3.2 - Air Quality

3.2.1 - Introduction

This section describes the existing air quality setting and potential effects from project implementation on the site, its surrounding area, and global climate. MBA performed air quality analysis for the proposed project, which included air quality modeling; the modeling output is provided in Appendix B. This analysis follows the Bay Area Air Quality Management District (District) recommendations for preparing an air quality analysis under CEQA.

3.2.2 - Environmental Setting

San Francisco Bay Area Air Basin

Solano County is split between the San Francisco Bay Area Air Basin and the Sacramento Valley Air Basin. The project is located within the San Francisco Bay Area Air Basin (Basin) portion of the County, which consists of the entirety of Alameda, Contra Costa, Marin, Napa, San Francisco, San Mateo, and Santa Clara counties; the western portion of Solano County; and the southern portion of Sonoma County. The Basin is characterized by complex terrain consisting of coastal mountain ranges, inland valleys, and bays. Elevations of 1,500 feet are common in the higher terrain of this area.

Regional Climate

Meteorology is the study of weather and climate. Weather refers to the state of the atmosphere at a given time and place relating to temperature, air pressure, humidity, cloudiness, and precipitation. Weather refers to conditions over short periods; conditions over long periods, generally at least 30 to 50 years, are referred to as climate. Climate in a narrow sense is usually defined as the "average weather," or more rigorously, as the statistical description in terms of the mean and variability of relevant quantities over a period ranging from months to thousands or millions of years. These quantities most often are surface variables such as temperature, precipitation, and wind.

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 quite 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 San Francisco 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. 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.

Winds

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 produces a jet that sweeps eastward but widens downstream, producing southwest winds at Berkeley and northwest winds at San Jose; a branch curves eastward through the Carquinez Straits and into the Central Valley. Wind speeds may be locally strong 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 a.m. to 4 p.m. in July is about 20 miles per hour (mph), compared with only about 8 mph at San Jose and less than 7 mph at the Farallon Islands.

The sea breeze between the coast and the Central Valley 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 Basin 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.

Regional Air Quality

Background

An emissions inventory is an account of the amount of air pollution generated by various emissions sources. To estimate the sources and quantities of pollution, the California Air Resources Board (ARB), in cooperation with local air districts and industry, maintains an inventory of California emission sources. Sources are subdivided into the four major emission categories: mobile, stationary, areawide, and natural sources.

Mobile sources include on-road sources and off-road mobile sources. The on-road emissions inventory, which includes automobiles, motorcycles, and trucks, is an estimation of population, activity, and emissions of the on-road motor vehicles used in California. The off-road emissions

inventory is an estimate of the population, activity, and emissions of various off-road equipment, including recreational vehicles, farm and construction equipment, lawn and garden equipment, forklifts, locomotives, commercial marine ships, and marine pleasure craft. ARB staff estimates mobile source emissions with assistance from districts and other government agencies.

Stationary sources are large, fixed sources of air pollution, such as power plants, refineries, and manufacturing facilities. Stationary sources also include aggregated point sources. These include many small point sources, or facilities, that are not inventoried individually but are estimated as a group and reported as a single-source category. Examples include gas stations and dry cleaners. Each of the local air districts estimates the emissions for the majority of stationary sources within its jurisdiction. Stationary source emissions are based on estimates made by facility operators and local air districts. Emissions from specific facilities can be identified by name and location.

Areawide sources include source categories associated with human activity, and these emissions take place over a wide geographic area. Consumer products, fireplaces, farming operations (such as tilling), and unpaved road dust are examples of areawide sources. ARB and local air district staffs estimate areawide emissions. Emissions from areawide sources may be either from small, individual sources, such as residential fireplaces, or from widely distributed sources that cannot be tied to a single location, such as consumer products and dust from unpaved roads.

Natural, or non-anthropogenic, sources include source categories with naturally occurring emissions such as geogenic (e.g., petroleum seeps), wildfires, and biogenic emissions from plants. ARB staff and the air districts also estimate natural sources.

Solano County Emissions Inventory

The 2010 emissions inventory for the Basin portion of Solano County is available in ARB's 2009 Almanac Emission Projection Data. Table 3.2-1 summarizes the estimated 2010 emissions for the main pollutants of concern in the Basin portion of Solano County.

Table 3.2-1: 2010 Solano County (Basin Portion) Emissions Inventory

Emission Category	Tons per Day			
	ROG	NO_x	PM_{10}	$PM_{2.5}$
Stationary Sources	7.0	7.1	1.2	1.1
Areawide Sources	3.6	0.6	10.8	2.7
Mobile Sources	9.8	18.4	1.1	0.9
Natural Sources	2.6	—	—	—
Total Basin Portion of Solano County	**23.0**	**26.1**	**13.1**	**4.6**

Notes:
ROG = reactive organic gases; NO_x = nitrogen oxides; PM_{10} and $PM_{2.5}$ = particulate matter
Source: California Air Resources Board 2011

ROG. Mobile sources contributed approximately 43 percent of the 2010 reactive organic gases (ROG) emissions. Stationary sources accounted for approximately 30 percent of the 2010 emissions inventory.

NO_x. Mobile sources generated the majority of oxides of nitrogen (NO_x) emissions in the Basin portion of Solano County at approximately 70 percent of the total NO_x inventory. Stationary sources, primarily fuel combustion from petroleum refining, contributed approximately 27 percent of the NO_x inventory.

PM_{10}. For particulate matter smaller than 10 microns in diameter (PM_{10}), areawide sources contributed more than 80 percent of the 2010 inventory. The main PM_{10}-generating areawide sources include paved road dust, construction and demolition, and fugitive windblown dust.

$PM_{2.5}$. Areawide sources contributed nearly 60 percent of the 2010 inventory of particulate matter smaller than 2.5 microns in diameter ($PM_{2.5}$), and stationary sources generated approximately 24 percent of the inventory. The main $PM_{2.5}$-generating areawide source was residential fuel combustion, followed by paved road dust.

Local Climate

The project is located on the north side of the Carquinez Straight, near the boundary of the Carquinez Straight and Napa Valley subregions of the Basin. Prevailing winds in the Carquinez Straight are from the west, with the strongest up valley winds occurring in the afternoon. Prevailing winds in the Napa Valley flow up-valley from the south about half the time. For both subregions, strong up-valley winds frequently develop during warm summer afternoons, which can draw in air from the San Pablo Bay.

The City of Vallejo area is characterized as a Mediterranean climate, with warm summers, mild winters, and moderate precipitation. Temperatures in the project area range from an average high of 82.9°F in August to an average low of 35.9°F in December. Rainfall averages 17.65 inches annually (WRCC 2011).

Two weather patterns in Vallejo create adverse conditions for air pollution. The first occurs primarily in summer and fall when high pressure over the Pacific Coast diminishes the sea breeze. Under this regime, temperatures are warm, winds light, and an elevated inversion restricts vertical dilution. These conditions result in peak ozone concentrations, and typically last three to five days. The second weather pattern is high pressure in the winter. Light or calm winds combined with a ground-based radiation inversion severely restrict dilution of pollutants in the evening and night hours. Under these conditions, emissions from automobiles, together with fireplace and woodstove emissions, cause peak concentrations of carbon monoxide.

Local Air Quality

Existing levels of ambient air quality and historical trends and projections of air quality in the project area are best documented from measurements made near the project site. The local air quality can be evaluated by reviewing relevant air pollution concentrations near the project area. District operates 25 ambient air monitoring stations within the greater Bay Area. The Vallejo ambient air monitoring station (Vallejo station), located approximately 2 miles southwest of the project boundary, is the nearest station to the project. The Vallejo station is located in the Napa Valley climate subregion. Table 3.2-2 summarizes 2009 through 2011 published monitoring data for the Vallejo station, with the exception of PM_{10}, which represents data from the Napa station.

Table 3.2-2: Local Air Quality Monitoring Summary

Air Pollutant	Averaging Time	Item	2009	2010	2011
Ozone	1 Hour	Max 1 Hour (ppm)	0.104	0.091	0.090
		Days > State Standard (0.09 ppm)	2	0	0
	8 Hour	Max 8 Hour (ppm)	0.074	0.081	0.070
		Days > State Standard (0.07 ppm)	1	2	0
		Days > National Standard (0.075 ppm)	0	1	0
Carbon monoxide	8 Hour	Max 8 Hour (ppm)	2.23	1.94	2.41
		Days > State/National Standard (9 ppm)	0	0	0
Nitrogen dioxide	Annual	Annual Average (ppm)	0.010	0.009	0.010
	1 Hour	Max 1 Hour (ppm)	0.049	0.055	0.047
		Days > State Standard (0.18 ppm)	0	0	0
Sulfur dioxide	Annual	Annual Average (ppm)	0.000	0.000	0.000
	24 Hour	Max 24 Hour (ppm)	0.003	0.002	0.002
		Days > State Standard (0.04 ppm)	0	0	0
Inhalable coarse particles (PM_{10})	Annual	Annual Average ($\mu g/m^3$)	18.5	17.4	20.2
	24 hour	24 Hour ($\mu g/m^3$)	55.4	36.6	55.3
		Days > State Standard (50 $\mu g/m^3$)	6	0	6
		Days > National Standard (150 $\mu g/m^3$)	0	0	0
Fine particulate matter ($PM_{2.5}$)	Annual	Annual Average ($\mu g/m^3$)	9.7	7.7	ID
	24 Hour	24 Hour ($\mu g/m^3$)	38.9	29.5	30.6
		Days > National Standard (35 $\mu g/m^3$)	5	0	0

Notes and Abbreviations:
> = exceed ppm = parts per million $\mu g/m^3$ = micrograms per cubic meter
ID = insufficient data max = maximum State Standard = California Ambient Air Quality Standard
National Standard = National Ambient Air Quality Standard
Source: California Air Resources Board 2012. PM_{10} data is from the Napa station (Jefferson Avenue); all other pollutants shown in table are from the Vallejo station (304 Tuolumne Street).

