F. 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 traffic generated by 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

A description of existing air quality conditions and air quality standards relevant to Menlo Park and the project site are described below.

a. Air Pollution Climatology. The amount of a given pollutant in the atmosphere is determined by the amount of a pollutant released and the atmosphere's ability to transport and dilute the pollutant. The major determinants of transport and dilution are wind, atmospheric stability, terrain, and for photochemical pollutants, sunshine.

Northwesterly and northerly winds are most common in the project area, reflecting the orientation of San Francisco Bay and the San Francisco Peninsula. Winds from these directions carry pollutants released by autos and factories from upwind areas of the Peninsula toward Menlo Park, particularly during the summer months. Winds are lightest on average in fall and winter, at which time local pollutants tend to build up in the atmosphere.

Pollutants can be diluted by mixing in the atmosphere both vertically and horizontally. Vertical mixing and dilution of pollutants are often suppressed by inversion conditions, when a warm layer of air traps cooler air close to the surface. During the summer, inversions are generally elevated above ground level, but are present over 90 percent of both the morning and afternoon hours. In winter, surface-based inversions dominate in the morning hours, but frequently dissipate by afternoon.

Topography can restrict horizontal dilution and mixing of pollutants by creating a barrier to air movement. The South Bay has significant terrain features that affect air quality. The Santa Cruz Mountains and Diablo Range on either side of the South Bay restrict horizontal dilution, and this alignment of the terrain also channels winds from the north to south, carrying air pollution from the northern Peninsula toward San Jose.

The combined effects of moderate ventilation, frequent inversions that restrict vertical dilution, and terrain that restricts horizontal dilution give Menlo Park a relatively high atmospheric potential for air pollution compared to other parts of the San Francisco Bay Air Basin.

b. Ambient Air Quality Standards. Both the U.S. Environmental Protection Agency (EPA) and the California Air Resources Board (ARB) have established ambient air quality standards for common pollutants. These ambient air quality standards are levels of contaminants which represent safe levels that avoid specific adverse health effects associated with each pollutant. The ambient air quality standards cover what are called “criteria” pollutants (criteria pollutants are described in more

[1] Bay Area Air Quality Management District, 1999. *BAAQMD CEQA Guidelines.*

detail below). These standards are designed to protect the health and welfare of the populace with a reasonable margin of safety. Health effects are progressively more severe as pollutant levels increase from Stage One to Stage Three. Table IV.F-1 lists the health effects of criteria pollutants and the sources of pollutants according to the ARB. These health effects would not occur unless the standards are exceeded by a large margin or for a prolonged period of time. The State Ambient Air Quality Standards (AAQS) are more stringent than the federal AAQS.

The federal and State AAQS are summarized in Table IV.F-2 for important pollutants. The federal and State ambient standards were developed independently with differing purposes and methods, although both processes aim to prevent health-related effects resulting from poor air quality. As a result, the federal and State standards differ in some cases. In general, the State standards are more stringent. This is particularly true for ozone and particulate matter.

The U.S. Environmental Protection Agency established new national air quality standards for ground-level ozone and for fine particulate matter in 1997. The 1-hour ozone standard was phased out and replaced by an 8-hour standard of 0.08 parts per million (ppm). Implementation of the 8-hour standard became effective in July 2005. New national standards for fine particulate matter (diameter 2.5 microns or less) were adopted for 24-hour and annual averaging periods.

In addition to the criteria pollutants discussed above, Toxic Air Contaminants (TACs) are another group of pollutants of concern. TACs are injurious in small quantities and are regulated by the EPA and the ARB despite the absence of criteria documents. Some examples of TACs include: benzene, butadiene, formaldehyde, and hydrogen sulfide. The identification, regulation and monitoring of TACs is relatively recent compared to that for criteria pollutants.

