3.3 - Air Quality

3.3.1 - Introduction

This section describes existing air quality conditions regionally and locally as well as the relevant regulatory framework. This section also evaluates the possible impacts related to air quality that could result from implementation of the proposed project. Information included in this section is based on project-specific air quality modeling results included in Appendix C.

3.3.2 - Environmental Setting

Regional Geography and Climate

The City of Antioch is located in Contra Costa County and within the San Francisco Bay Area Air Basin (Air Basin or SFBAAB). The Air Basin is approximately 5,600 square miles in area and consists of nine counties that surround the San Francisco Bay, including all of Alameda, Contra Costa, Marin, San Francisco, San Mateo, Santa Clara, and Napa Counties; the southwestern portion of Solano County; and the southern portion of Sonoma County. The San Francisco Bay Area (Bay Area) has a Mediterranean climate characterized by mild, dry summers and mild, moderately wet winters; moderate daytime onshore breezes, and moderate humidity.

A semi-permanent, high-pressure area centered over the northeastern Pacific Ocean dominates the summer climate of the West Coast. Because this high-pressure cell is persistent, storms rarely affect the California coast during the summer. Thus, the conditions that persist along the coast of California during summer are a northwest airflow and negligible precipitation. A thermal low-pressure area from the Sonoran-Mojave Desert also causes air to flow onshore over the Bay Area much of the summer.

The steady northwesterly flow around the eastern edge of the Pacific High (a high-pressure cell) exerts stress on the ocean surface along the west coast. This induces upwelling of cold water from below the surface. Upwelling produces a band of cold water off San Francisco that is approximately 80 miles wide. During July, the surface waters off San Francisco are 3 degrees Fahrenheit (°F) cooler than those off Vancouver, British Columbia, more than 900 miles to the north. Air approaching the California coast, already cool and moisture-laden from its long trajectory over the Pacific, is further cooled as it flows across this cold bank of water near the coast, thus accentuating the temperature contrast across the coastline. This cooling is often sufficient to produce condensation—a high incidence of fog and stratus clouds along the northern California coast in summer.

In summer, the northwest winds to the west of the Pacific coastline are drawn into the interior through the gap in the western Coast Ranges, known as the Golden Gate, and over the lower portions of the San Francisco Peninsula. Immediately to the south of Mount Tamalpais, the northwesterly winds accelerate considerably and come more nearly from the west as they stream through the Golden Gate. This channeling of the flow through the Golden Gate[1] produces a jet that sweeps eastward but widens downstream, producing southwest winds at Berkeley and northwest winds at San José; a branch curves eastward through the Carquinez Straits and into the Central Valley. Wind speeds may be locally strong

[1] A strait on the West Coast of North America that connects the San Francisco Bay to the Pacific Ocean.

in regions where air is channeled through a narrow opening such as the Golden Gate, the Carquinez Strait, or San Bruno Gap. For example, the average wind speed at San Francisco International Airport from 3:00 a.m. to 4:00 p.m. in July is about 20 miles per hour (mph), compared with only about 8 mph at San José and less than 7 mph at the Farallon Islands.

The sea breeze between the coast and the Central Valley[2] commences near the surface along the coast in late morning or early afternoon; it may first be observed only through the Golden Gate. Later in the day, the layer deepens and intensifies while spreading inland. As the breeze intensifies and deepens, it flows over the lower hills farther south along the peninsula. This process frequently can be observed as a bank of stratus clouds "rolling over" the coastal hills on the west side of the Bay. The depth of the sea breeze depends in large part upon the height and strength of the inversion. The generally low elevation of this stable layer of air prevents marine air from flowing over the coastal hills. It is unusual for the summer sea breeze to flow over terrain exceeding 2,000 feet in elevation.

In winter, the SFBAAB experiences periods of storminess, moderate-to-strong winds, and periods of stagnation with very light winds. Winter stagnation episodes are characterized by outflow from the Central Valley, nighttime drainage flows in coastal valleys, weak onshore flows in the afternoon, and otherwise light and variable winds.

A primary factor in air quality is the mixing depth (the vertical air column available for dilution of contaminant sources). Generally, the temperature of air decreases with height, creating a gradient from warmer air near the ground to cooler air at elevation. This is caused by most of the sun's energy being converted to sensible heat at the ground, which in turn warms the air at the surface. The warm air rises in the atmosphere, where it expands and cools. Sometimes, however, the temperature of air actually increases with height. This condition is known as temperature inversion because the temperature profile of the atmosphere is "inverted" from its usual state. Over the SFBAAB, the frequent occurrence of temperature inversions limits mixing depth and, consequently, limits the availability of air for dilution.

Air Pollutant Types, Sources, and Effects

Criteria Air Pollutants

Concentrations of criteria air pollutants are used as indicators of air quality conditions. Air pollutants are termed criteria air pollutants if they are regulated by developing specific public health- and welfare-based criteria as the basis for setting permissible levels. According to the United States Environmental Protection Agency (EPA), criteria air pollutants are ozone, particulate matter (PM_{10} and $PM_{2.5}$), nitrogen dioxide (NO_2), carbon monoxide (CO), lead, and sulfur dioxide (SO_2). Table 3.3-1 provides a summary of the types, sources, and effects of criteria air pollutants of national and California concern.

[2] A flat valley that dominates the geographical center of California stretching 450 miles from north-northwest to south-southeast, inland from and parallel to the Pacific Ocean coast. It is bounded by the Sierra Nevada to the east and the Coast Range to the west.

Table 3.3-1: Description of Criteria Pollutants of National and California Concern

Criteria Pollutant	Physical Description and Properties	Sources	Most Relevant Effects from Pollutant Exposure
Ozone	Ozone is a photochemical pollutant as it is not emitted directly into the atmosphere, but is formed by a complex series of chemical reactions between volatile organic compounds (VOC), nitrous oxides (NO_X), and sunlight. Ozone is a regional pollutant that is generated over a large area and is transported and spread by the wind.	Ozone is a secondary pollutant; thus, it is not emitted directly into the lower level of the atmosphere. The primary sources of ozone precursors (VOC and NO_X) are mobile sources (on-road and off-road vehicle exhaust).	Irritate respiratory system; reduce lung function; breathing pattern changes; reduction of breathing capacity; inflame and damage cells that line the lungs; make lungs more susceptible to infection; aggravate asthma; aggravate other chronic lung diseases; cause permanent lung damage; some immunological changes; increased mortality risk; vegetation and property damage.
Particulate matter (PM_{10}) Particulate matter ($PM_{2.5}$)	Suspended particulate matter is a mixture of small particles that consist of dry solid fragments, droplets of water, or solid cores with liquid coatings. The particles vary in shape, size, and composition. PM_{10} refers to particulate matter that is between 2.5 and 10 microns in diameter, (one micron is one-millionth of a meter). $PM_{2.5}$ refers to particulate matter that is 2.5 microns or less in diameter, about one-thirtieth the size of the average human hair.	Stationary sources include fuel or wood combustion for electrical utilities, residential space heating, and industrial processes; construction and demolition; metals, minerals, and petrochemicals; wood products processing; mills and elevators used in agriculture; erosion from tilled lands; waste disposal, and recycling. Mobile or transportation related sources are from vehicle exhaust and road dust. Secondary particles form from reactions in the atmosphere.	• Short-term exposure (hours/days): irritation of the eyes, nose, throat; coughing; phlegm; chest tightness; shortness of breath; aggravate existing lung disease, causing asthma attacks and acute bronchitis; those with heart disease can suffer heart attacks and arrhythmias. • Long-term exposure: reduced lung function; chronic bronchitis; changes in lung morphology; death.
Nitrogen dioxide (NO_2)	During combustion of fossil fuels, oxygen reacts with nitrogen to produce nitrogen oxides—NO_X (NO, NO_2, NO_3, N_2O, N_2O_3, N_2O_4, and N_2O_5). NO_X is a precursor to ozone, PM_{10}, and $PM_{2.5}$ formation. NO_X can react with compounds to form nitric acid and related small particles and result in PM related health effects.	NO_X is produced in motor vehicle internal combustion engines and fossil fuel-fired electric utility and industrial boilers. Nitrogen dioxide forms quickly from NO_X emissions. NO_2 concentrations near major roads can be 30 to 100 percent higher than those at monitoring stations.	Potential to aggravate chronic respiratory disease and respiratory symptoms in sensitive groups; risk to public health implied by pulmonary and extra-pulmonary biochemical and cellular changes and pulmonary structural changes; contributions to atmospheric discoloration; increased visits to hospital for respiratory illnesses.

Table 3.3-1 (cont.): Description of Criteria Pollutants of National and California Concern

Criteria Pollutant	Physical Description and Properties	Sources	Most Relevant Effects from Pollutant Exposure
Carbon monoxide (CO)	CO is a colorless, odorless, toxic gas. CO is somewhat soluble in water; therefore, rainfall and fog can suppress CO conditions. CO enters the body through the lungs, dissolves in the blood, replaces oxygen as an attachment to hemoglobin, and reduces available oxygen in the blood.	CO is produced by incomplete combustion of carbon-containing fuels (e.g., gasoline, diesel fuel, and biomass). Sources include motor vehicle exhaust, industrial processes (metals processing and chemical manufacturing), residential wood burning, and natural sources.	Ranges depending on exposure: slight headaches; nausea; aggravation of angina pectoris (chest pain) and other aspects of coronary heart disease; decreased exercise tolerance in persons with peripheral vascular disease and lung disease; impairment of central nervous system functions; possible increased risk to fetuses; death.
Sulfur dioxide (SO_2)	Sulfur dioxide is a colorless, pungent gas. At levels greater than 0.5 parts per million (ppm), the gas has a strong odor, similar to rotten eggs. Sulfur oxides (SO_X) include sulfur dioxide and sulfur trioxide. Sulfuric acid is formed from sulfur dioxide, which can lead to acid deposition and can harm natural resources and materials. Although sulfur dioxide concentrations have been reduced to levels well below State and federal standards, further reductions are desirable because sulfur dioxide is a precursor to sulfate and PM_{10}.	Human caused sources include fossil-fuel combustion, mineral ore processing, and chemical manufacturing. Volcanic emissions are a natural source of sulfur dioxide. The gas can also be produced in the air by dimethyl sulfide and hydrogen sulfide. Sulfur dioxide is removed from the air by dissolution in water, chemical reactions, and transfer to soils and ice caps. The sulfur dioxide levels in the State are well below the maximum standards.	Bronchoconstriction accompanied by symptoms which may include wheezing, shortness of breath and chest tightness, during exercise or physical activity in persons with asthma. Some population-based studies indicate that the mortality and morbidity effects associated with fine particles show a similar association with ambient sulfur dioxide levels. It is not clear whether the two pollutants act synergistically or one pollutant alone is the predominant factor.
Lead (Pb)	Lead is a solid heavy metal that can exist in air pollution as an aerosol particle component. Leaded gasoline was used in motor vehicles until around 1970. Lead concentrations have not exceeded State or federal standards at any monitoring station since 1982.	Lead ore crushing, lead-ore smelting, and battery manufacturing are currently the largest sources of lead in the atmosphere in the United States. Other sources include dust from soils contaminated with lead-based paint, solid waste disposal, and crustal physical weathering.	Lead accumulates in bones, soft tissue, and blood and can affect the kidneys, liver, and nervous system. It can cause impairment of blood formation and nerve conduction, behavior disorders, mental retardation, neurological impairment, learning deficiencies, and low IQs.

Table 3.3-1 (cont.): Description of Criteria Pollutants of National and California Concern

Criteria Pollutant	Physical Description and Properties	Sources	Most Relevant Effects from Pollutant Exposure
Sources: National Toxicology Program. 2016. Report on Carcinogens, Fourteenth Edition; U.S. Department of Health and Human Services, Public Health Service. Diesel Exhaust Particles. Website: https://ntp.niehs.nih.gov/ntp/roc/content/profiles/dieselexhaustparticulates.pdf. Accessed July 30, 2018. National Toxicology Program. 2011. Report on Carcinogens, Twelfth Edition; U.S. Department of Health and Human Services, Public Health Service. June 10. Benzene. Website: http://ntp.niehs.nih.gov/ntp/roc/twelfth/profiles/Benzene.pdf. Accessed December 31, 2019. United States Environmental Protection Agency (EPA). 2003. Particle Pollution and your Health. EPA-452/F-03-001. Website: https://www3.epa.gov/airnow/particles-bw.pdf. Accessed December 30, 2019. United States Environmental Protection Agency (EPA). 2009. Fact Sheet, Proposed Revisions to the National Ambient Air Quality Standards for Nitrogen Dioxide. July 22. Website: https://www.gpo.gov/fdsys/pkg/FR-2009-07-15/pdf/E9-15944.pdf. Accessed December 31, 2019. United States Environmental Protection Agency (EPA). 2009. Ozone and your Health. EPA-456/F-09-001. Website: https://www3.epa.gov/airnow/ozone-c.pdf. Accessed December 30, 2019. United States Environmental Protection Agency (EPA). 2010. Technology Transfer Network, Air Toxics Website. Page updated April 5, 2010. Health Effects Notebook for Hazardous Air Pollutants. Website: https://www.epa.gov/haps/health-effects-notebook-hazardous-air-pollutants. Accessed December 31, 2019.			

Toxic Air Contaminants

Concentrations of toxic air contaminants (TAC) are also used as indicators of air quality conditions. TACs are defined as air pollutants that may cause or contribute to an increase in mortality or serious illness or that may pose a hazard to human health. TACs are usually present in minute quantities in the ambient air; however, their high toxicity or health risk may pose a threat to public health even at very low concentrations. TACs can cause long-term health effects (such as cancer, birth defects, neurological damage, asthma, bronchitis, or genetic damage) or short-term acute affects (such as eye watering, respiratory irritation, runny nose, throat pain, or headaches). For those TACs that may cause cancer, there is no concentration that does not present some risk. In other words, there is no threshold level below which some adverse health impacts are not expected to occur. This contrasts with the criteria pollutants such as nitrogen dioxide and carbon dioxide for which acceptable levels of exposure can be determined and for which the State and federal governments have set ambient air quality standards.

TACs are separated into carcinogens and noncarcinogens based on the nature of the physiological effects associated with exposure to a particular TAC. Carcinogens are assumed to have no safe threshold below which health impacts would not occur. Cancer risk is typically expressed as excess cancer cases per million exposed individuals, typically over a lifetime exposure or other prolonged duration. For noncarcinogenic substances, there is generally assumed to be a safe level of exposure below which no negative health impact is believed to occur. These levels may vary depending on the specific pollutant. Acute and chronic exposure to noncarcinogens is expressed as a hazard index (HI), which is the ratio of expected exposure levels to an acceptable reference exposure levels (RELs). Table 3.3-2 provides a summary of the types, sources, and effects of TACs.

To date, the California Air Resources Board (ARB) has designated nearly 200 compounds as TACs. The ARB has implemented control measures for a number of compounds that pose high risks and show potential for effective control. The majority of the estimated health risk from TACs can be attributed to a relatively few compounds, the most important being diesel particulate matter (DPM) from diesel-fueled engines. Common TACs of national and California concern include: DPM, volatile organic compounds (VOCs), benzene, asbestos, hydrogen sulfide, sulfates, visibility-reducing particulates, vinyl chloride, and lead. Table 3.3-2 provides a summary of the types, sources, and effects of TACs of national and California concern.

Table 3.3-2: Description of Toxic Air Contaminants of National and California Concern

Toxic Air Contaminant	Physical Description and Properties	Sources	Most Relevant Effects from Pollutant Exposure
Diesel Particulate Matter (DPM)	DPM is a source of $PM_{2.5}$—diesel particles are typically 2.5 microns and smaller. Diesel exhaust is a complex mixture of thousands of particles and gases that is produced when an engine burns diesel fuel. Organic compounds account for 80 percent of the total particulate matter mass, which consists of compounds such as hydrocarbons and their derivatives, and polycyclic aromatic hydrocarbons and their derivatives. Fifteen polycyclic aromatic hydrocarbons are confirmed carcinogens, a number of which are found in diesel exhaust.	Diesel exhaust is a major source of ambient particulate matter pollution in urban environments. Typically, the main source of DPM is from combustion of diesel fuel in diesel-powered engines. Such engines are in on-road vehicles such as diesel trucks, off-road construction vehicles, diesel electrical generators, and various pieces of stationary construction equipment.	Some short-term (acute) effects of DPM exposure include eye, nose, throat, and lung irritation, coughs, headaches, light-headedness, and nausea. Studies have linked elevated particle levels in the air to increased hospital admissions, emergency room visits, asthma attacks, and premature deaths among those suffering from respiratory problems. Human studies on the carcinogenicity of DPM demonstrate an increased risk of lung cancer, although the increased risk cannot be clearly attributed to diesel exhaust exposure.
VOCs	Reactive organic gases (ROGs), or VOCs, are defined as any compound of carbon—excluding carbon monoxide, carbon dioxide, carbonic acid, metallic carbides or carbonates, and ammonium carbonate—that participates in atmospheric photochemical reactions. Although there are slight differences in the definition of ROGs and VOCs, the two terms are often used interchangeably.	Indoor sources of VOCs include paints, solvents, aerosol sprays, cleansers, tobacco smoke, etc. Outdoor sources of VOCs are from combustion and fuel evaporation. A reduction in VOC emissions reduces certain chemical reactions that contribute to the formulation of ozone. VOCs are transformed into organic aerosols in the atmosphere, which contribute to higher PM_{10} and lower visibility.	Although health-based standards have not been established for VOCs, health effects can occur from exposures to high concentrations because of interference with oxygen uptake. In general, concentrations of VOCs are suspected to cause eye, nose, and throat irritation; headaches; loss of coordination; nausea; and damage to the liver, the kidneys, and the central nervous system. Many VOCs have been classified as toxic air contaminants.

