3.4 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 nonattainment area under the national and State standards; and (2) fine particulate matter ($PM_{2.5}$) emissions, for which the Bay Area is currently designated as nonattainment 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 $PM_{2.5}$. This EIR examines these pollutants 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.

The related issues of greenhouse gas (GHG) emissions and potential climate change effects are addressed separately in Section 3.6, "Climate Change, Greenhouse Gases, and Energy," of this EIR.

Comments received in response to the Notice of Preparation (NOP) expressed concerns about $PM_{2.5}$ and cancer risk resulting from TACs; how the Plan's proposed growth will exacerbate the toxic effects of major oil refineries in the region and subsequent health effects; and a desire to include ambitious goals for reduction in mobile source emissions.

The CEQA Guidelines note that comments received during the NOP scoping process can be helpful in "identifying the range of actions, alternatives, mitigation measures, and significant effects to be analyzed in depth in an EIR and in eliminating from detailed study issues found not to be important." (CEQA Guidelines Section 15083.) Neither the CEQA Guidelines nor the statutes require a lead agency to respond directly to comments received in response to the NOP, but they do require that they be considered. Consistent with these requirements, the comments received in response to the NOP have been carefully reviewed and considered by MTC and ABAG in the preparation of the impact analysis in this section. Appendix B includes all NOP comments received.

3.4.1 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. Particulate matter (PM) pollution is anticipated to increase because of climate change, which can lead to worsening asthma symptoms, chronic obstructive pulmonary disease, and respiratory infections associated to premature mortality. Increasing temperatures related to climate change are also anticipated to lead to an increase in wildfires across California. Wildfires are a significant source of smoke and PM exposure. PM can also be carried over long distances by wind and then settle on ground or water. Depending on chemical composition, the effects of PM settling may include; making lakes and streams acidic, changing the nutrient balance in coastal waters and large river basins, depleting the nutrients in soil, damaging sensitive forests and farm crops and affecting the diversity of ecosystems, contributing to acid rain effects (EPA 2021).

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 Ranges 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 semipermanent 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 onshore 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 onshore 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, 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 PM 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: ground-level ozone, carbon monoxide, nitrogen dioxide (NO_2), sulfur dioxide (SO_2), PM, and lead. 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 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 3.4-1 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 coarse PM (PM_{10}) standards. Based on the nonattainment status of these pollutants, this analysis is focused on ground-level ozone precursor emissions and PM emissions.

Table 3.4-2 presents a 10-year Bay Area air quality summary for days over the national and California standards for ozone, carbon monoxide, and PM. Each of these criteria pollutants is discussed in more detail in the following pages.

Table 3.4-1: Bay Area Ambient Air Quality Standards and Attainment Status as of 2020

Pollutant	Averaging Time	California Standard[1,3]	Attainment Status for California Standard[1]	Federal Primary Standard[2,3]	Attainment Status for Federal Standard	Major Pollutant Sources
Ozone	8 hour	0.070 ppm	Nonattainment[4]	0.070 ppm	Nonattainment[5]	Motor vehicles, other mobile sources, combustion, industrial, and commercial processes
	1 hour	0.09 ppm	Nonattainment	---	---[6]	
Carbon Monoxide (CO)	8 hour	9.0 ppm	Attainment	9 ppm	Attainment[7]	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[8]	---[8]	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	---[9]	Fossil fuel combustion at power plants and other industrial facilities, and burning of high sulfur–containing fuels by locomotives, large ships, and nonroad equipment
	1 Hour	0.25 ppm	Attainment	0.075 ppm	---[9]	
	Annual Arithmetic Mean	---	---	0.030 ppm	---[9]	
Particulate Matter (PM_{10})	24 Hour	50 µg/m^3	Nonattainment	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	Nonattainment[10]	---	---	
Particulate Matter – Fine ($PM_{2.5}$)	24 Hour	---	---	35 µg/m^3[11]	Nonattainment	
	Annual Arithmetic Mean	12 µg/m^3	Nonattainment[10,12]	12 µg/m^3[11]	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)	---[14]	---	No National Standards		Same as particulate matter sources

Pollutant	Averaging Time	California Standard[1,3]	Attainment Status for California Standard[1]	Federal Primary Standard[2,3]	Attainment Status for Federal Standard	Major Pollutant 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[15]	24 hour	0.010 ppm	No information available			Plastics manufacturing, landfills, wastewater treatment plants, and hazardous waste sites

Notes: ppb = parts per billion; ppm = parts per million; 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 the California Air Resource Board (CARB) determines would occur less than once per year on the average. The Lake Tahoe carbon monoxide 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 and 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 3-year period, the average number of days per year with maximum hourly concentrations above the standard is equal to or less than 1. The 8-hour ozone standard is attained when the 3-year average of the fourth-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 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 the U.S. Environmental Protection Agency (EPA) at levels determined to be protective of public health with an adequate margin of safety.

[4] The 8-hour California ozone standard was approved by CARB on April 28, 2005, and became effective on May 17, 2006.

[5] 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 3 years, is equal to or less than 0.070 ppm. Nonattainment areas will have until late 2037 to meet the health standard, with attainment dates varying based on the ozone level in the area.

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

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

[8] 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 0.100 ppm.

[9] The current primary standard is set at a level of 75 ppb, as the 99th percentile of daily maximum 1-hour SO_2 concentrations, averaged over 3 years.

[10] In June 2002, CARB established new annual standards for $PM_{2.5}$ and PM_{10}.

[11] In December 2012, EPA strengthened the annual $PM_{2.5}$ NAAQS from 15.0 to 12.0 µg/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 was April 15, 2015.

[12] On January 9, 2013, EPA issued a final rule to determine that the Bay Area attains the 24-hour $PM_{2.5}$ national standard. This EPA rule suspends key State Implementation Plan requirements as long as monitoring data continue to show that the Bay Area attains the standard. Despite this EPA action, the Bay Area will continue to be designated as nonattainment for the national 24-hour $PM_{2.5}$ standard until such time as the Bay Area Air Quality Management District submits a "redesignation request" and a "maintenance plan" to EPA, and EPA approves the proposed redesignation.

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

[14] 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.

[15] CARB 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.

Source: BAAQMD 2017a

Table 3.4-2: Ten-Year Bay Area Air Quality Summary (2010–2019)

Days Over Standard for Ozone, Carbon Monoxide, and Particulate Matter												
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
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	0	0	0
2016	6	15	15	0	0	0	0	0	0	0	0	0
2017	6	6	6	0	0	0	0	6	18	1	0	0
2018	2	3	3	0	0	0	1	6	18	0	0	0
2019	6	9	9	0	0	0	0	5	1	0	0	0

Notes: Nat = national; Cal = California.

[1] In October 2015, the U.S. Environmental Protection Agency implemented a new 8-hour ozone standard of 70 parts per billion. Exceedances are based on this standard. (Note that national and State numbers can differ because of data-handling conventions.)

[2] U.S. EPA tightened the national 24-hour PM 2.5 standard from 65 to 35 µg/m3 in 2006. On January 9, 2013, U.S. EPA issued a final rule to determine that the San Francisco Bay Area region attains the 24-hour PM 2.5 national standard. This U.S. EPA rule suspends key SIP requirements as long as monitoring data continues to show that the Air District attains the standard. Despite this U.S. EPA action, the Air District will continue to be designated as non-attainment for the national 24-hour PM2.5 standard until the Air District submits a redesignation request and a maintenance plan to U.S. EPA, and U.S. EPA approves the proposed redesignation.

Source: BAAQMD 2020

Ozone

Ozone is a reactive pollutant that 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 (NOX). ROG and NOX 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 NOX that contribute to the formation of ozone. Ozone is a regional air pollutant because it is formed downwind of sources of ROG and NOX 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 preexisting 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 3.4-3 and 3.4-4 show exceedances of the State 1-hour ozone standard and national 8-hour ozone standard, respectively. The number of days the region experiences unhealthy ozone levels has fallen overall from 2002 to 2019. This improvement is because of the California Air Resources Board (CARB) regulations affecting motor vehicle emissions and Bay Area Air Quality Management District (BAAQMD) regulations to reduce emissions from industrial and commercial sources.

Table 3.4-3: Days Exceeding the California 1-Hour Ozone Standard (2002–2019)

Stations by Sub-Region	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Northern																		
Napa/Napa Valley College	1	2	0	0	1	0	1	1	1	0	0	0	0	0	0	1	0	1
San Rafael	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Santa Rosa/Sebastopol	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Vallejo	1	2	1	0	0	0	1	2	0	0	0	0	0	0	1	1	0	0
Central																		
Hayward	0	3	0	0	2	0	1	4	--	0	0	0	1	2	0	2	0	2
Oakland	0	0	0	0	--	--	0	0	1	0	0	0	0	0	0	2	0	1
Oakland-West	--	--	--	--	--	--	--	--	--	0	0	0	0	0	0	0	0	1
Redwood City	0	1	1	0	0	0	0	0	2	0	0	0	0	0	0	2	0	0
San Francisco	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
San Leandro	1	2	1	1	0	0	0	--	--	--	--	--	--	--	--	--	--	--
Richmond/San Pablo	0	0	1	0	0	0	0	0	1	0	0	0	0	0	--	3	0	1
Eastern																		
Bethel Island	5	0	1	0	9	0	4	2	3	0	1	0	0	0	0	0	0	0
Concord	5	5	1	1	8	1	3	2	2	2	0	0	1	0	1	0	0	0
Fairfield	4	0	1	0	3	0	2	2	1	0	0	0	0	0	0	0	0	0
Livermore	10	10	5	6	13	2	5	8	3	3	2	3	0	1	2	5	2	4
Pittsburg	4	0	0	0	3	1	1	--	--	--	--	--	--	--	--	--	--	--
San Ramon	--	--	--	--	--	--	--	--	--	--	1	0	0	1	1	0	0	1
Southern																		
Fremont	3	4	0	1	4	0	1	4	1	--	--	--	--	--	--	--	--	--
Cupertino	--	--	--	--	--	--	--	--	--	0	0	0	--	--	--	--	--	--
Los Gatos	4	7	0	3	7	0	2	3	2	0	0	0	0	1	0	0	0	0
Mountain View/Sunnyvale	0	4	1	1	3	0	0	--	--	--	--	--	--	--	--	--	--	--
San Jose Central	--	4	0	1	5	0	1	0	5	--	--	--	--	--	--	--	--	--
San Jose East	0	2	0	1	--	--	--	--	--	--	--	--	--	--	--	--	--	--
San Jose	--	--	--	--	--	--	--	--	--	1	1	0	0	0	0	3	0	1
Gilroy	6	6	0	0	4	0	1	1	0	0	0	0	0	1	0	1	1	0
San Martin	8	9	0	2	7	1	2	4	2	0	0	0	1	1	1	1	0	0

Note: -- = no data available.

Source: BAAQMD 2020

Table 3.4-4: Days Exceeding the National 8-Hour Ozone Standard (2002-2019)

Stations by Sub-Region	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Northern																		
Napa/Napa Valley College	0	0	0	0	0	0	2	1	2	0	0	1	0	0	0	2	0	2
San Rafael	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Santa Rosa/Sebastopol	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
Vallejo	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	2	0	1
Central																		
Hayward	0	1	0	--	0	0	1	3	--	0	0	0	0	0	0	3	0	2
Oakland	0	0	0	0	--	--	0	0	0	0	0	0	0	0	0	2	0	2
Oakland-West	--	--	--	--	--	--	--	--	--	0	0	0	0	0	0	0	0	1
Redwood City	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	2	0	2
San Francisco	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
San Leandro	0	0	0	0	0	0	--	--	--	--	--	--	--	--	--	--	--	--
Richmond/San Pablo	0	0	0	0	0	0	0	--	1	0	0	0	0	0	0	2	0	2
Eastern																		
Bethel Island	3	0	0	0	1	0	4	3	4	2	2	0	0	2	2	1	1	1
Concord	3	1	0	0	4	0	6	2	1	2	2	0	2	2	2	0	0	2
Fairfield	0	0	0	0	1	0	1	2	2	1	1	0	0	1	0	0	0	0
Livermore	6	3	0	1	5	1	6	6	3	2	3	1	4	2	4	6	3	7
Patterson Pass	--	--	--	--	--	--	--	--	--	--	--	--	--	--	15	--	--	--
Pittsburg	2	0	0	0	1	0	1	--	--	--	--	--	--	--	--	--	--	--
San Ramon	--	--	--	--	--	--	--	--	--	--	3	0	3	--	1	2	2	1
Southern																		
Fremont	0	1	0	0	0	0	1	0	1	--	--	--	--	--	--	--	--	--
Cupertino	--	--	--	--	--	--	--	--	--	0	0	1	--	--	--	--	--	--
Los Gatos	2	2	0	1	4	0	2	4	2	0	0	0	1	4	0	3	0	2
Mountain View/Sunnyvale	0	2	0	0	0	0	1	--	--	--	--	--	--	--	--	--	--	--
San Jose Central	--	0	0	0	1	0	2	0	3	--	--	--	--	--	--	--	--	--
San Jose East	0	0	0	0	--	--	--	--	--	--	--	--	--	--	--	--	--	--
San Jose	--	--	--	--	--	--	--	--	--	0	0	1	0	2	0	4	0	2
Gilroy	2	2	0	0	2	0	1	2	5	0	0	0	0	3	0	1	0	0
San Martin	5	4	0	0	5	0	2	5	5	0	1	1	3	4	1	3	1	2

Notes: These values reflect exceedances based on ozone standards at the time.

-- = no data available.

Source: BAAQMD 2020

Carbon Monoxide

Carbon monoxide is an odorless and invisible gas. It is a nonreactive 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 carbon monoxide comes from on-road motor vehicles, although a large amount also comes from burning wood in fireplaces.

The approved maintenance plan for the San Francisco-Oakland-San Jose carbon monoxide nonattainment area did not extend the maintenance plan period beyond 20 years from redesignation. Consequently, transportation conformity requirements for carbon monoxide ceased to apply after June 1, 2018 (i.e., 20 years after the effective date of EPA's approval of the first 10-year maintenance plan and redesignation of the area to attainment for the carbon monoxide NAAQS). As a result, as of June 1, 2018, transportation conformity requirements no longer apply for the carbon monoxide NAAQS in the San Francisco-Oakland-San Jose carbon monoxide nonattainment area for Federal Highway Administration/Federal Transit Association projects as defined in 40 CFR 93.101 (see: https://www.govinfo.gov/content/pkg/FR-2005-11-30/pdf/05-23502.pdf#page=1).

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. Since the year 2010, the Bay Area has had three exceedances of the national NO_2 standard – one exceedance each in 2012, 2015 and 2017.

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 parts per million or more. 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. (EPA 2018)

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 ranking 350 on the list of top SO_2 emitters in the nation (CARB 2011, 2015). 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 the State SO_2 standard.

Particulate Matter

PM includes dirt, dust, soot, smoke, and liquid droplets found in the air. Coarse PM, 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 PM, such as demolition and construction activities, are more local in nature, while others, such as vehicular traffic, have a more regional effect. $PM_{2.5}$ refers to particles less than or equal to 2.5 microns in diameter, and it 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 PM 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 PM 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 2012:89, 135).

Coarse and fine PM is 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 PM.

Lead

Lead is a metal found naturally in the environment, as well as in manufactured products, and it is a potent neurotoxin that can cause increased chances of cancer and noncancer 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 it 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; CARB 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 2017a). CARB 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 (CARB 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 they 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 noncarcinogens 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 1 million exposed individuals, typically over a lifetime of exposure. Noncarcinogens differ in that there is a safe level at 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 PM 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 CARB 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 (CARB 2005).

The three most potent carcinogens—diesel PM overall, and 1,3-butadiene and benzene as specific components of diesel PM—come primarily from motor vehicles. 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. CARB 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 CARB, 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, CARB 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 (BAAQMD 2012).

According to CARB, 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. As a result of these measures, more than 30,000 facilities in California have reduced their toxic emissions. This has led to the reduction of ambient cancer risk in California by about 80 percent since 1990. Several communities also have established community emission reduction plans that outline actions that stationary facilities and mobile sources can take to further reduce harmful air pollutants. (CARB 2021)

BAAQMD's Community Air Risk Evaluation (CARE) Program, initiated in 2004, works extensively with local governments, communities, and businesses to reduce air pollution and adverse health outcomes in disproportionately affected areas within the Bay Area. Periodically, the CARE Program identifies affected areas by overlaying maps that combine emissions, estimated cancer risks, predicted $PM_{2.5}$ concentrations, and health outcome data.

