3.2 Air Quality

3.2.1 Introduction

This section addresses the existing air quality conditions within the region and presents an evaluation of the potential effects to air quality from implementation of the project. The air quality analysis is based on air quality modeling and project features. Modeling assumptions and calculations are provided in Appendix C.

3.2.2 Scoping Comments

Comments related to air quality impacts were received during the public scoping process. These comments and the location where they are addressed in the air quality analysis are provided in Table 3.2-1.

Table 3.2-1 Air Quality Scoping Comments

Agency/Entity	Comment	Location in Air Quality Section that Comment is Addressed
Garril Page	No one in Ross welcomes the toxic traffic fumes of Sir Francis Drake Blvd. The FAP Riparian Corridor results in increased air pollution from SFD and diminished air quality for at least 10 years, probably longer, until proposed trees mature. Deciduous trees will be less effective in removing toxic fumes. and improving air quality. The longer construction period of FAP Riparian Corridor means extended, expanded exposure to all aspects of construction-caused air pollution.	Section 3.2.6, Impact 3.2-3

3.2.3 Environmental Setting

Air Pollutant Standards and Definitions

Overview

The U.S. Environmental Protection Agency (USEPA) has set air-pollutant emission standards to protect public health. USEPA has set National Ambient Air Quality Standards (NAAQS) for six criteria pollutants: ozone (O_3), carbon monoxide (CO), nitrogen dioxide (NO_2), sulfur dioxide (SO_2), lead (Pb), and particulate matter. Particulate-matter criteria pollutants are classified as either respirable particulate matter less than 10 micrometers in diameter (PM_{10}) or fine particulate matter less than 2.5 micrometers in diameter ($PM_{2.5}$). The California Air Resources Board (CARB) has set California Ambient Air Quality Standards (CAAQS) for four pollutants in addition to the six NAAQS criteria pollutants: sulfates, hydrogen sulfide (H_2S), vinyl chloride (C_2H_3Cl), and visibility reducing particles. Table 3.2-2 presents the NAAQS and CAAQS for the criteria air pollutants at different averaging periods as well as the primary and secondary standards for each. Primary standards are the levels of air quality necessary to protect public health with an adequate margin of safety. Secondary standards are the levels of air quality necessary to protect the public welfare from any known or anticipated adverse effects of a pollutant.

USEPA and CARB designate air basins or portions thereof as either “attainment” or “nonattainment” for each criteria air pollutant, based on whether or not the NAAQS or CAAQS have been achieved. Thus, areas in California have two sets of attainment/nonattainment designations: one set with respect to the national standards and one set with respect to the state standards. Table 3.2-2 shows the attainment status of the San Francisco Bay Area Air Basin (SFBAAB) with respect to the national and state ambient air quality standards for different criteria pollutants.

Ozone

Ozone is found in the upper atmosphere (as the ozone layer) as well as at ground level. At ground level, ozone is considered a pollutant. Ozone forms when ozone precursors (e.g., reactive organic gases [ROGs], CO, or nitrogen oxides [NO_X]) react with sunlight in the atmosphere. Sources of these precursors include fuel combustion in vehicles and industrial processes, gasoline vapors, and chemical solvents. Significant ozone production generally requires ozone precursors to be present in a stable atmosphere with strong sunlight for approximately three hours. Ozone can cause respiratory problems (e.g., chest pain, coughing, or throat irritation) and exacerbate existing respiratory problems such as asthma and bronchitis (USEPA, 2018a). Ozone is at the highest concentrations in summer. Ozone concentrations have steadily decreased in the Bay Area over the last three decades. Ozone one-hour NAAQS exceedances in the SFBAAB occurred on two days in 2017 compared to 36 days in 1980 (CARB, 2018a). Ozone is the main pollutant of concern for the NCCAB; however, ozone concentrations have also been steadily decreasing over the last three decades. Ozone eight-hour CAAQS exceedances in the NCCAB occurred on one day in 2018 compared to 32 days in 1980 (CARB, 2018b).

Nitrogen Dioxide

NO_2 is formed during combustion of fossil fuels from vehicles and industrial processes. NO_2 is an air quality pollutant of concern because it acts as a respiratory irritant. NO_2 is an ozone precursor and can also cause acid rain and acid snow. Health effects of NO_2 include airway inflammation in healthy people and exacerbation of preexisting asthma (USEPA, 2018a). NO_2 is a major component of the group of gaseous nitrogen compounds commonly referred to as NO_x. Typically, NO_x emitted from fuel combustion is in the form of nitric oxide (NO) and NO_x, with the vast majority (95 percent) of the NO_x emissions being comprised of NO. NO is converted to NO_2 in the atmosphere when it reacts with ozone or undergoes photochemical reactions.

Table 3.2-2 NAAQS and CAAQS for Criteria Air Pollutants and SFBAAB Attainment Status

Pollutant	Averaging Time	CAAQS [a]	Attainment Status for CAAQS	NAAQS [b]	Attainment Status for NAAQS
O_3	1 hour	0.09 ppm (180 μg/m^3)	Nonattainment	–	–
	8 hours	0.070 ppm (137 μg/m^3)	Nonattainment	0.070 ppm (137 μg/m^3) [c]	Nonattainment
CO	1 hour	20 ppm (23 mg/m^3)	Attainment	35 ppm (40 mg/m^3) [d]	Attainment
	8 hours	9.0 ppm (10 mg/m^3)	Attainment	9 ppm (10 mg/m^3) [d]	Attainment
NO_2	1 hour	0.18 ppm (339 μg/m^3)	Attainment	0.10 ppm (188 μg/m^3) [e]	–
	Annual arithmetic mean	0.030 ppm (57 μg/m^3)	–	0.053 ppm (100 μg/m^3) [e]	Attainment
SO_2	1 hour	0.25 ppm (655 μg/m^3)	Attainment	0.075 ppm (196 μg/m^3)	–
	24 hours	0.04 ppm (105 μg/m^3)	Attainment	0.14 ppm (365 μg/m^3) [f]	–
	Annual arithmetic mean	None	–	0.030 ppm (81 μg/m^3) [f]	–
Pb	30-day average	1.5 μg/m^3	–	None	–
	Calendar quarter	–	–	1.5 μg/m^3 [g]	Attainment
	Rolling 3-month average	None	–	0.15 μg/m^3	Attainment
PM_{10}	24 hours	50 μg/m^3	Nonattainment	150 μg/m^3 [h]	Unclassified
	Annual arithmetic mean	20 μg/m^3	Nonattainment	None	–
$PM_{2.5}$	24 hours	None	–	35 μg/m^3 [i]	Nonattainment
	Annual arithmetic mean	12 μg/m^3	Nonattainment	12.0 μg/m^3 [j]	Unclassified/Attainment
Sulfates	24 hours	25 μg/m^3	Attainment	None	–
H_2S	1 hour	0.03 ppm (42 μg/m^3)	Unclassified	None	–
C_2H_3Cl	24 hours	0.01 ppm (26 μg/m^3)	No information available	None	–

Pollutant	Averaging Time	CAAQS [a]	Attainment Status for CAAQS	NAAQS [b]	Attainment Status for NAAQS
Visibility reducing particles	8 Hours	Extinction coefficient of 0.23 per kilometer	Unclassified	–	–

Notes:

[a] Pollutant concentrations should not exceed California standards for O_3, CO, SO_2 (1- and 24-hour), NO_2, PM_{10}, $PM_{2.5}$, and visibility reducing particles. Pollutant concentrations shall not equal or exceed any other concentrations.

[b] Pollutant concentrations should not exceed national standards (other than O_3, particulate matter, and those based on annual arithmetic mean) more than once per year. Annual standards should never be exceeded.

[c] An area achieves the O_3 standard when the fourth-highest eight-hour concentration measured at each site in a year, averaged over three years, is equal to or less than the standard.

[d] An area achieves the CO standard when fewer than two days are equal to or less than the standard.

[e] An area achieves the NO_2 standard when 98 percent of the one-hour maximum concentrations, averaged over three years, are equal to or less than the standard.

[f] No areas of SO_2 nonattainment are located in California.

[g] Los Angeles County is the only area of Pb nonattainment in California.

[h] An area achieves the PM_{10} 24-hour standard when the expected number of days with a 24-hour average concentration greater than 150 $\mu g/m^3$ is equal to or less than one in any one calendar year.

[i] An area achieves the $PM_{2.5}$ 24-hour standard when 98 percent of the daily concentrations, averaged over three years, are equal to or less than the standard.

[j] An area achieves the $PM_{2.5}$ annual standard when the annual average concentrations, averaged over three years, are equal to or less than the standard.

mg/m^3 = milligrams per cubic meter

$\mu g/m^3$ = micrograms per cubic meter

ppm = parts per million

Sources: (CARB, 2016; BAAQMD, 2017b)

Carbon Monoxide

CO is a non-reactive pollutant that is a product of incomplete combustion and is mostly associated with motor vehicle traffic. High CO concentrations develop primarily during winter when periods of light winds combine with the formation of ground-level temperature inversions (typically from the evening through early morning). These conditions result in reduced dispersion of vehicle emissions. The primary source of CO in urban areas is from motor vehicles. This being the case, higher concentrations of CO are found along transportation corridors. Exposure to CO results in reduced oxygen-carrying capacity of the blood. High CO concentrations can result in health risks, particularly for individuals with compromised cardiovascular systems (USEPA, 2018b). When inhaled at high concentrations, CO combines with hemoglobin in the blood and reduces the oxygen-carrying capacity of the blood. This results in reduced oxygen reaching the brain, heart, and other body tissues. This condition is especially critical for people with cardiovascular diseases, chronic lung disease, or anemia.