Table 3.3-2 (cont.): Description of Toxic Air Contaminants of National and California Concern

Toxic Air Contaminant	Physical Description and Properties	Sources	Most Relevant Effects from Pollutant Exposure
Benzene	Benzene is a VOC. It is a clear or colorless light-yellow, volatile, highly flammable liquid with a gasoline-like odor. The EPA has classified benzene as a "Group A" carcinogen.	Benzene is emitted into the air from fuel evaporation, motor vehicle exhaust, tobacco smoke, and from burning oil and coal. Benzene is used as a solvent for paints, inks, oils, waxes, plastic, and rubber. Benzene occurs naturally in gasoline at one to two percent by volume. The primary route of human exposure is through inhalation.	Short-term (acute) exposure of high doses from inhalation of benzene may cause dizziness, drowsiness, headaches, eye irritation, skin irritation, and respiratory tract irritation, and at higher levels, loss of consciousness can occur. Long-term (chronic) occupational exposure of high doses has caused blood disorders, leukemia, and lymphatic cancer.
Asbestos	Asbestos is the name given to a number of naturally occurring fibrous silicate minerals that have been mined for their useful properties such as thermal insulation, chemical and thermal stability, and high tensile strength. The three most common types of asbestos are chrysotile, amosite, and crocidolite.	Chrysotile, also known as white asbestos, is the most common type of asbestos found in buildings. Chrysotile makes up approximately 90 to 95 percent of all asbestos contained in buildings in the United States.	Exposure to asbestos is a health threat; exposure to asbestos fibers may result in health issues such as lung cancer, mesothelioma (a rare cancer of the thin membranes lining the lungs, chest, and abdominal cavity), and asbestosis (a non-cancerous lung disease that causes scarring of the lungs). Exposure to asbestos can occur during demolition or remodeling of buildings that were constructed prior to the 1977 ban on asbestos for use in buildings. Exposure to naturally occurring asbestos can occur during soil-disturbing activities in areas with deposits present.
Hydrogen Sulfide	Hydrogen sulfide (H_2S) is a flammable, colorless, poisonous gas that smells like rotten eggs.	Manure, storage tanks, ponds, anaerobic lagoons, and land application sites are the primary sources of hydrogen sulfide. Anthropogenic sources include the combustion of sulfur containing fuels (oil and coal).	High levels of hydrogen sulfide can cause immediate respiratory arrest. It can irritate the eyes and respiratory tract and cause headache, nausea, vomiting, and cough. Long exposure can cause pulmonary edema.

Table 3.3-2 (cont.): Description of Toxic Air Contaminants of National and California Concern

Toxic Air Contaminant	Physical Description and Properties	Sources	Most Relevant Effects from Pollutant Exposure
Sulfates	Sulfates occur in combination with metal and/or hydrogen ions. Many sulfates are soluble in water.	Sulfates are particulates formed through the photochemical oxidation of sulfur dioxide. In California, the main source of sulfur compounds is combustion of gasoline and diesel fuel.	(a) Decrease in ventilatory function; (b) aggravation of asthmatic symptoms; (c) aggravation of cardio-pulmonary disease; (d) vegetation damage; (e) degradation of visibility; (f) property damage.
Visibility Reducing Particles	Suspended particulate matter is a mixture of small particles that consist of dry solid fragments, droplets of water, or solid cores with liquid coatings. The particles vary in shape, size, and composition. PM_{10} refers to particulate matter that is between 2.5 and 10 microns in diameter (1 micron is one-millionth of a meter). $PM_{2.5}$ refers to particulate matter that is 2.5 microns or less in diameter, about one-thirtieth the size of the average human hair.	Stationary sources include fuel or wood combustion for electrical utilities, residential space heating, and industrial processes; construction and demolition; metals, minerals, and petrochemicals; wood products processing; mills and elevators used in agriculture; erosion from tilled lands; waste disposal; and recycling. Mobile or transportation-related sources are from vehicle exhaust and road dust. Secondary particles form from reactions in the atmosphere.	• Short-term exposure (hours/days): irritation of the eyes, nose, throat; coughing; phlegm; chest tightness; shortness of breath; aggravates existing lung disease, causing asthma attacks and acute bronchitis; those with heart disease can suffer heart attacks and arrhythmias. • Long-term exposure: reduced lung function; chronic bronchitis; changes in lung morphology; death.
Vinyl Chloride	Vinyl chloride, or chloroethene, is a chlorinated hydrocarbon and a colorless gas with a mild, sweet odor. In 1990, the California Air Resources Board (ARB) identified vinyl chloride as a toxic air contaminant and estimated a cancer unit risk factor.	Most vinyl chloride is used to make polyvinyl chloride plastic and vinyl products, including pipes, wire and cable coatings, and packaging materials. It can be formed when plastics containing these substances are left to decompose in solid waste landfills. Vinyl chloride has been detected near landfills, sewage plants, and hazardous waste sites.	Short-term exposure to high levels of vinyl chloride in the air causes central nervous system effects, such as dizziness, drowsiness, and headaches. Epidemiological studies of occupationally exposed workers have linked vinyl chloride exposure to development of a rare cancer, liver angiosarcoma, and have suggested a relationship between exposure and lung and brain cancers.

Table 3.3-2 (cont.): Description of Toxic Air Contaminants of National and California Concern

Toxic Air Contaminant	Physical Description and Properties	Sources	Most Relevant Effects from Pollutant Exposure
Lead (Pb)	Lead is a solid heavy metal that can exist in air pollution as an aerosol particle component. Leaded gasoline was used in motor vehicles until around 1970. Lead concentrations have not exceeded State or federal standards at any monitoring station since 1982.	Lead ore crushing, lead-ore smelting, and battery manufacturing are currently the largest sources of lead in the atmosphere in the United States. Other sources include dust from soils contaminated with lead-based paint, solid waste disposal, and crustal physical weathering.	Lead accumulates in bones, soft tissue, and blood and can affect the kidneys, liver, and nervous system. It can cause impairment of blood formation and nerve conduction, behavior disorders, mental retardation, neurological impairment, learning deficiencies, and low IQs.

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Air Quality

Air quality is a function of both the rate and location of pollutant emissions under the influence of meteorological conditions and topographic features. Atmospheric conditions such as wind speed, wind direction, and air temperature inversions interact with the physical features of the landscape

to determine the movement and dispersal of air pollutant emissions and, consequently, their effect on air quality.

Regional Air Quality

The Bay Area Air Quality Management District (BAAQMD) is the regional agency with jurisdiction for regulating air quality within the nine-county SFBAAB.

Air Pollutant Standards and Attainment Designations

Air pollutant standards have been identified by the EPA and the ARB for the following six criteria air pollutants that affect ambient air quality: ozone, NO_2, CO, SO_2, lead, and particulate matter (PM), which is subdivided into two classes based on particle size: PM equal to or less than 10 microns in diameter (PM_{10}), and PM equal to or less than 2.5 microns in diameter ($PM_{2.5}$). These air pollutants are called "criteria air pollutants," because they are regulated by developing specific public health- and welfare-based criteria as the basis for setting permissible levels. California has also established standards for toxic air contaminants such as visibility-reducing particles, sulfates, hydrogen sulfide, and vinyl chloride. Table 3.3-3 presents the National Ambient Air Quality Standards (NAAQS) and California ambient air quality standards (CAAQS) for these aforementioned air pollutants. Note that there are no State or federal air quality standards for VOCs, benzene, or DPM.

Table 3.3-3: Federal and State Air Quality Standards in the SFBAAB

Air Pollutant	Averaging Time	California Standard	Federal Standard[a]
Ozone	1 Hour	0.09 ppm	—
	8 Hour	0.070 ppm	0.070 ppm[f]
Nitrogen dioxide[b] (NO_2)	1 Hour	0.18 ppm	0.100 ppm
	Annual	0.030 ppm	0.053 ppm
Carbon monoxide (CO)	1 Hour	20 ppm	35 ppm
	8 Hour	9.0 ppm	9 ppm
Sulfur dioxide[c] (SO_2)	1 Hour	0.25 ppm	0.075 ppm
	3 Hour	—	0.5 ppm
	24 Hour	0.04 ppm	0.14 (for certain areas)
	Annual	—	0.030 ppm (for certain areas)
Lead[e]	30-day	1.5 µg/m^3	—
	Quarter	—	1.5 µg/m^3
	Rolling 3-month average	—	0.15 µg/m^3
Particulate matter (PM_{10})	24 Hour	50 µg/m^3	150 µg/m^3
	Mean	20 µg/m^3	—

Table 3.3-3 (cont.): Federal and State Air Quality Standards in the SFBAAB

Air Pollutant	Averaging Time	California Standard	Federal Standard[a]
Particulate matter ($PM_{2.5}$)	24 Hour	—	35 µg/m^3
	Annual	12 µg/m^3	12.0 µg/m^3
Visibility-reducing particles	8 Hour	See note below[d]	
Sulfates	24 Hour	25 µg/m^3	—
Hydrogen sulfide	1 Hour	0.03 ppm	—
Vinyl chloride[e]	24 Hour	0.01 ppm	—

Notes:
ppm = parts per million (concentration) µg/m^3 = micrograms per cubic meter Annual = Annual Arithmetic Mean
30-day = 30-day average Quarter = Calendar quarter

[a] Federal standard refers to the primary national ambient air quality standard, or the levels of air quality necessary, with an adequate margin of safety to protect the public health. All standards listed are primary standards except for 3-Hour SO2, which is a secondary standard. A secondary standard is the level of air quality necessary to protect the public welfare from any known or anticipated adverse effects of a pollutant.

[b] To attain the 1-hour nitrogen dioxide national standard, the 3-year average of the annual 98th percentile of the 1-hour daily maximum concentrations at each site must not exceed 100 parts per billion (0.100 ppm).

[c] On June 2, 2010, a new 1-hour SO2 standard was established and the existing 24-hour and annual primary standards were revoked. To attain the 1-hour national standard, the 3-year average of the annual 99th percentile of the 1-hour daily maximum concentrations at each site must not exceed 75 part per billion (ppb). The 1971 SO2 national standards (24-hour and annual) remain in effect until one year after an area is designated for the 2010 standard, except that in areas designated nonattainment for the 1971 standards, the 1971 standards remain in effect until implementation plans to attain or maintain the 2010 standards are approved.

[d] Visibility reducing particles: In 1989, the ARB converted both the general Statewide 10-mile visibility standard and the Lake Tahoe 30-mile visibility standard to instrumental equivalents, which are "extinction of 0.23 per kilometer" and "extinction of 0.07 per kilometer" for the Statewide and Lake Tahoe Air Basin standards, respectively.

[e] The ARB has identified lead and vinyl chloride as "toxic air contaminants" with no threshold level of exposure for adverse health effects determined. These actions allow for the implementation of control measures at levels below the ambient concentrations specified for these pollutants.

[f] The EPA Administrator approved a revised 8-hour ozone standard of 0.07 ppb on October 1, 2015. The new standard went into effect 60 days after publication of the Final Rule in the Federal Register. The Final Rule was published in the Federal Register on October 26, 2015 and became effective on December 28, 2015.

Source of Standards:
South Coast Air Quality Management District (SCAQMD). 2016. National Ambient Air Quality Standards (NAAQS) and California Ambient Air Quality Standards (CAAQS) Attainment Status for South Coast Air Basin. February. Website http://www.aqmd.gov/docs/default-source/clean-air-plans/air-quality-management-plans/naaqs-caaqs-feb2016.pdf?sfvrsn=2. Accessed June 30, 2017.

Ambient air pollutant concentrations in the SFBAAB are measured at air quality monitoring stations operated by the ARB and BAAQMD. In general, the SFBAAB experiences low concentrations of most pollutants compared to federal or State standards.

Both the EPA and ARB use ambient air quality monitoring data to designate areas according to their attainment status for criteria air pollutants. The purpose of these designations is to identify the areas with air quality problems and initiate planning efforts for improvement. The three basic designation categories are nonattainment, attainment, and unclassified. "Attainment" status refers to those regions that are meeting federal and/or State standards for a specified criteria pollutant. "Nonattainment" refers to regions that do not meet federal and/or State standards for a specified

criteria pollutant. "Unclassified" refers to regions where there is not enough data to determine the region's attainment status for a specified criteria air pollutant. Each standard has a different definition, or "form" of what constitutes attainment, based on specific air quality statistics. For example, the federal 8-hour CO standard is not to be exceeded more than once per year; therefore, an area is in attainment of the CO standard if no more than one 8-hour ambient air monitoring values exceeds the threshold per year. In contrast, the federal annual $PM_{2.5}$ standard is met if the three-year average of the annual average $PM_{2.5}$ concentration is less than or equal to the standard.

The current attainment designations for the SFBAAB are shown in Table 3.3-4. The SFBAAB is designated as nonattainment for the State ozone, PM_{10}, and $PM_{2.5}$, standards and nonattainment for the national ozone and $PM_{2.5}$ standards.

Table 3.3-4: San Francisco Bay Area Air Basin Attainment Status

Pollutant	State Status	National Status
Ozone	Nonattainment	Nonattainment
CO	Attainment	Attainment
NO_2	Attainment	Attainment
SO2	Attainment	Attainment
PM_{10}	Nonattainment	Unclassified
$PM_{2.5}$	Nonattainment	Nonattainment
Sulfates	Attainment	N/A
Hydrogen Sulfates	Unclassified	N/A
Visibility-reducing Particles	Unclassified	N/A
Lead	N/A	Attainment

Source: Bay Area Air Quality Management District (BAAQMD). 2017. Air Quality Standards and Attainment Status. January. Website: http://www.baaqmd.gov/research-and-data/air-quality-standards-and-attainment-status. Accessed February 8, 2019.

Air Quality Index

The health impacts of the various air pollutants of concern can be presented in a number of ways. The clearest comparison is to the State and federal ozone standards. If concentrations are below the standard, it is safe to say that no health impact would occur to anyone. When concentrations exceed the standard, impacts will vary based on the amount by which the standard is exceeded. The EPA developed the Air Quality Index (AQI) as an easy-to-understand measure of health impacts compared with concentrations in the air. Table 3.3-5 provides a general description of the health impacts of ozone at different concentrations.

Table 3.3-5: Air Quality Index and Health Effects from Ozone

Air Quality Index/ 8-hour Ozone Concentration	Health Effects Description
AQI—51–100—Moderate Concentration 55–70 ppb	**Sensitive Groups**: Children and people with asthma are the groups most at risk.
	Health Effects Statements: Unusually sensitive individuals may experience respiratory symptoms.
	Cautionary Statements: Unusually sensitive people should consider limiting prolonged outdoor exertion.
AQI—101–150—Unhealthy for Sensitive Groups Concentration 86–105 ppb	**Sensitive Groups**: Children and people with asthma are the groups most at risk.
	Health Effects Statements: Increasing likelihood of respiratory symptoms and breathing discomfort in active children and adults and people with respiratory disease, such as asthma.
	Cautionary Statements: Active children and adults, and people with respiratory disease, such as asthma, should limit prolonged outdoor exertion.
AQI—151–200—Unhealthy Concentration 86–105 ppb	**Sensitive Groups**: Children and people with asthma are the groups most at risk.
	Health Effects Statements: Greater likelihood of respiratory symptoms and breathing difficulty in active children and adults and people with respiratory disease, such as asthma; possible respiratory effects in general population.
	Cautionary Statements: Active children and adults, and people with respiratory disease, such as asthma, should avoid prolonged outdoor exertion; everyone else, especially children, should limit prolonged outdoor exertion.
AQI—201–300—Very Unhealthy Concentration 106–200 ppb	**Sensitive Groups**: Children and people with asthma are the groups most at risk.
	Health Effects Statements: Increasingly severe symptoms and impaired breathing likely in active children and adults and people with respiratory disease, such as asthma; increasing likelihood of respiratory effects in general population.
	Cautionary Statements: Active children and adults, and people with respiratory disease, such as asthma, should avoid all outdoor exertion; everyone else, especially children, should limit outdoor exertion.
Source: Air Now. 2015. AQI Calculator: AQI to Concentration. Website: http://www.airnow.gov/index.cfm?action=resources.aqi_conc_calc. Accessed July 2, 2018.	

Local Air Quality

Air quality is a function of both the rate and location of pollutant emissions under the influence of meteorological conditions and topographic features. Atmospheric conditions such as wind speed, wind direction, and air temperature inversions interact with the physical features of the landscape

to determine the movement and dispersal of air pollutant emissions and, consequently, their effect on air quality. While the predominant average hourly wind direction in the City of Antioch varies throughout the year, and instantaneous wind speed and direction vary more widely than hourly averages, the wind most often comes from the west for approximately 9 months between mid-February and mid-November, and most often from the north for approximately 3 months between mid-November and mid-February.[3]

The local air quality can be evaluated by reviewing relevant air pollution concentrations near the project area. The air quality monitoring station closest to the project site is the Bethel Island Road Air Monitoring Site, which is located approximately 8.3 miles northeast of the project site. Table 3.3-6 summarizes the recorded ambient air data at the representative monitoring stations for years 2016 through 2018, which is the most current data available at the time of this writing. As Table 3.3-6 shows, the recorded data show exceedances of the California standards for PM_{10} (24-hour), and national standards for ozone (8-hour) and $PM_{2.5}$ (24-hour), on multiple occasions from 2016 through 2018. No exceedances of either the State or national standards were recorded for CO, NO_2, or SO_2. No recent monitoring data for Contra Costa County or the San Francisco Air Basin was available for CO or SO_2. Generally, no monitoring is conducted for pollutants that are no longer likely to exceed ambient air quality standards.

Table 3.3-6: Air Quality Monitoring Summary

Air Pollutant	Averaging Time	Item	2016	2017	2018
Ozone(1)	1 Hour	Max 1 Hour (ppm)	0.089	0.090	0.093
		Days > State Standard (0.09 ppm)	0	0	0
	8 Hour	Max 8 Hour (ppm)	**0.81**	**0.071**	**0.078**
		Days > State Standard (0.07 ppm)	1	2	2
		Days > National Standard (0.070 ppm)(2)	**2**	**1**	**1**
CO	8 Hour	Max 8 Hour (ppm)	ND	ND	ND
		Days > State Standard (9.0 ppm)	ND	ND	ND
		Days > National Standard (9 ppm)	ND	ND	ND
NO_2(1)	Annual	Annual Average (ppm)	0.005	0.005	0.005
	1 Hour	Max 1 Hour (ppm)	0.032	0.034	0.042
		Days > State Standard (0.18 ppm)	0	0	0
SO_2	Annual	Annual Average (ppm)	ND	ND	ND
	24 Hour	Max 24 Hour (ppm)	ND	ND	ND
		Days > State Standard (0.04 ppm)	ND	ND	ND

[3] Weatherspark. 2020. Average Weather in Antioch. Website: https://weatherspark.com/y/1111/Average-Weather-in-Antioch-California-United-States-Year-Round. Accessed March 3, 2020.

Table 3.3-6 (cont.): Air Quality Monitoring Summary

Air Pollutant	Averaging Time	Item	2016	2017	2018
Inhalable coarse particles (PM_{10})[(1)]	Annual	Annual Average (µg/m^3)	7.5	7.9	10.0
	24 Hour	24 Hour (µg/m^3)	26.0	**52.0**	**151.0**
		Days > State Standard (50 µg/m^3)	ID	ID	ID
		Days > National Standard (150 µg/m^3)	0	ID	ID
Fine particulate matter ($PM_{2.5}$)[(3)]	Annual	Annual Average (µg/m^3)	5.9	12.0	13.4
	24 Hour	24 Hour (µg/m^3)	20.7	**89.4**	**180.0**
		Days > National Standard (35 µg/m^3)	0	**6.0**	**14.2**

Notes:
> = exceed ppm = parts per million µg/m^3 = micrograms per cubic meter
ID = insufficient data ND = no data max = maximum
Bold = exceedance
State Standard = California Ambient Air Quality Standard
National Standard = National Ambient Air Quality Standard
(1) Bethel Island Road Air Monitoring Station
(2) On October 1, 2015, the EPA strengthened the NAAQS for ground-level ozone to 70 parts per million through the adoption of a new standard. The Final Rule went into effect on December 28, 2015.
(3) Concord-2975 Treat Blvd Air Monitoring Station
Source: California Air Resources Board (ARB). 2018. iADAM: Air Quality Data Statistics. Website: https://www.arb.ca.gov/adam. Accessed October 1, 2019.