The CARE program has brought together government, communities, and business in an effort to understand and address localized areas of elevated air pollution and adverse health impacts. While improvements in air quality continues to occur throughout the Bay Area, levels of air pollution and their impacts vary from location to location. Air pollution levels of many pollutants are highest in close proximity to pollution sources—such as near freeways, busy roadways, busy distribution centers, and large industrial sources. Communities where these types of sources are concentrated often have areas within them where air pollution is relatively high and corresponding health impacts are greater (BAAQMD 2014).

In addition to tracking regional criteria pollution levels as measured at central monitoring sites, and in addition to tracking TAC pollution levels from individual permitted facilities, BAAQMD tracks the cumulative impacts of exposures to multiple pollutants and multiple sources in the neighborhoods where people live. With the shift toward more consideration of cumulative air pollution exposures, BAAQMD's staff continues to evaluate the health status of Bay Area residents and how health status affects vulnerability to air pollution. This has been a gradual but important shift. It is a shift that will continue to require closer collaboration between BAAQMD and the region's health departments and health professionals and researchers. By exploring the links between air pollution exposures and community health status, the CARE Program will continue to help focus BAAQMD's resources to achieve the greatest health benefits (BAAQMD 2014b).

3.4.2 Regulatory Setting

Air quality is regulated at the federal, State, and regional levels. This section 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 U.S. Code 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 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, 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 below 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, which are nationally uniform standards oriented toward controlling particular hazardous air pollutants. 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 redesignated to attainment after 1990 ("maintenance areas") for the following transportation-related criteria pollutants: ozone, $PM_{2.5}$ and PM_{10}, carbon monoxide, 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 an 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 are expected to be 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. Upon completion of the conformity analysis for the proposed Plan and associated Transportation Improvement Program, these materials will be posted for review at www.planbayarea.org.

Safer Affordable Fuel-Efficient Vehicles Rule Part One: One National Program

In September 2019, EPA and the National Highway Traffic Safety Administration issued the Safer Affordable Fuel-Efficient (SAFE) Vehicles Rule Part One: One National Program, which revoked California's authority to set its own GHG emissions standards and zero-emission vehicle mandates in California (84 Federal Register 51310) In April 2020, the federal agencies issued the SAFE Vehicles Rule for Model Years 2021–2026 Passenger Cars and Light Trucks, which relaxed federal GHG emissions and fuel economy standards (85 Federal Register 24174). At the time of preparation of this environmental document, the implications of the SAFE Rule on California's future emissions are uncertain. On February 8, 2021, the incoming administration issued a stay in regard to the legal challenges by California and other states to the revocation of California's waiver (JDSupra 2021a). As of April 22, 2021, there is currently a proposal to withdraw Part One of the SAFE Rule (JDSupra 2021b).

STATE REGULATIONS

Mulford-Carrel Act

In 1967, the California Legislature passed the Mulford-Carrel Act, which established CARB from two Department of Health bureaus operating at that time: the Bureau of Air Sanitation and the Motor Vehicle Pollution Control Board. CARB 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. Assembly Bill (AB) 32, also known as the Global Warming Solutions Act of 2006 (Nunez), expanded CARB's role to development and oversight of California's main GHG reduction programs. These include cap and trade, the Low Carbon Fuel Standard, and the zero-emission vehicle programs.

With the passage of additional laws (such as Senate Bill [SB] 32 in 2016 and AB 398 in 2017), CARB continues to map out how these programs and others can help California reach its next target: reducing GHG emissions an additional 40 percent below 1990 levels by 2030. The ultimate goal for California is to reduce GHG emissions by 80 percent below 1990 levels by 2050.

California Clean Air Act

The CCAA of 1988 requires nonattainment areas to achieve and maintain the California ambient air quality standards (CAAQS) by the earliest practicable date and local air districts to develop plans for attaining the State ozone, carbon monoxide, SO_2, and NO_2 standards. CARB sets the CAAQS.

Under the CCAA, areas not in compliance with the standard must prepare plans to reduce ozone. Noncompliance with the State ozone standard does not affect 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 *2017 Clean Air Plan: Spare the Air, Cool the Climate*. The *2017 Clean Air Plan* provides "all feasible measures" to reduce ozone precursors—ROG and NO_x—and reduce transport of ozone and its precursors to neighboring air basins. In addition, the 2017 Clean Air Plan builds upon and enhances BAAQMD's efforts to reduce emissions of $PM_{2.5}$ and TACs (BAAQMD 2017b).

Senate Bill 656 (Chapter 738, Statues of 2003)

In 2003, the California Legislature enacted 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 CARB, 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 CARB 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 toward attaining California's more health protective standards. This list of air district control measures was adopted by CARB on November 18, 2004.

The BAAQMD also complied with this legislation; staff developed a Particulate Matter Implementation Schedule that was adopted by BAAQMD in November 2005, and BAAQMD adopted the measures identified in the Implementation Schedule (BAAQMD 2012).

Toxic Air Contaminant Identification and Control Act of 1983

The Toxic Air Contaminant Identification and Control Act (AB 1807, Tanner 1983) created California's program to reduce exposure to air toxics. The program involves a two-step process: risk identification and risk management.

In the risk identification step, and upon CARB's request, the Office of Environmental Health Hazard Assessment evaluates the health effects of substances other than pesticides and their pesticidal uses. Substances with the potential to be emitted or that are currently being emitted into the ambient air may be identified as a TAC.

In the risk management step, once a substance is identified as a TAC, and with the participation of local air districts, industry, and interested public, CARB prepares a report that outlines the need and degree to regulate the TAC through a control measure (CARB 2020).

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

The Air Toxics "Hot Spots" Information and Assessment Act (AB 2588, 1987, Connelly) was enacted in September 1987. Under this act, stationary sources are required to report the types and quantities of certain substances their facilities routinely release into the air. Emissions of interest are those that result from the routine operation of a facility or that are predictable, including but not limited to continuous and intermittent releases and process upsets or leaks.

The goals of the Air Toxics "Hot Spots" Act are to collect emission data, identify facilities having localized impacts, ascertain health risks, and notify nearby residents of significant risks. In September 1992, the "Hot Spots" Act was amended by SB 1731 (Calderon) to address the reduction of significant risks. The bill requires that owners of significant-risk facilities reduce their risks below the level of significance (CARB 2020).

Diesel Risk Reduction Plan

In August 1998, CARB identified particulate emissions from diesel-fueled engines (diesel PM) as TACs, based on data linking diesel PM emissions to increased risks of lung cancer and respiratory disease. Following the identification process, CARB 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, CARB 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 are continuing to 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), CARB 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. CARB has promulgated several mobile and stationary source airborne toxic control measures (ATCMs) pursuant to this authority. For instance, effective as of July 2003, CARB 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 (CARB 2010). In addition, effective February 2005, CARB 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).

California Building Standards Code - Title 24

Title 24 is a collection of energy standards for California buildings. Its goal is to promote energy efficiency in new homes and commercial constructions. Since 1978, California residents have had to comply with Title 24, Part 6 of the CCR in their homes and businesses. This section specifies energy-efficiency standards designed to make the State's energy usage more responsible and sustainable.

Title 24 receives updates every 3 years to incorporate the latest research, design, and trends in interior systems, such as lighting and HVAC systems. The latest adopted revisions to Title 24 regulations came out in 2019, superseding the version issued in 2016. Title 24 energy compliance requirements apply to new constructions and any new installations or retrofits in existing buildings. Older buildings do not have to upgrade their systems, but if they choose to renovate, their new systems must meet Title 24 standards. Updated Title 24 standards for 2022 were drafted in May 2021 but are not final as of the publication of this Draft EIR.

Heavy-Duty Vehicle Inspection Program

The Heavy-Duty Vehicle Inspection Program (HDVIP) and the Periodic Smoke Inspection Program (PSIP) are CARB's heavy-duty vehicle inspection programs for in-use trucks and buses. HDVIP requires heavy-duty trucks and buses to be inspected for excessive smoke, tampering, and engine certification label compliance. Any heavy-duty vehicle traveling in California may be inspected, including vehicles registered in other states and foreign countries. CARB inspection teams perform tests at border crossings, California Highway Patrol weigh stations, fleet facilities, and randomly selected roadside locations. Owners of trucks and buses found in violation are subject to minimum penalties starting at $300 per violation. Penalty payment and proof of correction must be supplied to clear violations.

PSIP requires annual opacity self-testing for California fleets with two or more heavy-duty vehicles.

Drayage Truck Regulation

CARB established the Drayage Truck Regulation as part of its ongoing efforts to reduce PM and NOx emissions from diesel-fueled engines and improve air quality associated with goods movement. The purpose of this regulation is to reduce emissions and public exposure to diesel PM, NOx, and other air contaminants by setting emission standards for in-use, heavy-duty diesel-fueled vehicles that transport cargo to and from California's ports and intermodal rail facilities.

Starting January 1, 2023, drayage trucks are subject to the provisions of Title 13, CCR, Section 2025, the Regulation to Reduce Emissions of Diesel Particulate Matter, Oxides of Nitrogen and Other Criteria Pollutants from In-Use Heavy Duty Diesel-Fueled Vehicles, which requires that all not otherwise exempt in-use on-road diesel vehicles, including drayage trucks, have a 2010 model year emissions equivalent engine by January 1, 2023 (Article 4.5, Chapter 1, Division 3, Title 13, Section 2027, CCR).

Senate Bill 1: The Road Repair and Accountability Act of 2017

SB 1 was passed in April 2017 by a two-thirds majority in the California Legislature. As the largest transportation investment in California history, SB 1 is expected to raise $52.4 billion in funding to rebuild neighborhood streets, freeways, and bridges across California. Transportation improvements funded by SB 1 include: maintenance of State highways and bridges, repairs to local streets and roads, transit, congested corridors and trade corridors, and bike and pedestrian projects. Funding for SB 1 comes from State gas tax and vehicle fees. It is split evenly between State and local governments for highway and local road repair and maintenance. SB 1 doubles the amount of revenue that cities, such as the City of Oakland, receive from the State for local street maintenance and repair.

Proposition 1B: Goods Movement Emission Reduction Program

The $1 billion Proposition 1B Goods Movement Emission Reduction Program is a partnership between CARB and local agencies, air districts, and seaports to quickly reduce air pollution emissions and health risk from freight movement along California's trade corridors. Local agencies apply to CARB for funding. Then those agencies offer financial incentives to owners of equipment used in freight movement to upgrade to cleaner technologies. Projects funded under this program must achieve early or extra emission reductions not otherwise required by law or regulation.

California Air Pollution Control Officers Association

The California Air Pollution Control Officers Association (CAPCOA), is a non-profit association of the air pollution control officers from all 35 local air quality agencies throughout California. CAPCOA was formed in 1976 to promote clean air and to provide a forum for sharing of knowledge, experience, and information among the air quality regulatory agencies around the State. The Association promotes unity and efficiency, and strives to encourage consistency in methods and practices of air pollution control.

In August of 2010 CAPCOA released "Quantifying Greenhouse Gas Mitigation Measures, A Resource for Local Government to Assess Emission Reductions from Greenhouse Gas Mitigation Measures." This work is considered "state of the practice" for this subject matter and provides a common platform of information and tools for identifying feasible mitigation measures to reduce air quality impacts from proposed development projects. As noted, the source document for the table of mitigation measures provided below is the CAPCOA document.

Table 3.4-5: 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)		
Measure Number	Land Use/Location	Description
LUT-1	Increase Density	Designing the Project with increased densities
LUT-2	Increase Location Efficiency	Documentation of empirical data to justify the "cap" for all land use/location strategies
LUT-3	Increase Mixed Use Development	Increase Diversity of Urban and Suburban Developments
LUT-4	Improve Destination Accessibility	Project close to regional employment or destination center
LUT-5	Increase Transit Accessibility	Project near high-quality transit
LUT-6	Integrate Below Market Rate Housing	Incorporates affordable housing
LUT-8	Encourage Alternative Mode Use	Locate Project near Bike Path/Bike Lane
Measure Number	Neighborhood/Site Enhancements	Description
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-3	Implement NEV Network	Project provides a viable Neighborhood Electric Vehicle (NEV) network
CalEEMod Traffic Tab: Neighborhood Enhancement Measures (Designated by associated CAPCOA measure)		
SDT-4	Encourage Non-Motorized Travel	Create Urban Non-Motorized Zones
SDT-5	Increase Bike Commuting	Incorporate Bike Lane Street Design
SDT-6	Increase Bike Parking	Provide Bike Parking for Non-Residential projects
SDT-7	Increase Bike Parking	Provide Bike Parking for Multi-Unit Residential projects
SDT-8	Increase Electric Vehicle Parking	Provide Electric Vehicle Parking
SDT-9	Designate Bike Commuting Routes	Improve Connectivity to Off-site Bike Networks
CalEEMod Traffic Tab: Parking Policy/Pricing Measures (Designated by associated CAPCOA measure)		
Measure Number	Parking Policy/Pricing	Description
PDT-1	Limit Parking Supply	Change parking requirements and types of supply
PDT-2	Unbundle Parking Costs	Parking cost separated from property costs
CalEEMod Traffic Tab: Transit Improvement Measures (Designated by associated CAPCOA measure)		
Measure Number	Transit System Improvements	Description
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
TST-5	Increase Parking Near Transit	Provide short-term and long-term bicycle parking near transit stations and stops
CalEEMod Traffic Tab: Commute Trip Measures (Designated by associated CAPCOA measure)		
Measure Number	Commute Trip Reduction	Description
TRT-1	Implement Trip Reduction Program	Implement voluntary Commute Trip Reduction (CTR) program with employers
TRT-2	Implement Trip Reduction Program	Implement Commute Trip Reduction (CTR) ordinance
TRT-3	Increase Ride-sharing	Provide Ride-Sharing Programs
CalEEMod Energy Tab: Building Energy Measures (Designated by associated CAPCOA measure)		
Measure Number	Building Energy	Description
BE-1	Exceed Title 24	Use less energy than allowed by Title 24
CalEEMod Energy Tab: Alternative Energy Measures (Designated by associated CAPCOA measure)		
Measure Number	Alternative Energy	Description
AE-1	On-site Renewable Energy	Establish Onsite Renewable or Carbon-Neutral Energy Systems-Generic

Sources: CAPCOA 2010, CAPCOA 2016

REGIONAL AND LOCAL REGULATIONS

Regional Air Districts

The nine-county MTC region encompasses three air basins: the San Francisco Bay Area Air Basin 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 Area 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 3.4-1**. 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.

Maritime Air Quality Improvement Plan

In collaboration with a task force of diverse stakeholders, the Port of Oakland (Port) developed the Maritime Air Quality Improvement Plan (MAQIP) to guide its efforts to reduce criteria pollutants, notably diesel PM, associated with maritime (seaport) activities at the Port. The MAQIP is the Port's master plan to reduce air pollution from both mobile and stationary on/near-shore and off-shore sources at the seaport. It not only supports current and future State and local emission reduction requirements but enhances these requirements through early implementation goals and by targeting emission reductions that exceed legally mandated requirements.

The MAQIP builds upon the Port Maritime Air Quality Policy Statement (Port Air Quality Statement), adopted by the Board of Port Commissioners in March 2008. The Port Air Quality Statement sets a goal of reducing the excess community cancer health risk related to exposure to diesel PM emissions associated with the Port's maritime operations by 85 percent from 2005 to 2020, through all practicable and feasible means. It also commits the Port to implement early action emissions reduction measures to reduce the duration of the public's exposure to emissions that may cause health risks, through all practicable and feasible means.

Comprehensive Truck Management Plan

The Port of Oakland initiated development of the Comprehensive Truck Management Plan (CTMP) in early 2007 through the establishment of a technical advisory committee. The purpose of the CTMP is to address air quality, safety and security, business and operations, and community issues associated with drayage trucks serving the Port. As part of implementing the CTMP, the Port has developed a truck registry for trucks serving the seaport, supported compliance with truck-related regulations to reduce emissions of air pollutants, increased safety and security domain awareness, improved operational efficiencies, reduced traffic and congestion, and involved and educated stakeholders.