In 1998, ARB identified particulate matter from diesel-fueled engines as a toxic air contaminant. ARB has completed a risk management process that identified potential cancer risks for a range of activities using diesel-fueled engines.[2] High volume freeways, stationary diesel engines, and facilities attracting heavy and constant diesel vehicle traffic (distribution centers, truck stops) were identified as posing the highest risk to adjacent receptors. Other facilities associated with increased risk include warehouse distribution centers, large retail or industrial facilities, high volume transit centers, and schools with a high volume of bus traffic. Health risks from TACs are a function of both concentration and duration of exposure.

c. Air Monitoring Data. Air quality in the region is controlled by the rate of pollutant emissions and meteorological conditions. Meteorological conditions such as wind speed, atmospheric stability, and mixing height may all affect the atmosphere's ability to mix and disperse pollutants. Long-term variations in air quality typically result from changes in air pollutant emissions, while frequent, short-term variations result from changes in atmospheric conditions. The San Francisco Bay Area is considered to be one of the cleanest metropolitan areas in the country with respect to air quality. BAAQMD monitors air quality conditions at more than 30 locations throughout the Bay Area. The closest monitoring station to the project site is in Redwood City. Summarized air pollutant data for this station are shown in Table IV.F-3. This table shows the highest air pollutant concentrations measured at the Redwood City station and in the Bay Area as a whole over the last several years.

[2] California Air Resources Board, 2000. *Risk Reduction Plan to Reduce Particulate Matter Emissions from Diesel-Fueled Engines and Vehicles*. October.

Table IV.F-1: Health Effects of Air Pollutants

Pollutant	Health Effects	Primary Sources
Suspended Particulate Matter ($PM_{2.5}$ and PM_{10})	• Reduced lung function • Aggravation of the effects of gaseous pollutants • Aggravation of respiratory and cardio respiratory diseases • Increased cough and chest discomfort • Soiling • Reduced visibility	• Stationary combustion of solid fuels • Construction activities • Industrial processes • Atmospheric chemical reactions
Ozone (O_3)	• Breathing difficulties • Lung damage	• Formed by chemical reactions of air pollutants in the presence of sunlight; common sources are motor vehicles, industries, and consumer products
Carbon Monoxide (CO)	• Chest pain in heart patients • Headaches, nausea • Reduced mental alertness • Death at very high levels	• Any source that burns fuel such as cars, trucks, construction and farming equipment, and residential heaters and stoves
Lead (Pb)	• Organ damage • Neurological and reproductive disorders • High blood pressure	• Metals processing • Fuel combustion • Waste disposal
Nitrogen Dioxide (NO_2)	• Lung damage	• See carbon monoxide sources
Toxic Air Contaminants	• Cancer • Chronic eye, lung, or skin irritation • Neurological and reproductive disorders	• Cars and trucks, especially diesels • Industrial sources such as chrome platers • Neighborhood businesses such as dry cleaners and service stations • Building materials and products

Source: ARB and EPA, 2005.

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

Pollutant	Averaging Time	California Standards	National Standards [a]	
			Primary [b]	Secondary [c]
Ozone	8-hour	0.070 ppm	0.075 ppm	—
	1-hour	0.09 ppm	—[e]	Same as primary
Carbon monoxide	8-hour	9.0 ppm	9 ppm	—
	1-hour	20 ppm	35 ppm	—
Nitrogen dioxide	Annual	0.03 ppm	0.053 ppm	Same as primary
	1-hour	0.18 ppm	0.030 ppm	—
Sulfur dioxide	Annual	—	0.03 ppm	—
	24-hour	0.04 ppm	0.14 ppm	—
	3-hour	—	—	0.5 ppm
	1-hour	0.25 ppm	—	—
PM_{10}	Annual	20 $\mu g/m^3$	—[f]	Same as primary
	24-hour	50 $\mu g/m^3$	150 $\mu g/m^3$	Same as primary
$PM_{2.5}$	Annual	12 $\mu g/m^3$	15 $\mu g/m^3$	
	24-hour	—	35 $\mu g/m^3$ [f]	
Lead	Calendar quarter	—	1.5 $\mu g/m^3$	Same as primary
	30-day average	1.5 $\mu g/m^3$	—	—

Table notes on following page.

Note: ppm = parts per million and $\mu g/m^3$ = micrograms per cubic meter.
[a] Standards, other than for ozone and those based on annual averages, are not to be exceeded more than once a year. The ozone standard is attained when the expected number of days per calendar year with maximum hourly average concentrations above the standard is equal to or less than one.
[b] Primary Standards: The levels of air quality necessary, with an adequate margin of safety, to protect the public health. Each state must attain the primary standards no later than 3 years after that state's implementation plan is approved by the U.S. EPA.
[c] Secondary Standards: The levels of air quality necessary to protect the public welfare from any known or anticipated adverse effects of a pollutant.
[d] The national 1-hour ozone standard was revoked by U.S. EPA on June 15, 2005. A new 8-hour standard was established in May 2008.
[f] The annual PM_{10} standard was revoked by U.S. EPA on September 21, 2006 and a new $PM_{2.5}$ 24-hour standard was established.
Source: LSA Associates, 2008.