Air Pollution Sensitive Receptors

Air pollution does not affect every individual in the population in the same way, and some groups are more sensitive to adverse health effects than others are. Land uses such as residences, schools, day care centers, hospitals, nursing and convalescent homes, and parks are considered the most sensitive to poor air quality, because the population groups associated with these uses have increased susceptibility to respiratory distress or, as in the case of residential receptors, their exposure time is greater than that for other land uses. Therefore, these groups are referred to as sensitive receptors. Exposure assessment guidance typically assumes that residences would be exposed to air pollution 24 hours per day, 350 days per year, for 70 years. The BAAQMD defines sensitive receptors as children, adults, and seniors occupying or residing in residential dwellings, schools, day care centers, hospitals, and senior-care facilities.

Project Vicinity

The areas surrounding the proposed project include a single-family, medium density residential subdivision to the north, undeveloped portions of the Sand Creek Focus Area to the south, Mixed-Use Medical Facility to the east, and a continuation of undeveloped Sand Creek Focus Area land to the west.

The nearest sensitive receptors are single-family residences located approximately 10 feet (3 meters) north of the project site, and the Kaiser Permanente Antioch Medical Center across Deer Valley Road, approximately 500 feet east of the project site.

Existing Air Pollutant Emissions

There are no calculable sources of air pollutants currently emitted from the project site, although some level of methane is likely emitted from the cattle grazing.

3.3.3 - Regulatory Framework

Federal

Clean Air Act

Congress established much of the basic structure of the Clean Air Act (CAA) in 1970 and made major revisions in 1977 and 1990. Six common air pollutants (also known as criteria pollutants) are addressed in the CAA. These are particulate matter, ground-level ozone, CO, sulfur oxides, nitrogen oxides, and lead. The 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. The set of limits based on human health are called primary standards. Another set of limits intended to prevent environmental and property damage are called secondary standards.[4] The federal standards are called NAAQS. The air quality standards provide benchmarks for determining whether air quality is healthy at specific locations and whether development activities will cause or contribute to a violation of the standards. The criteria pollutants are:

- Ozone
- Nitrogen dioxide (NO_2)
- Lead
- Particulate matter (PM_{10} and $PM_{2.5}$)
- Carbon monoxide (CO)
- Sulfur dioxide

The federal standards were set to protect public health, including that of sensitive individuals; thus, the EPA is tasked with updating the standards as more medical research is available regarding the health effects of the criteria pollutants. Primary federal standards are the levels of air quality necessary, with an adequate margin of safety, to protect the public health.

The Clean Air Act also requires each state to prepare an air quality control plan referred to as a State Implementation Plan (SIP). The federal Clean Air Act Amendments of 1990 added requirements for states with nonattainment areas to revise their SIPs to incorporate additional control measures to reduce air pollution. The SIP is periodically modified to reflect the latest emissions inventories, planning documents, and rules and regulations of the air basins, as reported by their jurisdictional agencies.

EPA Emission Standards for New Off-Road Equipment

Before 1994, there were no standards to limit the amount of emissions from off-road equipment. In 1994, the EPA established emission standards for hydrocarbons, NO_X, CO, and PM to regulate new

[4] United States Environmental Protection Agency (EPA). 2014. Clean Air Act Requirements and History. Website: https://www.epa.gov/clean-air-act-overview/clean-air-act-requirements-and-history. Accessed December 10, 2019.

pieces of off-road equipment. These emission standards came to be known as Tier 1. Since that time, increasingly more stringent Tier 2, Tier 3, and Tier 4 (interim and final) standards were adopted by the EPA, as well as by the ARB. Each adopted emission standard was phased in over time. New engines built in and after 2015 across all horsepower sizes must meet Tier 4 final emission standards. In other words, new manufactured engines cannot exceed the emissions established for Tier 4 final emissions standards.

State

California Air Quality Control Plan (State Implementation Plan)

A SIP is a document prepared by each state describing existing air quality conditions and measures that will be followed to attain and maintain federal standards. The SIP for the State of California is administered by the ARB, which has overall responsibility for Statewide air quality maintenance and air pollution prevention. California's SIP incorporates individual federal attainment plans for regional air districts—an air district prepares their federal attainment plan, which is sent to the ARB to be approved and incorporated into the California SIP. Federal attainment plans include the technical foundation for understanding air quality (e.g., emission inventories and air quality monitoring), control measures and strategies, and enforcement mechanisms for attaining and maintaining air quality standards.

Areas designated nonattainment must develop air quality plans and regulations to achieve standards by specified dates, depending on the severity of the exceedances. For much of the country, implementation of federal motor vehicle standards and compliance with federal permitting requirements for industrial sources are adequate to attain air quality standards on schedule. For many areas of California, however, additional State and local regulation is required to achieve the standards.

California Clean Air Act

The California Legislature enacted the California Clean Air Act (CCAA) in 1988 to address air quality issues of concern not adequately addressed by the federal CAA at the time. California's air quality problems were and continue to be some of the most severe in the nation, and required additional actions beyond the federal mandates. The ARB administers the CAAQS for the 10 air pollutants designated in the CCAA. The 10 State air pollutants are the six federal standards listed above as well as visibility-reducing particulates, hydrogen sulfide, sulfates, and vinyl chloride. The EPA authorized California to adopt its own regulations for motor vehicles and other sources that are more stringent than similar federal regulations implementing the CAA. Generally, the planning requirements of the CCAA are more stringent than the federal CAA; therefore, consistency with the CAA will also demonstrate consistency with the CCAA.

Other ARB responsibilities include but are not limited to overseeing local air district compliance with California and federal laws; approving local air quality plans; submitting SIPs to EPA; monitoring air quality; determining and updating area designations and maps; conducting basic research aimed at providing a better understanding between emissions and public well-being, and setting emissions standards for new mobile sources, consumer products, small utility engines, off-road vehicles, and fuels.

California Health and Safety Code Section 39655 and California Code of Regulations Title 17 Section 93000 (Substances Identified as Toxic Air Contaminants)

The ARB identifies substances as TACs as defined in Health and Safety Code Section 39655 and listed in Title 17, Section 93000 of the California Code of Regulations, "Substances Identified As Toxic Air Contaminants." A TAC is defined as an air pollutant that may cause or contribute to an increase in mortality or serious illness, or that may pose a hazard to human health. TACs are usually present in minute quantities in the ambient air; however, their high toxicity or health risk may pose a threat to public health even at low concentrations. In general, for those TACs that may cause cancer, there are thresholds set by regulatory agencies below which adverse health impacts are not expected to occur. This contrasts with the criteria pollutants for which acceptable levels of exposure can be determined and for which the State and federal governments have set ambient air quality standards. According to the California Almanac of Emissions and Air Quality, the majority of the estimated health risk from TACs for the State of California can be attributed to relatively few compounds, the most important of which is diesel particulate matter (DPM) from diesel-fueled engines.

California Low-Emission Vehicle Program

The ARB first adopted Low-Emission Vehicle (LEV) program standards in 1990. These first LEV standards ran from 1994 through 2003. LEV II regulations, running from 2004 through 2010, represent continuing progress in emission reductions. As the State's passenger vehicle fleet continues to grow and more sport utility vehicles and pickup trucks are used as passenger cars rather than work vehicles, the more stringent LEV II standards were adopted to provide reductions necessary for California to meet federally mandated clean air goals outlined in the 1994 SIP. In 2012, the ARB adopted the LEV III amendments to California's LEV regulations. These amendments, also known as the Advanced Clean Car Program, include more stringent emission standards for model years 2017 through 2025 for both criteria pollutants and greenhouse gas (GHG) emissions for new passenger vehicles.[5]

California On-Road Heavy-Duty Vehicle Program

The ARB has adopted standards for emissions from various types of new on-road heavy-duty vehicles. Section 1956.8, Title 13, California Code of Regulations contains California's emission standards for on-road heavy-duty engines and vehicles, and test procedures. The ARB has also adopted programs to reduce emissions from in-use heavy-duty vehicles including the Heavy-Duty Diesel Vehicle Idling Reduction Program, the Heavy-Duty Diesel In-Use Compliance Program, the Public Bus Fleet Rule and Engine Standards, and the School Bus Program and others.[6]

California In-Use Off-Road Diesel Vehicle Regulation

On July 26, 2007, the ARB adopted a regulation to reduce DPM and NO_X emissions from in-use (existing) off-road heavy-duty diesel vehicles in California. Such vehicles are used in construction, mining, and industrial operations. The regulation limits idling to no more than five consecutive minutes, requires reporting and labeling, and requires disclosure of the regulation upon vehicle sale.

[5] California Air Resources Board (ARB). 2013. Clean Car Standards—Pavley, Assembly Bill 1493. Website: http://www.arb.ca.gov/cc/ccms/ccms.htm. Accessed December 10, 2019.

[6] California Air Resources Board (ARB). 2013. The California Almanac of Air Quality and Emissions—2013 Edition. Website: http://www.arb.ca.gov/aqd/almanac/almanac13/almanac13.htm. Accessed December 10, 2019.

The ARB is enforcing that part of the rule with fines up to $10,000 per day for each vehicle in violation. Performance requirements of the rule are based on a fleet's average NO_X emissions, which can be met by replacing older vehicles with newer, cleaner vehicles or by applying exhaust retrofits. The regulation was amended in 2010 to delay the original timeline of the performance requirements, making the first compliance deadline January 1, 2014 for large fleets (over 5,000 horsepower), 2017 for medium fleets (2,501-5,000 horsepower), and 2019 for small fleets (2,500 horsepower or less).

The latest amendments to the Truck and Bus regulation became effective on December 31, 2014. The amended regulation requires diesel trucks and buses that operate in California to be upgraded to reduce emissions. Newer heavier trucks and buses must meet PM filter requirements beginning January 1, 2012. Lighter and older heavier trucks must be replaced starting January 1, 2015. By January 1, 2023, nearly all trucks and buses will need to have 2010 model year engines or equivalent.

The regulation applies to nearly all privately and federally owned diesel fueled trucks and buses and to privately and publicly owned school buses with a gross vehicle weight rating greater than 14,000 pounds. The regulation provides a variety of flexibility options tailored to fleets operating low use vehicles, fleets operating in selected vocations like agricultural and construction, and small fleets of three or fewer trucks.[7]

California Airborne Toxic Control Measures for Asbestos

The ARB has adopted Airborne Toxic Control Measures (ATCM) for sources that emit a particular TAC. If there is a safe threshold for a substance at which there is no toxic effect, the control measure must reduce exposure below that threshold. If there is no safe threshold, the measure must incorporate Best Available Control Technology to minimize emissions.

In July 2001, the ARB approved an ATCM for construction, grading, quarrying and surface mining operations to minimize emissions of naturally occurring asbestos. The regulation requires application of Best Management Practices (BMPs) to control fugitive dust in areas known to have naturally occurring asbestos and requires notification to the local air district prior to commencement of ground-disturbing activities. The measure establishes specific testing, notification and engineering controls prior to grading, quarrying, or surface mining in construction zones where naturally occurring asbestos is located on projects of any size. There are additional notification and engineering controls at work sites larger than 1 acre in size. These projects require the submittal of a "Dust Mitigation Plan" and approval by the air district prior to the start of a project.

Construction sometimes requires the demolition of existing buildings where construction occurs. Asbestos is also found in a natural state, known as naturally occurring asbestos. Exposure and disturbance of rock and soil that naturally contain asbestos can result in the release of fibers into the air and consequent exposure to the public. Asbestos most commonly occurs in ultramafic rock that has undergone partial or complete alteration to serpentine rock (serpentinite) and often contains chrysotile asbestos. In addition, another form of asbestos, tremolite, can be found associated with

[7] California Air Resources Board (ARB). 2015. On-Road Heavy-Duty Diesel Vehicles (In-Use) Regulation. Website: http://www.arb.ca.gov/msprog/onrdiesel/onrdiesel.htm. Accessed December 10, 2019.

ultramafic rock, particularly near faults. Sources of asbestos emissions include unpaved roads or driveways surfaced with ultramafic rock, construction activities in ultramafic rock deposits, or rock quarrying activities where ultramafic rock is present.

The ARB has an Air Toxics Control Measure for construction, grading, quarrying, and surface mining operations, requiring the implementation of mitigation measures to minimize emissions of asbestos-laden dust. The measure applies to road construction and maintenance, construction and grading operations, and quarries and surface mines when the activity occurs in an area where naturally occurring asbestos is likely to be found. Areas are subject to the regulation if they are identified on maps published by the Department of Conservation as ultramafic rock units or if the Air Pollution Control Officer or owner/operator has knowledge of the presence of ultramafic rock, serpentine, or naturally occurring asbestos on the site. The measure also applies if ultramafic rock, serpentine, or asbestos is discovered during any operation or activity.

Verified Diesel Emission Control Strategies

The EPA and ARB tiered off-road emission standards only apply to new engines and off-road equipment can last several years. The ARB has developed Verified Diesel Emission Control Strategies (VDECS), which are devices, systems, or strategies used to achieve the highest level of pollution control from existing off-road vehicles, to help reduce emissions from existing engines. VDECS are designed primarily for the reduction of DPM emissions and have been verified by the ARB. There are three levels of VDECS, the most effective of which is the Level 3 VDECS. Tier 4 engines are not required to install VDECS because they already meet the emissions standards for lower tiered equipment with installed controls.

California Diesel Risk Reduction Plan

The ARB Diesel Risk Reduction Plan has led to the adoption of new State regulatory standards for all new on-road, off-road, and stationary diesel-fueled engines and vehicles to reduce DPM emissions in 2020 by about 90 percent overall from year 2000 levels. The projected emission benefits associated with the full implementation of this plan, including federal measures, are reductions in DPM emissions and associated cancer risks of 75 percent by 2010, and 85 percent by 2020.[8]

Tanner Air Toxics Act and Air Toxics Hot Spots Information and Assessment Act

TACs in California are primarily regulated through the Tanner Air Toxics Act (Assembly Bill [AB] 1807) and the Air Toxics Hot Spots Information and Assessment Act of 1987 (AB 2588), also known as the Hot Spots Act. To date, the ARB has identified more than 21 TACs, and has adopted the EPA list of Hazardous Air Pollutants (HAPs) as TACs.

Carl Moyer Memorial Air Quality Standards Attainment Program

The Carl Moyer Memorial Air Quality Standards Attainment Program (Carl Moyer Program), a partnership between the ARB and local air districts, issues grants to replace or retrofit older engines and equipment with engines and equipment that exceed current regulatory requirements to reduce air pollution. Money collected through the Carl Moyer Program complements California's regulatory

[8] California Air Resources Board (ARB). 2000. Risk Reduction Plan to Reduce Particulate Matter Emissions from Diesel-fueled Engines and Vehicles. Website: http://www.arb.ca.gov/diesel/documents/rrpfinal.pdf. Accessed December 10, 2019.

program by providing incentives to effect early or extra emission reductions, especially from emission sources in environmental justice communities and areas disproportionately affected by air pollution. The program has established guidelines and criteria for the funding of emissions reduction projects. Within the SFBAAB, the BAAQMD administers the Carl Moyer Program. The program has established guidelines and criteria for the funding of emissions reduction projects. Within the SFBAAB, the BAAQMD administers the Carl Moyer Program. The program establishes cost-effectiveness criteria for funding emission reductions projects, which under the final 2017 Carl Moyer Program Guidelines are $30,000 per weighted ton of NO_X, ROG, and PM.[9]

Regional

BAAQMD CEQA Air Quality Guidelines

The BAAQMD is the primary agency responsible for ensuring that air quality standards (NAAQS and CAAQS) are attained and maintained in the SFBAAB through a comprehensive program of planning, regulation, enforcement, technical innovation, and promotion of the understanding of air quality issues. The BAAQMD prepares plans to attain ambient air quality standards in the SFBAAB. The BAAQMD prepares ozone attainment plans for the national ozone standard, clean air plans (CAPs) for the California standard, and PM plans to fulfill federal air quality planning requirements. Additionally, the BAAQMD inspects stationary sources of air pollution; responds to citizen complaints; monitors ambient air quality and meteorological conditions; and implements programs and regulations required by the Clean Air Act, the Clean Air Act Amendments of 1990, and the California Clean Air Act.

The BAAQMD developed quantitative thresholds of significance for its California Environmental Quality Act (CEQA) Guidelines in 2010, which were also included in its updated 2011 Guidelines.[10,11] The BAAQMD adoption of the 2010 thresholds of significance was later challenged in court. In an opinion issued on December 17, 2015, related to the BAAQMD CEQA Guidelines, the California Supreme Court held that CEQA does not generally require an analysis of the impacts of locating development in areas subject to environmental hazards unless the project would exacerbate existing environmental hazards. The Supreme Court also found that CEQA requires the analysis of exposing people to environmental hazards in specific circumstances, including the location of development near airports, schools near sources of toxic contamination, and certain exemptions for infill and workforce housing. The Supreme Court also held that public agencies remain free to voluntarily conduct this analysis not required by CEQA for their own public projects (CBIA v. BAAQMD [2016] 2 Cal. App. 5th 1067, 1083).

In view of the Supreme Court's opinion, the BAAQMD published a new version of its CEQA Guidelines in May 2017. The BAAQMD CEQA Guidelines state that local agencies may rely on thresholds designed to reflect the impact of locating development near areas of toxic air contamination where such an analysis is required by CEQA or where the agency has determined that

[9] California Air Resources Board (ARB). 2017. 2017 Carl Moyer Program Guidelines. Website: https://www.arb.ca.gov/msprog/moyer/guidelines/current.htm. Accessed November 30, 2019.

[10] Bay Area Air Quality Management District (BAAQMD). 2010. CEQA Air Quality Guidelines. Website: https://www.baaqmd.gov/~/media/Files/Planning%20and%20Research/CEQA/Draft_BAAQMD_CEQA_Guidelines_May_2010_Final.ashx. Accessed November 15, 2019.

