunes evening-primrose	Franciscan manzanita	Steelhead - California Central Valley	Steelhead - Central California Coast	Steelhead - South Central California Coast
	acres														miles		
Land Use Growth Footprint																	
Proposed Plan	0	20	280	410	670	0	<1	0	100	100	100	0	0	7	0	3	0
No Project Alternative	1	440	260	530	7,700	<1	120	610	1,300	620	1,300	50	50	4	<1	3	2
Main Streets Alternative	0	100	370	90	530	0	140	0	9	9	110	0	0	0	0	3	<1
Big Cities Alternative	0	30	70	110	70	0	0	0	0	0	0	0	0	4	0	1	0
EEJ Alternative	0	210	130	100	1,000	0	40	0	60	70	70	0	0	4	0	3	0
Transportation Projects Footprint																	
Proposed Plan	0	40	0	<1	600	0	0	0	40	40	50	0	0	40	2	3	0
No Project Alternative	0	0	0	0	210	0	0	0	0	0	0	0	0	0	0	<1	0
Main Streets Alternative	0	0	0	80	840	0	0	0	200	40	150	0	0	0	<1	1	0
Big Cities Alternative	0	40	0	0	210	0	0	0	0	0	0	0	0	40	<1	2	0
EEJ Alternative	0	40	0	0	210	0	0	0	0	0	0	0	0	40	<1	2	0

Notes: Numbers less than 1 are shown as "<1"; Whole numbers have been rounded (between 0 and 10 to the nearest whole number, between 11 and 999 to the nearest 10, between 1,000 and 1,000,000 to the nearest 100, above 1,000,000 to the nearest 1,000).
Source: MTC 2017, USFWS 2016

Table 3.1-34 Acreage of Wetland Features within the Land Use Growth Footprint and Transportation Projects Footprint, by Alternative

Alternative	Estuarine and Marine Deepwater	Estuarine and Marine Wetland	Freshwater Emergent Wetland	Freshwater Forested/ Shrub Wetland	Freshwater Pond	Lake	Other	Riverine	Total
	Land Use Growth Footprint								
Proposed Plan	20	50	50	20	40	0	0	80	**250**
No Project Alternative	20	130	400	70	100	30	520	270	**1,500**
Main Streets Alternative	20	50	20	20	30	0	0	60	**210**
Big Cities Alternative	20	20	70	20	30	0	0	30	**190**
EEJ Alternative	10	20	50	20	30	0	10	90	**250**
	Transportation Projects Footprint								
Proposed Plan	2,300	70	7	5	12	8	0	43	**2,400**
No Project Alternative	200	0	<1	0	0	<1	0	3	**200**
Main Streets Alternative	280	20	20	6	10	<1	30	80	**440**
Big Cities Alternative	1,500	10	2	2	8	8	0	20	**1,500**
EEJ Alternative	1,500	50	3	2	8	8	0	20	**1,600**

Notes: Numbers less than 1 are shown as "<1"; Whole numbers have been rounded (between 0 and 10 to the nearest whole number, between 11 and 999 to the nearest 10, between 1,000 and 1,000,000 to the nearest 100, above 1,000,000 to the nearest 1,000).
Source: MTC 2017, USFWS 2016

Table 3.1-35 Acreage Essential Connectivity Acres with the Land Use Growth Footprint and Transportation Projects Footprint, by Alternative

Alternative	Land Use Growth Footprint	Transportation Projects Footprint
Proposed Plan	1,000	1,000
No Project Alternative	4,500	0
Main Streets Alternative	1,100	1,300
Big Cities Alternative	500	370
EEJ Alternative	1,400	370

Notes: Numbers less than 1 are shown as "<1"; Whole numbers have been rounded (between 0 and 10 to the nearest whole number, between 11 and 999 to the nearest 10, between 1,000 and 1,000,000 to the nearest 100, above 1,000,000 to the nearest 1,000).
Source: CDFW 2010, MTC 2017

Alternative 1, No Project

Impacts on special-status species could occur within the land use growth footprint, including the temporary and permanent removal or conversion of vegetation and habitat necessary for species breeding, feeding, dispersal, or sheltering. Construction and/or ongoing operations could result in direct mortality of special-status plants and wildlife, entrapment in open trenches, and general disturbance due to noise or vibration during pile- driving, earthmoving, and other construction activities. Construction-generated fugitive dust accumulation on surrounding vegetation and construction-related erosion, runoff, and sedimentation could degrade the quality of adjacent vegetation communities, affecting their ability to support special-status plants and wildlife. As shown in Table 3.1-7, the No Project Alternative would result in a greater area of land being converted from non-urban to urban uses (27,500 acres versus 6,600). This impact would be significant and unavoidable for the reasons described under Impact 2.9-1a, and **greater** than the proposed Plan.

Impacts on critical habitat could include temporary or permanent habitat loss. Degradation of areas that have high conservation value for these species could also occur in association with development, where such development occurs within or adjacent to critical habitat, through the introduction of night lighting, increases in ambient noise levels, and the introduction of invasive species and predators. Potential impacts on salmonid critical habitat could include stream degradation in association with increased impervious surfaces and surface runoff, decreases in water quality due to increased point source pollution, and erosion and sedimentation during construction. As shown in 3.1-33, there would be a greater area of critical habitat affected by the No Project Alternative (13,000 acres) than the proposed Plan (1,700). The transportation projects footprint would affect a smaller acreage of critical habitat under the No Project Alternative (200 acres) compared to the proposed Plan (800 acres). Overall, the No Project Alternative footprint would be greater that the proposed Plan footprint in areas designated as critical habitat Thus, this impact would be less than significant for the reasons described under Impact 2.9-1b, and **greater** than the proposed Plan.

Potential impacts on wetlands include the temporary disturbance, or permanent loss, of jurisdictional waters, including wetlands; loss or degradation of stream or wetland function; incremental degradation of wetland habitats; and fragmentation of streams and wetlands. Jurisdictional waters in the region vary from relatively small, isolated roadside areas, wet meadows, and vernal pools to major streams and rivers, bays and estuaries, to tidal, brackish, and freshwater marshes. As shown in 3.1-34, there would be a larger area of wetland features affected by the No Project Alternative (1,500 acres) than the proposed Plan (250 acres). The transportation projects footprint would affect a smaller acreage of wetland features under the No Project Alternative (200 acres) compared to the proposed Plan (2,400 acres). Overall, the No Project Alternative footprint would be smaller than the proposed Plan footprint in areas designated as wetland features. Thus, this impact would be significant and unavoidable for the reasons described under Impact 2.9-2, and **less** than the proposed Plan.

The Bay Area encompasses large areas of wildlands that provide habitat for both common and rare plants and wildlife and some of these areas were mapped as Essential Connectivity Areas (ECAs). The ECAs are not regulatory delineations but are identified as lands likely important to wildlife movement between large, mostly natural areas at the statewide level. As shown in 3.1-35, implementation of the No Project Alternative would result in a much greater area of affected ECAs (4,500 acres) than the proposed Plan (1,000 acres). There would also be adverse effects on ECAs due to implementation of transportation projects. Thus, this impact would be significant and unavoidable for the reasons described under Impact 2.9-3, and **greater** than the proposed Plan.

The potential for land use development and implementation of transportation projects under the proposed Plan could each result in potentially significant conflicts with local ordinances or policies protective of biological resources HCP/NCCPs, Conservation Strategies, and LCPs on a localized basis as well as region-wide. As shown in **Table 3.1-7**, the No Project Alternative would result in a greater area of land being converted from non-urban to urban uses (27,500 acres versus 6,600). This impact would be less than significant for the reasons described under Impact 2.9-4, and **greater** than the proposed Plan.

For the reasons described above, the No Project Alternative would affect special status species and sensitive natural communities. Overall, this impact would be significant and unavoidable for the reasons described under Impact 2.9-5, and **greater** than the proposed Plan

Alternative 2, Main Streets

Impacts on special-status species could occur within the land use growth footprint, including the temporary and permanent removal or conversion of vegetation and habitat necessary for species breeding, feeding, dispersal, or sheltering. As shown in **Table 3.1-7**, the Main Streets Alternative would result in a smaller area of land being converted from non-urban to urban uses (5,600 acres versus 6,600). This impact would be significant and unavoidable for the reasons described under Impact 2.9-1a, and **less** than the proposed Plan.

As shown in 3.1-33, there would be a smaller area of critical habitat affected by the Main Streets Alternative (1,400 acres) than the proposed Plan (1,700). The transportation projects footprint would affect a larger acreage of critical habitat under the Main Streets Alternative (1,300 acres) compared to the proposed Plan (800 acres). Overall, the Main Streets Alternative footprint would be larger than the proposed Plan footprint in areas designated as critical habitat. Thus, this impact would be less than significant for the reasons described under Impact 2.9-1b, and **greater** than the proposed Plan.

As shown in 3.1-34, there would be a smaller area of wetland features affected by the Main Streets Alternative (210 acres) than the proposed Plan (250 acres). The transportation projects footprint would affect a smaller acreage of wetland features under the Main Streets Alternative (440 acres) compared to the proposed Plan (2,400 acres). Overall, the Main Streets Alternative footprint would be smaller than the proposed Plan footprint in areas designated as wetland features. Thus, this impact would be significant and unavoidable for the reasons described under Impact 2.9-2, and **less** than the proposed Plan.

As shown in 3.1-35 the land use growth footprint would affect a greater area of ECAs under the Main Streets Alternative (1,100 acres) than the proposed Plan (1,000 acres). There would also be adverse effects on ECAs due to implementation of transportation projects. Thus, this impact would be significant and unavoidable for the reasons described under Impact 2.9-3, and slightly **greater** than the proposed Plan.

The potential for land use development and implementation of transportation projects under the proposed Plan could each result in potentially significant conflicts with local ordinances or policies protective of biological resources and HCP/NCCPs, Conservation Strategies, and LCPs on a localized basis as well as region-wide. As shown in **Table 3.1-7**, the Main Streets Alternative would result in a smaller area of land being converted from non-urban to urban uses (5,600 acres versus 6,600). This impact would be less than significant for the reasons described under Impact 2.9-4, and **less** than the proposed Plan.

For the reasons described above, the Main Streets Alternative would affect special status species and sensitive natural communities. Overall, this impact would be significant and unavoidable for the reasons described under Impact 2.9-5, and **less** than the proposed Plan.

Alternative 3, Big Cities

Impacts on special-status species could occur within the land use growth footprint, including the temporary and permanent removal or conversion of vegetation and habitat necessary for species breeding, feeding, dispersal, or sheltering. As shown in **Table 3.1-7**, the Big Cities Alternative would result in a greater area of land being converted from non-urban to urban uses (3,000 acres versus 6,600). This impact would be significant and unavoidable for the reasons described under Impact 2.9-1a, and **less** than the proposed Plan.

As shown in 3.1-33, there would be a smaller area of critical habitat affected by the Big Cities Alternative (300 acres) than the proposed Plan (1,700). The transportation projects footprint would affect a smaller acreage of critical habitat under the Big Cities Alternative (300 acres) compared to the proposed Plan (800 acres). Overall, the Big Cities Alternative footprint would be smaller than the proposed Plan footprint in areas designated as critical habitat. Thus, this impact would be less than significant for the reasons described under Impact 2.9-1b, and **less** than the proposed Plan.

As shown in 3.1-34, there would be a smaller area of wetland features affected by the Big Cities Alternative (190 acres) than the proposed Plan (250 acres). The transportation projects footprint would affect a smaller acreage of wetland features under the Big Cities Alternative (1,500 acres) compared to the proposed Plan (2,400 acres). Overall, the Big Cities Alternative footprint would be smaller than the proposed Plan footprint in areas designated as wetland features. Thus, this impact would be significant and unavoidable for the reasons described under Impact 2.9-2, and **less** than the proposed Plan.

As shown in 3.1-35 the land use growth footprint would affect a smaller area of ECAs under the Big Cities Alternative (500 acres) than the proposed Plan (1,000 acres). There would also be adverse effects on ECAs due to implementation of transportation projects. Thus, this impact would be significant and unavoidable for the reasons described under Impact 2.9-3, and **less** than the proposed Plan.

The potential for land use development and implementation of transportation projects under the proposed Plan could each result in potentially significant conflicts with local ordinances or policies protective of biological resources and HCP/NCCPs, Conservation Strategies, and LCPs on a localized basis as well as region-wide. As shown in **Table 3.1-7**, the Big Cities Alternative would result in a smaller area of land being converted from non-urban to urban uses (3,000 acres versus 6,600). This impact would be less than significant for the reasons described under Impact 2.9-4, and **less** than the proposed Plan.

For the reasons described above, the Big Cities Alternative would affect special status species and sensitive natural communities. Overall, this impact would be significant and unavoidable for the reasons described under Impact 2.9-5, and **less** than the proposed Plan.

Alternative 4, EEJ

Impacts on special-status species could occur within the land use growth footprint, including the temporary and permanent removal or conversion of vegetation and habitat necessary for species breeding, feeding, dispersal, or sheltering. As shown in Table 3.1-7, the EEJ Alternative would result in a greater area of land being converted from non-urban to urban uses (6,900 acres versus 6,600). This impact would be significant and unavoidable for the reasons described under Impact 2.9-1a, and **greater** than the proposed Plan.

As shown in 3.1-33, there would be a similar sized area of critical habitat affected by the EEJ Alternative as the proposed Plan (1,700). The transportation projects footprint would affect a smaller acreage of critical habitat under the EEJ Alternative (300 acres) compared to the proposed Plan (800 acres). Overall, the EEJ Alternative footprint would be smaller than the proposed Plan footprint in areas designated as critical habitat. Thus, this impact would be less than significant for the reasons described under Impact 2.9-1b, and **less** than the proposed Plan.

As shown in 3.1-34, there would be a similar size area of wetland features affected by the EEJ Alternative (250 acres) than the proposed Plan (250 acres). The transportation projects footprint would affect a smaller acreage of wetland features under the EEJ Alternative (1,600 acres) compared to the proposed Plan (2,400 acres). Overall, the EEJ Alternative footprint would be smaller than the proposed Plan footprint in areas designated as wetland features. Thus, this impact would be significant and unavoidable for the reasons described under Impact 2.9-2, and **less** than the proposed Plan.

As shown in 3.1-35 the land use growth footprint would affect a greater area of ECAs under the EEJ Alternative (1,400 acres) than the proposed Plan (1,000 acres). There would also be adverse effects on ECAs due to implementation of transportation projects. Thus, this impact would be significant and unavoidable for the reasons described under Impact 2.9-3, and **greater** than the proposed Plan.

The potential for land use development and implementation of transportation projects under the proposed Plan could each result in potentially significant conflicts with local ordinances or policies protective of biological resources and HCP/NCCPs, Conservation Strategies, and LCPs on a localized basis as well as region-wide. As shown in Table 3.1-7, the EEJ Alternative would result in a greater area of land being converted from non-urban to urban uses (6,900 acres versus 6,600). This impact would be less than significant for the reasons described under Impact 2.9-4, and **greater** than the proposed Plan.

For the reasons described above, the EEJ Alternative would affect special status species and sensitive natural communities. Overall, this impact would be significant and unavoidable for the reasons described under Impact 2.9-5, and **greater** than the proposed Plan.

VISUAL RESOURCES

Visual resources are addressed in Section 2.10, which includes an analysis of: scenic vistas, scenic resources along state scenic highways, visual character and quality, and light and glare. The relative magnitude of impacts compared to the proposed Plan is generally based on the area of land use growth footprint under the proposed Plan and each alternative.

Alternative 1, No Project

Land use and transportation projects would not substantially change the existing scenic vistas in the Bay Area at the regional scale because views of landforms and man-made features would remain similar to the existing conditions. Impacts to scenic vistas would be substantial from discrete locations due to the presence of construction-related activities and introduction of new feature in a localized viewshed. As shown in Table 3.1-7, the No Project Alternative would result in a greater area of land being converted from non-urban to urban uses (27,500 acres versus 6,600). Thus, this impact would be significant and unavoidable for the reasons described under Impact 2.10-1, and **greater** than the proposed Plan.

Development adjacent to or with construction on scenic highways, could cause short-term visual impacts resulting from construction equipment and scaffolding, temporary lighting, and exposed excavation and slope faces. The Scenic Highway Guidelines adopted by Caltrans to protect scenic highway corridors, which include certain limits on land uses adjacent to the roadway, are implemented at the local level. Most cities and counties have policies (e.g., General Plan), regulations (e.g., zoning), and other guidance (e.g., design guidelines), that control the size and scale of new development to maintain its visual compatibility with the natural and built environments. As shown in Table 3.1-7, the No Project Alternative would result in a greater area of land being converted from non-urban to urban uses (27,500 acres versus 6,600). This impact would be less than significant for the reasons described under Impact 2.10-2, and **greater** than the proposed Plan

In growth areas where density and intensity is anticipated to increase substantially, new development—and in some cases, new *types* of development—would be required to accommodate growth. Most cities and counties have policies (e.g., General Plan), regulations (e.g., zoning), and other guidance (e.g., design guidelines), which control the size and scale of new development to maintain its visual compatibility with the natural and built environments. Local jurisdictions maintain land use and design control over discretionary development

projects and would be responsible for approving development plans. However, major transportation projects could result in substantial effects on visual resources in the region. Some transportation projects in the proposed Plan that expand or extend existing rights-of-way could affect community character by increasing visual contrast in the community. As shown in Table 3.1-7, the No Project Alternative would result in a greater area of land being converted from non-urban to urban uses (27,500 acres versus 6,600). This impact would be significant and unavoidable for the reasons described under Impact 2.10-3, and **greater** than the proposed Plan.

Development resulting from the proposed Plan could cause substantial visual impacts by adding a visual element of urban character to an existing rural or open space area or adding a modern element to a historic area. In addition, transportation projects would introduce new roadways in rural, open space, or historic areas, which would constitute a substantial effect on the existing visual resources. As shown in Table 3.1-7, the No Project Alternative would result in a greater area of land being converted from non-urban to urban uses (27,500 acres versus 6,600). This impact would be significant and unavoidable for the reasons described under Impact 2.10-4, and **greater** than the proposed Plan.

Development and transportation projects could create new substantial sources of light and glare at the regional scale that cause a public hazard, disrupt scenic vistas, and brighten the night sky. In portions of the region with substantial existing development, increases would not cause a new public hazard or substantially degrade the visual character or quality of the area because existing sources of glare and light are already a dominant feature of the landscape. As shown in Table 3.1-7, the No Project Alternative would result in a greater area of land being converted from non-urban to urban uses (27,500 acres versus 6,600). This impact would be significant and unavoidable for the reasons described under Impact 2.10-5, and **greater** than the proposed Plan.

Alternative 2, Main Streets

Impacts to scenic vistas would be substantial from discrete locations due to the presence of construction-related activities and introduction of new feature in a localized viewshed. As shown in Table 3.1-7, the Main Streets Alternative would result in a greater area of land being converted from non-urban to urban uses (5,600 acres versus 6,600). Thus, this impact would be significant and unavoidable for the reasons described under Impact 2.10-1, and **less** than the proposed Plan.

The Scenic Highway Guidelines adopted by Caltrans to protect scenic highway corridors, which include certain limits on land uses adjacent to the roadway, are implemented at the local level. Most cities and counties have policies (e.g. General Plan), regulations (e.g. zoning), and other guidance (eg design guidelines), that control the size and scale of new development to maintain its visual compatibility with the natural and built environments. As shown in Table 3.1-7, the Main Streets Alternative would result in a smaller area of land being converted from non-urban to urban uses (5,600 acres versus 6,600). This impact would be less than significant for the reasons described under Impact 2.10-2, and **less** than the proposed Plan

In growth areas where density and intensity is anticipated to increase substantially, new development—and in some cases, new *types* of development—would be required to accommodate growth. Most cities and counties have policies (e.g., General Plan), regulations (e.g., zoning), and other guidance (e.g., design guidelines), which control the size and scale of new development to maintain its visual compatibility with the natural and built environments. As shown in Table 3.1-7, the Main Streets Alternative would result in a smaller area of land being converted from non-urban to urban uses (5,600 acres versus 6,600). This impact would be significant and unavoidable for the reasons described under Impact 2.10-3, and **less** than the proposed Plan.

Development resulting from the proposed Plan could cause substantial visual impacts by adding a visual element of urban character to an existing rural or open space area or adding a modern element to a historic area. As shown in Table 3.1-7, the Main Streets Alternative would result in a smaller area of land being converted from non-urban to urban uses (5,600 acres versus 6,600). This impact would be significant and unavoidable for the reasons described under Impact 2.10-4, and **less** than the proposed Plan.

Development and transportation projects could create new substantial sources of light and glare at the regional scale that cause a public hazard, disrupt scenic vistas, and brighten the night sky. As shown in Table 3.1-7, the Main Streets Alternative would result in a smaller area of land being converted from non-urban to urban uses (5,600 acres versus 6,600). This impact would be significant and unavoidable for the reasons described under Impact 2.10-5, and **less** than the proposed Plan.

Alternative 3, Big Cities

Impacts to scenic vistas would be substantial from discrete locations due to the presence of construction-related activities and introduction of new feature in a localized viewshed. As shown in Table 3.1-7, the Big Cities Alternative would result in a smaller area of land being converted from non-urban to urban uses (3,000 acres versus 6,600). Thus, this impact would be significant and unavoidable for the reasons described under Impact 2.10-1, and **less** than the proposed Plan.

The Scenic Highway Guidelines adopted by Caltrans to protect scenic highway corridors, which include certain limits on land uses adjacent to the roadway, are implemented at the local level. Most cities and counties have policies (e.g., General Plan), regulations (e.g., zoning), and other guidance (e.g., design guidelines), that control the size and scale of new development to maintain its visual compatibility with the natural and built environments. As shown in Table 3.1-7, the Big Cities Alternative would result in a smaller area of land being converted from non-urban to urban uses (3,000 acres versus 6,600). This impact would be less than significant for the reasons described under Impact 2.10-2, and **less** than the proposed Plan

In growth areas where density and intensity is anticipated to increase substantially, new development—and in some cases, new *types* of development—would be required to accommodate growth. Most cities and counties have policies (e.g., General Plan), regulations (e.g., zoning), and other guidance (e.g., design guidelines), which control the size and scale of new development to maintain its visual compatibility with the natural and built environments. As shown in Table 3.1-7, the Big Cities Alternative would result in a smaller area of land being converted from non-urban to urban uses (3,000 acres versus 6,600). This impact would be significant and unavoidable for the reasons described under Impact 2.10-3, and **less** than the proposed Plan.

Development resulting from the proposed Plan could cause substantial visual impacts by adding a visual element of urban character to an existing rural or open space area or adding a modern element to a historic area. As shown in Table 3.1-7, the Big Cities Alternative would result in a smaller area of land being converted from non-urban to urban uses (3,000 acres versus 6,600). This impact would be significant and unavoidable for the reasons described under Impact 2.10-4, and **less** than the proposed Plan.

Development and transportation projects could create new substantial sources of light and glare at the regional scale that cause a public hazard, disrupt scenic vistas, and brighten the night sky. As shown in Table 3.1-7, the Big Cities Alternative would result in a smaller area of land being converted from non-urban to urban uses (3,000 acres versus 6,600). This impact would be significant and unavoidable for the reasons described under Impact 2.10-5, and **less** than the proposed Plan.

Alternative 4, EEJ

Impacts to scenic vistas would be substantial from discrete locations due to the presence of construction-related activities and introduction of new feature in a localized viewshed. As shown in Table 3.1-7, the EEJ Alternative would result in a greater area of land being converted from non-urban to urban uses (6,900 acres versus 6,600). Thus, this impact would be significant and unavoidable for the reasons described under Impact 2.10-1, and **greater** than the proposed Plan.

The Scenic Highway Guidelines adopted by Caltrans to protect scenic highway corridors, which include certain limits on land uses adjacent to the roadway, are implemented at the local level. Most cities and counties have policies (e.g., General Plan), regulations (e.g., zoning), and other guidance (e.g., design guidelines), that control the size and scale of new development to maintain its visual compatibility with the natural and built environments. As shown in Table 3.1-7, the EEJ Alternative would result in a greater area of land being

converted from non-urban to urban uses (6,900 acres versus 6,600). This impact would be less than significant for the reasons described under Impact 2.10-2, and **greater** than the proposed Plan

In growth areas where density and intensity is anticipated to increase substantially, new development—and in some cases, new *types* of development—would be required to accommodate growth. Most cities and counties have policies (e.g., General Plan), regulations (e.g., zoning), and other guidance (e.g., design guidelines), which control the size and scale of new development to maintain its visual compatibility with the natural and built environments. As shown in Table 3.1-7, the EEJ Alternative would result in a greater area of land being converted from non-urban to urban uses (6,900 acres versus 6,600). This impact would be significant and unavoidable for the reasons described under Impact 2.10-3, and **greater** than the proposed Plan.

Development resulting from the proposed Plan could cause substantial visual impacts by adding a visual element of urban character to an existing rural or open space area or adding a modern element to a historic area. As shown in Table 3.1-7, the EEJ Alternative would result in a greater area of land being converted from non-urban to urban uses (6,900 acres versus 6,600). This impact would be significant and unavoidable for the reasons described under Impact 2.10-4, and **greater** than the proposed Plan.

Development and transportation projects could create new substantial sources of light and glare at the regional scale that cause a public hazard, disrupt scenic vistas, and brighten the night sky. As shown in Table 3.1-7, the EEJ Alternative would result in a greater area of land being converted from non-urban to urban uses (6,900 acres versus 6,600). This impact would be significant and unavoidable for the reasons described under Impact 2.10-5, and **greater** than the proposed Plan.

CULTURAL RESOURCES

Cultural resources are addressed in Section 2.11, which includes an analysis of effects on historic resources, unique archaeological resources, paleontological resources, human remains, tribal cultural resources, and important examples of the major periods of California history or prehistory. The relative magnitude of impacts compared to the proposed Plan is generally based on the area of land use growth footprint under the proposed Plan and each alternative.

Alternative 1, No Project

Projects located in areas with known historical sites, or located in communities with established historic preservation programs, or involving activities that would introduce new visual elements or disturb the existing terrain have the potential to result in substantial historic resource impacts. As shown in Table 3.1-7, the No Project Alternative would result in a greater area of land being converted from non-urban to urban uses (27,500 acres versus 6,600). This impact would be significant and unavoidable for the reasons described under Impact 2.11-1, and **greater** than the proposed Plan.