Alternative Transit

Section 3.11, Transportation/Traffic discusses public transit, bicycle infrastructure and the pedestrian network near the project location. Please see Section 3.11, Transportation/Traffic, for detailed discussions of alternative transit infrastructure and service near the project.

Pollutants of Concern

For reasons described in Section 3.2.3, Regulatory Framework, the criteria pollutants of greatest concern for the project area are ozone, inhalable particulate matter (PM_{10}), and fine particulate matter ($PM_{2.5}$). Although the area is in attainment of the carbon monoxide (CO) standards, there is a potential for CO hotspots on congested roadways and at congested intersections. Other pollutants of concern are toxic air contaminants. The proposed project is not expected to produce air emissions containing hydrogen sulfide, sulfates, lead, and vinyl chloride. A description of the air pollutants are summarized in Table 3.2-3.

Table 3.2-3: Description of Air Pollutants

Air Pollutant	Averaging Time	California Standard	Federal Standard[a]	Most Relevant Effects from Pollutant Exposure	Properties	Sources
Ozone	1 Hour	0.09 ppm	—	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.	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 reactive organic gases (ROG), 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 (ROG and NO_x) are mobile sources (on-road and off-road vehicle exhaust).
	8 Hour	0.070 ppm	0.075 ppm			
Carbon monoxide (CO)	1 Hour	20 ppm	35 ppm	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.	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.
	8 Hour	9.0 ppm	9 ppm			
Nitrogen dioxide [b] (NO_2)	1 Hour	0.18 ppm	0.100 ppm	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; contribution to atmospheric discoloration; increased visits to hospital for respiratory illnesses.	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. NO_2 concentrations near major roads can be 30 to 100 percent higher than those at monitoring stations.
	Annual	0.030 ppm	0.053 ppm			

Table 3.2-3 (cont.): Description of Air Pollutants

Air Pollutant	Averaging Time	California Standard	Federal Standard[a]	Most Relevant Effects from Pollutant Exposure	Properties	Sources
Sulfur dioxide [c] (SO_2)	1 Hour	0.25 ppm	0.075 ppm	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.	Sulfur dioxide is a colorless, pungent gas. At levels greater than 0.5 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 dimethylsulfide 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.
	3 Hour	—	0.5 ppm			
	24 Hour	0.04 ppm	0.14 (for certain areas)			
	Annual	—	0.030 ppm (for certain areas)			
Particulate matter (PM_{10})	24 hour	50 µg/m^3	150 µg/m^3	• Short-term exposure (hours/days): irrigation 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.	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.
	Mean	20 µg/m^3	—			
Particulate matter ($PM_{2.5}$)	24 Hour	—	35 µg/m^3			
	Annual	12 µg/m^3	15 µg/m^3			
Visibility reducing particles	8 Hour	See note below [d]				

Table 3.2-3 (cont.): Description of Air Pollutants

Air Pollutant	Averaging Time	California Standard	Federal Standard[a]	Most Relevant Effects from Pollutant Exposure	Properties	Sources
Sulfates	24 Hour	25 µg/m^3	—	(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.	The sulfate ion is a polyatomic anion with the empirical formula SO_4^{2-}. 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.
Lead [e]	30-day	1.5 µg/m^3	—	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.	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.
	Quarter	—	1.5 µg/m^3			
	Rolling 3-month average	—	0.15 µg/m^3			
Vinyl chloride [e]	24 Hour	0.01 ppm	—	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.	Vinyl chloride, or chloroethene, is a chlorinated hydrocarbon and a colorless gas with a mild, sweet odor. In 1990, 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.

Table 3.2-3 (cont.): Description of Air Pollutants

Air Pollutant	Averaging Time	California Standard	Federal Standard[a]	Most Relevant Effects from Pollutant Exposure	Properties	Sources
Hydrogen sulfide	1 Hour	0.03 ppm	—	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.	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).
Reactive organic gases (ROG)		There are no state or federal standards for ROGs because they are not classified as criteria pollutants.		Although health-based standards have not been established for ROGs, health effects can occur from exposures to high concentrations because of interference with oxygen uptake. In general, concentrations of ROGs 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 ROGs have been classified as toxic air contaminants.	ROGs, or volatile organic compounds (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 ROGs include paints, solvents, aerosol sprays, cleansers, tobacco smoke, etc. Outdoor sources of ROGs are from combustion and fuel evaporation. A reduction in ROG emissions reduces certain chemical reactions that contribute to the formulation of ozone. ROGs are transformed into organic aerosols in the atmosphere, which contribute to higher PM_{10} and lower visibility.
Benzene		There are no ambient air quality standards for benzene.		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.	Benzene is a ROG. 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 1 to 2 percent by volume. The primary route of human exposure is through inhalation.

Table 3.2-3 (cont.): Description of Air Pollutants

Air Pollutant	Averaging Time	California Standard	Federal Standard[a]	Most Relevant Effects from Pollutant Exposure	Properties	Sources
Diesel particulate matter (DPM)		There are no ambient air quality standards for DPM.		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 DPM exposure.	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.

Notes:
ppm = parts per million (concentration) $\mu g/m^3$ = 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 SO_2, 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] attain the 1-hour national standard, the 3-year average of the annual 98th percentile of the 1-hour daily maximum concentrations must not exceed 100 parts per billion (0.100 ppm).

[c] On June 2, 2010, a new 1-hour SO_2 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 ppb. The 1971 SO_2 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] 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.

Sources: California Environmental Protection Agency 2002; California Air Resources Board 2009; U.S. Environmental Protection Agency 2003, 2009a, 2009b, 2010, 2011b, and 2012; National Toxicology Program 2011a and 2011b.
Source of standards: California Air Resources Board 2012.

Toxic Air Contaminants

In addition to the above-listed criteria pollutants, toxic air contaminants, also known as hazardous air pollutants, are another group of pollutants of concern. A toxic air contaminant 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. Toxic air contaminants 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 toxic air contaminants that may cause cancer, there is no concentration that does not present some risk. In other words, there is no threshold level 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 (ARB 2009), the majority of the estimated health risk from toxic air contaminants can be attributed to relatively few compounds, the most important being diesel particulate matter (DPM) from diesel-fueled engines.

Diesel Particulate Matter

The ARB identified the PM emissions from diesel-fueled engines as a toxic air contaminant in August 1998 under California's toxic air contaminant program. The State of California, after a 10-year research program, determined in 1998 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. Some short-term (acute) effects of diesel exhaust DPM exposure include eye, nose, throat, and lung irritation, and can cause 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.

The California Office of Environmental Health Hazard Assessment recommends using a 70-year exposure duration for determining residential cancer risks. The main source of DPM is combustion of diesel fuel in diesel-powered engines. DPM is emitted from both mobile and stationary sources. Such engines can include are in on-road vehicles such as diesel trucks, off-road construction vehicles, diesel electrical generators, and various pieces of stationary construction equipment

Asbestos

Asbestos is listed as a toxic air contaminant by ARB and as a Hazardous Air Pollutant by the United States Environmental Protection Agency (EPA). Asbestos is of special concern in Napa County because it occurs naturally in surface deposits of several types of rock formations. 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 ultramafic rock, particularly near faults. Crushing or breaking

these rocks, through construction or other means, can release asbestoform fibers into the air. Asbestos emissions can result from the sale or use of asbestos-containing materials, road surfacing with such materials, grading activities, and surface mining.

The risk of disease is dependent upon the intensity and duration of exposure. When inhaled, asbestos fibers may remain in the lungs and with time may be linked to such diseases as asbestosis, lung cancer, and mesothelioma. According to United States Geological Survey maps (2011), there does appear to some asbestos a couple of miles northeast of the project site. However, since the project is built up and is not directly located in the naturally occurring asbestos area, it is anticipated that disturbing naturally occurring asbestos during project construction is not a concern.

3.2.3 - Regulatory Framework

Air pollutants are regulated at the national, state, and air basin level; each agency has a different level of regulatory responsibility. The EPA regulates at the national level, the ARB regulates at the state level, and the District regulates at the county level. This section describes the existing regulatory setting for the regional and local pollutants analyzed in this EIR.

Federal and State

The EPA is responsible for global, international, national, and interstate air pollution issues and policies. The EPA sets national vehicle and stationary source emission standards, oversees approval of all State Implementation Plans (SIP), provides research and guidance for air pollution programs, and sets National Ambient Air Quality Standards, also known as federal standards. There are federal standards for six common air pollutants, called criteria air pollutants, which were identified from provisions of the Clean Air Act of 1970. The criteria pollutants are:

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

The federal standards were set to protect public health, including that of sensitive individuals; thus, the standards continue to change 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 (ARB 2012).

The SIP for the State of California is administered by ARB, which has overall responsibility for statewide air quality maintenance and air pollution prevention. An SIP is prepared by each state describing existing air quality conditions and measures that will be followed to attain and maintain federal standards. The SIP incorporates individual federal attainment plans for regional air districts. Federal attainment plans prepared by each air district are sent to 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.

ARB also administers California Ambient Air Quality Standards for the ten air pollutants designated in the California Clean Air Act. The ten state air pollutants are the six criteria pollutants listed above as well as visibility-reducing particulates, hydrogen sulfide, sulfates, and vinyl chloride. The federal and state ambient air quality standards were summarized previously in Table 3.2-3.

California Air Resources Board Regulations

ARB Final Regulation Order, Requirements to Reduce Idling Emissions from New and In-Use Trucks, would require that new 2008 and subsequent model-year heavy-duty diesel engines be equipped with an engine shutdown system that automatically shuts down the engine after 300 seconds of continuous idling operation once the vehicle is stopped, the transmission is set to "neutral" or "park," and the parking brake is engaged. If the parking brake is not engaged, then the engine shutdown system shall shut down the engine after 900 seconds of continuous idling operation once the vehicle is stopped and the transmission is set to "neutral" or "park." Any project-related trucks manufactured after 2008 would be consistent with this rule, which would ultimately reduce air emissions.

