C. AIR QUALITY

This section has been prepared using methods and assumptions recommended in the air quality impact assessment guidelines of the Bay Area Air Quality Management District (BAAQMD).[1] In keeping with these guidelines, this chapter describes existing air quality, and the potential impacts of the proposed project on local carbon monoxide levels and regional air pollution. Mitigation measures to reduce or eliminate significant air quality impacts are identified, where appropriate.

1. Setting

The following discussion provides an overview of existing air quality conditions in the region and the Menlo Park area. Ambient standards and the regulatory framework relating to air quality are summarized. Climate, air quality conditions, and typical air pollutant types are also described below.

a. Existing Climate and Air Quality. Following is a discussion of the regional air quality, local climate, and air quality in the Menlo Park area.

(1) Local Climate and Air Quality. The project site is located in the San Francisco Bay Area Air Basin (Basin) which comprises all of Alameda, Contra Costa, Marin, Napa, San Francisco, San Mateo, and Santa Clara counties, the southern portion of Sonoma County, and the southwestern portion of Solano County. Air quality in this area is determined by such natural factors as topography, meteorology, and climate, in addition to the presence of existing air pollution sources. Air quality is the balance of the natural dispersal capacity of the atmosphere and emissions of air pollutants from human uses of the environment.

Menlo Park is located in the southeastern portion of the Peninsula subregion, which extends from northwest of San Jose to the Golden Gate. The Santa Cruz Mountains run up the center of the Peninsula with elevations exceeding 2,000 feet at the southern end, decreasing to 500 feet in South San Francisco. The orientation of the Santa Cruz Mountains results in variation in summertime maximum temperatures in different parts of the Peninsula. The mean maximum summer temperatures (in Fahrenheit) in Menlo Park are in the low 80's. Mean minimum temperatures during the winter months are in the high 30's to low 40's on the eastern side of the Peninsula.

Annual average wind speeds range from 5 to 10 mph throughout the Peninsula. Winds on the eastern side of the Peninsula are often high in certain areas, such as near the San Bruno Gap and the Crystal Springs Gap. The prevailing winds along the Peninsula's coast are from the west, although individual sites can show significant differences. On the east side of the mountains winds are generally from the west, although wind patterns in this area are often influenced greatly by local topographic features.

Two primary meteorological factors affect air quality in Menlo Park: wind and temperature. Winds affect the direction of transport of any air pollution emissions and the volume of air into which pollution is mixed in a given period of time. While winds govern horizontal mixing processes, temperature inversions determine the vertical mixing depth of air pollutants.

(2) Existing Air Quality. Air quality conditions in the San Francisco Bay Area have improved significantly since the BAAQMD was created in 1955. Ambient concentrations of air

[1] Bay Area Air Quality Management District, 2011. *BAAQMD CEQA Air Quality Guidelines.* May.

pollutants and the number of days during which the region exceeds air quality standards have fallen dramatically. Neither State nor national ambient air quality standards for the following chemicals have been violated in recent decades: nitrogen dioxide, sulfur dioxide, sulfates, lead, hydrogen sulfide, and vinyl chloride. Those exceedances of air quality standards that do occur primarily happen during meteorological conditions conducive to high pollution levels, such as cold, windless winter nights or hot, sunny summer afternoons.

Ozone levels, measured by peak concentrations and the number of days over the State 1-hour standard, have declined substantially as a result of aggressive programs by air quality agencies. The reduction of peak concentrations represents progress in improving public health; however, the Bay Area still exceeds the State 1-hour and 8-hour ozone standards, and the coarse particulate matter (PM_{10}) and fine particulate matter ($PM_{2.5}$) standards.

No exceedances of the State or federal carbon monoxide (CO) standards have been recorded at any of the region's monitoring stations since 1991. The Bay Area is currently considered a maintenance area for State and federal CO standards.

(3) Monitoring Data. The BAAQMD operates the regional air quality monitoring network that regularly measures the concentrations of the five major criteria air pollutants.

Pollutant monitoring results for the years 2008 to 2010 at the Redwood City ambient air quality monitoring station (the closest station to the project site) indicate that air quality in the vicinity of the project site is generally good. Table IV.C-1, below, summarizes the last 3 years of published data from this monitoring station.

Table IV.C-1: Redwood City Air Quality Monitoring Station Data

Pollutant	Standard	2008	2009	2010
Carbon Monoxide (CO)				
Maximum 1-hour concentration (ppm)		4.3	ND	ND
Number of days exceeded:	State: > 20 ppm	0	0	0
	Federal: > 35 ppm	0	0	0
Maximum 8-hour concentration (ppm)		1.86	1.76	1.72
Number of days exceeded:	State: > 9 ppm	0	0	0
	Federal: > 9 ppm	0	0	0
Ozone (O_3)				
Maximum 1-hour concentration (ppm)		0.082	0.087	0.113
Number of days exceeded:	State: > 0.09 ppm	0	0	2
Maximum 8-hour concentration (ppm)		0.069	0.063	0.077
Number of days exceeded:	State: > 0.07 ppm	0	0	1
	Federal: > 0.08 ppm	0	0	1
Coarse Particulates (PM_{10})*				
Maximum 24-hour concentration (μg/m^3)		55.0	41.1	44.2
Number of days exceeded:	State: > 50 μg/m^3	1	0	0
	Federal: > 150 μg/m^3	0	0	0
Annual arithmetic average concentration (μg/m^3)		23.4	20.3	19.5
Exceeded for the year:	State: > 20 μg/m^3	Yes	Yes	Yes
	Federal: > 50 μg/m^3	No	No	No

Table IV.C-1 *Continued*

Pollutant	**Standard**	**2008**	**2009**	**2010**
Fine Particulates ($PM_{2.5}$)				
Maximum 24-hour concentration ($\mu g/m^3$)		27.9	31.7	36.5
Number of days exceeded:	Federal: > 35 $\mu g/m^3$	0	0	1
Annual arithmetic average concentration ($\mu g/m^3$)		9.0	8.7	8.7
Exceeded for the year:	State: > 12 $\mu g/m^3$	No	No	No
	Federal: > 15 $\mu g/m^3$	No	No	No
Nitrogen Dioxide (NO_2)				
Maximum 1-hour concentration (ppm)		0.069	0.056	0.059
Number of days exceeded:	State: > 0.25 ppm	0	0	0
Annual arithmetic average concentration (ppm)		0.014	0.012	0.012
Exceeded for the year:	Federal: > 0.053 ppm	No	No	No
Sulfur Dioxide (SO_2)*				
Maximum 1-hour concentration (ppm)		ND	ND	ND
Number of days exceeded:	State: > 0.25 ppm	ND	ND	ND
Maximum 3-hour concentration (ppm)		ND	ND	ND
Number of days exceeded:	Federal: > 0.5 ppm	ND	ND	ND
Maximum 24-hour concentration (ppm)		ND	0.001	0.002
Number of days exceeded:	State: > 0.04 ppm	ND	0	0
	Federal: > 0.14 ppm	ND	0	0
Annual arithmetic average concentration (ppm)		ND	ND	ND
Exceeded for the year:		ND	ND	ND

Notes:
*Data from the San Jose Air Quality Monitoring Station
ppm = parts per million
$\mu g/m^3$ = micrograms per cubic meter
ND = No data. There were insufficient (or no) data to determine the value.

Source: California Air Resources Board (ARB) and U.S. Environmental Protection Agency (EPA) websites, 2011.

b. Air Quality Standards, Regulatory Framework and Attainment Status. This section includes a discussion of applicable air quality regulations and standards.

(1) National and State Ambient Air Quality Standards. Both the State and federal governments have established health-based Ambient Air Quality Standards for six air pollutants: CO, ozone (O_3), nitrogen dioxide (NO_2), sulfur dioxide (SO_2), lead (Pb), and suspended particulate matter (PM). These are the most prevalent air pollutants and have extensive documented health effects, and are commonly referred to as “criteria air pollutants.” In addition, the State has set standards for sulfates, hydrogen sulfide, vinyl chloride and visibility-reducing particles. These standards are designed to protect the health and welfare of the populace with a reasonable margin of safety.

California Ambient Air Quality Standards (CAAQS) and National Ambient Air Quality Standards (NAAQS) for the criteria air pollutants are listed in Table IV.C-2.