Particulate Matter

Particulate matter is a combination of liquid or solid particles suspended in the air. PM_{10} and $PM_{2.5}$ represent fractions of particulate matter that can be inhaled into air passages and the lungs and can cause adverse health effects. PM_{10} particles are a threat to health because they can enter the lungs and are small enough that the respiratory system cannot naturally filter them out. PM_{10} can exacerbate asthma and bronchitis and potentially contribute to premature death (USEPA, 2018a). $PM_{2.5}$ is considered more hazardous to human health than PM_{10} because it can contain a larger variety of dangerous components than PM_{10} and can travel farther into the lungs, potentially causing scarring of lung tissue and reduced lung capacity (USEPA, 2018a). Particulate matter in the atmosphere results from many kinds of dust- and fume-producing industrial and agricultural operations, fuel combustion, and atmospheric photochemical reactions. Some sources of particulate matter, such as demolition and construction activities, are more local in nature, while others, such as vehicular traffic, have a more regional effect. According to a study prepared by CARB, exposure to ambient $PM_{2.5}$, particularly diesel particulate matter (DPM), can be associated with approximately 14,000 to 24,000 premature annual deaths statewide (CARB, 2009). Particulate matter also can damage materials and reduce visibility.

Sulfur Dioxide

SO_2 is a colorless, acidic gas with a strong odor. It is produced by the combustion of sulfur-containing fuels such as oil, coal, and diesel. SO_2 has the potential to damage materials and can cause health effects at high concentrations. It can irritate lung tissue and increase the risk of acute and chronic respiratory disease (BAAQMD, 2017a). Pollutant trends suggest that the SFBAAB currently meets and will continue to meet the federal and state standards for SO_2 for the foreseeable future.

In 2010, the USEPA implemented a new 1-hour SO_2 standard, which is presented in Table 3.2-2. The USEPA initially designated the SFBAAB as an attainment area for SO_2. Similar to the new federal standard for NO_2, the USEPA established requirements for a new monitoring network to measure SO_2 concentrations beginning in January 2013 (USEPA, 2010). No additional SO_2

monitors are required for the Bay Area because the SFBAAB has never been designated as nonattainment for SO_2, and no State implementation plans or maintenance plans have been prepared for SO_2 (BAAQMD, 2019).

Lead

Lead has a range of adverse neurotoxin health effects and was formerly released into the atmosphere primarily via leaded gasoline products. Leaded gasoline (phased out in the United States beginning in 1973), paint (on older houses, cars), smelters (metal refineries), and manufacture of lead storage batteries have been the primary sources of lead released into the atmosphere. Lead is a highly stable compound that accumulates in the environment and in living organisms. In humans, lead exposures can interfere with the maturation and development of red blood cells, affect liver and kidney functions, and cause nervous system damage (CARB, 2020a). Lead is considered by CARB to be a toxic air contaminant. Any level of lead exposure has adverse health effects. The Bay Area Air Quality Management District (BAAQMD) monitors lead emissions from industrial operations through the toxic air contaminant (TAC) reporting process. In SFBAAB, there are no sources of lead that could exceed the national ambient air-quality standard (BAAQMD, 2019).

Ambient lead concentrations are only monitored on an as-warranted, site-specific basis in California. On October 15, 2008, the USEPA strengthened the national ambient air quality standard for lead by lowering it from 1.5 $\mu g/m^3$ to 0.15 $\mu g/m^3$ on a rolling three-month average. The USEPA revised the monitoring requirements for lead in December 2010. (Federal Register, 2010).

Regional Topography, Meteorology, and Climate

California is divided geographically into 15 air basins for the purpose of managing the air resources of the state on a regional basis. An air basin generally has similar meteorological and geographic conditions throughout. The project area is located within the Town of Ross and unincorporated areas of Marin County, which is within the SFBAAB, as shown in Figure 3.2-1. The SFBAAB covers roughly 5,340 square miles and consists of Napa, Marin, San Francisco, Contra Costa, Alameda, San Mateo, and Santa Clara Counties, the southern portion of Sonoma County, and the western portion of Solano County. The SFBAAB includes major urbanized areas, encompassing a population of about 7,000,000 (Panorama Environmental, Inc., 2017). The BAAQMD is the regulatory body responsible for air-quality-related activities in the SFBAAB.

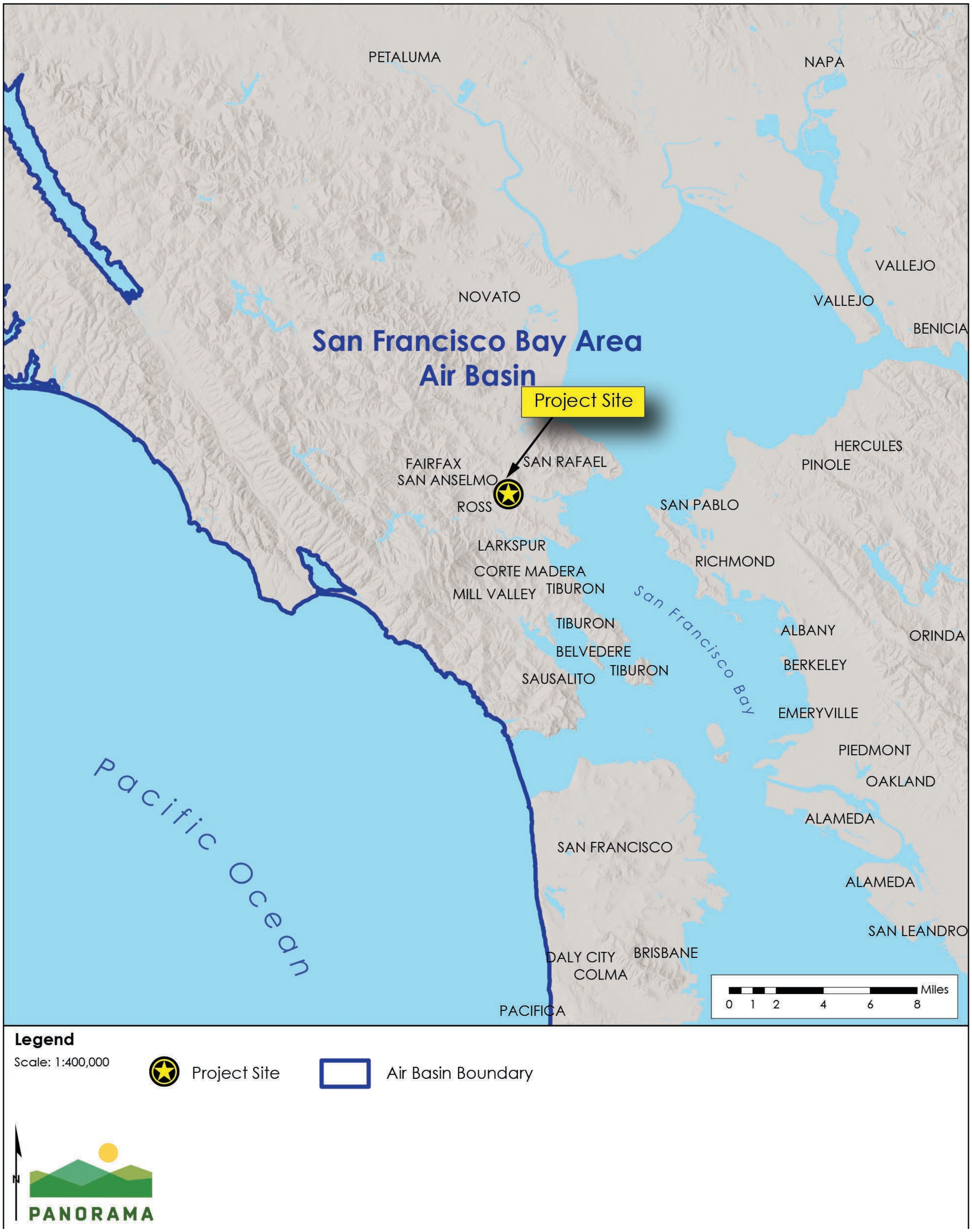
Ambient air quality within SFBAAB is influenced by climatological conditions, topography, and the quantity and type of pollutants released in an area. The major determinants of transport and dilution of a given pollutant are wind, atmospheric stability, terrain, and sunshine for photochemical pollutants. The regional climate in SFBAAB is semi-arid and characterized by mild, dry summers and mild, moderately wet winters (about 90 percent of the annual total rainfall is received in the November to April period), moderate daytime onshore breezes, and moderate humidity. The climate is determined largely by a high-pressure system that is often present over the eastern Pacific Ocean off the West Coast of North America. In winter, the Pacific high-pressure system shifts southward, allowing storms to pass through the region.

During the winter rainy periods, inversions are weak or nonexistent, winds are often moderate, and air pollution potential is very low. During winter periods, when the Pacific high becomes dominant, inversions become strong and often are surface based; winds are light and pollution potential is high. These periods are characterized by winds that flow out of the Central Valley into the Bay Area and often include tule fog. Climate is also affected by the moderating effects of the adjacent oceanic heat reservoir. In summer, when the high-pressure cell is strongest and farthest north, fog forms in the morning, and temperatures are mild. In winter, when the high--pressure cell is weakest and farthest south, occasional rainstorms occur. The air pollution potential is lowest for those regions closest to the San Francisco Bay, due largely to good ventilation and less influx of pollutants from upwind sources. The occurrence of light winds in the evenings and early mornings occasionally results in elevated pollutant levels. Wind flow patterns are controlled by air circulation in the atmosphere, which is affected by air pressure and the variable topography of the coastal areas adjacent to the San Francisco Bay (BAAQMD, 2017a).