New development and transportation projects could result in archaeological impacts if construction activities include the disturbance of previously-identified or unidentified archaeological resources. Projects involving excavation, grading, or soil removal in previously undisturbed areas have the greatest likelihood to encounter significant archaeological resources which could represent important examples of periods of California's prehistory. Likewise, the establishment of staging areas, temporary roads, and other temporary facilities necessary for construction activities has the potential to impact these cultural resources. As shown in Table 3.1-7, the No Project Alternative would result in a greater area of land being converted from non-urban to urban uses (27,500 acres versus 6,600). This impact would be significant and unavoidable for the reasons described under Impact 2.11-2, and **greater** than the proposed Plan.

In general, potential impacts on paleontological or geologic resources would be similar to those identified for archaeological resources discussed above fore archaeological resources. Projects involving excavation, grading, or soil removal in previously undisturbed areas have the greatest likelihood to encounter these resources. As shown in Table 3.1-7, the No Project Alternative would result in a greater area of land being converted from non-urban to urban uses (27,500 acres versus 6,600), which could result in land conversion

in greater areas of paleontological sensitivity. This impact would be significant and unavoidable for the reasons described under Impact 2.11-3, and **greater** than the proposed Plan.

In general, potential impacts on human remains would be similar to those discussed for archaeological resource impacts discussed above. New development and transportation projects involving construction activities that would disturb native terrain, including excavation, grading, or soil removal, would have the greatest likelihood to encounter human remains. Compliance with California Health and Safety Code Sections 7050.5 and 7052 and California Public Resources Code Section 5097 would provide an opportunity to avoid or minimize the disturbance of human remains, and to appropriately treat any remains that are discovered. As shown in **Table 3.1-7**, the No Project Alternative would result in a greater area of land being converted from non-urban to urban uses (27,500 acres versus 6,600). This impact would be less than significant for the reasons described under Impact 2.11-4, and **greater** than the proposed Plan.

MTC requested consultation meetings with all three tribes; however, no tribes responded. Consequently, no tribal concerns or TCRs have been identified. Although no resources within the Plan area have been identified as meeting any of the PRC Section 5024.1(c) criteria, it is possible that TCRs could be identified during analysis of subsequent projects. As shown in **Table 3.1-7**, the No Project Alternative would result in a greater area of land being converted from non-urban to urban uses (27,500 acres versus 6,600). This impact would be significant and unavoidable for the reasons described under Impact 2.11-5, and **greater** than the proposed Plan.

Alternative 2, Main Streets

Projects located in areas with known historical sites, or located in communities with established historic preservation programs, or involving activities that would introduce new visual elements or disturb the existing terrain have the potential to result in substantial historic resource impacts. As shown in Table 3.1-7, the Main Streets Alternative would result in a smaller area of land being converted from non-urban to urban uses (5,600 acres versus 6,600). This impact would be significant and unavoidable for the reasons described under Impact 2.11-1, and **less** than the proposed Plan.

As discussed above under the Main Streets Alternative, new development and transportation projects could result in archaeological impacts if construction activities include the disturbance of previously-identified or unidentified archaeological resources. As shown in Table 3.1-7, the Main Streets Alternative would result in a smaller area of land being converted from non-urban to urban uses (5,600 acres versus 6,600). This impact would be significant and unavoidable for the reasons described under Impact 2.11-2, and **less** than the proposed Plan.

In general, potential impacts on paleontological or geologic resources would be similar to those identified for archaeological resources discussed above for archaeological resources. Projects involving excavation, grading, or soil removal in previously undisturbed areas have the greatest likelihood to encounter these resources. As shown in **Table 3.1-7**, the Main Streets Alternative would result in a smaller area of land being converted from non-urban to urban uses footprint and transportation project footprint (16,600 acres versus 23,000). This impact would be significant and unavoidable for the reasons described under Impact 2.11-3, and **less** than the proposed Plan.

In general, potential impacts on human remains would be similar to those discussed for archaeological resource impacts discussed above. As shown in **Table 3.1-7**, the Main Streets Alternative would result in a smaller area of land being converted from non-urban to urban uses (5,600 acres versus 6,600). This impact would be less than significant for the reasons described under Impact 2.11-4, and **less** than the proposed Plan.

MTC requested consultation meetings with all three tribes; however, no tribes responded. Consequently, no tribal concerns or TCRs have been identified. Although no resources within the Plan area have been identified as meeting any of the PRC Section 5024.1(c) criteria, it is possible that TCRs could be identified during analysis of subsequent projects. As shown in **Table 3.1-7**, the Main Streets Alternative would result in a smaller area

of land being converted from non-urban to urban uses (5,600 acres versus 6,600). This impact would be significant and unavoidable for the reasons described under Impact 2.11-5, and **less** than the proposed Plan.

Alternative 3, Big Cities

Projects located in areas with known historical sites, or located in communities with established historic preservation programs, or involving activities that would introduce new visual elements or disturb the existing terrain have the potential to result in substantial historic resource impacts. As shown in Table 3.1-7, the Big Cities Alternative would result in a smaller area of land being converted from non-urban to urban uses (3,000 acres versus 6,600). This impact would be significant and unavoidable for the reasons described under Impact 2.11-1, and **less** than the proposed Plan.

As discussed above under the Big Cities Alternative, new development and transportation projects could result in archaeological impacts if construction activities include the disturbance of previously-identified or unidentified archaeological resources. As shown in Table 3.1-7, the Big Cities Alternative would result in a smaller area of land being converted from non-urban to urban uses (3,000 acres versus 6,600). This impact would be significant and unavoidable for the reasons described under Impact 2.11-2, and **less** than the proposed Plan.

In general, potential impacts on paleontological or geologic resources would be similar to those identified for archaeological resources discussed above fore archaeological resources. Projects involving excavation, grading, or soil removal in previously undisturbed areas have the greatest likelihood to encounter these resources. As shown in Table 3.1-7, the Big Cities Alternative would result in a smaller area of land being converted from non-urban to urban uses (3,000 acres versus 6,600). This impact would be significant and unavoidable for the reasons described under Impact 2.11-3, and **less** than the proposed Plan.

In general, potential impacts on human remains would be similar to those discussed for archaeological resource impacts discussed above. As shown in Table 3.1-7, the Big Cities Alternative would result in a smaller area of land being converted from non-urban to urban uses (3,000 acres versus 6,600). This impact would be less than significant for the reasons described under Impact 2.11-4, and **less** than the proposed Plan.

MTC requested consultation meetings with all three tribes; however, no tribes responded. Consequently, no tribal concerns or TCRs have been identified. Although no resources within the Plan area have been identified as meeting any of the PRC Section 5024.1(c) criteria, it is possible that TCRs could be identified during analysis of subsequent projects. As shown in Table 3.1-7, the Big Cities Alternative would result in a smaller area of land being converted from non-urban to urban uses (3,000 acres versus 6,600). This impact would be significant and unavoidable for the reasons described under Impact 2.11-5, and **less** than the proposed Plan.

Alternative 4, EEJ

Projects located in areas with known historical sites, or located in communities with established historic preservation programs, or involving activities that would introduce new visual elements or disturb the existing terrain have the potential to result in substantial historic resource impacts. As shown in Table 3.1-7, the EEJ Alternative would result in a greater area of land being converted from non-urban to urban uses (6,900 acres versus 6,600). This impact would be significant and unavoidable for the reasons described under Impact 2.11-1, and **greater** than the proposed Plan.

As discussed above under the EEJ Alternative, new development and transportation projects could result in archaeological impacts if construction activities include the disturbance of previously-identified or unidentified archaeological resources. Projects involving excavation, grading, or soil removal in previously undisturbed areas have the greatest likelihood to encounter significant archaeological resources which could represent important examples of periods of California's prehistory. Likewise, the establishment of staging areas, temporary roads, and other temporary facilities necessary for construction activities has the potential to impact these cultural resources. As shown in Table 3.1-7, the EEJ Alternative would result in a greater area of land being converted from non-urban to urban uses (6,900 acres versus 6,600). This impact would be

significant and unavoidable for the reasons described under Impact 2.11-2, and **greater** than the proposed Plan.

In general, potential impacts on paleontological or geologic resources would be similar to those identified for archaeological resources discussed above fore archaeological resources. Projects involving excavation, grading, or soil removal in previously undisturbed areas have the greatest likelihood to encounter these resources. As shown in Table 3.1-7, the EEJ Alternative would result in a greater area of land being converted from non-urban to urban uses (6,900 acres versus 6,600). This impact would be significant and unavoidable for the reasons described under Impact 2.11-3, and **greater** than the proposed Plan.

In general, potential impacts on human remains would be similar to those discussed for archaeological resource impacts discussed above. As shown in Table 3.1-7, the EEJ Alternative would result in a greater area of land being converted from non-urban to urban uses (6,900 acres versus 6,600). This impact would be less than significant for the reasons described under Impact 2.11-4, and **greater** than the proposed Plan.

MTC requested consultation meetings with all three tribes; however, no tribes responded. Consequently, no tribal concerns or TCRs have been identified. Although no resources within the Plan area have been identified as meeting any of the PRC Section 5024.1(c) criteria, it is possible that TCRs could be identified during analysis of subsequent projects. As shown in Table 3.1-7, the EEJ Alternative would result in a greater area of land being converted from non-urban to urban uses (6,900 acres versus 6,600). This impact would be significant and unavoidable for the reasons described under Impact 2.11-5, and **treater** than the proposed Plan.

PUBLIC UTILITIES AND FACILITIES

Public utilities and facilities are addressed in Section 2.12, which includes an analysis of impacts related to: water supplies, wastewater treatment capacity, stormwater drainage facilities, water or wastewater treatment facilities, water or wastewater treatment requirements, and landfill capacity.

There would be no discernable difference in magnitude for the following types of impacts when comparing the alternatives and the proposed Plan because these impacts are population-driven and all alternatives are forecasted to reach the same population level by 2040.

- wastewater treatment capacity (Impact 2.12-2), a less-than-significant impact after mitigation is implemented;
- new or expanded water or wastewater treatment facilities (Impact 2.12-4), a significant and unavoidable impact; and
- solid waste generation (Impact 2.12-5), a significant and unavoidable impact.

Additionally, it is not anticipated that the forecasted development and transportation projects under the proposed Plan would exceed, or result in the violation of, the established wastewater treatments standards of the Regional Water Quality Control Boards. Thus, Impact 2.12-6 would be of similar magnitude to the proposed Plan for all Alternatives.

The remainder of impacts are related to the forecasted land use growth footprint under each Plan alternative.

Alternative 1, No Project

Increases to water demand are primarily associated with increased population levels. Landscaping features associated with transportation projects may also require water supplies, depending on the requirements of the plant species used. The No Project Alternative would result in the same increase to population levels as the proposed Plan. However, the land use growth footprint is greater under the No Project Alternative than under the proposed Plan (27,500 acres versus 6,600) and the percentage of new households located in TPAs is less (40 percent versus 45 percent under the proposed Plan), which would result in a less efficient water supply system

(e.g., greater areas of irrigated landscaping). While the transportation project list would differ between the No Project Alternative and the proposed Plan, consideration of how water demand may differ cannot be determined without more detailed information on individual project design. Thus, this impact would be significant and unavoidable for the reasons described under Impact 2.12-1, and **greater** than the proposed Plan.

Development outside of urbanized areas could require the construction of new stormwater drainage systems. In addition, implementation of transportation projects could increase permeable surfaces into impervious surfaces through the expansion of existing roadways and construction of new traffic lanes. The land use growth footprint is greater under the No Project Alternative than the proposed Plan. Thus, this impact would be significant and unavoidable for the reasons described under Impact 2.12-3, and **greater** than the proposed Plan.

Alternative 2, Main Streets

The Main Streets Alternative would result in the same increase to population levels as the proposed Plan. However, the land use growth footprint is smaller under the Main Streets Alternative than under the proposed Plan, which would result in a more efficient water supply system (e.g., greater areas of irrigated landscaping). While the transportation project list would differ between the Main Streets Alternative and the proposed Plan, consideration of how water demand may differ cannot be determined without more detailed information on individual project design. Thus, this impact would be significant and unavoidable for the reasons described under Impact 2.12-1, and **less** than the proposed Plan.

Development outside of urbanized areas could require the construction of new stormwater drainage systems. In addition, implementation of transportation projects could increase permeable surfaces into impervious surfaces through the expansion of existing roadways and construction of new traffic lanes. The land use growth footprint and transportation project footprint is smaller under the Main Streets Alternative than the proposed Plan (16,600 acres versus 23,000_. Thus, this impact would be significant and unavoidable for the reasons described under Impact 2.12-3, and **less** than the proposed Plan.

Alternative 3, Big cities

The Big Cities Alternative would result in the same increase to population levels as the proposed Plan. However, the land use growth footprint is smaller under the Big Cities Alternative than under the proposed Plan, which would result in a more efficient water supply system (e.g., greater areas of irrigated landscaping). While the transportation project list would differ between the Big Cities Alternative and the proposed Plan, consideration of how water demand may differ cannot be determined without more detailed information on individual project design. Thus, this impact would be significant and unavoidable for the reasons described under Impact 2.12-1, and **less** than the proposed Plan.

Development outside of urbanized areas could require the construction of new stormwater drainage systems. In addition, implementation of transportation projects could increase permeable surfaces into impervious surfaces through the expansion of existing roadways and construction of new traffic lanes. The land use growth footprint and transportation project footprint is smaller under the Big Cities Alternative than the proposed Plan (15,000 acres versus 23,000 acres). Thus, this impact would be significant and unavoidable for the reasons described under Impact 2.12-3, and **less** than the proposed Plan.

Alternative 4, EEJ

The EEJ Alternative would result in the same increase to population levels as the proposed Plan. However, the land use growth footprint is greater under the EEJ Alternative than under the proposed Plan, which would result in a less efficient water supply system (e.g., greater areas of irrigated landscaping). While the transportation project list would differ between the EEJ Alternative and the proposed Plan, consideration of how water demand may differ cannot be determined without more detailed information on individual project design. Thus, this impact would be significant and unavoidable after implementation of mitigation for the reasons described under Impact 2.12-1, and **greater** than the proposed Plan.

Development outside of urbanized areas could require the construction of new stormwater drainage systems. In addition, implementation of transportation projects could increase permeable surfaces into impervious

surfaces through the expansion of existing roadways and construction of new traffic lanes. The land use growth and transportation footprints are less under the EEJ Alternative than the proposed Plan (18,500 acres versus 23,000). Thus, this impact would be significant and unavoidable for the reasons described under Impact 2.12-3, and **less** than the proposed Plan.

HAZARDS

Hazards are addressed in Section 2.13, which includes an analysis of impacts related to: routine transport, use, or disposal of hazard materials, release of hazardous materials into the environment, hazardous emissions near schools, historical releases of hazardous materials or wastes, proximity to public airports, proximity to private airstrips, impairment of adopted emergency plans or emergency evacuation plans, and exposure of risks associated with wildland fires.

Table 3.1-36 shows the acreage of the land use growth footprint associated with projected development within fire hazard severity zones for each alternative. Table 3.1-37 shows acreage of ultramafic rock within the land use growth footprint and transportation projects footprint.

Table 3.1-36 Acreage of Fire Hazard Severity Zones within the Land Use Growth Footprint, by Alternative

Alternative	Moderate	High	Very High	Total
Proposed Plan	780	60	20	**860**
No Project Alternative	4,400	2,300	470	**7,200**
Main Streets Alternative	630	300	4	**930**
Big Cities Alternative	550	100	10	**660**
EEJ Alternative	450	30	4	**480**

Notes: Numbers less than 1 are shown as "<1"; Whole numbers have been rounded (between 0 and 10 to the nearest whole number, between 11 and 999 to the nearest 10, between 1,000 and 1,000,000 to the nearest 100, above 1,000,000 to the nearest 1,000).

Source: CAL FIRE 2016, MTC 2017

Table 3.1-37 Acreage of Ultramafic Rock within the Land Use Growth Footprint and Transportation Projects Footprint, by Alternative

Alternative	Land Use Growth Footprint	Transportation Projects Footprint
Proposed Plan	350	650
No Project Alternative	520	0
Main Streets Alternative	580	20
Big Cities Alternative	380	640
EEJ Alternative	370	640

Notes: Numbers less than 1 are shown as "<1"; Whole numbers have been rounded (between 0 and 10 to the nearest whole number, between 11 and 999 to the nearest 10, between 1,000 and 1,000,000 to the nearest 100, above 1,000,000 to the nearest 1,000).

Source: Krevor et. al. 2009, MTC 2017

Alternative 1, No Project

Specific uses such as dry cleaners, gas stations, and certain industrial uses, could involve routine transport, use, and disposal of hazardous materials such as household hazardous wastes (e.g., paints, cleaning supplies, solvents, and petroleum products) and commercial and industrial hazardous waste. Routine transportation, use, or disposal of hazardous materials poses a potential risk to residents within the planning area by using trucks, rail, and other modes that are shared with the public, through direct contact, inhalation, or ingestion.

These impacts are subject to regulations described in Section 2.13, which would reduce the potential for adverse effects to occur. This impact would be less than significant for the reasons described under Impact 2.13-1, and **similar** to the proposed Plan.

Construction associated with implementation of the proposed Plan could result in impacts related to use of hazardous materials and disturbance of potentially hazardous materials, including naturally occurring asbestos (NOA). The most likely incidents involving construction-related hazardous materials are generally associated with minor spills or drips. Small fuel or oil spills are possible, but would have a negligible impact on public health. All hazardous materials would be stored, handled, and disposed of according to the manufacturers' recommendations, and spills would be cleaned up in accordance with applicable regulations. As shown in Table 3.1-37, there would be a larger area of the land use growth footprint located in areas that may result in dispersal of NOA (i.e., ultramafic rock) under the No Project Alternative (520 acres) compared to the proposed Plan (350 acres). The transportation projects footprint would be smaller under the No Project Alternative (0 acres) compared to the proposed Plan (650 acre) in areas that contain ultramafic rock. Overall, the area of land use growth footprint that is located within areas that contain ultramafic rock are smaller under the No Project Alternative than the proposed Plan. This impact would be less than significant for the reasons described under Impact 2.13-2, and **less** than the proposed Plan.

During construction, demolition, and excavation activities, the changes in planned land use and transportation projects could potentially produce hazardous air emissions or involve the handling of extremely hazardous wastes. During operation, land use projects could use and produce hazardous materials that may be transported on roadways included in this Plan. However, all projects would comply with federal and State regulations that are designed to reduce the potential for the release of large quantities of hazardous materials and wastes into the environment to an acceptable level, and in particular to protect schools. Existing protective measures and regulations would be sufficient to ensure that hazardous materials stored, used, transported, and disposed of under the Plan would not pose a substantial hazard to the public or the environment, including children at schools, under normal conditions. These impacts are subject to regulations described in Section 2.13, which would reduce the potential for adverse effects to occur. This impact would be less than significant for the reasons described under Impact 2.13-3, and **similar** to the proposed Plan.

Throughout the Plan Area there are many sites where historical releases of hazardous materials or wastes have occurred; these are listed in environmental databases pursuant to Government Code Section 65962.5. These sites range from small releases that have had localized effects on private property and have already been remediated to large scale releases from long-term historical industrial practices that have had wider ranging effects on groundwater. These impacts are subject to regulations described in Section 2.13, which would reduce the potential for adverse effects to occur. This impact would be significant and unavoidable for the reasons described under Impact 2.13-4, and **similar** to the proposed Plan.

Projects within an airport land use plan or, where such a plan has not been adopted, within 2 miles of a public airport or public use airport would not be approved by local agencies until project design plans have been reviewed and approved by the appropriate ALUC. These impacts are subject to regulations described in Section 2.13, which would reduce the potential for adverse effects to occur. This impact would be less than significant for the reasons described under Impact 2.13-5, and **similar** to the proposed Plan.

Within the vicinity of a private airstrip, implementing agencies would require project sponsors to comply with applicable local land use regulations and federal aviation guidelines, as well as any FAA (14 CFR Part 77) requirements applicable to projects located within 2 miles of a private airstrip. Projects would not be approved by local agencies until project design plans can demonstrate compliance with subject airstrip, local, and FAA requirements. These existing regulations and FAA procedures would ensure compatibility between land uses and airports and reduce the potential for aircraft accidents. These impacts are subject to regulations described in Section 2.13, which would reduce the potential for adverse effects to occur. This impact would be less than significant for the reasons described under Impact 2.13-6, and **similar** to the proposed Plan.

Both land use and transportation projects would be subject to implementation of State and federal regulations, as well as local/regional requirements for adequate emergency response and emergency evacuation plans,

such as those required by the California Emergency Services Act and California Emergency Management Agency. Emergency and evacuation plans are periodically updated to accommodate growth and would continue to be updated for growth and changes in planned development associated with the proposed Plan. These impacts are subject to regulations described in Section 2.13, which would reduce the potential for adverse effects to occur. This impact would be less than significant for the reasons described under Impact 2.13-7, and **similar** to the proposed Plan.

Land development under the proposed Plan could result in exposure of people to loss, injury, or death and damage to property adjacent to wildlands or where residences are intermixed with wildlands. Transportation improvements, especially capacity improvements, generally improve the transportation network to move people more efficiently, in case there is a need to evacuate due to a wildfire. The No Project Alternative would result in a substantially greater land use growth footprint within a fire hazard severity zone (FHSZ) rated moderate, high, or very high (7,200 acres) than the proposed Plan (860 acres). This impact would be less than significant for the reasons described under Impact 2.13-8, and **greater** than the proposed Plan.

Alternative 2, Main Streets

Routine transportation, use, or disposal of hazardous materials poses a potential risk to residents within the planning area by using trucks, rail, and other modes that are shared with the public, through direct contact, inhalation, or ingestion. These impacts are subject to regulations described in Section 2.13, which would reduce the potential for adverse effects to occur. This impact would be less than significant for the reasons described under Impact 2.13-1, and **similar** to the proposed Plan.

Construction associated with implementation of the proposed Plan could result in impacts related to use of hazardous materials and disturbance of potentially hazardous materials, including naturally occurring asbestos (NOA). All hazardous materials would be stored, handled, and disposed of according to the manufacturers' recommendations, and spills would be cleaned up in accordance with applicable regulations. As shown in Table 3.1-37, there would be a larger area of the land use growth footprint located in areas that may result in dispersal of NOA (i.e., ultramafic rock) under the Main Streets Alternative (580 acres) compared to the proposed Plan (350 acres). The transportation projects footprint would be smaller under the Main Streets Alternative (20 acres) compared to the proposed Plan (650 acre) in areas that contain ultramafic rock. Overall, the area of land use growth footprint that is located within areas that contain ultramafic rock are smaller under the Main Streets Alternative than the proposed Plan. This impact would be less than significant for the reasons described under Impact 2.13-2, and **less** than the proposed Plan.

During construction, demolition, and excavation activities, the changes in planned land use and transportation projects could potentially produce hazardous air emissions or involve the handling of extremely hazardous wastes. These impacts are subject to regulations described in Section 2.13, which would reduce the potential for adverse effects to occur. This impact would be less than significant for the reasons described under Impact 2.13-3, and **similar** to the proposed Plan.

Throughout the Plan Area there are many sites where historical releases of hazardous materials or wastes have occurred; these are listed in environmental databases pursuant to Government Code Section 65962.5. These impacts are subject to regulations described in Section 2.13, which would reduce the potential for adverse effects to occur. This impact would be significant and unavoidable for the reasons described under Impact 2.13-4, and **similar** to the proposed Plan.

Projects within an airport land use plan or, where such a plan has not been adopted, within 2 miles of a public airport or public use airport would not be approved by local agencies until project design plans have been reviewed and approved by the appropriate ALUC. These impacts are subject to regulations described in Section 2.13, which would reduce the potential for adverse effects to occur. This impact would be less than significant for the reasons described under Impact 2.13-5, and **similar** to the proposed Plan.

Within the vicinity of a private airstrip, implementing agencies would require project sponsors to comply with applicable local land use regulations and federal aviation guidelines, as well as any FAA (14 CFR Part 77)

requirements applicable to projects located within 2 miles of a private airstrip. These impacts are subject to regulations described in Section 2.13, which would reduce the potential for adverse effects to occur. This impact would be less than significant for the reasons described under Impact 2.13-6, and **similar** to the proposed Plan.

Both land use and transportation projects would be subject to implementation of State and federal regulations, as well as local/regional requirements for adequate emergency response and emergency evacuation plans, such as those required by the California Emergency Services Act and California Emergency These impacts are subject to regulations described in Section 2.13, which would reduce the potential for adverse effects to occur. This impact would be less than significant for the reasons described under Impact 2.13-7, and **similar** to the proposed Plan.

The Main Streets Alternative would result in a greater land use growth footprint within a FHSZ rated moderate, high or very high (930 acres) than the proposed Plan (860 acres). This impact would be less than significant for the reasons described under Impact 2.13-8, and **greater** than the proposed Plan.

Alternative 3, Big Cities

Routine transportation, use, or disposal of hazardous materials poses a potential risk to residents within the planning area by using trucks, rail, and other modes that are shared with the public, through direct contact, inhalation, or ingestion. These impacts are subject to regulations described in Section 2.13, which would reduce the potential for adverse effects to occur. This impact would be less than significant for the reasons described under Impact 2.13-1, and **similar** to the proposed Plan.

Construction associated with implementation of the proposed Plan could result in impacts related to use of hazardous materials and disturbance of potentially hazardous materials, including naturally occurring asbestos (NOA). All hazardous materials would be stored, handled, and disposed of according to the manufacturers' recommendations, and spills would be cleaned up in accordance with applicable regulations. As shown in Table 3.1-37, there would be a larger area of the land use growth footprint located in areas that may result in dispersal of NOA (i.e., ultramafic rock) under the Big Cities Alternative (380 acres) compared to the proposed Plan (350 acres). The transportation projects footprint would be smaller under the Big Cities Alternative (640 acres) compared to the proposed Plan (650 acre) in areas that contain ultramafic rock. Overall, the area of land use growth footprint that is located within areas that contain ultramafic rock are larger under the Big Cities Alternative than the proposed Plan. This impact would be less than significant for the reasons described under Impact 2.13-2, and **greater** than the proposed Plan.

During construction, demolition, and excavation activities, the changes in planned land use and transportation projects could potentially produce hazardous air emissions or involve the handling of extremely hazardous wastes. These impacts are subject to regulations described in Section 2.13, which would reduce the potential for adverse effects to occur. This impact would be less than significant for the reasons described under Impact 2.13-3, and **similar** to the proposed Plan.

Throughout the Plan Area there are many sites where historical releases of hazardous materials or wastes have occurred; these are listed in environmental databases pursuant to Government Code Section 65962.5. These impacts are subject to regulations described in Section 2.13, which would reduce the potential for adverse effects to occur. This impact would be significant and unavoidable for the reasons described under Impact 2.13-4, and **similar** to the proposed Plan.