[11] Bay Area Air Quality Management District (BAAQMD). 2010. CEQA Air Quality Guidelines. Website: https://www.baaqmd.gov/~/media/Files/Planning%20and%20Research/CEQA/BAAQMD%20CEQA%20Guidelines%20May%202011.ashx?la=en. Accessed November 15, 2019.

such an analysis would assist in making a decision about the project. However, the thresholds are not mandatory, and agencies should apply them only after determining that they reflect an appropriate measure of a project's impacts. The BAAQMD's guidelines for implementation of the thresholds are for informational purposes only, to assist local agencies.

To fulfill federal air quality planning requirements, the BAAQMD adopted a $PM_{2.5}$ emissions inventory for year 2010 at a public hearing on November 7, 2012. The Bay Area Clean Air Plan also included several measures for reducing PM emissions from stationary sources and wood burning. On January 9, 2013, the EPA issued a final rule determining that the Bay Area has attained the 24-hour $PM_{2.5}$ NAAQS, suspending federal SIP planning requirements for the SFBAAB.[12] Despite this EPA action, the SFBAAB will continue to be designated as nonattainment for the national 24-hour $PM_{2.5}$ standard until the BAAQMD submits a redesignation request and a maintenance plan to the EPA, and the EPA approves the proposed redesignation.

The SFBAAB is in nonattainment for the federal PM_{10} and federal $PM_{2.5}$ standards. The EPA lowered the 24-hour $PM_{2.5}$ standard from 65 micrograms per cubic meter ($\mu g/m^3$) to 35 $\mu g/m^3$ in 2006, and designated the Air Basin as nonattainment for the new $PM_{2.5}$ standard effective December 14, 2009.

On December 8, 2011, the ARB submitted a "clean data finding" request to the EPA on behalf of the Bay Area. If the clean data finding request is approved, then EPA guidelines provide that the region can fulfill federal $PM_{2.5}$ SIP requirements by preparing either a redesignation request and a $PM_{2.5}$ maintenance plan, or a "clean data" SIP submittal. Because peak $PM_{2.5}$ levels can vary from year to year based on natural, short-term changes in weather conditions, the BAAQMD believes that it would be premature to submit a redesignation request and $PM_{2.5}$ maintenance plan at this time. Therefore, the BAAQMD will prepare a "clean data" SIP to address the required elements, including:

- An emission inventory for primary $PM_{2.5}$, as well as precursors to secondary PM formation
- Amendments to the BAAQMD's New Source Review regulation to address $PM_{2.5}$

BAAQMD 2017 Clean Air Plan

The BAAQMD adopted the Bay Area Clean Air Plan: Spare the Air, Cool the Climate (Bay Area Clean Air Plan) on April 19, 2017, to provide a regional strategy to improve Bay Area air quality and meet public health goals.[13] The control strategy described in the Bay Area Clean Air Plan includes a wide range of control measures designed to reduce emissions and lower ambient concentrations of harmful pollutants, safeguard public health by reducing exposure to air pollutants that pose the greatest health risk, and reduce GHG emissions to protect the climate.

The Bay Area Clean Air Plan addresses four categories of pollutants: ground-level ozone and its key precursors, ROG and NO_X; PM, primarily $PM_{2.5}$, and precursors to secondary $PM_{2.5}$; air toxics; and

[12] United States Environmental Protection Agency (EPA). 2013. Federal Register. Determination of Attainment for the San Francisco Bay Area Nonattainment Area for the 2006 Fine Particle Standard; California; Determination Regarding Applicability of Clean Air Act Requirements. Website: https://www.federalregister.gov/documents/2013/01/09/2013-00170/determination-of-attainment-for-the-san-francisco-bay-area-nonattainment-area-for-the-2006-fine. Accessed June 5, 2018.

[13] Bay Area Air Quality Management District (BAAQMD). 2017. Final 2017 Clean Air Plan. Website: http://www.baaqmd.gov/~/media/files/planning-and-research/plans/2017-clean-air-plan/attachment-a_-proposed-final-cap-vol-1-pdf.pdf?la=en. Accessed April 24, 2018.

GHGs. The control measures are categorized based on the economic sector framework including stationary sources, transportation, energy, buildings, agriculture, natural and working lands, waste management, and water measures.[14]

BAAQMD Regulations

Regulation 2, Rule 5 (New Source Review Permitting)

The BAAQMD regulates backup emergency generators, fire pumps, and other sources of TACs through its New Source Review (Regulation 2, Rule 5) permitting process.[15] Although emergency generators are intended to be used only during periods of power outages, monthly testing of each generator is required; however, the BAAQMD limits testing to no more than 50 hours per year. Each emergency generator installed is assumed to meet a minimum of Tier 2 emission standards (before control measures). As part of the permitting process, the BAAQMD limits the excess cancer risk from any facility to no more than 10 per 1-million-population for any permits that are applied for within a 2-year period and would require any source that would result in an excess cancer risk greater than 1 per 1 million to install Best Available Control Technology for Toxics.

Regulation 8, Rule 3 (Architectural Coatings)

This rule governs the manufacture, distribution, and sale of architectural coatings and limits the reactive organic gases content in paints and paint solvents. Although this rule does not directly apply to the project, it does dictate the ROG content of paint available for use during the construction.

Regulation 8, Rule 15 (Emulsified and Liquid Asphalts)

Although this rule does not directly apply to the project, it does dictate the reactive organic gases content of asphalt available for use during the construction through regulating the sale and use of asphalt and limits the ROG content in asphalt.

Regulation 1, Rule 301 (Odorous Emissions)

The BAAQMD is responsible for investigating and controlling odor complaints in the Bay Area. The agency enforces odor control by helping the public to document a public nuisance. Upon receipt of a complaint, the BAAQMD sends an investigator to interview the complainant and to locate the odor source if possible. The BAAQMD typically brings a public nuisance court action when there are a substantial number of confirmed odor events within a 24-hour period. An odor source with five or more confirmed complaints per year averaged over 3 years is considered to have a substantial effect on receptors.

Several BAAQMD regulations and rules apply to odorous emissions. Regulation 1, Rule 301 is the nuisance provision that states that sources cannot emit air contaminants that cause nuisance to a number of persons. Regulation 7 specifies limits for the discharge of odorous substances where the BAAQMD receives complaints from 10 or more complainants within a 90-day period. Among other things, Regulation 7 precludes discharge of an odorous substance that causes the ambient air at or

[14] Bay Area Air Quality Management District (BAAQMD). 2017. Final 2017 Clean Air Plan. Website: http://www.baaqmd.gov/~/media/files/planning-and-research/plans/2017-clean-air-plan/attachment-a_-proposed-final-cap-vol-1-pdf.pdf?la=en. Accessed April 24, 2018.

[15] Bay Area Air Quality Management District (BAAQMD). 2016. NSR [New Source Review Permitting]. Website: http://www.baaqmd.gov/permits/permitting-manuals/nsr-permitting-guidance. Accessed March 4, 2019.

beyond the property line to be odorous after dilution with 4 parts of odor-free air, and specifies maximum limits on the emission of certain odorous compounds.

Association of Bay Area Governments and Metropolitan Transportation Commission Plan Bay Area

On July 18, 2013, the Metropolitan Transportation Commission (MTC) and the Association of Bay Area Governments (ABAG) approved the Plan Bay Area. The Plan Bay Area includes integrated land use and transportation strategies for the region and was developed through OneBayArea, a joint initiative between ABAG, BAAQMD, MTC, and the San Francisco Bay Conservation and Development Commission. The plan's transportation policies focus on maintaining the extensive existing transportation network and utilizing these systems more efficiently to handle density in Bay Area transportation cores (ABAG and MTC 2013).[16] Assumptions for land use development used are taken from local and regional planning documents. Emission forecasts in the Bay Area Clean Air Plan rely on projections of vehicle miles traveled, population, employment, and land use projections made by local jurisdictions during development of Plan Bay Area. The Plan Bay Area 2040 was adopted July 2017 and updates Plan Bay Area.

Plan Bay Area 2040, published by the MTC and ABAG, is a long-range integrated transportation and land use/housing strategy through 2040 for the Bay Area. Plan Bay Area 2040 functions as the sustainable communities' strategy mandated by Senate Bill (SB) 375. As a regional land use plan, Plan Bay Area 2040 aims to reduce per-capita greenhouse gas emissions through the promotion of more compact, mixed-use residential and commercial neighborhoods located near transit. Plan Bay Area 2040 is a limited and focused update that builds upon a growth pattern and strategies developed in the original Plan Bay Area (adopted by MTC in 2013) but with updated planning assumptions that incorporate key economic, demographic, and financial trends from the last four years.

Local

City of Antioch General Plan

The City of Antioch General Plan was adopted November 24, 2003.[17] The following are applicable General Plan goals and policies related to air quality from the City of Antioch General Plan, including policies from Section 4.4.6.7 specific to the Sand Creek Focus Area:

- **Policy 4.4.6.7ff:** The Sand Creek Focus Area is intended to be "transit-friendly," including appropriate provisions for public transit and non-motorized forms of transportation.
- **Objective 10.6.1:** Minimize air pollutant emissions within the Antioch Planning Area so as to assist in achieving state and federal air quality standards.
- **Policy 10.6.2a:** Require development projects to minimize the generation of particulate emissions during construction through implementation of the dust abatement actions outlined in the CEQA Handbook of the Bay Area Air Quality Management District.

[16] Association of Bay Area Governments (ABAG) and Metropolitan Transportation Commission (MTC). 2013. Plan Bay Area. Website: https://www.planbayarea.org/previous-plan. Accessed December 27, 2019.

[17] City of Antioch. 2003. City of Antioch General Plan. November 24. Website: https://www.antiochca.gov/fc/community-development/planning/Antioch_Adopted_General_Plan.pdf. Accessed September 30, 2019.

- **Policy 10.6.2b:** Require developers of large residential and non-residential projects to participate in programs and to take measures to improve traffic flow and/or reduce vehicle trips resulting in decreased vehicular emissions. Examples of such efforts may include, but are not limited to the following:
  - Development of mixed-use projects, facilitating pedestrian and bicycle transportation and permitting consolidation of vehicular trips.
  - Installation of transit improvements and amenities, including dedicated bus turnouts and sufficient rights-of-way for transit movement, bus shelters, and pedestrian easy access to transit.
  - Provision of bicycle and pedestrian facilities, including bicycle lanes and pedestrian walkways connecting residential areas with neighborhood commercial centers, recreational facilities, schools, and other public areas.
  - Contributions for off-site mitigation for transit use.
  - Provision of charging stations for electric vehicles within large employment-generating and retail developments.
- **Policy 10.6.2f:** Provide physical separations between (1) proposed new industries having the potential for emitting toxic air contaminants and (2) existing and proposed sensitive receptors (e.g., residential areas, schools, and hospitals).
- **Policy 10.6.2g:** Require new wood burning stoves and fireplaces to comply with EPA and BAAQMD approved standards.

3.3.4 - Impacts and Mitigation Measures

Significance Criteria

According to the CEQA Guidelines' Appendix G Environmental Checklist, to determine whether impacts to air quality are significant environmental effects, the following questions are analyzed and evaluated.

> Where available, the significance criteria established by the applicable air quality management or air pollution control district may be relied upon to make the following determinations.
>
> Would the project:
>
> 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 non-attainment under an applicable federal or State ambient air quality standard?
>
> c) Expose sensitive receptors to substantial pollutant concentrations?
>
> d) Result in other emissions (such as those leading to odors) adversely affecting a substantial number of people?

Approach to Analysis

Emission factors represent the emission rate of a pollutant over a given time or activity; for example, grams of NO_X per vehicle miles traveled (VMT) or grams of NO_X per horsepower hour of equipment

operation. The ARB has published emission factors for on-road mobile vehicles/trucks in the EMFAC mobile source emissions model and emission factors for off-road equipment and vehicles in the OFFROAD emissions model. Activity levels are a measure of how active a piece of equipment is and can be represented as the amount of material processed, elapsed time that a piece of equipment is in operation, horsepower of a piece of equipment used, or VMT per day. An air emissions model (or calculator) combines the emission factors and the various levels of activity and outputs the emissions for the various pieces of equipment.

The California Emissions Estimator Model (CalEEMod) version 2016.3.2 was developed in collaboration with the South Coast Air Quality Management District (SCAQMD) and other air districts throughout the State. CalEEMod is designed as a uniform platform for government agencies, land use planners, and environmental professionals to quantify potential criteria pollutant emissions associated with construction and operation from a variety of land uses.

The modeling follows the BAAQMD guidance where applicable from the BAAQMD CEQA Air Quality Guidelines. The models used in this analysis are summarized as follows:

- Construction criteria pollutant and precursor emissions: CalEEMod, version 2016.3.2
- Operational criteria pollutant and precursor emissions: CalEEMod, version 2016.3.2
- Construction TAC emission air dispersion assessment: EPA AERMOD dispersion model, version 9.8.3.

The following criteria air pollutants and precursors are assessed in this analysis:

- Reactive organic gases (ROG)
- Nitrogen oxides (NO_X)
- Carbon monoxide (CO)
- Particulate matter less than 10 microns in diameter (PM_{10})
- Particulate matter less than 2.5 microns in diameter ($PM_{2.5}$)

Note that the development of the proposed project would emit ozone precursors ROG and NO_X. However, the development of the proposed project would not directly emit ozone since it is formed in the atmosphere during the photochemical reactions of ozone precursors.

Construction-related Criteria Pollutants

Construction emissions can vary substantially from day to day, depending on the level of activity, the specific type of operation, and prevailing weather conditions. Construction emissions result from both on-site and off-site activities. On-site emissions consist of exhaust emissions from the activity levels of heavy-duty construction equipment, motor vehicle operation, and fugitive dust (mainly PM_{10}) from disturbed soil. Additionally, paving operations and application of architectural coatings would release ROG emissions. Off-site emissions result from motor vehicle exhaust from delivery vehicles, worker traffic and road dust (PM_{10} and $PM_{2.5}$).

Schedule

The implementation of the proposed project would include demolition of approximately 3,500 square feet of building space, as well as construction of 1,177 single-family residential units (low density, medium density, and age restricted housing) on 253.50 acres, a 5-acre village center consisting of 54,000 square feet of commercial, office, and retail space, 3 acres of public facility space, including a site for a new fire station and a trail staging area, 22.50 acres of public parks and landscaped area, 38 acres of roadway improvements, and the dedication of 229.50 acres of public open space and trails.

Based on information outlined in Section 2, Project Description, construction would be constructed in three phases and take approximately 8 years, with full buildout to occur in Fall 2029. If the construction schedule moves to later years, construction emissions would likely decrease because of improvements in technology and more stringent regulatory requirements for construction equipment and vehicles. The construction work for trail improvements is assumed to occur simultaneously with the construction activities for the proposed project.

The major construction activities associated with each construction activity are noted in Table 3.3-7, while a detailed account of the construction activities in each activity is included in Section 2, Project Description. Construction activities would include demolition, site preparation, grading, building construction, paving, and architectural coating. The conceptual construction schedule for the proposed project is shown in Table 3.3-7.

Table 3.3-7: Conceptual Construction Schedule

Construction Activity	Conceptual Construction Schedule		Working Days
	Start Date	End Date	
Phase 1			
Demolition	06/21/2021	07/02/2021	10
Site Preparation	07/03/2021	07/30/2021	20
Grading	07/31/2021	07/30/2021	53
Building Construction	10/14/2021	10/20/2023	527
Architectural Coating	09/01/2023	10/23/2023	37
Paving	10/21/2023	12/12/2023	37
Phase 2			
Site Preparation	03/19/2024	04/16/2024	21
Grading	04/17/2024	07/05/2024	58
Building Construction	07/06/2024	10/07/2026	588
Architectural Coating	08/13/2026	10/07/2026	40
Paving	10/08/2026	12/02/2026	40
Phase 3			
Site Preparation	03/22/2027	04/21/2027	23

Table 3.3-7 (cont.): Conceptual Construction Schedule

Construction Activity	Conceptual Construction Schedule		Working Days
	Start Date	End Date	
Grading	04/22/2027	07/13/2027	59
Building Construction	07/14/2027	10/15/2029	589
Architectural Coating	08/17/2029	10/15/2029	42
Paving	10/16/2029	12/12/2029	42
Source: FirstCarbon Solutions (FCS) and CalEEMod. Based on project-specific information (Appendix C).			

Equipment Tiers and Emission Factors

Equipment tiers refer to a generation of emission standards established by the EPA and ARB that apply to diesel engines in off-road equipment. The "tier" of an engine depends on the model year and horsepower rating; generally, the newer a piece of equipment is, the greater the tier it is likely to have. Excluding engines greater than 750 horsepower, Tier 1 engines were manufactured generally between 1996 and 2003. Tier 2 engines were manufactured between 2001 and 2007. Tier 3 engines were manufactured between 2006 and 2011. Tier 4 engines are the newest and some incorporate hybrid electric technology; they were manufactured after 2007.

Construction emissions are generally calculated as the product of an activity factor and an emission factor. The activity factor for construction equipment is a measure of how active a piece of equipment is and can be represented as the amount of material processed, elapsed time that a piece of equipment is in operation, horsepower of a piece of equipment used, or the amount of fuel consumed in a given amount of time. The emission factor relates the process activity to the amount of pollutant emitted. Examples of emission factors include grams of emissions per miles traveled and grams of emissions per horsepower-hour. The operation of a piece of equipment is tempered by its load factor which is the average power of a given piece of equipment while in operation compared with its maximum rated horsepower. A load factor of 1.0 indicates that a piece of equipment continually operates at its maximum operating capacity. This analysis uses the CalEEMod default load factors for off-road equipment.

On-site Off-road Equipment

CalEEMod contains built-in inventories of construction equipment for a variety of land use construction projects that incorporate estimates of the number of equipment, their age, their horsepower, and emission control equipment tier mix from which rates of emissions are developed. These inventories were developed based on construction surveys for several land use projects. Table 3.3-8 presents the construction equipment used on the proposed project as derived from CalEEMod. The CalEEMod default emission control equipment tier mix was used in this analysis for the estimation of unmitigated emissions from on-site construction equipment.