Marin County is bounded on the west by the Pacific Ocean, on the east by San Pablo Bay and San Francisco Bay, on the south by the Golden Gate, and on the north by the Petaluma Gap. Most of Marin's population lives in the eastern part of the county, in small, sheltered valleys. These valleys act like a series of miniature air basins. Mount Tamalpais, with a peak of over 2,500 feet, has a substantial effect on climate in central Marin County by blocking the marine layer. In southern Marin, the distance from the ocean is short and elevations are lower, resulting in higher incidence of maritime air in the area. Wind speeds are highest along the west coast of Marin, averaging about 8 to 10 miles per hour. The complex terrain in central Marin creates sufficient friction to slow the air flow. The prevailing wind directions throughout Marin County are generally from the northwest. In the summer months, areas along the coast are usually subject to onshore movement of cool marine air. In the winter, proximity to the ocean keeps the coastal regions relatively warm, with temperatures varying little throughout the year. Coastal temperatures are usually in the high 50s in the winter and the low 60s in the summer. The warmest months tend to be September and October. The eastern side of Marin County has warmer weather than the western side because of its distance from the ocean and because the hills that separate eastern Marin from western Marin occasionally block the flow of the marine air. The temperatures of cities next to the Bay are moderated by the cooling effect of the Bay in the summer and the warming effect of the Bay in the winter. For example, San Rafael experiences average maximum summer temperatures in the low 80s and average minimum winter temperatures in the low 40s (BAAQMD, 2017a).

Air pollution potential is highest in eastern Marin County, where most of population is located in semi-sheltered valleys. In the southeast, the influence of marine air keeps pollution levels low. As development moves further north, there is greater potential for air pollution to build up because the valleys are more sheltered from the sea breeze. While Marin County does not have many polluting industries, the air quality on its eastern side, especially along the U.S. Highway 101 corridor, is affected by emissions from increasing motor vehicle use within and through the county.

Figure 3.2-1 San Francisco Bay Area Air Basin Boundary



Sources: (Tele Atlas North America, Inc. 2019, GHD 2020, USGS 2012, US Geological Survey 2013, California Air Resources Board, Planning and Technical Support Division 2004)

Existing Air Quality

BAAQMD operates a regional monitoring network of air quality monitoring stations to measure the ambient concentrations of criteria pollutants. Existing levels of air pollutants in the study area can be inferred from ambient air quality measurements conducted by BAAQMD at its stations within and close to the project area. The monitoring station that best represents the air quality in the project area is located at 534 4th Street in San Rafael. Table 3.2-3 shows a five-year summary of data collected at this station for ozone, PM_{10}, $PM_{2.5}$, and NO_2. The table also compares the data to CAAQS and NAAQS.

As shown in Table 3.2-3, there were no exceedances of state and national ozone standards between 2014 and 2018. The 24-hour State PM_{10} standard was exceeded on approximately 12 days over the five years, and the 24-hour national PM_{10} standard was exceeded on approximately six days over the five years, but there were no exceedances of the state annual average PM_{10} standard. The national 24-hour $PM_{2.5}$ standard was exceeded on 24 days between 2014 and 2018. There were no measured exceedances of the annual average state or national $PM_{2.5}$ standards or the state or national NO_2 standards. CO, SO_2, and lead were not monitored at the San Rafael station over the five-year study period; however, concentrations of these pollutants are expected to be well below standards in the project area (CARB, 2018).

Toxic Air Contaminants

Health Effects

TACs are airborne substances that are capable of causing short-term (acute) and/or long-term (chronic or carcinogenic, i.e., cancer-causing) adverse human health effects (i.e., injury or illness). TACs include both organic and inorganic chemical substances. They may be emitted from a variety of common sources including gasoline stations, automobiles, dry cleaners, industrial operations, and painting operations. The current California list of TACs includes approximately 200 compounds, including DPM emissions from diesel-fueled engines, which was identified as a TAC by CARB in 1998 (CARB, 2011).

Sensitive Receptors

For the purposes of air quality analysis, sensitive receptors are defined as facilities and 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 residential areas, schools, hospitals, and daycare centers. The reasons for greater-than-average sensitivity include pre-existing health problems, proximity to emissions sources, and duration of exposure to air pollutants. Schools, hospitals, and convalescent homes are considered to be relatively sensitive to poor air quality because children, elderly people, and the infirm are more susceptible to respiratory distress and other air quality-related health problems than the general public. Residential areas are considered sensitive to poor air quality because people usually stay home for extended periods of time, which results in greater exposure to ambient air quality. Sensitive receptors in the project vicinity include residential neighborhoods and schools in the Town of Ross and the unincorporated census-designated place of Kentfield in Marin County.

Table 3.2-3 Air Quality Data Summary (2014–2018) for the Project Vicinity

Pollutant	Monitoring Data by Year				
	2014	2015	2016	2017	2018
Ozone					
Highest 1-hour average (ppm)	0.088	0.081	0.088	0.088	0.072
Days over state standard (0.09 ppm)	0	0	0	0	0
Highest 8-hour average (ppm)	0.068	0.070	0.067	0.063	0.053
Days over state standard (0.070 ppm)	0	0	0	0	0
Days over national standard (0.070 ppm)	0	0	0	0	0
Respirable Particulate Matter (PM_{10})					
Highest 24-hour average – state (µg/m^3)	40.9	42.0	27.0	94.0	166.0
Days over State 24-hour standard (50 µg/m^3)	0	0	0	-	12.2
Highest 24-hour average – national (µg/m^3)	39.0	42.2	26.6	91.5	160.0
Days over national 24-hour standard (150 µg/m^3)	0	0	0	-	6.1
State annual average (Standard: 20 µg/m^3)	14.1	16.1	13.8	-	18.9
Fine Particulate Matter ($PM_{2.5}$)					
Highest 24-hour average – state (µg/m^3)	38.1	36.3	15.6	74.7	167.6
Days over national standard (35 µg/m^3)	1.0	2.0	0.0	8.1	13.0
State annual average (Standard: 12 µg/m^3)	10.8	-	-	9.7	11.1
National annual average (Standard: 12 µg/m^3)	10.8	8.6	6.4	9.7	11.1
Nitrogen Dioxide (NO_2)					
Highest hourly average (ppm)	0.062	0.044	0.045	0.053	0.055
Days over state standard (0.18 ppm)	0	0	0	0	0
Days over national standard (0.1 ppm)	0	0	0	0	0

Notes:

- Indicates that data are not available. Measurements are from the monitoring station at 534 4th Street in San Rafael.

ppm = Parts per million

µg/m^3= Micrograms per cubic meter

Source: (CARB, 2018)

Sensitive land uses within 1,000 feet of the project area include single-family residences along the eastern and western edges of Corte Madera Creek, Ross Elementary School, Kentfield Hospital, Kent Middle School, and the College of Marin. The average distance between Corte

Madera Creek and the closest sensitive receptor is approximately 50 feet. However, residences on Sylvan Lane and along Corte Madera Creek near the left bank of the fish ladder are within 25 feet of the project. Ross Elementary School is approximately 300 feet from the nearest project component, while the College of Marin and Kent Middle School border Corte Madera Creek, within 25 feet of the project area. Kentfield Hospital also borders Corte Madera Creek and is located within 25 feet of the project area. The sensitive receptors within 1,000 feet of the project area are shown on Figure 3.2-2.