Table IV.C-2: State and Federal Ambient Air Quality Standards

Pollutant	Averaging Time	California Standards [a]		Federal Standards [b]		
		Concentration [c]	Method [d]	Primary [c,e,i]	Secondary [c,f]	Method [g]
Ozone (O_3)	1-Hour	0.09 ppm (180 µg/m³)	Ultraviolet Photometry	No Federal Standard	Same as Primary Standard	Ultraviolet Photometry
	8-Hour	0.07 ppm (137 µg/m³)		0.075 ppm (147 µg/m³)		
Respirable Particulate Matter (PM_{10})	24-Hour	50 µg/m³	Gravimetric or Beta Attenuation	150 µg/m³	Same as Primary Standard	Inertial Separation and Gravimetric Analysis
	Annual Arithmetic Mean	20 µg/m³		–		
Fine Particulate Matter ($PM_{2.5}$)	24-Hour	No Separate State Standard		35 µg/m³	Same as Primary Standard	Inertial Separation and Gravimetric Analysis
	Annual Arithmetic Mean	12 µg/m³	Gravimetric or Beta Attenuation	15 µg/m³		
Carbon Monoxide (CO)	8-Hour	9.0 ppm (10 mg/m³)	Non-Dispersive Infrared Photometry (NDIR)	9 ppm (10 mg/m³)	None	Non-Dispersive Infrared Photometry (NDIR)
	1-Hour	20 ppm (23 mg/m³)		35 ppm (40 mg/m³)		
	8-Hour (Lake Tahoe)	6 ppm (7 mg/m³)		–		
Nitrogen Dioxide (NO_2)	Annual Arithmetic Mean	0.03 ppm (57 µg/m³)	Gas Phase Chemiluminescence	0.053 ppm (100 µg/m³) (see footnote h)	Same as Primary Standard	Gas Phase Chemiluminescence
	1-Hour	0.18 ppm (339 µg/m³)		0.100 ppm (see footnote h)	None	
Lead [j]	Rolling 3-Month Average	–	Atomic Absorption	0.15 µg/m³	Same as Primary Standard	High-Volume Sampler and Atomic Absorption
	30-day average	1.5 µg/m³		–		
	Calendar Quarter	–		1.5 µg/m³		
Sulfur Dioxide (SO_2)	24-Hour	0.04 ppm (105 µg/m³)	Ultraviolet Fluorescence		–	Spectrophotometry (Pararosaniline Method)
	3-Hour	–		–	0.5 ppm (1300 µg/m³) (see footnote i)	
	1-Hour	0.25 ppm (655 µg/m³)		75 ppb (196 µg/m³) (see footnote i)	–	
Visibility-Reducing Particles	8-Hour	Extinction coefficient of 0.23 per kilometer - visibility of 10 miles or more (0.07-30 miles or more for Lake Tahoe) due to particles when relative humidity is less than 70 percent. Method: Beta Attenuation and Transmittance Through Filter Tape.		**No Federal Standards**		
Sulfates	24-Hour	25 µg/m³	Ion Chromatography			
Hydrogen Sulfide	1-Hour	0.03 ppm (42 µg/m³)	Ultraviolet Fluorescence			
Vinyl Chloride [j]	24-Hour	0.01 ppm (26 µg/m³)	Gas Chromatography			

Table notes on next page.

[a] California standards for ozone, carbon monoxide (except in the Lake Tahoe air basin), sulfur dioxide (1- and 24-hour), nitrogen dioxide, suspended particulate matter – PM_{10}, $PM_{2.5}$, and visibility-reducing particles, are values that are not to be exceeded. All others are not to be equaled or exceeded. California ambient air quality standards are listed in the Table of Standards in Section 70200 of Title 17 of the California Code of Regulations.

[b] National standards (other than for ozone, PM, and those based on annual averages or annual arithmetic means) are not to be exceeded more than once a year. The ozone standard is attained when the fourth highest 8-hour concentration in a year, averaged over 3 years, is equal to or less than the standard. For PM_{10}, the 24-hour standard is attained when the expected number of days per calendar year with a 24-hour average concentration above 150 $\mu g/m^3$ is equal to or less than 1. For $PM_{2.5}$, the 24-hour standard is attained when 98 percent of the daily concentrations, averaged over 3 years, are equal to or less than the standard. Contact U.S. EPA for further clarification and current federal policies.

[c] Concentration expressed first in units in which it was promulgated. Equivalent units given in parentheses are based upon a reference temperature of 25°C and a reference pressure of 760 torr. Most measurements of air quality are to be corrected to a reference temperature of 25°C and a reference pressure of 760 torr; parts per million (ppm) in this table refers to ppm by volume, or micromoles of pollutant per mole of gas.

[d] Any equivalent procedure which can be shown to the satisfaction of the ARB to give equivalent results at or near the level of the air quality standard may be used.

[e] National Primary Standards: The levels of air quality necessary, with an adequate margin of safety, to protect the public health.

[f] National Secondary Standards: The levels of air quality necessary to protect the public welfare from any known or anticipated adverse effects of a pollutant.

[g] Reference method as described by the U.S. EPA. An "equivalent method" of measurement may be used but must have a "consistent relationship to the reference method" and must be approved by the U.S. EPA.

[h] To attain this standard, the 3-year average of the 98th percentile of the daily maximum 1-hour average at each monitor within an area must not exceed 0.100 ppm (effective January 22, 2010). Note that the U.S. EPA standards are in units of parts per billion (ppb). California standards are in units of ppm. To directly compare the national standards to the California standards, the units can be converted from ppb to ppm. In this case, the national standards of 53 ppb and 100 ppb are identical to 0.053 ppm and 0.100 ppm, respectively.

[i] On June 2, 2010, the U.S. EPA established a new 1-hour SO_2 standard, effective August 23, 2010, which is based on the 3-year average of the annual 99th percentile of 1-hour daily maximum concentrations. U.S. EPA also proposed a new automated Federal Reference Method (FRM) using ultraviolet technology, but will retain the older parasaniline methods until the new FRM has adequately permeated State monitoring networks. The U.S. EPA also revoked both the existing 24-hour SO_2 standard of 0.14 ppm and the annual primary SO_2 standard of 0.30 ppm, effective August 23, 2010. The secondary SO_2 standard was not revised at that time; however, the secondary standard is undergoing a separate review by EPA. Note that the new standard is in units of ppb. California standards are in units of ppm. To directly compare the new primary national standard to the California standard the units can be converted to ppm. In this case, the national standard of 75 ppb is identical to 0.075 ppm.

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

Source: ARB, 2010.

(2) Attainment Status Designations. The ARB is required to designate areas of the State as attainment, nonattainment or unclassified for each State standard. An "attainment" designation for an area signifies that pollutant concentrations did not violate pollutant standards. A "nonattainment" designation indicates that a pollutant concentration violated the standard at least once, excluding those occasions when a violation was caused by an exceptional event, as defined in the criteria. An "unclassified" designation signifies that data do not support either an attainment or nonattainment status. The law divides districts into moderate, serious, and severe air pollution categories, with increasingly stringent control requirements mandated for each category.

The U.S. EPA designates areas for ozone, CO, and NO_2 as "does not meet the primary standards," "cannot be classified," or "is better than national standards." For SO_2, areas are designated as "does not meet the primary standards," "does not meet the secondary standards," "cannot be classified" or "is better than national standards." In 1991, new nonattainment designations were assigned to areas for PM_{10} based on the likelihood that they would violate national PM_{10} standards. All other areas are designated "unclassified." Table IV.C-3 provides a summary of the attainment status for the San Francisco Bay Area with respect to national and State ambient air quality standards.

Table IV.C-3: Bay Area Attainment Status

Pollutant	Averaging Time	California Standards [a]		National Standards [b]	
		Concentration	Attainment Status	Concentration [c,j]	Attainment Status
Ozone (O_3)	8-Hour	0.070 ppm (137µg/m^3)	Nonattainment [h]	0.075 ppm	Nonattainment [d]
	1-Hour	0.09 ppm (180 µg/m^3)	Nonattainment	Not Applicable	Not Applicable [e]
Carbon Monoxide (CO)	8-Hour	9.0 ppm (10 mg/m^3)	Attainment	9 ppm (10 mg/m^3)	Attainment [f]
	1-Hour	20 ppm (23 mg/m^3)	Attainment	35 ppm (40 mg/m^3)	Attainment
Nitrogen Dioxide (NO_2)	1-Hour	0.18 ppm (339 µg/m^3)	Attainment	0.100 ppm	Unclassified
	Annual Arithmetic Mean	0.030 ppm (57 µg/m^3)	Not Applicable	0.053 ppm (100 µg/m^3)	Attainment
Sulfur Dioxide (SO_2)	24-Hour	0.04 ppm (105 µg/m^3)	Attainment	0.14 ppm (365 µg/m^3)	Attainment
	1-Hour	0.25 ppm (655 µg/m^3)	Attainment	Not applicable	Not applicable
	Annual Arithmetic Mean	Not Applicable	Not Applicable	0.030 ppm (80 µg/m^3)	Attainment
Particulate Matter - Coarse (PM_{10})	Annual Arithmetic Mean	20 µg/m^3	Nonattainment [g]	Not Applicable	Not Applicable
	24-Hour	50 µg/m^3	Nonattainment	150 µg/m^3	Unclassified
Particulate Matter - Fine ($PM_{2.5}$)	Annual Arithmetic Mean	12 µg/m^3	Nonattainment [g]	15 µg/m^3	Attainment
	24-Hour	Not Applicable	Not Applicable	35 µg/m^3 [i]	Nonattainment

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

[b] National standards shown are the "primary standards" designed to protect public health. National standards other than for ozone, particulates and those based on annual averages are not to be exceeded more than once a year. The 1-hour ozone standard is attained if, during the most recent 3-year period, the average number of days per year with maximum hourly concentrations above the standard is equal to or less than 1. The 8-hour ozone standard is attained when the 3-year average of the fourth highest daily concentrations is 0.075 ppm (75 ppb) or less. The 24-hour PM_{10} standard is attained when the 3-year average of the 99th percentile of monitored concentrations is less than 150 µg/m^3. The 24-hour $PM_{2.5}$ standard is attained when the 3-year average of 98th percentiles is less than 35 µg/m^3. Except for the national particulate standards, annual standards are met if the annual average falls below the standard at every site. The national annual particulate standard for PM_{10} is met if the 3-year average falls below the standard at every site. The annual $PM_{2.5}$ standard is met if the 3-year average of annual averages spatially-averaged across officially-designed clusters of sites falls below the standard.

Table notes continued on next page.

[c] National air quality standards are set by U.S. EPA at levels determined to be protective of public health with an adequate margin of safety.

[d] In June 2004, the Bay Area was designated as a marginal nonattainment area for the national 8-hour ozone standard. U.S. EPA lowered the national 8-hour ozone standard from 0.80 to 0.75 PPM (i.e., 75 ppb), effective May 27, 2008.