Projects within an airport land use plan or, where such a plan has not been adopted, within 2 miles of a public airport or public use airport would not be approved by local agencies until project design plans have been reviewed and approved by the appropriate ALUC. These impacts are subject to regulations described in Section 2.13, which would reduce the potential for adverse effects to occur. This impact would be less than significant for the reasons described under Impact 2.13-5, and **similar** to the proposed Plan.

Within the vicinity of a private airstrip, implementing agencies would require project sponsors to comply with applicable local land use regulations and federal aviation guidelines, as well as any FAA (14 CFR Part 77) requirements applicable to projects located within 2 miles of a private airstrip. These impacts are subject to regulations described in Section 2.13, which would reduce the potential for adverse effects to occur. This impact would be less than significant for the reasons described under Impact 2.13-6, and **similar** to the proposed Plan.

Both land use and transportation projects would be subject to implementation of State and federal regulations, as well as local/regional requirements for adequate emergency response and emergency evacuation plans, such as those required by the California Emergency Services Act and California Emergency These impacts are subject to regulations described in Section 2.13, which would reduce the potential for adverse effects to occur. This impact would be less than significant for the reasons described under Impact 2.13-7, and **similar** to the proposed Plan.

The Big Cities Alternative would result in a smaller land use growth footprint within a FHSZ rated moderate, high or very high (660 acres) than the proposed Plan (860 acres). This impact would be less than significant for the reasons described under Impact 2.13-8, and **less** than the proposed Plan.

Alternative 4, EEJ

Routine transportation, use, or disposal of hazardous materials poses a potential risk to residents within the planning area by using trucks, rail, and other modes that are shared with the public, through direct contact, inhalation, or ingestion. These impacts are subject to regulations described in Section 2.13, which would reduce the potential for adverse effects to occur. This impact would be less than significant for the reasons described under Impact 2.13-1, and **similar** to the proposed Plan.

The changes in planned land use and transportation projects could increase the potential for unintentional upset and accident conditions. These impacts are subject to regulations described in Section 2.13, which would reduce the potential for adverse effects to occur. As shown in Table 3.1-37, there would be a larger area of the land use growth footprint located in areas that may result in dispersal of NOA (i.e., ultramafic rock) under the EEJ Alternative (370 acres) compared to the proposed Plan (350 acres). The transportation projects footprint would be smaller under the EEJ Alternative (640 acres) compared to the proposed Plan (650 acre) in areas that contain ultramafic rock. Overall, the area of land use growth footprint that is located within areas that contain ultramafic rock are larger under the EEJ Alternative than the proposed Plan. This impact would be less than significant for the reasons described under Impact 2.13-2, and **greater** than the proposed Plan.

During construction, demolition, and excavation activities, the changes in planned land use and transportation projects could potentially produce hazardous air emissions or involve the handling of extremely hazardous wastes. These impacts are subject to regulations described in Section 2.13, which would reduce the potential for adverse effects to occur. This impact would be less than significant for the reasons described under Impact 2.13-3, and **similar** to the proposed Plan.

Throughout the Plan Area there are many sites where historical releases of hazardous materials or wastes have occurred; these are listed in environmental databases pursuant to Government Code Section 65962.5. These impacts are subject to regulations described in Section 2.13, which would reduce the potential for adverse effects to occur. This impact would be less than significant for the reasons described under Impact 2.13-4, and **similar** to the proposed Plan.

Projects within an airport land use plan or, where such a plan has not been adopted, within 2 miles of a public airport or public use airport would not be approved by local agencies until project design plans have been reviewed and approved by the appropriate ALUC. These impacts are subject to regulations described in Section 2.13, which would reduce the potential for adverse effects to occur. This impact would be significant and unavoidable for the reasons described under Impact 2.13-5, and **similar** to the proposed Plan

Within the vicinity of a private airstrip, implementing agencies would require project sponsors to comply with applicable local land use regulations and federal aviation guidelines, as well as any FAA (14 CFR Part 77) requirements applicable to projects located within 2 miles of a private airstrip. These impacts are subject to regulations described in Section 2.13, which would reduce the potential for adverse effects to occur. This impact would be less than significant for the reasons described under Impact 2.13-6, and **similar** to the proposed Plan.

Both land use and transportation projects would be subject to implementation of State and federal regulations, as well as local/regional requirements for adequate emergency response and emergency evacuation plans, such as those required by the California Emergency Services Act and California Emergency These impacts are subject to regulations described in Section 2.13, which would reduce the potential for adverse effects to occur. This impact would be less than significant for the reasons described under Impact 2.13-7, and **similar** to the proposed Plan.

The EEJ Alternative would result in a smaller land use growth footprint within a FHSZ rated moderate, high or very high (480 acres) than the proposed Plan (860 acres). This impact would be less than significant for the reasons described under Impact 2.13-8, and **less** than the proposed Plan.

PUBLIC SERVICES AND RECREATION

Public services and recreation are addressed in Section 2.14, which includes an analysis of environmental impacts associated with: the need for new or modified schools, emergency services, police protection, fire protection, recreational facilities, and other public facilities.

Alternative 1, No Project

Depending on the growth and housing patterns, some school and other general government services and facilities could exceed their capacity. With respect to increased demand for public services (e.g., schools, emergency services, police protection, fire protection) the composition of residential land uses (e.g., single family residences, multi-family residences) from proposed changes in land use would vary as future development or redevelopment occurs. The magnitude of this impact is dependent on changes to population levels, which would be the same under all Plan alternatives. This impact would be significant and unavoidable for the reasons described under Impact 2.14-1, and **similar** to the proposed Plan.

Open space resources, however, are variable and some (such as large open space reserves) serve residents from throughout the region. For instance, large open space preserves in Marin, Napa, and San Mateo counties serve residents throughout the region. Smaller parks and playgrounds are intended, on the other hand, to serve immediate neighborhoods. The magnitude of this impact is dependent on changes to population levels, which would be the same under all Plan alternatives. This impact would be less than significant for the reasons described under Impact 2.14-2, and **similar** to the proposed Plan.

Alternative 2, Main Streets

Depending on the growth and housing patterns, some school and other general government services and facilities could exceed their capacity. With respect to increased demand for public services (e.g., schools, emergency services, police protection, fire protection) the composition of residential land uses (e.g., single family residences, multi-family residences) from proposed changes in land use would vary as future development or redevelopment occurs. The magnitude of this impact is dependent on changes to population levels, which would be the same under all Plan alternatives. This impact would be significant and unavoidable for the reasons described under Impact 2.14-1, and **similar** to the proposed Plan.

Open space resources, however, are variable and some (such as large open space reserves) serve residents from throughout the region. For instance, large open space preserves in Marin, Napa, and San Mateo counties serve residents throughout the region. Smaller parks and playgrounds are intended, on the other hand, to serve immediate neighborhoods. The magnitude of this impact is dependent on changes to population levels,

which would be the same under all Plan alternatives. This impact would be less than significant for the reasons described under Impact 2.14-2, and **similar** to the proposed Plan.

Alternative 3, Big Cities

Depending on the growth and housing patterns, some school and other general government services and facilities could exceed their capacity. With respect to increased demand for public services (e.g., schools, emergency services, police protection, fire protection) the composition of residential land uses (e.g., single family residences, multi-family residences) from proposed changes in land use would vary as future development or redevelopment occurs. The magnitude of this impact is dependent on changes to population levels, which would be the same under all Plan alternatives. This impact would be significant and unavoidable for the reasons described under Impact 2.14-1, and **similar** to the proposed Plan

Open space resources, however, are variable and some (such as large open space reserves) serve residents from throughout the region. For instance, large open space preserves in Marin, Napa, and San Mateo counties serve residents throughout the region. Smaller parks and playgrounds are intended, on the other hand, to serve immediate neighborhoods. The magnitude of this impact is dependent on changes to population levels, which would be the same under all Plan alternatives. This impact would be less than significant for the reasons described under Impact 2.14-2, and **similar** to the proposed Plan.

Alternative 4, EEJ

Depending on the growth and housing patterns, some school and other general government services and facilities could exceed their capacity. With respect to increased demand for public services (e.g., schools, emergency services, police protection, fire protection) the composition of residential land uses (e.g., single family residences, multi-family residences) from proposed changes in land use would vary as future development or redevelopment occurs. The magnitude of this impact is dependent on changes to population levels, which would be the same under all Plan alternatives. This impact would be significant and unavoidable for the reasons described under Impact 2.14-1, and **similar** to the proposed Plan.

Open space resources, however, are variable and some (such as large open space reserves) serve residents from throughout the region. For instance, large open space preserves in Marin, Napa, and San Mateo counties serve residents throughout the region. Smaller parks and playgrounds are intended, on the other hand, to serve immediate neighborhoods. The magnitude of this impact is dependent on changes to population levels, which would be the same under all Plan alternatives. This impact would be less than significant for the reasons described under Impact 2.14-2, and **similar** to the proposed Plan.

3.1.6 Environmentally Superior Alternative

CEQA Guidelines Section 15126.6 requires that an EIR identify the environmentally superior alternative among the alternatives analyzed. CEQA Guidelines Section 15126.6(d)(2) states that if the environmentally superior alternative is the no project alternative, the EIR shall also identify an environmentally superior alternative from among the other alternatives analyzed. The proposed Plan is included in the consideration of environmentally superior alternatives in EIRs. Table 3.1-38 provides a comparison of the environmental effects of the alternatives in relation to the proposed Plan to assist in identifying the environmentally superior alternative.

As stated above, the objectives for the proposed Plan are provided in Section 1.2, "Project Description" and related goals and performance targets are provided in the draft *Plan Bay Area 2040*. The proposed Plan's core strategy is focused growth in existing communities along the existing transportation network. Consistent with this core strategy, the seven goals of the proposed Plan are:

- Climate Protection,
- Adequate Housing,
- Healthy and Safe Communities,
- Open Space and Agricultural Preservation,

- Equitable Access,
- Economic Vitality, and
- Transportation System Effectiveness.

MTC and ABAG developed 13 performance targets associated with the goals for the proposed Plan (**Table 1.2-6**). Senate Bill 375 mandates two of these performance targets. These are the primary objectives of the Plan:

- The proposed Plan must address climate change by reducing CO_2 emissions pursuant to targets established in consultation with CARB: the regional plan must meet or exceed a seven percent reduction in per-capita emissions from cars and light-duty trucks by 2020 and a 15 percent reduction by 2035 relative to 2005 levels.

- The proposed Plan must house 100 percent of the region's projected growth by income level without displacing low-income residents, and with no increase in in-commuters over the proposed Plan baseline year. As calculated for the proposed Plan pursuant to the agreement with the BIA, the Regional Housing Control total—the number of new dwelling units needed to meet this goal based on projected employment growth---is 820,400.

In addition to these objectives, MTC and ABAG voluntarily adopted 11 additional targets. An alternative that performs substantially worse than the proposed Plan with respect to meeting the plan goals would not achieve the basic objectives of the proposed Plan. In the case of the alternatives evaluated in this EIR, each would result in varying degrees of success at achieving the Plan Bay Area goals and objectives. While all alternatives are expected to house 100 percent of the region's housing, the No Project Alternative and Main Streets Alternative are not expected to meet the CO_2 emissions targets for cars and light-duty trucks. See section 3.4, above, for a comparative analysis of how the alternatives meet the performance targets for the Plan. Table 3.1-39 provides an overview of the ability for the alternatives to meet the project targets.

ENVIRONMENTALLY SUPERIOR ALTERNATIVE DETERMINATION

The primary objectives of the Plan revolve around accommodating household and job growth forecasts and providing a transportation investment strategy for the region. A substantial level of development is required to accommodate the growth forecasts. Consequently, the majority of impacts of the proposed Plan and alternatives are similar in type and magnitude. Differences in impacts revolve around the location and size of land use growth and transportation footprints, and the ability of feasible policies to influence how development forecasted in the Plan and its alternatives would proceed.

Further, CEQA provides little guidance regarding selection of environmentally superior alternatives. In an instance such as the proposed Plan, where alternatives result in many similar impacts but also would result in tradeoffs (some greater impacts, some lesser impacts than the Plan), judgement is required in determining how these tradeoffs factor in selection of the environmentally superior alternative. Policy makers who review this EIR and must decide on which alternative to select may differ in their judgement, and this may also be affected by their consideration of the feasibility of alternatives.

As described below, some of the alternatives are relatively similar in terms of type and extent of environmental impact, although there are gradations of differences. In fact, three alternatives, the proposed Plan, the Big Cities and the EEJ Alternatives result in a similar level of environmental impact, in the aggregate. Each of these alternatives has environmental advantages and disadvantages, when compared to each other. This assessment is based on the relative number of less-than-significant and significant and unavoidable impacts that are reduced or increased under each alternative, as described below.

The Big Cities Alternative would result in the lowest overall level of environmental impacts, although only marginally lower, as compared to all alternatives, and therefore is identified as the environmentally superior alternative. However, this conclusion is based on prioritizing certain types of impacts over others.

In summary, the proposed Plan would result in 40 impacts that would be less than significant or less than significant after mitigation and 38 impacts that would be significant and unavoidable following implementation of mitigation measures or due to uncertainty because MTC/ABAG cannot require local implementing agencies to adopt mitigation measures identified in this EIR. As shown in Table 3.1-38, the Big Cities Alternative would have similar less-than-significant impacts for 15 impacts identified under the proposed Plan. The Big Cities Alternative would reduce 21 less-than-significant impacts and increase two less-than-significant impacts compared to the proposed Plan. The Big Cities Alternative would have similar significant and unavoidable impacts for 19 impacts identified under the proposed Plan. The Big Cities Alternative would reduce 18 significant and unavoidable impact and increase three significant and unavoidable impacts compared to the proposed Plan. As discussed below in more detail, the Big Cities Alternative would have the same impacts as the proposed Plan and other alternatives but to a lesser degree overall related to air quality, land use, energy, water resources, visual resources, biological resources, geology and seismicity, and cultural resources. The Big Cities Alternative would result in two new significant and unavoidable impacts compared to the proposed Plan. One new impact would occur because the Big Cities Alternative would result in a significant impact (greater than five percent increase) associated with per-trip non-commute travel time for drive alone and carpool trips, relative to existing conditions. The other new impact would occur because the Big Cities Alternative would result in a significant impact associated with per-capita VMT by causing an 8 percent increase in per-capita congested VMT in Solano County, relative to existing conditions. However, ABAG/MTC, in considering these two impacts, views them in light of shifting views of traffic congestion under CEQA. The Transportation section of this Draft EIR explains that SB 743 (2013) changes the way that public agencies evaluate the transportation impacts of projects under CEQA, recognizing that roadway congestion, while an inconvenience to drivers, is not itself an environmental impact. (See Pub. Resource Code, § 21099, subd. (b)(2) ["automobile delay, as described solely by level of service or similar measures of vehicular capacity or traffic congestion shall not be considered a significant impact on the environment pursuant to [CEQA]"].) This change to CEQA is intended to occur once new guidelines are implemented consistent with this directive; nevertheless, ABAG/MTC, in considering the environmentally superior alternative, believes this legislative directive de-emphasizes the importance of traffic congestion. Therefore, compared comprehensively against the number of impacts that the Big Cities Alternative decreases, the Big Cities Alternative would be the environmentally superior alternative.

The No Project and Main Streets Alternatives would result in a greater number of significant and unavoidable impacts compared to the proposed Plan (see "Total" in Table 3.1-38). The EEJ Alternative would result in the same number of less-than-significant and significant and unavoidable impacts as the proposed Plan. However, examining the EEJ Alternative further, of the 40 less-than-significant impacts, 17 would be similar, 9 would be less, and 14 would be greater than the proposed Plan. Of the 38 significant and unavoidable impacts in the EEJ Alternative, 16 would be similar, six would be less, and 16 would be greater than the proposed Plan. Therefore, overall, the EEJ Alternative would have greater impacts that the proposed Plan, and it would not reduce any of the proposed Plan's significant and unavoidable impacts to a less-than-significant level. Similarly, the Main Streets and No Project Alternatives would have greater impacts than the proposed Plan and would not reduce the proposed Plan's significant and unavoidable impacts to a less-than-significant level. The Main Streets Alternative would result in two new significant and unavoidable impacts compared to the proposed Plan and would increase five less-than-significant impacts and seven significant and unavoidable impacts compared to the proposed Plan. The No Project Alternative would have greater environmental impacts than the proposed Plan resulting in six additional significant and unavoidable impacts and increasing the largest numbers of less-than-significant (19) and significant and unavoidable impacts (25) compared to the proposed Plan.

The following discussions provide additional information regarding the important relative differences between the proposed Plan and alternatives:

- In **Transportation**, the proposed Plan has the least environmental impact as it features shorter commute travel times (one to two percent shorter than the Main Streets, Big Cities, and EEJ Alternatives (see Table 3.4-2)) and a lesser amount of congested VMT. Three of the alternatives would result in new significant and unavoidable impacts, compared to the proposed Plan. The No Project Alternative would result in two

new significant and unavoidable impacts related to increases in per-trip travel time for commute and non-commute travel. The Main Streets Alternative would result in one new significant and unavoidable impact related to an increase in per capita VMT compared to existing conditions. The Big Cities Alternative would result in two new significant and unavoidable impacts related to increases in per-trip travel time for non-commute travel and an increase in per capita VMT compared to existing conditions. Overall, the Proposed Plan would result in impacts to a lesser degree related to transportation than the four alternatives.

- In **Air Quality**, the Big Cities and EEJ Alternatives would have the least environmental impact as they would result in lower criteria pollutant emissions compared to the proposed Plan (see Table 3.1-21). The No Project Alternative would result in one new significant and unavoidable impact because it would not be expected to meet the goals of the 2017 Clean Air Plan. Overall, the Big Cities and EEJ Alternatives would result in impacts to a lesser degree related to air quality than the proposed Plan and No Project and Main Streets alternatives.

- In **Land Use**, the EEJ Alternative would result in fewer acres of important agricultural and open space land converted to urbanized use than the proposed Plan but would result in more acres of forest and timberland converted to urbanized use. The Main Streets Alternative would result in more acres of important agricultural and open space land converted to urbanized use than the proposed Plan but would result in less acres of forest and timberland converted to urbanized use. The Big Cities Alternative would result in fewer acres of important agricultural and open space land and timber and forestland converted to urbanized uses than the proposed Plan. The risk of displacement would be similar under the EEJ Alternative as the proposed Plan but greater under the No Project, Main Streets, and Big Cities Alternatives. The EEJ Alternative would result in fewer transportation projects than the proposed Plan, which would require less acquisition of land that may result in division of established communities. Overall, the Big Cities Alternative would result in impacts to a lesser degree related to land use than the proposed Plan and other alternatives.

- In **Energy**, the No Project Alternative would result in two new significant and unavoidable impacts because it would result in a less energy efficient and more wasteful consumption of electricity and natural gas. The three other alternatives would result in similar improvements to energy efficiency as the proposed Plan, with the Big Cities Alternative resulting in the lowest per capita energy use. Overall, the Big Cities Alternative would result in impacts to a lesser degree related to energy than the proposed Plan and other alternatives.

- In **Climate Change and Greenhouse Gases**, the No Project Alternative and Main Streets Alternatives would result in two new significant and unavoidable impacts because they would not meet the SB 375 targets for per capita passenger vehicle and light duty truck CO2 emissions. The EEJ Alternative would result in more reductions in net mobile- and land use-source GHG emissions than the proposed Plan and the other alternatives. Impacts related to locating portions of projected land use growth footprint or transportation projects in areas projected to be regularly inundated by sea level rise would be similar across the proposed Plan and alternatives. Overall, the EEJ Alternative would result in impacts to a lesser degree related to climate change and greenhouse gases than the proposed Plan and other alternatives.

- In **Noise**, the No Project Alternative and Main Streets Alternative would result in similar impacts as the proposed Plan, but to a lesser degree because, compared to existing (2015) conditions, the average change in noise levels throughout the Bay Area for freeways, expressway, major arterials, collectors and other types of roadways would be less than the proposed Plan for these alternatives. The long-term exposure of sensitive receptors to increased operational stationary source noise levels would also be less than under the proposed Plan for the No Project and Main Streets Alternatives. Overall, the No Project Alternative and Main Streets Alternative would result in impacts to a lesser degree related to noise than the proposed Plan and other alternatives.

- In **Water Resources**, **Visual Resources and Cultural Resources**, the Main Streets Alternative and Big Cities Alternative would result in smaller land use growth and transportation project footprints, compared to the proposed Plan and other alternatives. Overall, the Main Streets and Big Cities Alternatives would have the

same impacts as the proposed Plan and other alternatives but to a lesser degree related to water resources, visual resources, and cultural resources.

- In **Biological Resources**, the Big Cities Alternative would result in fewer physical impacts because it would result in a smaller land use growth footprint and transportation project footprint than the proposed Plan and other alternatives and would intersect with fewer acres of resources, such as critical habitat and essential connectivity acres. However, the Main Streets Alternative would result in fewer impacts related to effects on wetland features. Overall, the Big Cities Alternative would result in impacts to a lesser degree related to biological resources than the proposed Plan and other alternatives.

- In **Geology**, the Big Cities Alternative would have similar impacts as the proposed Plan but to a lesser degree because it would result in less acres of land use growth footprint and transportation project footprint that overlaps with Alquist-Priolo Zones, in areas within very high and high liquefaction potential zones, areas of landslides, or areas that could expose soils to the effects of erosion or loss of topsoil. The Big Cities Alternative would have a greater area of land use growth footprint located within areas subject to violent ground shaking compared to the proposed Plan. However, overall, the Big Cities Alternative would result in impacts to a lesser degree related to geology and soils than the proposed Plan and other alternatives.

- In **Hazards and Public Services and Recreation**, the proposed Plan and all of the alternatives are comparable and would have the same less-than-significant and significant and unavoidable impacts, and to a similar degree. One exception to this is in regard to exposure of people to loss, injury, or death and damage to property adjacent to wildlands or where residences are intermixed with wildlands. This impact would be similar to the proposed Plan but greater under the No Project and Main Streets Alternatives and similar to the proposed Plan but less under the Big Cities and EEJ Alternatives. Another exception is in regard to potential exposure to naturally occurring asbestos due to the area of land use growth footprint located within areas that contain ultramafic rock. This would be similar to the proposed Plan but less for the No Project and Main Streets Alternatives and greater under the Big Cities and EEJ Alternatives. Overall, the four alternatives would result in impacts similar to the proposed Plan related to Hazards and Public Services and Recreation.

Policy makers will be required to judge the relative importance of the various issue areas in making their final decision.

Table 3.1-38 Summary of Alternatives Comparison to the Proposed Plan

Impacts	Proposed Plan	No Project	Main Streets	Big Cities	EEJ
2.1 TRANSPORTATION					
Impact 2.1-1: Implementation of the proposed Plan could result in a significant increase in per-trip travel time for commute travel by any mode over existing conditions. A significant increase in per-trip travel time is defined as greater than 5 percent.	LS	SU (G)	LS (S)	LS (S)	LS (S)
Impact 2.1-2: Implementation of the proposed Plan could result in a significant increase in per-trip travel time for non-commute travel by any mode over existing conditions. A significant increase in per-trip travel time is defined as greater than 5 percent.	LS	SU (G)	LS (S)	SU (G)	LS (S)
Impact 2.1-3: Implementation of the proposed Plan could result in a significant increase in per capita VMT on facilities experiencing level of service (LOS) F compared to existing conditions during AM peak periods, PM peak periods, or during the day as a whole (LOS F defines a condition on roads where traffic volumes exceed capacity, resulting in stop-and-go conditions for extended periods of time). A significant increase in LOS F-impacted per capita VMT is defined as greater than 5 percent.	SU	SU (G)	SU (G)	SU (S)	SU (G)

Table 3.1-38 Summary of Alternatives Comparison to the Proposed Plan

Impacts	Proposed Plan	No Project	Main Streets	Big Cities	EEJ
Impact 2.1-4: Implementation of the proposed Plan could result in a significant increase in per capita VMT compared to existing conditions. A significant increase in per capita VMT is defined as greater than 5 percent.	LS	LS (S)	SU (G)	SU (G)	LS (S)
Impact 2.1-5: Implementation of the proposed Plan could result in increased percent utilization of regional transit supply resulting in an exceedance of transit capacity during the AM peak period, PM peak period, or on a daily basis. An exceedance is defined as passenger seat-mile demand for any transit technology being greater than 80 percent of passenger seat-miles supplied by transit operators.	LS	LS (S)	LS (S)	LS (S)	LS (S)
Impact 2.1-6: Implementation of the proposed Plan could cause a disruption to goods movement into or through the Bay Area region.	LS	LS (S)	LS (S)	LS (S)	LS (S)
Impact 2.1-7: Implementation of the proposed Plan could cause a disruption to the ongoing operations of the applicable regional or local area transportation system due to construction activities.	SU	SU (S)	SU (S)	SU (S)	SU (S)
2.2 AIR QUALITY					
Impact 2.2-1: Implementation of the proposed Plan could conflict with or obstruct implementation of an applicable air quality plan, including: the primary goals, applicable control measures, or implementation of any control measures.	LS	SU (G)	LS (S)	LS (S)	LS (S)
Impact 2.2-2: Implementation of the proposed Plan could result in a substantial net increase in construction-related emissions.	SU	SU (S)	SU (S)	SU (S)	SU (S)
Impact 2.2-3 Implementation of the proposed Plan could result in a net increase of emissions of criteria pollutants from on-road mobile and land use sources compared to existing conditions, including emissions of ROG, NO_x, CO, PM_{10}, and $PM_{2.5}$, as the SFBAAB is in non-attainment for ozone, PM_{10}, and $PM_{2.5}$ standards.	SU	SU (G)	SU (G)	SU (L)	SU (L)
Impact 2.2-4: Implementation of the proposed Plan could cause a cumulative net increase in emissions of toxic air contaminants, including diesel PM, 1,3-butadiene, and benzene, from on-road mobile sources compared to existing conditions.	LS	LS (S)	LS (S)	LS (S)	LS (S)
Impact 2.2-5: Implementation of the proposed Plan could result in a net increase in sensitive receptors located in Transit Priority Areas (TPA) where: (a) TACs or $PM_{2.5}$ concentrations result in cancer risk levels greater than 100 in a million or a concentration of $PM_{2.5}$ greater than 0.8 $\mu g/m^3$; or (b) TACs or $PM_{2.5}$ concentrations result in noncompliance with an adopted Community Risk Reduction Plan.	SU	SU (S)	SU (S)	SU (S)	SU (S)
Impact 2.2-6: Implementation of the proposed Plan could result in changes in TAC and or $PM_{2.5}$ exposure levels that disproportionally impact minority and low-income populations.	SU	SU (S)	SU (S)	SU (S)	SU (S)
2.3 LAND USE AND PHYSICAL DEVELOPMENT					
Impact 2.3-1: Implementation of the proposed Plan could displace substantial numbers of existing residents or businesses.	SU	SU (G)	SU (G)	SU (G)	SU (S)
Impact 2.3-2: Implementation of the proposed Plan could physically divide an established community.	SU	SU (L)	SU (S)	SU (S)	SU (L)
Impact 2.3-3: Implementation of the proposed Plan could conflict with applicable land use plans, policies, or regulations of an agency with jurisdiction over the project (including, but not limited to the general plans, specific plans, local coastal programs, or zoning ordinances) adopted for the purpose of avoiding or mitigating an environmental effect.	LS	LS (S)	LS (S)	LS (S)	LS (S)
Impact 2.3-4: Implementation of the proposed Plan could directly or indirectly convert substantial amounts of important agricultural lands and open space (Prime Farmland, Unique Farmland, or Farmland of Statewide Importance) or lands under Williamson Act contract to non-agricultural use.	SU	SU (G)	SU (G)	SU (L)	SU (L)