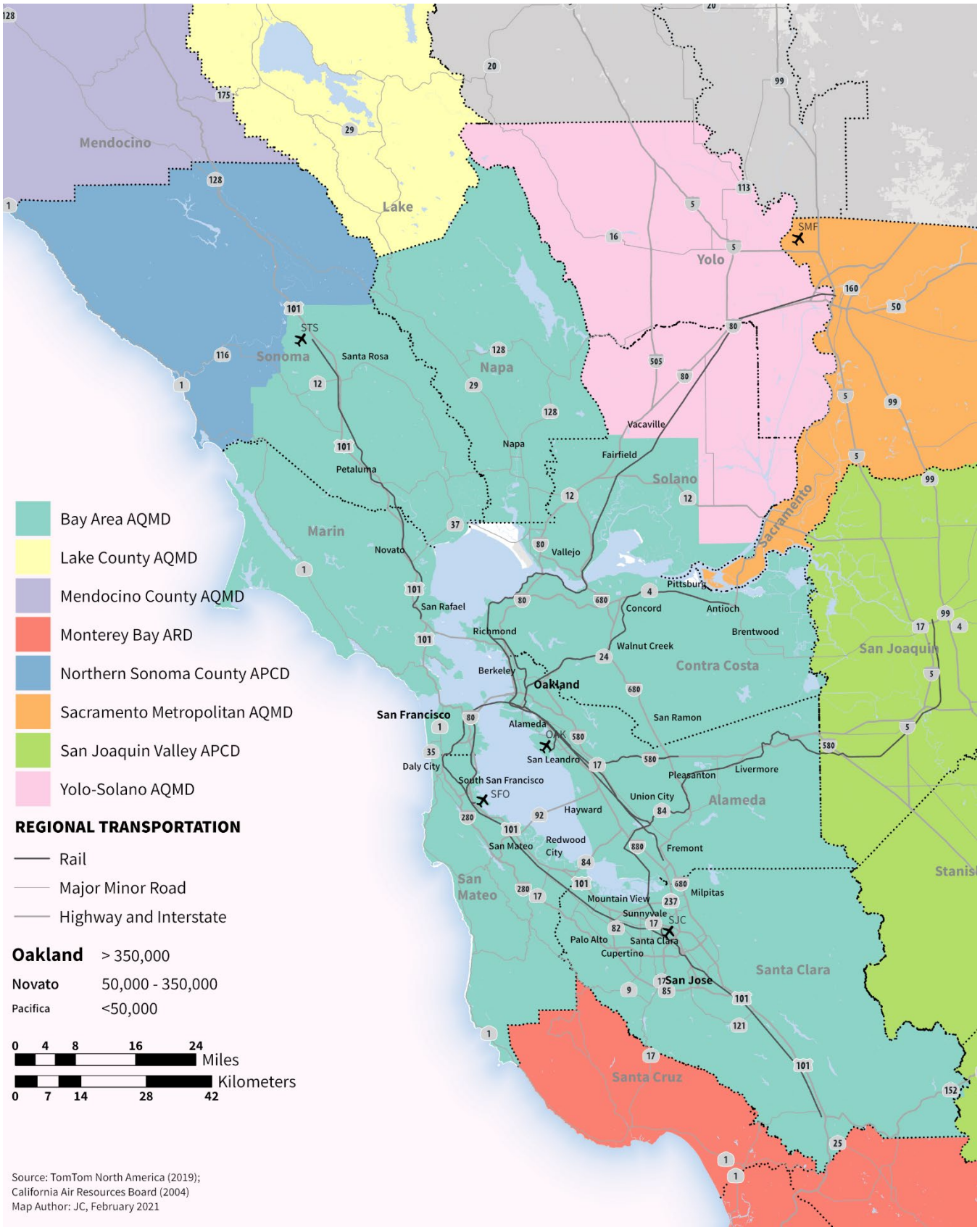

Figure 3.4-1: Area Air Basins

Bay Area Air Quality Management District

BAAQMD attains and maintains air quality conditions in the San Francisco Bay Area Air Basin 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, the following rules:

- **Regulation 2, Rule 1, General Permit Requirements.** This rule 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.** This rule applies to new or modified sources and contains requirements for best available control technology (BACT) and emission offsets. Rule 2 implements federal New Source Review and Prevention of Significant Deterioration requirements.
- **Regulation 6, Rule 1, General Requirements.** Regulation 6 limits the quantity of PM in the atmosphere by controlling emission rates, concentration, visible emissions, and opacity.
- **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 the citizen complaints described above, the limits shall remain effective until such time as no citizen complaints have been received by BAAQMD for 1 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.** This rule 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's jurisdiction.

The Air District developed screening criteria to provide lead agencies and project applicants with a conservative indication of whether a proposed project could result in potentially significant air quality impacts. If all of the screening criteria are met by a proposed project, then the lead agency or applicant would not need to perform a detailed air quality assessment of their project's air pollutant emissions. These screening levels are generally representative of new development on greenfield sites without any form of mitigation measures taken into consideration, and the screening criteria do not account for project design features, attributes, or local development requirements that could also result in lower emissions. For projects that are mixed-use, infill, and/or proximate to transit service and local services, emissions would be less than the greenfield type project that these screening criteria are based on. If a project includes emissions from stationary source engines (e.g., back-up generators) and

industrial sources subject to Air District Rules and Regulations, the screening criteria should not be used. The project's stationary source emissions should be analyzed separately from the land use-related indirect mobile- and area-source emissions. Stationary-source emissions are not included in the screening estimates given below and, for criteria pollutants, must be added to the indirect mobile- and area-source emissions generated by the land use development and compared to the appropriate Thresholds of Significance. Greenhouse gas emissions from permitted stationary sources should not be combined with operational emissions, but compared to a separate stationary source greenhouse gas threshold.

The screening criteria developed for greenhouse gases were derived using the default emission assumptions in URBEMIS and using off-model GHG estimates for indirect emissions from electrical generation, solid waste and water conveyance. If the project has other significant sources of GHG emissions not accounted for in the methodology described above, then the screening criteria should not be used. Projects below the applicable screening criteria shown in **Table 3.4-6** would not exceed the 1,100 MT of CO2e/yr GHG threshold of significance for projects other than permitted stationary sources.

If a project, including stationary sources, is located in a community with an adopted qualified GHG Reduction Strategy, the project may be considered less than significant if it is consistent with the GHG Reduction Strategy. A project must demonstrate its consistency by identifying and implementing all applicable feasible measures and policies from the GHG Reduction Strategy into the project.

Table 3.4-6: 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 (NO_X)	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 (NO_X)	11 ksf	277 ksf (ROG)
Elementary school	271 ksf (NO_X)	44 ksf	277 ksf (ROG)
Elementary school	2,747 students (ROG)	-	3,904 students (ROG)
Junior high school	285 ksf (NO_X)	-	277 ksf (ROG)
Junior high school	2,460 students (NO_X)	46 ksf	3,261 students (ROG)
High school	311 ksf (NO_X)	49 ksf	277 ksf (ROG)
High school	2,390 students (NO_X)	-	3,012 students (ROG)
Junior college (2 years)	152 ksf (NO_X)	28 ksf	277 ksf (ROG)
Junior college (2 years)	2,865 students (ROG)	-	3,012 students (ROG)
University/college (4 years)	1,760 students (NO_X)	320 students	3,012 students (ROG)
Library	78 ksf (NO_X)	15 ksf	277 ksf (ROG)
Place of worship	439 ksf (NO_X)	61 ksf	277 ksf (ROG)
City park	2,613 acres (ROG)	600 acres	67 acres (PM_{10})
Racquet club	291 ksf (NO_X)	46 ksf	277 ksf (ROG)

Land Use Type	Operational Criteria Pollutant Screening Size	Operational GHG Screening Size	Construction Criteria Pollutant Screening Size
Racquetball/health	128 ksf (NO_X)	24 ksf	277 ksf (ROG)
Quality restaurant	47 ksf (NO_X)	9 ksf	277 ksf (ROG)
High turnover restaurant	33 ksf (NO_X)	7 ksf	277 ksf (ROG)
Fast food rest. w/ drive thru	6 ksf (NO_X)	1 ksf	277 ksf (ROG)
Fast food rest. w/o drive thru	8 ksf (NO_X)	1 ksf	277 ksf (ROG)
Hotel	489 rooms (NO_X)	83 rooms	554 rooms (ROG)
Motel	688 rooms (NO_X)	106 rooms	554 rooms (ROG)
Free-standing discount store	76 ksf (NO_X)	15 ksf	277 ksf (ROG)
Free-standing discount superstore	87 ksf (NO_X)	17 ksf	277 ksf (ROG)
Discount club	102 ksf (NO_X)	20 ksf	277 ksf (ROG)
Regional shopping center	99 ksf (NO_X)	19 ksf	277 ksf (ROG)
Electronic Superstore	95 ksf (NO_X)	18 ksf	277 ksf (ROG)
Home improvement superstore	142 ksf (NO_X)	26 ksf	277 ksf (ROG)
Strip mall	99 ksf (NO_X)	19 ksf	277 ksf (ROG)
Hardware/paint store	83 ksf (NO_X)	16 ksf	277 ksf (ROG)
Supermarket	42 ksf (NO_X)	8 ksf	277 ksf (ROG)
Convenience market (24 hour)	5 ksf (NO_X)	1 ksf	277 ksf (ROG)
Convenience market with gas pumps	4 ksf (NO_X)	1 ksf	277 ksf (ROG)
Bank (with drive-through)	17 ksf (NO_X)	3 ksf	277 ksf (ROG)
General office building	346 ksf (NO_X)	53 ksf	277 ksf (ROG)
Office park	323 ksf (NO_X)	50 ksf	277 ksf (ROG)
Government office building	61 ksf (NO_X)	12 ksf	277 ksf (ROG)
Government (civic center)	149 ksf (NO_X)	27 ksf	277 ksf (ROG)
Pharmacy/drugstore w/ drive through	49 ksf (NO_X)	10 ksf	277 ksf (ROG)
Pharmacy/drugstore w/o drive through	48 ksf (NO_X)	10 ksf	277 ksf (ROG)
Medical office building	117 ksf (NO_X)	22 ksf	277 ksf (ROG)
Hospital	226 ksf (NO_X)	39 ksf	277 ksf (ROG)
Hospital	334 beds (NO_X)	84 ksf	337 beds (ROG)
Warehouse	864 ksf (NO_X)	64 ksf	259 ksf (NO_X)
General light industry	541 ksf (NO_X)	121 ksf	259 ksf (NO_X)
General light industry	72 acres (NO_X)	-	11 acres (NO_X)
General light industry	1,249 employees (NO_X)	-	540 employees (NO_X)
General heavy industry	1899 ksf (ROG)	-	259 ksf (NO_X)
General heavy industry	281 acres (ROG)	-	11 acres (NO_X)
Industrial park	553 ksf (NO_X)	65 ksf	259 ksf (NO_X)
Industrial park	61 acres (NO_X)	-	11 acres (NO_X)
Industrial park	1,154 employees (NO_X)	-	577 employees (NO_X)
Manufacturing	992 ksf (NO_X)	89 ksf	259 ksf (NO_X)

Notes: THE SCREENING VALUES IN THIS TABLE CANNOT BE USED AS SCREENING FOR RISK AND HAZARD IMPACTS.
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.
Source: BAAQMD 2017c

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, the following rules:

- **Rule 200, Permit Requirements.** This rule 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}, carbon monoxide, and lead) to comply with 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; endanger the comfort, repose, health, or safety of any such persons or the public; or 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, the following rules:

- **Rule 2.11, Particulate Matter Concentration.** This rule prohibits any source that would emit dust, fumes, or total suspended PM from generated emissions that would exceed the rule's established emission concentration limit.
- **Rule 2.14, Architectural Coatings.** This rule establishes volatile organic compound 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 multifamily units). New developments may use only a pellet-fueled heater, an 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 manufactured, offered for sale, sold, or installed within YSAQMD's jurisdiction.

- **Rule 3.1, General Permit Requirements.** This rule 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}, carbon monoxide, and lead) to comply with BACT and emissions offset requirements.
- **Rule 3.13, Toxics New Source Review.** This rule requires the installation of BACT 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 areawide 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 nonattainment area for the 1-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 3 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 2017 Clean Air Plan (adopted April 19, 2017) provides a regional strategy to protect public health and protect the climate. To protect public health, the plan describes how BAAQMD will continue making progress toward attaining all State and federal air quality standards and eliminating health risk disparities from exposure to air pollution among Bay Area communities. To protect the climate, the plan defines a vision for transitioning the region to a postcarbon economy needed to achieve ambitious GHG reduction targets for 2030 and 2050 and provides a regional climate protection strategy that will put the Bay Area on a pathway to achieve those GHG reduction targets.

The 2017 plan includes a wide range of control measures designed to decrease emissions of the air pollutants that are most harmful to Bay Area residents, such as PM, ozone, and TACs; reduce emissions of methane and other "super-GHGs" that are potent climate pollutants in the near term; and decrease emissions of carbon dioxide by reducing fossil fuel combustion.

Highlights of the 2017 plan include the following goals and measures:

- Limit Fossil Fuel Combustion: Develop a regionwide strategy to increase fossil fuel combustion efficiency at industrial facilities, beginning with the three largest sources of industrial emissions: oil refineries, power plants, and cement plants.
- Stop Methane Leaks: Reduce methane emissions from landfills and from oil and natural gas production, storage, and distribution.
- Reduce Exposure to Toxics: Reduce emissions of TACs by adopting more stringent limits and methods for evaluating toxic risks at existing and new facilities.
- Put a Price on Driving: Implement pricing measures to reduce travel demand.
- Advance Electric Vehicles: Accelerate the widespread adoption of electric vehicles.

- Promote Clean Fuels: Promote the use of clean fuels and low- or zero-carbon technologies in trucks and heavy-duty vehicles.
- Accelerate the Production of Low-Carbon Buildings: Expand the production of low-carbon, renewable energy by promoting on-site technologies, such as rooftop solar and ground-source heat pumps.
- Support More Energy Choices: Support community choice energy programs throughout the Bay Area.
- Make Buildings More Efficient: Promote energy efficiency in both new and existing buildings.
- Make Space and Water Heating Cleaner: Promote the switch from natural gas to electricity for space and water heating in Bay Area buildings. (BAAQMD 2020)

Northern Sonoma County Air Pollution Control District

NSCAPCD is in attainment for all criteria air pollutants. It does not currently have and is not 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, SO_2, NO_2, and PM. YSAQMD has attained all standards with the exception of ozone and PM. Ozone levels in Yolo and Solano Counties are in the healthy range on most days. However, emissions created within Yolo and Solano Counties do affect neighboring communities, especially in the greater Sacramento region. For this reason, YSAQMD is included in the Sacramento federal nonattainment area by EPA. As a nonattainment area for the federal ozone standard, the Sacramento region is required to prepare various planning documents on an ongoing basis.

Specific to YSAQMD, the CCAA requirement is to produce a plan for attaining and maintaining State ambient air quality standards for ozone with subsequent updates every 3 years. YSAQMD's current Triennial Assessment and Plan update (examining the years 2015–2017) discusses the progress YSAQMD has made toward improving the air quality in its jurisdiction since its last Triennial Plan. On May 10, 2017, EPA found that the area attained the 2006 $PM_{2.5}$ standard by the attainment date of December 31, 2015 (EPA 2017b). This finding was based on complete, quality-assured, and certified $PM_{2.5}$ monitoring data for 2013–2015. The $PM_{2.5}$ Maintenance Plan and Redesignation Request will be updated and submitted in the future based on the clean data finding made by EPA (YSAMQMD 2019).

Toxic Air Contaminants

The Air Toxics "Hot Spots" Program was enacted by State law (AB 2588) in 1987. The purpose of the law is to provide the public with information about the routine emissions and potential health impacts of toxic pollutants released to the air by facilities. Certain facilities are subject to the program and are required to submit a toxic emissions inventory. With those data, YSAQMD calculates a prioritization score for each facility. Depending on the prioritization score, some facilities are required to perform a health risk assessment.

YSAQMD's Air Toxics Hot Spots Program requires certain facilities with the potential to emit certain amounts of toxic air pollutants to submit emissions inventories to YSAQMD and, in some cases, pursue risk reduction strategies. The program is intended to provide the public with information about potential health impacts from toxic air pollutants routinely emitted by facilities.

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 that 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. Except for the San Joaquin Valley area, air quality is an optional general plan topic. Jurisdictions may choose to consider air quality as a stand-alone 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.

3.4.3 Impact Analysis

SIGNIFICANCE CRITERIA

Significance criteria are based on CEQA Guidelines Appendix G, the criteria used in the Plan Bay Area 2040 EIR (2017), and professional judgment. Under these criteria, implementation of the proposed Plan would have a potentially significant adverse impact if it would:

- conflict with or obstruct implementation of the applicable air quality plan (Criterion AQ-1);
- result in a net increase in construction-related emissions (Criterion AQ-2);
- result in a cumulatively considerable net increase of any criteria pollutant for which the project region is in non-attainment under an applicable federal or state ambient air quality standard (Criterion AQ-3);
- expose sensitive receptors to substantial pollutant concentrations (Criterion AQ-4); or
- result in other emissions (such as those leading to odors) adversely affecting a substantial number of people (Criterion AQ-5).