Table 3.3-8: Project Construction Equipment Assumptions

Phase Name	Equipment	Number	Hours per Day	Horsepower	Load Factor
Phase 1					
Demolition	Concrete/Industrial Saws	1	8	81	0.73
	Excavators	3	8	158	0.38
	Rubber Tired Bulldozers	2	8	247	0.40
Site Preparation	Rubber Tired Bulldozers	3	8	187	0.41
	Tractors/Loaders/Backhoes	4	8	97	0.37
Grading	Graders	1	8	187	0.41
	Excavators	2	8	158	0.38
	Rubber Tired Bulldozers	1	8	247	0.40
	Scrapers	2	8	367	0.48
	Tractors/Loaders/Backhoes	2	8	97	0.37
Building Construction	Cranes	1	8	231	0.29
	Forklifts	3	8	89	0.20
	Generator Sets	1	8	90	0.74
	Tractors/Loaders/Backhoes	3	6	97	0.37
	Welders	1	8	46	0.45
Architectural Coating	Air Compressors	1	6	78	0.48
Paving	Pavers	2	8	130	0.42
	Paving Equipment	2	8	132	0.36
	Rollers	2	8	80	0.38
Phase 2/Phase 3					
Site Preparation	Rubber Tired Bulldozers	3	8	187	0.41
	Tractors/Loaders/Backhoes	4	8	97	0.37
Grading	Graders	1	8	187	0.41
	Excavators	2	8	158	0.38
	Rubber Tired Bulldozers	1	8	247	0.40
	Scrapers	2	8	367	0.48
	Tractors/Loaders/Backhoes	2	8	97	0.37
Building Construction	Cranes	1	8	231	0.29
	Forklifts	3	8	89	0.20
	Generator Sets	1	8	90	0.74
	Tractors/Loaders/Backhoes	3	6	97	0.37

Table 3.3-8 (cont.): Project Construction Equipment Assumptions

Phase Name	Equipment	Number	Hours per Day	Horsepower	Load Factor
	Welders	1	8	46	0.45
Architectural Coating	Air Compressors	1	6	78	0.48
Paving	Pavers	2	8	130	0.42
	Paving Equipment	2	8	132	0.36
	Rollers	2	8	80	0.38
Source: Appendix C.					

Demolition, Site Preparation, and Grading

The proposed project would include the demolition of approximately 3,500 square feet of building space, which includes an existing single-family residence, various barns, and outbuildings.

During grading activities, fugitive dust can be generated from the movement of dirt on the proposed project site. CalEEMod estimates dust from dozers moving dirt around, dust from graders or scrapers leveling the land, and loading or unloading dirt onto haul trucks. Each activity is calculated differently in CalEEMod, based on the number of acres traversed by the grading equipment.

Only some pieces of equipment are assumed to generate fugitive dust in CalEEMod. The CalEEMod model manual identifies various equipment and the acreage disturbed in an 8-hour day for each piece of equipment:

- Crawler tractors, graders, and rubber-tired dozers: 0.5-acre per 8-hour day
- Scrapers: 1 acre per 8-hour day

The proposed project analysis assumes the project site will be balanced and will not require import or export of soil.

Off-site On-road Vehicle Trips

The CalEEMod model defaults trip length and vehicle fleet were used. The CalEEMod model run used the default worker trip length of 10.8 miles, vendor trip length of 7.3, and the hauling trip length of 20 miles. A summary of the project construction-related trips is shown in Table 3.3-9. Please note that worker and vendor trips are in terms of worker trips per day, while haul trips are presented as total trips.

Table 3.3-9: Construction Off-site Vehicle Trips

Construction Activity	Construction Trips per Day		Total Construction Trips
	Worker	Vendor	Haul
Phase 1			
Demolition	15	0	16
Site Preparation	18	0	0
Grading	20	0	0
Building Construction	606	225	0
Architectural Coating	121	0	0
Paving	15	0	0
Phase 2			
Site Preparation	18	0	0
Grading	20	0	0
Building Construction	466	175	0
Architectural Coating	93	0	0
Paving	15	0	0
Phase 3			
Site Preparation	18	0	0
Grading	20	0	0
Building Construction	578	207	0
Architectural Coating	116	0	0
Paving	15	0	0
Source: FirstCarbon Solutions (FCS) and CalEEMod, see Appendix C.			

Off-Gassing Materials

Asphalt paving and architectural coating materials used during construction would generate off-gas emissions of ROGs. The data collection process determined the acres of asphalt paving required, which CalEEMod uses to determine associated ROG emissions. CalEEMod contains assumptions for application of architectural coatings that are based on the BAAQMD's coating regulations and use type, and square footage of the buildings to be constructed and were used to quantify emissions.

Operation-related Criteria Pollutants

The operational emissions were analyzed assuming full-buildout of the proposed project in December 2029, consistent with the schedule presented in Table 3.3-7.

On-road Motor Vehicles

Motor vehicle emissions refer to exhaust and road dust emissions from the automobiles that would travel to and from the proposed project area. The emissions were estimated using the CalEEMod model. The trip generation rates for the proposed project operations were obtained from the transportation impact assessment (included in Appendix K).[18] As Saturday and Sunday trips were not explicitly stated in the transportation impact assessment, weekday trip generation rates were applied to both Saturday and Sunday trips.

The CalEEMod trip purposes (e.g., primary, pass-by) and default round trip lengths for an urban setting for Contra Costa County were used in this analysis. Emission factors are assigned to the expected vehicle mix as a function of vehicle class, speed, and fuel use (gasoline and diesel-powered vehicles). The CalEEMod default vehicle fleet mix for Contra County was used for this analysis.

Architectural Coatings

Paints release VOC/ROG emissions during application and drying. The buildings would be periodically repainted. The supplier that would likely serve the proposed project would be required to comply with the BAAQMD Regulation 8, Rule 3—Architectural Coatings.[19] This rule governs the manufacture, distribution, and sale of architectural coatings and limits the reactive organic gases content in paints and paint solvents.

Consumer Products

Consumer products include various solvents used in non-industrial applications, which emit VOCs during their product use. "Consumer Product" means a chemically formulated product used by household and institutional consumers, including but not limited to: detergents; cleaning compounds; polishes; floor finishes; cosmetics; personal care products; home, lawn, and garden products; disinfectants; sanitizers; aerosol paints; and automotive specialty products. It does not include other paint products, furniture coatings, or architectural coatings.[20] The default emission factor developed for CalEEMod was used.

Landscape Equipment

CalEEMod was used to estimate the landscaping equipment emissions using the default assumptions in the model.

Electricity

Electricity usage (for lighting, etc.) would result in emissions from the power plants that would generate electricity distributed on the electrical power grid. Off-site electricity emissions estimates are used more pertinent for the analysis of GHG emissions. More detail describing assumptions used in estimating parameters specific to electricity is included in Section 3.5, GHG Emissions and Energy.

[18] Fehr & Peers. 2019. Final Transport Impact Assessment, The Ranch. December.

[19] Bay Area Air Quality Management District (BAAQMD). 2009. Regulation 8: Organic Compounds Rule 3 Architectural Coatings. July 1. Website: http://www.baaqmd.gov/~/media/dotgov/files/rules/reg-8-rule-3-architectural-coatings/documents/rg0803_0709.pdf?la=en. Accessed September 20, 2019.

[20] California Air Resources Board (ARB). 2011. Regulation for Reducing Emissions from Consumer Products. Website: www.arb.ca.gov/consprod/regs/fro%20consumer%20products%20regulation.pdf. Accessed November 27, 2019.

Natural Gas

Implementation of the proposed project would generate emissions from the combustion of natural gas for water heaters, heat, etc. CalEEMod has two categories for natural gas consumption: Title 24 and non-Title 24. The Title 24 uses are defined as the major building envelope systems covered by California's Building Code Title 24 Part 6, such as space heating, space cooling, water heating, and ventilation. Non-Title 24 includes everything else such as appliances and electronics.

Construction- and Operation-related Toxic Air Contaminants

TACs are air pollutants in miniscule amounts in the air that, if a person is exposed to them, could increase the chances of experiencing health problems. Exposures to TAC emissions can have both chronic long-term (over a year or longer) and acute short-term (over a period of hours) health impacts. Construction-period TAC emissions could contribute to increased health risks to nearby residents or sensitive receptors.

An assessment was made of the potential health impacts to surrounding sensitive receptors resulting from TAC emissions during proposed project construction. The TACs of greatest concern are those that cause serious health problems or affect many people. Health problems can include cancer, respiratory irritation, nervous system problems, and birth defects. Some health problems occur soon after a person inhales TACs. These immediate effects may be minor, such as watery eyes; or they may be serious, such as life-threatening lung damage. Other health problems may not appear until many months or years after a person's first exposure to the TAC. Cancer is one example of a delayed health problem.

Fine particle pollution or $PM_{2.5}$ describes particulate matter that is 2.5 micrometers in diameter and smaller—one-thirtieth the diameter of a human hair. Fine particle pollution can be emitted directly or formed secondarily in the atmosphere. $PM_{2.5}$ health impacts are important because their size can be deposited deeply in the lungs causing respiratory effects.

For purposes of this analysis, exhaust emissions of DPM, are represented as exhaust emissions of $PM_{2.5}$. Studies indicate that DPM poses the greatest health risk among airborne TACs. A 10-year research program conducted by the ARB demonstrated that DPM from diesel-fueled engines is a human carcinogen and that chronic (long-term) inhalation exposure to DPM poses a chronic long-term health risk. DPM differs from other TACs in that it is not a single substance but a complex mixture of hundreds of substances. Although DPM is emitted by diesel-fueled, internal combustion engines, the composition of the emissions varies, depending on engine type, operating conditions, fuel composition, lubricating oil, and whether an emission control system is present.

Odors

The impact analysis qualitatively evaluates the types of land uses proposed to evaluate whether major sources of anticipated odors would be present and, if so, whether those sources would likely generate objectionable odors. According to the BAAQMD's CEQA Air Quality Guidelines, a project that involves the siting of a new odor source would consider the screening level distances and the complaint history of the odor sources. The proposed project does not include any odor emitting sources such as a wastewater treatment plant, landfill, composting facility, refinery, etc.

Specific Thresholds of Significance

Consistency with Air Quality Plan

The applicable air quality plan is BAAQMD's 2017 Bay Area Clean Air Plan, which identifies measures to:

- Reduce emissions and reduce ambient concentrations of air pollutants; and
- Safeguard public health by reducing exposure to the air pollutants that pose the greatest health risk, with an emphasis on protecting the communities most heavily affected by air pollution.

The proposed project would be consistent with the Bay Area Clean Air Plan if it would support the plan's goals, include applicable control measures from the Bay Area Clean Air Plan, and would not disrupt or hinder implementation of any control measures from the Bay Area Clean Air Plan. Consistency with the Bay Area Clean Air Plan is the basis for determining whether the proposed project would conflict with or obstruct implementation of an applicable air quality plan.

Ambient Air Quality

Where available, the significance thresholds established by the applicable air quality management or air pollution control district may be relied upon to make the significance determinations. While the final determination of whether or not a project is significant is within the purview of the lead agency pursuant to CEQA Guidelines Section 15064(b), the BAAQMD recommends that its quantitative and qualitative air pollution thresholds be used to determine the significance of project-related emissions.

In June 2010, the BAAQMD adopted thresholds of significance to assist lead agencies in the review of projects under CEQA. These thresholds (see Table 3.3-10) were designed to establish the level at which the BAAQMD believed air pollution emissions would cause significant environmental impacts under CEQA and included in the BAAQMD's current CEQA Guidelines (last updated May 2017).[21]

Table 3.3-10: BAAQMD Thresholds of Significance

Pollutant	Construction Thresholds Average Daily Emissions	Operational Thresholds	
		Average Daily Emissions	Annual Average Emissions
Criteria Air Pollutants			
ROG	54 pounds/day	54 pounds/day	10 tons/year
NO_X	54 pounds/day	54 pounds/day	10 tons/year
PM_{10}	82 pounds/day	82 pounds/day	15 tons/year
$PM_{2.5}$	54 pounds/day	54 pounds/day	10 tons/year
CO	Not Applicable	9.0 ppm (8-hour average) or 20.0 ppm (1-hour average)	

[21] Bay Area Air Quality Management District (BAAQMD). 2017. California Environmental Quality Act Air Quality Guidelines. May. Website: http://www.baaqmd.gov/~/media/files/planning-and-research/ceqa/ceqa_guidelines_may2017-pdf.pdf?la=en. Accessed September 22, 2018.

Table 3.3-10 (cont.): BAAQMD Thresholds of Significance

Pollutant	Construction Thresholds Average Daily Emissions	Operational Thresholds	
		Average Daily Emissions	Annual Average Emissions
Fugitive Dust	Construction Dust Ordinance or other Best Management Practices	Not Applicable	
Health Risks and Hazards for New Sources			
Excess Cancer Risk	Increase > 10.0 per one million	Increase > 10.0 per one million	
Chronic or Acute Hazard Index	Increase > 1.0	Increase > 1.0	
Incremental annual average $PM_{2.5}$	0.3 µg/m^3	0.3 µg/m^3	
Health Risks and Hazards for Sensitive Receptors (Cumulative from All Sources within 1,000-Foot Zone of Influence) and Cumulative Thresholds for New Sources			
Excess Cancer Risk	> 100 per 1 million		
Chronic Hazard Index	> 10.0		
Annual Average $PM_{2.5}$	> 0.8 µg/m^3		

Notes:
ROG = reactive organic gases
NO_X = nitrogen oxides
PM_{10} = course particulate matter or particulates with an aerodynamic diameter of 10 µm or less
$PM_{2.5}$ = fine particulate matter or particulates with an aerodynamic diameter of 2.5 µm or less
Source: Bay Area Air Quality Management District (BAAQMD). 2017. California Environmental Quality Act Air Quality Guidelines. May. Website: http://www.baaqmd.gov/~/media/files/planning-and-research/ceqa/ceqa_guidelines_may 2017-pdf.pdf?la=en. Accessed September 22, 2018.

Health Risk (Toxic Air Contaminants)

The air quality-related health risk significance thresholds utilized for this assessment were derived from the BAAQMD significance thresholds as project-specific thresholds. These thresholds are:

- **Cancer Risk:** increased cancer risk of greater than 10 in one million
- **Non-cancer Hazard Index:** increased non-cancer risk of greater than 1.0
- **Annual $PM_{2.5}$:** increase greater than 0.3 µg/m^3

Odors

The significance thresholds for odor impacts are qualitative in nature. The proposed project does not include any significant odor-generating source, as discussed above.

Impact Evaluation

Air Quality Management Plan Consistency

Impact AIR-1: The project would conflict with or obstruct implementation of the applicable air quality plan.

Construction/Operation

The SFBAAB is designated nonattainment for State standards for 1-hour and 8-hour ozone, 24-hour respirable particulate matter (PM_{10}), annual PM_{10}, and annual fine particulate matter ($PM_{2.5}$).[22] To address regional air quality standards, the BAAQMD has adopted several air quality policies and plans, and in April 2017, the BAAQMD adopted their 2017 Clean Air Plan,[23] which serves as BAAQMD's most current regional Air Quality Plan (AQP) for the Air Basin for attaining federal ambient air quality standards. The primary goals of the 2017 Clean Air Plan are to protect public health and protect the climate. The 2017 Clean Air Plan acknowledges that the BAAQMD's two stated goals of protection are closely related. As such, the 2017 Clean Air Plan identifies a wide range of control measures intended to decrease both criteria pollutants[24] and GHGs.[25] The 2017 Clean Air Plan updates the previous BAAQMD's 2010 Clean Air Plan, pursuant to air quality planning requirements defined in the California Health and Safety Code.

The 2017 Clean Air Plan also accounts for projections of population growth provided by ABAG and vehicle miles traveled provided by the MTC, and identifies strategies to bring regional emissions into compliance with federal and State air quality standards. A project would be judged to conflict with or obstruct implementation of the 2017 Clean Air Plan if it would result in substantial new regional emissions not foreseen in the air quality planning process.

The primary way of determining whether a project is consistent with the AQPs assumptions is to determine if a General Plan is consistent with the growth assumptions used in the AQPs for the Air Basin, and if the project is consistent with the applicable General Plan. As required by California law, city and county general plans contain a Land Use Element that details the types and quantities of land uses that the city or county estimates will be needed for future growth, and designates locations for land uses to regulate growth. The growth projections and land use information in adopted general plans, among other sources, is used to estimate future average daily trips and associated VMT, which are then provided to the BAAQMD to estimate future emissions in the AQPs. AQPs provide the amount of emission reductions required to reach attainment of the air standards based on the projected growth in emissions, and include control measures required to achieve those reductions by the deadlines mandated by the Clean Air Act.

[22] Bay Area Air Quality Management District (BAAQMD). 2017. Air Quality Standards and Attainment Status. January. Website: http://www.baaqmd.gov/research-and-data/air-quality-standards-and-attainment-status. Accessed December 27, 2019.

[23] Bay Area Air Quality Management District (BAAQMD). 2017. Final 2017 Clean Air Plan: Spare the Air—Cool the Climate. Website: http://www.baaqmd.gov/~/media/files/planning-and-research/plans/2017-clean-air-plan/attachment-a_-proposed-final-cap-vol-1-pdf.pdf?la=en. Accessed December 27, 2019.

[24] The EPA has established National Ambient Air Quality Standards (NAAQS) for six of the most common air pollutants—carbon monoxide, lead, ground-level ozone, particulate matter, nitrogen dioxide, and sulfur dioxide—known as "criteria" air pollutants (or simply "criteria pollutants").

[25] A greenhouse gas (GHG) is any gaseous compound in the atmosphere that is capable of absorbing infrared radiation, thereby trapping and holding heat in the atmosphere. By increasing the heat in the atmosphere, GHGs are responsible for the greenhouse effect, which ultimately leads to global warming.

The applicable general plan for the project is the City of Antioch General Plan, which was adopted prior to the BAAQMD 2017 Clean Air Plan. According to the City of Antioch General Plan, the proposed project site is located within the Sand Creek Focus Area and is designated for Hillside and Estate Residential/Golf Course/Senior Housing/Public-Quasi Public/Open Space uses. The proposed project seeks a General Plan Amendment to redesignate the site as Restricted Development Area and Limited Development Area. The Restricted Development Area would allow for Rural Residential, Agriculture, and Open Space uses. The Limited Development Area would allow for Estate Residential, Low Density Residential, Medium Low Density Residential, Medium Density Residential, Convenience Commercial, Mixed Use, Public/Quasi Public, and Open Space. Therefore, the proposed land uses are consistent with the allowable land use types pursuant to the current City of Antioch General Plan, and would, in fact, reduce impacts comparatively speaking because less units would be constructed on the project site than previously assumed for analysis purposes, and the neighborhood commercial component would allow for reduced traffic trips for neighbors and the Kaiser Permanente Antioch Medical Center.

The proposed project comprises a multi-generational plan, which would include a wide range of housing, including age-restricted housing for seniors. The proposed project includes development standards and design guidelines consistent with the low density and medium density designations. Development standards for the Low-Density designation "allows 4 single-family units per gross developable acre." Additionally, development standards for the Medium-Density designation allows for 10 dwelling units for each gross developable acre.

Thus, the proposed project would not directly or indirectly result in substantial unplanned population growth and the overall development of the proposed project site would be consistent with the growth assumptions incorporated into the Antioch General Plan and 2017 BAAQMD CAP.