Table 3.1-38 Summary of Alternatives Comparison to the Proposed Plan

Impacts	Proposed Plan	No Project	Main Streets	Big Cities	EEJ
Impact 2.3-5: Implementation of the proposed Plan could directly or indirectly result in the loss of forest land, conversion of forest land to non-forest use, or conflict with existing zoning for, or cause rezoning of, forest land, timberland, or timberland zoned Timberland Production.	SU	SU (G)	SU (L)	SU (L)	SU (G)
2.4 ENERGY					
Impact 2.4-1: Implementation of the proposed Plan could result in wasteful, inefficient, or unnecessary consumption of energy, during project construction or operation, as evidenced by a failure to decrease overall per capita energy consumption or decrease reliance on fossil fuels such as coal, natural gas and oil.	LS	SU (G)	LS (L)	LS (L)	LS (L)
Impact 2.4-2: Implementation of the proposed Plan could fail to incorporate feasible renewable energy or energy efficiency measures into building design, equipment use, transportation, or other project features, or otherwise fail to increase reliance on renewable energy sources.	LS	SU (G)	LS (S)	LS (S)	LS (S)
2.5 CLIMATE CHANGE AND GREENHOUSE GASES					
Impact 2.5-1: Implementation of the proposed Plan could fail to reduce per capita passenger vehicle and light duty truck CO_2 emissions by seven percent by 2020 and by 15 percent by 2035 as compared to the 2005 baseline, per SB 375.	LS	SU (G)	SU (G)	LS (L)	LS (L)
Impact 2.5-2: Implementation of the proposed Plan could result in a net increase in direct and indirect GHG emissions in 2040 when compared to existing conditions.	LS	LS (G)	LS (L)	LS (G)	LS (L)
Impact 2.5-3: Implementation of the proposed Plan could substantially conflict with the goal of SB 32 to reduce statewide GHG emissions to 40 percent below 1990 levels by 2030.	SU	SU (S)	SU (S)	SU (S)	SU (S)
Impact 2.5-4: Implementation of the proposed Plan could substantially conflict with local plans or policies adopted to reduce emissions of GHGs.	LS	LS (S)	LS (S)	LS (S)	LS (S)
Impact 2.5-5: Implementation of the proposed Plan could result in a net increase in transportation projects within areas projected to be regularly inundated by sea level rise by midcentury.	SU	SU (S)	SU (S)	SU (S)	SU (S)
Impact 2.5-6: Implementation of the proposed Plan could result in an increase in land use development within areas regularly inundated by sea level rise by midcentury.	SU	SU (S)	SU (S)	SU (S)	SU (S)
2.6 NOISE					
Impact 2.6-1: Implementation of the proposed Plan could result in exposure of persons to or generation of temporary construction noise levels and/or ground vibration levels in excess of standards established by local jurisdictions or other applicable regulatory agencies.	SU	SU (S)	SU (S)	SU (S)	SU (S)
Impact 2.6-2: Implementation of the proposed Plan could result in long-term permanent increases in traffic-noise levels that exceed applicable thresholds.	SU	SU (L)	SU (L)	SU (S)	SU (L)
Impact 2.6-3 Implementation of the proposed Plan could result in long-term permanent increases in transit noise levels that exceed applicable thresholds.	SU	SU (L)	SU (L)	SU (S)	SU (S)
Impact 2.6-4: Implementation of the proposed Plan could result in long-term permanent increase in transit-vibration levels that exceed applicable thresholds.	SU	SU (L)	SU (L)	SU (S)	SU (S)
Impact 2.6-5: Implementation of the proposed Plan could result in exposure of sensitive receptors to new or additional stationary noise sources in excess of standards established in the local general plan or noise ordinance or applicable standards of other agencies.	SU	SU (L)	SU (L)	SU (S)	SU (L)
Impact 2.6-6: Implementation of the proposed Plan could result in exposure of people residing or working in the planning area to excessive noise levels where an airport land use	SU	SU (S)	SU (S)	SU (S)	SU (S)

Table 3.1-38 Summary of Alternatives Comparison to the Proposed Plan

Impacts	Proposed Plan	No Project	Main Streets	Big Cities	EEJ
plan is adopted or, where such a plan has not been adopted, within two miles of a public airport, public use airport, or private airstrip.					
2.7 GEOLOGY AND SEISMICITY					
Impact 2.7-1: Implementation of the proposed Plan could increase the exposure of people or structures to the risk of property loss, injury, or death involving 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.	LS	LS (L)	LS (L)	LS (L)	LS (L)
Impact 2.7-2: Implementation of the proposed Plan could increase exposure of people or structures to the risk of property loss, injury, or death involving strong seismic ground shaking.	LS	LS (G)	LS (G)	LS (G)	LS (G)
Impact 2.7-3: Implementation of the proposed Plan could increase exposure of people or structures to the risk of property loss, injury, or death involving seismic-related ground failure, including liquefaction.	LS	LS (G)	LS (L)	LS (L)	LS (L)
Impact 2.7-4: Implementation of the proposed Plan could increase exposure of people or structures to the risk of property loss, injury, or death involving landslides.	LS	LS (G)	LS (G)	LS (L)	LS (G)
Impact 2.7-5: Implementation of the proposed Plan could result in substantial soil erosion or topsoil loss.	LS	LS (G)	LS (L)	LS (L)	LS (G)
Impact 2.7-6: Implementation of the proposed Plan could result in locating development on a geologic unit or soil that is unstable, contains expansive properties, 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.	LS	LS (G)	LS (L)	LS (L)	LS (G)
Impact 2.7-7: Implementation of the proposed Plan could result in the loss of availability of a known mineral resource that would be of value to the region or the residents of the State or a locally-important mineral resources recovery site delineated on a local land use plan.	LS	LS (G)	LS (L)	LS (L)	LS (G)
2.8 WATER RESOURCES					
Impact 2.8-1: Implementation of the proposed Plan could result in violation of water quality standards or waste or stormwater discharge requirements.	LS	LS (G)	LS (L)	LS (L)	LS (G)
Impact 2.8-2: Implementation of the proposed Plan could substantially interfere with or reduce rates of groundwater recharge due to the increased amount of impervious surfaces, such that there could be a net deficit in aquifer volume or a lowering of the groundwater table.	LS	LS (G)	LS (L)	LS (L)	LS (G)
Impact 2.8-3: Implementation of the proposed Plan could increase erosion by altering the existing drainage patterns of a site, contributing to sediment loads of streams and drainage facilities, and thereby affecting water quality.	LS	LS (G)	LS (L)	LS (L)	LS (G)
Impact 2.8-4: Implementation of the proposed Plan could increase non-point pollution of stormwater runoff due to litter, fallout from airborne particulate emissions, or discharges of vehicle residues, including petroleum hydrocarbons and metals, that would impact the quality of receiving waters.	LS	LS (G)	LS (L)	LS (L)	LS (G)
Impact 2.8-5: Implementation of the proposed Plan could increase non-point-source pollution of stormwater runoff from construction sites due to discharges of sediment, chemicals, and wastes to nearby storm drains and creeks.	LS	LS (G)	LS (L)	LS (L)	LS (G)
Impact 2.8-6: Implementation of the proposed Plan could increase rates and amounts of runoff due to additional impervious surfaces, cut-and-fill slopes, or result in alterations to drainage systems that could cause potential flood hazards and effects on water quality.	LS	LS (G)	LS (L)	LS (L)	LS (G)

Table 3.1-38 Summary of Alternatives Comparison to the Proposed Plan

Impacts	Proposed Plan	No Project	Main Streets	Big Cities	EEJ
Impact 2.8-7: Implementation of the proposed Plan could place structures that would impede or redirect flows within a 100-year flood hazard area.	LS	LS (G)	LS (L)	LS (L)	LS (L)
Impact 2.8-8: Implementation of the proposed Plan could expose people to a significant risk of loss, injury, or death involving flooding (including flooding as a result of the failure of a levee or dam), seiche, tsunami, or mudflow.	LS	LS (G)	LS (L)	LS (L)	LS (L)
2.9 BIOLOGICAL RESOURCES					
Impact 2.9-1a: Implementation of the proposed Plan could have a substantial adverse effect, either directly or through habitat modifications, on species identified as candidate, sensitive, or special-status in local or regional plans, policies, or regulations, or by the California Department of Fish and Wildlife or U.S. Fish and Wildlife Service.	SU	SU (G)	SU (L)	SU (L)	SU (G)
Impact 2.9-1b: Implementation of the proposed Plan could have substantial adverse impacts on designated critical habitat for federally listed plant and wildlife species.	LS	LS (G)	LS (G)	LS (L)	LS (L)
Impact 2.9-2: Implementation of the proposed Plan could have a substantial adverse effect on riparian habitat, federally protected wetlands as defined by Section 404 of the Clean Water Act (including but not limited to marsh, vernal pool, coastal), or other sensitive natural communities identified in local or regional plans, policies, or regulations, or by the California Department of Fish and Wildlife or U.S. Fish and Wildlife Service, through direct removal, filling, hydrological interruption, or other means.	SU	SU (L)	SU (L)	SU (L)	SU (L)
Impact 2.9-3: Implementation of the proposed Plan could interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridor, or impede the use of native wildlife nursery sites.	SU	SU (G)	SU (G)	SU (L)	SU (G)
Impact 2.9-4: Implementation of the proposed Plan could conflict with adopted local conservation policies, such as a tree protection ordinance, or resource protection and conservation plans, such as a Habitat Conservation Plan (HCP), Natural Community Conservation Plan (NCCP), or other adopted local, regional, or state habitat conservation plans.	LS	LS (G)	LS (L)	LS (L)	LS (G)
Impact 2.9-5: Implementation of the proposed Plan could have the potential to 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; or substantially reduce the number or restrict the range of an endangered, rare, or threatened species.	SU	SU (G)	SU (L)	SU (L)	SU (G)
2.10 VISUAL RESOURCES					
Impact 2.10-1: Implementation of the proposed Plan could have a substantial adverse effect on a scenic vista.	SU	SU (G)	SU (L)	SU (L)	SU (G)
Impact 2.10-2: Implementation of the proposed Plan could substantially damage scenic resources, including but not limited to trees, rock outcroppings, and historical buildings within a state scenic highway.	LS	LS (G)	LS (L)	LS (L)	LS (G)
Impact 2.10-3: Implementation of the proposed Plan could substantially degrade the existing visual character or quality of the site and its surroundings.	SU	SU (G)	SU (L)	SU (L)	SU (G)
Impact 2.10-4: Implementation of the proposed Plan could add a visual element of urban character to an existing rural or open space area or add a modern element to a historic area.	SU	SU (G)	SU (L)	SU (L)	SU (G)
Impact 2.10-5: Implementation of the proposed Plan could create a new source of substantial light or glare, which would adversely affect day or nighttime views in the area.	SU	SU (G)	SU (L)	SU (L)	SU (G)

Table 3.1-38 Summary of Alternatives Comparison to the Proposed Plan

Impacts	Proposed Plan	No Project	Main Streets	Big Cities	EEJ
2.11 CULTURAL RESOURCES					
Impact 2.11-1: The proposed Plan could cause a substantial adverse change in the significance of a historic resource as defined in Guidelines Section 15064.5 or eliminate important examples of major periods of California history.	SU	SU (G)	SU (L)	SU (L)	SU (G)
Impact 2.11-2: The proposed Plan could cause a substantial adverse change in the significance of a unique archaeological resource as defined in Guidelines Section 15064.5 or eliminate important examples of major periods of California history or prehistory.	SU	SU (G)	SU (L)	SU (L)	SU (G)
Impact 2.11-3: The proposed Plan could have the potential to destroy, directly or indirectly, a unique paleontological resource or site or unique geologic feature.	SU	SU (G)	SU (L)	SU (L)	SU (G)
Impact 2.11-4: The proposed Plan could have the potential to disturb human remains, including those interred outside dedicated cemeteries.	SU	SU (G)	SU (L)	SU (L)	SU (G)
Impact 2.11-5: The proposed Plan could cause a substantial adverse change in the significance of a TCR as defined in PRC Section 21074.	SU	SU (G)	SU (L)	SU (L)	SU (G)
2.12 PUBLIC UTILITIES AND FACILITIES					
Impact 2.12-1: Implementation of the proposed Plan could result in insufficient water supplies available to serve development implemented as part of the Plan from existing entitlements and resources.	SU	SU (G)	SU (L)	SU (L)	SU (G)
Impact 2.12-2: Implementation of the proposed Plan could result in a determination by the wastewater treatment provider which serves or may serve development implemented as part of the Plan that it has inadequate capacity to serve the project's projected demand in addition to the provider's existing commitments.	LS	LS (S)	LS (S)	LS (S)	LS (S)
Impact 2.12-3: Implementation of the proposed Plan could require or result in the construction of new stormwater drainage facilities or expansion of existing facilities, the construction of which could cause significant environmental impacts.	SU	SU (G)	SU (L)	SU (L)	SU (G)
Impact 2.12-4: Implementation of the proposed Plan could require or result in the construction of new or expanded water and wastewater treatment facilities, the construction of which could cause significant environmental effects.	SU	SU (S)	SU (S)	SU (S)	SU (S)
Impact 2.12-5: The proposed Plan would be served by a landfill with sufficient permitted capacity to accommodate the project's solid waste disposal needs and comply with federal, state, and local statutes and regulations related to solid waste.	SU	SU (S)	SU (S)	SU (S)	SU (S)
2.13 HAZARDS					
Impact 2.13-1: Implementation of the proposed Plan could create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials.	LS	LS (S)	LS (S)	LS (S)	LS (S)
Impact 2.13-2: Implementation of the proposed Plan could 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.	LS	LS (L)	LS (L)	LS (G)	LS (G)
Impact 2.13-3: Implementation of the proposed Plan could result in hazardous emissions or handling of hazardous or acutely hazardous materials, substances, or waste within 0.25 mile of an existing or proposed school.	LS	LS (S)	LS (S)	LS (S)	LS (S)
Impact 2.13-4: Implementation of the proposed Plan could result in projects 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 create a significant hazard to the public or the environment.	SU	SU (S)	SU (S)	SU (S)	SU (S)

Table 3.1-38 Summary of Alternatives Comparison to the Proposed Plan

Impacts	Proposed Plan	No Project	Main Streets	Big Cities	EEJ
Impact 2.13-5: Implementation of the proposed Plan could result in a safety hazard for people residing or working in the planning area for projects located within an airport land use plan or, where such a plan has not been adopted, within 2 miles of a public airport or public use airport.	LS	LS (S)	LS (S)	LS (S)	LS (S)
Impact 2.13-6: Implementation of the proposed Plan could result in a safety hazard for people residing or working in the planning area for projects within the vicinity of a private airstrip.	LS	LS (S)	LS (S)	LS (S)	LS (S)
Impact 2.13-7: Implementation of the proposed Plan could impair implementation of, or physically interfere with, an adopted emergency response plan or emergency evacuation plan.	LS	LS (S)	LS (S)	LS (S)	LS (S)
Impact 2.13-8: Implementation of the proposed Plan could expose people or structures to a significant risk of loss, injury, or death involving wildland fires, including where wildlands are adjacent to urbanized areas or where residences are intermixed with wildlands.	LS	LS (G)	LS (G)	LS (L)	LS (L)
2.14 PUBLIC SERVICES AND RECREATION					
Impact 2.14-1: Implementation of the proposed Plan could result in the need for new or modified facilities, the construction of which causes significant environmental impacts, to maintain acceptable service ratios, response times or other performance objectives for schools, police protection, fire protection, disaster response, emergency medical, and other public facilities.	SU	SU (S)	SU (S)	SU (S)	SU (S)
Impact 2.14-2: Implementation of the proposed Plan could result in the need for new or modified facilities, the construction of which causes significant environmental impacts; or may result in significant increase in use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated.	LS	LS (S)	LS (S)	LS (S)	LS (S)
Total: Less than significant or less than significant after mitigation	40	34	38	38	40
Total: Significant and unavoidable following implementation of mitigation measures or significant and unavoidable because MTC/ABAG cannot require local implementing agencies to adopt mitigation measures identified in this EIR	38	44	40	40	38

Table 3.1-39 Project Target Goals and Attainment for the Plan Alternatives

Goal	#	Target	Percent	No Project	Main Streets	Big Cities	Proposed Plan	EEJ*
Climate Protection	1	Reduce per-capita CO2 emissions from cars and light duty trucks	-15 %	-2 %	-14 %	-17 %	-16 %	-17 %
Adequate Housing	2	House region's projected growth by income level without displacing current low-income residents and with no increase in in-commuters over the Plan baseline year	100 %	100 %	100 %	100 %	100 %	100 %
Healthy & Safe Communities	3	Reduce adverse health impacts associated with air quality, road safety, and physical inactivity	-10 %	-0 %	-1 %	-1 %	-1 %	-1 %
Open Space & Agricultural Preservation	4	Direct non-agricultural development within the urban footprint (existing urban development and UGBs)	100 %	84 %	98 %	100 %	100 %	100 %
Equitable Access	5	Decrease the share of lower-income residents' household income consumed by transportation and housing	-10 %	+15 %	+13 %	+13 %	+13 %	+12 %
	6	Increase the share of affordable housing in PDAs, TPAs, or high-opportunity areas	+15 %	-0 %	+2 %	+1 %	+3 %	+3 %
	7	Do not increase the share of low- and moderate-income renter households in PDAs, TPAs, or high-opportunity areas that are at risk of displacement	+0 %	+18 %	+6 %	+9 %	+5 %	+5 %
Economic Vitality	8	Increase the share of jobs accessible within 30 minutes by auto or within 45 minutes by transit in congested conditions	+20 %	-3 %	-1 %	-1 %	-0 %	-1 %
	9	Increase the number of jobs in predominantly middle-wage industries	+38 %	+43 %	+43 %	+43 %	+43 %	+43 %
	10	Reduce per-capita delay on the Regional Freight Network	-20 %	+38 %	-25 %	-33 %	-29 %	-15 %
Transportation System Effectiveness	11	Increase non-auto mode share	+10 %	+2 %	+2 %	+4 %	+3 %	+4 %
	12	Reduce vehicle operating and maintenance costs due to pavement conditions	-100 %	+53 %	-59 %	+8 %	+6 %	+10 %
	13	Reduce per-rider transit delay due to aged infrastructure	-100 %	-57 %	-77 %	-78 %	-75 %	-76 %

3.2 OTHER CEQA CONSIDERATIONS

This section summarizes the impacts of the proposed Plan, including significant irreversible changes, significant unavoidable impacts, growth-inducing impacts, cumulative impacts, and impacts found not to be significant. These subject areas are evaluated based on the analysis in Sections 2.1 through 2.14 of this EIR.

3.2.1 Significant Irreversible Environmental Changes

Pursuant to § 15126.2(c) of the CEQA Guidelines, an EIR must identify any significant irreversible environmental outcomes that could result from the implementation of a proposed project. These may include current or future uses of nonrenewable resources and secondary or growth-inducing impacts that commit future generations to similar uses. CEQA requires that irretrievable commitments of resources be evaluated to ensure that such current consumption is justified.

Though not entirely irreversible, land use growth footprint and projected land use patterns that would result from implementation of the proposed Plan could be difficult to change once local governments have taken action to approve development consistent with the proposed Plan. The development pattern reflected in the proposed Plan represents a commitment of these areas to urban uses for the foreseeable future, if implemented. As noted in the Section 1.2, "Project Description," the region's cities and counties retain local land use authority and local jurisdictions would continue to determine where future development occurs. The entire Plan area includes approximately 4.4 million acres. As shown in the project description, Table 1.2-9, approximately 787,000 acres (around 18 percent of the total acreage) is urbanized. Forecasted development under the project would add an additional nearly 19,000 acres of development (see Table 1.2-8), with an estimated nearly 6,000 acres in TPAs, an increase of around 0.5 percent. This represents a more dense and intense approach (less land urbanization) to development than under current general plans, wherein approximately 27,500 acres would be expected to be newly urbanized by 2040.

For the purposes of this analysis, consideration of the proposed Plan in the context of resource commitments that would occur absent the proposed Plan is relevant. As compared to existing conditions, implementation of the proposed Plan would result in a more densely and intensely developed land use pattern, with more growth concentrated on less land. The result would be improved utilization of already developed land and better utilization of new land to be converted at the urban edge or in undeveloped areas of the region. As a secondary result, per-capita use of other nonrenewable resources would decrease under the proposed Plan (see Impact 2.4-1 in Section 2.4, "Energy"). These include: lower per-capita use of energy and fuels; less conversion of agricultural, open space, and habitat lands; and lower per-capita emissions of GHGs. Please see the analysis of alternatives, Section 3.1 for more detail (in particularly, the No Project alternative.)

While use of nonrenewable energy and fuel; conversion of agriculture, open space, and habitat; release of pollutants emissions into the atmosphere; and climate change effects are in and of themselves generally irreversible resource commitments, the fact that the proposed Plan changes (slows) the rate of use of these resources is a beneficial outcome. Overall, implementation of the proposed Plan would commit existing and future generations to a more efficient use of nonrenewable resources than under presently planned conditions.

Irretrievable commitments of non-renewable resources associated with the projected change in land use and transportation projects in the proposed Plan would include those described below. These issues are addressed in various sections of Chapter 2 as noted.

- Consumption of significant amounts of nonrenewable energy for construction, maintenance, and operation of new development or transportation projects. This is discussed in Section 2.4, "Energy."

- Use of building materials, fossil fuels, and other resources for construction, maintenance, and operation of new development or transportation improvements. This is addressed in Section 2.4, "Energy."

- Conversion of some resource lands, such as agricultural land, habitat areas, and other undeveloped lands into urbanized land or transportation uses. This is addressed in several sections, including Section 2.4, "Energy" and Section 2.9, "Biological Resources."

- Degradation of ambient air quality through the increase of harmful particulate matter caused by a cumulative increase in vehicle exhaust. This is addressed in Section 2.2, "Air Quality."

- Emission of greenhouse gases that would contribute to global climate change. This is addressed in Section 2.5, "Climate Change and Greenhouse Gases."

3.2.2 Significant Unavoidable Impacts

Significant unavoidable impacts are those that cannot be mitigated to a less-than-significant level. Chapter 2 of this EIR identifies the following significant unavoidable impacts of the proposed Plan. As stated in Chapter 2, to the extent that an individual project adopts and implements all feasible mitigation measures described for each significant impact, many of the impacts listed below would be reduced to a less-than-significant level. However, MTC/ABAG cannot require local implementing agencies to adopt most of the mitigation measures, and it is ultimately the responsibility of a lead agency to determine and adopt mitigation. Therefore, several impacts have been identified as significant and unavoidable for purposes of this program-level review. Where an impact below has been determined to be significant and unavoidable notwithstanding application of mitigation at the project-level, this is noted below in parentheticals. Projects taking advantage of CEQA Streamlining provisions of SB 375 (Public Resources sections 21155.1, 21155.2, and 21159.28) must apply the mitigation measures described in this EIR, as necessary and feasible to address site-specific conditions.

TRANSPORTATION

- Impact 2.1-3: Implementation of the proposed Plan could result in a significant increase in per capita VMT on facilities experiencing level of service (LOS) F compared to existing conditions during AM peak periods, PM peak periods, or during the day as a whole (LOS F defines a condition on roads where traffic volumes exceed capacity, resulting in stop-and-go conditions for extended periods of time). A significant increase in LOS F-impacted per capita VMT is defined as greater than 5 percent.

- Impact 2.1-7: Implementation of the proposed Plan could cause a disruption to the ongoing operations of the applicable regional or local area transportation system due to construction activities.

AIR QUALITY

- Impact 2.2-2: Implementation of the proposed Plan could result in a substantial net increase in construction-related emissions.

- Impact 2.2-3 Implementation of the proposed Plan could result in a net increase of emissions of criteria pollutants from on-road mobile and land use sources compared to existing conditions, including emissions of ROG, NO_X, CO, PM_{10}, and $PM_{2.5}$, as the SFBAAB is in non-attainment for ozone, PM10, and $PM_{2.5}$ standards. (This impact cannot be reduced to less than significant with feasible mitigation measures.)

- Impact 2.2-5: Implementation of the proposed Plan could result in a net increase in sensitive receptors located in Transit Priority Areas (TPA) where: (a) TACs or $PM_{2.5}$ concentrations result in cancer risk levels greater than 100 in a million or a concentration of $PM_{2.5}$ greater than 0.8 µg/m3; or (b) TACs or $PM_{2.5}$ concentrations result in noncompliance with an adopted Community Risk Reduction Plan. (This impact cannot be reduced to less than significant with feasible mitigation measures.)

- Impact 2.2-6: Implementation of the proposed Plan could result in changes in TAC and or $PM_{2.5}$ exposure levels that disproportionally impact minority and low-income populations. (This impact cannot be reduced to less than significant with feasible mitigation measures.)

LAND USE AND PHYSICAL DEVELOPMENT

- Impact 2.3-1: Implementation of the proposed Plan could displace substantial numbers of existing residents or businesses.
- Impact 2.3-2: Implementation of the proposed Plan could physically divide an established community.
- Impact 2.3-4: Implementation of the proposed Plan could directly or indirectly convert substantial amounts of important agricultural lands and open space (Prime Farmland, Unique Farmland, or Farmland of Statewide Importance) or lands under Williamson Act contract to non-agricultural use.
- Impact 2.3-5: Implementation of the proposed Plan could directly or indirectly result in the loss of forest land, conversion of forest land to non-forest use, or conflict with existing zoning for, or cause rezoning of, forest land, timberland, or timberland zoned Timberland Production.