Note that the Northern Sonoma County Air Pollution Control District and YSAQMD do not currently have officially recommended significance thresholds for regional plans. BAAQMD's updated CEQA Guidelines (updated May 2017) are intended to help lead agencies navigate through the CEQA process. The Guidelines for implementation of the Thresholds are for information purposes only to assist local agencies. Recommendations in the Guidelines are advisory and should be followed by local governments at their own discretion. These Guidelines may inform environmental review for development projects in the Bay Area, but do not commit local governments or the Air District to any specific course of regulatory action. The Guidelines offer step-by-step procedures for a thorough environmental impact analysis of adverse air emissions due to land development in the Bay Area.

If a project meets the screening criteria and is consistent with the methodology used to develop the screening criteria, its air quality impacts may be considered less than significant. Otherwise, lead agencies should evaluate potential air quality impacts of projects (and plans), as explained in Chapters 4–9 of the Guidelines. These chapters describe how to analyze air quality impacts from criteria air pollutants, GHGs, local community risk and hazards, and odors associated with construction activity and operations of a project or plan. If after proper analysis, the project or plan's air quality impacts are

found to be below the significance thresholds, then the air quality impacts may be considered less than significant. If not, the lead agency should implement appropriate mitigation measures to reduce associated air quality impacts. Lead agencies are responsible for evaluating and implementing all feasible mitigation measures in their CEQA document.

METHOD OF ANALYSIS

This program-level EIR evaluates potential impacts on air quality based on the location of the proposed Plan's footprint associated with the forecasted development pattern (i.e., the land use growth footprint), sea level rise adaptation infrastructure (i.e., sea level rise adaptation footprint), and transportation projects (i.e., transportation system footprint). The baseline for this analysis reflects existing conditions when the EIR NOP was released in September 2020. However, impacts relying on analysis from Travel Model 1.5 (e.g., VMT), reflect a baseline year of 2015 because it is the most recent year for which comprehensive land use, demographic, transit ridership and traffic volumes are available for the Bay Area region. Existing concentrations in the year 2015 were used as a baseline because of the potential for new land uses under the proposed Plan to be constructed at any point between the Plan's adoption and 2050.

This evaluation of air quality impacts assumes that construction and development under the proposed Plan would adhere to applicable federal, State, and local regulations and would conform to appropriate standards in the industry, as relevant for individual projects. Where existing regulatory requirements or permitting requirements exist, it is reasonable to assume that they would be implemented, thereby reducing impacts.

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 construction 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 construction emissions associated with any one project or all projects combined would be primarily dependent on the quantity, age, and fuel type of the construction equipment and the duration of their operation at the construction site or in the region. Also, individual land use and transportation projects associated with implementation of the proposed Plan, depending on their size, may exceed the thresholds for short-term construction criteria air pollutant emissions, especially if best management practices (BMPs) are not implemented.

Operational Emissions

This analysis addresses the effect of land use growth and transportation projects under the proposed Plan on air quality. Under the proposed Plan, MTC forecasts that Transit Priority Areas (TPAs) would absorb a majority of the approximately 1.4 million new households and 1.4 million new jobs expected in the Plan area by 2050. Much of the housing growth and job growth is expected to occur around the Plan area's transit network (e.g., BART, Caltrain) in Santa Clara, San Francisco, Alameda, and San Mateo 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 2050 conditions projected under the proposed Plan are summarized in **Table 3.4-7**, below.

Table 3.4-7: Bay Area Travel Activity Data

	2015 Baseline	2050 Proposed Plan	Change (2015 to 2050)	
			Numerical	Percent
Total Population	7,581,000	10,368,000	+2,786,000	+42%
Employed Residents	2,841,000	4,027,000	+1,186,000	+37%
Vehicles in Use	4,617,000	5,295,000	+679,000	+15%
Engine Starts	23,164,000	27,066,000	+3,902,000	+17%
Daily VMT	155,006,000	181,917,000	+26,911,000	+17%

Notes: Whole numbers have been rounded (between 11 and 999 to the nearest 10, above 1,000,000 to the nearest 1,000). Number of vehicles in use, engine starts, and Daily VMT forecasts do not account for expected reductions from the implementation of Strategy EN09 due to modeling limitations.
Source: Data compiled by MTC and ABAG in 2021

Area-Source Emissions

Area-source emissions were calculated using region-specific inputs derived from MTC's regional land use forecasting model, UrbanSim 2.0, and default model assumptions in the California Emissions Estimator Model (CalEEMod) Version 2016.3.2 (CAPCOA 2017). The proposed Plan includes two environmental strategies that, when implemented, would result in lower emissions. Strategy EN02, "Provide Means-Based Financial Support to Retrofit Existing Residential Buildings," would result in building ordinances and building retrofits to meet higher energy standards, among other things. Similarly, Strategy EN03, "Fund Energy Upgrades to Enable Carbon Neutrality in All Existing Commercial and Public Buildings," would support the electrification and resilient power system upgrades leading to lower building emissions. The emissions reductions of these two strategies were not quantified for the impact discussions below because of modeling limitations.

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 used in nonindustrial applications that emit ROGs during their product use, such as cleaning supplies, kitchen aerosols, cosmetics, toiletries; 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 2050 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 2050 and were assumed to meet 2019 Title 24 of the California Code of Regulations, known as the California Building Standards Code or Title 24. Title 24 contains energy efficiency standards applicable to all residential and non-residential buildings throughout California. With CalEEMod, building electricity and natural gas use is divided into two categories: (1) end uses subject to Title 24 standards and (2) end uses not subject to Title 24 standards.

For electricity, Title 24 uses include the major building envelope systems covered by Part 6 (California Energy Code) of Title 24 such as space heating, space cooling, water heating, and ventilation. Non-Title 24 uses include all other end uses, such as appliances, electronics, and other miscellaneous plug-in uses.

For natural gas, uses are likewise categorized as Title 24 or Non-Title 24, with Title 24 uses including building heating and hot water end uses. Non-Title 24 natural gas uses include cooking and appliances (including pool/spa heaters). In addition, there is increasingly interest in banning the use of natural gas in new construction. in California since Berkeley passed the first prohibition in 2019. This is true in the Bay Area, where the cities San Francisco, Oakland, and San Jose have proposed to reduce natural gas use by passing electric-only building mandates. Therefore, the analyses conducted here are conservative because they do not account for that reduction in natural gas use.

Motor Vehicle Emissions

Motor vehicle, or mobile source, emissions were calculated using MTC's travel demand forecasting model, Travel Model 1.5, and mobile source emission factors developed by CARB. Travel Model 1.5 produces forecasts of travel behavior and vehicle activity for the proposed Plan's base year, 2015, and 2050. Travel Model 1.5 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 traveled (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 CARB's Emission Factor (EMFAC) model.

Vehicle activity projections are correlated to changes in demographic, housing, and socioeconomic factors. For calculations relying on outputs from Travel Model 1.5 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 (please refer to Chapter 1 for an explanation of the different modeling tools). As shown in **Table 3.4-5**, between 2015 and 2050, the Bay Area is projected to add about 2.8 million people (a 42-percent increase) and 1.2 million employed residents (a 37-percent increase). Based on expected future growth, the total daily VMT in the region would increase by 17 percent, meaning VMT is projected to grow at a rate less than half that of population and job growth in the region. The results presented in **Table 3.4-5** do not account for implementation of Strategy EN09, "Expand Transportation Demand Management Initiatives," due to limitations that do not allow for the distribution of the VMT reductions by speed and county, key model outputs for emissions analyses. As such, the mobile source emissions in the following analyses are overstated.

CARB's EMFAC2021 emissions inventory model was used to calculate emissions for motor vehicles operating in the Bay Area for this Draft EIR analysis. CARB released EMFAC2021 (v1.0.0) in January 2021 and subsequently released version v1.0.1 on April 30, 2021 replacing version v1.0.0. EMFAC2021 includes the latest data on California's car and truck population, activity, and emission testing. New forecasting frameworks have been incorporated into EMFAC2021 to project zero-emission vehicle (ZEV) population, and to estimate heavy-duty vehicle miles traveled. New model features are added to reflect the more fuel and technologies, including modules to show emissions from Plug-in Hybrid Electric Vehicles and natural gas trucks, as well as energy consumption from ZEVs. Heavy-duty truck categories have been expanded to show more vocational types. EMFAC2021 also incorporates the most recently adopted on-road mobile source regulations and reflects CARB's latest understanding of statewide and regional vehicle activities, emissions, and recently adopted regulations such as the Advanced Clean Trucks (ACT) Regulation and Heavy Duty Omnibus Regulation. While EMFAC2021 is the latest emission inventory model that CARB uses to assess emissions from on-road motor vehicles in California and to support CARB's planning and policy development, EPA approval has yet to occur.

EMFAC2021 also includes updated carbon dioxide emission rates for 2016 through 2020 model year light-duty vehicles. The updates use the latest national fuel efficiency data from www.fueleconomy.gov, the official U.S. government source for fuel efficiency information. Further, unlike 2-cycle fuel economies used in EMFAC2017, EMFAC2021 benefits from the more realistic 5-cycle fuel economies. Additionally, CARB staff implemented the Final Safer Affordable Fuel-Efficient (SAFE) Vehicles Rule phase-in schedule on GHG emissions in EMFAC2021. The final SAFE rule applies to passenger cars and light-duty trucks in California. While the previously established federal GHG emission standards and related "augural" fuel economy standards for model years 2021-2025 would have achieved yearly improvements through model year2025, the SAFE rule results in far less stringent standards and consequently higher carbon dioxide emissions.

EMFAC2021 generates emission factors for all types of on-road vehicles in different seasons and driving conditions. CARB developed these factors based on thousands of emissions tests on both new and used vehicles recruited randomly from the California fleet. In the EMFAC2021 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, NOX, CO, and PM (associated with engine exhaust and tire wear) are direct outputs from EMFAC2021. To obtain estimates of the amount of PM generated by autos from roads (called "entrained dust"), regional VMT was multiplied by the following (annual) factors: (1) 0.134 grams per mile entrained dust for PM_{10} and (2) 0.020 grams per mile entrained dust for $PM_{2.5}$ (CARB 2021).

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-EMFAC2017 model which forecasts on-road vehicle emissions for criteria pollutants, TACs, GHG emissions, and fuel consumption. CT-EMFAC2017 is the most up to date on-road motor vehicle emission factor model for TACs available for use in California. In addition, the underlying data for the CT-EMFAC2017 model is based on the CARB's EMFAC2017 on-road emissions model and CARB-supplied/EPA-supplied TAC speciation factors.

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 sensitive receptors within TPAs based on the transportation projects and the forecasted land use changes in the proposed Plan. BAAQMD's 2017 CEQA Air Quality Guidelines define sensitive receptors as, "facilities or land uses that include members of the population that are particularly sensitive to the effects of air pollutants, such as children, the elderly, and people with illnesses. Examples include schools, hospitals and residential areas." SB 375 and the proposed Plan promotes residential and commercial/retail development along existing transit corridors (i.e., 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 located 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).

This program-level EIR evaluates potential impacts on air quality based on the location of the proposed Plan's footprint associated with the forecasted development pattern (i.e., the land use growth footprint) relative to the known distribution of sensitive receptors in the Bay Area.

Quantitative results are presented for the region (i.e., the entire footprint, often summarized by county) and for the portions of the land use growth footprint specifically within TPAs. TPAs are presented as a subset of the regional and county totals. Information provided by county includes both incorporated and unincorporated areas in the county.

For this impact assessment, a geographic information system (GIS) was used to digitally overlay the proposed Plan's land use growth footprint associated with forecasted land use development onto the location of communities and places throughout the region which BAAQMD estimated to have elevated levels of fine particulates and/or TACs.

The land use growth footprint is derived from the UrbanSim 2.0 land use model and represents the development or redevelopment of parcels of land simulated to accommodate the region's forecasted growth of households and jobs from 2015 through 2050 through new building(s). Precise building site(s) on the parcels are not known, therefore the land use growth footprint incorporates the entire parcel. Because of this assumption, the area of potential effects tends to be overstated when considering the land use growth footprint.

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.

CARE Communities

BAAQMD's 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. This Draft EIR identifies potential impacts in CARE Communities 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. MTC's evaluation of the proposed Plan's transportation investments and strategies on Equity Priority Communities is addressed in the Equity Analysis Report found at planbayarea.org/reports, prepared as a supplemental report to the proposed Plan.

In addition, BAAQMD developed the *Planning Healthy Places* process 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. 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 (BAAQMD 2016).

Motor Vehicle Emissions

Travel activity data for the roadway network were derived from MTC's travel demand forecasting model, Travel Model 1.5. The model forecasts VMT, along with daily vehicle trips and distribution of VMT by speed. This data is then imported into EMFAC2021 to obtain emissions data.

In its analysis, MTC modeled regional impacts from VMT on all links in the network and used a separate methodology to assess impacts to CARE Community. This approach is consistent with the PBA 2040 EIR and the approach that was developed by MTC's Equity Analysis workgroup. MTC used a GIS to digitally overlay the CARE communities onto Travel Model 1.5's roadway links to identify the roadway links that run through CARE communities and non-CARE communities that meet these criteria. TAC and $PM_{2.5}$ emissions were then estimated for CARE community and non-CARE community 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.

TAC Emission Sources

The following describes the types of TAC emission source impacts analyzed in this EIR.

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 travel activity data (from MTC's travel demand forecasting model, Travel Model 1.5) 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 were developed by extrapolating modeling results from excursions vessels departing San Francisco.

Large and/or Complex Sources

Large and complex sources—for example, oil refineries or seaports—can emit relatively high levels of TACs and fine PM. There are typically numerous emission sources within each of these facilities, making it difficult to characterize the specific local variations of concentrations of TACS and fine PM within the surrounding community (BAAQMD 2016).

Stationary Sources

Stationary sources include sources permitted by BAAQMD, such as refineries, gas stations, back-up generators, and auto body shops. Screening analyses for cancer risk and $PM_{2.5}$ exposures from stationary sources were conducted in accordance with the BAAQMD CEQA Guidelines (BAAQMD 2016).

IMPACTS AND MITIGATION MEASURES

Impact AQ-1: Conflict with or obstruct implementation of the applicable air quality plan (LTS)

The nine-county MTC region encompasses three air basins: the San Francisco Bay Area Air Basin 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. BAAQMD governs the San Francisco Bay Area Air Basin.

BAAQMD's 2017 Clean Air Plan, Spare the Air Cool the Climate (2017 Plan), is a multi-pollutant plan focused on two closely related goals: 1) protecting public health and 2) protecting the climate. The 2017 Plan's goals related to climate are discussed in Section 3.6, "Climate Change, Greenhouse Gases, and Energy." With respect to public health and air quality impacts, the 2017 Plan updates the previous Bay Area ozone plan, the 2010 Clean Air Plan, pursuant to air quality planning requirements defined in the California Health and Safety Code. To fulfill State ozone planning requirements, the control strategy includes all feasible measures to reduce emissions of ozone precursors—ROG and NO_X—and reduce transport of ozone and its precursors to neighboring air basins. In addition, the Plan builds upon and enhances the Air District's efforts to reduce emissions of $PM_{2.5}$ and TACs.

The control strategy, which serves as the backbone of the 2017 Plan, builds upon existing regional, State, and national programs that have successfully reduced air pollution and improved public health over the past several decades. The control strategy includes an integrated set of control measures designed to:

- reduce ozone precursors, in order to fulfill California Health and Safety Code ozone planning requirements;
- protect public health by reducing emissions of ozone precursors, PM TACs; and
- serve as a regional climate protection strategy by reducing GHG emissions across the full range of economic sectors.

The 2017 Plan's comprehensive control strategy includes 85 control measures with some measures focusing on reducing a single type of air pollutant. Many of the measures, however, reduce multiple pollutants and serve both to protect public health and to protect the climate. The control strategies in the 2017 Plan 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, in part, by dispersed development patterns that result in increased dependency on motor vehicles and by population and job growth. The 2017 Plan encourages 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 2017 Plan 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.

Land Use, Sea Level Rise Adaptation, and Transportation System Impacts

Operation

The proposed Plan's core "focused growth" strategy discussed in Chapter 2, "Project Description," aligns with the four key themes embedded in the 2017 Plan, identified above. This core strategy of the proposed Plan is intended to "focus growth" into existing communities along the existing

transportation network to achieve key regional economic, environmental and equity goals by building upon existing community characteristics, leveraging existing infrastructure, while reducing effects on areas with less low-density development.