ARB Regulation for In-Use Off-Road Diesel Vehicles. On July 26, 2007, the ARB adopted a regulation to reduce diesel particulate matter 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 5 consecutive minutes, requires reporting and labeling, and requires disclosure of the regulation upon vehicle sale. 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).

ARB Airborne Toxic Control Measure. In July 2001, the ARB approved an Air Toxic Control Measure for construction, grading, quarrying and surface mining operations to minimize emissions of naturally occurring asbestos. The regulation requires application of best management practices 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 greater than one acre. These projects require the submittal of a "Dust Mitigation Plan" and approval by the District prior to the start of the project.

Bay Area Air Quality Management District

The District regulates air quality in the Air Basin. The District is responsible for controlling and permitting industrial pollution sources (such as power plants, refineries, and manufacturing operations) and widespread, area wide sources (such as bakeries, dry cleaners, service stations, and commercial paint applicators), and for adopting local air quality plans and rules.

Attainment Status

The EPA has identified nonattainment and attainment areas for each criteria air pollutant. Under amendments to the federal Clean Air Act, the EPA has designated air basins or portions thereof as "attainment," "nonattainment," or "unclassifiable," based on whether or not the national standards have been achieved. Nonattainment areas must take steps towards attainment by a specific timeline. The Clean Air Act uses additional classification systems for areas designated nonattainment based on the severity of the pollution and to set realistic deadlines for reaching clean-up goals. If an air basin is not in federal attainment (that is, it does not meet federal standards) for a particular pollutant, the air basin is classified as a marginal, moderate, serious, severe, or extreme nonattainment area, based on the estimated time it would take to reach attainment.

The state designation criteria specify four categories: nonattainment, nonattainment-transitional, attainment, and unclassified. A nonattainment designation indicates one or more violations of the state standard have occurred. A nonattainment-transitional designation is a subcategory of nonattainment that indicates improving air quality, with only occasional violations or exceedances of the state standard. In contrast, an attainment designation indicates no violations of the state standard are available to evaluate attainment status. Finally, an unclassified designation indicates either no air quality data or an incomplete set of air quality data.

In addition, since attainment status is on a per-pollutant basis, if any averaging time standard is violated for a single pollutant, the area is out of attainment for that pollutant, even if the other averaging times are being met.

The current attainment designations for the Air Basin, shown in Table 3.2-4, indicate that the Air Basin is in nonattainment for the state ozone, PM_{10}, and $PM_{2.5}$ standards. The Air Basin is also nonattainment for the federal ozone standard.

Table 3.2-4: Bay Area Air Basin Attainment Status

Pollutant	State Status	Federal Status
Ozone	Nonattainment	Nonattainment
Carbon monoxide	Attainment	Maintenance (urban areas)
Nitrogen dioxide	Attainment	Attainment
Sulfur dioxide	Attainment	Attainment

Table 3.2-4 (cont.): Bay Area Air Basin Attainment Status

Pollutant	State Status	Federal Status
PM_{10}	Nonattainment	Attainment
$PM_{2.5}$	Nonattainment	Nonattainment
Lead	Attainment	Attainment
Sulfates	Attainment	No federal standards
Hydrogen sulfide	Unclassified	
Visibility-reducing particles	Unclassified	
Source of State Status: California Air Resources Board 2011. Source of Federal Status: U.S. Environmental Protection Agency 2012.		

Current Air Quality Plans

As described above under federal and state regulatory agencies, an SIP is a federal requirement; each state prepares an SIP to describe existing air quality conditions and measures that will be followed to attain and maintain the federal standards. In addition in California, state ozone standards have planning requirements. However, state PM_{10} standards have no attainment planning requirements, but air districts must demonstrate that all measures feasible for the area have been adopted.

Because the Air Basin is nonattainment for the federal and state ozone standards, the District prepared an Ozone Attainment Demonstration Plan to satisfy the federal 1-hour ozone planning requirement and a Clean Air Plan to satisfy the state 1-hour ozone planning requirement.

On September 15, 2010, the District adopted the final Bay Area 2010 Clean Air Plan, and certified its Final Environmental Impact Report. The 2010 Clean Air Plan was prepared by District in cooperation with the Metropolitan Transportation Commission and the Association of Bay Area Governments. The 2010 Clean Air Plan builds from and incorporates components of the District's 2005 Ozone Strategy, and identifies how the Air Basin will achieve compliance with the state 1-hour air quality standard for ozone as expeditiously as practicable and how the region will reduce transport of ozone and ozone precursors to neighboring air basins. The 2010 Clean Air Plan serves to:

- Update the Bay Area 2005 Ozone Strategy in accordance with the requirements of the California Clean Air Act to implement "all feasible measures" to reduce ozone.
- Provide a control strategy to reduce ozone, particulate matter (PM), air toxics, and greenhouse gases in a single, integrated plan.
- Review progress in improving air quality in recent years.
- Establish emission control measures to be adopted or implemented in the 2010 to 2012 timeframe.

The District is working to implement the 55 control measures in the 2010 Clean Air Plan; many of these measures will reduce will reduce direct emissions of PM, precursors that contribute to formation of ozone and secondary PM, toxic air contaminants, and greenhouse gases.

The Bay Area did not meet one of the federal air quality standards for $PM_{2.5}$ during the 3-year period from 2006 to 2008. The EPA therefore designated the Bay Area as "non-attainment" for the 24-hour $PM_{2.5}$ national ambient air quality standard in December 2009. Since then, Bay Area $PM_{2.5}$ pollution levels have decreased. Air quality monitoring data show that the Bay Area attained the national 24-hour $PM_{2.5}$ standard during the 3-year period from 2008 through 2010 and again for the 2009 through 2011 period.

Based on the Bay Area $PM_{2.5}$ monitoring data for years 2008-2010, 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 Air District believes that it would be premature to submit a redesignation request and $PM_{2.5}$ maintenance plan at this time. Therefore, the Air District 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 Air District's New Source Review regulation to address $PM_{2.5}$

Rules and Regulations

The District establishes and administers a program of rules and regulations that are air plans, as described above, to attain and maintain state and national air quality standards. The rules and regulations that apply to this project include but are not limited to the following:

- **Regulation 2, Rule 2.** New Source Review. This rule requires any new source resulting in an increase of any criteria pollutant to be evaluated for adherence to best available control technology. For compression internal combustion engines, best available control technology requires that the generator be fired on "California Diesel Fuel" (fuel oil with a sulfur content less than 0.05 percent by weight and less than 20 percent by volume of aromatic hydrocarbons). All stationary internal combustion engines larger than 50 horsepower must obtain a Permit to Operate. If the engine is diesel fueled, then it must also comply with the District-administered Statewide Air Toxics Control Measure for Stationary Diesel Engines.
- **Regulation 2, Rule 5.** New Source Review of Toxic Air Contaminants. This rule applies to preconstruction review of new and modified sources of toxic air contaminants, contains project health risk limits, and requires Toxics Best Available Control Technology.

- **Regulation 6, Rule 2.** Commercial Cooking Equipment. The purpose of this rule is to reduce emissions from commercial cooking equipment, and it applies to chain-driving or under-fired charbroilers.
- **Regulation 8, Rule 3.** Architectural Coatings. This rule governs the manufacture, distribution, and sale of architectural coatings and limits the ROG 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 ROG content of asphalt available for use during the construction through regulating the sale and use of asphalt and limits the ROG content in asphalt.

City of Vallejo

Local jurisdictions, such as the City of Vallejo, have the authority and responsibility to reduce air pollution through their police power and decision-making authority. Specifically, the City is responsible for the assessment and mitigation of air emissions resulting from its land use decisions. The City is also responsible for the implementation of transportation control measures as outlined in the air quality attainment plans.

General Plan

The City of Vallejo General Plan contains an Air Quality Element. In addition, the General Plan contains measures that affect air quality indirectly, such as through conservation of energy resources. The General Plan contains the following goals, objectives, and policies related to, or affecting, air quality:

Air Quality Goal 1: To improve Vallejo's air quality.

- **Policy 1:** Develop a more balanced transportation system in Vallejo that provides opportunities for non-auto travel through promotion of pedestrian, bicycle and transit modes of travel.
- **Policy 2:** Balance jobs and housing in future development to provide Vallejo residents the opportunity to work within Vallejo, and reduce long distance commuting both to and from Vallejo. Jobs and housing should be balanced both in numbers and in salary range/housing cost.
- **Policy 4:** Promote the use of trees and plants in landscaping to reduce air pollutant levels.

Air Quality Goal 2: To reduce the air quality impact associated with future development in Vallejo.

- **Policy 1:** Promote high-density development and infill development in those portions of Vallejo served by transit.

- **Policy 2:** Promote mixed land use development. The provision of commercial services such as day care, restaurants, banks and stores near to employment centers can reduce auto trip generation by promoting pedestrian travel. Providing neighborhood commercial and park uses within residential developments can reduce short auto trip generation by making pedestrian and bicycle trips feasible.
- **Policy 3:** Require air quality mitigation for new development not amenable to TSM methods. Retail and residential development, in particular, do not lend themselves to trip reduction through TSM. As part of the environmental review process, these types of uses should be required to provide air quality mitigation by providing funding for off-site improvements to improve air quality. Examples of such improvements are pedestrian/bicycle amenities, transit support, transit amenities such as bus shelters or additional park-and-ride lots.
- **Policy 4:** Use project siting to reduce air pollution exposure of sensitive receptors. Locate air pollution sources away from residential areas and other sensitive receptors. Include buffer zones within residential and sensitive receptor site plans to separate these uses from freeways, arterials, point sources and potential source of odors.

Energy Resources Goal: To reduce the City's dependence on non-renewable energy resources through conservation and development of renewable energy sources.