CLIMATE CHANGE AND GREENHOUSE GASES

- Impact 2.5-3: Implementation of the proposed Plan could substantially conflict with any applicable plan, policy, or regulation adopted to reduce the emissions of GHGs.
- Impact 2.5-5: Implementation of the proposed Plan could result in a net increase in transportation projects within areas projected to be regularly inundated by sea level rise by midcentury. (This impact cannot be reduced to less than significant with feasible mitigation measures.)
- Impact 2.5-6: Implementation of the proposed Plan could result in an increase in land use development within areas regularly inundated by sea level rise by midcentury. (This impact cannot be reduced to less than significant with feasible mitigation measures.)

NOISE

- Impact 2.6-1: Implementation of the proposed Plan could result in exposure of persons to or generation of temporary construction noise levels and/or ground vibration levels in excess of standards established by local jurisdictions or other applicable regulatory agencies.
- Impact 2.6-2: Implementation of the proposed Plan could result in long-term permanent increases in traffic-noise levels that exceed applicable thresholds.
- Impact 2.6-3 Implementation of the proposed Plan could result in long-term permanent increases in transit noise levels that exceed applicable thresholds.
- Impact 2.6-4: Implementation of the proposed Plan could result in long-term permanent increase in transit-vibration levels that exceed applicable thresholds.
- Impact 2.6-5: Implementation of the proposed Plan could result in exposure of sensitive receptors to new or additional stationary noise sources in excess of standards established in the local general plan or noise ordinance or applicable standards of other agencies.
- Impact 2.6-6: Implementation of the proposed Plan could result in exposure of people residing or working in the planning area to excessive noise levels where an airport land use plan is adopted or, where such a plan has not been adopted, within two miles of a public airport, public use airport, or private airstrip.

BIOLOGICAL RESOURCES

- Impact 2.9-1a: Implementation of the proposed Plan could have a substantial adverse effect, either directly or through habitat modifications, on species identified as candidate, sensitive, or special-status in local or regional plans, policies, or regulations, or by the California Department of Fish and Wildlife or U.S. Fish and Wildlife Service.

- Impact 2.9-2: Implementation of the proposed Plan could have a substantial adverse effect on riparian habitat, federally protected wetlands as defined by Section 404 of the Clean Water Act (including but not limited to marsh, vernal pool, coastal), or other sensitive natural communities identified in local or regional plans, policies, or regulations, or by the California Department of Fish and Wildlife or U.S. Fish and Wildlife Service, through direct removal, filling, hydrological interruption, or other means.

- Impact 2.9-3: Implementation of the proposed Plan could interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridor, or impede the use of native wildlife nursery sites.

- Impact 2.9-5: Implementation of the proposed Plan could have the potential to 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; or substantially reduce the number or restrict the range of an endangered, rare, or threatened species.

VISUAL RESOURCES

- Impact 2.10-1: Implementation of the proposed Plan could have a substantial adverse effect on a scenic vista.

- Impact 2.10-3: Implementation of the proposed Plan could substantially degrade the existing visual character or quality of the site and its surroundings.

- Impact 2.10-4: Implementation of the proposed Plan could add a visual element of urban character to an existing rural or open space area or add a modern element to a historic area.

- Impact 2.10-5: Implementation of the proposed Plan could create a new source of substantial light or glare, which would adversely affect day or nighttime views in the area.

CULTURAL RESOURCES

- Impact 2.11-1: The proposed Plan could cause a substantial adverse change in the significance of a historic resource as defined in Guidelines Section 15064.5 or eliminate important examples of major periods of California history.

- Impact 2.11-2: The proposed Plan could cause a substantial adverse change in the significance of a unique archaeological resource as defined in Guidelines Section 15064.5 or eliminate important examples of major periods of California history or prehistory.

- Impact 2.11-3: The proposed Plan could have the potential to destroy, directly or indirectly, a unique paleontological resource or site or unique geologic feature.

- Impact 2.11-4: The proposed Plan could have the potential to disturb human remains, including those interred outside dedicated cemeteries.

- Impact 2.11-5: The proposed Plan could cause a substantial adverse change in the significance of a TCR as defined in PRC Section 21074.

PUBLIC UTILITIES AND FACILITIES

- Impact 2.12-1: Implementation of the proposed Plan could result in insufficient water supplies available to serve development implemented as part of the Plan from existing entitlements and resources.
- Impact 2.12-3: Implementation of the proposed Plan could require or result in the construction of new stormwater drainage facilities or expansion of existing facilities, the construction of which could cause significant environmental impacts.
- Impact 2.12-4: Implementation of the proposed Plan could require or result in the construction of new or expanded water and wastewater treatment facilities, the construction of which could cause significant environmental effects.
- Impact 2.12-5: The proposed Plan would be served by a landfill with sufficient permitted capacity to accommodate the project's solid waste disposal needs and comply with federal, state, and local statutes and regulations related to solid waste.

HAZARDS

- Impact 2.13-4: Implementation of the proposed Plan could result in projects 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 create a significant hazard to the public or the environment.

PUBLIC SERVICES AND RECREATION

- Impact 2.14-1: Implementation of the proposed Plan could result in the need for new or modified facilities, the construction of which causes significant environmental impacts, in order to maintain acceptable service ratios, response times or other performance objectives for schools, police protection, fire protection, disaster response, emergency medical, and other public facilities.

3.2.3 Growth-Inducing Impacts

GROWTH-INDUCING IMPACTS

State CEQA Guidelines section 15126.2(d) requires an EIR to evaluate the potential growth-inducing impacts of a proposed project. Specifically, an EIR must discuss the ways in which a proposed project could foster economic or population growth, or the construction of additional housing, either directly or indirectly, in the surrounding environment. Growth can be induced in a number of ways, including the elimination of obstacles to growth, or by encouraging and/or facilitating other activities that could induce growth. Examples of projects likely to have growth- inducing impacts include extensions or expansions of infrastructure systems beyond what is needed to serve project-specific demand, and development of new residential or commercial uses in areas that are currently only sparsely developed or are undeveloped.

The CEQA Guidelines are clear that while an analysis of growth-inducing effects is required, it should not be assumed that induced growth is necessarily significant or adverse. The analysis below examines these issues relative to the adoption and implementation of the proposed Plan.

PROJECT OVERVIEW

The proposed Plan reinforces land use and transportation integration pursuant to SB 375 and presents a vision of the land use patterns and transportation networks for the Bay Area in 2040. The core strategy of the proposed Plan is focused growth in existing communities along the existing transportation network. Consistent with this core strategy, the seven goals of the proposed Plan are (also see Section 1.2, "Project Description"):

- Climate Protection,
- Adequate Housing,
- Healthy and Safe Communities,
- Open Space and Agricultural Preservation,
- Equitable Access,
- Economic Vitality, and
- Transportation System Effectiveness.

There are 13 performance targets associated with the proposed Plan (Table 1.2-6). Senate Bill 375 mandates two of these performance targets, related to climate change and housing. The proposed Plan must address climate change by reducing per-capita CO_2 emissions from cars and light-duty trucks, and the proposed Plan must include sufficient housing for all of the region's projected population growth, regardless of income. MTC and the ABAG Executive Board voluntarily adopted 11 additional targets. Key goals for Plan Bay Area 2040 include improved affordability and lessened displacement risk, ensuring a robust economy and protecting the environment for future generations.

The Bay Area consists of nine counties and 101 cities, covering an area of approximately 4.4 million acres. Of this area, approximately 17.8 percent (787,000 acres) are developed. The 2015 regional population is 7,571,000, with 2,760,000 households and 4,010,000 jobs. The proposed Plan largely reflects the foundation and regional growth pattern established in the original (2013) Plan Bay Area. The proposed Plan is not expected to increase growth beyond what would otherwise be projected to occur in the Bay Area; rather, it provides a strategy to accommodate that growth in a manner that is more efficient in terms of the provision of transportation options, minimization of GHG emission, and development of various land uses.

As described in detail in Section 1.2, "Project Description," the proposed Plan identifies a land use strategy and integrated transportation investments that are consistent with the needs of the forecasted employment, population, and households through 2040. MTC uses UrbanSim and Travel Model One as an integrated model framework to evaluate the relationship of transportation and land use. This allows for analysis of how transportation projects affect the surrounding land use pattern, as well as how changes to household and employment locations affect transportation demand, and ultimately affect GHG emissions. Section 1.2.5, "Proposed Plan" in Section 1.2 summarizes the land use growth footprint and transportation investment strategy for the region.

ANALYSIS OF GROWTH-INDUCEMENT

This analysis examines the following potential growth-inducing impacts related to implementation of the proposed MTP/SCS:

- foster population growth and construction of housing;
- eliminate obstacles to population growth;
- foster economic growth;
- affect service levels, facility capacity, or infrastructure demand; and
- encourage or facilitate other activities that could significantly affect the environment.

Foster Population Growth and Construction of Housing

The proposed Plan provides a coordinated strategy for managing land use patterns and transportation projects to ensure that projected economic growth would be accommodated/served in a manner that is regionally beneficial from the perspective of key environmental and economic indicators. The proposed Plan is intended to help shape growth patterns in the region, leading to better efficiency, a more sustainable approach, and more compact and mixed patterns of land use that are better served by transit and other mode choice options. A desired outcome of the proposed Plan is to foster population growth and construction of housing to balance existing and projected job growth in the region. ABAG and MTC do not possess independent land use authority to accomplish this. All land use decisions remain at the local level with the nine counties and 101 cities within the region. The Plan identifies areas within the region sufficient to accommodate the need for housing and

services to support existing and projected job growth. Development consistent with the proposed Plan would result in additional commerce, industry, recreation, public services, and infrastructure throughout the region. However, as substantiated by the growth forecasts, this growth is projected to occur under any alternative, including without the Plan. By influencing the location and nature of this growth, greenhouse gas (GHG) emissions and other adverse outcomes are avoided or minimized, and regional opportunities are maximized. That is, the development pattern would generally be more densely populated than otherwise planned, thereby reducing the overall footprint of area that would be developed. Therefore, rather than fostering population growth and the construction of housing, the plan accommodates and manages that growth.

Eliminate Obstacles to Population Growth

Impediments to growth may be physical, regulatory, or fiscal. A physical obstacle to growth typically involves the lack of public infrastructure or insufficient infrastructure capacity. The extension of public service infrastructure (e.g., roadways, water and sewer lines) into areas that are not currently provided with these services may be considered growth inducing. Similarly, the elimination of a regulatory obstacle, such as a service boundary or growth management policy, or a change in land use designation, can also result in new growth in a manner that might be considered growth inducing. In addition, resolution of infrastructure funding constraints or the identification of new sources of funding can facilitate growth by funding the construction of new infrastructure.

The proposed Plan would result in substantial investments and improvements in the regional circulation system in support of projected development. Transportation projects could remove impediments to growth by providing access and roadway capacity to new areas for development and, depending on location, creating roadway capacity that induces travel. Additionally, because community-serving infrastructure (e.g., roadways, water, and sewer lines) and services often are located within or adjoining road rights-of-way, the construction of roadways can facilitate the expansion and/or extension of infrastructure. However, for the proposed Plan the transportation network is designed to support the land use strategy in a way that moves the region closer to the attainment of identified goals and objectives. The transportation investment strategy for the proposed Plan largely continues the overall priorities from the previous (2013) plan – an emphasis on "fix it first," supporting focused growth, and achieving greenhouse gas targets. Development of the draft investment strategy required several important activities – an estimation of funding needs, a forecast of transportation revenues, the prioritization of major projects, and a comparison of trade- offs between funding maintenance, modernization, and expansion projects. It is also based on the overall policy objectives of SB 375 to achieve, among other things, increased roadway optimization, increased modes of travel other than single occupancy automobile use, increased access to jobs and amenities, reduced per capita VMT, and reduced per capita GHG emissions. Among the strategies to meet these goals is a mix of land uses balanced to minimize VMT and maximize the ability for residents to conduct everyday activities within their neighborhood without the need to travel by car. In other words, the roadway investments of the proposed Plan are located and sized to achieve more sustainable forecasted growth.

The total budget for the transportation strategies is $303 billion. This would primarily be used for operation and maintenance projects ($223 billion), with the remaining used to modernize ($50 billion) and expand ($30 billion) the existing system. A large portion of the funding to expand transportation facilities ($20 billion) would be applied to transit projects, such as extending Caltrain to downtown San Francisco and BART into Silicon Valley. Projects that would widen or expand roadways could be considered growth-inducing; however, this is considered an appropriate and beneficial result because the transportation system investment is integrally linked to support, the housing, employment, and population needs of the region.

Foster Economic Growth

As discussed above, the proposed Plan was developed to integrate forecasted population increases, employment opportunities, and housing needs within the Plan area. Therefore, the proposed Plan is designed to accommodate growth that would occur with or without its adoption; it is not designed, nor is it anticipated to, drive further population growth beyond the levels forecasted. The proposed Plan supports the successful economic growth and prosperity of the region as required by law. Federal regulations governing the preparation of regional transportation plans require that they "support the economic vitality of the metropolitan area" (23

Code Fed. Regs., § 450.306). Population growth resulting from that economic vitality is not driven by the Plan; thus, it is not a growth-inducing consequence of the proposed Plan.

Affect Service Levels, Facility Capacity, or Infrastructure Demand

While growth that may occur consistent with the proposed Plan could result in increases in demand for public services and infrastructure in excess of the existing conditions, local agencies retain the authority to ensure the provision of appropriately timed and sized services and utilities to serve new urban development concurrent with growth. These impacts are addressed in Section 2.2, "Public Utilities and Facilities" and Section 2.14, "Public Services and Recreation," of this Draft EIR.

Summary

In summary, the proposed Plan accommodates growth to achieve better regional outcomes related to balancing jobs, housing, and population, increasing density and intensity of land use in order to lower greenhouse gas emissions, and achieving a better balance between land use strategies and transportation investments. This growth is not under the authority or control of MTC or ABAG. As dictated by existing state law, it will occur in a manner substantially consistent with local general plans, regional values and visions, and state and federal requirement. The proposed Plan accounts for growth likely to occur through 2040 and makes assumptions about location and design that promote regional environmental benefits. While the effects of growth inducement can be considered an adverse impact under CEQA, the proposed Plan accommodates projected growth and implements state mandates to integrate land use and transportation decision-making in a way that achieves improved environmental and social outcomes. Under the proposed Plan, GHG emissions and other environmental impacts would be lessened relative to what may otherwise occur absent the regional strategies embodied in the proposed Plan.

3.2.4 Cumulative Impacts

CEQA defines cumulative impacts as "two or more individual effects which, when considered together, are considerable, or which can compound or increase other environmental impacts." Section 15130 of the CEQA Guidelines requires that an EIR evaluate potential environmental impacts that are individually limited but cumulatively considerable. These impacts can result from the proposed project alone, or together with other projects. The CEQA Guidelines state: "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" (CEQA Guidelines, Section 15355). A cumulative impact of concern under CEQA occurs when the net result of combined individual impacts compounds or increases other overall environmental impacts (CEQA Guidelines, Section 15355). In other words, cumulative impacts can result from individually minor but collectively significant projects taking place over a period of time. CEQA does not require an analysis of incremental effects that are not cumulatively considerable nor is there a requirement to discuss impacts which do not result in part from the project evaluated in the EIR.

METHODOLOGY

The proposed Plan is a cumulative plan by design. The Plan area is comprised of 4.4 million acres and includes 9 counties and 101 cities. It integrates transportation investments with land use strategies for an entire region of the state that shares, or is connected by, common economic, social, and environmental characteristics. As such, the environmental analysis of the proposed Plan presented throughout this Draft EIR is a cumulative analysis compliant with the requirements of CEQA and the CEQA Guidelines. Furthermore, this Draft EIR contains detailed analysis of regional (cumulative) impacts, which are differentiated from localized impacts that may occur at the county, TPA, and/or PDA level. Nevertheless, the following discussion examines impacts associated with implementation of the proposed Plan, plus implementation of projected development for jurisdictions adjoining the Bay Area, in order to assess the potential for cumulative impacts from growth extending beyond the region.

When evaluating cumulative impacts, CEQA allows the use of either a list of past, present, and probable future projects, including projects outside the control of the lead agency, or a summary of projections in an adopted planning document, or a thoughtful combination of the two approaches. The cumulative analysis presented below uses a projections-based approach. Land use and growth projections for the region, which are the subject of analysis throughout this Draft EIR, are combined with the growth projections for the adjoining counties. Adjoining counties are listed as follows:

- Lake County: Lake County is located generally to the north of the Plan area, north of Napa County and northeast of Sonoma County. It is sparsely populated, with the majority of development surrounding Clear Lake. According to the County General Plan, the County is rooted in agriculture, resort development, and rural mountain communities (Lake County 2008)

- Mendocino County: Mendocino County is located to the north of the Plan area, north of Sonoma County, and west of Lake County. It has a history of timber and agricultural production. This county is facing increased development pressures from its more urban neighboring counties, changes in the timber and agricultural industries, and global climate change (Mendocino County 2009)

- Merced County: Merced County is located in the heart of California's San Joaquin Valley, a very productive agricultural region. The county, which spans from the coastal range to the foothills of the Sierra Nevada, is bordered by Santa Clara County to the west (Merced County 2011). It is generally southeast of the Plan area.

- Sacramento County: Sacramento County is located east of the Plan area, bordering Solano County to the east and Contra Costa to the north. This county has a large population (nearly 1.5 million people), centered around seven incorporated cities (Sacramento County 2016).

- San Benito County: San Benito County is located south of the Plan area, bordering Santa Clara County to the south. San Benito County is generally rural, and contains substantial amounts of agricultural land (San Benito County 2015).

- San Joaquin County: San Joaquin County is located in the Central Valley of California, east of the Plan area. It borders Contra Costa and Alameda Counties to the east. San Joaquin County is primarily in agricultural production and contains a large population centered primarily around its seven cities (San Joaquin County 2010).

- Santa Cruz County: Santa Cruz County is located south of the plan area, bordering the western edge of Santa Clara County and to the south of San Mateo County. Due to its climate and the variety of landscape types, the County contains a diverse economic base that includes tourism, agriculture, and manufacturing. It contains a relatively small population, centered around the City of Santa Cruz (Santa Cruz County 1994).

- Stanislaus County: Stanislaus County is located east of the plan area, bordering the eastern edge of Santa Clara County. This county is located in the San Joaquin Valley. Stanislaus County is primarily in agricultural production, but is facing rapid population growth that began in the 1990s (Stanislaus County 2015).

- Yolo County: Yolo County was one of the original 27 counties created when California became a State in 1850. The county is located in the rich agricultural regions of California's Central Valley and the Sacramento River Delta. It is directly west of Sacramento, the State Capital, and northeast of the Bay Area counties of Solano and Napa (County of Yolo 2009: IN-2).

The area that includes the Bay Area and the above-referenced adjoining counties is referred to in this analysis as the "cumulative impact analysis area." As shown in Table 3.2-1, the population for the cumulative impact analysis area is projected to grow from just over 11 million people to 14.4 million by 2040.

Table 3.2-1 Population, Households, and Employment Projections of Cumulative Impact Analysis Area 2015 - 2040

Jurisdiction	Acreage	Population		Households		Jobs	
		2015	2040	2015	2040	2015	2040
Lake	851,000	65,000	70,000	28,000	28,000	16,000	17,000
Mendocino	2,045,000	88,000	95,000	36,000	37,000	32,000	35,000
Merced	1,266,000	270,000	369,000	77,000	96,000	78,000	97,000
Sacramento	636,000	1,490,000	1,942,000	522,000	603,000	614,000	785,000
San Benito	889,000	58,000	74,000	17,000	22,000	16,000	21,000
San Joaquin	913,000	728,000	996,000	220,000	280,000	235,000	308,000
Santa Cruz	286,000	275,000	318,000	96,000	107,000	107,000	127,000
Stanislaus	970,000	538,000	699,000	166,000	195,000	181,000	232,000
Yolo	653,000	213,000	297,000	71,000	87,000	103,000	130,000
Bay Area	4,400,000	7,571,000	9,628,000	2,760,000	3,427,000	4,010,000	4,698,000
Total	12,909,000	11,295,000	14,488,000	3,993,000	4,882,000	5,392,000	6,450,000

Source: Caltrans 2016, California Department of Conservation 2016, California Department of Finance 2016, MTC 2016

As shown in Table 3.2-1, the Plan area comprises approximately 67 percent of the existing population, 69 percent of the existing number of households, and 74 percent of the existing number of employees within approximately 34 percent of the total acreage in the cumulative impact analysis area. By 2040, this proportion is expected to remain similar (67 percent of the population, 70 percent of households, and 73 percent of employees). Thus, under both current and forecasted future conditions, the Bay Area represents a substantial portion of the growth in the cumulative analysis impact area. This is considered in the discussion below.

CUMULATIVE EFFECTS OF THE PROPOSED PLAN

The following analysis examines the cumulative effects of the proposed Plan within the cumulative analysis impact area. The potential cumulative effects of the proposed Plan are summarized qualitatively below for each of the topics analyzed in Chapters 2 of this Draft EIR.

Transportation and Traffic

Impacts to transportation and traffic related to implementation of the proposed Plan are analyzed in Section 2.1 of this Draft EIR. Within the cumulative analysis impact area, implementation of the proposed Plan combined with cumulative development outside the region has the potential to result in congestion and delay occurring outside the region, which would be considered a significant cumulative impact. The proposed Plan is designed to maintain and foster the balance between jobs and housing within the region and provides a strategy to allocate growth in such a way as to achieve a more balanced jobs/housing ratio and to optimize transportation investments that support those land uses. As discussed in Section 2.1, the proposed Plan does not include roadway capacity increases at the Bay Area boundaries. The analysis summarized in the *Effect of MTC Express Lanes on Interregional Travel* (Cambridge Systems 2017), which evaluated the potential effects of new express lanes on interregional traffic, indicated that the targeted roadway capacity increases and roadway management strategies within the Bay Area may result in a marginal increase in interregional traffic, resulting in a potential 0.2 percent increase in regional VMT from increased interregional trips. Thus, while cumulative traffic in the region surrounding the Bay Area may experience substantial growth and increased congestion as a result of growth in those areas, the proposed Plan's transportation projects and traffic would not be expected to considerably contribute to that increase. The proposed Plan provides sufficient housing to accommodate new job growth, relieving pressure to commute into the Bay Area for jobs and out of the Bay Area for housing. As a result, and as shown in Section 2.1, the proposed Plan would result in lower VMT per capita

and a greater mode share for non-motorized modes. Therefore, while cumulative traffic conditions within the cumulative impact analysis area may worsen such that impacts within the greater cumulative context would be significant and unavoidable, the proposed Plan would reduce per capita VMT within the region compared to existing conditions, thereby reducing the proposed Plan's contribution to less than cumulatively considerable. Therefore, the impact would be less than significant (LS).

Impact 3-1: The contribution of the proposed Plan to cumulative transportation impacts would not be cumulatively considerable. This impact would be less than significant (LS).

Mitigation Measure

None required.

Air Quality

As noted in Section 2.2, the nine-county MTC region encompasses three air basins: the San Francisco Bay Air Basin (SFBAB) in its entirety, portions of the North Coast Air Basin, and portions of the Sacramento Valley Air Basin; and falls within the jurisdiction of three air districts: Bay Area Air Quality Management District, North Sonoma County Air Pollution Control District, and Yolo Solano Air Quality Management District. Outside of the MTC region, the aforementioned nine additional counties within the cumulative impact analysis area include the following three additional air basins:

- Lake County Air Basin,
- San Joaquin Valley Air Basin, and
- North Central Coast Air Basin.

Additionally, portions of the cumulative impact analysis area (outside of the region) fall within the jurisdiction of the following five additional air districts:

- Lake County Air Quality Management District – Lake County;
- Mendocino County Air Quality Management District – Mendocino County;
- Monterey Bay Unified Air Pollution Control District – San Benito County;
- Sacramento Metropolitan Air Quality Management District – Sacramento County; and
- San Joaquin Valley Air Pollution Control District – Merced, San Joaquin, and Stanislaus Counties.

The state has identified air-basin-specific pollutants that have exceeded applicable federal and state pollutant standards. As noted in Section 2.2, any area that exceeds applicable standards for a particular pollutant is typically referred to as "nonattainment" for that pollutant. In addition, the air districts identified above have prepared area-specific air quality plans to improve air quality conditions within their jurisdiction to meet federal and state pollutant standards for those pollutants that currently exceed standards. Although each jurisdiction is primarily responsible for regulating its own emissions, pollutant transport, which is a result of a variety of topographical and atmospheric conditions that cause pollution generated in one location to move to another location (including a neighboring air basin), can result in one area's emissions affecting another's ability to achieve applicable pollutant standards.

Because the air basins identified above are currently designated as nonattainment for one or more pollutants for which federal and/or state standards exist, a significant cumulative impact exists. Additionally, the proposed Plan could result in substantial increases in pollutant emission levels (PM_{10} and $PM_{2.5}$) during construction and operational activities associated with future growth and development patterns. However, the proposed Plan is intended to reduce the overall emissions load, through a transportation and land use strategy that maximizes access to transit and other alternative transportation approaches, lowering potential VMT per capita. While an improvement over what would be expected absent the Plan, given existing air pollution conditions in surrounding areas, impacts would be cumulatively considerable and significant (S).

Impact 3-2: The contribution of the proposed Plan to cumulative air quality impacts would be cumulatively considerable. This is considered a significant impact (S).

Mitigation Measure

3-2: Implement Mitigation Measures in Section 2.2.

As noted in Section 2.2, mitigation measures are available that could reduce an individual project's contribution (under the proposed Plan) to areawide emissions. However, the ability and requirement to implement such measures would ultimately be the responsibility of a lead agency to determine on a case-by-case basis, and implementation cannot be guaranteed by MTC/ABAG. As a result, cumulative impacts would be significant and unavoidable (SU).

Land Use and Physical Development

Land use and physical development impacts associated with implementation of the proposed Plan are analyzed in Section 2.3 of this Draft EIR. The proposed Plan's forecasts are based on housing targets that are derived from the Regional Housing Control Total per the 2014 settlement agreement signed with the Building Industry Association (BIA). This increases the housing forecast by adding the number of housing units necessary to accommodate potential growth in in-commuters from outside the region, with the end result being that the proposed Plan provides housing opportunities needed to accommodate all new jobs. The Regional Housing Control Total estimated the total number of units needed to accommodate all of the residents in the region plus the number of housing units that correspond to the potential in-commuter increase. The number of units also included a 3 percent vacancy level to allow for moves within the region. As noted in Section 2.3, the additional population, housing, and job growth forecasted for the planning period is not a result of the proposed Plan, rather the growth is expected under current land use plans in effect throughout the region; the proposed Plan provides a strategy to allocate growth in such a way as to achieve a more balanced jobs/housing ratio and to optimize transportation investments that support those land uses. The land use growth footprint assumes an adequate number of residential units to meet the forecasted demand, taking into account localized displacement of some households within the region. Thus, implementation of the proposed Plan would not result in displacement at the regional scale, and localized displacement would not be expected to exert development pressure on areas surrounding the Bay Area. Because the proposed Plan would not exert development pressure on adjacent counties through displacement of land uses, indirect effects that would otherwise be expected (effects tied to development) would not occur. This is a less than significant cumulative effect (LS).