In addition, many of the proposed Plan's 35 integrated housing, economic, transportation, and environmental strategies align and would help implement many of the 85 control measures in the 2017 Plan control strategy. Applicable land use control measures of the 2017 Plan are listed below:

- EN2: Decrease Energy Use: This measure focuses on decreasing energy use in the Bay Area by (1) increasing consumer awareness about energy efficiency through education and outreach and (2) tracking electricity use.
- BL1: Green Buildings: This control measure would increase energy efficiency and the use of on-site renewable energy—as well as decarbonize existing end uses—for all types of existing and future buildings. The measure includes policy assistance, incentives, diffusion of public information, and targeted engagement and facilitation of partnerships in order to increase energy efficiency and on-site renewable energy in the buildings sector.
- BL2: Decarbonize Buildings: This control measure would reduce GHG emissions, criteria pollutants, and TACs by limiting the installation of space- and water-heating systems and appliances powered by fossil fuels. This measure will be implemented by developing model policies for local governments that support low- and zero-carbon technologies, as well as potentially developing a rule limiting the sale of natural gas furnaces and water heaters.
- BL4: Urban Heat Island Mitigation: This control measure in intended to reduce the "urban heat island" phenomenon by increasing the application of "cool roofing" and "cool paving" technologies, as well as increasing the prevalence of urban forests and vegetation, through voluntary approaches and educational outreach.

Applicable transportation control measures of the 2017 Plan are listed below:

- TR1: Clean Air Teleworking: The primary objective of the Clean Air Teleworking measure is to increase the number of employees who telework in the Bay Area, especially on Spare the Air days, by providing outreach and assistance to employees and employers.
- TR2: Trip Reduction Programs: The Trip Reduction Programs measure includes a mandatory and voluntary trip reduction program. The regional Commuter Benefits Program, resulting from SB 1339, and similar local programs in jurisdictions with ordinances that require employers to offer pretax transit benefits to their employees are mandatory programs. Voluntary programs include outreach to employers to encourage them to implement strategies that encourage their employees to use alternatives to driving alone.
- TR3: Local and Regional Bus Service: The Local and Regional Bus Service improvements control measure will improve existing transit service on the region's core transit systems and include new bus rapid transit lines in San Francisco, Oakland, and Santa Clara County.
- TR4: Local and Regional Rail Service Improvements: This measure will improve rail service by sustaining and expanding existing services and by providing funds to maintain rail cars, stations, and other rail capital assets. Specific projects for implementation include BART extensions, Caltrain electrification, Transbay Transit Center building and rail foundation, Capital Corridor intercity rail service, and Sonoma Marin Area Rail Transit (SMART) District commuter rail project.

- TR5: Transit Efficiency and Use: This measure will 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.

- TR6: Freeway and Arterial Operations: This measure improves the performance and efficiency of freeway and arterial systems through operational improvements, such as implementing the Freeway Performance Initiative, the Bay Area Freeway Service Patrol, and the Arterial Management Program.

- TR7: Safe Routes to Schools and Transit: This measure will facilitate safe routes to schools and transit by providing funds and working with transportation agencies, local governments, schools, and communities to implement safe access for pedestrians and cyclists. Likely projects will include implementation of youth outreach and educational programs to encourage walking and cycling, the construction of bicycle facilities, and improvements to pedestrian facilities.

- TR8: Ridesharing and Last-Mile Connections: The Ridesharing and Last-Mile Connections measure will promote ridesharing services and incentives through the implementation of the 511 Regional Rideshare Program, as well as local rideshare programs implemented by congestion management agencies. These activities will include marketing rideshare services, operating a rideshare information call center and website, and providing vanpool support services. In addition, this measure includes provisions for encouraging car sharing programs.

- TR9: Bicycle and Pedestrian Access and Facilities: The bicycle component of this measure will expand bicycle facilities serving employment sites, educational and cultural facilities, residential areas, shopping districts, and other activity centers. Typical improvements include bike lanes, routes, paths, and bicycle parking facilities. The bicycle component also includes a bike-share pilot project that was developed to assess the feasibility of bicycle sharing as a first- and last-mile transit option.

- TR10: Land Use Strategies: Local land use decisions can directly and indirectly affect air quality and GHG emissions, as well as people's exposure to TACs. This measure supports land use patterns that reduce VMT and associated emissions and exposure to TACs, especially within infill locations and affected communities.

- TR11: Value Pricing Strategies: This measure will pursue implementation of value pricing strategies, such as tolling on transbay bridges and cordon pricing on roads, as well as auto pricing options, such as a VMT fee and pay at-the-pump auto insurance.

- TR13: Parking Policies: Parking policies and practices have a profound impact on vehicle travel and mode choice, as well as land use patterns and the quality of the built environment. Parking policies are also an important tool in implementing focused growth strategies. This control measure outlines how MTC and the Air District, in cooperation with regional agency partners, will (1) take actions at the regional level to implement parking policies that will benefit air quality, and (2) encourage and support local agency parking policies to reduce motor vehicle travel and promote focused growth.

- TR14: Cars & Light Trucks: This control measures summarizes actions by the Air District, MTC, local businesses, city and county governments, and State and federal agencies to expand the use of zero-emission vehicles and plug-in electric vehicles (PEV), comprising both battery electric and plug-in hybrid passenger vehicles and light-duty trucks, within the Bay Area.

- TR15: Public Outreach: The Public Outreach control measure includes activities to encourage Bay Area residents to make choices that benefit air quality. This measure includes various public outreach campaigns to educate the public about the health effects of air pollution and the air

quality benefits of reducing motor-vehicle trips and choosing transportation modes that reduce motor vehicle emissions. The measure includes outreach and education regarding electric vehicles, smart driving, carpooling, vanpooling, use of public transit, biking, walking, and telecommuting.

- TR16: Indirect Source Review: An indirect source review rule would reduce construction and operating emissions associated with new or modified land uses in the Bay Area. The Indirect Source Review measure is intended to address potential increases in air pollutant emissions related to economic and population growth in the region. Indirect sources are development projects that generate or attract motor vehicle trips and thus "indirectly" cause air pollution from vehicles and area sources. Area source emissions include fireplaces, home heating furnaces, hot water heaters, and landscape maintenance equipment.

- TR18: Goods Movement: The measure includes regional programs to reduce emissions associated with goods movement including funding for goods movement–related infrastructure, planning work to update the Regional Goods Movement Plan, and participation in the regional Goods Movement Collaborative. Goods movement is a critical component of the Bay Area's economic and transportation system, and a significant source of air pollutant emissions. Exposure to diesel PM from goods movement disproportionately affects the health of residents near ports, railyards, distribution centers, and roads with high truck volumes. Investing in the Bay Area's trade corridors will address existing air quality and public health issues, as well as help the region to prepare for continued growth in this economic sector.

Table 3.4-8 below cross references the proposed Plan's housing, economic, and environmental strategies to relevant control measures in the 2017 Plan.

Table 3.4-8: Proposed Plan Land Use Strategies and 2017 Plan Control Measures

Proposed Plan Strategy	Relevant Control Measures in 2017 Clean Air Plan
Strategy H3: **Allow a Greater Mix of Housing Densities and Types in Growth Geographies** | Allow a variety of housing types at a range of densities to be built in PDAs, select TRAs, and select HRAs.	TR10
Strategy H4: **Build Adequate Affordable Housing to Ensure Homes for All** | Construct enough deed-restricted affordable homes necessary to fill the existing gap in housing for the unhoused community and to meet the needs of low-income households.	BL1, BL2, BL4, TR10, EN2
Strategy H5: **Transform Aging Malls and Office Parks into Neighborhoods** | Permit and promote the reuse of shopping malls and office parks with limited commercial viability as neighborhoods with housing at all income levels.	BL1, BL2, BL4, TR10, EN2
Strategy H6: **Provide Targeted Mortgage, Rental and Small Business Assistance to Communities of Concern** | Provide assistance to low-income communities and communities of color to address the legacy of exclusion and predatory lending, while helping to grow locally owned businesses.	BL1, BL2, BL4, TR10, EN2
Strategy H8: **Accelerate Reuse of Public and Community-Owned Land for Mixed-Income Housing and Essential Services** | Help public agencies, community land trusts and other non-profit landowners to accelerate development of mixed-income affordable housing.	BL1, BL2, BL4, TR10, EN2
Strategy EC3: **Invest in High-Speed Internet in Underserved Low-Income Communities** | Provide direct subsidies and construct public infrastructure to ensure all communities have affordable access to high-speed internet.	TR1
Strategy EC4: **Allow Greater Commercial Densities in Growth Geographies** | Allow greater densities for new commercial development in select PDAs and select TRAs to encourage more jobs to locate near public transit.	TR10
Strategy EC5: **Provide Incentives to Employers to Shift Jobs to Housing-Rich Areas Well Served by Transit** | Provide subsidies to encourage employers to relocate offices to housing-rich areas near regional rail stations.	TR5, TR10
Strategy EC6: **Retain and Invest in Key Industrial Lands** | Implement local land use policies to protect key industrial lands identified as PPAs, while funding key infrastructure improvements in these areas.	TR10

Proposed Plan Strategy	Relevant Control Measures in 2017 Clean Air Plan
Strategy EN2: **Provide Means-Based Financial Support to Retrofit Existing Residential Buildings** | Adopt building ordinances and incentivize retrofits to existing buildings to meet higher seismic, wildfire, water, and energy standards, providing means-based subsidies to offset associated costs.	BL1, BL2, EN2
Strategy EN3: **Fund Energy Upgrades to Enable Carbon-Neutrality in All Existing Commercial and Public Buildings** | Support electrification and resilient power system upgrades in all public and commercial buildings.	BL1, BL2, EN2
Strategy EN4: **Maintain Urban Growth Boundaries** | Using urban growth boundaries and other existing environmental protections, confine new development within areas of existing development or areas otherwise suitable for growth, as established by local jurisdictions.	TR10
Strategy EN5: **Protect and Manage High-Value Conservation Lands** | Provide strategic matching funds to help conserve and maintain high-priority natural and agricultural lands, including but not limited to PCAs and wildland-urban interface lands.	TR10
Strategy EN6: **Modernize and Expand Parks, Trails and Recreation Facilities** | Invest in quality parks, trails and open spaces that provide inclusive recreation opportunities for people from all backgrounds, abilities, and ages to enjoy.	TR10
Strategy EN7: **Expand Commute Trip Reduction Programs at Major Employers** | Set a sustainable commute target for major employers as part of an expanded Bay Area Commuter Benefits Program, with employers responsible for funding incentives and disincentives to shift auto commuters to any combination of telecommuting, transit, walking, and/or bicycling.	TR1, TR2, TR8, TR9, TR15
Strategy EN8: **Expand Clean Vehicle Initiatives** | Expand investments in clean vehicles, including more fuel-efficient vehicles and electric vehicle subsidies and chargers.	TR14
Strategy EN9: **Expand Transportation Demand Management Initiatives** | Expand investments in programs like vanpools, bikeshare, carshare and parking fees to discourage solo driving.	TR2, TR8, TR11, TR13, TR14

Source: Data compiled by MTC and ABAG in 2021 in consultation with BAAQMD

The proposed Plan supports the 2017 Plan in a variety of areas by providing a long-term transportation funding strategy, allocating housing construction funds, and defining a strategy to meet the GHG reduction goals for cars and light trucks established by CARB pursuant to SB 375 (discussed above). The proposed Plan pursues the region's goals through a strategy to direct the region's future housing needs to Priority Development Areas (PDAs), while protecting open space, scenic areas, and agricultural lands that face near-term development pressure through Priority Conservation Areas (PCAs). In addition to reducing development pressure on the region's open space, this "focused growth" approach would place development near existing transit facilities and encourage more balanced jobs and housing ratios to reduce commute distances. In addition to changes in land use and transportation investments, the proposed Plan includes a number of complementary policies and programs designed to provide additional reductions in vehicle travel and GHG emissions from on-road vehicles.

Consistent with the 2017 Plan, a primary objective of the proposed Plan is to reduce mobile-source GHG emissions through reductions in per-capita VMT. Reducing VMT would lead to direct reduction in transportation related air quality pollutants emitted by motor vehicles. Additionally, reducing GHG emissions may further improve local air quality. Atmospheric warming associated with GHG emissions and climate change have the potential to increase ground-level ozone in many regions, which may present challenges for compliance with the ozone standards in the future. The impact of GHG emissions and climate change on other air pollutants, such as PM, is less certain, but research is underway to address these uncertainties.

The policies and the capital investments defined by transportation strategies in the proposed Plan are consistent with the relevant control measures in the 2017 Plan. **Table 3.4-9**, like **Table 3.4-8**, above, cross references the proposed Plan's transportation and environmental strategies that align and would

help implement control measures in the 2017 Plan. See also Impact TRA-2 in Section 3.15, "Transportation," for a discussion of the proposed Plan strategies. As noted under TRA-2, the combination of proposed Plan transportation and environmental strategies, plus the housing and economy strategies in the proposed Plan, would shift trips throughout the Bay Area away from driving and towards transit, walk, and bike modes. The proposed Plan would support implementation of the 2017 Plan. Therefore, the proposed Plan would not conflict with nor obstruct implementation of the primary goals, applicable control measures, or implementation of any control measures of BAAQMD's 2017 Clean Air Plan, and this impact would be less than significant (LTS).

Table 3.4-9: Proposed Plan Transportation Strategies and 2017 Plan Control Measures

Proposed Plan Strategy	Relevant Control Measures in 2017 Clean Air Plan
Strategy T2: **Support Community-Led Transportation Enhancements in Communities of Concern** | Provide direct funding to historically marginalized communities to fund locally identified transportation needs.	TR3, TR4, TR5, TR7, TR8, TR9, TR14, TR15
Strategy T3: **Enable a Seamless Mobility Experience** | Eliminate barriers to multi-operator transit trips by streamlining fare payment and trip planning, while requiring schedule coordination at timed transfer hubs.	TR5, TR8, TR9
Strategy T4: **Reform Regional Transit Fare Policy** | Streamline fare payment and replace existing operator- specific discounted fare programs with an integrated fare structure across all transit operators.	TR5
Strategy T5: **Implement Per-Mile Tolling on Congested Freeways with Transit Alternatives** | Apply a per-mile charge on auto travel on select congested freeway corridors where transit alternatives exist, with discounts for carpoolers, low-income residents, and off-peak travel, with excess revenues reinvested into transit alternatives in the corridor.	TR11
Strategy T6: **Improve Interchanges and Address Highway Bottlenecks** | Rebuild interchanges and widen key highway bottlenecks to achieve short-to-medium term congestion relief.	TR6, TR14, TR18
Strategy T7: **Advance Other Regional Programs and Local Priorities** | Fund regional programs like Clipper and 511, while supporting local transportation investments on arterials and local streets.	TR5
Strategy T8: **Build a Complete Streets Network** | Enhance streets to promote walking, biking, and other micromobility through sidewalk improvements, car-free slow streets, and 10,000 miles of bike lanes or multi-use paths.	TR2, TR7, TR8, TR9
Strategy T9: **Advance Regional Vision Zero Policy through Street Design and Reduced Speeds** | Reduce speed limits to 20 to 35 miles per hour on local streets and 55 miles per hour on freeways, relying on design elements on local streets and automated speed enforcement on freeways.	TR7, TR9
Strategy T10: **Enhance Local Transit Frequency, Capacity and Reliability** | Improve the quality and availability of local bus and light rail service, with new bus rapid transit lines, South Bay light rail extensions, and frequency increases focused in lower-income communities.	TR3, TR4
Strategy T11: **Expand and Modernize the Regional Rail Network** | Better connect communities while increasing frequencies by advancing a New Transbay Rail Crossing, BART to Silicon Valley Phase 2, Valley Link and Caltrain/High-Speed Rail Grade Separations, among other projects.	TR3, TR4

Source: Data compiled by MTC and ABAG in 2021 in consultation with BAAQMD

The Northern Sonoma County Air Pollution Control District (NSCAPCD) governs the North Coast Air Basin. NSCAPCD is in attainment for all state and federal criteria air pollutants and NSCAPCD does not currently have and is not required to have an air quality management plan. NSCAPCD makes air quality improvements though the permitting and rule-making processes.