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

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

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

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

[i] U.S EPA lowered the 24-hour $PM_{2.5}$ standard from 65 $\mu g/m^3$ to 35 $\mu g/m^3$ in 2006. The U.S. EPA designated the Bay Area as nonattainment for the 35 $\mu g/m^3$ $PM_{2.5}$ standard on October 8, 2009. The effective date of the designation is December 14, 2009, and the BAAQMD has 3 years to develop a plan called a State Implementation Plan (SIP) that demonstrates how the Bay Area will achieve the revised standard by 2014. The SIP for the new standard must be submitted to the U.S. EPA by December 14, 2012.

[j] To attain this standard, the 3-year average of the 98th percentile of the daily maximum 1-hour average at each monitor within an area must not exceed 0.100 ppm (effective January 22, 2010).

Lead (Pb) is not listed in the above table because it has been in attainment since the 1980s.
ppm = parts per million
mg/m^3 = milligrams per cubic meter
$\mu g/m^3$ = micrograms per cubic meter

Source: Bay Area Air Quality Management District, Bay Area Attainment Status, 2010.

(3) Criteria Air Pollutants and Health Effects. Both State and federal governments have established health-based Ambient Air Quality Standards for six criteria air pollutants: carbon monoxide (CO), ozone (O_3), nitrogen dioxide (NO_2), sulfur dioxide (SO_2), lead (Pb), and suspended particulate matter (PM). In addition, the State has established standards for sulfates, hydrogen sulfide, vinyl chloride and visibility-reducing particles. These standards are designed to protect the health and welfare of the populace with a reasonable margin of safety. CAAQS and NAAQS for criteria air pollutants are listed in Table IV.C-2. Ambient air quality data from nearby air monitoring stations are shown in Table IV.C-1, while health effects are summarized in Table IV.C-4. As shown in Table IV.C-4, long term exposure to elevated levels of criteria pollutants could result in adverse health effects. However, emission thresholds established by an air district are used to manage total regional emissions within an air basin based on the air basin's attainment status for criteria pollutants. These emission thresholds were established for individual projects that would contribute to regional emissions and pollutant concentrations and may adversely affect or delay the projected attainment target year for certain criteria pollutants.

Because of the conservative nature of the thresholds and the basin-wide context of individual project emissions, there is no direct correlation between a single project and localized health effects. One individual project that generates emissions exceeding a threshold does not necessarily result in adverse health effects for residents in the project vicinity. This condition is especially true when the criteria pollutants exceeding thresholds are those with regional effects, such as ozone precursors like nitrogen oxides (NO_x) and reactive organic gases (ROG).

Overall, the potential for an individual project to significantly degrade regional air quality or contribute to a significant health risk is small, even if the emission thresholds are exceeded by that project. Because of the overall improvement trend in air quality in the air basin, it is unlikely that regional air quality would worsen or that the overall health risk would increase compared to current conditions, as a result of emissions from an individual project.

Types of air pollution and their health effects, and other air pollution-related considerations, are described in Table IV.C-4 and in more detail below.

Table IV.C-4: Health Effects and Sources of Air Pollutants

Pollutants	Sources	Primary Effects
Carbon Monoxide (CO)	• Incomplete combustion of fuels and other carbon-containing substances, such as motor exhaust • Natural events, such as decomposition of organic matter	• Reduced tolerance for exercise • Impairment of mental function • Impairment of fetal development • Death at high levels of exposure • Aggravation of some heart diseases (angina)
Nitrogen Dioxide (NO_2)	• Motor vehicle exhaust • High temperature stationary combustion • Atmospheric reactions	• Aggravation of respiratory illness • Reduced visibility • Reduced plant growth • Formation of acid rain
Ozone (O_3)	• Atmospheric reaction of organic gases with nitrogen oxides in sunlight	• Aggravation of respiratory and cardiovascular diseases • Irritation of eyes • Impairment of cardiopulmonary function • Plant leaf injury
Lead (Pb)	• Contaminated soil	• Impairment of blood functions and nerve construction • Behavioral and hearing problems in children
Suspended Particulate Matter ($PM_{2.5}$ and PM_{10})	• Stationary combustion of solid fuels • Construction activities • Industrial processes • Atmospheric chemical reactions	• Reduced lung function • Aggravation of the effects of gaseous pollutants • Aggravation of respiratory and cardiorespiratory diseases • Increased cough and chest discomfort • Soiling • Reduced visibility
Sulfur Dioxide (SO_2)	• Combustion of sulfur-containing fossil fuels • Smelting of sulfur-bearing metal ores • Industrial processes	• Aggravation of respiratory diseases (asthma, emphysema) • Reduced lung function • Irritation of eyes • Reduced visibility • Plant injury • Deterioration of metals, textiles, leather, finishes, coatings, etc.

Source: ARB, 2008.

Ozone. Ozone is a secondary air pollutant produced in the atmosphere through a complex series of photochemical reactions involving ROG and NO_x. The main sources of ROG and NO_x, often referred to as ozone precursors, are combustion processes (including combustion in motor vehicle engines) and the evaporation of solvents, paints, and fuels. In the Bay Area, automobiles are the single largest source of ozone precursors. Ozone is referred to as a regional air pollutant because its precursors are transported and diffused by wind concurrently with ozone production through the photochemical reaction process. Ozone causes eye irritation, airway constriction, and shortness of breath and can aggravate existing respiratory diseases such as asthma, bronchitis, and emphysema. Table IV.C-1 shows that, according to BAAQMD published data, the most stringent applicable standards (the State 1-hour standard of 9 ppm and the federal 8-hour standard of 8 ppm) were not exceeded in Redwood City between 2008 and 2010.

Carbon Monoxide. CO is an odorless, colorless gas usually formed as the result of the incomplete combustion of fuels. The single largest source of CO is motor vehicles. While CO transport is limited, it disperses with distance from the source under normal meteorological conditions. However, under certain extreme meteorological conditions, CO concentrations near congested roadways or intersections may reach unhealthful levels that adversely affect local sensitive receptors (e.g., residents, schoolchildren, the elderly, hospital patients, etc.). Typically, high CO concentrations are associated with roadways or intersections operating at unacceptable levels of service (LOS) or with extremely high traffic volumes. Exposure to high concentrations of CO reduces the oxygen-carrying capacity of the blood and can cause headaches, nausea, dizziness, and fatigue, impair central nervous system function, and induce angina (chest pain) in persons with serious heart disease. Very high levels of CO can be fatal. As shown in Table IV.C-1, no exceedances of State CO standards were recorded between 2008 and 2010.

Particulate Matter. Particulate matter is a class of air pollutants that consists of heterogeneous solid and liquid airborne particles from manmade and natural sources. Particulate matter is categorized in two size ranges: PM_{10} for particles less than 10 microns in diameter and $PM_{2.5}$ for particles less than 2.5 microns in diameter. In the Bay Area, motor vehicles generate about half of the air basin's particulates, through tailpipe emissions as well as brake pad and tire wear. Wood burning in fireplaces and stoves, industrial facilities, and ground-disturbing activities such as construction are other sources of such fine particulates. These fine particulates are small enough to be inhaled into the deepest parts of the human lung and can cause adverse health effects. According to the ARB, studies in the United States and elsewhere have demonstrated a strong link between elevated particulate levels and premature deaths, hospital admissions, emergency room visits, and asthma attacks, and studies of children's health in California have demonstrated that particle pollution may significantly reduce lung function growth in children. The ARB also reports that State-wide attainment of particulate matter standards could prevent thousands of premature deaths, lower hospital admissions for cardiovascular and respiratory disease and asthma-related emergency room visits, and avoid hundreds of thousands of episodes of respiratory illness in California.[2] As shown in Table IV.C-1, exceedances of the State standard for PM_{10} were recorded every year between 2008 and 2010.

Nitrogen Dioxide. NO_2 is a reddish brown gas that is a byproduct of combustion processes. Automobiles and industrial operations are the main sources of NO_2. Aside from its contribution to ozone formation, NO_2 can increase the risk of acute and chronic respiratory disease and reduce visibility. NO_2 may be visible as a coloring component on high pollution days, especially in conjunction with high ozone levels. Table IV.C-1 shows that the standard for NO_2 is being met at the Redwood City monitoring station, and pollutant trends suggest that the air basin will continue to meet these standards

[2] California Air Resources Board, 2004. *Recent Research Findings: Health Effects of Particulate Matter and Ozone Air Pollution*. Website: www.arb.ca.gov/research/health/fs/PM-03fs.pdf. January.

for the foreseeable future. On January 22, 2010, the U.S. EPA strengthened the health-based NAAQS for NO_2.

Sulfur Dioxide. SO_2 is a colorless acidic gas with a strong odor. It is produced by the combustion of sulfur-containing fuels such as oil, coal, and diesel. SO_2 has the potential to damage materials and can cause health effects at high concentrations. It can irritate lung tissue and increase the risk of acute and chronic respiratory disease.[3] Table IV.C-1 shows that the standard for SO_2 is being met at the Redwood City monitoring station; pollutant trends suggest that the air basin will continue to meet standards for SO_2 for the foreseeable future.

Lead. Lead is a metal found naturally in the environment as well as in manufactured products. The major sources of lead emissions have historically been mobile and industrial sources. As a result of the phase-out of leaded gasoline, metal processing is currently the primary source of lead emissions. The highest levels of lead in air are generally found near lead smelters. Other stationary sources are waste incinerators, utilities, and lead-acid battery manufactures.