Implementation of the proposed Plan has the potential to result in conversion of land uses, including agricultural lands and forest land to urban uses. Similarly, development pursuant to other local and regional planning efforts within the greater cumulative impact area could also have impacts on special-status species and habitat, and as a result, cumulative impacts would be considered potentially significant. Further, implementation of the proposed Plan and other cumulative development could also result in additional conversion of agriculture land and forest land to other uses. Due to the potential direct and indirect impacts that may occur as a result of the proposed Plan, the proposed Plan would contribute considerably to this impact, and would be significant (S).

Impact 3-3: The contribution of the proposed Plan to indirect cumulative impacts from displaced land uses would not be cumulatively considerable (LS). Land use impacts associated with conversion of agricultural and forest lands would be cumulatively considerable. This is considered a significant impact (S).

Mitigation Measure

3-9: Implement Mitigation Measures in Section 2.3 that pertains to agricultural and land forest land.

These mitigation measures would reduce the potentially significant impact of conversion or forest or timberland to other uses because it would require avoidance or compensation for converted lands. If the implementing agency and/or project sponsor adopts these mitigation measures, it would reduce the cumulative contribution of the proposed Plan to less than considerable, and residual impacts on conversion of forest land and agricultural land would be less than significant (LS). However, the ability and requirement to implement such measures would ultimate be the responsibility of the local jurisdiction, and implementation

cannot be guaranteed by MTC/ABAG, resulting in a cumulatively considerable contribution by the proposed Plan. Therefore, cumulative impacts would remain significant and unavoidable (SU).

Energy

Potential impacts related to increased energy consumption from implementation of the proposed Plan are evaluated in Section 2.4 of this Draft EIR. Demand for electrical power and natural gas has the potential to affect an area larger than the MTC region in a cumulative manner, because energy systems are interconnected over large areas that could cross over into other regions and beyond.

The proposed Plan is designed to increase the efficiency of transportation and reduce per capita VMT, which would reduce per capita automotive fuel consumption and increase overall energy efficiency as it pertains to mobility. The proposed Plan emphasizes new compact housing (e.g., multi-family housing with shared walls) that would potentially share infrastructure costs pertaining to heating and cooling and include energy efficiency measures built into Building Code requirements and Title 24 standards. Further, the proposed Plan includes a Climate Initiatives Program with implementing strategies to further the use of renewable energy supplies and energy efficiency measures. As such, despite other growth and development in the cumulative impact analysis area that could result in increases in the demand for energy, the proposed Plan would not result in a wasteful or inefficient use of energy and its contribution to cumulative energy impacts would not be cumulatively considerable, and impacts would be less than significant (LS).

Impact 3-4: The contribution of the proposed Plan to cumulative energy impacts would not be cumulatively considerable, and the impact would be less than significant (LS).

Mitigation Measure

None required.

Climate Change and Greenhouse Gases

Climate change is an inherently cumulative issue. As discussed in Section 2.5, implementation of projected development under the proposed Plan woud reduce per capita passenger vehicle and light duty truck CO_2 emissions by over seven percent by 2020 and by over 15 percent by 2035 as compared to 2005 baseline; and, would result in net reductions in greenhouse gas (GHG) emissions in 2040 compared to existing conditions. While development of projected development and transportation projects could be located in areas that would be regularly inundated by sea level rise by midcentury, these impacts would be site-specific and would not combine to create a significant cumulative effect. Thus, the proposed Plan would not contribute to cumulative climate change effects, and impacts would be less than significant.

Impact 3-5: *The contribution of the proposed Plan to climate change and GHG impacts would not be cumulatively considerable, and the impact would be less than significant (LS).*

Mitigation Measure

None required.

Noise

Impacts associated with noise related to implementation of the proposed Plan are analyzed in Section 2.6 of this Draft EIR. Noise impacts are based on factors related to site-specific and project-specific characteristics and conditions, including distance to noise sources, barriers between land uses and noise sources, and other factors. Impacts related to construction, traffic, and transit would be significant. Cumulative noise increases from traffic within the Plan area are addressed in Section 2.6. No other cumulative sources of noise (in relation to cumulative development) are expected.

The proposed Plan is not expected to substantially increase inter-regional travel, because the proposed Plan address how to accommodate projected growth. Therefore, proposed Plan-related contributions to traffic noise

outside the region are expected to be minimal, and the proposed Plan's contribution to cumulative traffic noise would be less than significant (LS).

Impact 3-6: The contribution of the proposed Plan to cumulative noise impacts would not be cumulatively considerable, and the impact would be less than significant (LS).

Mitigation Measure

None required.

Geology, Soils, Seismicity, and Mineral Resources

Impacts to geology, soils, seismicity, and mineral resources, related to implementation of the proposed Plan are analyzed in Section 2.7 of this Draft EIR. Geology, soils, seismicity, and mineral resources impacts may be related to: increased exposure to seismic hazards, increase erosion and/or loss of topsoil, the presence of unstable/expansive soils, alternative waste disposal or septic systems, and the loss of known mineral resources. These effects occur independently of one another, related to site-specific and project-specific characteristics and conditions. In addition, existing regulations specify mandatory actions that must occur during project development, which would adequately address the potential for effects from construction or operation of projects related to geology, soils, seismicity, and mineral resources as noted throughout the impacts discussed in Section 2.7 of this Draft EIR.

The potential for cumulative impacts related to geology, soils, seismicity, and mineral resources is not cumulative considerable, and the impact would be less than significant (LS).

Impact 3-7: The contribution of the proposed Plan to cumulative geology, soils, seismicity, and mineral resources impacts would not be cumulatively considerable, and impacts would be less than significant (LS).

Mitigation Measure

None required.

Water Resources

Impacts associated with water resources associated with implementation of the proposed Plan are analyzed in Section 2.8 of this Draft EIR. Water resources impacts may be related to: violation of water quality standards, inference with groundwater recharge, increase erosion, increased non-point source pollution, increased runoff, affects to flood zones, and exposure of people to a significant risk of loss, injury, or death involving flooding (including flooding as a result of the failure of a levee or dam), seiche, tsunami, or mudflow. These effects, like those related to geology and seismicity above, occur independently of one another, related to site-specific and project-specific characteristics and conditions. In addition, existing regulations specify mandatory actions that must occur during project development, which would adequately address the potential for construction or operation of projects to affect water resources as noted throughout the impacts discussed in Section 2.8. Thus, the potential for cumulative impacts related to water resources is not cumulative considerable, and the impact would be less than significant (LS).

Impact 3-8: The contribution of the proposed Plan to cumulative water resources impacts would not be cumulatively considerable, and this impact would be less than significant (LS).

Mitigation Measure

None required.

Biological Resources

The effect of implementation of the proposed Plan on regional biological resources is analyzed in Section 3.9 of this Draft EIR. Biological resources impacts may be related to: direct and indirect effects on sensitive/special status species or their habitat; substantial adverse effects on riparian, wetland, or other sensitive natural

communities; interference with wildlife movement/corridors and nursery sites; or conflicts with plans or policies protecting biological resources. As noted in Section 3.9, implementation of the land use development pattern under the proposed Plan could result in regional impacts on special-status species. Similarly, development pursuant to other local and regional planning efforts within the greater cumulative impact area could also have impacts on special-status species and habitat, and as a result, cumulative impacts would be considered potentially significant. Further, implementation of the proposed Plan and other cumulative development could also result in disruption of movement corridors and nursery sites. Due to the potential direct and indirect impacts, including loss of individual species and habitat, that may occur as a result of the proposed Plan, the proposed Plan would contribute considerably to this impact, and would be significant (S).

Impact 3-8: The contribution of the proposed Plan to cumulative biological resources impacts would be cumulatively considerable. This is considered a significant impact (S).

Mitigation Measure

3-9: Implement Mitigation Measures in Section 2.9.

These mitigation measures set requirements for surveys and actions to be taken if biological resources may be adversely affected. If the implementing agency and/or project sponsor adopts these mitigation measures, it would reduce the contribution of the proposed Plan to cumulative impacts on biological resources. However, the mitigation measures may not be sufficient to reduce impacts to less-than-significant levels in all cases. For projects proposing to streamline environmental review, lead agencies must conduct project-level analysis for each project to analyze whether, based on substantial evidence in the record, the proposed mitigation will reduce the impact to less than significant. Additionally, MTC/ABAG cannot require implementing agencies to adopt these mitigation measures, and it is ultimately the responsibility of the implementing agency to determine and adopt mitigation. Therefore, the regional contribution to this cumulative impact remains significant and unavoidable (SU).

Visual Resources

Visual resources impacts associated with implementation of the proposed Plan are analyzed in Section 2.10 of this Draft EIR. The analysis examines impacts of the proposed Plan on visual resources throughout the Bay Area and is cumulative in nature. Some impacts would be expected to scenic viewsheds, but these viewsheds are within the Bay Area and not visible to areas surrounding the Plan area. The effects on scenic resources occurs at the interface between development and the scenic resources, and tend to be localized. Consequently, the proposed Plan would not be expected to combine with development in adjacent areas to produce a considerable contribution to cumulative impacts. The potential for cumulative impacts related to visual resources is not cumulatively considerable, and the impact would be less than significant (LS).

Impact 3-10: The contribution of the proposed Plan to cumulative visual resources impacts would not be cumulatively considerable, and this impact would be less than significant (LS).

Mitigation Measure

None required.

Cultural Resources

The effect of implementation of the proposed Plan on cultural resources is analyzed in Section 2.11 of this Draft EIR. While some cultural resources may have regional significance, the resources themselves are site-specific, and impacts to them are project-specific. For example, impacts to a subsurface archeological find at one project site are generally not made worse by impacts from another project to a cultural resource at another site. Rather the resources and the effects upon them are generally independent. Therefore, the proposed Plan would not be expected to combine with impacts to cultural resources in areas surrounding the Bay Area to create more considerable impacts. The potential for cumulative impacts related to cultural resources is not cumulative considerable, and the impact would be less than significant (LS).

Impact 3-11: The contribution of the proposed Plan to cumulative cultural resources impacts would not be cumulatively considerable and would be less than significant (LS).

Mitigation Measure

None required.

Public Utilities and Facilities

Impacts to utilities and services related to implementation of the proposed Plan are analyzed in Section 2.12 of this Draft EIR. This analysis includes an examination of potential impacts related to the availability and capacity of water supply, stormwater, wastewater, solid waste, natural gas, propane, electricity, and telecommunications infrastructure. The utilities identified below are generally provided or delivered on a local level, but may originate from sources outside of the local jurisdiction and/or as part of a regional distribution system. The proposed Plan's contribution to cumulative impacts associated with the provision of utilities is discussed below.

Water Supply and Infrastructure

Water supply and associated infrastructure have both local and regional aspects. The rivers that provide virtually all the surface water supplies in the Bay Area originate outside the region, and travel through the region and beyond, providing water supply to jurisdictions inside and outside of the Bay Area along the way.

An increase in demand and water consumption in one region has the potential to affect supplies throughout California, because the surface water supply systems are interconnected. Development of future water supply and associated infrastructure regionally and beyond depends on several factors, such as surface water availability, groundwater recharge, land use density and land use type. Future urban growth (population, housing, and employees) anticipated with implementation of the Plan would result in an increase in water supply needs and demand. Future growth elsewhere in the cumulative impact analysis area could also lead to potential future water shortages and depletion of existing water supplies. As a result, the proposed Plan is cumulatively considerable with respect to water supply and water infrastructure, and this impact would be potentially significant (S).

Wastewater and Infrastructure

Wastewater service (sewer treatment) is a localized concern, as the wastewater treatment facilities and services are usually provided and regulated by local governments or special districts for areas within their jurisdiction. As such, wastewater systems and associated infrastructure within the Bay Area would not be substantially affected by development outside of the region. Therefore, the proposed Plan would not be cumulatively considerable with respect to wastewater and wastewater infrastructure, and impacts would be less than significant (LS).

Stormwater and Infrastructure

Stormwater drainage systems in the Bay Area are generally provided by local governments for areas within their jurisdictions or for county/city areas combined, and are not typically provided on a regional or extra-regional basis. Stormwater drainage solutions typically depend on site-specific and project-specific characteristics and implementation. As such, stormwater drainage systems within the Plan area would not be significantly affected by development outside of the region. Therefore, the proposed Plan would not be cumulatively considerable with respect to stormwater and stormwater infrastructure, and impacts would be less than significant (LS).

Solid Waste

Solid waste management is generally provided by privately-operated landfills (with the exception of one landfill operated by the Sonoma County Public Works Department) under the oversite of each county's local enforcement agency and not on a regional basis. Implementation of the proposed Plan, in conjunction with other development projected to occur in the cumulative impact analysis area, has the potential to exceed available local solid waste capacity and, due to the potential solid waste generated through Plan implementation, is cumulatively considerable. Impacts would be potentially significant (S).

Impact 3-11: The contribution of the proposed Plan to cumulative impacts associated with certain public utilities (water supply and infrastructure and solid waste facilities) would be cumulatively considerable. This is considered a significant impact (S).

Mitigation Measure

3.12d: Implement Mitigation Measures in Section 2.12.

The mitigation measures identified in Section 2.12 would ensure that adequate public services and utilities be available to serve the project at applicable service levels. If the implementing agency and/or project sponsor adopts these mitigation measures, it would reduce the cumulative contribution of the proposed Plan to less than considerable, and residual impacts on public utilities and facilities would be less than significant (LS). However, the ability and requirement to implement such measures would ultimate be the responsibility of the local jurisdiction, and implementation cannot be guaranteed by MTC/ABAG, resulting in a cumulatively considerable contribution by the proposed Plan. Therefore, cumulative impacts would remain significant and unavoidable (SU).

Hazards

Impacts associated with hazards and hazardous materials related to implementation of the proposed Plan are analyzed in Section 2.13 of this Draft EIR. Hazards and hazardous materials impacts may be related to: the transport, use, or disposal of hazardous materials (including by rail); reasonably foreseeable upset or accidental conditions involving the release of hazardous materials; emission of hazardous materials within ¼-mile of a school; location on a known hazardous materials site; airport-related hazards; conflicts with emergency response plans; and wildland fires. These effects occur independently of one another, related to site-specific and project-specific characteristics and conditions. In addition, the proposed Plan would not generate a substantial increase in hazardous materials by rail. Furthermore, existing regulations specify mandatory actions that must occur during project development, including transport, use, and disposal of hazardous materials, which would adequately address issues pertaining to hazards and hazardous materials as noted throughout the impact discussed in Section 2.13 of this Draft EIR. The potential for cumulative impacts related to hazards and hazardous materials is not cumulatively considerable, and the impact would be less than significant (LS).

Impact 3-8: The contribution of the proposed Plan to cumulative hazards and hazardous materials impacts would not be cumulatively considerable, and impacts would be less than significant (LS).

Mitigation Measure

None required.

Public Services and Recreation

Impacts to public services and recreation related to implementation of the proposed Plan are analyzed in Section 2.14 of this Draft EIR. This assessment includes an analysis of the need for new facilities or modification to facilities, the construction of which causes significant environmental impacts, in order to maintain acceptable service ratios, response times or other performance objectives for schools, emergency services, police protection, fire protection, and other public facilities; or regional parks or other recreational facilities.

Law enforcement, fire protection, and emergency services are provided by local governments or fire protection districts for areas within their jurisdiction, although mutual aid agreements between agencies do help spread resources. The California Highway Patrol (CHP) has specific jurisdiction over all California state routes (including all freeways and expressways), US Highways, Interstate Highways, and all public roads in unincorporated parts of a county. The US Forest Service and State Department of Forestry and Fire Protection (CAL FIRE) provide fire protection services within many rural areas.

Public schools are provided by school districts to areas within their jurisdictions. While districts may have cross-jurisdictional boundaries, school services are still provided at the local, rather than regional, level. Libraries are also generally provided by local governments for areas within their jurisdiction, and services are

not provided on a regional basis, although there are often regional cooperation programs. Social services are generally provided by counties, and not provided on a regional basis.

Neighborhood and city/county parks and recreational services are provided by local governments for areas within their jurisdiction. The Bay Area also includes numerous regional, state, and federal parks, open space, and recreational areas.

The effects of the proposed Plan as it relates to most public services and local parks and recreation, is not cumulatively considerable due to the localized (and inherently non-cumulative) nature of these services. As a result, impacts for these services would be less than significant (LS).

However, cumulative impacts to: state routes, freeways, and other roads under the jurisdiction of the CHP; rural wildland fire areas protected by CAL FIRE; and regional, state, and federal parks, open space, and recreational areas cross jurisdictional boundaries of cities and counties. As such, the proposed Plan would be cumulatively considerable with respect to those services, and impacts would be potentially significant (PS).

Impact 3-11: The contribution of the proposed Plan to cumulative impacts associated with certain public services (state routes, freeways, and other roads under the jurisdiction of the CHP; rural wildland fire areas protected by CAL FIRE; and regional, state, and federal parks, open space, and recreational areas) would be cumulatively considerable. This is considered a significant impact (S).

Mitigation Measure

3-14: Implement Mitigation Measures in Section 2.14.

The mitigation measures identified in Section 2.14 require local agencies to ensure that adequate public services are available prior to the approval of new development projects. If the implementing agency and/or project sponsor adopts these mitigation measures, it would reduce the cumulative contribution of the proposed Plan to less than considerable, and residual impacts on cultural resources would be less than significant (LS). However, the ability and requirement to implement such measures would ultimately be the responsibility of the local jurisdiction, and implementation cannot be guaranteed by MTC/ABAG, resulting in a cumulatively considerable contribution by the proposed Plan. Therefore, cumulative impacts would remain significant and unavoidable (SU).

3.2.5 Impacts Found not to be Significant

This EIR focuses on potentially significant impacts. CEQA requires that an EIR provide a brief statement indicating why various possible significant impacts were determined to not be significant and were not discussed in detail. For the issue areas addressed in Chapter 2, all potential impacts are identified. See Sections 2.1 through 2.14 for discussions related to impacts found not to be significant.

4.1 BIBLIOGRAPHY

Executive Summary
None

1.1 Introduction
None

1.2 Project Description
None

2.0 Approach to the Analysis
None

2.1 Transportation
Association of Bay Area Governments. 2016 (February). *Regional Forecast for Plan Bay Area 2040.* Available: http://reports.abag.ca.gov/other/Regional_Forecast_for_Plan_Bay_Area_2040_F_030116.pdf Accessed March 14, 2017.

Alameda County Transportation Commission. 2016 (February). *Countywide Goods Movement Plan.* Available: http://www.alamedactc.org/files/managed/Document/18249/AlamedaCTC_GoodsMovementPlan_FINAL.pdf. Accessed March 14, 2017.

California Department of Transportation. 2014. *San Francisco Bay Area Freight Mobility Study.* Available: http://www.dot.ca.gov/hq/tpp/offices/ogm/regional_level/FR3_SFBAFMS_Final_Report.pdf. Accessed March 14, 2017.

———. 2015 (December). Design Information Bulletin Number 89. Class IV Bikeway Guidance.

———. 2016 (July). California Highway Design Manual. Available: http://www.dot.ca.gov/hq/oppd/hdm/pdf/english/HDM_Complete_15Jul2016.pd]. Accessed August 15, 2016.

California Association of Realtors. 2016. Market Data, Current Sales & Price Statistics. Available: http://www.car.org/marketdata/data/countysalesactivity/. Accessed August 15, 2016.

California Transportation Commission. 2010. Regional Transportation Guidelines. Available: http://www.catc.ca.gov/programs/rtp/2010_RTP_Guidelines.pdf. Accessed August 15, 2016.

———. 2017. 2017 Regional Transportation Plan Guidelines for Metropolitan Planning Organizations. Adopted on January 18, 2017. Available: http://www.dot.ca.gov/hq/tpp/offices/orip/rtp/docs/2017RTPGuidelinesforMPOs.pdf. Accessed March 15, 2017.

Federal Highway Administration. 2012 (August). Integrating Demand Management into the Transportation Planning Process: A Desk Reference. Online: https://ops.fhwa.dot.gov/publications/fhwahop12035/fhwahop12035.pdf. Referenced April 5, 2017.

FHWA. *See* Federal Highway Administration.

Metropolitan Transportation Commission and Association of Bay Area Governments. 2013 (April). *Plan Bay Area Draft Environmental Impact Report*.

MTC. 2016a (June). *Statistical Summary of Transit Operators*.

MTC. 2016b (June). Draft Transportation Air Quality Conformity Analysis for the Amended Plan Bay Area and 2017 Transportation Improvement Program Amendment #11-25. Available: http://mtc.ca.gov/our-work/fund-invest/transportation-improvement-program-tip/draft-2017-tip. Accessed August 15, 2016.

MTC. 2016c (February). *San Francisco Bay Area Goods Movement Plan*. Available: http://mtc.ca.gov/sites/default/files/RGM_Full_Plan.pdf. Accessed March 14, 2017.

Metropolitan Transportation Commission. 2017. Travel Demand Forecasts, 2015.

MTC. 2017b. *Freight Emissions Reduction Action Plan.*

MTC. 2017c. *Summary of Predicted Traveler Responses.*

MTC. 2017d. *Summary of Predicted Land Use Responses.*

U.S. Census Bureau. American Community Survey, Five-Year Estimates, 2006-2010, Tables B08301. Available: https://factfinder.census.gov. Accessed August 15, 2016.

————.2010 and 2015, Tables B08301, B08103, and S0802. Available: https://factfinder.census.gov. Accessed August 15, 2016.

2.2 Air Quality

ARB. *See* California Air Resources Board.

BAAQMD. *See* Bay Area Air Quality Management District.

Bay Area Air Quality Management District. 2010a (September). Bay Area 2010 Clean Air Plan. Adopted September 15, 2010. Available: http://www.baaqmd.gov/plans-and-climate/air-quality-plans/current-plans. Accessed March 1, 2017.

————. 2010b (May). Draft CEQA Guidelines. May 2010. Available: http://www.baaqmd.gov/plans-and-climate/california-environmental-quality-act-ceqa/updated-ceqa-guidelines. Accessed March 1, 2017.

————. 2012a. (November). Understanding Particulate Matter: Protecting Public Health in the San Francisco Bay Area. Available: http://www.baaqmd.gov/~/media/Files/Planning%20and%20Research/Plans/PM%20Planning/UnderstandingPM_Draft_Aug%2023.ashx. Accessed March 1, 2017.

————. 2012b. Stationary-source Screening Analysis Tool. Available: http://www.baaqmd.gov/plans-and-climate/california-environmental-quality-act-ceqa/ceqa-tools. Accessed March 14, 2017.

————. 2014a. Toxic Air Contaminants. Available: http://www.baaqmd.gov/research-and-data/emission-inventory/toxic-air-contaminants. Accessed March 23, 2017. Last updated May 24, 2015.

————. 2014b. Updated CEQA Guidelines. Available: http://www.baaqmd.gov/plans-and-climate/california-environmental-quality-act-ceqa/updated-ceqa-guidelines. Last updated January 16, 2014. Accessed March 1, 2017.

————. 2015a. Annual Bay Area Air Quality Summaries. Available: http://www.baaqmd.gov/about-air-quality/air-quality-summaries. Accessed March 23, 2017. Last updated May 23, 2016.

———. 2015b. Community Air Risk Evaluation Program. Available: http://www.baaqmd.gov/plansandclimate/communityairriskevaluationcareprogram. Last updated May 28, 2015. Accessed January 11, 2017.

———. 2016 (May). Planning Healthy Places: A Guidebook for Addressing Local Sources of Air Pollutants in Community Planning. Available: http://www.baaqmd.gov/~/media/files/planning-and-research/planning-healthy-places/php_may20_2016-pdf.pdf?la=en. Accessed March 1, 2017.

———. 2017a. Air Quality Standards and Attainment Status. Available: http://www.baaqmd.gov/research-and-data/air-quality-standards-and-attainment-status. Accessed March 23, 2017. Last updated January 5, 2017.

———. 2017b. Spare The Air. Cool The Climate. A Blueprint for Clean Air and Climate Protection in the Bay Area. Draft 2017 Clean Air Plan. January 10, 2017. Available: http://www.baaqmd.gov/~/media/files/planning-and-research/plans/2017-clean-air-plan/baaqmd_2017_cap_draft_122816-pdf.pdf?la=en. Accessed March 1, 2017.

California Air Pollution Control Officers Association. 2016a. California Emissions Estimator Model. Version 2016.3.1. Available: http://www.caleemod.com/. Accessed March 1, 2017.

_____. 2016b (September). Appendix A Calculation Details for CalEEMod. Available: http://www.aqmd.gov/docs/default-source/caleemod/upgrades/2016.3/01_user-39-s-guide2016-3-1.pdf?sfvrsn=2. Accessed March 1, 2017.

California Air Resources Board. 2000 (October). Risk Reduction Plan to Reduce Particulate Matter Emissions from Diesel-Fueled Engines and Vehicles. Available: https://www.arb.ca.gov/diesel/documents/rrpFinal.pdf. Accessed March 23, 2017.

———. 2001 (July). Lead Fact Sheet. Available: https://www.arb.ca.gov/toxics/lead/factsheet.pdf. Accessed March 23, 2017.

———. 2005 (March). Air Quality and Land Use Handbook: A Community Health Perspective. Sacramento, CA. Available: http://arb.ca.gov/ch/handbook.pdf. Accessed March 1, 2017.

———. 2011. Recommended Area Designations for the 2010 Federal Sulfur Dioxide (SO_2) Standard Staff Report. Available: https://www.arb.ca.gov/desig/so2e1.pdf. Accessed March 23, 2017.

———. 2014a. History of Air Resources Board. Available: https://www.arb.ca.gov/knowzone/history.htm. Accessed March 23, 2017. Last updated October 22, 2014.

———. 2014b. California Air Toxics Program – Background. Available: https://www.arb.ca.gov/toxics/background.htm. Accessed March 23, 2017. Last updated December 8, 2014.

———. 2014c. EMFAC2014 Volume I - User's Guide. V. 1.0.7. April 30, 2014. Available: https://www.arb.ca.gov/msei/downloads/emfac2014/emfac2014-vol1-users-guide-052015.pdf. Accessed January 11, 2017.