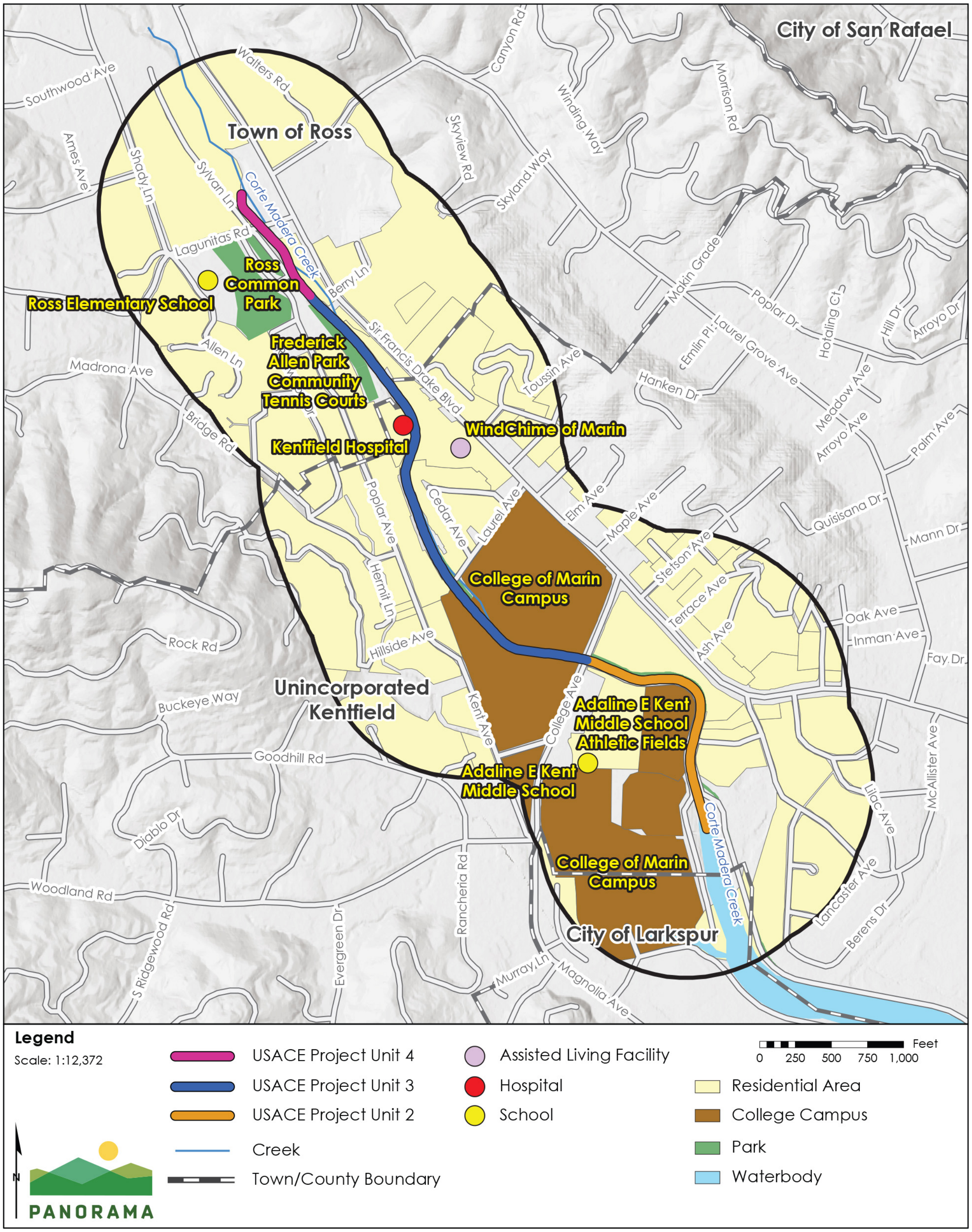
Naturally Occurring Asbestos

Asbestos is a group of naturally occurring fibrous minerals that were commonly used from the mid-1940s to the mid-1980s in building materials because of their high tensile strength and flexibility as well as fire-retardant properties. Asbestos was identified by CARB as a TAC and is classified as a known human carcinogen by state, federal, and international agencies (CARB, 2011). Inhaled asbestos dust in any quantity can contribute to eventual severe health problems such as mesothelioma and other cancers (WHO, 2012). While serpentine soils and bedrock are found in Marin County, none underlie the project area (NRCS, 2017 updated 2019; USGS, 2017 updated 2019).

Dry Deposition of Particulate Matter

Research has shown that trees and plants can remove particulate matter from the air through a process known as dry deposition. Dry deposition is a process by which particles in the atmosphere deposit themselves on a surface, decreasing the atmospheric concentration of particulate matter. The process by which this occurs is particulate matter concentrations in an incoming air flow pass through tree canopies and vegetation, within which a fraction of the particulate matter is removed. A small portion of the incoming airflow is deflected by the canopy instead of passing through it, which can result in locally higher concentrations of particulate matter upwind of a tree. Much of the fine particulates, $PM_{2.5}$, become permanently incorporated into leaf wax or cuticle, while a portion of the coarse fraction is resuspended as a function of wind speed. The remainder of the coarse fraction is eventually washed off to the ground by precipitation. The reduction in particulate matter concentration due to dry deposition is localized to generally within 30 meters (98 feet), with very little reduction in concentration beyond 300 meters (984 feet) of the tree or trees. The rate of dry deposition is greater in areas with higher atmospheric concentrations of particulate matter and associated with larger leaf surface area. Other factors that affect deposition include wind speed, temperature, and relative humidity (McDonald, et al., 2016). Based on studies, the percent air quality improvement estimated to be provided by urban trees due to dry deposition and other processes ranges from 0.2 to 1.0 percent for coarse particulates, depending upon the location, due to variation in weather, tree cover, and tree species (Nowak, Crane, & Stevens, 2006).

Figure 3.2-2 Sensitive Receptors within 1,000 Feet of the Project Area



Sources: (Tele Atlas North America, Inc. 2019, GHD 2020, USGS 2012, US Geological Survey 2013, Esri, United States Geological Survey, U.S. Geographic Names Information System 2020)

3.2.4 Regulatory Setting

Federal and State Regulations

United States Environmental Protection Agency – Clean Air Act

The USEPA is responsible for enforcing the federal Clean Air Act (CAA) and the 1990 amendments. The NAAQS, as previously discussed, were established by the federal CAA of 1970 and amended in 1977 and 1990. The USEPA is responsible for implementing programs established by the federal CAA, such as establishing and reviewing the NAAQS for the following air pollutants: CO, ozone, NO_2, SO_2, PM_{10}, $PM_{2.5}$, and lead. The federal CAA also requires the USEPA to designate areas (counties or air basins) as attainment or non-attainment with respect to each criteria pollutant, depending on whether the area meets the NAAQS. As part of its enforcement responsibilities, the USEPA requires each state with non-attainment areas to prepare and submit a State Implementation Plan (SIP) that demonstrates the means to attain the federal standards. The SIP must integrate federal, State, and local plan components and regulations to identify specific measures to reduce pollution in non-attainment areas, using a combination of performance standards and market-based programs. The project activities must comply with the thresholds set by the local air district, which are intended to meet NAAQS and achieve the goals of the SIP. Air quality within the SFBAAB does not attain the federal standards for ozone or $PM_{2.5}$.

California Air Resources Board – California Clean Air Act

CARB oversees air quality planning and control throughout California. It is primarily responsible for ensuring implementation of the 1989 amendments to the California Clean Air Act (CCAA), responding to the federal CAA requirements, and regulating emissions from motor vehicles and consumer products within the state. CARB is the agency delegated responsibility for preparing and submitting the SIP to the USEPA. CARB also oversees air quality policies in California and has established CAAQS for NO_2, CO, PM_{10}, $PM_{2.5}$, SO_2, ozone, lead, sulfates, hydrogen sulfide, vinyl chloride, and visibility-reducing particles. Most of the CAAQS are at least as stringent (and typically more stringent) as the NAAQS. Similar to the USEPA, CARB designates counties or air basins in California as attainment or nonattainment with respect to the CAAQS. Air quality within the SFBAAB does not attain the state standards for ozone, PM_{10}, or $PM_{2.5}$. Activities associated with implementation of the project must comply with the thresholds set by the BAAQMD, which are intended to meet the CAAQS.

Regional Regulations

Bay Area Air Quality Management District – Overview

BAAQMD maintains air quality conditions in the project area in Marin 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 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, including the project analyzed in this EIR, are subject to BAAQMD's rules and regulations in effect at the time of construction or implementation. Specific plans applicable to the activities associated with the project or alternatives being considered may include, but are not limited to, the regulations listed below (BAAQMD, 2019b).

Bay Area Air Quality Management District – Bay Area 2001 Ozone Attainment Plan
BAAQMD prepared the San Francisco Bay Area 2001 Ozone Attainment Plan for the one-hour National Ozone Standard (2001 Ozone Attainment Plan) to reduce ozone-forming emissions in SFBAAB by implementing emissions-reductions measures for stationary, area, and mobile sources, such as reductions in off-gassing of architectural coatings and organic liquids, low-emission vehicles, expansion of express bus systems, and bicycle and pedestrian programs. The 2001 Ozone Attainment Plan was adopted on November 1, 2001, as a revision to the California SIP (BAAQMD, 2001). The 2001 Ozone Attainment Plan identified proposed control measures for stationary, area, and mobile sources to improve air quality and re-attain the national 1-hour ozone standard in SFBAAB. BAAQMD does not have the jurisdiction to adopt mobile-source control measures. Mobile-source control measures were proposed for CARB to review and adopt as part of the California SIP.

Bay Area Air Quality Management District – 2017 Clean Air Plan
BAAQMD adopted the 2017 Clean Air Plan (CAP) to address state nonattainment in SFBAAB for both the one- and eight-hour ozone standards. The 2017 CAP details a control strategy to address ozone precursors (typically ROGs and NO_X), particulate matter, and TACs. The 85 control measures are categorized into nine economic sectors, including transportation, energy, agriculture, and natural and working lands (BAAQMD, 2017a). The 2017 CAP would apply to the project.

Local Plans and Policies

Marin County Countywide Plan
The following goals and policies in the Marin Countywide Plan are relevant to the project (Marin County , 2007):

Goal AIR-1: Improved Regional Air Quality. Promote planning and programs that result in the reduction of airborne pollutants measured within the county and the Bay Area.

> ***Policy AIR-1.2: Meet Air Quality Standards***. Seek to attain or exceed the more stringent of federal or State Ambient Air Quality Standards for each measured pollutant.
>
> ***Policy AIR-1.3: Require Mitigation of Air Quality Impacts***. Require projects that generate potentially significant levels of air pollutants, such as quarry, landfill operations, or large construction projects, to incorporate best available air quality mitigation in the project design.

Implementing Program AIR-1.g: Require control measures for construction and agricultural activity. Require reasonable and feasible measures to control particulate emissions (PM-10 and PM-2.5) at construction sites and during agricultural tilling activity, pursuant to the recommendations in the BAAQMD CEQA Guidelines, which may include the following:

1. Watering active construction or agricultural tilling areas.
2. Covering hauled materials.
3. Paving or watering vehicle access roads.
4. Sweeping paved and staging areas.