- **Policy 1:** Support energy efficient modes of transportation through land use planning, including mixed-use development, improved pedestrian and bicycle access, and more compact.
- **Policy 3:** Encourage participation in the PG&E programs for reducing energy consumption

3.2.4 - Methodology

The District's CEQA Guidelines are developed to assist local jurisdictions and lead agencies in complying with the requirements of CEQA regarding potentially adverse impacts to air quality. These CEQA Guidelines were updated in June 2010 to include reference to thresholds of significance ("Thresholds") adopted by the District Board on June 2, 2010. The Guidelines were further updated in May 2011. On March 5, 2012, the Alameda County Superior Court issued a judgment finding that the Air District had failed to comply with CEQA when it adopted the Thresholds. The court did not determine whether the Thresholds were valid on the merits, but found that the adoption of the Thresholds was a project under CEQA. The court issued a writ of mandate ordering the District to set aside the Thresholds and cease dissemination of them until the District had complied with CEQA. The District has appealed the Alameda County Superior Court's decision. The appeal is currently pending in the Court of Appeal of the State of California, First Appellate District.

In view of the court's order, the District is no longer recommending that the Thresholds be used as a generally applicable measure of a project's significant air quality impacts. The District released a new version of the Guidelines in May 2012 removing the Thresholds. The District recommends that lead agencies will need to determine appropriate air quality thresholds of significance based on

substantial evidence in the record. Although lead agencies may rely on the District's CEQA Guidelines (updated May 2011) for assistance in calculating air pollution emissions, obtaining information regarding the health impacts of air pollutants, and identifying potential mitigation measures, the District has been ordered to set aside the Thresholds and is no longer recommending that these Thresholds be used as a general measure of a project's significant air quality impacts. According to the District, lead agencies may continue to rely on the District's 1999 Thresholds of Significance and they may continue to make determinations regarding the significance of an individual project's air quality impacts based on the substantial evidence in the record for that project.[1]

Operational and construction emissions for the project were modeled using CalEEMod based on information within the Plan. Model output and assumptions are provided in Appendix B.

3.2.5 - Thresholds of Significance

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) Violate any air quality standard or contribute substantially to an existing or projected air quality violation?

c) 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 (including releasing emissions, which exceed quantitative thresholds for ozone precursors)?

d) Expose sensitive receptors to substantial pollutant concentrations?

e) Create objectionable odors affecting a substantial number of people?

[1] Website: http://www.baaqmd.gov/Divisions/Planning-and-Research/CEQA-GUIDELINES.aspx

3.2.6 - Project Impacts and Mitigation Measures

Air Quality Plan

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

Impact Analysis

The District's 2010 Clean Air Plan is the regional air quality management plan for the Air Basin. The 2010 Clean Air Plan accounts for projections of population growth provided by Association of Bay Area Governments and vehicle miles traveled provided by the Metropolitan Transportation Commission, and it identifies strategies to bring regional emissions into compliance with federal and state air quality standards. The District's Guidance provides two criteria for determining if a plan-level project is consistent with the current air quality plan (AQP) control measures; these two measures are consistency with current air quality plan control measures (Criteria 1 through 3, below) and the projected vehicle miles traveled in relation to the projected population increase (Criterion 4, below). The District does not provide a threshold of significance for project-level consistency analysis. Therefore, the following criteria will be used for determining the 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 2010 Clean Air Plan, 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 greenhouse gas emissions and protect the climate.

The project supports the primary goals of the AQP by providing a mixed use development within an existing urbanized community, adjacent to alternative transit infrastructure, jobs, housing, and community services.

As discussed shown in Impacts AIR-2, AIR-4, and AIR-5, the project would not create a localized violation of state or federal air quality standards, expose sensitive receptors to substantial pollutant concentrations, or create objectionable odors affecting a substantial number of people after incorporation of mitigation measures. However, the project could contribute to a significant ozone contribution as shown in Impact AIR-3. Therefore, this impact is potentially significant according to this criterion.

Criterion 2

The 2010 Clean Air Plan contains 55 control measures aimed at reducing air pollution in the Bay Area. Along with the traditional stationary, area, mobile source, and transportation control measures, the 2010 Clean Air Plan contains a number of new control measures designed to protect the climate and promote mixed use, compact development to reduce vehicle emissions and exposure to pollutants from stationary and mobile sources (BAAQMD 2010).

None of the 18 stationary source control measures are applicable to the project. In addition, none of the 10 mobile source measures or six land use and local impact measures applies to the project. Of the transportation control measures, TCM D (Support Focused Growth), measures D-1 through D-3, apply to the project, and the Plan and Section 3.11, Transportation/Traffic detail the pedestrian and bicycle infrastructure near the project.

The Plan provides a comprehensive network of pedestrian facilities, including sidewalks, multi-use paths and controlled crossing to promote walking to the site and within the site. All of the primary and secondary roadways on the site have either sidewalks on both sides or a sidewalk on one side and a multi-use path on the other.

Fairgrounds Drive currently has bicycle lanes along most of the project frontage, although there is a gap in the lanes. The Solano Transit Authority (STA) project will provide continuous bike lanes on Fairgrounds Drive between SR 37 and Redwood Parkway. The Plan includes bike lanes or a multi-use path on all the primary roadways. The project will connect the interior of the project to the adjacent bicycle and pedestrian infrastructure.

The Plan includes a 2.2-acre Transit/North Parking Center, which would serve as a bus hub, with pedestrian and bicycle connections to the rest of the site. The Transit/North Parking Center would be located south of Sage Street.

In accordance with the City's General Plan, the project would incorporate Transportation Demand Management strategies and improvements, such as bus stops, as appropriate, and as determined necessary by the City and the transportation agency.

As described in Impact TRANS-3, located in Section 3.11, Transportation/Traffic, the project does not conflict with the congestion management plan. In addition, as detailed in Impact TRANS-7, the project includes sidewalks or multi-use paths throughout the site, bicycle routes and lanes, and transit service onsite. In addition, bicycle parking spaces would be required for each development. Therefore, the project would provide continuity with adjacent bicycle infrastructure, as well as provide onsite bicycle parking.

Furthermore, the project would increase the density and intensity of use of the project site over the prior zoning and land use designations, thereby resulting in a higher density, mixed use development that includes residential and employment development near transit.

Relative to the Energy and Climate measures contained in the 2010 Clean Air Plan, the project would be consistent with all applicable measures:

- **Energy Efficiency:** The project applicant would be required to conform to the energy efficiency requirements of the California Building Standards Code, also known as Title 24. The project would be required to comply with whatever version of Title 24 is in effect when it obtains its building permits. The Building Efficiency Standards were adopted, in part, to meet an Executive order in the Green Building Initiative to improve the energy efficiency of nonresidential buildings through aggressive standards. Mitigation Measure AIR-1 requires the project applicant to increase the project's energy efficiency by 10 percent over 2008 Title 24 standards or to implement the 2013 or later standards. As specified in the California Green Building Standards (CALGreen) Code, which became effective January 1, 2011, the California Energy Commission believes a green building should achieve at least a 10 percent reduction in energy usage when compared to the State's mandatory energy efficiency standards. In addition, the project contains water conservation features in its project design, which would also reduce electricity required to transport water to the site.
- **Renewable Energy.** As described in the Utilities and Service Systems of this EIR, Pacific Gas and Electric Company (PG&E) provides electricity and natural gas service to the project area. PG&E facilities include nuclear, natural gas, and hydroelectric facilities. PG&E's 2009 power mix consisted of nuclear generation (20.5 percent), large hydroelectric facilities (13.0 percent) and renewable resources (14.4 percent), such as wind, geothermal, biomass and small hydro. The remaining portion came from natural gas (34.6 percent), coal (1.3 percent), unspecified sources (15.0 percent), and other fossil-based resources (1.2 percent). In addition, the shared public parking on the project site may have a solar generation field installed, according to Exhibit 2-7 in the EIR.
- **Urban Heat Island Mitigation.** The proposed project's landscaping plan (Exhibit 2.1-7) incorporates extensive tree plantings and other vegetation plantings within the areas of the site to be developed. In addition, if a solar field were installed above the shared parking area, it could reduce the heat island effect. Given the characteristics of the existing site, and the project's landscaping plan, the project would not contribute to urban heat island effects.
- **Shade Tree Planting.** The project's landscaping plan would incorporate extensive landscaping and shade tree planting within the areas of the site to be developed.

In summary, the project would meet all of the Energy and Climate measures contained in the 2010 Clean Air Plan through project design features and implementation of mitigation.

Criterion 3

The project will not preclude extension of a transit line or bike path, propose excessive parking beyond parking requirements, or otherwise create an impediment or disruption to implementation of

any AQP control measures. The project would be incorporating a Transit/North Parking Center. Indeed, as shown above, the project incorporates several AQP control measures as project design features.

Conclusion

The project is not consistent with Criterion 1 because the project exceeds the District's significance thresholds during operation. After incorporation of mitigation, the project would be consistent with Criterion 2. The project is consistent with Criterion 3 without mitigation. With the implementation of the mitigation measure identified below, impacts would be significant.

Level of Significance Prior to Mitigation

Potentially significant impact.

Mitigation Measures

MM AIR-1 The project shall exceed Title 24 energy efficiency standards by at least 15 percent.

Level of Significance After Mitigation

Significant and unavoidable impact.

Air Quality Standards/Violations

Impact AIR-2:	**The project would not violate any air quality standard or contribute substantially to an existing or projected air quality violation.**

Impact Analysis

This impact is related to localized criteria pollutant impacts because criteria pollutants are the pollutants with ambient air quality standards. Potential localized impacts would be exceedances of state or federal standards for $PM_{2.5}$, PM_{10}, or CO. The District provides recommended thresholds of significance for project-level construction -generated PM_{10} and $PM_{2.5}$ (fugitive dust); however, the District does not recommend the fugitive dust threshold for plan-level analysis. In addition, the District recommends an operational CO threshold, as described below.

The District does not have a quantitative threshold for fugitive dust. However, the District does recommend minimizing fugitive dust during project construction to avoid localized impacts to nearby receptors. Therefore, the District recommends inclusion of the fugitive dust control measures identified in its Air Quality Guidelines.