The Yolo-Solano Air Quality Management District (YSAQMD) governs the Sacramento Valley Air Basin, which covers eastern Solano County. YSAQMD is within the Sacramento Air Quality Management District's federal nonattainment boundaries and is directly responsible for portions of the federal 2015 ozone SIP. YSAQMD was required to submit a reasonably available control technology (RACT) SIP analysis, and it was approved by their board of directors on September 9, 2020. The YSAQMD's RACT analysis recommends VOC limits for solvents that are generally equivalent to those found in the BAAQMD rule regulating solvent use. In addition, for state of California air quality standards, YSAQMD is not required to prepare an attainment plan for PM_{10} or $PM_{2.5}$, but YSAQMD consulted with MTC,

ABAG, and BAAQMD during the development of their triennial assessment and plan update, and the proposed Plan would not be inconsistent with the YSAQMD Triennial Plan.

Conclusion

The proposed Plan's core objectives and strategies align with and would support the implementation of the 2017 Clean Air Plan and YSAQMD Triennial Plan. 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 BAAQMD's 2017 Clean Air Plan and YSAQMD Triennial Plan, the impact would be **less than significant (LTS)**.

Mitigation Measures

None required.

Impact AQ-2: Result in a substantial net increase in construction-related emissions (PS)

Land Use, Sea Level Rise Adaptation, and Transportation System Impacts

Construction

Construction-related emissions from implementation of the proposed Plan's forecasted development pattern, sea level rise adaptation infrastructure, and transportation projects would contribute to construction-related emissions but would not likely result in a substantial net increase in 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 2050. Construction equipment and processes are generally similar between land use, sea level rise adaptation, and transportation projects.

As individual projects under the projected land use pattern, sea level rise infrastructure, and planned transportation improvements are constructed, construction activity would result in emissions of criteria air pollutants (e.g., $PM_{2.5}$ and PM_{10}) and precursors (e.g., Reactive Organic Gases [ROG] and NO_x) from site preparation (e.g., excavation, grading, and clearing); exhaust from off-road equipment, material delivery vehicles, and worker commute vehicles; vehicle travel on paved and unpaved roads; and other miscellaneous activities (e.g., building construction, asphalt paving, application of architectural coatings, and trenching for utility installation). The above pollutants are specifically relevant because the region is in nonattainment for State and federal ozone standards, the federal 24-hour $PM_{2.5}$ standard, and State PM_{10} standards. These emission types and associated levels fluctuate greatly depending on the particular type, number, and duration of usage for the varying equipment used during construction. 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).

With respect to construction equipment, EPA and CARB 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 CARB rules and emission standards are in the process of being implemented and are therefore reasonably foreseeable. EPA and CARB 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, CARB'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.

Although EPA and CARB 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 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. This impact would be potentially significant (PS).

Conclusion

Implementation of the proposed Plan's land use development pattern, sea level rise adaptation infrastructure, and transportation projects could result in a substantial net increase in construction-related emissions, this impact would be **potentially significant (PS)**. Mitigation Measure AQ-2 addresses this impact and is described below.

Mitigation Measures

Mitigation Measure AQ-2 Implementing agencies and/or project sponsors shall implement measures, where feasible and necessary based on project- and site-specific considerations, that include those identified below:

When applicable screening levels set by the relevant air district are exceeded, implementing agencies and/or project sponsors shall implement measures, where feasible and necessary based on project- and site-specific considerations, that include those identified below:

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 the relevant air district (e.g., BAAQMD, NSCAPCD, or YSAQMD) for review and certification. The list shall include all information necessary to ensure the equipment meets the following requirement:
  - Equipment shall be zero emissions or have engines that meet or exceed either EPA or CARB Tier 4 off-road emission standards, and it shall have engines that are retrofitted with a CARB 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 Entrained 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.
- On-site dirt piles or other stockpiled PM shall be covered, wind breaks installed, and water and/or soil stabilizers employed to reduce wind-blown dust emissions. The use of approved nontoxic soil stabilizers shall be incorporated according to manufacturers' specifications to all inactive construction areas.
- 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 transfer processes involving a free fall of soil or other PM shall be operated in such a manner as to minimize the free fall distance and fugitive dust emissions.
- 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.
- Open burning shall be prohibited at the project site. No open burning of vegetative waste (natural plant growth wastes) or other legal or illegal burn materials (e.g., trash, demolition debris) may be conducted at the project site. Vegetative wastes shall be chipped or delivered to waste-to-energy facilities (permitted biomass facilities), mulched, composted, or used for firewood. It is unlawful to haul waste materials off-site for disposal by open burning.
- The primary contractor shall be responsible for ensuring that all construction equipment is properly tuned and maintained before and for the duration of on-site operation.

- Where accessible, existing power sources (e.g., power poles) or clean-fuel generators shall be used rather than temporary power generators.
- A traffic plan shall be developed to minimize traffic flow interference from construction activities. The plan may include advance public notice of routing, use of public transportation, and satellite parking areas with a shuttle service. Operations that affect traffic shall be scheduled for off-peak hours. Obstruction of through-traffic lanes shall be minimized. A flag person shall be provided to guide traffic properly and ensure safety at construction sites.

Applicable mitigation measures shall be required at the time grading permits are issued.

Significance after Mitigation

The measures described above would minimize emissions of criteria air pollutants (e.g., PM_{10} and $PM_{2.5}$) and precursors (e.g., ROG and NOx) by requiring best practices for dust and exhaust emissions 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 implementing agency requires an individual project to implement all feasible mitigation measures described above, the project's impact would be less than significant with mitigation (LTS-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 and 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 would be **significant and unavoidable (SU)** for purposes of this program-level review.

Impact AQ-3: Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is in non-attainment under an applicable federal or state ambient air quality standard (PS)

Land Use Impacts

Operation

This discussion addresses operation of the proposed Plan. See Impact AQ-2 for a discussion of the construction-related impact of Plan implementation. As shown in **Table 3.4-10**, the area-source emissions of criteria pollutants and precursors would increase over the planning horizon of the Plan because of the net increase in population, households, and employment in the region. When compared to existing conditions (2015), implementation of the proposed Plan would increase area-source ROG emissions by 22.8 tons per day, NO_X emissions by 5.3 tons per day, PM_{10} emissions by 1.5 tons per day, and $PM_{2.5}$ emissions by 1.5 tons per day. In addition, because the proposed Plan area is in nonattainment for State and federal ozone standards, the federal 24-hour $PM_{2.5}$ standard, and State PM_{10} standard, emissions of ozone precursors (ROG and summertime NO_x), $PM_{2.5}$ and PM_{10} are evaluated to determine whether emissions of these pollutants would result in a cumulatively considerable net increase. **Table 3.4-11** shows the percent breakdown of the net change in regional emissions by area-source type. As discussed under "Method of Analysis," these area-source emissions estimates are based on the net change in land use development anticipated in the region under the Plan. The land use and transportation network in the proposed Plan provides only the foundation for future development and transportation patterns. Whether or not individual projects would result in substantial area source emissions would depend on various parameters (e.g., project size, design, energy efficiency) that are not known at this time and, therefore, cannot be quantified on an individual

basis. However, area-source emissions associated with implementation of the proposed Plan have been generally calculated for informational purposes.

As shown in **Table 3.4-10**, 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. CARB and the three air districts in the region have policies in place that regulate emissions from architectural coatings and hearths. CARB also has five existing consumer product regulations (CARB 2019). However, more emission reduction measures may be needed to ensure that all projects consistent with the proposed Plan would not exceed existing levels. This impact would be potentially significant (PS).

Table 3.4-10: Unmitigated Daily Area-Source Emissions from Changes in Land Uses by County in 2050 (tons per day)

County	ROG	NO_X	PM_{10}	$PM_{2.5}$
Alameda	5.4	1.6	0.2	0.2
Contra Costa	3.7	1.2	0.1	0.1
Marin	1.2	0.3	0.1	0.1
Napa	0.2	0.1	0.0	0.0
San Francisco	7.8	0.8	1.0	1.0
San Mateo	2.4	0.7	0.1	0.1
Santa Clara	0.2	0.1	0.0	0.0
Solano	1.3	0.4	0.0	0.0
Sonoma	0.7	0.2	0.0	0.0
Regional Total	22.8	5.3	1.5	1.5

Notes: Forecasts of area-source emissions do not account for expected reductions from the implementation of strategy EN02 or EN03 because of modeling limitations. "Changes in land uses" are the net change in land uses between 2015 and 2050 anticipated under the proposed Plan.

Source: Data provided by Ascent Environmental in 2021 based on modeling using CalEEMod 2016.3.2 and land use estimates provided by MTC and ABAG in 2021

Table 3.4-11: Distribution of Area-Source Emissions from Changes in Land Uses by Source in 2050

Source	ROG	NO_X	PM_{10}	$PM_{2.5}$
Architectural Coatings	14%	0%	0%	0%
Consumer Products[1]	82%	0%	0%	0%
Landscaping Equipment	2%	4%	15%	15%
Natural Gas – Hearths[2]	N/A	2%	19%	19%
Natural Gas – Energy[3]	1%	94%	66%	66%
Total	100%	100%	100%	100%

Notes: Forecasts of area-source emissions do not account for expected reductions from the implementation of strategy EN02 or EN03 because of modeling limitations. "Changes in land uses" are the net change in land uses between 2015 and 2050 anticipated under the proposed Plan.

[1] Includes emissions from consumer products, such as aerosols and household chemicals.

[2] Includes emissions from natural gas combustion in hearths.

[3] Includes emissions from natural gas combustion in water heating, space heating, and cooking applications.

Sources: Estimates calculated by Ascent Environmental in 2021 based on modeling using CalEEMod 2016.3.2 and land use estimates provided by MTC and ABAG in 2021

Sea Level Rise Adaptation Impacts

Operation

The operation of sea level rise adaptation infrastructure would not result in a considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable federal or State ambient air quality standard because the sea level rise adaptation infrastructure would not

include stationary equipment that would generate or emit emissions. This impact would be less than significant (LTS).

Transportation System Impacts

Operation

The proposed transportation projects would result in a net increase in VMT (**Table 3.4-7**); however, as shown in **Table 3.4-12**, mobile source emissions of criteria pollutants ROG, NO_X (summertime and wintertime), and $PM_{2.5}$ in the region would decrease between 2015 and 2050, 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 70 percent (41.1 tons per day), summertime NO_X emissions by 81 percent (89.9 tons per day), and wintertime NO_X emissions by 81 percent (102.2 tons per day). The primary reason for these reductions is the increasingly stringent emission controls adopted by CARB 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. 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 per capita.

Table 3.4-12: Emission Estimates for Criteria Pollutants using EMFAC2021 Emission Rates (tons per day)

	Baseline, 2015	Proposed Project, 2050	Change, 2015 to 2050	
			Numerical	Percentage
ROG	58.5	17.4	-41.1	-70%
NO_X (Summertime)	111.6	21.7	-89.9	-81%
NO_X (Wintertime)	126.7	24.5	-102.2	-81%
$PM_{2.5}$	6.3	5.5	-0.7	-12%
PM_{10}	27.1	30.0	+3.0	+11%

Note: Forecasts of mobile-source emissions do not account for expected reductions from the implementation of strategy EN08 or EN09 because of modeling limitations.
Source: Emissions modeling using EMFAC 2021; data compiled by MTC and ABAG in 2021

The results in **Table 3.4-12** indicate that mobile-source $PM_{2.5}$ emissions would decrease by 12 percent (0.7 tons per day), and PM_{10} emissions would increase 11 percent (3.0 tons per day) during the proposed Plan's timeframe compared to existing conditions. The higher levels of PM_{10} emissions in 2050 conditions are primarily a function of the 17 percent growth in VMT (**Table 3.4-7**) (which directly affects the occurrence of entrained roadway dust), with some contributions from tire and brake wear and exhaust. Exhaust emissions of PM_{10} would not increase at the same rate as VMT (17 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.

SB 1, the Road Repair and Accountability Act of 2017, requires the California Department of Motor Vehicles, starting January 1, 2020, to verify that a medium-duty or heavy-duty vehicle is compliant with or exempt from CARB's Truck and Bus Regulation before allowing registration.

In addition, the Goods Movement Emission Reduction Program (GMP, Program) under Proposition 1Bis a partnership between CARB and local agencies designed to quickly reduce diesel emissions and health risk from freight movement along California trade corridors. Projects funded under this Program must achieve early or extra emission reductions not otherwise required by law or regulation. The BAAQMD will solicit projects during 2020-2021 for the Year 5 Program. BAAQMD staff will evaluate

all applications received during the solicitation period and submit a single approved-projects list to CARB for competitive ranking based on estimated emission reductions and cost-effectiveness. Eligible project types include upgrading diesel-powered RTG with zero-emissions RTG system (electric, fuel cell), converting existing yard truck with an electric drive train and control system, replacing yard trucks with electric-or fuel cell-powered yard trucks, replacing forklifts with class 1 electric or fuel cell-powered forklifts, and replacing large-capacity lift equipment with electric-or fuel cell-powered lifts. With the replacement or conversion of at least one yard truck, applicants may also apply for a battery charger or hydrogen fueling unit (BAAQMD 2017b).

Even with implementation of these programs, there would be significant reductions in ROG, NO_X, and some reduction in $PM_{2.5}$ mobile-source emissions. Nonetheless, because there would be a net increase in PM_{10} emissions from mobile sources, this impact would be potentially significant (PS).

Conclusion

Table 3.4-13 shows the net new daily emissions that would occur in the region as a result of the implementation of the proposed Plan's land use development pattern and transportation projects; implementation of sea level rise adaptation infrastructure projects are not anticipated to result in net increases in emissions.

Table 3.4-13: Net Mobile- and Area-Source Emissions Anticipated under the Plan (Tons per Year)

Source	ROG	NO_X	$PM_{2.5}$	PM_{10}
Mobile	-41.1	-89.9	-0.7	3.0
Area	22.8	5.3	1.5	1.5
Total	-18.3	-84.6	0.8	4.5
Increase from Existing?	No	No	Yes	Yes
Within BAAQMD CEQA Plan Thresholds of Significance	Yes	Yes	No	No

Note: Forecasts of mobile- and area-source emissions do not account for expected reductions from the implementation of strategy EN02, EN03, EN08, or EN09 because of modeling limitations.

Sources: Emissions modeling using EMFAC2021; data compiled by MTC and ABAG in 2021

As shown in Table 3.4-13, the proposed Plan would result in a net decrease in ROG and NO_X 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.

A key source of PM is the combustion of fossil fuels. After these fuels break down during combustion, they cool, become radicalized, and agglomerate. These particles can form highly toxic compounds, and, when inhaled, the particles can enter the respiratory tract, causing chemical imbalances throughout the body, potentially resulting in inflammation, cell death and organ failure. The health effects from toxic PM emission compounds can contribute to cardiovascular events, such as stroke and heart attack (BAAQMD 2020).

For PM emissions, the Bay Area faces challenges in overcoming information gaps including concerns of newly dominant sources of $PM_{2.5}$. As PM emissions from top sources are reduced, additional sources emerge as priorities, yet less information is available about these other sources. This leaves a lag between re-prioritization and updated scientific literature and this uncertainty cannot yet be quantified. As emissions from vehicle exhaust are reduced, the proportion of $PM_{2.5}$ attributed to re-entrained road dust increases. However, calculations for re-entrained road dust were last updated in the late 1980s. These methods are being currently evaluated and updated by CARB and the California Department of Transportation (BAAQMD 2020).

BAAQMD continues to update its rules and regulations to further limit PM exposures. As its focus shifts from an exclusively regional perspective to reducing risks for disproportionately impacted local communities, the Air District is exploring the possibility of treating PM as a TAC. Although the State of California does not presently recognize undifferentiated PM as an air toxic, it may be possible for the Air District to do so independently (BAAQMD 2020).

The increase of PM emissions could result in an increase in ambient concentrations of PM in the San Francisco Bay Area Air Basin and, moreover, increase the likelihood that ambient concentrations exceed the CAAQS and NAAQS. The increase in Plan-generated emissions of PM could impede air quality planning efforts to bring the air basin into attainment of the CAAQS for both PM_{10} and $PM_{2.5}$. However, the levels of criteria air pollutant and precursor emissions associated with implementation of the Plan cannot be directly correlated to specific health outcomes for specific sensitive receptors.

While the description of effects noted above could manifest in the recipient receptors, actual effects on individuals depend on individual factors, such as life stage (e.g., older adults are more sensitive), preexisting cardiovascular or respiratory diseases, and genetic conditions. Even with this type of specific medical information (which is confidential to the individual), there are wide ranges of potential outcomes from exposure to particulates, from no effect to the effects described above. In addition, local and regional concentration levels of PM are highly dependent on meteorological conditions, such as precipitation and wind patterns, and MTC does not have land use authority over the anticipated new development under the Plan and cannot know with certainty that future development would occur as outlined in the proposed Plan or if new growth would occur within the Plan area and period. Therefore, other than determining the types of health effects that could occur, it would be speculative to more specifically correlate exposure to criteria air pollutants from this Plan to specific health outcomes for sensitive receptors.