Twenty years ago, mobile sources were the main contributor to ambient lead concentrations in the air. In the early 1970s, the U.S. EPA established national regulations to gradually reduce the lead content in gasoline. In 1975, unleaded gasoline was introduced for motor vehicles equipped with catalytic converters. The U.S. EPA banned the use of leaded gasoline in highway vehicles in December 1995. As a result of the U.S. EPA's regulatory efforts to remove lead from gasoline, emissions of lead from the transportation sector and levels of lead in the air decreased dramatically.

Toxic Air Contaminants. Toxic air contaminants (TACs) are air pollutants that may lead to serious illness or increased mortality, even when present in relatively low concentrations. Potential human health effects of TACs include birth defects, neurological damage, cancer, and death. There are hundreds of different types of TACs with varying degrees of toxicity. Individual TACs vary greatly in the health risk they present; at a given level of exposure, one TAC may pose a hazard that is many times greater than another.

TACs do not have ambient air quality standards, but are regulated by the BAAQMD using a risk-based approach. This approach uses a health risk assessment to determine what sources and pollutants to control as well as the degree of control. A health risk assessment is an analysis in which human health exposure to toxic substances is estimated, and considered together with information regarding the toxic potency of the substances, in order to provide a quantitative estimate of health risks.[4] As part of ongoing efforts to identify and assess potential health risks to the public, the BAAQMD has collected and compiled air toxics emissions data from industrial and commercial sources of air pollution throughout the Bay Area. Monitoring data and emissions inventories of TACs help the BAAQMD determine health risk to Bay Area residents.

Ambient monitoring concentrations of TACs indicate that pollutants emitted primarily from motor vehicles (1,3-butadiene and benzene) account for slightly over 50 percent of the average calculated

[3] Bay Area Air Quality Management District, 2010, op. cit.

[4] In general, a health risk assessment is required if the BAAQMD concludes that projected emissions of a specific air toxic compound from a proposed new or modified source suggests a potential public health risk. Such an assessment generally evaluates chronic, long term effects, including the increased risk of cancer as a result of exposure to one or more TACs.

cancer risk from ambient air in the Bay Area.[5] According to the BAAQMD, ambient benzene levels declined dramatically in 1996 with the advent of Phase 2 reformulated gasoline. Due to this reduction, the calculated average cancer risk based on monitoring results has been reduced to 143 in 1,000,000; however, this risk does not include the risk resulting from exposure to diesel particulate matter or other compounds not monitored.

Diesel particulate matter, which is emitted in diesel engine exhaust, was identified as a toxic air contaminant by the ARB in 1998. Unlike TACs emitted from industrial and other stationary sources noted above, most diesel particulate matter is emitted from mobile sources – primarily "off-road" sources such as construction and mining equipment, agricultural equipment, and truck-mounted refrigeration units, as well as trucks and buses traveling on freeways and local roadways. Agricultural and mining equipment is not commonly used in urban parts of the Bay Area, while construction equipment typically operates for a limited time at changeable locations. As a result, the readily identifiable locations where diesel particulate matter is emitted in the project area include high-traffic roadways and other areas with substantial truck traffic.

Although not specifically monitored, recent studies indicate that exposure to diesel particulate matter may contribute significantly to a cancer risk (approximately 500-700 cases of cancer in a population of 1,000,000) that is greater than all other measured TACs combined.[6] The ARB's Diesel Risk Reduction Plan is intended to substantially reduce diesel particulate matter emissions and associated health risks through introduction of ultra-low-sulfur diesel fuel – a step already implemented – and cleaner-burning diesel engines. The technology for reducing diesel particulate matter emissions from heavy-duty trucks is well established, and both State and federal agencies are moving aggressively to regulate engines and emission control systems to reduce and remediate diesel emissions. ARB anticipates that by 2020, average State-wide diesel particulate matter concentrations will decrease by 85 percent from levels in 2000 with full implementation of the Diesel Risk Reduction Plan, meaning that the State-wide health risk from diesel particulate matter is expected to decrease from 540 cancer cases in 1,000,000 to 21.5 cancer cases in 1,000,000. It is likely that the Bay Area cancer risk from diesel particulate matter will decrease by a similar factor by 2020.

Odors. Odors are also an important element of local air quality conditions. Specific activities allowed within each land use category can raise concerns related to odors on the part of nearby neighbors. Major sources of odors include restaurants and manufacturing plants. Other odor producers include the industrial facilities within the region. BAAQMD Regulation 7 places general limitations on odorous substances and specific emission limitations on certain odorous compounds. This regulation limits the "discharge of any odorous substance which causes the ambient air at or beyond the property line…to be odorous and to remain odorous after dilution with four parts of odor-free air." The BAAQMD must receive odor complaints from 10 or more complainants within a 90-day period in order for the limitations of this regulation to go into effect. If this criterion has been met, an odor violation can be issued by the BAAQMD if a test panel of people can detect an odor in samples collected periodically from the source. While sources that generate objectionable odors must comply with air quality regulations, the public's sensitivity to locally produced odors often exceeds regulatory thresholds.

[5] Bay Area Air Quality Management District, 2007. *Toxic Air Contaminant Control Program Annual Report 2003 Volume 1.* August.

[6] Ibid.

Sensitive Receptors. Occupants of facilities such as schools, day care centers, parks and playgrounds, hospitals, and nursing and convalescent homes are considered to be more sensitive than the general public to poor air quality because the population groups associated with these uses have increased susceptibility to respiratory disease. Persons engaged in strenuous work or exercise also have increased sensitivity to poor air quality. Residential areas are considered more sensitive to air quality conditions, compared to commercial and industrial areas, because people generally spend longer periods of time at their residences, with greater associated exposure to ambient air quality conditions. Recreational uses are also considered sensitive compared to commercial and industrial uses due to greater exposure to ambient air quality conditions associated with exercise. Residents surrounding the project site would be considered sensitive receptors.

High Volume Roadways. Air pollutant exposures and their associated health burdens vary considerably within places in relation to sources of air pollution. Motor vehicle traffic is perhaps the most important source of intra-urban spatial variation in air pollution concentrations. Air quality research consistently demonstrates that pollutant levels are substantially higher near freeways and busy roadways and human health studies have consistently demonstrated that children living within 100 to 200 meters of freeways or busy roadways have reduced lung function and higher rates of respiratory disease.[7] At present, it is not possible to attribute the effects of roadway proximity on non-cancer health effects to one or more specific vehicle types or vehicle pollutants. Engine exhaust, from diesel, gasoline, and other combustion engines, is a complex mixture of particles and gases, with collective and individual toxicological characteristics. Four epidemiological studies on roadways and health impacts conducted in California populations are described below.

- In Oakland, California, children at schools in proximity to high volume roadways experienced more asthma and bronchitis symptoms.[8]
- In a low-income population of children in San Diego, children with asthma living within 550 feet of high traffic volumes were more likely than those residing near lower traffic volumes to have more medical care visits for asthma.[9]
- In a study of Southern California school children, residence location within 75 meters (246 feet) of a major road was associated with an increased risk of asthma.[10]
- In a study conducted in 12 Southern California communities, children who lived within 500 feet of a freeway had reduced growth in lung capacity compared to those living greater than 1,500 feet from a freeway.[11]

Federal and State regulations control air pollutants at the regional level by limiting vehicle and stationary source emissions. However, air quality regulations have not limited the use of vehicles

[7] Delfino, RJ., 2002. Epidemiologic Evidence for Asthma and Exposure to Air Toxics: Linkages Between Occupational, Indoor, and Community Air Pollution Research. *Environmental Health Perspectives.*

[8] Kim, J., et al., 2004. Traffic-Related Air Pollution and Respiratory Health: East Bay Children's Respiratory Health Study. *American Journal of Respiratory and Critical Care Medicine*.

[9] English, P., et al., 1999. Examining Associations Between Childhood Asthma and Traffic Flow Using a Geographic Information System. *Environmental Health Perspectives*.

[10] McConnell, R., et al., 2006. Traffic, Susceptibility, and Childhood Asthma. *Environmental Health Perspectives*.

[11] Gauderman, W. J. The Effect of Air Pollution on Lung Development From 10 to 18 Years of Age. *New England Journal of Medicine.* September 2004 and March 2005.

and generally have not protected sensitive land uses from air pollution "hot spots" associated with proximity to transportation facilities. Because of the robust evidence relating proximity to roadways and a range of non-cancer and cancer health effects, the ARB created guidance for avoiding air quality conflicts in land use planning in its Air Quality and Land Use Handbook: A Community Health Perspective.[12] In its guidance, the ARB advises that new sensitive uses (e.g., residences, schools, day care centers, playgrounds, and hospitals) not be located within 500 feet of a freeway or urban roads carrying 100,000 vehicles per day, or within 1,000 feet of a distribution center (warehouse) that accommodates more than 100 trucks or more than 90 refrigerator trucks per day.

ARB guidance suggests that the use of these guidelines should be customized for individual land use decisions, and take into account the context of development projects. The Air Quality and Land Use Handbook specifically states that these recommendations are advisory and acknowledges that land use agencies must balance other considerations, including housing and transportation needs, economic development priorities, and other quality of life issues.

(4) Regulatory Framework. The BAAQMD is primarily responsible for regulating air pollution emissions from stationary sources (e.g., factories) and indirect sources (e.g., traffic associated with new development) in the San Francisco Bay Area Air Basin, as well as for monitoring ambient pollutant concentrations in the Basin. The ARB and the U.S. EPA regulate direct emissions from motor vehicles.