In regards to CO, the District recommends that a project that causes an exceedance of any state or federal ambient air quality standards, or makes a substantial contribution to an existing exceedance of a standard, would have a significant adverse impact on air quality.

Construction Fugitive PM_{10} and $PM_{2.5}$

As stated above, the District's Guidance does not include a recommended threshold for plan-level construction-generated fugitive dust. However, since the construction phasing, soil balancing and other construction details are known for this project component, the project-level threshold is applied.

The District recommends that fugitive dust from construction dust be evaluated separately from PM_{10} and $PM_{2.5}$ from exhaust. For construction dust, the District recommends incorporation of best management practices to reduce localized dust impacts to less than significant. As best management practices for construction-generated dust are not addressed in the project's description, it is assumed that the project would not incorporate them. Therefore, without application of best management practices, this impact is potentially significant. Incorporation of Mitigation Measure AIR-2 reduces this impact to less than significant.

Carbon Monoxide

The District does not provide a specific CO threshold for plan-level analysis. However, since the project's traffic study combines both components in the analysis on impacted intersections, the District's project-level threshold is applied. Furthermore, because the traffic study does not differentiate between the project's components when analyzing potential impacts to intersections, this analysis covers impacts from both components.

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

- 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
- The project traffic would not increase traffic volumes at affected intersections to more than 44,000 vehicles per hour; or
- The project traffic 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).

Section 3.11, Transportation/Traffic Impact TRANS-3 analyzes the project's potential to conflict with the applicable Congestion Management Plan. Impacts TRANS-1, TRANS-2, and TRANS-3, TRANS-8, and TRANS-9 assess the project's potential to impact the level of service (LOS) of adjacent roadways, including under the cumulative plus project conditions. Impact TRANS-3 found impacts to queuing to be less than significant. Impacts TRANS-1, TRANS-2 TRANS-8, and

TRANS-9 found the project has the potential to significantly impact the LOS of adjacent roadways and freeway segments or ramp junctions, and apply mitigation measures requiring payment of fair-share fees to improve roadway and intersection conditions. The improvements identified in Mitigation Measures TRANS-1, and TRANS-9 would improve intersection LOS; however, impacts would remain significant and unavoidable.

For pedestrian, bicycle and transit facilities, Impact TRANS-7 found the project would provide adequate access to alternative modes of transportation and, therefore, would result in a less than significant impact for alternative transportation.

The project is expected to generate up to 1,879 Saturday AM peak-hour primary trips and 1,566 Saturday PM peak-hour primary trips. The maximum peak-hour Cumulative Plus Project intersection would have less than 7,500 trips; therefore, the project would not increase traffic volumes at affected intersections to more than 44,000 vehicles per hour. The project would not increase traffic volumes in an area where vertical and/or horizontal mixing is substantially limited.

Therefore, the project does not meet all three screening criteria after application of Mitigation Measures TRANS-1 and TRANS-9, and may result in a significant impact to air quality for local CO. Therefore, CO hotspot analysis using CALINE4 was prepared for the three most-impacted intersections in the existing plus project and cumulative plus project scenario. The localized CO concentration at project intersections is shown in Table 3.2-5. The level of service is from Table 3.11-13 in the traffic section of the EIR, Cumulative plus Project Conditions (Saturday). The emission factors are from EMFAC2011, for the year 2020. The traffic volumes are from the traffic EIR section, from the cumulative plus project volumes for Phases 1, 2, and 3. As shown, CO concentrations are less than significant.

Table 3.2-5: Carbon Monoxide Concentrations at Intersections

Intersection	CO Concentration (ppm)		Significant Impact?
	1 Hour	8 Hour	
2. SR-37 WB Ramps/Fairgrounds Drive	4.1	2.9	No
3. SR-37 EB Ramps/Fairgrounds Drive	4.0	2.8	No
15. Redwood Street/I-80 WB Ramp	4.2	3.0	No

Notes:
The 1-hour concentration is the CALINE4 output (see Appendix B for model output) plus the 1-hour background concentration of 3.4 ppm (8-hour concentration divided by 0.7).
The 8 hour project increment was calculated by multiplying the 1 hour CALINE4 output by 0.7 (persistence factor), then adding the 8 hour background concentration of 2.41 ppm (from Table 3.2-2).
A significant impact would occur if the estimated CO concentration were over the 1-hour state standard of 20 ppm or the 8-hour state/federal standard of 9 ppm.

Level of Significance Prior to Mitigation

Potentially significant impact.

Mitigation Measures

Implement TRANS-1 and TRANS-9 and the following:

Entertainment Area and Fairgrounds

MM AIR-2 All construction activity: During construction activities, the following air pollution control measures shall be implemented:

- Exposed surfaces (e.g., parking areas, staging areas, soil piles, graded areas, and unpaved access roads) shall be watered two times per day, or more as needed.
- All haul trucks transporting soil, sand, or other loose material offsite shall be covered
- All visible mud or dirt track-out onto adjacent public roads shall be removed using wet power vacuum street sweepers at least once per day. The use of dry power sweeping is prohibited.
- All vehicle speeds on unpaved roads and surfaces shall be limited to 15 mph.
- All roadways, driveways, and sidewalks shall be paved as soon as possible.
- A publicly visible sign shall be posted with the telephone number and person to contact at the City of Vallejo regarding dust complaints. This person shall respond and take corrective action within 48 hours of a complaint or issue notification. The Bay Area Air Quality Management District's phone number shall also be visible to ensure compliance with applicable regulations.

Level of Significance After Mitigation

Less than significant impact.

Criteria Pollutant

Impact AIR-3:	**The project would 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 (including releasing emissions, which exceed quantitative thresholds for ozone precursors)**

Impact Analysis

The non-attainment pollutants of concern for this impact are ozone, PM_{10} and $PM_{2.5}$. Ozone is not emitted directly into the air, but is a regional pollutant formed by a photochemical reaction in the atmosphere. Ozone precursors, ROG and NO_x, react in the atmosphere in the presence of sunlight to form ozone. Therefore, the District does not have a recommended ozone threshold, but has regional thresholds of significance for project-emitted NO_x and ROG.

The District has determined that a project-level exceedance of the thresholds presented in Table 3.2-6 would have significant adverse impact on the air quality in the Basin by jeopardizing the Basin's attainment of the federal standards. Therefore, projects within the Basin with construction or

operational emissions in excess of any of the thresholds in Table 3.2-6 are considered to have a significant regional air quality impact.

Table 3.2-6: Bay Area Air Quality Management District Project-Level Mass Thresholds

Pollutant	Construction-Related	Operational-Related
Reactive organic gases (ROG)	54 lbs per day	54 lbs per day, and 10 tons per year
Nitrogen oxides (NO_x)	54 lbs per day	54 lbs per day, and 10 tons per year
PM_{10} (Exhaust)	80 lbs per day	80 lbs per day, and 15 tons per year
$PM_{2.5}$ (Exhaust)	54 lbs per day	54 lbs per day, and 10 tons per year

Note:
The District's 1999 guidelines identify operational thresholds of 15 tons per year for ROG, NO_x, and PM_{10} and 80 pounds per day for ROG, NO_x, and PM_{10}. The 1999 guidelines do not specify construction thresholds. Therefore, for purposes of this analysis, the thresholds in the 2011 guidelines are used since they are more stringent, with the exception of daily PM_{10} emissions, which use the 1999 guidelines since they call for 2 pounds per day less.
Abbreviation: lbs = pounds
Source: BAAQMD 2011.

The District's 2011 Guidance states the following:

> In developing thresholds of significance for air pollutants, the District considered the emission levels for which a project's individual emissions would be cumulatively considerable. If a project exceeds the identified significance thresholds, its emissions would be cumulatively considerable, resulting in significant adverse air quality impacts to the region's existing air quality conditions. Therefore, additional analysis to assess cumulative impacts is unnecessary. The analysis to assess project-level air quality impacts should be as comprehensive and rigorous as possible.

Therefore, if the project's emissions are below the District thresholds or the screening criteria, then the project's cumulative impact would be less than significant.

The District has developed screening levels to help determine when additional analysis is necessary to determine significance for criteria pollutant emissions. The screening levels developed by the District represent the size of development by land use type at which the District's emissions threshold of significance for ROG, NO_x, PM_{10}, and $PM_{2.5}$ would not be exceeded. However, the project land uses do not easily fit within any of the land use types offered in the screening tables. In addition, use of the screening tables is not recommended if there proposed construction would involve any demolition, simultaneous occurrence of more than two construction phases, or extensive site preparation (such as an increase in cut/fill or earth movement). Therefore, emissions were estimated.

Construction Emissions

The emissions from project construction equipment and worker vehicles are shown in Table 3.2-7 for the year 2013 and Table 3.2-8 for the year 2017. The methodology and assumptions used in estimating the emissions are explained in Appendix B. Because the project is to be phased over a variety of years, it was assumed that on any one day, approximately 34 acres would be worked on during construction at a time. These construction emissions could occur during any part of construction of the project: the fairgrounds or entertainment area. As shown in the tables, ROG and NO_x emissions exceed the significance thresholds. Therefore, emissions are potentially significant.

Table 3.2-7: Construction Daily Emissions (2013)

Source	Daily Exhaust Emissions (pounds per day)			
	ROG	NO_x	PM_{10}	$PM_{2.5}$
Demolition	9.0	70.8	3.8	3.5
Site preparation	10.2	81.7	4.3	4.0
Grading	12.1	99.2	5.0	4.7
Building construction	5.8	39.6	3.2	2.5
Paving	6.4	34.0	3.3	2.9
Architectural coatings	66.7	3.0	0.4	0.3
Overlapping phases: building construction, paving, coatings	78.9	76.6	6.9	5.7
Maximum daily emissions	**78.9**	**99.2**	**6.9**	**5.7**
Threshold of Significance	54	54	80	54
Significant Impact?	Yes	Yes	No	No

Notes:
Emissions represent a construction fleet during the year 2013 as estimated by CalEEMod. Emissions in later years would decrease as construction equipment technology increases and as older equipment is retired and replaced with newer, cleaner equipment. Onsite fugitive dust emissions are excluded from this table, since the thresholds are only for exhaust emissions. Onsite fugitive dust emissions are discussed in Impact AIR-2.
Abbreviations:
ROG = reactive organic gases PM_{10} = particulate matter 10 microns and less in diameter
NO_x = nitrogen oxides $PM_{2.5}$ = particulate matter 2.5 microns and less in diameter.
Source of emissions: Michael Brandman Associates 2012 (Appendix B).
Source of thresholds: BAAQMD 1999 and BAAQMD 2011.