Goal PFS-4: Efficient Processing and Reduced Landfill Disposal of Solid Waste. Minimize, treat, and safely process solid waste materials in a manner that protects natural resources from pollution while planning for the eventual reuse or recycling of discarded material to achieve zero waste.

Policy PFS-4.4: Promote Regulatory Efforts. Support State legislative or regulatory efforts that will aid in achieving zero waste.

Implementing Program PFS-4.b: Divert Construction Waste. Continue to implement the construction and demolition recycling waste ordinance to divert construction waste from landfills.

3.2.5 Impact Assessment Methodology

Significance Criteria

Consistent with State CEQA Guidelines Appendix G (Environmental Checklist) and Marin County Environmental Review Guidelines, the project would have a significant impact if it would:

a. Conflict with or obstruct implementation of the applicable air quality plan;
b. Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is nonattainment under an applicable federal or state ambient air quality standard;
c. Expose sensitive receptors to substantial pollutant concentrations; or
d. Result in other emissions (such as those leading to odors) adversely affecting a substantial number of people.

Significance Thresholds

BAAQMD released the 2017 Air Quality CEQA Guidelines,[1] which included thresholds of significance, in May 2017 to assist lead agencies in determining when air-quality emissions would be considered significant under CEQA. Table 3.2-4 identifies quantitative criteria air pollutant significance thresholds and is followed by a discussion of each threshold. Projects that would result in criteria pollutant emissions below these significance thresholds would not violate an air quality standard, contribute substantially to an air quality violation, or result in a cumulatively considerable net increase in criteria air pollutants within the SFBAAB. Both sets of thresholds (average daily and maximum annual) apply to operational emissions from a given project. Construction emissions are assessed solely with respect to the average daily thresholds, pursuant to BAAQMD guidance, because of the temporary nature of construction-related emissions (BAAQMD, 2017a).

Any project that would have the potential to expose sensitive receptors to substantial levels of toxic air contaminants such that it would result in an incremental increase in cancer or non cancer health risk, or in an increase in ambient PM2.5 concentrations in excess of the thresholds identified in Table 3.2 4, would be considered to have a significant impact on sensitive receptors (BAAQMD, 2017a). The PM2.5 threshold for construction is applied to exhaust emissions only and does not include concentrations of fugitive dust (BAAQMD, 2017a). Depending on the distance separating construction activities from the nearest sensitive receptors and the concentration of construction DPM and PM2.5 exhaust emissions generated by the project elements, health-risk impacts on sensitive receptors may occur.

The thresholds of significance for criteria air pollutants and health risk are based on substantial evidence presented in Appendix D of the BAAQMD CEQA Air Quality Guidelines and BAAQMD's Revised Draft Options and Justification Report concerning CEQA thresholds (BAAQMD, 2017a; BAAQMD, 2009). Based on the substantial technical research that went into the preparation of the thresholds by BAAQMD, this analysis uses the BAAQMD thresholds and the methodologies in its 2017 Air Quality CEQA Guidelines to determine the significance of the project's impacts on air quality and sensitive receptors.

Approach to Impact Analysis

The evaluation of potential impacts to regional and local air quality that may result from the construction and long-term operations of the project is described below. Additional details on the air quality modeling are provided in Appendix C.

[1] A subsequent update of BAAQMD's Air Quality CEQA Guidelines will be released to address outdated references, links, analytical methodologies, or other technical information that may be in the 2017 Air Quality CEQA Guidelines or Thresholds Justification Report.

Table 3.2-4 Significance Thresholds

Pollutant	Construction-Related	Operations-Related	
	Average Daily Emissions (pounds per day)	Average Daily Emissions (pounds per day)	Maximum Annual Emissions (tons per year)
ROG	54	54	10
NOx	54	54	10
PM_{10}	82 (exhaust)	85	15
$PM_{2.5}$	54 (exhaust)	54	10
PM_{10} / $PM_{2.5}$ (fugitive dust)	Construction dust ordinance or other best management practices to control fugitive dust emissions	Not applicable	
Risk and hazards for new sources and receptors (individual project) *	Same as operational thresholds **	Increased cancer risk of >10.0 in a million Increased non-cancer risk of > 1.0 Hazard Index (Chronic or Acute) Ambient $PM_{2.5}$ increase: > 0.3 µg/m^3 annual average Zone of Influence: 1,000-foot radius from property line of source or receptor	
Risk and Hazards for new sources and receptors (cumulative threshold) *	Same as operational thresholds **	Cancer: > 100 in a million (from all local sources) Non-cancer: > 10.0 Hazard Index (from all local sources) (Chronic) $PM_{2.5}$: > 0.8 µg/m^3 annual average (from all local sources) Zone of Influence: 1,000-foot radius from property line of source or receptor	

Notes:

*The receptor thresholds were the subject of litigation in California Building Industry Association v. Bay Area Air Quality Management District (2015) 62 Cal. 4th 369.

** The BAAQMD recommends that for construction projects that are less than one-year duration, Lead Agencies should annualize impacts over the scope of actual days that peak impacts are to occur, rather than the full year.

Source: (BAAQMD, 2017a)

Criteria Air Pollutant Assessment

Overview

By definition, regional air pollution is largely a cumulative impact in that no single project is sufficient in size to, by itself, result in nonattainment of air quality standards. Instead, a project's individual emissions are considered to contribute to the existing, cumulative air quality conditions. If a project's contribution to cumulative air quality conditions is considerable, then the project's impact on air quality would be considered significant (BAAQMD, 2017a).

The potential for a project to result in a cumulatively considerable net increase in criteria air pollutants that may contribute to an existing or projected air quality violation is based on the federal and state Clean Air Acts' emissions limits for stationary sources. To ensure that new stationary sources do not cause or contribute to a violation of an air quality standard, BAAQMD Regulation 2, Rule 2, requires that any new source that emits criteria air pollutants above a specified emissions limit must offset those emissions.

Construction Emissions

Average daily emissions during construction are calculated from estimated construction activities developed by the project engineers and applying the appropriate emissions factors for each source of emissions. Equipment, fugitive dust from disturbance, and worker-trip emissions were estimated for the project using the California Emissions Estimator Model (CalEEMod) (version 2016.3.2), which is a statewide land-use emissions computer model designed to provide a uniform platform for government agencies, land use planners, and environmental professionals to quantify criteria pollutant emissions from a variety of projects. CalEEMod was developed in collaboration with the air districts of California. Regional data (e.g., emission factors, trip lengths, meteorology, source inventory) have been provided by the various California air districts to account for local requirements and conditions. The model is considered to be an accurate and comprehensive tool for quantifying air quality impact from projects throughout California and is recommended by the BAAQMD.[2] Pollutant emissions from truck trips were estimated based on the emission factors developed in the EMission FACtors 2017 (EMFAC2017) model and USEPA AP-42 methodologies.

Vehicle-exhaust-emission factors (including running, evaporative, starting, idling, brake-wear, and tire-wear emissions) were derived based on modeling results from the EMFAC2017 model developed by the CARB (CARB, 2017).[3] Fugitive dust emissions from trucks traveling on paved roads were estimated based on the USEPA AP-42 methodologies (USEPA, 2006; USEPA, 2011).

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[2] California Emissions Estimator Model is available at: http://caleemod.com/.

[3] On September 19, 2019, the USEPA and the National Highway Traffic Safety Administration (NHTSA) enacted the "Safer, Affordable, Fuel-Efficient (SAFE) Vehicles Rule Part One: One National Program," which they had proposed in 2018 to roll back corporate annual fuel economy standards issued during the Obama Administration. The One National Program was immediately challenged in federal court. The day after it was issued, California's Attorney General, Xavier Bercerra, with 23 states and the District of Columbia, Los Angeles, and New York City, sued the Trump Administration, arguing that the "preemption rule" is "unlawful, disregards the National Environmental Policy Act and is arbitrary and capricious, among other complaints." Observers predict that the legal battle will go all the way to the Supreme Court, which means that the rule will be tied up in litigation for the next few years. Although CARB has issued EMFAC adjustment factors for gasoline light-duty vehicle emissions, these adjustment factors are very small (less than 1.2 percent by 2028). Despite the SAFE vehicles rule undergoing litigation, and since the adjustment factors are very small, the impact of the SAFE vehicles rule was accounted for quantitatively in this analysis.

Detailed calculations are provided in Appendix C of this Draft EIR. Average daily emissions represent the emissions that would occur for every day of project construction in the project area in 2022, over a period of approximately seven months. The average daily emissions are compared to the BAAQMD average daily emissions thresholds.

Operational Emissions

Operational emissions were estimated for the project using CalEEMod software for the pumps and 150-kW backup generator. Average daily operational emissions represent total emissions that would occur from operation of the pump and generator divided by 365 total days each year. The average daily emissions are compared to the BAAQMD average daily emissions thresholds.