Federal Air Quality Regulations. At the federal level, the U.S. EPA has been charged with implementing national air quality programs. U.S. EPA's air quality mandates are drawn primarily from the Federal Clean Air Act (FCAA), which was enacted in 1963. The FCAA was amended in 1970, 1977, and 1990.

The FCAA required U.S. EPA to establish primary and secondary NAAQS and required each state to prepare an air quality control plan referred to as a State Implement Plan (SIP). The Federal Clean Air Act Amendments of 1990 (FCAAA) added requirements for states with nonattainment areas to revise their SIPs to incorporate additional control measures to reduce air pollution. The SIP is periodically modified to reflect the latest emissions inventories, planning documents, and rules and regulations of the air basins as reported by their jurisdictional agencies. U.S. EPA has responsibility to review all state SIPs to determine conformity with the mandates of the FCAAA and determine if implementation will achieve air quality goals. If the U.S. EPA determines a SIP to be inadequate, a Federal Implementation Plan (FIP) may be prepared for the nonattainment area which imposes additional control measures. Failure to submit an approvable SIP or to implement the plan within the mandated timeframe may result in the application of sanctions on transportation funding and stationary air pollution sources in the air basin.

State Air Quality Regulations. In 1992 and 1993, the ARB requested delegation of authority for the implementation and enforcement of specified New Source Performance Standards and National Emission Standards for Hazardous Air Pollutants to the BAAQMD. U.S. EPA's review of the State of California's laws, rules, and regulations showed them to be adequate for the implementation and enforcement of federal standards, and the U.S. EPA granted the delegations as requested.

[12] California Environmental Protection Agency, and Air Resources Board, 2005. *Air Quality and Land Use Handbook: A Community Health Perspective*. Website: www.arb.ca.gov/ch/landuse.htm.

The ARB is the agency responsible for the coordination and oversight of State and local air pollution control programs in California and for implementing the California Clean Air Act (CCAA), adopted in 1988. The CCAA requires that all air districts in the State achieve and maintain the CAAQS by the earliest practical date. The CCAA specifies that districts should focus on reducing the emissions from transportation and air-wide emission sources, and provides districts with the authority to regulate indirect sources.

ARB is primarily responsible for developing and implementing air pollution control plans to achieve and maintain the NAAQS. ARB is primarily responsible for Statewide pollution sources and produces a major part of the SIP. Local air districts provide additional strategies for controlling sources under their jurisdiction. ARB combines this data and submits completed SIPs to U.S. EPA.

Other ARB duties include monitoring air quality (in conjunction with air monitoring networks maintained by air pollution control and air quality management districts), establishing CAAQS (which in many cases are more stringent than the NAAQS), determining and updating area designations and maps, and establishing emissions standards for new mobile sources, consumer products, small utility engines, and off-road vehicles.

Bay Area Air Quality Management District. The BAAQMD seeks to attain and maintain air quality conditions in the Basin through a comprehensive program of planning, regulation, enforcement, technical innovation, and education. The clean air strategy includes the preparation of plans for the attainment of ambient air quality standards, adoption and enforcement of rules and regulations, and issuance of permits for stationary sources. The BAAQMD also inspects stationary sources and responds to citizen complaints, monitors ambient air quality and meteorological conditions, and implements programs and regulations required by law.

The BAAQMD is responsible for developing a Clean Air Plan which guides the region's air quality planning efforts to attain the CAAQS. The BAAQMD's 2010 Clean Air Plan is the latest Clean Air Plan which contains district-wide control measures to reduce ozone precursor emissions (i.e., ROG and NO_x) and particulate matter.

The Bay Area 2010 Clean Air Plan, which was adopted on September 15, 2010 by the BAAQMD's board of directors:

- Updates 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;
- Provides a control strategy to reduce ozone, particulate matter, air toxics, and greenhouse gases in a single, integrated plan;
- Reviews progress in improving air quality in recent years; and
- Establishes emission control measures to be adopted or implemented in the 2010 to 2012 timeframe.

2. Impacts and Mitigation Measures

This section analyzes air quality impacts that could result from implementation of the proposed project. The subsection begins with the criteria of significance, which establish the thresholds for determining whether an impact is significant. The latter part of this subsection presents the impacts associated with the proposed project, and recommends mitigation measures as appropriate.

a. Criteria of Significance. The project would result in significant air quality impacts if it would:

- Violate any air quality standard or contribute substantially to an existing or projected air quality violation.
- Expose sensitive receptors to pollutants as defined by federal or State air quality standards.
- Create objectionable odors (defined as odors that are so strong they can be detected by the average person).
- Result in a cumulatively considerable net increase of any criteria pollutant or a precursor to that 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).
- Conflict with or obstruct implementation of an applicable air quality plan.
- Result in a cumulatively considerable net increase of any criteria pollutant.

Generally, if a project results in an increase in ROG, NO_x, or PM that exceeds the significance criteria, then it would also contribute considerably to a significant cumulative effect. For projects that would not cause an increase in ROG, NO_x, or PM emissions above levels cited below, the cumulative effect is evaluated for consistency with the regional Clean Air Plan.

The BAAQMD has further defined these criteria of significance to indicate the project would result in a significant air quality impact if it would:

- Directly violate criteria pollutant standards (e.g., PM_{10}) or contribute substantially to an existing or projected air quality violation by:
  - Contributing to CO concentrations exceeding the State ambient air quality standards;
  - Generating construction or operation emissions of Reactive Organic Gases (ROG)[13] or NO_x, greater than 10 tons per year or 54 pounds per day;
  - Generating operational-related exhaust emissions of PM_{10} greater than 15 tons per year or 82 pounds per day; or
  - Generating operational-related $PM_{2.5}$ exhaust emissions greater than 10 tons per year or 54 pounds per day.
- Frequently expose members of the public to objectionable odors. Screening distances from odor sources and odor complaint history identified by the BAAQMD apply.
- Expose sensitive receptors (such as residential areas) or the general public to toxic air contaminants in excess of the following thresholds:
  - Increased cancer risk greater than 10.0 in one million;
  - Increased non-cancer risk of greater than 1.0 on the non-hazard index (chronic or acute); or

[13] Reactive Organic Gases (ROG) are compounds that transform with heat and sunlight to form ozone smog.

- Ambient $PM_{2.5}$ increase greater than 0.3 µg/m^3 annual average.

It should be noted that the emission thresholds were established based on the attainment status of the air basin for specific criteria pollutants. Because the concentration standards were established at a level that protects public health with an adequate margin of safety according to the U.S. EPA, these emission thresholds are regarded as conservative and would tend to overstate an individual project's contribution to health risks.

b. Less-Than-Significant Impacts. The project would result in the following less-than-significant air quality impacts.

(1) Odor Emissions. During construction of the project, the various diesel-powered vehicles and equipment in use within the project site would create localized odors. These odors would be temporary and are not likely to be noticeable for extended periods of time beyond the vicinity of the project site. Once constructed, the proposed residential uses would not be expected to generate odors. Activities associated with nearby Planet Auto have the potential to release odors; however, no odor complaints have been documented from this facility in the past 3 years by the BAAQMD. Therefore, this auto repair facility would not be considered a significant source of odors. There are no other known odor sources in the project site vicinity that would affect sensitive receptors. Project-related odor impacts would be considered a less-than-significant impact.

(2) Operational Emissions – Regional Emissions Analysis. The project would generate two types of emissions: short term construction emissions and long term air emissions such as those associated with changes in permanent usage of the project site. These long term emissions are primarily mobile source emissions that would result from vehicle trips associated with the proposed project**.** The proposed project is expected to generate approximately 195 trips per day (or 155 net trips, taking into account existing residences on the site). Area sources, such as natural gas heaters, landscape equipment, and use of consumer products, would also result in pollutant emissions.

Based on the BAAQMD screening criteria, residential projects that contain fewer than 325 dwelling units would not result in the generation of operational-related criteria air pollutants and/or precursors that exceed the thresholds of significance. As the proposed project would include 26 dwelling units, and the transportation analysis evaluated a total of 27 units,[14] the impacts to air quality from criteria air pollutant and precursor emissions would be less than significant. However, to confirm pollutant emissions associated with the proposed project, the Urban Emissions Model (URBEMIS 2007 v. 9.2.4) computer program, which is the most current air quality model available in California for estimating emissions associated with land use development projects, was used to calculate long term mobile and area source emissions. URBEMIS output sheets are included in Appendix B of this EIR.

The ROG emissions from mobile sources include emissions from different automobile operating modes, including running emissions and evaporation from engine running and resting. These emissions also include those resulting from incomplete combustion when a cold car is started. NO_x emissions comprise running exhaust and are increased during the initial engine running periods.

[14] The maximum number of units that could be developed on the site under the State Density Bonus Law.

PM_{10} emissions result from running exhaust, tire and brake wear, and the entrainment of dust into the atmosphere from vehicles traveling on paved roadways. Entrainment of PM_{10} occurs when vehicle tires pulverize small rocks and pavement and the vehicle wakes generate airborne dust. The contribution of tire and brake wear is small compared to the other PM emission processes. Gasoline-powered engines have small rates of particulate matter emissions compared with diesel-powered vehicles. Since much of the project traffic fleet would be made up of light-duty gasoline-powered vehicles (i.e., light vehicles typically driven by residents in Menlo Park), a majority of the PM_{10} emissions would result from entrainment of roadway dust from vehicle travel.

Area source emissions associated with the project would include water heating, the use of landscaping equipment, and fireplace emissions (fireplaces would be required to comply with Section 12.48 of the Municipal Code, Woodburning Appliances).