———. 2015a. Facility Search Results. Available: https://www.arb.ca.gov/app/emsinv/facinfo/factox.php?grp=1&dbyr=2015&all_fac=C&sort=PolHi&showpol=SOX&co_=&ab_=&facid_=&dis_=BA&city_=&fsic_=&fname_=&fzip_=&chapis_only=&dd=. Accessed March 23, 2017.

———. 2015b. Consumer Products Regulations. Available: https://www.arb.ca.gov/consprod/regs/regs.htm. Accessed March 14, 2017. Last updated March 5, 2015.

———.2015c (May). Evaluation of Particulate Matter Filters in On-Road Heavy-Duty Diesel Vehicle Applications. Available: https://www.arb.ca.gov/msprog/onrdiesel/documents/DPFEval.pdf. Accessed March 14, 2017.

———. 2015d. EMFAC2014 Volume III – Technical Documentation. V. 1.0.7. May 12, 2015. Available: https://www.arb.ca.gov/msei/downloads/emfac2014/emfac2014-vol3-technical-documentation-052015.pdf. Accessed March 2, 2017.

———. 2016 (November). Miscellaneous Process Methodology 7.9 Entrained Road Travel, Paved Road Dust. Revised and updated November 2016. Available: https://www.arb.ca.gov/ei/areasrc/onehtm/one7-9_2016.htm. Accessed March 1, 2017.

California Energy Commission. 2013. 2013 Integrated Energy Policy Report. CEC-100-2013-001-CMF. Posted February 20, 2014. Available: http://www.energy.ca.gov/2013_energypolicy/. Accessed March 1, 2017.

_____. 2015a. 2016 Building Energy Efficiency Standards. Adoption Hearing. Presented by Mazi Shirakh, Payan Bozorgchami, and Peter Strait on June 10, 2015. Available: http://www.energy.ca.gov/title24/2016standards/rulemaking/documents/2015-06-10_hearing/2015-06-10_Adoption_Hearing_Presentation.pdf. Accessed March 1, 2017.

_____. 2015b. 2016 Building Energy Efficiency Standards. Frequently Asked Questions. Available: http://www.energy.ca.gov/title24/2016standards/rulemaking/documents/2016_Building_Energy_Efficiency_Standards_FAQ.pdf. Accessed March 1, 2017.

California Department of Transportation. 1989. CALINE4, California Line Source Dispersion Model, Version 4. Software. Available: http://www.dot.ca.gov/hq/env/air/software/caline4/calinesw.htm. Accessed March 14, 2017.

Caltrans. *See* California Department of Transportation.

CAPCOA. *See* California Air Pollution Control Officers Association.

CDC. *See* Centers of Disease Control.

CEC. *See* California Energy Commission.

Centers of Disease Control. 1978 (September). Occupational Health Guideline for Sulfur Dioxide. Available: https://www.cdc.gov/niosh/docs/81-123/pdfs/0575.pdf. Accessed March 23, 2017.

EPA. *See* U.S. Environmental Protection Agency.

Metropolitan Transportation Commission. 2015 (December 31). *MTC Resolution No. 4217: Equity Framework for Plan Bay Area 2040*. Letter memorandum to the MTC Planning Committee. Oakland, CA. Available: https://mtc.legistar.com/View.ashx?M=F&ID=4216456&GUID=42E0CBF3-9490-4A6D-A6A6-B04003451057. Accessed January 11, 2017.

MTC. *See* Metropolitan Transportation Commission.

STI. *See* Sonoma Technology, Inc.

Sonoma Technology, Inc. 2008 (February 15). *Final documentation of the preparation of year-2005 emission inventories of toxic air contaminants for the San Francisco Bay Area (Contract No. 2006-019).* Letter memorandum to Phil Martien of Bay Area Air Quality Management District. Petaluma, CA. Available: http://www.baaqmd.gov/~/media/Files/Planning%20and%20Research/CARE%20Program/STI_2005_TAC_EI_TechMemo_Final.ashx. Accessed March 23, 2017.

_____. 2010 (April 23). *Draft documentation of the preparation of future-year emissions inventories of toxic air contaminants for the San Francisco Bay Area (Contract No. 2009-127).* Letter memorandum to Phil Martien of Bay Area Air Quality Management District. Petaluma, CA . Available: http://www.baaqmd.gov/~/media/Files/Planning%20and%20Research/CARE%20Program/STI_FY_Toxics_TechMemo.ashx?la=en. Accessed March 23, 2017.

U.S. Environmental Protection Agency. 2016 (November). Lead in Outdoor Air. Available: https://www.epa.gov/lead/lead-outdoor-air. Last updated November 28, 2016. Accessed March 23, 2017.

_____. 2017 (January). U.S. EPA protects Bay Area residents from hazardous lead paint. Available: https://www.epa.gov/newsreleases/us-epa-protects-bay-area-residents-hazardous-lead-paint. Last updated January 19, 2017. Accessed March 23, 2017.

Yolo-Solano Air Quality Management District. 2017. Planning for Particulate Standards. Available: http://www.ysaqmd.org/plans-data/particulates/. March 23, 2017.

YSAQMD. *See* Yolo-Solano Air Quality Management District

2.3 Land Use and Physical Development

Bay Area Open Space Council. 2014. Conservation Lands Network Database. Available: http://openspacecouncil.org/programs/protect/. Accessed: March 2017.

California Department of Conservation. 2015. Farmland Mapping and Monitoring Program. Available: http://www.labormarketinfo.edd.ca.gov. Accessed: March 2017.

_____. 2016a. Farmland Mapping and Monitoring Program. 2014 Field Report. County: Contra Costa.

_____. 2016b. Farmland Mapping and Monitoring Program. 2014 Field Report. County: Santa Clara.

_____. 2016c. Farmland Mapping and Monitoring Program. 2014 Field Report. County: Sonoma.

California Department of Finance. 2016. Demographics. Available: http://www.dof.ca.gov/Forecasting/Demographics/. Accessed: December 2016.

California Employment Development Department. 2016. Labor Market Information Division. Available: EDD 2016

California Protected Areas Database. 2012. Available: http://www.calands.org/data/history. Accessed: February 2017.

DOC. *See* California Department of Conservation.

EDD. *See* California Employment Development Department.

Greenbelt Alliance. 2015. What Are Urban Growth Boundaries and Why Do We need Them? Available: http://www.greenbelt.org/blog/urban-growth-boundaries-need/. Accessed: February 2017.

U.S. Department of Agriculture. 2016. CropScape and Cropland Data Layer. Available: https://www.nass.usda.gov/Research_and_Science/Cropland/SARS1a.php. Accessed: February 2017.

2.4 Energy

Alternative Fuels Data Center. 2017. Alternative Fueling Station Counts by State. Available: http://www.afdc.energy.gov/fuels/stations_counts.html. Accessed: April 7, 2017.

ARB. *See* California Air Resources Board.

Barr, Robert. *China Surpasses U.S. as Top Energy Consumer.* MSNBC. NBCNews.com June 8, 2011. Accessed August, 6, 2012

Bureau of Transportation Statistics. 2015. Table 7-1: Transportation Energy Consumption by Energy Source. Available: https://www.rita.dot.gov/bts/sites/rita.dot.gov.bts/files/publications/state_transportation_statistics/state_transportation_statistics_2014/index.html/chapter7/table7-1. Accessed: April 2017.

California Air Resources Board. 2014. EMFAC2011 computer program, Version 1.0.7. Sacramento, CA. Available: https://www.arb.ca.gov/emfac/2014/. Accessed by Ascent Environmental March 12, 2017.

———. 2010. California completes its commitment to a national greenhouse gas standard for cars. Please Release 10-20. February 25, 2010. Available: https://www.arb.ca.gov/newsrel/2010/nr022510b.htm. Accessed: April 7, 2017.

California Energy Commission. 2014. California Energy Consumption Database. Available: ecdms.energy.ca.gov. Accessed: April 2017.

———.2016. Renewable Energy – Overview. Available: http://www.energy.ca.gov/renewables/tracking_progress/documents/renewable.pdf. Accessed: April 2017.

———.2017. California Average Weekly Retail Gasoline Prices. Available: http://www.energy.ca.gov/almanac/transportation_data/gasoline/retail_gasoline_prices2.html. Accessed: April 2017.

California Energy Commission and California Air Resources Board. 2003. Reducing California's Petroleum Dependence. P600-03-005F. Available: https://www.arb.ca.gov/fuels/carefinery/ab2076final.pdf. Accessed: April 2017.

Caltrans. 2009. 2008 California Motor Vehicle Stock, Travel and Fuel Forecast.

California State Board of Equalization. 2016. *Net Taxable Gasoline Gallons*. Available: http://www.boe.ca.gov/sptaxprog/reports/MVF_10_Year_Report.pdf. Accessed July 6, 2016.

EIA. *See* U.S. Energy Information Administration.

Federal Register. 2010. Vol. 75, No. 88, May 7, 2010.

US Department of Energy. 2016 (June). *Monthly Energy Review*. Available: http://www.eia.gov/totalenergy/data/monthly. Accessed: July 7, 2016.

U.S. Energy Information Administration. 2016. *Monthly Energy Review June 2016*. Available: https://www.eia.gov/totalenergy/data/annual/. Accessed July 6, 2016.

———. California Natural Gas Consumption by End Use. Available: https://www.eia.gov/dnav/ng/ng_cons_sum_dcu_sca_a.htm. Accessed: April 2017.

———. California Energy Highlight. 2014 EIA reports and publications. Available: https://www.eia.gov/state/state_one_pager/California.pdf. Accessed: April 2017.

2.5 Climate Change and Greenhouse Gases

ARB. *See* California Air Resources Board.

BAAQMD. *See* Bay Area Air Quality Management District.

Bay Area Air Quality Management District. 2012 (November). *Understanding Particulate Matter: Protecting Public Health in the San Francisco Bay Area*. Available: http://www.baaqmd.gov/~/media/Files/Planning%20and%20Research/Plans/PM%20Planning/UnderstandingPM_Draft_Aug%2023.ashx. Accessed: March 15, 2017.

———. 2017. Spare The Air. Cool The Climate. A Blueprint for Clean Air and Climate Protection in the Bay Area. Draft 2017 Clean Air Plan. January 10, 2017. Available: http://www.baaqmd.gov/~/media/files/planning-and-research/plans/2017-clean-air-plan/baaqmd_2017_cap_draft_122816-pdf.pdf?la=en. Accessed March 1, 2017.

BCDC. *See* San Francisco Bay Conservation and Development Commission.

Bell M.L., Dominici F., and Samet J.M. 2005. *A Meta-Analysis of Time-Series Studies of Ozone and Mortality with Comparison to the National Morbidity, Mortality, and Air Pollution Stud*y. Epidemiology 2005; 16:436-445.

Berdahl P. and S. Bretz. 1997. *Preliminary survey of the solar reflectance of cool roofing materials*. Energy and Buildings 25:149-158.California Air Resources Board.2014a (May). *First Update to the Climate Change Scoping Plan: Building on the Framework Pursuant to AB 32; The California Global Warming Solutions Act of 200*6. Sacramento, CA.

California Air Resources Board. 2014b. EMFAC2014 Volume I - User's Guide. V. 1.0.7. April 30, 2014. Available: https://www.arb.ca.gov/msei/downloads/emfac2014/emfac2014-vol1-users-guide-052015.pdf. Accessed January 11, 2017.

———. 2016 (June). California Greenhouse Gas Inventory Summary [2000-2014]. Available: http://www.arb.ca.gov/cc/inventory/data/data.htm. Accessed March 17, 2017. Last updated March 30, 2016.

———. 2017. The 2017 Climate Change Scoping Plan Update.

California Climate Action Team. 2013 (March). *State of California Sea-Level Rise Guidance Document*. Available: http://www.opc.ca.gov/webmaster/ftp/pdf/docs/2013_SLR_Guidance_Update_FINAL1.pdf.

California Energy Commission. 2012 (May). *Building Energy Efficiency Standards for Residential and Non Residential Building*s. Available: http://www.energy.ca.gov/2012publications/CEC-400-2012-004/CEC-400-2012-004-CMF-REV2.pdf. Accessed: March 15, 2017.

_____. 2013a (July*). Impact Analysis: California's 2013 Building Energy Efficiency Standard*s. Available: http://www.energy.ca.gov/2013publications/CEC-400-2013-008/CEC-400-2013-008.pdf. Accessed: March 15, 2017.

_____. 2013b. 2013 Integrated Energy Policy Report. CEC-100-2013-001-CMF. Posted February 20, 2014. Available: http://www.energy.ca.gov/2013_energypolicy/. Accessed March 1, 2017.

_____. 2015a. 2016 Building Energy Efficiency Standards. Adoption Hearing. Presented by Mazi Shirakh, Payan Bozorgchami, and Peter Strait on June 10, 2015. Available: http://www.energy.ca.gov/title24/2016standards/rulemaking/documents/2015-06-10_hearing/2015-06-10_Adoption_Hearing_Presentation.pdf. Accessed March 1, 2017.

_____. 2015b. 2016 Building Energy Efficiency Standards. Frequently Asked Questions. Available: http://www.energy.ca.gov/title24/2016standards/rulemaking/documents/2016_Building_Energy_Efficiency_Standards_FAQ.pdf. Accessed March 1, 2017.

California Natural Resources Agency. 2009. *2009 California Climate Adaptation Strategy: A Report to the Governor of the State of California in Response to Executive Order S-13-2008*. Available: http://resources.ca.gov/docs/climate/Statewide_Adaptation_Strategy.pdf. Accessed: March 15, 2017. California Public Utilities Commission. 2011 (January). CA Energy Efficiency Strategic Plan. January 2011 Update. Available: http://www.energy.ca.gov/ab758/documents/CAEnergyEfficiencyStrategicPlan_Jan2011.pdf. Accessed March 18, 2017.

County of Marin. 2015 (September). *Marin Ocean Coast Sea Level Rise Vulnerability Assessment*. Marin County, CA: Marin County Community Development Agency. Available: http://www.marincounty.org/~/media/files/departments/cd/planning/slr/vulnerability-assessment/part-01_draft_marin_coast_slr_va_v2.pdf?la=en. Accessed: March 15, 2017.

CEC. *See* California Energy Commission.

CNRA. *See* California Natural Resources Agency. CPUC. *See* California Public Utilities Commission.

EIA. *See* U.S. Energy Information Administration.

EPA. *See* U.S. Environmental Protection Agency.

Governor's Office of Planning and Research. 2016 (March). 2016 California Jurisdictions Addressing Climate Change. Available: https://www.opr.ca.gov/docs/2016_California_Jurisdictions_Addressing_Climate_Change_Summary.pdf. Accessed March 24, 2017.

Heberger, M., Cooley, H., Herrera, P., Gleick, P.H. and Moore, E. 2009 (May). *The Impacts of Sea Level Rise on the California Coast. A Paper From: California Climate Change Center*. CEC-500-2009-024-F. Available: http://pacinst.org/app/uploads/2014/04/sea-level-rise.pdf. Accessed: March 15, 2017.

IAMC. See Integrated Assessment Modeling Consortium.

IPCC. See Intergovernmental Panel on Climate Change. Intergovernmental Panel on Climate Change. 2014. Climate Change 2013: The Physical Science Basis. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change.

Integrated Assessment Modeling Consortium. 2009. *RCP Database (version 2.0)*. Available: http://tntcat.iiasa.ac.at:8787/RcpDb/dsd?Action=htmlpage&page=welcome#intro. Last updated 2009. Accessed: March 15, 2017.

Ito K, De Leon SF, Lippmann M. 2005. *Associations Between Ozone and Daily Mortality: analysis and meta-analysis*. Epidemiology 2005; 16:446-429.

Levy JI, Chermerynski SM, Sarnat JA. 2005. *Ozone Exposure and Mortality: an empiric Bayes metaregression analysis*. Epidemiology 2005; 16:458-468. Marin Energy Authority. 2012 (October). Revised Community Choice Aggregation Implementation Plan and Statement of Intent. Available: https://www.mcecleanenergy.org/wp-content/uploads/2016/06/Implementation_Plan_w-Resolution__JPA_10.4.12-Richmond-Revised_1.22.13.pdf. Accessed March 15, 2017.

Marin Clean Energy. 2015. FAQs. Available: https://www.mcecleanenergy.org/faq/. Last updated November 21, 2015. Accessed March 15, 2017.

MCE. *See* Marin Clean Energy.

MEA. *See* Marin Energy Authority.

National Oceanic and Atmospheric Administration. 2016*. Heat Safety*. Available: http://www.nws.noaa.gov/os/heat/. Accessed: March 15, 2017.

NHTSA. See National Highway Traffic Safety Administration.

NOAA. See National Oceanic and Atmospheric Administration.

National Highway Traffic Safety Administration. 2014. CAFE-Fuel Economy web page. Available: http://www.nhtsa.gov/fuel-economy. Accessed March 2015.

OPR. *See* Governor's Office of Planning and Research.

Pacific Gas and Electric Company. 2016 (February). *PG&E's Carbon Emissions Remain among Nation's Lowest*. Available http://www.pgecurrents.com/2016/02/05/pge%E2%80%99s-carbon-emissions-remain-among-nation%E2%80%99s-lowest/. Posted February 5, 2016. Accessed March 15, 2017.

_____. 2017. Learn what Community Choice Aggregation is. Available: https://www.pge.com/en_US/residential/customer-service/other-services/alternative-energy-providers/community-choice-aggregation/community-choice-aggregation.page. Accessed March 15, 2017.

Peninsula Clean Energy. 2017. Technical Study. Available: http://www.peninsulacleanenergy.com/resources/technical-study/. Accessed March 15, 2017.

PCE. *See* Peninsula Clean Energy.

PG&E. *See* Pacific Gas and Electric Company.

Raun L., and Ensor K. 2012 (October) *Association of Out-of-Hospital Cardiac Arrest with Exposure to Fine Particulate and Ozone Ambient Air Pollution from Case-Crossover Analysis Results: Are the Standards Protective*? James A. Baker III Institute for Public Policy of Rice University. SCP. *See* Sonoma Clean Power

San Francisco Bay Conservation and Development Commission. 2016a (May). *Sea Level Rise & Overtopping Analysis for San Mateo County's Bayshor*e. Available: http://seachangesmc.com/wp-content/uploads/2015/08/SanMateoCo_Bayshore_Final_Report_w_Appendices.20160523_web.pdf . Accessed: March 15, 2017.

_____. 2016b (February). *Adapting to Rising Tides Contra Costa County Shoreline Vulnerability Assessment.* Available: http://www.adaptingtorisingtides.org/wp-content/uploads/2015/04/Contra-Costa_ART_Final_Report_web_2016.03.08.pdf. Accessed: March 15, 2017.

_____. 2015 (May). *Adapting to Rising Tides Alameda County Shoreline Vulnerability Assessment.* Available: http://www.adaptingtorisingtides.org/wp-content/uploads/2015/09/ALA-Report_FINAL_2015.05.26sm_REPORT.pdf. Accessed: March 15, 2017.

San Francisco, City of. 2016 (March). *San Francisco Sea Level Rise Action Plan*. San Francisco, CA. Available: http://default.sfplanning.org/plans-and-programs/planning-for-the-city/sea-level-rise/160309_SLRAP_Final_ED.pdf. Accessed: March 15, 2017.

San Francisco Public Utilities Commission. 2015 (March). *Climate Stressors and Impacts: Bayside Sea Level Rise Map*. San Francisco, CA. Prepared by: Sewer System Improvement Program Program Management Consultant.

Silicon Valley Clean Energy. 2016 (July). Community Choice Aggregation Implementation Plan and Statement of Intent. Available: https://www.svcleanenergy.org/files/managed/Document/376/SVCEA%20CCA%20Implementation%20Plan%20071416%20%20NO%20Appendices.pdf. Accessed February 9, 2017.

Sonoma Clean Power. 2016. 2016 Annual Report. Available: http://sonomacleanpower.org/2015-16-annual-report/. Accessed March 15, 2017.

SVCE. See Silicon Valley Clean Energy.

U.S. Energy Information Administration. 2017. Annual Energy Outlook 2017. Table: Transportation Sector Key Indicators and Delivered Energy Consumption. Available: https://www.eia.gov/outlooks/aeo/data/browser/#/?id=7-AEO2017&region=0-0&cases=ref2017&start=2015&end=2050&f=A&linechart=~ref2017-d120816a.33-7-AEO2017~ref2017-d120816a.49-7-AEO2017&ctype=linechart&chartindexed=1&sid=ref2017-d120816a.49-7-AEO2017&sourcekey=0. Accessed March 16, 2017.

U.S. Environmental Protection Agency. 2009

U.S. Environmental Protection Agency. 2015 (October). eGRID2012 Summary Tables. Available: https://www.epa.gov/energy/emissions-generation-resource-integrated-database-egrid-questions-and-answers. Accessed March 15, 2017.

Union of Concerned Scientists. 2011 (June). *Climate Change and Your Health: Rising Temperatures, Worsening Ozone Pollution*. Available: http://www.ucsusa.org/sites/default/files/legacy/assets/documents/global_warming/climate-change-and-ozone-pollution.pdf. Accessed: March 15, 2017.

Wegesser, T.C., Pinkerton, K.E., and Last, J.A. 2009 (June). *California Wildfires of 2008: Coarse and Fine Particulate Matter Toxicity*. In *Environmental Health Perspectives* Volume 117, Number 6: 893-897.

2.6 Noise

3M. No date. 3M Hearing Solutions Catalog. St. Paul, Minnesota.

Alameda County. 2010 (December). Oakland International Airport. Airport Land Use Compatibility Plan. Prepared for Alameda County Community Development Agency. Prepared by ESA. Alameda County, CA.

California Department of Transportation. 2004 (June). *Transportation- and Construction-Induced Vibration Guidance Manual.* Prepared by: Jones & Stokes. Available: http://www.dot.ca.gov/hq/env/noise/pub/vibrationmanFINAL.pdf. Accessed: August 22, 2016.

_____. 2013 (September). *Technical Noise Supplement to the Traffic Noise Analysis Protocol.* Report No. CT-HWANP-RT-13-069.25.2. Available: http://www.dot.ca.gov/hq/env/noise/pub/TeNS_Sept_2013A.pdf. Accessed: August 22, 2016.

Caltrans. *See California Department of Transportation.*

City/County Association of Governments of San Mateo County (C/CAG). 2012. Comprehensive Airport Land Use Compatibility Plan for Environs of San Francisco International Airport. Prepared for City/County Association of Governments of San Mateo County. Prepared by Ricondo & Associates. Redwood City, California.

DOT. *See U.S. Department of Transportation.*

Egan, David M. 2007. *Architectural Acoustics.* J.Ross Publishing. New York: McGraw-Hill.

EPA. *See* U.S. Environmental Protection Agency.

Federal Highway Administration. 2006 (January). *Federal Highway Administration Roadway Construction Noise Model User's Guide*. Report No. FWHA-HEP-05-054; DOT-VNTSC-FHWA-05-01. Available: https://www.fhwa.dot.gov/environment/noise/construction_noise/rcnm/rcnm.pdf. Accessed: August 22, 2016.

_____2010 (June). Highway Traffic Noise: Analysis and Abatement Guidance. U.S. Department of Transportation. Federal Highway Administration.

Federal Interagency Committee on Noise (FICON). 1992. *Federal Agency Review of Selected Airport Noise Analysis Issues*, August 1992.

Federal Transit Administration. 2006 (May). *Transit Noise and Vibration Impact Assessment.* Report No. fta-va-90-1003-06. Available: https://www.transit.dot.gov/sites/fta.dot.gov/files/docs/FTA_Noise_and_Vibration_Manual.pdf. Accessed: August 22, 2016.

FHWA. *See Federal Highway Administration.*

FTA. *See Federal Transit Administration.*

National Institute for Occupational Safety and Health (NIOSH). 2016. Noise and Hearing Loss Prevention. Available: https://www.cdc.gov/niosh/topics/noise/noisemeter_html/default.html. Accessed: March 9, 2017.

Office of Planning and Research. 2003 (October). *State of California General Plan Guidelines.* Available: https://www.opr.ca.gov/docs/General_Plan_Guidelines_2003.pdf. Accessed: August 22, 2016.

OPR. *See Office of Planning and Research.*

Peninsula Joint Powers Board. 2014 (February). Draft Peninsula Corridor Eletrification Project Environmental Impact Report. Prepared for Peninsula Corrido Joint Powers Board. Prepared by ICF International. San Carlos, CA.

San Francisco. 2004. San Francisco General Plan Environmental Protection Element. Last amended December 2, 2004. Available: http://generalplan.sfplanning.org/I6_Environmental_Protection.htm. Accessed: March 9, 2017.

Santa Clara County. 2016. Comprehensive Land Use Plan. Norman Y. Mineta San Jose International Airport. Prepared by Walter B. Windus.

U.S. Department of Transportation. 1995 (June). *Highway Traffic Noise Analysis and Abatement Policy and Guidance.* Available: http://www.fhwa.dot.gov/environment/noise/regulations_and_guidance/polguide/polguid.pdf. Accessed: August 22, 2016.

U.S. Environmental Protection Agency. 1971 (December 31). *Noise from Construction Equipment and Operations, Building Equipment and Home Appliances*.

2.7 Geology and Seismicity

ABAG. *See* Association of Bay Area Governments.

Association of Bay Area Governments. 2010. *Multi-Jurisdictional Local Hazard Mitigation Plan for the San Francisco Bay Area*. Available: http://quake.abag.ca.gov/wp-content/documents/ThePlan-Chapters-Intro.pdf. Accessed August 17, 2016.

ABAG and USGS. *See* Association of Bay Area Governments and U.S. Geological Survey.

Association of Bay Area Governments and U.S. Geological Survey. 2013. Probabilistic Shaking Hazard Map. Sub-Regional Earthquake Hazards and Earthquake Mapping Update. USGS Award #G12AP20105. Association of Bay Area Governments, U.S. Geological Survey. Available: <http://resilience.abag.ca.gov/open-data/>

Alameda County. 2014. *Alameda County General Plan: Safety Element*. Adopted January 8, 2014. Amended February 4, 2014.

California Department of Water Resources. 2013. *California Water Plan, Update 2013*, Volume 2 – Regional Reports: San Francisco Bay Hydrologic Region.

California Geological Survey. 2002. *California Geomorphic Provinces*, CGS Note 36.

_____. 2008. *Guidelines for Evaluating and Mitigating Seismic Hazards*. CGS Special Publication 117A.

_____. 2015. GIS Revised Official Map of Alquist-Priolo Earthquake Fault Zones. Department of Conservation, California Geological Survey. Issued as required by the Alquist-Priolo Earthquake Fault Zoning Act (Public Resources Code Section 2621-2630).