The BAAQMD does not provide a numerical threshold of significance for project-level consistency analysis. Therefore, the following additional criteria were used for determining a project's consistency with the AQP.

- **Criterion 1:** Does the project support the primary goals of the AQP?
- **Criterion 2:** Does the project include applicable control measures from the AQP?
- **Criterion 3:** Does the project disrupt or hinder implementation of any AQP control measures?

Criterion 1

The primary goals of the 2017 Clean Air Plan (CAP), the current AQP to date, are to:

- Attain air quality standards;
- Reduce population exposure to unhealthy air and protecting public health in the Bay area; and
- Reduce GHG emissions and protect the climate.

As discussed under Impact AIR-2, the implementation of the proposed project would not result in a project- or cumulative-level net increase of any criteria air pollutant with implementation of Mitigation Measure (MM) AIR-2a. However, as discussed under Impact AIR-2, even with the implementation of MM AIR-2a and MM AIR-2b, implementation of the proposed project would result in a significant and

unavoidable cumulative operational impact associated with violating an air quality standard in terms of criteria air pollutant emissions. As discussed under Impact AIR-3, the project would not expose sensitive receptors to substantial pollutant concentrations with implementation of MM AIR-2a. Therefore, the proposed project would support the goals of attaining air quality standards and reducing population exposure to unhealthy air. A detailed analysis of impacts as they relate to GHG emissions and climate are included in Section 3.6, GHG Emissions and Energy. As discussed in Section 3.6, project- and cumulative-level GHG emissions impacts would be less than significant. As discussed below under Criterion 2, the proposed project would provide pedestrian connectivity. Considering that the proposed project would violate an air quality standard, the proposed project would not support the overall goals of the 2017 Clean Air Plan. The proposed project is, therefore, inconsistent with Criterion 1, even with implementation of MM AIR-2a and MM AIR-2b.

Criterion 2

The 2017 Clean Air Plan contains 85 control measures aimed at reducing air pollutant emissions and GHG emissions at the local, regional, and global levels. Along with the traditional stationary, area, mobile source, and transportation control measures, the 2017 Clean Air Plan contains a number of control measures designed to protect the climate, promote mixed use and to compact development to reduce vehicle emissions and exposure to pollutants from stationary and mobile sources. The 2017 Clean Air Plan also includes an account of the implementation status of control measures identified in the 2010 Clean Air Plan.

Table 3.3-11 lists the Clean Air Plan policies relevant to the proposed project and evaluates the proposed project's consistency with the policies. As shown below, the proposed project would be consistent with the applicable measures.

Table 3.3-11: Clean Air Plan Control Measures Consistency Analysis

Control Measure	Plan Consistency
Buildings Control Measures	
BL1: Green Buildings	**Consistent.** As discussed in more detail in Section 3.6, GHG Emissions and Energy, the proposed project would comply with the California Energy Code and, thus, incorporate applicable energy efficiency features designed to reduce energy consumption associated with the proposed project.
BL4: Urban Heat Island Mitigation	**Consistent.** The proposed project would incorporate landscaping (including trees) throughout the plan area. The proposed project would provide landscaping in accordance with City standards that would serve to reduce the urban heat island effect and include the planting of shade trees.
Energy Control Measures	
EN2: Decrease Electricity Demand	**Consistent.** The design of the proposed project would be required to conform to the energy efficiency requirements of the California Building Standards Code, also known as Title 24, which was adopted in order to meet an executive order in the Green Building Initiative to improve the energy efficiency of buildings through aggressive standards.

Table 3.3-11 (cont.): Clean Air Plan Control Measures Consistency Analysis

Control Measure	Plan Consistency
	The 2016 Building Efficiency Standards are the current regulations and went into effect on January 1, 2017. The 2019 Title 24 Standards are scheduled to go into effect on January 1, 2020.
Natural and Working Lands Control Measures	
NW2: Urban Tree Planting	**Consistent.** The proposed project would incorporate landscaping (including trees) throughout the proposed project site. The proposed project would provide landscaping in accordance with City standards that would include the planting of trees.
WA3: Green Waste Diversion	**Consistent.** The waste service provider for the proposed project would be required to meet AB 341, SB 939, and SB 1374 requirements that require waste service providers to divert green waste away from landfills. All plant refuse generated during operations of the proposed project would be recycled off-site.
WA4: Recycling and Waste Reduction	**Consistent.** The waste service provider for the proposed project would be required to meet AB 341, SB 939, and SB 1374 requirements that require waste to be recycled.
Stationary Control Measures	
SS29: Asphaltic Concrete	**Consistent.** Paving activities associated with the proposed project would be required to utilize asphalt that does not exceed BAAQMD emission standards.
SS36: Particulate Matter from Trackout	**Consistent with Mitigation.** Mud and dirt that may be tracked out onto nearby public roads during construction activities would be removed promptly by the contractor based on BAAQMD requirements. MM AIR-2a, identified under Impact AIR-2, would implement BMPs recommended by BAAQMD for fugitive dust emissions during construction.
SS38: Fugitive Dust	**Consistent.** Material stockpiling and track out during grading activities as well as smoke and fumes from paving and roofing asphalt operations shall utilize best management practices to minimize the creation of fugitive dust. MM AIR-2a, identified under Impact AIR-2, would implement BMPs recommended by BAAQMD for fugitive dust emissions during construction.
Transportation Control Measures	
TR9: Bicycle and Pedestrian Access and Facilities.	**Consistent.** The proposed project includes pedestrian access connections within and adjacent to the plan area. The sidewalk network would connect the proposed project to adjacent developments, providing continuous pedestrian connections in the area. The proposed project would also construct a number of off-street trails, ranging from a four-foot natural trail to a 10-foot asphalt trail with

Table 3.3-11 (cont.): Clean Air Plan Control Measures Consistency Analysis

Control Measure	Plan Consistency
	stabilized shoulders to accommodate emergency vehicle access. The proposed project would be consistent with the BAAQMD effort to encourage planning for bicycle and pedestrian facilities.
Source: Bay Area Air Quality Management District (BAAQMD). 2017. Final 2017 Clean Air Plan: Spare the Air, Cool the Climate. April 19.	

In summary, the implementation of the proposed project would not conflict with applicable measures under the 2017 Clean Air Plan with the implementation of MM AIR-2a, therefore; the proposed project would be consistent with Criterion 2 with implementation of MM AIR-2a.

Criterion 3

In addition to being located near planned and existing pedestrian and bicycle facilities, the proposed project would produce a residential development that is within relatively close proximity to local transit authority transit stops. The proposed project site is located 4 miles from the closest Bay Area Rapid Transit (BART) Station. The proposed project would be consistent with transportation plans and targets. The proposed project is surrounded by residential and commercial land uses, and would develop office and retail land uses within proximity of the proposed and existing residents. The proposed project would support the use of public spaces and encourage resident use of these spaces. Implementation of the proposed project would support the overall goals of the 2017 Clean Air Plan. Furthermore, the proposed project would comply with applicable BAAQMD rules and regulations listed above under Regulatory Framework during construction and operations. Considering this information, the proposed project would not create an impediment or disruption to implementation of any AQP control measures. The proposed project is, therefore, consistent with Criterion 3.

Level of Significance Before Mitigation

Potentially Significant

Mitigation Measures

Implement MM AIR-2a and MM AIR-2b

Level of Significance After Mitigation

Significant and Unavoidable

Cumulative Criteria Pollutant Emissions Impacts

Impact AIR-2: **The project would result in a cumulatively considerable net increase of a criteria pollutant for which the project region is non-attainment under an applicable federal or State ambient air quality standard.**

By its nature, air pollution is largely a cumulative impact resulting from emissions generated over a large geographic region. The nonattainment status of regional pollutants is a result of past and

present development within the air basin, and this regional impact is a cumulative impact. In other words, new development projects (proposed multi-family residential project) within the air basin would contribute to this impact only on a cumulative basis. No single project would be sufficient in size, by itself, to result in nonattainment of regional air quality standards. Instead, a project's emissions may be individually limited, but cumulatively significant when taken in combination with past, present, and future development projects.

In developing thresholds of significance for criteria air pollutants, the BAAQMD considered the emission levels for which a project's individual emissions would be cumulatively significant. As such, if a project exceeds the identified thresholds of significance, its emissions would be significant in terms of both project- and cumulative-level impacts, resulting in significant adverse air quality impacts to the region's existing air quality conditions. Thus, this impact analysis and discussion is related to the project- and cumulative-level effect of the project's regional criteria air pollutant emissions.

The cumulative analysis focuses on whether a specific project would result in cumulatively significant emissions. According to Section 15064(h)(4) of the CEQA Guidelines, the existence of significant cumulative impacts caused by other projects alone does not constitute substantial evidence that the project's incremental effects would be cumulatively significant. Rather, the determination of cumulative air quality impacts for construction and operational emissions is based on whether the proposed project would result in regional emissions that exceed the BAAQMD regional thresholds of significance for construction and operations on a project level. The thresholds of significance represent the allowable amount of emissions each project can generate without generating a cumulatively significant contribution to regional air quality impacts. Therefore, a project that would not exceed the BAAQMD thresholds of significance on the project level also would not be considered to result in a cumulatively significant impact with regard to regional air quality and, therefore, would not be considered to result in a significant impact related to cumulative regional air quality.

Construction

Construction activities associated with development of the proposed project contemplated by the proposed project would include demolition, site preparation, grading, paving, building construction, and painting. During construction, fugitive dust (PM_{10} and $PM_{2.5}$) would be generated from site grading and other earth-moving activities. The majority of this fugitive dust would remain localized and would be deposited near the plan area. However, the potential for impacts from fugitive dust exists unless control measures are implemented to reduce the emissions from this source. Exhaust emissions would also be generated from the operation of the off-road construction equipment, as shown in Table 3.3-9.

Construction Fugitive Dust

Construction would require demolition, general site clearing and grading/earthwork activities. Emissions from construction activities are generally short-term in duration, but may still cause adverse air quality impacts. The proposed project would generate emissions from construction equipment exhaust, worker travel, and fugitive dust as PM_{10} and $PM_{2.5}$. PM is of concern during construction because of the potential to emit fugitive dust during earth-disturbing activities (construction fugitive dust). The BAAQMD does not have a quantitative significance threshold for

fugitive dust. The BAAQMD's Air Quality Guidelines recommend that proposed projects determine the significance for fugitive dust through application of BMPs. Unmitigated the proposed project does not include any dust control measures. As such, this represents a significant cumulative construction impact related to criteria air pollutant emissions.

However, per MM AIR-2a, the fugitive dust control measures identified in the BAAQMD's Air Quality Guidelines would be required to be implemented during construction of the proposed project in order to reduce localized dust impacts. Therefore, with implementation of MM AIR-2a, cumulative construction impacts associated with violating an air quality standard or contributing substantially to an existing or projected air quality violation in terms of criteria air pollutant emissions specific to fugitive dust would be less than significant.

Construction Emissions: ROG, NO_X, PM_{10} (exhaust), $PM_{2.5}$ (exhaust)

As described above under Approach to Analysis, CalEEMod was used to estimate the proposed project's construction emissions. Estimated construction emissions are compared with the applicable thresholds of significance established by the BAAQMD to assess ROG, NO_X, exhaust PM_{10}, and exhaust $PM_{2.5}$ construction emissions to determine significance for this criterion.

As shown in Table 3.3-7, for the purpose of analysis in this Draft EIR, construction of the proposed project is anticipated to begin as early as June 2021 and continue through December 2029. The construction schedule used in the analysis represents a "worst-case" analysis scenario since a delay in construction dates into the future would result in using emission factors for construction equipment that decrease as the analysis year increases, due to improvements in technology and the need to meet more stringent regulatory requirements. Therefore, construction emissions would decrease if the construction schedule moves to later years. The duration of construction activity and associated equipment represent a reasonable approximation of the expected construction fleet. The construction emissions modeling parameters and assumptions are summarized above under Approach to Analysis, and the complete modeling results are provided in Appendix C. Annual construction emissions are shown by source, converted to average daily construction emissions, and are compared with the applicable significance thresholds in Table 3.3-12.

Table 3.3-12: Construction Annual and Daily Average Emissions (Unmitigated)

Construction Activity	Annual Emissions (tons)			
	ROG	NO_X	PM_{10} (exhaust)	$PM_{2.5}$ (exhaust)
2021 Total Construction Emissions	0.30	3.03	0.11	0.10
2022 Total Construction Emissions	0.55	5.19	0.12	0.11
2023 Total Construction Emissions	9.27	3.71	0.10	0.09
2024 Total Construction Emissions	0.32	3.00	0.10	0.09
2025 Total Construction Emissions	0.38	3.48	0.08	0.07
2026 Total Construction Emissions	5.90	2.85	0.07	0.07
2027 Total Construction Emissions	0.31	2.87	0.08	0.08
2028 Total Construction Emissions	0.39	3.69	0.08	0.07
2029 Total Construction Emissions	13.06	3.11	0.07	0.07

Table 3.3-12 (cont.): Construction Annual and Daily Average Emissions (Unmitigated)

Parameter	Air Pollutants			
	ROG	NO_X	PM_{10} (exhaust)	$PM_{2.5}$ (exhaust)
Total Construction Emissions (tons)	30.49	30.94	0.81	0.76
Total project Construction Emissions (lbs)	60,974	61,880	1,616	1,511
Average Daily Construction Emissions (lbs/day)[1]	29.50	29.94	0.78	0.73
BAAQMD Average Daily Construction Emission Thresholds (lbs/day)	**54**	**54**	**82**	**54**
Exceeds Significance Threshold?	**No**	**No**	**No**	**No**

Notes:
[1] Calculated by dividing the total number of pounds by the total 2,067 working days of construction for the duration of construction (2021-2029).
lbs = pounds ROG = reactive organic gases NO_X = oxides of nitrogen
PM_{10} = particulate matter 10 microns in diameter $PM_{2.5}$ = particulate matter 2.5 microns in diameter
All calculation totals may not appear to add exactly due to rounding.
Source of thresholds: Bay Area Air Quality Management District (BAAQMD) CEQA Guidelines 2017.
Source of Emissions: CalEEMod Output (Appendix C).

As shown in Table 3.3-12, construction emissions would not exceed the BAAQMD's recommended thresholds of significance with regard to emissions of ROG, NO_X, exhaust PM_{10}, and exhaust $PM_{2.5}$. Therefore, cumulative construction impacts associated with violating an air quality standard or contributing substantially to an existing or projected air quality violation in terms of criteria air pollutant emissions specific to ROG, NO_X, PM_{10}, and $PM_{2.5}$ would be less than significant.

Operation

Operational Emissions: ROG, NO_X, PM_{10}, PM 2.5

Operational pollutants of concern include ROG, NO_X, PM_{10}, and $PM_{2.5}$. Operational emissions include those emissions that occur when a project commences operations. Operations were analyzed assuming that the first year of operation of the proposed project would be at full build out in 2029. The total daily trips associated with proposed and existing land uses are consistent with those presented in the transportation impact assessment included in Appendix K.[26] The CalEEMod default trip lengths for an urban setting in Contra Costa County[27] were used in this analysis of vehicle emissions. The major sources for operational emissions of ROG, NO_X, PM_{10}, and $PM_{2.5}$ were shown above under Approach to Analysis. The operational emissions for the respective pollutants were calculated using CalEEMod. Annual operational emissions estimated for the proposed project are shown by source and are compared with the applicable significance thresholds in Table 3.3-13. The average daily operational-related emissions for the proposed project are compared with the applicable significance thresholds in Table 3.3-14.

[26] Fehr & Peers. 2019. Final Transport Impact Assessment, The Ranch. December.
[27] Note that the CalEEMod setting is limited to the county level, so there is no option to select a city.

Table 3.3-13: Project Operation Annual Emissions (Unmitigated)

Emission Source	Annual Emissions (tons/year)			
	ROG	NO_X	PM_{10}	$PM_{2.5}$
Area	16.6514	0.1256	0.0484	0.0484
Energy	0.1771	1.5141	0.1223	0.1223
Mobile	1.7598	8.0473	8.9384	2.4344
Stationary	0.0016	0.0046	0.0002	0.0002
Waste	0.0000	0.0000	0.0000	0.0000
Water	0.0000	0.0000	0.0000	0.0000
Total Project Operational Emissions	**18.59**	**9.69**	**9.11**	**2.61**
BAAQMD Maximum Annual Emission Threshold (tons/year)	**10**	**10**	**15**	**10**
Exceeds thresholds?	**Yes**	**No**	**No**	**No**

Notes:
ROG = reactive organic gases
NO_X = oxides of nitrogen
PM_{10} = particulate matter 10 microns in diameter
$PM_{2.5}$ = particulate matter 2.5 microns in diameter
Source of emissions: CalEEMod Output (Appendix C).

Table 3.3-14: Project Daily Operational Emissions (Unmitigated)

Parameters	Average Daily Emissions (pounds/day)			
	ROG	NO_X	PM_{10}	$PM_{2.5}$
Area	91.24	0.69	0.27	0.27
Energy	0.97	8.30	0.67	0.67
Mobile (Motor Vehicles)	9.64	44.09	48.98	13.34
Stationary	—	—	—	—
Average Daily Emissions[3] (lbs/day)	101.86	53.10	49.91	14.28
BAAQMD Average Daily Emission Thresholds (lbs/day)	**54**	**54**	**82**	**54**
Exceeds thresholds?	**Yes**	**No**	**No**	**No**

Notes:
ROG = reactive organic gases NO_X = oxides of nitrogen
PM_{10} = particulate matter 10 microns or less in diameter
$PM_{2.5}$ = particulate matter 2.5 microns or less in diameter
The highest daily project emissions occurred in the winter run for NO_X, PM_{10}, and $PM_{2.5}$. The highest ROG emissions occurred in the summer run.
Calculations use unrounded results.
Source: CalEEMod output (see Appendix C).

As shown in Table 3.3-13 and Table 3.3-14, the implementation of the proposed project would result in ROG emissions that would exceed BAAQMD's thresholds of significance for both annual operational emissions and daily operational emissions, indicating that on-going operations would be considered to have the potential to generate a significant quantity of ROGs. The majority of operational ROG emissions from project area sources is from consumer products. Specifically, these project area sources of ROG emissions include degreasers for the proposed parking lots and pesticide/fertilizers for the proposed public parks and landscaped areas. Refer to Appendix C for details. It is not feasible to regulate the consumer products used by the future project occupants. Therefore, cumulative operational impacts associated with violating an air quality standard or contributing substantially to an existing or projected air quality violation in terms of criteria air pollutant emissions would be significant and unavoidable.