The daily emissions associated with project operational trip generation and area sources are identified in Table IV.C-5 for ROG, NO_x, PM_{10}, and $PM_{2.5}$. The results indicate the project would be well below (less than 10 percent of) the significance thresholds for any of the pollutants; therefore, the proposed project would not have a significant effect on regional air quality.

The primary emissions associated with the project are regional in nature, meaning that air pollutants are rapidly dispersed on emission or, in the case of vehicle emissions associated with the project, emissions are released in other areas of the Air Basin. Because the resulting emissions would be dispersed rapidly and contribute only a small fraction of the region's air pollution, air quality in the immediate vicinity of the project site would not substantially change compared to existing conditions or the air quality monitoring data reported in Table IV.C-1.

Table IV.C-5: Project Regional Emissions

	Reactive Organic Gases	**Nitrogen Oxides**	**PM_{10}**	**$PM_{2.5}$**
Emissions in Pounds Per Day				
Area Source Emissions	5.56	0.71	2.21	2.73
Mobile Source Emissions	1.63	2.57	3.79	0.72
Total Emissions	7.19	3.28	6.00	2.85
BAAQMD Significance Threshold	**54.00**	**54.00**	**82.00**	**54.00**
Exceed?	**No**	**No**	**No**	**No**
Emissions in Tons Per Year				
Area Source Emissions	0.49	0.07	0.09	0.09
Mobile Source Emissions	0.29	0.37	0.69	0.13
Total Emissions	0.78	0.44	0.78	0.22
BAAQMD Significance Threshold	**10.00**	**10.00**	**15.00**	**10.00**
Exceed?	**No**	**No**	**No**	**No**

Source: LSA Associates, Inc., 2011.

(3) Clean Air Plan (CAP) Consistency. A key element in air quality planning is to make reasonably accurate projections of future human activities, particularly vehicle activities that are related to air pollutant emissions. The applicable air quality plan is the BAAQMD's 2010 Clean Air Plan, which was adopted on September 15, 2010. The Clean Air Plan is a comprehensive plan to improve Bay Area air quality and protect public health. Consistency with the Clean Air Plan can be determined if the project supports the goals of the Clean Air Plan, includes applicable control measures from the Clean Air Plan, and would not disrupt or hinder implementation of any control measures from the Clean Air Plan.

The proposed project would result in short term construction-related criteria air pollutant emissions. However, these emissions would not be significant and would be limited to the project's construction period. As discussed in further detail above, the project's operational emissions would also not be significant. Therefore, the project would support the primary goals of the BAAQMD's 2010 Clean Air Plan.

The proposed project would be consistent with the type of development promoted by the Clean Air Plan's Transportation Control Measures for Local Land Use Strategies, which support and promote land use patterns, policies, and infrastructure investments that support higher density residential uses, and employment development near transit to facilitate walking, bicycling, and transit use. The proposed project would be generally consistent with this strategy, based on the proximity of the site to the Menlo Park Caltrain station, bus routes, and other urban amenities. The project would also not preclude the extension of a transit line or bike path, and would not provide excessive parking beyond applicable parking requirements.

Therefore, the proposed project would incorporate all feasible air quality plan control measures and would not hinder implementation of the 2010 Clean Air Plan. The associated impact would be less than significant.

(4) Operational Emissions – Localized CO Impacts. The BAAQMD has established a screening methodology that provides a conservative indication of whether the implementation of a proposed project would result in significant CO emissions. According to the BAAQMD's CEQA Guidelines, a proposed project would result in a less-than-significant impact to localized CO concentrations if the following screening criteria are met:

- The project is consistent with an applicable congestion management program established by the county congestion management agency for designated roads or highways, and the regional transportation plan and local congestion management agency plans.
- Project traffic would not increase traffic volumes at affected intersections to more than 44,000 vehicles per hour.
- The project would not increase traffic volumes at affected intersections to more than 24,000 vehicles per hour where vertical and/or horizontal mixing is substantially limited (e.g., tunnel, parking garage, bridge underpass, natural or urban street canyon, or below-grade roadway).

The proposed project would not conflict with the San Mateo County Transportation Authority's Congestion Management Program for designated roads or highways, a regional transportation plan, or other agency plans, as the proposed project would not cause the level of service to significantly deteriorate on any regional roadway. In addition, traffic volumes on roadways in the vicinity of the project site are less than 44,000 vehicles per hour and the project is expected to generate a maximum of less than 20 net peak hour vehicle trips. Therefore, the proposed project would not increase traffic volumes at affected intersections to more than 24,000 vehicles per hour and would not result in localized CO concentrations that exceed State or federal standards. Localized CO impacts would be considered less than significant.

(5) Toxic Air Contaminants – Project Operation. Any project with the potential to expose sensitive receptors (including residential areas) or the general public to substantial levels of toxic air contaminants would be deemed to have a significant impact. This would apply to locating receptors near existing sources of toxic air contaminants, as well as locating sources of toxic air contaminants near existing receptors. Sensitive receptors are facilities that house or attract children, the elderly, and people with illnesses or others who are especially sensitive to the effects of air pollutants. Hospitals, schools, convalescent facilities, and residential areas are examples of sensitive receptors.

According to the BAAQMD, when siting a new receptor, an evaluation of existing sources of TACs and $PM_{2.5}$ emissions that would adversely affect individuals within a proposed project should be performed. Implementation of the proposed project would not create any new stationary sources of TACs and the proposed project is located more than 1,000 feet from the nearest Caltrain station; therefore, emissions generated by trains idling near the station would not substantially affect future residents of the site. However, a database search of the BAAQMD's Stationary Source Risk and Hazard Analysis Tool revealed that there are two existing permitted sources of TAC or $PM_{2.5}$ emissions within 1,000 feet of the project site. One source is identified as the Menlo Park Beacon located at 275 El Camino Real and the other source is the Shell Station at 495 El Camino Real. The BAAQMD identified the Menlo Park Beacon station as a source with no significant risk. The Shell Station is also a gas dispensary and the risk levels associated with this facility are shown in Table IV.C-6, below.

In addition, traffic along El Camino Real is characterized by a low percentage of diesel vehicles (3.29 percent).[15] El Camino Real carries approximately 30,000 vehicles per day.[16] An analysis of these sources and the associated health risk and $PM_{2.5}$ concentrations is shown in Table IV.C-6.

Table IV.C-6: TAC Sources in the Project Site Vicinity

Source	**Lifetime Cancer Risk**	**Hazard Index**	**$PM_{2.5}$ Concentration**
Shell Station[1]	3.92	0.007	NA
Menlo Park Beacon[1]	NA	NA	NA
El Camino Real[2]	6.56	NA	0.278
BAAQMD Individual Project Significance Threshold	**10.0**	**1.0**	**0.3**
Cumulative Total	10.48	0.007	0.278
BAAQMD Cumulative Significance Threshold	**100.0**	**10.0**	**0.8**
Exceed?	**No**	**No**	**No**

Notes:
1 Risk level calculated based on the data supplied by the BAAQMD.
2 Risk level and $PM_{2.5}$ concentration based on the data from the BAAQMD's *San Mateo County $PM_{2.5}$ Concentrations and Cancer Risks Generated from Surface Streets* screening table released in May 2011.
NA = According to the BAAQMD, there is no significant risk from this source.
Source: LSA Associates, Inc., 2011.

Based on the analysis of the TAC sources in the project site vicinity as shown in Table IV.C-6, future residents of the project site would not be exposed to substantial levels of TACs, and local community risk and hazards impacts associated with TACs would be less than significant.

15 Caltrans, 2010. *2009 Annual Average Daily Truck Traffic.* December.

16 Caltrans, 2011. *2010 All Traffic Volumes on California State Highway System.* October.

c. Significant Impacts. The proposed project would result in the following potentially significant impacts related to air quality.

Impact AIR-1: Construction of the proposed project would generate air pollutant emissions that could expose sensitive receptors to substantial pollutant concentrations. (S)

(1) Project Construction – Criteria Air Pollutants. During construction, short term degradation of air quality may occur due to the release of particulate emissions generated by excavation, grading, hauling, and other activities. Emissions from construction equipment are also anticipated and would include CO, NO_x, ROG, directly-emitted particulate matter ($PM_{2.5}$ and PM_{10}), and TACs such as diesel exhaust particulate matter.

Site preparation and project construction would involve demolition of two existing structures on the project site, clearing, cut-and-fill activities, grading, and building activities. Construction-related effects on air quality from the proposed project would be greatest during the site preparation phase because most engine emissions are associated with the excavation, handling, and transport of soils on the site. If not properly controlled, these activities would temporarily generate PM_{10}, $PM_{2.5}$, and small amounts of CO, SO_2, NO_x, and VOCs. Sources of fugitive dust would include disturbed soils at the construction sites and trucks carrying uncovered loads of soils. Unless properly controlled, vehicles leaving the site would deposit dirt and mud on local streets, which could be an additional source of airborne dust after it dries. PM_{10} emissions would vary from day to day, depending on the nature and magnitude of construction activity and local weather conditions. PM_{10} emissions would depend on soil moisture, silt content of soil, wind speed, and the amount of operating equipment. Larger dust particles would settle near the source, while fine particles would be dispersed over greater distances from the construction sites.

Water or other soil stabilizers can be used to control dust, resulting in emission reductions of 50 percent or more. The BAAQMD has established standard measures for reducing fugitive dust emissions (PM_{10}). With the implementation of standard construction measures such as frequent watering (e.g., two times per day at a minimum), fugitive dust emissions from construction activities would not result in adverse air quality impacts.