Other Criteria Pollutants

Regional concentrations of CO in the Bay Area have not exceeded the state standards in the past 11 years, and SO_2 concentrations have never exceeded the standards. The primary source of CO emissions from development projects is vehicle traffic. Construction-related SO_2 emissions represent a negligible portion of the total basin-wide emissions, and construction-related CO emissions represent less than five percent of the total basin-wide CO emissions. As discussed previously, the SFBAAB is in attainment for both CO and SO_2. Furthermore, the BAAQMD has demonstrated, based on modeling, that to exceed the California ambient air quality standard of 9.0 ppm (eight-hour average) or 20 ppm (one-hour average) for CO, project traffic in addition to existing traffic would need to exceed 44,000 vehicles per hour at affected intersections (or 24,000 vehicles per hour where vertical and/or horizontal mixing is limited).[4] The project would not generate any new vehicle trips outside of construction vehicles because it does not have an operational component. Maximum average daily construction vehicle trips during construction would be significantly less than 24,000 vehicles per hour. Therefore, given the SFBAAB's attainment status and the limited CO and SO_2 emissions that could result from the project, the project would not result in a cumulatively considerable net increase in CO or SO_2, and a quantitative analysis relative to these pollutants is not required.

Toxic Air Contaminants Assessment

The health risk assessment was conducted in accordance with the Office of Environmental Health Hazards Assessment (OEHHA) Air Toxics Hot Spots Program Guidance Manual for Preparation of Health Risk Assessments (OEHHA, 2015), CARB and California Air Pollution Control Officers Association Risk Management Guidance for Stationary Sources of Air Toxics (CARB and CAPCOA, 2015), and BAAQMD Air Toxics NSR Program Health Risk Assessment Guidelines (BAAQMD, 2016). Exposure of nearby sensitive receptors to TACs from project

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[4] For a land-use project type, the BAAQMD CEQA Air Quality Guidelines state that a proposed project would result in a less-than-significant impact on localized CO concentrations if the project would not increase traffic at affected intersections to more than 44,000 vehicles per hour.

construction and operation was estimated using the USEPA's AERMOD (atmospheric dispersion modeling system) (USEPA, 2019). Dispersion modeling with the emissions produced by CalEEMod was conducted using AERMOD and hourly meteorological data from the most representative monitoring station to predict TAC and fine particulate matter exposures associated with the proposed project. The cancer risks associated with modeled particulate matter concentrations were computed following the BAAQMD risk management policy guidance.

The BAAQMD has identified a distance of 1,000 feet from the source to the closest sensitive receptor locations within which community health risk thresholds would be applicable to gauge the significance of health risk-related impacts. Impacts are quantified for the maximally impacted sensitive receptors. The 1,000-foot radius used herein is a conservative metric to identify sensitive receptors in the vicinity of the project area. It follows that the impact analysis examines existing baseline conditions and foreseeable future conditions. Therefore, an HRA was conducted in accordance with OEHHA guidance (2015) to estimate the maximum cancer risk resulting from exposure to DPM associated with the proposed project. Refer to Appendix C for further details on the methodology and calculation sheets that show all assumptions used to estimate the cancer risk and chronic hazard index associated with the proposed project.

3.2.6 Impact Discussion

Impacts Analyzed

	Significance Determination
	Construction: Less than Significant
Impact 3.2-1: The project would not conflict with or obstruct implementation of the applicable air quality plan.	**Operation and Maintenance: Less than Significant**

Construction

The BAAQMD is required, pursuant to the Clean Air Act, to reduce emissions of criteria pollutants for which the SFBAAB is in nonattainment of the CAAQS (i.e., ozone, PM_{10}, and $PM_{2.5}$) and NAAQS (i.e., ozone and $PM_{2.5}$). The most recently adopted air quality plan for the air basin is the 2017 Clean Air Plan. The 2017 Clean Air Plan is a road map that demonstrates how the air basin will achieve compliance with the state ozone standards as expeditiously as practicable and how the region will reduce the transport of ozone and ozone precursors to neighboring air basins. The BAAQMD's 2017 Clean Air Plan contains a comprehensive list of pollution control strategies directed at reducing emissions and achieving the CAAQS and NAAQS. Projects, uses, and activities that are consistent with the applicable growth projections and control strategies used in the development of the Clean Air Plan would not jeopardize attainment of the air quality levels identified in the Clean Air Plan. In determining consistency with the 2017 Clean Air Plan, this analysis considers whether the project would: (1) support the primary goals of the 2017 Clean Air Plan, (2) include applicable control measures from the 2017 Clean Air Plan, and (3) avoid disrupting or hindering implementation of control measures identified in the 2017 Clean Air Plan (BAAQMD, 2017).

The primary goals of the 2017 Clean Air Plan are to: (1) protect air quality and health at the regional and local scale; (2) eliminate disparities among Bay Area communities in cancer health risk from toxic air contaminants; and (3) protect the climate by reducing greenhouse gas emissions. To meet the primary goals, the 2017 Clean Air Plan recommends specific control measures and actions. These control measures are grouped into various categories that include stationary and area source measures, mobile source measures, transportation control measures, land use measures, and energy and climate measures. To this end, the 2017 Clean Air Plan includes 85 control measures aimed at reducing air pollution in the air basin.

Examples of a project that could cause the disruption or delay of the 2017 Clean Air Plan control measures are projects that would preclude the extension of a transit line or bike path, or projects that propose excessive parking beyond parking requirements. Some temporary closures of the pathway along the creek would occur during construction and for up to seven months at Frederick Allen Park, but in the long term, the project would not permanently preclude the extension of a transit line or a bike path or any other transit improvement, nor would it alter the use of surrounding areas. This being the case, construction of the project would not disrupt or hinder implementation of control measures identified in the 2017 Clean Air Plan.

Construction crew members would commute to and from the project site, and heavy equipment would be used during construction of the project. The measures most applicable to the project construction are transportation control measures. The 2017 Clean Air Plan includes several transportation control measures applicable to these activities, including the following:

- Provide incentives to promote ridesharing (TR8).
- Provide incentives to purchase new trucks that exceed NOx emission standards, hybrid trucks, or zero-emission trucks (TR19).
- Deploy construction and farm equipment with Tier 3 or 4 off-road engines (TR22).
- Encourage local governments to adopt tree planting ordinances (NW2).

The applicable transportation control measures are voluntary incentive measures and do not require vehicle upgrades or retrofits. The proposed use of vehicles and equipment, and the proposed tree planting, would not conflict with these programs. Therefore, the project would not conflict with or obstruct implementation of the control measures identified to achieve the goals of the 2017 Clean Air Plan.

Operation of vehicles and equipment during project construction would emit diesel particulate matter and criteria air pollutants. Construction activities, particularly during demolition and grading, would also temporarily generate fugitive dust in the form of PM_{10} and $PM_{2.5}$. As further discussed under Impact 3.2-2, no exceedances of the criteria air pollutant significance thresholds would occur, and the project would comply with the requirements of the Clean Construction and Dust Control Ordinances. Therefore, no conflict would occur from exceedance of the criteria air pollutant significance thresholds, and the project would support the primary goals set forth in the 2017 Clean Air Plan. The project's impact with respect to GHGs are discussed in Section 3.7 Greenhouse Gas Emissions, which demonstrates that the project would comply with the 2017 Clean Air Plan.

For the reasons described above, the project construction would not interfere with implementation of the 2017 Clean Air Plan. The project would be consistent with the applicable air quality plan that demonstrates how the region will improve ambient air quality and achieve the state and federal ambient air quality standards. The impact from conflict or obstruction of an applicable air quality plan would be less than significant because the project would be consistent with the applicable air quality plan.

Operation and Maintenance

The 2017 Clean Air Plan does not contain any measures specific to flood control activities and, therefore, no inconsistency with the 2017 Clean Air Plan has been identified. With no specific control measures from the 2017 Clean Air Plan applicable to flood control and management programs, the project would not be considered to hinder implementation of any of the 2017 Clean Air Plan control measures.

Project operation and maintenance would involve activities similar to existing conditions including periodic debris or sediment removal in the creek channel, fish pools and stormwater pump station, vegetation management, and annual routine inspections. A new backup generator would be installed to provide power to the pump station in the event of power failure. One stationary source control measure applies regarding reducing emissions of diesel particulate matter and black carbon from emergency backup generators in accordance with Rule 11-18 (SS32). However, the adopted Rule 11-18 exempts generators used only for emergency use. As further discussed under Impact 3.2-2, no exceedances of the criteria air pollutant significance thresholds would occur. Therefore, no conflict would occur from exceedance of the criteria air pollutant significance thresholds and the project would support the primary goals set forth in the 2017 Clean Air Plan. For the reasons described above, the project would not interfere with implementation of the 2017 Clean Air Plan and the impact would be less than significant.

Mitigation: None required.

	Significance Determination
Impact 3.2-2: The project would not result in a cumulatively considerable net increase of any criteria pollutant for which the region is in nonattainment under an applicable federal or state ambient air quality standard.	**Construction: Less than Significant with Mitigation**
	Operation and Maintenance: Less than Significant

Construction

Construction activities associated with the project would involve the use of diesel-powered construction equipment, such as graders, excavators, and loaders that would generate exhaust in the form of both criteria air pollutants and criteria air pollutant precursors. In addition, exhaust emissions would be generated from vehicle trips associated with material delivery/debris hauling and commuting workers. Construction activities would also generate fugitive dust (including PM_{10} and $PM_{2.5}$) during excavation, grading, spoils placement, and vehicle travel.

The project design engineer provided information on:

- Duration of each construction phase for each project element;
- Estimated construction equipment requirements for each construction phase for each of the project elements; and
- Estimated number of on-road truck trips for material and equipment delivery, soil off-haul truck trips, water truck trips, and other miscellaneous truck trips.