Plan-generated emissions could contribute to the existing nonattainment condition in the county with respect to the CAAQS and NAAQS for PM and could therefore increase the potential for adverse health impacts from exposure to PM. While the Plan would not conflict with the 2017 Clean Air Plan and other applicable plans and policies, it is possible that individual projects developed under the Plan could exceed BAAQMD's project-level thresholds. For this reason, should this occur, this impact would be **potentially significant (PS)**. Mitigation Measures AQ-3(a) through AQ-3(d) address this impact and are presented below.

Mitigation Measures

Mitigation Measure AQ-3(a) MTC and ABAG, in partnership with BAAQMD, and implementing agencies, shall work together to support the use of existing air quality and transportation funds and seek additional funds to continue to implement BAAQMD and CARB programs (e.g., Carl Moyer) intended to retrofit and replace trucks and locomotives.

Mitigation Measure AQ-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, brake wear, and roadway dust.

Mitigation Measure AQ-3(c) MTC and ABAG, in partnership with local air districts, and implementing agencies shall:

- support the advancement of corridor-level plans and implementation of projects located on severely congested (LOS F) facilities and

- incorporate transportation demand management (TDM) strategies into individual land use land transportation projects and plans, as part of the planning process; TDM strategies could include ridesharing, carsharing, telecommuting, adopting flexible working hours, implementing parking management and traffic- calming measures, and marketing TDM options (especially alternative commuting services).

Mitigation Measure AQ-3(d) When applicable screening levels set by the applicable air district are exceeded, implementing agencies and/or project sponsors shall implement measures, where feasible and necessary based on project- and site-specific considerations, that include those identified below or are updated by BAAQMD/the applicable air district or within CalEEMod:

- Provide for, or contribute to, dedication of land for off-site Class I and Class II bicycle trails linking the project to designated bicycle commuting routes in accordance with the regional bikeway master plan.
- Provide preferential parking spaces for carpool and vanpool vehicles, implement parking fees for single-occupancy vehicle commuters, and implement parking cash-out program for employees.
- Support local requirements regarding electric vehicle charging spaces.
- Support the inclusion of bus shelters at transit access points where deemed appropriate by local public transit operator in large residential, commercial, and industrial projects.
- Support local communities and agencies equipping of residential structures with electric outlets in the front and rear of the structure to facilitate use of electrical lawn and garden equipment.
- Support the contribution to the provision of synchronized traffic signals on roadways affected by the project and as deemed necessary by the local public works department.
- Support local transit-enhancing infrastructure that includes bus turnouts or bulbs, passenger benches, street lighting, route signs and displays, and shelters as demand and service routes warrant, subject to review and approval by local transportation planning agencies.
- Support pedestrian-enhancing infrastructure that includes sidewalks and pedestrian paths, direct pedestrian connections, street trees to shade sidewalks, pedestrian safety designs and infrastructure, street furniture and artwork, street lighting, pedestrian signalization and signage, and/or access between bus service and major transportation points in the Plan area.
- Support local community requirements to require all employment centers to include an adequate number of on-site shower/locker facilities for bicycling and pedestrian commuters (typically one shower and three lockers for every 25 employees per shift).
- Support local communities and agencies to provide park-and-ride lots as deemed feasible and appropriate by transportation planning agencies.
- At employment centers that exceed a designated size, as measured by the number of employees, support the provision of on-site child care and after-school facilities or contribute to off-site construction of such facilities within walking distance of employment land uses (for employment centers on or adjacent to industrial land uses, on-site child daycare centers shall be provided only if supported by the findings of a comprehensive health risk assessment performed in consultation with the local air district).
- Commit to support programs that include guaranteed ride home, subsidized transit passes, and rideshare matching.
- Support local communities and agencies to provide transportation (e.g., shuttles) to major transit stations and multimodal centers.

Mitigation Measure AQ-3(e): Implementing agencies and/or project sponsors shall implement the following measures, where feasible and necessary based on project- and site-specific considerations, to reduce criteria air pollutant emitted by natural gas combustion in buildings:

- Prohibit natural gas infrastructure in new development.
- Utilize, or design to support, microgrid electric systems to facilitate the resiliency of new developments prohibiting natural gas.
- Equip residential structures containing front and rear yard area with electric outlets in the front and rear of the structure to facilitate use of electrical lawn and garden equipment.
- Install ground-source heat pumps, solar, or other alternatively-fueled water heaters instead of natural gas or grid-based electric water heaters.
- Install ground-source heat pump, or other alternative, heating and cooling systems.
- Increase wall and attic insulation to 20 percent above Title 24 requirements (residential and commercial).
- Orient buildings to take advantage of solar heating and natural cooling, and use passive solar designs (residential, commercial, and industrial).
- Provide energy-efficient windows (double pane and/or Low-E) and awnings or other shading mechanisms for windows, porches, patios, and walkways.
- Utilize passive solar cooling and heating designs, ceiling and whole house fans, and programmable thermostats in the design of heating and cooling systems.

Significance after Mitigation

Mitigation Measures AQ-3(a) through AQ-3(d) would reduce significant impacts from forecasted increases in $PM_{2.5}$ and PM_{10} because they would lead to reductions in vehicle trips and VMT. Further, Mitigation Measure AQ-3(e) would reduce area-source emissions from natural gas combustion and landscaping equipment in new developments. 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, because reductions cannot be estimated, it cannot be concluded with certainty that all significant impacts would be avoided. This impact would remain **significant and unavoidable (SU)** for purposes of this program level review.

Impact AQ-4: Expose sensitive receptors to substantial pollutant concentrations (PS)

Some communities and neighborhoods in the region experience relatively higher air pollution levels and corresponding negative health impacts than others. Levels of local air pollutants such as fine PM and TACs are highest near air pollution sources, such as freeways, heavily trafficked seaports, and large industrial facilities. In addition, there are many smaller, more discrete sources of air pollution, including gas stations and back-up diesel generators, that exacerbate conditions in communities with already elevated levels of air pollution that can be harmful to people's health (BAAQMD 2016). Given the lack of specific information regarding construction locations and construction activities, impacts cannot be quantified with precision.

The proposed Plan could potentially adversely expose sensitive receptors to substantial pollutant; therefore, this impact would be significant if implementation of the proposed Plan would:

- Locate sensitive receptors in TPAs where:
  - (a) cancer risk would exceed 100 in a million, and/or exceed fine PM concentrations of 0.8 micrograms per cubic meter ($\mu g/m^3$) and/or are within 500 feet of a freeway, 175 feet of a major roadway (>30k AADT), or 500 feet of a ferry terminal or
  - (b) TACs (cancer risk) or PM2.5 concentrations would result in noncompliance with an adopted Community Risk Reduction Plan;
- cause a cumulative net increase in emissions of TACs, including diesel PM, 1,3-butadiene, and benzene, from on-road mobile sources compared to existing conditions;
- result in changes in TAC and or $PM_{2.5}$ exposure levels that disproportionally affect minority and low-income populations; or
- result in disproportionate impacts from TAC and $PM_{2.5}$ emissions on CARE communities.

Land Use Impacts

The Plan would result in land use growth, including land uses that would locate sensitive receptors, throughout the Plan area. Figure 3.4-2 displays the locations of areas where cancer risk levels and/or $PM_{2.5}$ concentrations are exceeded, referred to as TAC Risk Areas, in relation to TPAs. In general, the figures show that 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. Table 3.4-14 quantifies the acres of overlap between the proposed Plan's land use growth footprint and the TAC Risk Areas.

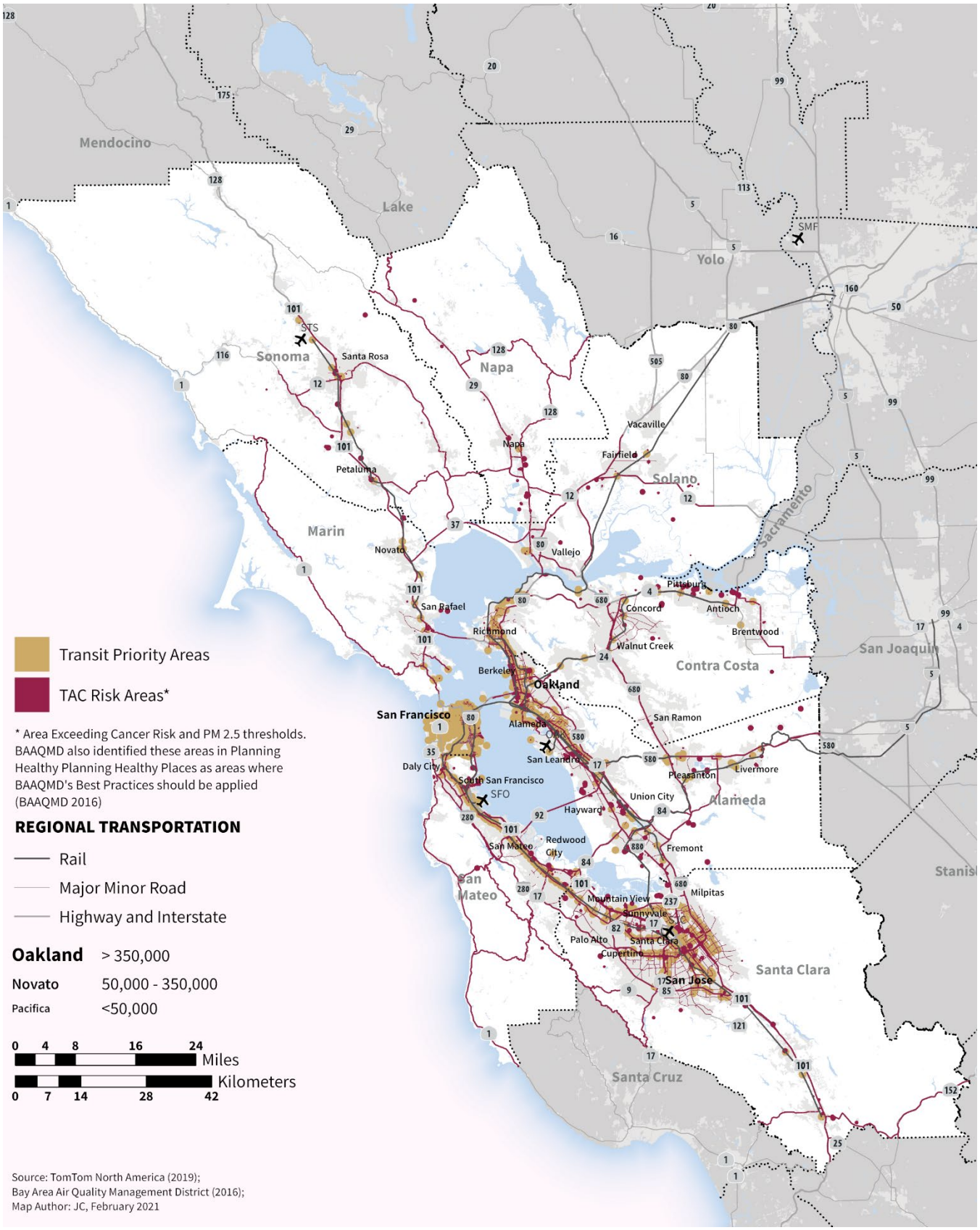

Figure 3.4-2: Toxic Air Contaminant Risk Areas

Table 3.4-14: Acreage of Land Use Growth Footprint within Toxic Air Contaminant Risk Areas

County		Total (acres)
Alameda	County Total	2,100
	Within TPAs	1,300
Contra Costa	County Total	1,300
	Within TPAs	420
Marin	County Total	400
	Within TPAs	130
Napa	County Total	220
	Within TPAs	20
San Francisco	County Total	730
	Within TPAs	700
San Mateo	County Total	1,000
	Within TPAs	730
Santa Clara	County Total	2,500
	Within TPAs	1,700
Solano	County Total	330
	Within TPAs	40
Sonoma	County Total	260
	Within TPAs	50
Regional Total	County Total	8,900
	Within TPAs	5,100

Notes: TPA acreages are a subset of county acreages. Whole numbers have been rounded (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. $PM_{2.5}$ emissions in TAC risk areas would exceed cancer risk and $PM_{2.5}$ thresholds.

Sources: Data compiled by MTC and ABAG in 2021; BAAQMD 2016

As shown in the table above, many TPAs (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 the analysis under "Transportation System Impacts," below, finds that TAC and diesel PM emissions would decrease through 2050 in the Plan area, it is possible that sensitive receptors may locate within the risk areas in the future.

Although some of the proposed Plan's land use growth footprint could result in additional stationary sources and building energy and water usage, these would be subject to applicable air district rules as established by adopted plans and regulations at the time of air quality permitting as well as project-level CEQA analyses, as applicable.

Additionally, in jurisdictions with an adopted Community Risk Reduction Plan (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. The goal of a CRRP is to bring TAC and $PM_{2.5}$ concentrations for the entire community covered by the Plan down to acceptable levels as identified by the local jurisdiction and approved by the Air District. This approach provides local agencies a proactive alternative to addressing communities with high levels of risk on a project-by-project approach.

The proposed Plan could locate sensitive receptors in areas where 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 micro grams (µg) per cubic meter (m^3), as summarized in **Table 3.4-14**, above, or where TACs or $PM_{2.5}$ concentrations are in noncompliance with an adopted CRRP. Thus, land use impacts would be potentially significant (PS). Mitigation Measure AQ-4(a) is presented below to help reduce TACs or $PM_{2.5}$ emissions from mobile and area sources.

Sea Level Rise Adaptation Impacts

The operation of sea level rise adaptation infrastructure would not result in a considerable net increase in emission of fine PM or TACs because it would not include stationary equipment that would generate or emit emissions. Therefore, implementation of sea level rise adaptation infrastructure would not result in the exposure of sensitive receptors to substantial pollutant concentrations. This impact would be less than significant (LTS).

Transportation System Impacts

For transportation system impacts, the proposed Plan would have a significant impact if it would:

- cause a cumulative net increase in emissions of TACs, including diesel PM, 1,3-butadiene, and benzene, from on-road mobile sources compared to existing conditions, or
- result in changes in TAC and or $PM_{2.5}$ exposure levels that disproportionally impact minority and low-income populations.

Toxic Air Contaminants Emissions

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 1.5, with the land use forecasting model, known as Bay Area UrbanSim 2.0. 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 3.4-7); however, as shown in Table 3.4-15, there would be a 91-percent decrease in diesel PM, a 71-percent decrease in 1,3-butadiene, and a 75-percent decrease in benzene compared to existing conditions. These reductions can be attributed to CARB 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 CARB 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 and diesel fuel specifications, and CARB's HDVIP, discussed above. In addition, there are a number of programs in place to address PM in general and TACs in particular, including CARB and BAAQMD's Goods Movement Program, which provides financial incentives to owners of equipment used in freight movement to upgrade to cleaner technologies, and Port of Oakland Clean Air Programs such as the Maritime Air Quality Improvement Plan, Comprehensive Truck Management Plan, and Seaport Air Quality 2020 and Beyond Plan.

In addition, the State's Drayage Truck Regulation requires all trucks to meet the equivalent of the on-road 2004 emission standard via newer trucks or verified diesel emission control strategies (VDECS) by December 31, 2009. All pre-1994 engines were phased-out as of January 1, 2010 and after December 31, 2013, drayage trucks were required to meet the 2007 engine emissions standards.

Table 3.4-15: Emission Estimates for Toxic Air Contaminants Pollutants (kilograms per day)

	Baseline, 2015	Proposed Plan, 2050	Change, 2015 to 2050	
			Numerical	Percent
Diesel Particulate Matter	1,366.2	126.9	-1,239.3	-91%
1,3 Butadiene	77.5	22.5	-55.0	-71%
Benzene	363.1	90.7	-272.4	-75%

Source: Data compiled by MTC and ABAG in 2021

Because the proposed Plan would result in a reduction in TAC emissions, as shown in Table 3.4-15, there would be a less-than-significant impact (LTS).

Effects on CARE Communities

This analysis discloses effects from TAC and $PM_{2.5}$ emissions on CARE communities. Figure 3.4-3 displays the locations of designated CARE communities in relation to MTC and ABAG's designated Equity Priority Communities (previously known as "Communities of Concern").

Table 3.4-16 summarizes MTC's analysis results, expressed as a percentage change in TAC pollutants (diesel PM, benzene, and 1, 3 butadiene), $PM_{2.5}$ 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.