In addition to dust-related PM_{10} emissions, heavy trucks and construction equipment powered by gasoline and diesel engines would generate CO, SO_2, NO_x, VOCs and some soot particulate ($PM_{2.5}$ and PM_{10}) in exhaust emissions. If construction activities were to increase traffic congestion in the area, CO and other emissions from traffic would increase slightly while those vehicles are delayed. These emissions would be temporary and limited to the immediate area surrounding the construction sites.

The proposed construction schedule for all improvements is approximately 14 months. Construction emissions were estimated for the project using the URBEMIS model as recommended by the BAAQMD. Construction-related emissions are presented in Table IV.C-7.

Table IV.C-7: Project Construction Emissions in Pounds Per Day

Project Construction	ROG	CO	NO_x	Exhaust $PM_{2.5}$	Fugitive Dust $PM_{2.5}$	Total $PM_{2.5}$	Exhaust PM_{10}	Fugitive Dust PM_{10}	Total PM_{10}
Maximum Daily Emissions	35.7	14.7	22.0	1.2	9.4	10.4	1.3	45.0	46.1
BAAQMD Thresholds	54.0	NA	54.0	54.0	BMP	NA	82.0	BMP	NA
Exceed Threshold?	**No**	**NA**	**No**	**No**	**NA**	**NA**	**No**	**NA**	**NA**

Notes:
NA = Not Applicable; the BAAQMD does not have threshold.
BMP = Best Management Practices. If BMPs are implemented, the emissions are considered less than significant.
Source: LSA Associates, Inc., 2011.

The effects of construction activities would be increased dustfall and locally elevated levels of PM_{10} downwind of construction activity. Construction dust would be generated at levels that could create an annoyance to occupants of nearby properties. The BAAQMD requires the implementation of Best Management Practices to reduce construction impacts to a less-than-significant level. Implementation of Mitigation Measure AIR-1 would impose the BAAQMD's Best Management Practices and reduce diesel PM_{10} exhaust emissions as well as construction PM_{10} impacts.

Mitigation Measure AIR-1: Consistent with guidance from the BAAQMD, the following actions shall be required of construction contracts and specifications for the project:

- All exposed surfaces (e.g., parking areas, staging areas, soil piles, graded areas, and unpaved access roads) shall be watered two times per day.
- All haul trucks transporting soil, sand, or other loose material off-site shall be covered.
- All visible mud or dirt tracked-out onto adjacent public roads shall be removed using wet power vacuum street sweepers at least once per day. The use of dry power sweeping is prohibited.
- All vehicle speeds on unpaved roads shall be limited to 15 mph.
- All roadways, driveways, and sidewalks to be paved shall be completed as soon as possible.
- Building pads shall be laid as soon as possible after grading unless seeding or soil binders are used.
- Idling times shall be minimized either by shutting equipment off when not in use or reducing the maximum idling time to 5 minutes (as required by the California airborne toxics control measure, Title 13, Section 2485 of the California Code of Regulations [CCR]). Clear signage shall be provided for construction workers at all access points.
- All construction equipment shall be maintained and properly tuned in accordance with the manufacturer's specifications. All equipment shall be checked by a certified mechanic and determined to be running in proper condition prior to operation.
- A publicly visible sign shall be posted with the telephone number and person to contact at the City regarding dust complaints. This person shall respond and take corrective action within 48 hours. The BAAQMD's phone number shall also be visible to ensure compliance with applicable regulations. (LTS)

According to the BAAQMD, projects that implement Best Management Practices result in less-than-significant impacts related to fugitive dust (PM_{10} and $PM_{2.5}$) impacts. Therefore, implementation of Mitigation Measure AIR-1 would reduce construction period fugitive dust emissions to a less-than-significant level.

Impact AIR-2: Construction of the proposed project would generate air pollutant emissions that could expose sensitive receptors to substantial toxic air contaminants. (S)

(2) Project Construction – Toxic Air Contaminants. According to the BAAQMD CEQA Air Quality Guidelines, any project that would expose persons to substantial levels of TACs resulting in: (a) a cancer risk level greater than 100 in a million; (b) a non-cancer risk (chronic or acute) hazard index greater than 10.0; or (c) an increase of greater than 0.8 micrograms per cubic meter of annual average $PM_{2.5}$ through the siting of a new source or a new receptor would be considered to have a significant cumulative air quality impact. The use of construction equipment on the project site, such as front-end loaders, backhoes, cranes, forklifts, and trucks would result in diesel emission exhaust or diesel particulate emissions. The project site is located in an urban area in close proximity to existing residential uses.

The following discussion is based on the Health Risk Assessment (HRA) for project construction included in Appendix B. To estimate the potential cancer risk associated with construction of the proposed project from vehicle engine exhaust (including diesel particulate matter), a dispersion model was used to translate an emission rate from the source location to a concentration at the receptor location of interest (i.e., a nearby residence). Dispersion modeling varies from a simpler, more conservative screening-level analysis to a more complex and refined detailed analysis. This assessment was conducted using the ARB health risk model, Hot-Spots Analysis and Reporting Program (HARP), with the air dispersion modeling performed using the U.S. EPA dispersion model ISCST3. The model provides a detailed estimate of concentrations based on site and source geometry, source emissions strength, distance from the source to the receptor, and site-specific meteorological data.

Emission Estimates. The HRA was conducted as recommended by the California Office of Environmental Health Hazard Assessment (OEHHA) Guidelines, the ARB,[17] and the BAAQMD.[18] It consists of several steps including: determine the PM_{10} emission factor, emission rate, and concentration at locations of interest; translate the PM_{10} concentrations into health risk values; and compare the health risk values to thresholds and determine significance.

Emission factors for equipment emissions were estimated using the ARB's OFFROAD2007 and EMFAC2007 models. Both models include assumptions of technological and regulatory changes that are expected to reduce emission rates over time. The HRA only allows for a single emission rate for the entire 70-year health risk evaluation period. Therefore, a worst-case set of emission factors from the year 2011 was used to represent the long term 70-year evaluation period. The 70-year evaluation period reflects the average human lifespan. The OEHHA recommends that the analysis of short term

[17] California Air Resources Board, 2005. *HARP Model Documentation, Appendix K, Risk Assessment Procedures to Evaluate Particulate Emissions from Diesel-Fueled Engines*. February.

[18] Bay Area Air Quality Management District, 2010. *CEQA Construction Screening Approach*, May 2010, *Health Risk Screening Analysis Guidelines*, January 2010, and *Recommended Methods for Screening and Modeling Local Risks and Hazards*, May 2010.

projects such as construction projects apply an age sensitivity factor (CRAF) which weights exposures that occur early in life for prenatal, postnatal, and juvenile exposures. Following this guidance, a factor of 10 was applied in the analysis, with the results reflecting risk over a 70 year lifetime from exposure to the short term construction emissions, including potential early-in-life exposure to related pollutants.

Total project construction is anticipated to take 14 months. The PM_{10} emission rate was determined by using estimated equipment utilization, as shown in Table IV.C-8, combined with the OFFROAD2007 and EMFAC2007 emissions factors (included in Appendix B).

Table IV.C-8: Equipment Usage and Diesel Particulate Emissions

Demolition	# of Units	Hours Per Day	CARB OffRoad Emission Factors Diesel Emission Factors (lbs/hour) PM_{10}		Average Emission Rates (lbs/day) PM_{10}
Bulldozer	2	5	1.29E-01		0.64
Bobcat Loader	1	7	4.77E-02		0.33
Industrial Saw	1	6	6.83E-02		0.41
Generator Set	1	7	6.60E-02		0.46
	# of Units	**Miles Per Day**	**EMFAC2007: 2011 Factors Emission Factors (gms/mi)**	**Speed (mph)**	
Mechanic Truck	1	10	0.04	25	0.00088
Fuel Truck	1	10	0.04	25	0.00088
Foreman Truck	1	10	0.04	25	0.00088
Water Truck	1	10	0.061	15	0.0013
			Gasoline Emission Factors (gms/mi)		
Worker Commute	40	50	0.02	50	0.088
				Total Demolition	**1.9**
Construction	**# of Units**	**Hours Per Day**	**CARB OffRoad Emission Factors Diesel Emission Factors (lbs/hr) PM_{10}**		**Average Emission Rates (lbs/day) PM_{10}**
Skip Loader	2	6	1.97E-02		0.12
Backhoe	2	6	4.77E-02		0.29
Crane	1	5	3.58E-01		1.79
Forklift	2	6	3.53E-02		0.21
Manlift	1	5	6.05E-02		0.30
Generator Set	1	7	6.60E-02		0.46
	# of Units	**Miles Per Day**	**EMFAC2007: 2011 Factors Emission Factors (gms/mi)**	**Speed (mph)**	
Mechanic Truck	1	10	0.04	25	0.00088
Fuel Truck	1	10	0.04	25	0.00088
Foreman Truck	1	10	0.04	25	0.00088
Delivery Trucks	10	30	0.035	30	0.023
			Gasoline Emission Factors (gms/mi)		
Worker Commute	40	50	0.02	50	0.088
				Total Construction	**3.3**

Table IV.C-8 *Continued*

Painting & Paving	# of Units	Hours Per Day	CARB OffRoad Emission Factors Diesel Emission Factors (lbs/hr) PM_{10}		Average Emission Rates (lbs/day) PM_{10}
Skip Loader	2	7	1.97E-02		0.14
Paving Machine	1	7	8.18E-02		0.57
Roller	1	6	6.11E-02		0.37
Vibratory Plate	1	6	1.31E-03		0.01
Striping Machines	1	6	6.41E-02		0.38
Generator Set	1	7	6.60E-02		0.46
	# of Units	**Miles Per Day**	**EMFAC2007: 2011 Factors Emission Factors (gms/mi)**	**Speed (mph)**	
Mechanic Truck	1	10	0.04	25	0.00088
Fuel Truck	1	10	0.04	25	0.00088
Foreman Truck	1	10	0.04	25	0.00088
Delivery Trucks	10	30	0.035	30	0.023
			Gasoline Emission Factors (gms/mi)		
Worker Commute	40	50	0.02	50	0.088
			Total Painting and Paving		**2**

Notes:

lbs/hr = pounds per hour
lbs/day = pounds per day
gms/mi = grams per mile
PM_{10} = particulate matter less than 10 microns in size

Source: LSA Associates, Inc., 2011.