Level of Significance Before Mitigation

Potentially Significant

Mitigation Measures

MM AIR-2a Implement BAAQMD Best Management Practices During Construction

The following Best Management Practices (BMPs), as recommended by the Bay Area Air Quality Management District (BAAQMD), shall be included in the design of the proposed project and implemented during construction:

- All active construction areas shall be watered at least two times per day.
- All exposed non-paved surfaces (e.g., parking areas, staging areas, soil piles, graded areas, and access roads) shall be watered at least three times per day and/or non-toxic soil stabilizers shall be applied to exposed non-paved surfaces.
- All haul trucks transporting soil, sand, or other loose material off-site shall be covered and/or shall maintain at least 2 feet of freeboard.
- 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 miles per hour.
- All roadways, driveways, and sidewalks to be paved shall be completed as soon as possible. Building pads shall be laid as soon as possible after grading unless seeding or soil binders are used.
- Idling times shall be minimized either by shutting equipment off when not in use or reducing the maximum idling time to 5 minutes (as required by the California airborne toxics control measure Title 13, Section 2485 of California Code of Regulations). Clear signage regarding idling restrictions shall be provided for construction workers at all access points.
- All construction equipment shall be maintained and properly tuned in accordance with manufacturer's specifications. All equipment shall be checked by a certified mechanic and determined to be running in proper condition prior to operation.

- The prime construction contractor shall post a publicly visible sign with the telephone number and person to contact regarding dust complaints. The City of Antioch and the construction contractor shall take corrective action within 48 hours. The BAAQMD's phone number shall also be visible to ensure compliance with applicable regulations.

MM AIR-2b The following measure shall be applied during construction of the proposed project to facilitate the use of low volatile organic compound (VOC) landscaping equipment during project operations:

- Prior to issuance of building permits, the applicant shall prepare and submit building plans to the City of Antioch that demonstrate that all buildings meet or exceed building code standards.

Additionally, the following measures shall be applied during both construction and operation of the proposed project to reduce reactive organic gases (ROG) emissions:

- Use super-compliant architectural coatings. These coatings are defined as those with volatile organic compound VOC less than 10 grams per liter. South Coast Air Quality Management District (SCAQMD) provides a list of manufacturers that provide this type of coating.[28]
- Keep lids closed on all paint containers when not in use to prevent VOC emissions and excessive odors.
- Use compliant low VOC cleaning solvents to clean paint application equipment.
- Keep all paint and solvent laden rags in sealed containers to prevent VOC emissions.

Level of Significance After Mitigation

Significant and Unavoidable

Sensitive Receptors Exposure to Toxic Air Contaminant Concentrations

Impact AIR-3: The project would not expose sensitive receptors to substantial pollutant concentrations.

This impact addresses whether the implementation of the proposed project would expose air pollution sensitive receptors to TACs such as construction-related asbestos disturbance, construction-generated fugitive dust (PM_{10} and $PM_{2.5}$), construction-generated DPM, operational-related TACs, or operational CO hotspots.

The proposed project would result in the development of residential and commercial structures, impacting nearby sensitive receptors once operational. The proposed project would be constructed in three phases. Grading activities and site preparation activities that would generate the greatest amount of emissions during construction when heavy equipment is used to prepare the land for construction. In Phase I, the proposed project's construction activities could impact the neighbors along the northern boundary. The Kaiser Permanente Antioch Medical Center is located approximately

[28] The availability of super-compliant architectural coatings for purchase is not limited to any geographical area.

500 feet east of the project site, and therefore would experience substantially less impact than the residential receptors located just 10 feet from the project boundary. As a result of the proposed project phasing, there would be time periods when construction activities would overlap with operation of the proposed project (i.e., Phase 1 in operation while Phase 2 is under construction, Phase 1 and Phase 2 in operation while Phase 3 is under construction). Construction of the proposed project is proposed to start in June of 2021 and conclude in December 2029 (see Table 3.3-7). To account for the overlaps in proposed project construction and operations, the Health Risk Assessment is conducted for three exposure scenarios.

- **Scenario 1:** Accounting for exposure to all off-site receptors from construction of all Phases
- **Scenario 2:** Accounting for exposure to on-site receptors occupying Phase 1 from construction of Phase 2 and Phase 3 and
- **Scenario 3:** Accounting for exposure to on-site receptors occupying Phase 1 and Phase 2 from construction of Phase 3

The closest off-site sensitive receptors in the vicinity of the proposed project area include single-family residences located approximately 10 feet north of the proposed project site.

Construction

Construction Asbestos Exposure

Asbestos from Demolition

The proposed project includes demolition of one on-site residence and accessory structures, and the movement of dirt surfaces. Demolition of existing buildings or structures would be subject to BAAQMD Regulation 11, Rule 2 (Asbestos Demolition, Renovation, and Manufacturing), which is intended to limit asbestos emissions from demolition or renovation of structure and the associated disturbance of asbestos-containing waste material generated or handled during these activities. The rule addresses the national emissions standards for asbestos along with some additional requirements. The rule requires the Lead Agency and its contractors to notify the BAAQMD of any regulated renovation or demolition activity. This notification includes a description of structures and methods utilized to determine whether asbestos-containing materials are potentially present. All asbestos-containing material found on the site must be removed prior to demolition or renovation activity in accordance with BAAQMD Regulation 11, Rule 2, including specific requirements for surveying, notification, removal, and disposal of asbestos-containing materials. Therefore, projects that comply with BAAQMD Regulation 11, Rule 2 would ensure that asbestos-containing materials would be removed and disposed of appropriately and safely thereby minimizing the release of airborne asbestos emissions and not resulting in a significant impact related to air quality or the exposure of sensitive receptors to substantial pollutant concentrations.

Naturally Occurring Asbestos

Construction in areas of rock formations that contain naturally occurring asbestos could release asbestos into the air and pose a health hazard. The project site does not have rock formations containing naturally occurring asbestos.[29] The closest ultramafic rock deposits are located 3.57 miles

[29] United States Geological Survey (USGS). 2011. Van Gosen, B.S., and Clinkenbeard, J.P. California Geological Survey Map Sheet 59.

from the project site. Therefore, it can be reasonably concluded that the implementation of the proposed project would not expose sensitive receptors to naturally occurring asbestos during grading. Impacts would be less than significant.

Construction Fugitive Dust

Construction activities associated with development of the proposed project would include demolition, site preparation, grading, building construction, paving, and architectural coating. Generally, the most substantial air pollutant emissions would be dust generated from site grading. If uncontrolled, these emissions could lead to both health and nuisance impacts. Construction activities would also temporarily create emissions of equipment exhaust and other air contaminants.

The BAAQMD does not recommend a numerical threshold for fugitive, dust-related PM emissions. Instead, the BAAQMD bases the determination of significance for fugitive dust on a consideration of the control measures to be implemented. If all appropriate emissions control measures recommended by the BAAQMD are implemented, then fugitive dust emissions during construction are not considered significant. MM AIR-2a includes the fugitive dust control measures recommended by the BAAQMD, thereby reducing this impact to less than significant.

Construction Toxic Air Contaminants

During construction, the proposed project would result in the emissions of TACs that could potentially impact nearby sensitive receptors. TACs are the air pollutants of most concern as they relate to sensitive receptors, as they have the greatest potential to pose a carcinogenic and non-carcinogenic (such as asthma and bronchitis) hazard to human health. The BAAQMD has defined health risk significance thresholds as discussed under Specific Thresholds of Significance above (see Table 3.3-13). These thresholds are represented as a cancer risk to the public and a non-cancer hazard from exposures to TACs and annual $PM_{2.5}$ impacts to sensitive receptors. Cancer risk represents the probability (in terms of risk per million individuals) that an individual would contract cancer resulting from exposure to TACs continuously over a period of several years.

In this regard, a Health Risk Assessment (HRA) was performed to assess the potential health impacts to sensitive receptors located both external to the proposed project site as well as sensitive receptors located within the proposed project site from TAC emissions during construction. An HRA is a guide that helps to determine whether current or future exposures to a chemical or substance in the environment could affect the health of a population. In general, risk depends on the following factors:

- Identify the TACs that may be present in the air;
- Estimate the amount of TACs released from all sources, or the source of particular concern, using air samples or emission models;
- Estimate concentrations of TACs in air in the geographic area of concern by using dispersion models with information about emissions, source locations, weather, and other factors; and
- Estimate the number of people exposed to different concentrations of the TAC at different geographic locations.

Reported Historic Asbestos Mines, Historic Asbestos Prospects, and Other Natural Occurrences of Asbestos in California. Open-File Report 2011-1188. Website: http://pubs.usgs.gov/of/2011/1188/. Accessed November 27, 2019.

Construction DPM Emissions

The principal TAC emission analyzed in this assessment was DPM from the operation of off-road equipment and diesel-powered delivery and worker vehicles during construction. DPM has been identified by the ARB as an important carcinogenic substance. For purposes of this analysis, DPM is represented as exhaust emissions of $PM_{2.5}$. Construction assumptions relating to emissions and health risks are summarized above under Approach to Analysis.

Construction DPM emissions (as $PM_{2.5}$ exhaust) and total $PM_{2.5}$ ($PM_{2.5}$ exhaust and $PM_{2.5}$ fugitive dust) were estimated using CalEEMod (version 2016.3.2) and are summarized in Table 3.3-15 below.

Table 3.3-15: Project Construction DPM (as $PM_{2.5}$ Exhaust) and Total $PM_{2.5}$ Emissions

Parameter	On-site DPM (as $PM_{2.5}$ Exhaust) (tons/year)	Off-site DPM[(1)] (as $PM_{2.5}$ Exhaust) (tons/year)	On-site Total $PM_{2.5}$ (as $PM_{2.5}$ Total)[2] (tons/year)	Off-site Total $PM_{2.5}$[(1)] (as $PM_{2.5}$ Total)[2] (tons/year)
Annual Average Construction Emissions (No Mitigation)				
Phase 1[3]	0.100	0.002	0.379	0.043
Phase 2	0.218	0.001	0.310	0.030
Phase 3[4]	0.208	0.001	0.307	0.036
Total Unmitigated Emissions	*0.526*	*0.003*	*0.996*	*0.109*

Notes:
(1) The off-site emissions were estimated over construction vehicle travel routes within approximately 1,000 feet of the project site; see Appendix C for detailed assumptions.
(2) Compliance with BAAQMD's Best Management Practices for fugitive dust, implemented as MM AIR-2a.
(3) Phase-1 on-site construction emissions include emissions from roadway improvements.
(4) Phase-3 on-site construction emissions include emissions from construction of trail network.
Source: Appendix C.

Estimation of Cancer Risks

The BAAQMD has developed a set of guidelines for estimating cancer risks that provide adjustment factors that emphasize the increased sensitivities and susceptibility of young children to exposures to TACs.[30] These adjustment factors include age-sensitivity weighting factors, age-specific daily breathing rates, and age-specific time-at-home factors. The recommend method for the estimation of cancer risk is shown in the equations below with the cancer risk adjustment factors provided in Table 3.3-16 for several types of sensitive/residential receptors (infant, child, and adult).

$$\text{Cancer Risk} = C_{DPM} \times \text{Inhalation Exposure Factor} \qquad \text{(EQ-1)}$$

Where:

Cancer Risk = Total individual excess cancer risk defined as the cancer risk a hypothetical individual faces if exposed to carcinogenic emissions from a particular source for specified exposure durations;

[30] Bay Area Air Quality Management District (BAAQMD). 2016. Air Toxics NSR Program Health Risk Assessment (HRA) Guidelines. Website: http://www.baaqmd.gov/~/media/files/planning-and-research/rules-and-regs/workshops/2016/reg-2-5/hra-guidelines_clean_jan_2016-pdf.pdf?la=en. Accessed November 27, 2019.

this risk is defined as an excess risk because it is above and beyond the background cancer risk to the population; cancer risk is expressed in terms of risk per million exposed individuals.

C_{DPM} = Period average DPM air concentration calculated from the air dispersion model in $\mu g/m^3$

Inhalation is the most important exposure pathway to impact human health from DPM and the inhalation exposure factor is defined as follows:

$$\text{Inhalation Exposure Factor} = CPF \times EF \times ED \times DBR \times AAF/AT \qquad \text{(EQ-2)}$$

Where:

CPF = Inhalation cancer potency factor for the TAC: 1.1 $(mg/kg\text{-}day)^{-1}$ for DPM
EF = Exposure frequency (days/year)
ED = Exposure duration (years of construction)
AAF = set of age-specific adjustment factors that include age sensitivity factors (ASF), daily breathing rates (DBR), and time at home factors (TAH)—see Table 3.3-16
AT = Averaging time period over which exposure is averaged (days)

The California Office of Environmental Health Hazards Assessment (OEHHA)-recommended values for the various cancer risk parameters shown in EQ 2, above, are provided in Table 3.3-16 as appropriate for the construction duration. For detailed parameter for each scenario analyzed, please see Appendix C.

Table 3.3-16: Exposure Assumptions for Cancer Risk

Receptor Type	Exposure Frequency		Exposure Duration (years)	Age Sensitivity Factors	Time at Home Factor (%)	Daily Breathing Rate[1] (l/kg-day)
	Hours/day	Days/year				
Scenario 1						
Sensitive/Residential—Infant						
3rd Trimester	24	350	0.25	10	85	361
0–2 years	24	350	2.00	10	85	1,090
2–9 years[2]	24	350	5.64	3	100[3]	631
Sensitive Receptor—Child						
3–16 years	24	350	7.90	3	100[3]	572
Sensitive Receptor—Adult						
> 16 to 30 years	24	350	7.90	1	73	261
Scenario 2						
Sensitive/Residential—Infant						
3rd Trimester	24	350	0.25	10	85	361
0–2 years	24	350	2.00	10	85	1,090
2–6 years[4]	24	350	3.17	3	100[3]	631

Table 3.3-16 (cont.): Exposure Assumptions for Cancer Risk

Receptor Type	Exposure Frequency		Exposure Duration (years)	Age Sensitivity Factors	Time at Home Factor (%)	Daily Breathing Rate[(1)] (l/kg-day)
	Hours/day	Days/year				
Sensitive Receptor—Child						
3–16 years	24	350	5.42	3	100[3]	572
Sensitive Receptor—Adult						
> 16 to 30 years	24	350	5.42	1	73	261
Scenario 3						
Sensitive/Residential—Infant						
3rd Trimester	24	350	0.25	10	85	361
0–2 years	24	350	2.00	10	85	1,090
2–3 years[5]	24	350	0.47	3	100[3]	631
Sensitive Receptor—Child						
3–16 years	24	350	2.72	3	100[3]	572
Sensitive Receptor—Adult						
> 16 to 30 years	24	350	2.72	1	73	261

Notes:
(1) The daily breathing rates recommended by the BAAQMD for sensitive/residential receptors assume the 95th percentile breathing rates for all individuals less than 2 years of age and 80th percentile breathing rates for all older individuals. (l/kg-day) = liters per kilogram body weight per day
(2) The proposed project construction will occur in 3 Phases over a period of 8 years, with gaps between each Phase. Scenario 1 assesses exposure to all off-site receptors at full build-out.
(3) There are two schools within 1500 feet of the project. Therefore, the Time at Home Factor is considered to be 1 as recommended by California Office of Environmental Health Hazards Assessment (OEHHA).
(4) Scenario 2 assesses exposure to all occupants in Phase 1 during construction of Phase 2 and Phase 3.
(5) Scenario 3 assesses exposure to all occupants in Phase 1 and Phase 2 during construction of Phase 3.
Source: Bay Area Air Quality Management District (BAAQMD). 2016. Air Toxics NSR Program Health Risk Assessment (HRA) Guidelines. Website: http://www.baaqmd.gov/~/media/files/planning-and-research/rules-and-regs/workshops/2016/reg-2-5/hra-guidelines_clean_jan_2016-pdf.pdf?la=en. Accessed November 27, 2019.

Estimation of Non-Cancer Chronic Hazards

An evaluation of the potential non-cancer effects of chronic chemical exposures was also conducted. Adverse health effects are evaluated by comparing the annual receptor concentration of each chemical compound with the appropriate Reference Exposure Level (REL). Available RELs promulgated by the OEHHA were considered in the assessment.

Risk characterization for non-cancer health hazards from TACs is expressed as a hazard index (HI). The HI is a ratio of the predicted concentration of a proposed project's emissions to a concentration considered acceptable to public health professionals, termed the REL.

To quantify non-carcinogenic impacts, the hazard index approach was used.

$$HI = C_{ann}/REL \qquad \text{(EQ-3)}$$

Where:

HI = chronic hazard index
C_{ann} = annual average concentration of TAC as derived from the air dispersion model ($\mu g/m^3$)
REL = reference exposure level above which a significant impact is assumed to occur ($\mu g/m^3$)

The hazard index assumes that chronic exposures to TACs adversely affect a specific organ or organ system (toxicological endpoint) of the body. For each discrete chemical exposure, target organs presented in regulatory guidance were used. To calculate the hazard index, each chemical concentration or dose is divided by the appropriate toxicity REL. For compounds affecting the same toxicological endpoint, this ratio is summed. Where the total equals or exceeds 1, a health hazard is presumed to exist. For purposes of this assessment, the TAC of concern is DPM, for which the OEHHA has defined a REL for DPM of 5 micrograms per cubic meter ($\mu g/m^3$). The principal toxicological endpoint assumed in this assessment was through inhalation.

Air Dispersion Modeling Results

An air dispersion model is a mathematical formulation used to estimate the air quality impacts at specific locations (receptors) surrounding a source of emissions given the rate of emissions and prevailing meteorological conditions. The air dispersion model applied in this assessment was the American Meteorological Society/EPA Regulatory Model (AERMOD version 19191) air dispersion model that is approved by the BAAQMD for air dispersion assessments. Specifically, the AERMOD model was used to estimate levels of air emissions at sensitive receptor locations from the proposed project construction DPM (as $PM_{2.5}$ exhaust) emissions. The use of the AERMOD model provides a refined methodology for estimating construction impacts by utilizing long-term, measured representative meteorological data and a representative construction schedule.

Terrain elevations were obtained using the EPA Terrain Preprocessor (AERMAP) model, the AERMOD terrain data preprocessor. The urban dispersion option was used to describe the air dispersion in the local vicinity of the plan area. The air dispersion model assessment used meteorological data from the Livermore Municipal Airport, which is approximately 18 miles south of the proposed project site.

Receptor locations within the AERMOD model were placed at locations of existing residences, hospital and schools surrounding the plan area. To evaluate localized construction impacts, sensitive receptor height should be taken into account at the point of maximum impact (ground level for the purposes of this analysis). The emissions from the on-site construction exhaust source were assumed to be emitted at a height of 5 meters above ground to account for the top of the equipment exhaust stack where the emissions are released to the atmosphere and the increase in the height of the emissions due to its heated exhaust. The off-site construction vehicle emissions were represented in the AERMOD model as line volume sources with a release height of 3.1 meters for the DPM vehicles. The off-site emissions were estimated over construction vehicle travel routes within approximately 1,000 feet of the proposed project site; see Appendix C for detailed assumptions.