Table 3.2-8: Construction Daily Emissions (2017)

Source	Daily Exhaust Emissions (pounds per day)			
	ROG	NO_x	PM_{10}	$PM_{2.5}$
Site preparation	8.1	61.5	2.8	2.8
Grading	9.6	71.0	3.1	3.1

Table 3.2-8 (cont.): Construction Daily Emissions (2017)

Source	Daily Exhaust Emissions (pounds per day)			
	ROG	NO_x	PM_{10}	$PM_{2.5}$
Building construction	4.1	27.5	1.5	1.5
Paving	5.1	26.5	2.2	2.2
Architectural coatings	66.5	2.2	0.2	0.2
Overlapping phases: building construction, paving, coatings	75.7	56.2	3.9	3.9
Maximum daily emissions	**75.7**	**61.5**	**3.9**	**3.9**
Threshold of Significance	54	54	80	54
Significant Impact?	Yes	Yes	No	No

Notes:
Emissions represent a construction fleet during the year 2017 as estimated by CalEEMod. Emissions in later years would decrease as construction equipment technology increases and as older equipment is retired and replaced with newer, cleaner equipment. Onsite fugitive dust emissions are excluded from this table, since the thresholds are only for exhaust emissions. Onsite fugitive dust emissions are discussed in Impact AIR-2.
Abbreviations:
ROG = reactive organic gases PM_{10} = particulate matter 10 microns and less in diameter
NO_x = nitrogen oxides $PM_{2.5}$ = particulate matter 2.5 microns and less in diameter.
Source of emissions: Michael Brandman Associates 2012 (Appendix B).
Source of thresholds: BAAQMD 1999 and BAAQMD 2011.

Operation Emissions

The trip generation is anticipated to differ, based on peak and off-peak seasons. The maximum daily emissions during the peak season day are shown in Table 3.2-9. Average annual emissions are shown in Table 3.2-10. The emissions take into account reductions from project design features, such as a Transit/North Parking Center, pedestrian access, mixed use, and increased density.

As shown in the tables, daily and annual emissions of ROG and NO_x are over the significance thresholds. Therefore, emissions are potentially significant. The daily emissions of only the fairgrounds would not exceed the daily operational thresholds. However, the combined daily emissions of both the fairgrounds and the entertainment and open space area would exceed the thresholds.

Table 3.2-9: Peak Daily Operational Emissions

Source	Daily Exhaust Emissions (pounds per day)			
	ROG	NO_x	PM_{10}	$PM_{2.5}$
Area	14	<1	<1	<1
Hearth	78	1	12	12
Natural Gas	1	7	1	1
Mobile: Entertainment Area	114	181	9	9
Mobile: Fairgrounds	26	45	2	2

Table 3.2-9 (cont.): Peak Daily Operational Emissions

Source	Daily Exhaust Emissions (pounds per day)			
	ROG	NO_x	PM_{10}	$PM_{2.5}$
Total Maximum Daily Emissions	**233**	**234**	**24**	**24**
Threshold of Significance	54	54	80	54
Significant Impact?	Yes	Yes	No	No

Notes:
Area sources include consumer products, landscape, and architectural coatings. Fugitive dust from paved roads is not included.
Abbreviations:
ROG = reactive organic gases PM_{10} = particulate matter 10 microns and less in diameter
NO_x = nitrogen oxides $PM_{2.5}$ = particulate matter 2.5 microns and less in diameter
< 1 = less than one
Source: Michael Brandman Associates 2012 (CalEEMod Output for year 2020, mitigated mobile emissions)
Source of thresholds: BAAQMD 1999 and BAAQMD 2011.

Table 3.2-10: Annual Operational Emissions

Source	Annual Exhaust Emissions (tons per year)			
	ROG	NO_x	PM_{10}	$PM_{2.5}$
Area	2.6	0.0	0.0	0.0
Hearth	2.9	0.0	0.4	0.4
Natural Gas	0.1	0.3	0.1	0.1
Mobile: Entertainment Area and Fairgrounds	14.5	25.0	1.3	1.2
Total Annual	**20.1**	**25.3**	**1.8**	**1.7**
Threshold of Significance	10	10	15	10
Significant Impact?	Yes	Yes	No	No

Notes:
Area sources include consumer products, landscape, and architectural coatings. Fugitive dust from unpaved roads is not included.
Abbreviations:
ROG = reactive organic gases PM_{10} = particulate matter 10 microns and less in diameter
NO_x= nitrogen oxides $PM_{2.5}$ = particulate matter 2.5 microns and less in diameter
Source of emissions: Michael Brandman Associates 2012 (CalEEMod Output for year 2020, mitigated mobile emissions)
Source of thresholds: BAAQMD 2011.

Air Quality Plan

The geographic scope for cumulative criteria pollution from air quality impacts is the Air Basin, because that is the area in which the air pollutants generated by the sources within the basin circulate and are often trapped. The District is required to prepare and maintain an AQP and a State Implementation Plan to document the strategies and measures to be undertaken to reach attainment of ambient air quality standards. While the District does not have direct authority over land use

decisions, it is recognized that changes in land use and circulation planning are necessary to maintain clean air. The District evaluated the entire Basin when it developed the 2010 Clean Air Plan.

According to the analysis contained in Impact AIR-1, the project is not consistent with the 2010 Clean Air Plan and State Implementation Plan without mitigation. Therefore, the project presents a significant impact according to this criterion.

Cumulative Health Impacts

The Basin is in nonattainment for ozone, PM_{10}, and $PM_{2.5}$, which means that the background levels of those pollutants are at times higher than the ambient air quality standards. The air quality standards were set to protect public health, including the health of sensitive individuals (such as the elderly, children, and the sick). Therefore, when the concentration of those pollutants exceeds the standard, it is likely that some sensitive individuals in the population would experience health effects that were described in Table 3.2-3. However, the health effects are a factor of the dose-response curve. Concentration of the pollutant in the air (dose), the length of time exposed, and the response of the individual are factors involved in the severity and nature of health impacts. If a significant health impact results from project emissions, it does not mean that 100 percent of the population would experience health effects.

The analysis of construction and operation emissions indicates that without mitigation, the project would exceed the significance thresholds for ROG and NO_x (ozone precursors). Because ozone is a secondary pollutant (it is not emitted directly but formed by chemical reactions in the air), it can be formed miles downwind of the project site. Project emissions of ROG and NO_x may contribute to the background concentration of ozone and cumulatively cause health effects. Health impacts may or may not include the following:

(a) Pulmonary function decrements and localized lung edema in humans and animals

(b) Risk to public health implied by alterations in pulmonary morphology and host defense in animals

(c) Increased mortality risk

(d) Risk to public health implied by altered connective tissue metabolism and altered pulmonary morphology in animals after long-term exposures and pulmonary function decrements in chronically exposed humans

Level of Significance Prior to Mitigation

Potentially significant impact.

Mitigation Measures

Entertainment Area and Fairgrounds

MM AIR-3a During construction, the following measures shall be implemented:

a) Use paints with a volatile organic compound (VOC) content of 100 grams per liter or lower for both interior and exterior surfaces, if painted.
b) Recycle leftover paint. Take any leftover paint to a household hazardous waste center; do not mix leftover water-based and oil-based paints.
c) Keep lids closed on all paint containers when not in use to prevent VOC emissions and excessive odors.
d) For water-based paints, clean up with water only. Whenever possible, do not rinse the clean-up water down the drain or pour it directly into the ground or the storm drain. Set aside the can of cleanup water and take it to the hazardous waste center (refer to www.cleanup.org).
e) Use compliant, low-VOC cleaning solvents to clean paint application equipment.
f) Keep all paint and solvent laden rags in sealed containers to prevent VOC emissions.

MM AIR-3b When more than five pieces of off-road diesel equipment with a horsepower greater than 70 per piece of equipment are operating on one day, equipment greater than 70 horsepower shall meet or exceed United States Environmental Protection Agency Tier 3 off-road emissions standards.

MM AIR-3c Paving of the onsite roads shall occur prior to building construction.

MM AIR-3d Any residential units on the project site shall not include wood-burning appliances. Natural gas fireplaces are allowed.

Level of Significance After Mitigation

Construction

Less than significant impact.

Table 3.2-11 displays the mitigated construction emissions. Mitigation Measure AIR-3a reduces the ROG emissions from paint by assuming 100 grams per liter of paint; the emissions reductions are estimated by CalEEMod. Mitigation Measure AIR-3b is estimated in CalEEMod by changing the equipment greater than the specified horsepower to Tier 3.