Construction equipment would operate throughout the site. However, for the purposes of this analysis all diesel truck exhaust was modeled as if it would be generated on a single spot on the site. This technique was used because it generates health risk values that are more conservative than locating equipment emissions throughout the site. The SCREEN3 input parameters are shown in Table IV.C-9. The receptor height was set to approximate the lowest floor occupied by nearby residents (i.e., the ground floor).

Table IV.C-9: SCREEN3 Input Parameters

Source Type	=	Volume
Emission Rate (g/s)	=	1.00
Source Height (m)	=	3.00
Initial Lateral Dimension (m)	=	4.65
Initial Vertical Dimension (m)	=	4.65
Receptor Height (m)	=	2.0
Urban/Rural Option	=	Urban

Notes:

g/s = grams per second
m = meters
Source: LSA Associates, Inc., 2011.

Table IV.C-10 shows the SCREEN3 PM_{10} concentrations at a range of locations using the PM_{10} emission rates from Tables IV.C-8 and IV.C-9. The nearest sensitive receptors would be located approximately 15 feet west of the site. To a certain extent, PM_{10} concentrations increase with distance due to the nature of air dispersion and the plume effect; the peak concentration occurs at a distance of approximately 200 feet (60 meters). (The SCREEN3 model output is included in Appendix B.)

Assuming that the emissions of PM_{10} exactly represent diesel particulate matter, the peak PM_{10} concentration from Table IV.C-8 is translated to the health risk value shown in Table IV.C-10 using the OEHHA methodology as described in the following equations:

Inhalation cancer risk = (Cair * DBR * A * EF * ED * $1x10^{-6}$) / AT * Inhalation Cancer Potency Factor

where:

Cair	=	Concentration of PM_{10} in air
DBR	=	Adult daily breathing rate
A	=	Inhalation absorption factor
EF	=	Exposure frequency
ED	=	Exposure duration
AT	=	Averaging time period over which exposure is averaged in days (25,550 days for a 70-year cancer risk)
CRAF	=	Cancer Risk Adjustment Factor

Source: OEHHA Guidelines, August 2003 and BAAQMD's Recommended Methods for Screening and Modeling Local Risks and Hazards, May 2010

Modeling results were used to determine the annual average concentration of diesel particulate matter in the air during construction activities. For residential risk, the BAAQMD-recommended 80th percentile breathing rate of 302 liters/kg-day was used in the equation and the exposure frequency was assumed to be 350 days per year.[19] Exposure duration was assumed to be 14 months for construction. The inhalation absorption factor was based on the conservative assumption that all pollution would be absorbed. To determine incremental cancer risk, the estimated dose through inhalation was multiplied by the OEHHA-established cancer potency slope factor for diesel particulate matter, which is 1.1 $(mg/kg\text{-}day)^{-1}$. Results include a CRAF of 10.

Non-cancer health risk is based on a hazard index for both acute (short term) and chronic (long term) exposures. The hazard index is established by the OEHHA and is the ratio of the predicted incremental exposure concentration from project emissions to the referenced exposure level (REL) that could cause adverse health effects. The REL is the inhalation exposure concentration at which no adverse health effects would be anticipated following exposure. The OEHHA has established a diesel exhaust chronic REL of 5.0 $\mu g/m^3$. This REL represents the level below which exposure to DPM would not result in adverse health effects.

The chronic risk level is calculated as follows:

Inhalation chronic risk = Cair / Inhalation Chronic REL

where: Cair = annual concentration of DMP and Inhalation Chronic REL = 5.0

[19] Bay Area Air Quality Management District, 2010. *Air Toxics NSR Program Health Risk Screening Analysis Guidelines*. January.

Table IV.C-10: SCREEN3 Modeling Results

Distance From Source (meters)	Inhalation Cancer Risk in One Million	Inhalation Chronic Risk Factor	PM_{10} Concentrations ($\mu g/m^3$)		$PM_{2.5}$ Concentrations ($\mu g/m^3$)	
			24-Hour	Annual	24-Hour	Annual
20	8	0.025	2.7	0.049	2.5	0.046
25	12	0.036	4.0	0.072	3.6	0.066
30	15	0.046	5.0	0.092	4.6	0.084
35	17	0.053	5.8	0.11	5.3	0.097
40	19	0.058	6.3	0.12	5.8	0.11
45	20	0.061	6.7	0.12	6.1	0.11
50	21	0.065	7.1	0.13	6.5	0.12
60	22	0.068	7.5	0.14	6.9	0.13
70	22	0.068	7.4	0.14	6.8	0.12
80	21	0.065	7.1	0.13	6.5	0.12
90	21	0.066	7.2	0.13	6.6	0.12
100	21	0.065	7.1	0.13	6.6	0.12
200	16	0.050	5.5	0.10	5.0	0.091
300	13	0.041	4.5	0.083	4.2	0.077
400	10	0.032	3.5	0.064	3.2	0.058
500	8.2	0.025	2.8	0.051	2.6	0.047
BAAQMD Threshold	10	1.0	NA	NA	NA	0.300
Exceed?	Yes	No	--	--	--	No

Notes:
PM_{10} = particulate matter less than 10 microns in size
$\mu g/m^3$ = micrograms per cubic meter
$PM_{2.5}$ concentrations derived from PM_{10} concentrations using the $PM_{2.5}$ fraction of PM_{10} value of 0.92 from the ARB.
Source: LSA Associates, Inc., 2011.

Acute Emission Impacts. The only TAC expected to be emitted in any substantial quantity on the site is diesel exhaust particulates. Exposure to diesel exhaust can have immediate health effects. Diesel exhaust can irritate the eyes, nose, throat, and lungs, and it can cause coughs, headaches, lightheadedness, and nausea. In studies with human volunteers, diesel exhaust particles made people with allergies more susceptible to the materials to which they are allergic, such as dust and pollen. Exposure to diesel exhaust also causes inflammation in the lungs, which may aggravate chronic respiratory symptoms and increase the frequency or intensity of asthma attacks. However, according to the rulemaking on ARB's Identifying Particulate Emissions from Diesel-Fueled Engines as a Toxic Air Contaminant, the available data from studies of humans exposed to diesel exhaust are not sufficient for deriving an acute noncancer health risk guidance value. Construction of the project would not release emissions with other acute effects. Therefore, the potential for short term acute exposure from construction emissions would be less than significant.

Carcinogenic and Chronic Impacts. The results for carcinogenic and chronic impacts are shown in Table IV.C-10. Results of the analysis indicate that the maximum exposed individual (MEI) within the project construction area would be exposed to an inhalation cancer risk 22 in 1 million, which is greater than the threshold of 10 in 1 million. The maximum chronic hazard index would be 0.068, which is below the threshold of 1.0. Table IV.C-10 also shows that the peak annual concentration of $PM_{2.5}$ from the equipment exhaust of construction operations is 0.13 $\mu g/m^3$, which is below the BAAQMD significance threshold of 0.3 $\mu g/m^3$.

Construction of the proposed project would thus exceed the BAAQMD's significance criterion for cancer risk due to the expected inhalation cancer risk of the MEI. Therefore, the following mitigation measure would be required.

Mitigation Measure AIR-2: Consistent with guidance from the BAAQMD, the following actions shall be required of construction contracts and specifications for the project:

- The construction contractor shall ensure the idling time of diesel-powered construction equipment is 2 minutes or less.
- The construction contractor shall utilize off-road equipment (more than 50 horsepower) used in the construction of the project (i.e., owned, leased, and subcontractor vehicles) that achieves a project wide fleet-average 20 percent nitrogen oxide reduction and 45 percent particulate matter reduction compared to the most recent ARB fleet average. Acceptable options for reducing emissions include the use of late model engines, low-emission diesel products, alternative fuels, engine retrofit technology, after-treatment products, add-on devices such as particulate filters, and/or other options that are available.
- All construction equipment, diesel trucks, and generators shall be equipped with Best Available Control Technology for emission reductions of nitrogen oxides and particulate matter.
- The project construction contractor shall use equipment that meets the ARB's most recent certification standard for off-road heavy duty diesel engines. (LTS)

Implementation of the above mitigation measure would reduce the construction health risk impact to 7.1 in one million, which is below the BAAQMD's toxic air contaminant threshold of 10 in one million. Table IV.C-11 shows health risks after implementation of Mitigation Measure AIR-2. With implementation of Mitigation Measure AIR-2, construction of the proposed project would not expose residents in the project vicinity to substantial toxic air contaminants.

Table IV.C-11: Mitigated Heath Risk Levels

Distance (meters)	70-Year Adult Inhalation Cancer Risk # in a million
20	2.6
25	3.8
30	4.8
35	5.6
40	6.0
45	6.4
50	6.8
60	7.1
70	7.1
80	6.8
90	6.9
100	6.8
200	5.2
300	4.3
400	3.4
500	2.7

Source: LSA Associates, 2011

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