Construction is assumed to begin in April 2022, with several overlapping phases. Construction of the project is anticipated to take approximately seven months (167 total workdays) at Frederick Allen Park and less time in other areas (refer to Table 2.6-5 and Appendix C for details). Construction-related emissions for each project element is a function of the construction activity involved, including the type, size, and amount of construction equipment used, duration of equipment use, the amount of required auto/light-truck and heavy truck trips, and the average mileage of those trips. Construction emissions can vary substantially from day to day, depending on the level of activity, the specific type of construction activity, and prevailing weather conditions.

Table 3.2-5 presents unmitigated criteria pollutant emissions generated by construction as compared to the BAAQMD construction thresholds. Refer to Appendix C for the assumptions and calculation sheets that were used to estimate the daily average emissions that would be associated with construction of the proposed project. As shown in the table, emissions would not exceed the BAAQMD thresholds.

In addition to exhaust emissions, emissions of fugitive dust would also be generated by construction activities associated with grading and earth disturbance as well as vehicle travel. The BAAQMD CEQA Air Quality Guidelines requires control of fugitive dust through BMPs in order to consider impacts from fugitive dust emissions less than significant. BAAQMD does not have a quantitative standard for fugitive dust from construction activities. Studies have shown that the application of best management practices (BMPs) at construction sites significantly controls fugitive dust (Countess Environmental, 2006), and individual measures have been shown to reduce fugitive dust by anywhere from 30 to 90 percent (BAAQMD, 2009). The County Development Code includes BAAQMD's fugitive dust Basic Control Measures, but work within Unit 4 and Frederick Allen Park is located within the Town of Ross where the BAAQMD fugitive dust Basic Control Measures have not been adopted into the local regulations.

Table 3.2-5 Estimated Construction Emissions (Pounds)

Unit	Project Element	ROG	NOx	PM_{10} (exhaust)	$PM_{2.5}$ (exhaust)
Unit 4	Fish ladder removal and Unit 4 grading	83	599	23	21
Unit 3	Frederick Allen Park	141	1,269	46	39
	Fish pools	178	1,225	48	46

Unit	Project Element	ROG	NOx	PM_{10} (exhaust)	$PM_{2.5}$ (exhaust)
	Floodwall (Segment #3)	18	170	7	5
	Stormwater pump station	42	338	13	11
	Floodwall (Segment #2)	9	74	3	3
Unit 2	Floodwall (Segment #1)	15	129	6	4
	Lower College of Marin concrete channel removal	82	796	28	23
Total construction emissions		**569**	**4,598**	**174**	**152**
Average daily construction emissions (based on 167 workdays)		**3.4**	**27.5**	**1.0**	**0.9**
BAAQMD significance thresholds		54	54	82	54
Threshold exceeded?		No	No	No	No

Note:
Numbers may not add up due to rounding.

Because the proposed project has not proposed specific dust control measures to comply with BAAQMD CEQA Air Quality Guidelines, the impact associated with fugitive dust emissions in the Town of Ross could be significant. **Mitigation Measure 3.2-2: Fugitive Dust Measures** requires implementation of the BAAQMD's fugitive dust Basic Control Measures, which would meet BAAQMD CEQA Air Quality Guidelines requirements for fugitive dust emissions and reduce impacts to less than significant. The impact from construction emissions would be less than significant with mitigation because emissions would not exceed the BAAQMD thresholds and the mitigation measure would require implementation of the BAAQMD fugitive dust Basic Control Measures across the entire project.

Operation and Maintenance

Following construction, the operation and maintenance of the project elements would be very similar to current management practices in the current creek channel. These activities would involve periodic debris or sediment removal in the creek channel, fish pools and stormwater pump station, vegetation management, and annual routine inspections. The lower Unit 2 restoration would be designed to be a natural and self-maintaining creek ecosystem. No maintenance would be necessary. Vegetation maintenance activities may be slightly higher than existing conditions for a few years after construction to remove invasive weeds and maintain temporary irrigation but in the long term are assumed to be no greater than existing conditions.

Operation and maintenance activities would generally be similar to existing conditions except for operation of the proposed pump station and testing of the new backup generator. The new pump station would house a 40 hp pump powered through an electrical connection to the grid and a 150-kW backup generator in the event of a power outage. The backup generator is assumed to be tested for 50 hours a year in accordance with the California Code of Regulations limit on annual operation of emergency generators for testing and maintenance (CCR § 93115.6 (3)(A)). Table 3.2-6 presents unmitigated operational criteria air pollutant emissions compared to the BAAQMD operational thresholds. As shown in the table, no emissions would exceed the BAAQMD thresholds. This being the case, operational emissions would not result in exceedance of an air quality standard or contribute substantially to an existing or projected air quality violation and the impact would be less than significant.

Table 3.2-6 Estimated Average Daily Operational Emissions (Pounds/Day)

Unit	Project Element	ROG	NOx	PM_{10}	$PM_{2.5}$
Unit 4	Stormwater pump station	0.05	0.13	0.01	0.01
BAAQMD significance thresholds		54	54	82	54
Threshold exceeded?		No	No	No	No

Note:

The emission calculation conservatively assumed up to 50 hours of operation for testing the backup generator and operation of the 40 hp pumps for up to 365 days a year. Realistically, the pumps would only operate during storm events.

Mitigation: Implement Mitigation Measure 3.2-2.

Mitigation Measure 3.2-2: Fugitive Dust Measures.

To limit dust, criteria pollutants, and precursor emissions associated with construction, the following BAAQMD-recommended fugitive dust control measures shall be implemented and included in all contract specifications for components constructed under the project:

- All exposed surfaces (e.g., unpaved parking areas, unpaved staging areas, soil piles, graded areas, and unpaved access roads) shall be watered two times per day.
- All haul trucks transporting soil, sand, or other loose material off site shall be covered.
- All visible mud or dirt track-out onto adjacent public roads shall be removed using wet power vacuum street sweepers at least once per day. The use of dry power sweeping is prohibited.
- All vehicle speeds on unpaved roads shall be limited to 15 mph.
- Idling times shall be minimized either by shutting equipment off when not in use or reducing the maximum idling time to five minutes (as required by the California airborne toxics control measure Title 13, Section 2485 of California Code of Regulations [CCR]). Clear signage shall be provided for construction workers at all access points.
- Construction equipment shall be properly maintained by a certified mechanic.

- A publicly visible sign shall be posted with the telephone number and person to contact at the District regarding dust complaints. This person shall respond and take corrective action within 48 hours. The BAAQMD's phone number shall also be visible to ensure compliance with applicable regulations.

Significance after Mitigation: Mitigation Measure 3.2-2 would require the implementation of BAAQMD's fugitive dust Basic Control Measures, which would reduce fugitive dust emissions during construction to a less-than-significant level.

	Significance Determination
Impact 3.2-3: The project would not expose sensitive receptors to substantial pollutant concentrations.	**Construction: Less than Significant with Mitigation**
	Operation and Maintenance: Less than Significant

Overview

Project construction activities would result in short-term emissions of DPM and other TACs from operation of heavy equipment and vehicles. Operational activities would generate some TAC emissions from the new emergency generator. Impacts on the health of sensitive receptors related to particulate matter are analyzed with other TAC emissions below.

Toxic Air Contaminants

Construction

Construction activities associated with the project would result in the short-term generation of DPM emissions from the use of off-road diesel equipment required to construct the proposed project elements and from construction material deliveries and debris/spoils removal using on-road heavy-duty trucks. Construction activities associated with the project would be transitory and short term in nature, occurring for seven months. Table 3.2-8 presents unmitigated cancer risk, chronic hazard index, and $PM_{2.5}$ exhaust concentrations associated with construction emissions and compares these emissions to the BAAQMD thresholds. Unmitigated construction activities would result in exposure of sensitive receptors to DPM emissions, causing potentially significant health risk impacts. The construction activities conducted in Unit 4 and the northern portion of Unit 3 would pose the greatest health risk because work at this site is surrounded by residential sensitive receptors, with private residential property adjacent to the work area. As shown in Table 3.2-7, cancer risk and maximum acute hazard index exceeds the BAAQMD thresholds, which constitutes a significant impact. The maximum chronic hazard index and annual average $PM_{2.5}$ exhaust concentrations would be less than the BAAQMD's significance thresholds. The short-term health risk impact on sensitive receptors would be potentially significant.

Mitigation Measure 3.2-3: Engine Controls for Construction Equipment requires that all off-road diesel-powered equipment (more than 25 horsepower) used for the project would be equipped with engines that achieve USEPA Tier 3 and Diesel Particulate Filter level 3 emissions standards. This requirement applies to all phases of construction, with the exception of the Lower College of Marin concrete channel removal due to the lower pollutant concentrations associated with those construction activities and the greater distance between those activities and sensitive receptors. Table 3.2-8 presents a summary of the mitigated health risk at the maximally exposed receptor associated with construction emissions. As shown, the cancer risk, chronic hazard index, and annual average $PM_{2.5}$ exhaust concentrations would be less than the BAAQMD's significance thresholds. Therefore, the impact on sensitive receptors would be reduced to less than significant with mitigation.

Table 3.2-7 Estimated Unmitigated Construction Health Risk

Receptor	Maximum Cancer Risk (in 1 million)	Chronic Hazard Index	Acute Hazard Index	Annual Average $PM_{2.5}$ Exhaust Concentrations ($\mu g/m^3$)
Maximally exposed individual receptor[a]	16.5	0.039	--	0.12
Maximally exposed residential receptor[b]	11.9	0.028	59	--
BAAQMD significance thresholds	10.0	1.0	1.0	0.30
Threshold exceeded?	**Yes**	No	**Yes**	No

Notes:

[a] This receptor location is the location where the maximum health risk would occur based on modeling. No real-world sensitive receptors occur at this location.