Table 3.2-11: Construction Daily Emissions (Mitigated, 2013)

Source	Daily Exhaust Emissions (pounds per day)			
	ROG	NO_x	PM_{10}	$PM_{2.5}$
Demolition	5.5	34.9	2.5	2.5
Site preparation	6.2	39.5	2.6	2.6
Grading	8.1	52.0	3.5	3.5

Table 3.2-11 (cont.): Construction Daily Emissions (Mitigated, 2013)

Source	Daily Exhaust Emissions (pounds per day)			
	ROG	NO_x	PM_{10}	$PM_{2.5}$
Building construction	4.2	25.5	2.0	2.0
Paving	3.4	15.6	1.6	1.6
Architectural coatings	26.8	1.5	0.2	0.2
Overlapping phases: building construction, paving, coatings	34.4	42.6	3.8	3.8
Maximum daily emissions	**34.4**	**52.0**	**3.8**	**3.8**
Threshold of Significance	54	54	80	54
Significant Impact?	No	No	No	No

Notes:
Onsite fugitive dust emissions are excluded from this table, since the thresholds are only for exhaust emissions. Onsite fugitive dust emissions are discussed in Impact AIR-2.
Abbreviations:
ROG = reactive organic gases PM_{10} = particulate matter 10 microns and less in diameter
NO_x = nitrogen oxides $PM_{2.5}$ = particulate matter 2.5 microns and less in diameter.
Source of emissions: Michael Brandman Associates 2012 (Appendix B).
Source of thresholds: BAAQMD 1999 and BAAQMD 2011.

Operation

Significant and unavoidable impact. As shown in Table 3.2-12 and Table 3.2-13, operational emissions are over the thresholds even after application Mitigation Measure AIR-3d. Therefore, the project could cumulatively contribute to ozone concentrations, thereby potentially contributing to health effects in the Basin.

Table 3.2-12: Peak Daily Operational Emissions (Mitigated)

Source	Daily Exhaust Emissions (pounds per day)			
	ROG	NO_x	PM_{10}	$PM_{2.5}$
Area	14	<1	<1	<1
Hearth	<1	<1	<1	<1
Natural Gas	1	7	1	1
Mobile: Entertainment Area	114	181	9	9
Mobile: Fairgrounds	26	45	2	2
Total Maximum Daily Emissions	**155**	**233**	**12**	**12**
Threshold of Significance	54	54	80	54
Significant Impact?	Yes	Yes	No	No

Table 3.2-12 (cont.): Peak Daily Operational Emissions (Mitigated)

Source	Daily Exhaust Emissions (pounds per day)			
	ROG	NO_x	PM_{10}	$PM_{2.5}$
Notes: Area sources include consumer products, landscape, and architectural coatings. Fugitive dust from paved roads is not included. Abbreviations: ROG = reactive organic gases PM_{10} = particulate matter 10 microns and less in diameter NO_x = nitrogen oxides $PM_{2.5}$ = particulate matter 2.5 microns and less in diameter <1 = less than one Source: Michael Brandman Associates 2012 (CalEEMod Output for year 2020, mitigated mobile emissions) Source of thresholds: BAAQMD 1999 and BAAQMD 2011.				

Table 3.2-13: Annual Operational Emissions (Mitigated)

Source	Annual Exhaust Emissions (tons per year)			
	ROG	NO_x	PM_{10}	$PM_{2.5}$
Area	2.6	0.0	0.0	0.0
Hearth	0.0	0.0	0.0	0.0
Natural Gas	0.1	0.3	0.1	0.1
Mobile: Entertainment Area and Fairgrounds	14.5	25.0	1.3	1.2
Total Annual	**17.2**	**25.3**	**1.4**	**1.3**
Threshold of Significance	10	10	15	10
Significant Impact?	Yes	Yes	No	No
Notes: Area sources include consumer products, landscape, and architectural coatings. Fugitive dust from unpaved roads is not included. Abbreviations: ROG = reactive organic gases PM_{10} = particulate matter 10 microns and less in diameter NO_x= nitrogen oxides $PM_{2.5}$ = particulate matter 2.5 microns and less in diameter Source of emissions: Michael Brandman Associates 2012 (CalEEMod Output for year 2020, mitigated mobile emissions) Source of thresholds: BAAQMD 2011.				

Sensitive Receptors

Impact AIR-4: The project would not expose sensitive receptors to substantial pollutant concentrations.

Impact Analysis

This discussion addresses whether the project would expose sensitive receptors to substantial pollutant concentrations of carbon monoxide, diesel particulate matter, or other toxic air contaminants of concern. A health risk is the probability that exposure to a given toxic air contaminant under a given set of conditions will result in an adverse health effect. The health risk is affected by several factors, such as the amount, toxicity, and concentration of the contaminant; meteorological conditions; distance from the emission sources to people; the distance between the emission sources;

the age, health, and lifestyle of the people living or working at a location; and the length of exposure to the toxic air contaminant.

Sensitive Receptors

Certain populations are particularly sensitive to the health impacts of air pollution, such as children, the elderly, and persons with preexisting respiratory or cardiovascular illness. The District defines typical sensitive receptors as residences, schools, playgrounds, childcare centers, athletic facilities, hospitals, long-term health care facilities, rehabilitation centers, convalescent centers, and retirement homes. The nearest sensitive receptors to the project are residences located approximately 60 feet (18 meters) south, 215 feet (65 meters) southwest, and 200 feet (60 meters) north of the project. In addition, the following sensitive receptors have been identified within one mile of the project site (all distances are approximate):

Schools

- New Horizons Montessori School (900 Fairgrounds Drive), adjacent to project
- Head Start-Child Start (0.5 mile)
- Widenmann Elementary School (0.9 mile)
- Everest School (1.0 mile)
- UHS Vallejo Schools
- Loma Vista Elementary School (1.0 mile)
- Olympic School
- Solano Middle School (1.0 mile)
- Vallejo KinderCare (0.4 mile)
- North Hills Christian School (1.0 mile)
- Highland Elementary School (1.1 miles)
- Cooper (Johnston) Elementary School (0.6 mile)
- Peoples High School (1.0 mile)

Parks and Recreation Areas

- Dan Foley Park (0.25 mile)
- Six Flags Discovery Park (0.1 mile)
- North Vallejo Park (0.5 mile)
- Borges Ranch Park (0.7 mile)
- Crest Ranch Park (0.3 mile)
- Hanns Park (0.6 mile)
- Fairmont Park (0.8 mile)
- Richardson Park (0.8 mile)

Hospital

- Sutter Solano Medical Center (0.5 mile)

Carbon Monoxide

The screening and analysis for the project's potential to contribute to a localized exceedance of state or federal CO standards is contained in Impact AIR-2, above. As shown, the project would not significantly contribute to a local violation of the CO standards after implementation of Mitigation Measures TRANS-1 and TRANS-9. Ambient air quality standards are set to protect the health of sensitive individuals. Therefore, the project would not significantly contribute to exposure of sensitive receptors to unacceptable levels of CO.

Local Sources of Air Pollution

State Route 37 (SR-37) and Interstate 80 (I-80) bound the north and eastern boundary of the project. According to California Department of Transportation traffic volume data, SR-37 had up to 48,000 average annual daily trips west of the intersection with I-80 in 2009. Caltrans estimated 133,000 average annual daily trips occurred on I-80 south of the intersection with SR-37 (Caltrans 2011). Of the trips on SR-37 and I-80, Caltrans counted 2,813 and 6,876 truck trips in 2009, respectively (Caltrans 2010). Both SR-37 and I-80 near the project site meet the District's definition of a 'significant traffic volume roadway,' which includes freeways or arterial roadway with greater than 10,000 vehicles per day.

In addition, multiple ARB-permitted stationary source sites are located near the project boundary, including the following:

- Marine World Chevron (460 feet from project boundary)
- T&J Cleaners (900 feet from project boundary; more than 1,000 feet from project residences)
- Target (590 feet from project boundary; more than 1,000 feet from project residences)

Other local emissions include those associated with Fairground Drive, Six Flags Discovery Kingdom, nearby commercial Target Center, and residential land uses including emissions from the combustion of natural gas in heating systems, landscaping equipment emissions, and use of consumer products that release hydrocarbon emissions.

Toxic Air Contaminants

The District has defined the following project-level health risk thresholds:

- Maximum Incremental Cancer Risk: greater than 10 in 1 million at the nearest sensitive receptor or offsite worker; and
- Non-cancer Hazard Index (project increment) greater than 1.0.
- Ambient $PM_{2.5}$ increase of greater than 0.3 $\mu g/m^3$ annual average.

These thresholds apply to both the construction-generated and operational-related emissions. The quantitative thresholds require the preparation of a health risk assessment to quantitatively assess

potential significance. However, the District does not recommend health risk assessments be prepared for all projects. The District recommends that health risk assessments be prepared for those projects that present the potential for adverse toxic air contaminant impacts by placing sensitive receptors in proximity to sources of toxic air contaminants. The District has provided guidance for when quantitative health risk assessments should be prepared, and has developed screening guidance to use to determine whether the risk impacts from construction are estimated to be less than significant.

Two scenarios have the potential for exposing sensitive receptors to toxic air contaminants. The first is when a project includes a new or modified source of toxic air contaminants and would be located near an existing or proposed sensitive receptor. The second scenario involves a residential or other sensitive receptor development locating near an existing or planned source of toxic air contaminants. The proposed project would contain a residential component, which is considered a sensitive receptor. Therefore, further analysis is warranted to determine if the residences would be exposed to significant toxic air contaminant impacts.

Operation: Risk to Offsite Sensitive Receptors

ARB's Air Quality and Land Use Handbook (Land Use Handbook) was used to determine if the project would be a toxic air contaminant "source" site. The Land Use Handbook contains recommendations for locating sensitive receptors in relation to known sources of toxic air contaminants in order to minimize potential health impacts to sensitive receptors (ARB 2005). The Land Use Handbook recommends avoiding siting new receptors within 1,000 feet of a distribution center that accommodates more than 100 trucks per day. The project is not a distribution center; however, project would have minor emissions from diesel-fueled delivery truck trips. As discussed in Appendix B, the project is estimated to generate 28 daily diesel-fueled truck trips for the medium-heavy and heavy-heavy duty truck ranges on average over the year. Therefore, the project would generate less than the ARB's guidance definition of a toxic air contaminant source.

Other potential sources of toxic air contaminants could be from mobile food vendors that idle engines during fair activities or diesel generators running to generate electricity. These sources of air pollutants can be mitigated and reduced.