Table 3.4-16: Percent Change in On-Road Mobile Source Exhaust and total $PM_{2.5}$ Emissions, Years 2015-2050

County	CARE Status	Exhaust Emissions				Total $PM_{2.5}$	VMT
		Exhaust Only $PM_{2.5}$	Diesel PM	Benzene	1, 3 Butadiene		
Alameda	CARE Community	-89%	-93%	-79%	-76%	-18%	10%
	Remainder of County	-74%	-90%	-73%	-73%	7%	11%
Contra Costa	CARE Community	-88%	-92%	-76%	-75%	-8%	21%
	Remainder of County	-71%	-83%	-73%	-73%	14%	20%
Marin	Entire County	-77%	-91%	-74%	-74%	9%	13%
Napa	Entire County	-80%	-94%	-80%	-80%	2%	8%
San Francisco	CARE Community	-90%	-96%	-74%	-72%	-5%	20%
	Remainder of County	-88%	-98%	-73%	-73%	3%	12%
San Mateo	Entire County	-69%	-84%	-34%	-34%	22%	8%
Santa Clara	CARE Community	-86%	-92%	-73%	-70%	4%	23%
	Remainder of County	-68%	-88%	-67%	-67%	25%	22%
Solano	CARE Community	-89%	-92%	-79%	-77%	-3%	24%
	Remainder of County	-79%	-89%	-77%	-77%	17%	23%
Sonoma	Entire County	-80%	-95%	-86%	-86%	6%	11%
Regional Total	CARE Community	-88%	-93%	-76%	-73%	-8%	18%
	Remainder of Region	-74%	-91%	-71%	-70%	14%	15%
	Total	-83%	-93%	-74%	-71%	9%	17%

Notes: CARE = Community Air Risk Evaluation; $PM_{2.5}$ = fine particulate matter; PM = particulate matter; VMT = vehicle miles travelled. Percentages are rounded to the nearest whole number. Total $PM_{2.5}$ includes vehicle exhaust, entrained road dust, and tire and brake wear. Marin, Napa, San Mateo, and Sonoma Counties do not have CARE-designated areas. Emissions rates from EMFAC.

Sources: Data compiled by MTC and ABAG in 2021 based on data from BAAQMD 2020

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 2050. Region-wide, for all TAC emissions (diesel PM, benzene, and 1, 3 butadiene), on-road vehicle exhaust is estimated to decrease between 71 and 93 percent. Region-wide $PM_{2.5}$ emissions from all on-road vehicle exhaust are expected to decrease by approximately 83 percent. The reductions in TAC and $PM_{2.5}$ exhaust emissions expected from 2015 to 2050 within CARE community and within areas without CARE community status vary by county. Areas without CARE status are considered non-CARE communities. As shown in Table 3.4-16, reductions in TAC and $PM_{2.5}$ exhaust emissions are greater in CARE communities than non-CARE Communities.

These reductions are largely attributed to the implementation of CARB's On-Road Heavy-Duty Diesel Vehicle Regulations, which requires diesel trucks and buses that operate in California to be upgraded to reduce emissions. By January 1, 2023, nearly all trucks and buses will need to have 2010 model year engines or equivalent.

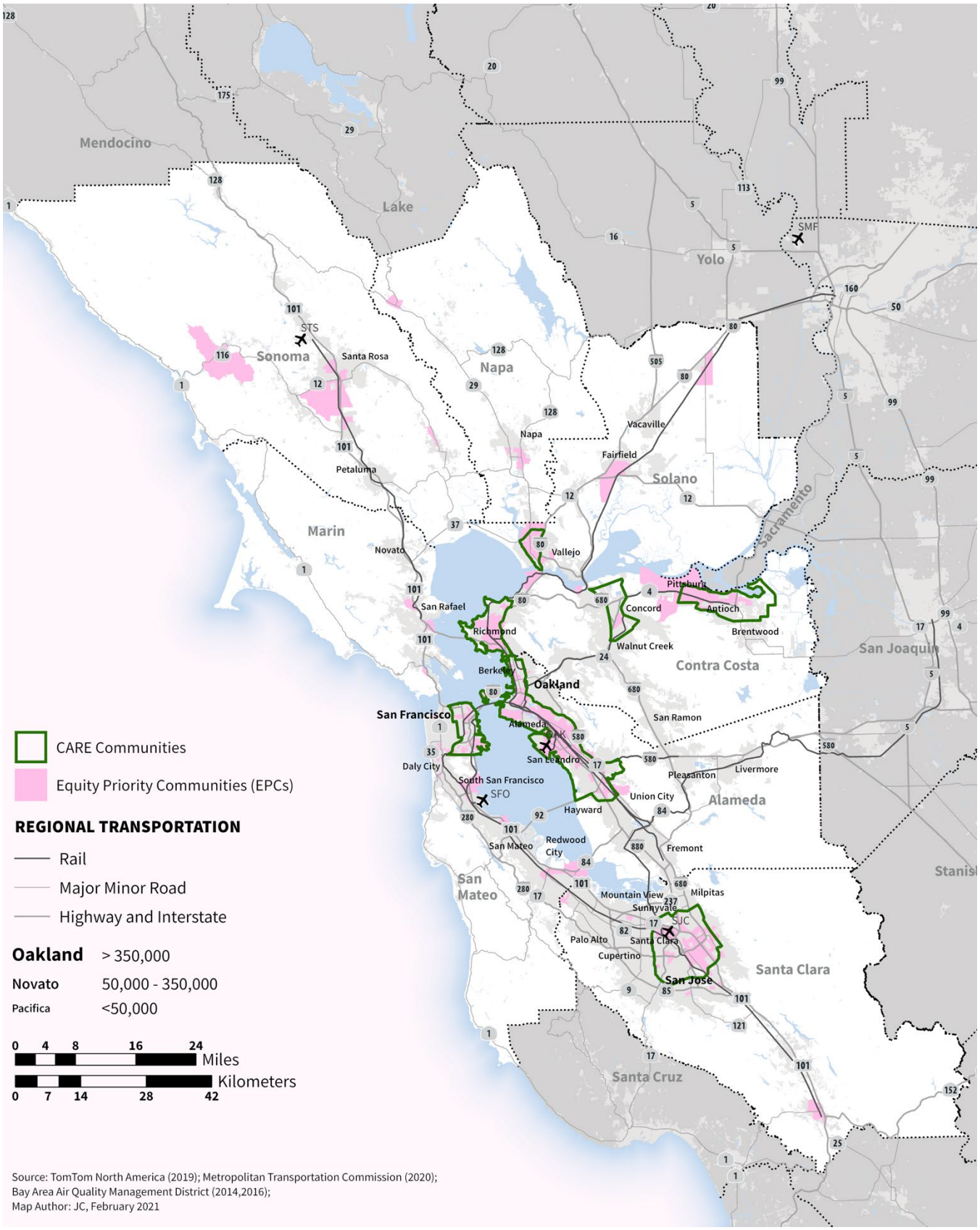

Figure 3.4-3: Designated CARE Communities and Equity Priority Communities

Sources contributing TAC and $PM_{2.5}$ emissions reductions in the 5-year timeframe also include:

- street sweeping, potentially reducing road dust emissions by 10 percent;
- cleaner locomotive engines;
- BAAQMD's Rule 11-18, which will potentially reduce TACs from the East Bay Municipal Utility District and Schnitzer Steel by an estimated 70 percent; and
- better enforcement and incentives discouraging backyard burning and limiting residential fuel combustion.

Total $PM_{2.5}$ includes exhaust from all vehicles, as well as, brake wear and tire wear, and does not include TACs from gasoline vehicles. Brake wear and tire wear emission rates are estimated in EMFAC2021.

When all sources of $PM_{2.5}$ are aggregated, the anticipated $PM_{2.5}$ emissions would increase over existing conditions by 9 percent, across all counties. Increases in total $PM_{2.5}$ emissions are generally higher for non-CARE communities than CARE communities. CARE communities in Alameda and Solano Counties would see an overall reduction in total $PM_{2.5}$ emissions (-18 percent and -3 percent, respectively) as would the CARE communities in total at the regional scale (-8 percent). This increase in total $PM_{2.5}$ emissions would be a potentially significant impact (PS).

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. CARB on-road Heavy-Duty Diesel Regulations are expected to reduce diesel PM by 85 percent by 2020 from 1998 conditions. According to EMFAC 2017 model runs for the MTC region, brake and tire wear from passenger vehicles is expected to represent approximately 82 percent of $PM_{2.5}$ from vehicles by 2050 (not including entrained road dust emissions). At the time of this writing, no regulations have been adopted that would reduce future levels of PM from tire and brake wear emissions (CARB 2018). Therefore, EMFAC2021 does not consider any improvements in brake and tire wear emissions in future year's emission estimates. This means that as VMT increases, so would $PM_{2.5}$ emissions from brake and tire wear.

Conclusion

Implementation of the proposed Plan's land use development pattern and transportation projects could expose sensitive receptors near TPAs to substantial concentrations of TAC emissions; implementation of sea level rise adaptation infrastructure projects are not anticipated to result in significant impacts to sensitive receptors. Approximately 8,900 acres overall (in the region) and 5,100 acres in TPAs in the region would be exposed to a cancer risk level greater than 100 in a million. Given the limitations of modeling tools and assumptions, sensitive receptor exposure numbers are an indication of relative exposure, and not a precise prediction. Actual exposures potentially could be lower because of the conservative emission modeling assumptions used in the cancer risk analysis.

While exhaust-related emissions would decrease in both CARE communities and non-CARE communities, total $PM_{2.5}$ emissions would increase in the Plan area as would total $PM_{2.5}$ emissions in the Santa Clara County CARE community. The projected increase in total $PM_{2.5}$ emissions in the Santa Clara County community CARE community from 2015 to 2050 would constitute a change in $PM_{2.5}$ exposure levels that disproportionally affect minority and low-income populations.

For these reasons, this impact would be **potentially significant (PS)** in 2050. Mitigation Measures AQ-4(a) through AQ-4(d) address this impact and are described below.

Mitigation Measures

Implement Mitigation Measure AQ-2

Mitigation Measure AQ-4(a) When locating sensitive receptors in TAC risk areas, as identified in **Figure 3.4-2**, implementing agencies and/or project sponsors shall implement measures, where feasible and necessary based on project- and site-specific considerations, that include those identified below:

- 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 (BAAQMD 2016). 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 percent supply filters shall be used.
- Reduce emissions from diesel trucks through implementing the following measures, if feasible: installing electrical hook-ups for diesel trucks at loading docks; requiring trucks to use Transportation Refrigeration Units that meet Tier 4 emission standards; requiring truck-intensive projects to use advanced exhaust technology (e.g., hybrid) or alternative fuels; prohibiting trucks from idling for more than 2 minutes; and establishing truck routes to avoid sensitive receptors in the project. Implement a truck route program, along with truck calming, parking, and delivery restrictions.
- Install passive electrostatic filtering systems with low air velocities (i.e., less than 1 mph).
- Phase residential developments when proposed within 500 feet of freeways such that homes nearest the freeway are built last, if feasible.
- Locate sensitive receptors as far away from truck activity areas, such as loading docks and delivery areas, as feasible.
- Ensure that existing and new standby or emergency diesel generators meet CARB's Tier 4 emission standards, if feasible.
- Locate individual and common exterior open space and outdoor activity areas proposed as part of individual projects as far away as possible from emission source within the project site boundary, face them away major freeways, and shield them from the source (i.e., the roadway) of air pollution with buildings or otherwise buffer them 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, do not locate residents immediately adjacent to a loading dock or where trucks concentrate to deliver goods.
- Locate sensitive receptors in buildings in areas upwind of major roadway traffic to reduce exposure to reduce cancer risk levels and exposure to $PM_{2.5}$.
- Plant 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 redwood (*Sequoia sempervirens*).

- Reduce emissions from diesel trucks by 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 (BAAQMD 2017c) and Planning Healthy Places (BAAQMD 2016).

Mitigation Measure AQ-4(b) MTC and 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 AQ-4(c) MTC and 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 AQ-4(d) Implementing agency shall implement the strategies identified in the CARB Technical Advisory to reduce air pollution exposure near high-volume roadways to less-than-significant levels, where feasible. Examples of effective strategies include (CARB 2017b):

- Using speed reduction mechanisms, such as roundabouts to reduce the frequency of stop-and-go driving common among streets that support stop signs;
- Using traffic signal management to limit the frequency of stop-and-go driving and vehicle idling;
- Establishing and enforcing speed limit reductions of high-speed roadways;
- Using design elements that promote air flow and pollutant dispersion along street corridors to optimize air flow, building downwash, and pollution dispersal;
- Incorporating bike lanes and sidewalks to promote alternative, zero-pollution modes of transportation; and
- Constructing solid barriers directly adjacent to high-volume roadways, such as sound walls to improve downwash.

Significance after Mitigation

Site-specific analysis would be needed when a project is proposed in the Plan area 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 $\mu g/m^3$.

The proposed Plan could result in changes in total $PM_{2.5}$ exposure levels that disproportionally impact minority and low-income communities. These impacts would vary across counties.

The vehicle speed reduction measures listed under Mitigation Measure AQ-4(e) would result in reduced stop-and-go driving and hard accelerations thereby reducing emissions rates. While each vehicle reaches its optimal fuel economy at a different speed (or range of speeds), gas mileage usually decreases rapidly at speeds above 50 mph. Aggressive driving (speeding, rapid acceleration and braking) wastes gas and lowers gas mileage by approximately 15–30 percent at highway speeds and 10–40 percent in stop-and-go traffic (Oak Ridge National Laboratory 2017).

The mitigation measures identified above would result in reduced emissions and lower exposure levels near sensitive receptors. 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, the exact reductions are not known at this time. Therefore, this impact would be **significant and unavoidable (SU).**

Impact AQ-5: Result in other emissions (such as those leading to odors) adversely affecting a substantial number of people (LTS)

Land Use, Sea Level Rise Adaptation, and Transportation System Impacts

Construction

The level of impact associated with odor emissions depends on numerous factors, including: the frequency, intensity, duration, offensiveness, and location of the source; wind speed and direction; and the sensitivity of the receptors. Offensive odors can be unpleasant and can lead to distress among members of the public. In addition, manifestations of a person's reaction to offensive odors can range from psychological (e.g., irritation, anger, or anxiety) to physiological (e.g., circulatory and respiratory effects, nausea, vomiting, and headache).

Individual descriptions of an odor reflect the nature of the smell experience. If a person describes an odor as flowery or sweet, then the person is describing the quality of the odor. Intensity refers to the strength of the odor. For example, a person may use the word "strong" to describe the intensity of an odor. Odor intensity depends on the concentration in the air. When an odor sample is progressively diluted, the odor concentration decreases. As this occurs, the odor intensity weakens and eventually becomes so low that the detection or recognition of the odor is quite difficult. At some point during dilution, the concentration of the odor reaches a level that is no longer detectable.

The ability to detect odors varies considerably among the population and overall is quite subjective. Some individuals can smell very minute quantities of specific substances; others may not have the same sensitivity but may have sensitivities to odors of other substances. In addition, people may have different reactions to the same odor; an odor that is offensive to one person may be perfectly acceptable to another (e.g., fast food restaurant). It is important to also note that an unfamiliar odor is more easily detected and is more likely to cause complaints than a familiar one. This is because of the phenomenon known as odor fatigue, in which a person can become desensitized to almost any odor and recognition only occurs with an alteration in the intensity. Odor sources commonly associated with negative human response include wastewater treatment plants, sanitary landfills, composting facilities, recycling facilities, petroleum refineries, chemical manufacturing plants, painting operations, rendering plants, food packaging plants, and cannabis. Several of these sources are located within the Plan area of the proposed Plan.

Project-related construction activities could result in odorous diesel exhaust emissions from construction equipment and odors associated with asphalt paving. Construction equipment and processes are generally similar between land use and transportation projects. 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 (LTS) impact.

Operation

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.

Jurisdictions may choose to adopt an optional air quality element or include policies related to air quality in other general plan elements. In general, local planning policies related to air quality are established to reduce exposure to air pollutants and safeguard public health and may address density; compact development; alternative transportation modes; energy conservation; cleaner-fuel vehicles; reductions for particulate emissions from roads, construction sites, and fireplaces; and public education programs. This impact would be less than significant (LTS).

Conclusion

Because objectionable odors associated with construction of the proposed Plan's land use development pattern, sea level rise adaptation infrastructure, and transportation projects 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 (LTS)**.

Mitigation Measures

None required.