Table 3.3-17 shows the MIR for each scenario analyzed.

Table 3.3-17 Maximum Impacted Sensitive Receptor in Each Scenario Analyzed

Phase	MIR	Distance from Closest On-site Construction
Scenario 1: Full Build-out Assessing Off-site Sensitive Receptors Only	An existing residence located approximately 30 feet north of the proposed project site.	30 feet
Scenario 2: Phase 1 Built and Phase 2 and Phase 3 under Construction	A park located between Phase 1 and Phase 2, to be built as part of Phase 1.	Less than 10 feet
Scenario 3: Phases 1 and 2 Built and Phases 3 under Construction	A future proposed project single-family residence located in Phase 2.	200 feet
Source: Appendix C.		

The estimated health and hazard impacts from construction emissions at the MIR are provided in Table 3.3-18. The estimates shown in Table 3.3-18 include application of BMPs recommended by the BAAQMD, as required by MM AIR-2a. It should be noted that inclusion of MM AIR-2a only reduces $PM_{2.5}$ total and not $PM_{2.5}$ exhaust.

Table 3.3-18: Project Construction Health Risks and Hazards (Unmitigated)

Scenario	Cancer Risk (risk per million)	Chronic Non-Cancer Hazard Index[1]	Annual $PM_{2.5}$ Concentration (µg/m3)
Scenario 1: Full Buildout Assessing Off-site Sensitive Receptors Only			
Risks and Hazards at the MIR: Infant[2]	6.48	0.003	0.025
Risks and Hazards at the MIR: Child[2]	2.93	0.003	0.025
Risks and Hazards at the MIR: Adult[2]	0.33	0.003	0.025
Scenario 2: Phase 1 Built and Phases 2 and Phase 3 Under Construction			
Risks and Hazards at the MIR: Infant[3]	9.31	0.005	0.035
Risks and Hazards at the MIR: Child[3]	3.42	0.005	0.035
Risks and Hazards at the MIR: Adult[3]	0.38	0.005	0.035
Scenario 3: Phases 1 and 2 built and Phases 3 Under Construction			
Risks and Hazards at the MIR: Infant[4]	0.97	0.0006	0.005
Risks and Hazards at the MIR: Child[4]	0.22	0.0006	0.005
Risks and Hazards at the MIR: Adult[4]	0.02	0.0006	0.005
Highest From Any Scenario			
Risks and Hazards at the MIR	9.31	0.005	0.035

Table 3.3-18 (cont.): Project Construction Health Risks and Hazards (Unmitigated)

Scenario	Cancer Risk (risk per million)	Chronic Non-Cancer Hazard Index[1]	Annual $PM_{2.5}$ Concentration (µg/m3)
BAAQMD Thresholds of Significance	**10**	**1**	**0.30**
Exceeds Individual Source Threshold?	No	No	No

Notes:
[1] Chronic non-cancer hazard index was estimated by dividing the annual DPM concentration (as $PM_{2.5}$ exhaust) by the REL of 5 µg/m^3.
[2] The MIR for Cancer Risk and Chronic Non-Cancer Hazard is as listed in Table 3.3-19. The MIR for Annual $PM_{2.5}$ is a single-family residence located on 80 feet from the project boundary at the southeast of the proposed project site.
[3] The MIR is as listed in Table 3.3-19.
[4] The MIR is as listed in Table 3.3-19.
Source: Appendix C.

As shown in Table 3.3-18, construction of the proposed project would not exceed the applicable BAAQMD thresholds for any of the three health impact metrics prior to the application of mitigation beyond that required by MM AIR-2a.

Operation

Operational Toxic Air Contaminants

The proposed project would include residential and commercial structures. Unlike warehouses or distribution centers, the daily vehicle trips generated by the proposed project would be primarily generated by passenger vehicles. Passenger vehicles typically use gasoline engines rather than the diesel engines that are found in heavy-duty trucks. Compared to the combustion of diesel, the combustion of gasoline had relatively low emissions of DPM. Consistent with BAAQMD guidance, an operational health risk analysis is not necessary, as the implementation of the proposed project would not result in significant health impacts during operation.

Operational CO Hotspots

Localized high levels of CO (CO hotspot) are associated with traffic congestion and idling or slow-moving vehicles. The BAAQMD recommends a screening analysis to determine if a project's operation has the potential to contribute to a CO hotspot. The screening criteria identify when site-specific CO dispersion modeling is not necessary. The implementation of the proposed project would result in a less than significant impact related to air quality for local CO if the following screening criteria are met:

- **Screening Criterion 1**: The project is consistent with an applicable congestion management program established by the county congestion management agency for designated roads or highways, regional transportation plan, and local congestion management agency plans; or
- **Screening Criterion 2:** Traffic associated with the project would not increase traffic volumes at affected intersections to more than 44,000 vehicles per hour; or
- **Screening Criterion 3:** Traffic associated with the project would not increase traffic volumes at affected intersections to more than 24,000 vehicles per hour where vertical and/or horizontal

mixing is substantially limited (e.g., tunnel, parking garage, bridge underpass, natural or urban street canyon, below-grade roadway).

The transportation impact assessment[31] (included as Appendix K) identified AM and PM peak-hour traffic volumes for 25 intersections affected by the implementation of the proposed project. The maximum peak-hour intersection volume would occur at State Route 4 Eastbound and Lone Tree Way intersection, "Cumulative with Project Peak Hour" scenario during the PM peak-hour. The estimated cumulative traffic volume at this intersection is 7,906 PM peak-hour trips. This level of peak-hour trips is substantially less than BAAQMD's second and third screening criteria of 44,000 vehicles per hour and 24,000 vehicles per hour respectively. The implementation of the proposed project would not result in an increase of traffic volumes at affected intersections to more than 44,000 vehicles per hour and would not increase traffic volumes at affected intersections to more than 24,000 where vertical or horizontal mixing is substantially limited. Therefore, based on the above criteria, the proposed project would not exceed the CO screening criteria and would have a less than significant impact related to CO.

Level of Significance

Less Than Significant

Objectionable Odors Exposure

Impact AIR-4: The project would not result in other emissions (such as those leading to odors adversely affecting a substantial number of people).

As stated in the BAAQMD 2017 Air Quality Guidelines, odors are generally regarded as an annoyance rather than a health hazard and the ability to detect odors is highly subjective and varies considerably among the populations. The BAAQMD does not have a recommended odor threshold for construction activities. However, the BAAQMD recommends operational screening criteria that are based on distance between types of sources known to generate odor and the receptor.[32] For projects within the screening distances, the BAAQMD has the following threshold for project operations:

> An odor source with five or more confirmed complaints per year averaged over 3 years is considered to have a significant impact on receptors within the screening distance shown in Table 3-3 [of the BAAQMD's CEQA Guidelines].

Odors can cause a variety of responses. The impact of an odor often results from interacting factors such as frequency (how often), intensity (strength), duration (time), offensiveness (unpleasantness), location, and sensory perception. Two circumstances have the potential to cause odor impacts:

1) A source of odors is proposed to be located near existing or planned receptors; or
2) A receptor land use is proposed near an existing or planned source of odor.

[31] Fehr & Peers. 2019. Final Transport Impact Assessment, The Ranch. December.

[32] Bay Area Air Quality Management District (BAAQMD). 2017. Air Quality Standards and Attainment Status. Website: http://www.baaqmd.gov/about-air-quality/research-and-data/air-quality-standards-and-attainment-status. Accessed November 27, 2019.

Construction

Diesel exhaust would be emitted during construction, the odors of which are objectionable to some. However, construction activity would be short-term and finite in nature. Furthermore, equipment exhaust odors would dissipate quickly and are common in an urban environment. As such, the project would not create objectionable odors affecting a substantial number of people during construction. Therefore, construction odor impacts at existing off-site odor sensitive receptors would be less than significant.

Operation

Project as an Odor Generator

Land uses typically considered associated with odors include wastewater treatment facilities, waste-disposal facilities, or agricultural operations.

The proposed project is a residential and commercial development project and is not expected to produce any offensive odors that would result in odor complaints. During operation of the proposed project, odors would primarily consist of passenger vehicles traveling to and from the site. These occurrences would not produce objectionable odors affecting a substantial number of people; therefore, operational impacts associated with the proposed project's potential to create odors would be less than significant.

Level of Significance

Less Than Significant

3.3.5 - Cumulative Impacts

Criteria Pollutants

The BAAQMD considers the emission levels for which a project's individual emissions would be cumulatively significant. As such, if a project exceeds the identified thresholds of significance, its emissions would be significant in terms of both project- and cumulative-level impacts, resulting in significant adverse air quality impacts to the region's existing air quality conditions. As stated in the BAAQMD 2017 CEQA Guidelines, additional analysis to assess cumulative impacts is unnecessary. Rather, the determination of cumulative air quality impacts for construction and operational emissions is based on whether the project would result in regional emissions that exceed BAAQMD regional thresholds of significance for construction and operations on a project level. Projects that generate emissions below the BAAQMD significance thresholds would be considered consistent with regional air quality planning efforts would not generate cumulatively significant emissions. See Impacts AIR-1 and AIR-2 for analysis and discussion of the cumulative air quality management plan consistency and criteria air pollutant emissions impacts. Overall, Impacts AIR-1 and AIR-2 determined that the cumulative construction criteria air pollutant emissions impacts would be less than significant with mitigation. However, cumulative operational ROG emissions would exceed BAAQMD's threshold of significance even with mitigation and would be considered cumulatively significant and unavoidable.

Level of Cumulative Significance Before Mitigation

Potentially Significant

Mitigation Measures

Implement MM AIR-2a and MM AIR-2b.

Level of Cumulative Significance After Mitigation

Significant and Unavoidable

Toxic Air Contaminants

Construction Emissions at Existing Maximum-impacted Air Pollution Sensitive Receptor

The BAAQMD recommends assessing the potential cumulative impacts from sources of TACs within 1,000 feet of a project site. For the proposed project, the cumulative impact assessment quantified TAC emission sources located within 1,000 feet of the proposed project in addition to the maximum TAC emissions from implementation of the proposed project. As previously discussed in Table 3.3-17, the MIR is different for different scenarios. For cumulative-level TACs analysis, the MIRs for all scenarios are analyzed. For cumulative-level TACs analysis, the BAAQMD provides three tools for use in screening potential impacts from cumulative sources of TACs. These tools are:

- **Surface Street Screening Tables.**[33] The BAAQMD pre-calculated potential cancer risk and $PM_{2.5}$ concentration increases for each county within their jurisdiction. This information is contained in a series of look-up tables that are used for roadways that meet BAAQMD's "major roadway" criteria of 10,000 vehicles or 1,000 trucks per day. Risks are assessed by roadway volume, roadway direction, and distance to sensitive receptors. Deer Valley Road, located immediately east of the proposed project, is estimated to carry 15,120 annual average daily trips.[34] Dallas Ranch Road, located immediately north of the project is estimated to carry 7,890 annual average daily trips.[35]
- **Freeway Screening Analysis Tool.** The BAAQMD prepared a Google Earth file[36] that contains pre-estimated cancer risk, hazard index, and $PM_{2.5}$ concentration increases for highways within the Bay Area. Risks are provided by roadway link and are estimated based on elevation and distance to the sensitive receptor. There are no freeways within 1000 feet of the proposed project.
- **Stationary Source Risk and Hazard Screening Tool.** The BAAQMD prepared a Google Earth file[37] that contains the locations of all stationary sources within the Bay Area that have BAAQMD operating permits. The BAAQMD has also prepared a Geographic Information System (GIS) tool[38] with the location of permitted sources, which has been updated more recently than

[33] Bay Area Air Quality Management District (BAAQMD). 2015. Roadway Screening Analysis Calculator. Website: http://www.baaqmd.gov/plans- and-climate/california-environmental-quality-act-ceqa/ceqa-tools. Accessed November 11, 2019.

[34] TJKM. 2015. Citywide Engineering and Traffic Study Antioch, California. February. Website: https://www.antiochca.gov/fc/community-development/engineering/TJKM-Final-Report-2015-02-06.pdf. Accessed December 12, 2019.

[35] Ibid

[36] Bay Area Air Quality Management District (BAAQMD). 2011. Highway Screening-Analysis Tool—Contra Costa County. April 28. Website: http://www.baaqmd.gov/plans-and-climate/california-environmental-quality-act-ceqa/ceqa-tools. Accessed November 11, 2019.

[37] Bay Area Air Quality Management District (BAAQMD). 2012. Stationary Source Screening Analysis Tool—Contra Costa_2012. August 29. Website: http://www.baaqmd.gov/plans-and-climate/california-environmental-quality-act-ceqa/ceqa-tools. Accessed November 11, 2019.

[38] Bay Area Air Quality Management District (BAAQMD). 2017. Permitted Stationary Sources Risk and Hazards. Permitted Stationary Sources Risk and Hazards. Website: https://baaqmd.maps.arcgis.com/apps/webappviewer/index.html?id=2387ae674013413f987b1071715daa65. Accessed November 11, 2019.

the previously mentioned Google Earth tool. For each emissions source, the BAAQMD provides conservative estimates of cancer risk, non-cancer hazards, and $PM_{2.5}$ concentrations. Using information from both the Google Earth file and the GIS tool, there is one existing stationary source located within approximately 1,000 feet of the proposed project.

Table 3.3-19 lists the cumulative health impacts at the MIR estimated to occur during construction of project.

Table 3.3-19: Cumulative Construction Air Quality Health Impacts at the Maximum Impacted Sensitive Receptor

Source	Source Type	Distance from MIR (feet)[5]	Cancer Risk (per million)	Chronic Non-Cancer HI	$PM_{2.5}$ Concentration ($\mu g/m^3$)
Proposed project					
Unmitigated Construction (Scenario 1)[1]	Construction Emissions	30	6.48	0.003	0.025
Unmitigated Construction (Scenario 2)[2]	Construction Emissions	10	9.31	0.005	0.035
Unmitigated Construction (Scenario 3)[3]	Construction Emissions	200	0.97	0.0006	0.005
Existing Stationary Sources (BAAQMD Facility Number)					
16855	Kaiser Permanente Antioch Medical Center	3200	50.88	0.026	2.120
Local Road[4] (>10,000 AADT)					
Deer Valley Road	Traffic on Local Road	2600	8.48	NA	0.216
Dallas Ranch Road	Traffic on Local Road	2500	4.42	NA	0.113
Cumulative Health Risks from Project Construction and Existing TAC Sources					
Cumulative Total at MIR with Construction of the Proposed project (Unmitigated)—Scenario 1			70.26	0.029	2.474
Cumulative Total at MIR with Construction of the Proposed project (Unmitigated)—Scenario 2			73.09	0.031	2.484
Cumulative Total at MIR with Construction of the Proposed project (Unmitigated)—Scenario 3			64.75	0.0266	2.454
BAAQMD Cumulative Thresholds of Significance			**100**	**10**	**0.8**
Threshold Exceeded prior to Application of Mitigation?			**No**	**No**	**Yes**

Table 3.3-19 (cont.): Cumulative Construction Air Quality Health Impacts at the Maximum Impacted Sensitive Receptor

Source	Source Type	Distance from MIR (feet)[5]	Cancer Risk (per million)	Chronic Non-Cancer HI	$PM_{2.5}$ Concentration ($\mu g/m^3$)
Notes: MIR = Maximum Impacted Sensitive Receptor NA = not available AADT = annual average daily traffic (1) The MIR is an existing residence located approximately 30 feet north of the project site. (2) The MIR is a park located between Phase 1 and Phase 2, to be built as part of Phase 1. (3) The MIR is a future project single-family residence located in Phase 2. (4) Traffic count source: TJKM. 2015. Citywide Engineering and Traffic Study Antioch, California. February. Website: https://www.antiochca.gov/fc/community-development/engineering/TJKM-Final-Report-2015-02-06.pdf. Accessed December 12, 2019. (5) All existing sources within 1000 feet of the proposed project boundary are considered for the analysis although the existing sources are more than 1000 feet from the MIR for a conservative analysis. Source: Appendix C.					

As noted above in Table 3.3-19, the cumulative health impacts at the MIR from existing TAC emission sources located within 1,000 feet of the proposed project, combined with the unmitigated construction-related emissions, would exceed the BAAQMD's recommended cumulative health significance thresholds. Therefore, even with implementation of MM AIR-2a and MM AIR-2b, the cumulative TACs impacts would be significant and unavoidable.

Operational Emissions at Project as an Air Pollution Sensitive Receptor

The proposed project would locate new sensitive receptors (residents) that could be subject to existing sources of TACs at the project site. However, the California Supreme Court concluded in *California Building Industry Association v. BAAQMD* that agencies generally subject to CEQA are not required to analyze the impact of existing environmental conditions on a project's future users or residents. Although impacts from existing sources of TAC emissions on sensitive receptors on the project site are not subject to CEQA, the BAAQMD recommends assessing the potential *cumulative* impacts from sources of TACs within 1,000 feet of a project when siting new sensitive land uses. The potential TAC risks to the project's future residents are analyzed for informational purposes below. The BAAQMD screening analysis was applied at the project for conditions at build-out. Table 3.3-20 summarizes the cumulative health impacts at buildout.

Table 3.3-20: Cumulative Operation Air Quality Health Impacts at the Project Site

Source	Source Type	Distance from Project (feet)	Cancer Risk (per million)	Chronic Non-Cancer HI	$PM_{2.5}$ Concentration ($\mu g/m^3$)
Existing Stationary Sources (BAAQMD Facility Number)					
16855	Kaiser Permanente Antioch Medical Center	490	50.88	0.026	2.120

Table 3.3-20 (cont.): Cumulative Operation Air Quality Health Impacts at the Project Site

Source	Source Type	Distance from Project (feet)	Cancer Risk (per million)	Chronic Non-Cancer HI	$PM_{2.5}$ Concentration ($\mu g/m^3$)
Local Road[(1)] (>10,000 AADT)					
Deer Valley Road	Traffic on Local Road	10	8.48	NA	0.216
Dallas Ranch Road	Traffic on Local Road	10	4.42	NA	0.113
Cumulative Total at the Project Site			63.78	0.03	2.45

Notes:
NA = not available
AADT = annual average daily traffic
(1) Traffic count source: TJKM. 2015. Citywide Engineering and Traffic Study Antioch, California. February. Website: https://www.antiochca.gov/fc/community-development/engineering/TJKM-Final-Report-2015-02-06.pdf. Accessed December 12, 2019.
Source: Appendix C.

Level of Cumulative Significance Before Mitigation

Potentially Significant

Mitigation Measures

Implement MM AIR-2a and MM AIR-2b.

Level of Cumulative Significance After Mitigation

Significant and Unavoidable