CGS. *See* California Geological Survey.

Contra Costa County. 2005 (January). *Contra Costa County General Plan 2005-2020*: Safety Element.

MTC and ABAG. *See* Metropolitan Transportation Commission and Association of Bay Area Governments.

Metropolitan Transportation Commission and Association of Bay Area Governments. 2013 (April). *Plan Bay Area Draft Environmental Impact Report*.

U.S. Geological Survey. 1975. Map Showing Mineral Resources of the San Francisco Bay Region, California-Present Availability and Planning for the Future. Prepared by Edgar H. Bailey and Deborah R. Harden.

_____. 1997. *San Francisco Bay Region Landslide Folio Part E – Map of Debris-Flow Source Areas in the San Francisco Bay Region, California*: Open File Report 97-745 E. Available: http://pubs.usgs.gov/of/ 1997/ of97-745/ of97-745e.html. Accessed August 22, 2016.

_____. 2006. *Maps of Quaternary Deposits and Liquefaction Susceptibility in the Central San Francisco Bay Region, California*. Open-File Report 2006-1037. Version 1.1. U.S. Geological Survey in cooperation with the California Geological Survey.

_____. 2008. Working Group on California Earthquake Probabilities (WG02), Fact Sheet 2008-2037, Forecasting California's Earthquakes – What Can We Expect in the Next 30 Years?. http://pubs.usgs.gov/fs/2008/3027/fs2008-3027.pdf.

_____. 2016. *Soil Type and Shaking Hazard in the San Francisco Bay Area*, http://earthquake.usgs.gov/regional/nca/soiltype/. Accessed June 30, 2016.

USGS. *See* U.S. Geological Survey.

2.8 Water Resources

Alameda County Water District, Association of Bay Area Governments, Bay Area Water Supply and Conservation Agency, California Coastal Conservancy, California Department of Water Resources, Contra Costa County Flood Control and Water Conservation District, Contra Costa Water District, East Bay Municipal Utility District, Marin County Department of Public Works, Marin Municipal Water District, Napa County Resource and Conservation District, North Bay Watershed Association, San Francisco Estuary Partnership, San Francisco Public Utilities Commission, Santa Clara Valley Water District, Solano County Water Agency, Sonoma County Water Agency, Stop Waste.org, Zone 7 Water Agency. 2013 (September). *San Francisco Bay Area Integrated Regional Water Management Plan*. Prepared by Kennedy/Jenks Consultants, Environmental Science Associates, Kerns & West, and Zentraal.

Bay Area Stormwater Management Agencies Association. 1999. *Start at the Source: Design Guidance Manual for Stormwater Quality Protection*.

California Department of Water Resources. 2013. California Water Plan, Update 2013, Volume 2 – Regional Reports: San Francisco Bay Hydrologic Region. Page SFB-11.

California Department of Transportation. 2016 (July). Statewide Stormwater Management Plan, Prepared by California Department of Transportation, Division of Environmental Analysis. Sacramento, CA.

California Department of Transportation. 2005. *Local Assistance Procedures Manual*. Chapter 11 Design Standards. October 7, 2005.

California Stormwater Quality Association. 2003 (January). *California Stormwater Best Management Practice Handbook for New Development and Redevelopment.* Available at: https://www.casqa.org/resources/bmp-handbooks/new-development-redevelopment-bmp-handbook. Accessed July 6, 2016.

Caltrans. *See* California Department of Transportation.

DWR. *See* California Department of Water Resources.

MTC and ABAG. 2013. *Plan Bay Area Draft Environmental Impact Report*.

Regional Water Quality Control Board, San Francisco Region. 2016. Total Maximum Daily Loads (TMDLs) and the 303(d) List of Impaired Water Bodies. Available: http://www.waterboards.ca.gov/sanfranciscobay/water_issues/programs/TMDLs/. Accessed July 2016.

San Francisco, City and County of. 2011. *Emergency Response Plan, an Element of the CCSF Emergency Management Program: Tsunami Response Annex*.

San Francisco RWQCB. *See* Regional Water Quality Control Board, San Francisco Region.

U.S. Geological Survey. 2007 (December). San Francisco Bay Bathymetry. http://sfbay.wr.usgs.gov/sediment/sfbay/geostat.html. Accessed July 2016.

Western Regional Climate Center. 2016. Available: website, www.wrcc.dri.edu/coopmap/. Accessed July 2016.

2.9 Biological Resources

California Department of Fish and Wildlife. 2009. *Protocols for Surveying and Evaluating Impacts to Special Status Native Plant Populations and Natural Communities*, available online: http://www.dfg.ca.gov/biogeodata/cnddb/pdfs/protocols_for_surveying_and_evaluating_impa cts.pdf.

_____. 2010. *List of Terrestrial Natural Communities*, available online: http://www.dfg.ca.gov/biogeodata/vegcamp/natural_comm_list.asp.

_____. 2016. California Natural Diversity Database. Rarefind: A Database Application for the Use of the California Department of Fish and Game's Natural Diversity Database. California Natural Heritage Division, California Department of Fish and Wildlife. Sacramento, CA.

CDFW. *See* California Department of Fish and Wildlife.

County of San Mateo. 1982. San Bruno Mountain Habitat Conservation Plan. Volumes 1 and II. Prepared by Thomas Reid Associates.

County of Santa Clara, City of San Jose, City of Morgan Hill, City of Gilroy, Santa Clara Valley Water District, and Santa Clara Valley Transportation Authority. 2012. Final Santa Clara Valley Habitat Plan. Prepared by ICF International. San Francisco, CA. August. Available at: http://scv-habitatagency.org/178/Santa-Clara-Valley-Habitat-Plan.

EACCSSC. *See* East Alameda County Conservation Strategy Steering Committee.

East Alameda County Conservation Strategy Steering Committee. 2010. East Alameda County Conservation Strategy. Final Draft. Prepared by ICF International. San Jose, CA. October. Available at http://www.eastalco-conservation.org/.

East Contra Costa County Habitat Conservation Plan Association. 2006. Final East Contra Costa County Habitat Conservation Plan and Natural Community Conservation Plan. Prepared by Jones & Stokes. San Jose, CA. Available at: http://www.co.contra-costa.ca.us/depart/cd/water/hcp/

ECCC HCPA. *See* East Contra Costa County Habitat Conservation Plan Association.

Federal Register. 1999. Designated Critical Habitat for Central California Coast and Southern Oregon/Northern California Coasts Coho Salmon. Federal Register, Vol. 64, No. 86, May 5, 1999, p. 24049.

Holland, R.F. 1986. Preliminary Descriptions of the Terrestrial Natural Communities of California, Department of Fish and Game, Sacramento, CA.

Metropolitan Transportation Commission. 2016. GIS Data/Shapefiles for Transportation Projects. Available from Metropolitan Transportation Commission. San Francisco, CA.

MTC. *See* Metropolitan Transportation Commission.

National Wetlands Inventory. 2016. U.S. Fish and Wildlife Service National Wetlands Inventory – Wetlands Data. Available at: http://www.fws.gov/wetlands/Data/GoogleEarth.html.

NWI. *See* National Wetlands Inventory.

Sawyer, J.O., T. Keeler-Wolf, and J.M. Evens. 2009. *A Manual of California Vegetation*. Second edition. California Native Plant Society. Sacramento, California. Available at: http://vegetation.cnps.org/.

Spencer, W.D., P. Beier, K. Penrod, K. Winters, C. Paulman, H. Rustigian-Romsos, J. Strittholt, M. Parisi, and A. Pettler. 2010. C*alifornia Essential Habitat Connectivity Project: A Strategy for Conserving a Connected California*. Prepared for California Department of Transportation, California Department of Fish and Game, and Federal Highways Administration.

U.S. Fish and Wildlife Service. 1983 (October). *The Ecology of San Francisco Bay Tidal Marshes: A Community Profile*. FWS/OBS-83/23.

_____. 1994. *The Ecology of Eelgrass Meadows in the Pacific Northwest: A Community Profile*. FWS/OBS-84/24, 85 pp.

_____. 1998. *Recovery Plan for the California Freshwater Shrimp (*Syncaris pacifica*)*. Portland, Oregon, 94 pp.

_____. 2005. *Santa Rosa Plain Conservation Strategy. Final*. December. Available at: https://www.fws.gov/sacramento/es/recovery-planning/Santa-Rosa/es_recovery_santa-rosa-strategy.htm.

_____. 2016. Critical Habitat Data and Maps. Environmental Conservation System Online. Available at: https://ecos.fws.gov/ecp/report/table/critical-habitat.html.

USFWS. *See* U.S. Fish and Wildlife Service.

2.10 Visual Resources

California Office of Planning and Research. 2003. State of California General Plan Guidelines. Available: https://www.opr.ca.gov/docs/General_Plan_Guidelines_2003.pdf. Accessed: February 2017.

Caltrans. 2016. California State Scenic Highway System Officially Designated and Eligible Routes in the Bay Area. Available: http://www.dot.ca.gov/hq/LandArch/16_livability/scenic_highways/accessed June 2016.

Department of Conservation. 2016. Farmland Mapping and Monitoring Program, Department of Conservation (2012-2014).

2.11 Cultural Resources

Alameda County, Community Development Agency. 2013. *Safety Element of the Alameda County General Plan*. Adopted January 8, 2013 Amended February 4, 2014

_____. 2016. *Community Development Agency – Historic Preservation*. Available: https://www.acgov.org/cda/planning/generalplans/ historic_preservation.htm. Accessed February 2, 2017.

Cerny, Susan Dinkelspiel. 2007. *An Architectural Guidebook to San Francisco and the Bay Area*. Gibbs Smith, Salt Lake City.

Contra Costa County. 2005. *General Plan 2005-2020*. Safety Element.

_____. 2009. *Bayview Residential Project Draft EIR*. Prepared by ESA. Page 4.D-3

Department of Conservation. 2015. Urban and Built Up Land, Farmland Mapping and Monitoring Program, Department of Conservation (2012-2014). Available: http://www.conservation.ca.gov/dlrp/fmmp/Pages/county_info.aspx. Accessed March 2017.

DOC. *See* Department of Conservation.

EDAW, Inc. 2004. *San Mateo Corridor Plan and Bay Meadows Specific Plan Amendment EIR*.

EIP Associates. 1993 (July). Rainier Avenue Cross Town Connector and U.S. 101 Interchange Project DEIR, prepared for the City of Petaluma.

Marin County. 2007. *Marin Countywide Plan Update Draft Environmental Impact Report*. Prepared by Nichols Berman Environmental Planning.

_____. 2011 (January). *Sir Francis Drake Roadway Rehabilitation Project EIR*. Prepared by LSA Associates, Inc.

Midpeninsula Regional Open Space District. 2014 (September). *Integrated Pest Management Program*. Los Altos, CA.

MTC and ABAG. *See* Metropolitan Transportation Commission and Association of Bay Area Governments.

Metropolitan Transportation Commission and Association of Bay Area Governments. 2013 (April). *Plan Bay Area Draft Environmental Impact Report*.

Napa County. 2007 (February). *Draft Environmental Impact Report for the Napa County General Plan Update*. Prepared by PMC.

Natural Investigations Company. 2016. *Cultural and Paleontological Resources Inventory for the Palmaz Private Helipad and Hangar Project, Napa County, California*. Prepared for Ascent Environmental.

Pacific Legacy, Inc. 2016. *Cultural Resources Analysis for the Midpeninsula Regional Open Space District Bear Creek Redwoods Preserve Plan Environmental Impact Report*.

San Francisco Estuary Partnership. 2016. Land Use and Population Fact Sheet. Available: http://www.sfestuary.org/about-the-estuary/documents-reports/. Accessed August 19, 2016.

San Francisco Planning Department. 2009. *Draft Preservation Element of the San Francisco General Plan*. Available http://default.sfplanning.org/Preservation/Element/PE_2009_Draft_Preservation_Element.pdf. Accessed February 2, 2017.

Santa Clara County. 1994. *Santa Clara County General Plan, Draft EIR. San Jose,* CA.

Solano County. 2008. *Draft Environmental Impact Report for the Solano County 2008 Draft General Plan*. Prepared by EDAW/AECOM.

Sonoma County. 2006. *Sonoma County GP 2020 Draft EIR*. Prepared by Nichols Berman.

_____. 2008. Sutter Medical Center of Santa Rosa/ Luther Burbank Memorial Foundation Joint Master Plan Draft EIR. Prepared by URS.

_____. 2010 (December). *Russian River Estuary Management Project Draft EIR*. Prepared by ESA.

U.S. Dept. of Interior, Minerals Management Service, Pacific OCS Region. 1990 (November). *California, Oregon, and Washington Archaeological Resource Study*.

UCMP. *See* University of the California Museum of Paleontology.

University of the California Museum of Paleontology. 2016. Localities Search. Available: http://ucmpdb.berkeley.edu/loc.html. Accessed February 22, 2016.

U.S. Geological Survey. 2016a. Mineral Resources On-Line Spatial Data. Geologic units in San Francisco, California. Available: https://mrdata.usgs.gov/geology/state/fips-unit.php?code=f06075. Accessed February 2, 2017.

_____. 2016b. Mineral Resources On-Line Spatial Data. Geologic units in San Mateo County, California Available: https://mrdata.usgs.gov/geology/state/fips-unit.php?code=f06081. Accessed February 2, 2017.

U.S. Geological Survey, Geologic Names Committee. 2010. Divisions of Geologic Time—Major Chronostratigraphic and Geochronologic Units: U.S. Geological Survey Fact Sheet 2010–3059. Electronic document, http://pubs.usgs.gov/fs/2010/3059/pdf/FS10-3059.pdf.

USGS. *See* U.S. Geological Survey.

2.12 Public Utilities and Facilities

ABAG. *See* Association of Bay Area Governments.

ACWD. *See* Alameda County Water District.

Alameda County Water District. 2015. *Urban Water Management Plan 2015-2020.* Available: http://www.water.ca.gov/urbanwatermanagement/2010uwmps/Alameda%20County%20Water%20District/Alameda%20County%20WD%202010%20UWMP.pdf. Accessed: March 15, 2017.

Association of Bay Area Governments. 2010. *Multi-Jurisdictional Local Hazard Mitigation Plan: Appendix C Natural Hazard Risk Assessment.*

_____. 2015. *Association of Bay Area Governments Resilience Program: Drought.* Available: http://resilience.abag.ca.gov/drought/. Accessed: March 15, 2017.

BARDP. *See* Bay Area Regional Desalination Project.

Bay Area Regional Desalination Project. 2016. *Bay Area Regional Desalination Project Homepage.* Available: http://www.regionaldesal.com/. Accessed: March 15, 2017.

California Department of Finance. 2014. *State and County Population Projections July 1, 2010-2060 (5-year Increments).*

California Department of Water Resources. 2003. *California's Groundwater Bulletin 118-Update 2003.* Available: http://www.water.ca.gov/pubs/groundwater/bulletin_118/california's_groundwater__bulletin_118_-_update_2003_/bulletin118_entire.pdf. Accessed: March 15, 2017.

_____. 2013. *California Water Plan Update 2013: Investigating in Innovation and Infrastructure for the San Francisco Bay Hydrologic Region.* Available: http://www.water.ca.gov/waterplan/docs/cwpu2013/Final/Vol2_SanFranciscoBayRR.pdf. Accessed: March 15, 2017.

_____. 2017 (February). Current Reservoir Conditions, Ending At Midnight – February 13, 2017.

California Department of Resources Recycling and Recovery. 2017. *Solid Waste Information System Facility/Site Listing.* Available: http://www.calrecycle.ca.gov/SWFacilities/Directory/SearchList/List?FAC=Disposal&OPSTATUS=Active&REGSTATUS=Permitted. Accessed: March 15, 2017.

CalRecycle. *See* California Department of Resources Recycling and Recovery.

CCWD. *See* Contra Costa Water District.

Contra Costa Water District. 2016 (May). *2015 Urban Water Management Plan for the Contra Costa Water District.* Available: http://www.ccwater.com/DocumentCenter/Home/View/2216. Accessed: March 15, 2017.

DOF. *See* California Department of Finance.

DWR. *See* California Department of Water Resources.

East Bay Municipal Utility District. 2016. *2015 Urban Water Management Plan.* Available: http://www.ebmud.com/water-and-drought/about-your-water/water-supply/urban-water-management-plan/. Accessed: March 15, 2017.

EBMUD. *See* East Bay Municipal Utility District.

Marin Municipal Water District. 2016 (April). *Final Urban Water Management Plan 2015 Update.* Available: http://marinwater.org/DocumentCenter/View/3828. Accessed: March 15, 2017.

MMWD. *See* Marin Municipal Water District.

Napa, City of. 2011 (June 21). *City of Napa Urban Water Management Plan 2010 Update.* Available: http://www.cityofnapa.org/images/publicworks/Water/UWMP/uwmp%202010%20-%20final.pdf. Accessed: March 15, 2017.

RMC. 2006. Bay Area Integrated Regional Water Management Plan. Available: http://bairwmp.org/docs/2013-bairwm-plan-update/2013-final-plan/San%20Francisco%20Bay%20Area%20IRWMP%20Final_September%202013.pdf. Accessed: March 15, 2017.

San Francisco Public Utilities Commission. 2016 (June). *2015 Urban Water Management Plan for the City and County of San Francisco*. Available: http://www.sfwater.org/modules/showdocument.aspx?documentid=9300. Accessed: March 15, 2017.

Santa Clara Valley Water District. 2016 (May). *2015 Urban Water Management Plan.* Available: http://www.valleywater.org/uploadedFiles/Services/CleanReliableWater/WaterSupplyPlanning/Urban_Water_Managment_Plan/SCVWD%202015%20UWMP-Report%20Only.pdf. Accessed: March 15, 2017.

SCVWD. *See* Santa Clara Valley Water District.

SCWA. *See* Solano County Water Agency.

SMCWA. *See* Sonoma County Water Agency.

Solano County Water Agency. 2010. *2010 Solano County Water Agency Urban Water Management Plan-Final Draft.* Available: http://www.water.ca.gov/urbanwatermanagement/2010uwmps/Solano%20County%20Water%20Agency/2010%2520UWMP%2520final%2520draft.pdf. Accessed: March 15, 2017.

Sonoma County Water Agency. 2016 (June). *Final 2015 Urban Water Management Plan.* Available: http://www.scwa.ca.gov/files/docs/water-resources/Sonoma%20CWA%202015%20UWMP_FINAL.PDF. Accessed: March 15, 2017.

State Water Resources Control Board. 2017 (February). *Fact Sheet: Prohibition, Monthly Reporting, and Stress Tests Continue with Extended Water Conservation Regulations*.

SWRCB. *See* State Water Resources Control Board.

U.S. Census. 2015. *Demographics for Santa Clara County.* Available: https://www.census.gov/quickfacts/table/PST045215/06085. Accessed: March 15, 2017

Zone 7 Water Agency. 2016 (February). *2015 Urban Water Management Plan.* Available: http://zone7water.com/images/pdf_docs/water_supply/2-4-16_draft-uwmp-w-appdcs.pdf. Accessed: March 15, 2017.

2.13 Hazards

Association of American Railroads. 2015. Crude Oil by Rail. Available: https://www.aar.org/todays-railroads/what-we-haul/crude-oil-by-rail. Accessed March 2015.

California Environmental Protection Agency. 2016. California Environmental Reporting System. Unified Program Regulator Directory. Available: http://cersapps.calepa.ca.gov/Public/Directory/. Accessed July 2016.

California Department of Transportation. 2015. Airport Compatible Land Use in California: Airport Land Use Commission Contact List and 2015 Airport Land Use Compatibility Plan Status. Available: http://dot.ca.gov/hq/planning/aeronaut/documents/alucp/. Accessed February 2017.

Cal/EPA. *See* California Environmental Protection Agency.

CAL FIRE. *See* California Department of Forestry and Fire Protection.

California Department of Forestry and Fire Protection. 2007. Fire Hazard Severity Zones. GIS layer. Available: http://www.fire.ca.gov/fire_prevention/fire_prevention_wildland_statewide.

California Department of Forestry and Fire Protection. 2016. *California Fire Hazard Severity Zone Map Update Project*. Available: http://www.fire.ca.gov/fire_prevention/fire_prevention_wildland_zones_ maps. Accessed July 2016.

Caltrans. *See* California Department of Transportation.

DTSC. *See* California Department of Toxic Substances Control.

FAA. 2017. Airport Data and Contact Information. Available: http://www.faa.gov/airports/airport_safety/airportdata_5010/menu/. Updated March 2017. Accessed March 2017.

Federal Railroad Administration. 2015. Railroad Safety. Available: https://www.fra.dot.gov/Page/P0010. Accessed: March 2015.

Krevor, SC, Graves, CR, Van Gosen, BS, and McCafferty, AE. 2009. Mapping the mineral resource base for mineral carbon-dioxide sequestration in the conterminous United States: U.S. Geological Survey Digital Data Series 414. Available: http://pubs.usgs.gov/ds/414/

Marin County. 2007. *Marin Countywide Plan: Natural Systems and Agriculture Element*. Prepared by the Marin County Community Development Agency. Adopted November 6, 2007. Last Amended September 24, 2013.

OEHHA and Cal/EPA. *See* Office of Environmental Health Hazard Assessment and California Environmental Protection Agency.

Office of Environmental Health Hazard Assessment and California Environmental Protection Agency. 2005. *Human-Exposure-Based Screening Numbers Developed to Aid Estimation of Cleanup Costs for Contaminated Soil*. Prepared November 2004, Revised January 2005.

Solano County. 2017. Solano County Airport Land Use Commission Documents. Available: https://www.solanocounty.com/depts/rm/boardscommissions/solano_county_airport_land_use_commission/documents.asp. Accessed February 2017.

San Mateo County. 1986. General Plan Policies: Natural Hazard Policies. Pages 15.7P through 15.9P. Adopted November 1986. Available: http://planning.smcgov.org/documents/general-plan-policies. Accessed January 5, 2017.

Santa Clara County. 2017. Airport Land Use Commission. Available: https://www.sccgov.org/sites/dpd/Commissions/ALUC/Pages/ALUC.aspx. Accessed: February 2017.

U.S. Department of Transportation. 2014 (May). Docket No. DOT-OST-2014-0067. Emergency Restriction/Prohibition Order.

U.S. Geological Survey. 2011. *Reported Historic Asbestos Mines, Historic Asbestos Prospects, and Other Natural Occurrences of Asbestos in California*, Open File Report 2011-1188.

2.14 Public Services and Recreation

Bay Area Open Space Council. 2014. *Bay Area Protected Areas Database.* Available: http://openspacecouncil.org/programs/protect/. Accessed: August 22, 2016.

CAL FIRE. *See* California Department of Forestry and Fire Prevention.

California Department of Education. 2015a (October). *Roles and Responsibilities.* Available: http://www.cde.ca.gov/eo/mn/rr/. Accessed: March 16, 2017.

_____. 2015b (October). *Belief and Purpose*. Available: http://www.cde.ca.gov/eo/mn/mv/. Accessed: March 16, 2017.

California Department of Finance. 2016. *State/County Population Estimates with Annual Percent Change (January 1, 2015 and 2016)*.

California Department of Forestry and Fire Protection. 2007. *State of California Fire Hazard Severity Zones in State Responsibility Areas.* Available: http://frap.fire.ca.gov/webdata/maps/statewide/fhszs_map.pdf. Accessed: August 22, 2016.

California Highway Patrol. 2017. *California Highway Patrol Mission Statement and Organizational Goals.* Available: https://www.chp.ca.gov/home/about-us. Accessed: March 16, 2017.

California State Library. 2017. *Public Library Fund.* Available: http://www.library.ca.gov/services/libraries/plf.html. Accessed: March 3, 2017.

CDE. *See* California Department of Education.

Education Data Partnership. 2017. *Fiscal, Demographic, and Performance Data on California's K-12 Schools: County Summaries.* Available: http://www.ed-data.org/county/. Accessed March 16, 2017.

Federal Emergency Management Agency. 2016. Protecting Our Communities. Available: http://www.fema.gov/protecting-our-communities. Accessed: March 16, 2017.

Office of Planning and Research. 2003. *State of California General Plan Guidelines.* Available: http://opr.ca.gov/docs/General_Plan_Guidelines_2003.pdf. Accessed: August 22, 2016.

OES. *See* Office of Emergency Services.

California Office of Emergency Services. 2017. Cal OES Internet Home for Governments & Tribal. Available: http://www.caloes.ca.gov/for-governments-tribal. Accessed: March 16, 2017.

3.1 Alternatives

None

3.2 CEQA Required Conclusions

Lake County. 2008. Lake County General Plan. Available: http://www.co.lake.ca.us/Assets/CDD/2008+General+Plan+Final+Version/2008+General+Plan+Docs/Cover+and+Table+of+Contents.pdfAccessed: April 2017.

Mendocino County. 2009. Mendocino County General Plan. Chapter 1: Introduction. Available: http://www.co.mendocino.ca.us/planning/pdf/fGPU_01_Introduction.pdf. Accessed: April 2017.

Merced County. 2011. Merced County General Plan. Part 1: General Plan Overview. Available: https://www.co.merced.ca.us/pdfs/planning/generalplan/2030sections/mcgpu_2030gp_part_i_gp_overview_pcrd_2011_06_14.pdfAccessed: April 2017.

Sacramento County. 2016. Sacramento County General Plan Available: http://www.per.saccounty.net/PlansandProjectsIn-Progress/Documents/General%20Plan%202030/2030%20General%20Plan%20Adopted%2011.9.11_sm.pdf. Accessed: April 2017.

San Benito County. 2015. San Benito County General Plan. Available: http://cosb.us/wp-content/uploads/Adopted-2035-GPU.pdf. Accessed: April 2017.

San Joaquin County. 2010. San Joaquin County General Plan. Volume 1. Available: https://www.sjgov.org/commdev/cgi-bin/cdyn.exe/handouts-planning_GP-V1-I?grp=handouts-planning&obj=GP-V1-IAccessed: April 2017.

Santa Cruz County. 1994. Santa Cruz County General Plan.. Chapter 1: introduction Available: http://www.sccoplanning.com/Portals/2/County/userfiles/106/GP%20Chapter%201.pdf. Accessed: April 2017.

Stanislaus County. 2015 Stanislaus County General Plan. Introduction. Available: http://www.stancounty.com/planning/pl/gp/current/gp-introduction.pdf. Accessed: April 2017.

County of Yolo. Yolo County General Plan. 2009. Chapter 1: Introduction and Administration. Available: http://www.yolocounty.org/home/showdocument?id=14470. Accessed: April 2017.

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