[b] This receptor location is the nearest real-world sensitive receptor.

Table 3.2-8 Estimated Mitigated Construction Health Risk

Receptor	Maximum Cancer Risk (in 1 million)	Chronic Hazard Index	Acute Hazard Index	Annual Average $PM_{2.5}$ Exhaust Concentrations ($\mu g/m^3$)
Maximally exposed individual receptor[a]	4.4	0.010	--	0.03
Maximally exposed residential receptor[b]	3.2	0.007	0.61[c]	--
BAAQMD significance thresholds	10.0	1.0	1.0	0.30
Threshold exceeded?	No	No	No	No

Receptor	Maximum Cancer Risk (in 1 million)	Chronic Hazard Index	Acute Hazard Index	Annual Average $PM_{2.5}$ Exhaust Concentrations (µg/m^3)

Notes:

[a] This receptor location is the location where the maximum health risk would occur based on modeling. No real-world sensitive receptor occurs at this location.

[b] This receptor location is the nearest real-world sensitive receptor.

[c] The maximally exposed residential receptor is a different residence for acute hazard index with mitigation.

Operation and Maintenance

After construction, maintenance activities would be conducted in the project area. Such activities include vegetation management, sediment and debris removal, and stormwater pump station and floodwall maintenance, which would be similar to existing maintenance activities, resulting in no measurable change in TAC emissions associated with those activities. Operation of the new backup generator during testing and maintenance would generate TAC emissions. Emergency use of the generator is not considered in the analysis. The District would acquire a permit from BAAQMD and comply with permit conditions for the new generator, which could include application of best available control technology and not exceeding 50 hours of testing per year (BAAQMD, 2007; BAAQMD, 2017). The health risk assessment analyzed potential excess lifetime cancer risks and $PM_{2.5}$ concentrations as well as chronic and acute non-cancer health effects resulting from project operation, as shown in Table 3.2-9. As shown, no exceedances of the BAAQMD significance thresholds would occur, and the impact to sensitive receptors would be less than significant.

Table 3.2-9 Estimated Unmitigated Operational Health Risk

Receptor	Maximum Cancer Risk (in 1 million)	Chronic Hazard Index	Acute Hazard Index	Annual Average $PM_{2.5}$ Exhaust Concentrations (µg/m^3)
Maximally exposed individual receptor[a]	0.76	0.0002	0.06	0.001
BAAQMD significance thresholds	10.0	1.0	1.0	0.30
Threshold exceeded?	No	No	No	No

Note:

[a] This receptor location is the location where the maximum health risk would occur based on modeling. No real-world sensitive receptor occurs at this location, but persons may be present during generator testing.

Other Localized Pollutant Concentrations

CO emissions generated from gas-powered truck traffic and other combustion equipment during construction activities could result in CO hotspots, or localized concentrations of CO.

Diesel-powered vehicles and equipment, such as those used for project construction, do not emit CO in the same concentrations and are less likely to cause a CO hotspot. This being the case, congested intersections with a large volume of traffic have the greatest potential to cause high, localized concentrations of CO, which could affect public health. On-road motor vehicle exhaust in metropolitan areas accounts for as much as 75 percent of CO emissions based on data collected across the nation. CO emissions and concentrations have been continually decreasing and have not exceeded the eight-hour federal or state air quality standard at any monitoring location, nationwide,[5] in decades (USEPA, 2017).

The proposed project would generate a relatively small amount of temporary construction traffic and no net new operational traffic. The 2017 CEQA Air Quality Guidelines indicate that a project would significantly affect CO levels if project traffic would increase traffic volumes at intersections to more than 44,000 vehicles per hour. The daily traffic volume at the nearest high-volume road, Sir Francis Drake Boulevard, varies from 22,500 vehicles on the two-lane section between Town of Ross limits and Elm Avenue, to 31,500 vehicles on the four-lane section between Elm Avenue and McAllister Avenue (LSA, 2018). Vehicles used during construction of the proposed project would generate a maximum of 465 one-way truck and worker trips per day (refer to Section 3.13 Transportation and Circulation). Traffic would increase by an average of up to 94 trips (including construction-worker vehicle trips and truck trips) per day during construction of the proposed project and would not cause traffic levels to exceed 44,000 vehicles per hour at any intersection. The other mobile sources associated with the proposed project, such as off-road equipment, would be operated intermittently and in such a manner that CO emissions would not be concentrated in any one area for a long duration. Consequently, construction of the proposed project would not result in CO concentrations in excess of the state or federal health-protective air quality standards in the air basin and, therefore, would not expose sensitive receptors to significant pollutant concentrations that could result in adverse health effects.

Dry Deposition of Particulate Matter

The project area is currently vegetated with trees and channelized along certain portions. No substantial sources of particulate pollution occur within the project area aside from the temporary construction activities and one new emergency generator (refer to the health risk assessment above for the risk associated with these project activities).

Concentrations of particulates due to dry deposition vary depending upon many factors, including wind direction, tree species (due to leaf surface area, density of canopy, and size of canopy), and size of the particle. For example, if vegetation is too dense, the airflow will be impeded and dry deposition will decrease. High concentrations of air pollutants increase dry

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[5] U.S. EPA Region 9, which includes California, Nevada, and Arizona, has 28 monitoring locations where CO data is collected.

deposition. This being the case, the best location for vegetation is around the source of the pollutants (Janhäll, 2015). Existing sources of pollution within 300 meters of the project area include permitted stationary sources such as generators and gas stations (refer to Appendix C for a map of permitted sources) as well as roadways such as Sir Francis Drake Boulevard.

Construction of the proposed project would involve removal of up to 144 trees from Frederick Allen Park and up to approximately 225 trees in other areas along the creek, depending on the extent of USACE-required vegetation removal from the existing floodwall and any new floodwalls. The proposed enhancements at Frederick Allen Park also include planting of up to 125 trees and planting with bushes and other types of vegetation that would increase vegetated areas due to the reduction in impervious concrete areas. In addition to on-site planting, urban trees would remain in the project vicinity between nearby residences and the project area. The trees proposed for removal are not surrounding and do not serve as a buffer between a source of air pollutants and sensitive receptors.

While urban vegetation and trees are a tool that can be used to decrease localized levels of particulate matter, ultimately dry deposition has been found to decrease coarse particulate levels by only up to one percent in cities (Nowak, Crane, & Stevens, 2006). Due to the large number of variables that correlate to increases or decreases in concentrations of particulate matter due to dry deposition, the smaller number of trees in the project area would not change concentrations of particulate matter to a degree that could affect the health of sensitive receptors. Impacts on sensitive receptors from changes in concentrations of particulate matter associated with changes in vegetation in the project area would be less than significant.

Mitigation: Implement Mitigation Measure 3.2-3.

Mitigation Measure 3.2-3: Engine Controls for Construction Equipment.

All off-road equipment greater than 25 horsepower that operates for more than 20 total hours over the entire duration of construction activities shall have engines that meet the USEPA or CARB Tier 3 off-road and Diesel Particulate Filter level 3 emission standards or more stringent standards for all phases of construction except the Lower College of Marin concrete channel removal.

Significance after Mitigation: As shown in Table 3.2-8, with implementation of Mitigation Measure 3.2-3, the maximum cancer risk and acute hazard index would be mitigated to below the BAAQMD's significance thresholds, reducing the impact on sensitive receptors to less than significant.

Impact 3.2-4: The project would not result in other emissions (such as those leading to odors) adversely affecting a substantial number of people.	Significance Determination
	Construction: Less than Significant
	Operation and Maintenance: Less than Significant

Construction

Typical odor sources of concern include wastewater treatment plants, sanitary landfills, transfer stations, composting facilities, petroleum refineries, asphalt batch plants, chemical manufacturing facilities, fiberglass manufacturing facilities, auto body shops, rendering plants, and coffee roasting facilities. Combustion emissions from the use of diesel fuel in construction equipment could generate localized objectionable odors. If sensitive receptors are located in the immediate vicinity of these activities, odors could be perceivable and constitute a nuisance impact. Construction of the project would take approximately seven months to complete and would take place within the construction hours specified by the applicable local ordinance. Construction equipment and paving activities would not be static and on any given day may take place at different parts of the construction site, which would ensure that receptors are not exposed to odors over the entire duration of the construction period. Any objectionable odors generated by project construction activities and perceived by sensitive receptors would occur on a short-term basis or would be intermittent. A substantial number of people would not be subjected to objectionable odors and the construction-related odor impacts would be less than significant. Further, the stringent idling-time limitations on equipment recommended by the BAAQMD have been incorporated into Mitigation Measure 3.2-2, which would further limit diesel odors generated by construction vehicles.

Operation and Maintenance

Operation of the project would be similar to existing conditions. Project operation and maintenance activities would include sediment and debris removal, vegetation management, and annal inspection. These activities would not emit additional odors above what would otherwise occur under existing maintenance of the flood control channel. The new backup generator could emit some odorous exhaust fumes; however, the generator would be tested for only 50 hours per year. Further, the generator is not directly adjacent to sensitive receptors, and odors dissipate with distance from the source. Therefore, implementation of the project would not cause substantial odorous emission or a substantial increase in the severity of existing odors and the impacts would be less than significant.

Mitigation: None required.

3.2.7 References

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