Operation: Risk to Onsite Residences

The project would construct up to 50 multi-family residential units somewhere within the Entertainment Mixed Use area. The ARB Land Use Handbook contains recommendations for distances between sensitive receptors and certain land uses, as follows:

- Freeways. ARB recommends avoiding new sensitive land uses within 500 feet of a freeway, Epidemiological studies indicate that the distance from the roadway and truck traffic densities were key factors in the correlation of health effects, particularly in children. The Entertainment Mixed Use area as noted in Exhibit 2-6 in the Project Description ranges from 400 feet to 1,500

feet from SR-37 and 1,300 feet to 2,400 feet from I-80. Therefore, any residences located 400 feet from the freeway could be exposed to substantial pollutant concentrations.

- Heavily traveled roads. ARB recommends avoiding new sensitive land uses within 500 feet from urban roads with 100,000 vehicles per day or rural roads with 50,000 vehicles per day. On a maximum day, the project could have up to 20,930 vehicles per day and an average of 14,061 vehicles per day. According to the California Environmental Health Tracking Program (2011), Fairgrounds Drive currently accommodates approximately 21,000 vehicles per day, which takes into account traffic from the existing uses that would be replaced with the project traffic. Therefore, traffic is less than the screening level and is less than significant.
- Distribution centers. ARB also recommends avoiding siting new sensitive land uses within 1,000 feet of a distribution center. There are no distribution centers within 1,000 feet of the project. Impacts are less than significant according to this criterion.
- Fueling stations. ARB recommends avoiding new sensitive land uses within 300 feet of a large fueling station (a facility with a throughput of 3.6 million gallons per year or greater). A 50-foot separation is recommended for typical gas dispensing facilities. There is a fueling station located more than 500 feet from the potential residential locations. Impacts are less than significant according to this criterion.
- Dry cleaning operations. ARB recommends avoiding siting new sensitive land uses within 300 feet of any dry cleaning operation that uses perchloroethylene. For operations with two or more machines, ARB recommends a buffer of 500 feet. For operations with three or more machines, ARB recommends consultation with the local air district. There are dry cleaning operations located more than 1,000 feet east of the potential onsite residential locations. Therefore, according to this criterion, impacts are less than significant.

Bay Area Air Quality Management District Screening Cancer Risk

To assess potential cancer risk and $PM_{2.5}$ localized exposure, the District had prepared a screening analysis process. Although the process is not currently recommended by the District (see Methodology above), it provides an additional analysis tool. Potential sources of toxic air contaminants (stationary sources, freeways, major roadways, ports, rail yards/lines) within 1,000 feet of the proposed sensitive receptor locations are shown in Table 3.2-14.

Table 3.2-14: Air Pollutant Sources within 1,000 feet from Entertainment Mixed Use Area

Source	Distance to Project Sensitive Receptor (feet)	Cancer Risk Screening Value (in one million)	$PM_{2.5}$	Hazard Index
Highway 37	400 (south)	24.9	0.14	0.020
	500 (south)	20.6	0.12	0.017
	700 (south)	14.1	0.08	0.011
Interstate 80	1000 (west)	4.4	0.03	0.005
Marine World Chevron: 10 Sage Street	500 (south)	0.7*	NA	0.006
Fairgrounds Drive (existing + project annual average daily traffic ~ 42,000)	50; north-south directional roadway	5.5	0.24	NA

Notes:
NA = not available
* The fueling station cancer risk of 14.4 at the source was scaled to the distance at which the closest sensitive receptor could be, which is 500 feet. The distance adjustment multiplier is 0.046, which reduces the cancer risk. The source for the scaling factor is located in Appendix B.
Source of cancer risk, $PM_{2.5}$, and hazard index: Bay Area Air Quality Management District 2012.
Source of thresholds: Bay Area Air Quality Management District 2011.

Table 3.2-15 displays the screening health risk values. As shown in the table, the cumulative risks are less than the significance thresholds. However, the maximum cancer risk of 24.9 from SR-37 is above the cancer risk screening threshold without mitigation.

Table 3.2-15: Screening Health Risk Values

Item	Cancer Risk Screening Value (in one million)	$PM_{2.5}$	Hazard Index
Maximum Individual	**24.9**	**0.14**	**0.020**
Project Maximum Threshold	10	0.3	1.0
Significant Project Impact?	Yes	No	No
Cumulative Total	**35.5**	**0.41**	**0.031**
Cumulative Threshold	100	0.8	10.0
Significant Cumulative Impact?	No	No	No

Source of risks: Table 3.2-12.
Source of thresholds: Bay Area Air Quality Management District 2011.

There are several ways to reduce the cancer risk for the proposed residences. One method is to increase the distance from the residences to the freeway. As noted in Table 3.2-14, increasing the distance to at least 700 feet would reduce the cancer risk down to 14.1, which is still over the 10 in one million threshold. Another strategy to reduce the cancer risk is to integrate indoor air filters.

Table 3.2-16 displays an indoor air filter comparison. As shown in the table, the greater the Minimum Efficiency Reporting Value (MERV) filter, the more particles are removed. Mitigation is recommended to reduce particulate matter impacts in the residential units. Integration of MERV 13 filters would reduce particles by at least 50 percent, bringing the individual cancer risk to below 10 in one million.

Table 3.2-16: Indoor Air Filter Comparison

MERV Filter	Particle Size Removal Efficiency, percent in particle size range, micrometers		
	0.3 to 1	1 to 3	3 to 10
14	75-85	> 90	> 90
13	<75	> 80	> 90
12	—	> 80	> 90
11	—	65-80	> 85

Notes:
MERV = minimum efficiency reporting value
> = greater than; < = less than
Source: U.S. Environmental Protection Agency 2009c

Construction

In 2010, the District released draft screening tables for air toxics evaluation during construction (BAAQMD 2010), as interim guidance on estimating construction-related health risks. The screening table in the guidance contains residential, commercial, and industrial project scenarios, listing the scenario by acreage, as well as number of dwelling units or square feet. However, the District has since removed that construction screening guidance from its website and indicated that the guidance is in the process of being updated. The District has not provided any additional information regarding the guidance and whether it should continue to be used. The District's 1999 Guidelines do not specifically address construction toxic air pollutant exposure.

As described in Section 2, Project Description, the project would be constructed on a 149.1-acre portion of the project site in multiple phases. It is unlikely that the project would be fully constructed by the year 2020; however, the air quality analysis of this Draft EIR assumes complete buildout of all phases by the year 2020 to provide a worst-case scenario. It is a worst-case scenario, since the emissions in earlier years for the construction equipment and the motor vehicles would be greater, because the emissions models assume that there are more polluting and older equipment/vehicles in earlier years. Assuming construction in a later year would result in fewer emissions because there would be newer and cleaner equipment and vehicles that would be used on average. The construction analysis assumes that at any one time, 34 acres would be constructed. The nearest existing sensitive receptor is approximately 60 feet from southern edge of the project boundary. The exact location of the onsite project sensitive receptors is unknown at this time. If the residential units are operational

during other phases of construction, the residential units could be adjacent to construction impacts. Construction equipment emits diesel particulate matter, which is a carcinogen.

Determination of risk from diesel particulate matter is considered over a 70-year exposure time. Guidance published by the California Air Pollution Control Officers Association (2009), Health Risk Assessments for Proposed Land Use Projects, does not include guidance for health risks from construction projects addressed in CEQA; risks near construction projects are expected to be included later when the toxic emissions from construction activities are better understood. Therefore, impacts are less than significant.

Level of Significance Prior to Mitigation

Potentially significant impact.

Mitigation Measures

Implement Mitigation Measures AIR-3b and AIR-3c and the following:

Entertainment Area

MM AIR-4a Any proposed residences shall be located at least 700 feet from the freeways. The residential units shall install high-efficiency Minimum Efficiency Reporting Value (MERV) filters of MERV 13 or better in the intake of residential ventilation systems. Heating, air conditioning and ventilation systems shall be installed with a fan unit power designed to force air through the filter. The owner/property manager shall maintain and replace filters in accordance with the manufacture's recommendations.

Fairgrounds

MM AIR-4b There shall no idling allowed on the site. Emergency generators are allowed on the site. Electrical hookups shall be available for vendors to avoid the use of onsite diesel-powered generators.

Level of Significance After Mitigation

Less than significant impact.

Odors

Impact AIR-5:	**The project would not create objectionable odors affecting a substantial number of people.**

Impact Analysis

The District does not have a recommended odor threshold for construction activities. However, District recommends screening criteria based on distance between types of sources known to generate odor and the receptor. For projects within the screening distances, the District has the following threshold for project operations:

> An odor source with five (5) or more confirmed complaints per year averaged over three years is considered to have a significant impact on receptors within the screening distance shown in Table 3-3 [of the District's guidance].

Two circumstances have the potential to cause odor impacts:

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

The project would contain residences, which are considered a location of sensitive receptors. In addition, as a recreational facility, the project would attract a substantial number of people who could be exposed to odor, if odor were present. However, the project is not a typical source of objectionable odors. Typical sources of objectionable odors include agricultural operations (dairies, feedlots, etc.), landfills, wastewater treatment plants, refineries, and other types of industrial land uses.

The project may include a restaurants and/or food vendors. Although the District does not list restaurants as a typical source of odor in their screening guidance or in the significance determination guidance, the District's Guidance document does discuss potential mitigation measures to reduce the potential for odor impacts from food services. Restaurants can generate odor from cooking processes and waste disposal. The future restaurant tenants, if any, are currently unknown, as are the cooking methods, putrescible waste generation and disposal methods.

In addition, there are no known sources of odor within the District's screening distance of the project site. Therefore, the project would not create objectionable odors affecting a substantial number of people.

Heavy-duty construction equipment used for project construction would emit odors. 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. Therefore, the project would not create objectionable odors affecting a substantial number of people.

Level of Significance Prior to Mitigation
Less than significant impact.

Mitigation Measures
No mitigation is necessary.

Level of Significance After Mitigation
Less than significant impact.

3.2.7 - Residual Significant Impacts

Significant and unavoidable impacts.