Table IV.F-3: Highest Measured Air Pollutant Concentrations

Pollutant	Average Time	Measured Air Pollutant Levels				
		2003	2004	2005	2006	2007
Redwood City						
Ozone (O_3)	1-Hour	**0.11 ppm**	**0.10 ppm**	0.08 ppm	0.09 ppm	0.08 ppm
	8-Hour	0.08 ppm	0.07 ppm	0.06 ppm	0.06 ppm	0.07 ppm
Carbon Monoxide (CO)	8-Hour	2.6 ppm	2.1 ppm	2.3 ppm	2.4 ppm	2.3 ppm
Nitrogen Dioxide (NO_2)	1-Hour	0.08 ppm	0.06 ppm	0.06 ppm	0.07 ppm	0.06 ppm
	Annual	0.015 ppm	0.015 ppm	0.015 ppm	0.014 pm	0.013 ppm
Respirable Particulate Matter (PM_{10})	24-Hour	38 $\mu g/m^3$	**65 $\mu g/m^3$**	**81 $\mu g/m^3$**	**70 $\mu g/m^3$**	**56 $\mu g/m^3$**
	Annual	20 $\mu g/m^3$	**21 $\mu g/m^3$**	**21 $\mu g/m^3$**	20 $\mu g/m^3$	20 $\mu g/m^3$
Fine Particulate Matter ($PM_{2.5}$)	24-Hour	34 $\mu g/m^3$	36 $\mu g/m^3$	31 ug/m^3	**75 $\mu g/m^3$**	45 $\mu g/m^3$
	Annual	9 $\mu g/m^3$	9 $\mu g/m^3$	9 ug/m^3	10 $\mu g/m^3$	8 $\mu g/m^3$
Bay Area (Basin Summary)						
Ozone (O_3)	1-Hour	**0.12 ppm**	**0.11 ppm**	**0.12 ppm**	**0.12 ppm**	**0.12 ppm**
	8-Hour	**0.10 ppm**	**0.08 ppm**	**0.09 ppm**	**0.11 ppm**	**0.09 ppm**
Carbon Monoxide (CO)	8-Hour	4.0 ppm	3.4 ppm	3.1 ppm	2.9 ppm	2.7 ppm
Nitrogen Dioxide (NO_2)	1-Hour	0.09 ppm	0.07 ppm	0.07 ppm	0.11 ppm	0.07 ppm
	Annual	0.021ppm	0.019ppm	0.019ppm	0.018ppm	0.017ppm
Respirable Particulate Matter (PM_{10})	1-Hour	**60 $\mu g/m^3$**	**65 $\mu g/m^3$**	**81 $\mu g/m^3$**	**73 $\mu g/m^3$**	**78 $\mu g/m^3$**
	Annual	**25 $\mu g/m^3$**	**26 $\mu g/m^3$**	**24 $\mu g/m^3$**	**23 $\mu g/m^3$**	**26 $\mu g/m^3$**
Fine Particulate Matter ($PM_{2.5}$)	24-Hour	56 $\mu g/m^3$	52 $\mu g/m^3$	55 $\mu g/m^3$	**75** $\mu g/m^3$	**58** $\mu g/m^3$
	Annual	12 $\mu g/m^3$	12 $\mu g/m^3$	12 $\mu g/m^3$	11 $\mu g/m^3$	11 $\mu g/m^3$

Note: ppm = parts per million and $\mu g/m^3$ = micrograms per cubic meter
Values reported in **bold** exceed ambient air quality standard
NA = data not available
Source: BAAQMD Air Quality Summaries for 2003, 2004, 2005, 2006, and 2007.

Table IV.F-4 identifies the annual number of days that ambient air quality standards were exceeded at the Redwood City monitoring station for each criteria pollutant.

d. Criteria Air Pollutants. Air quality studies generally focus on five pollutants that are most commonly measured and regulated: carbon monoxide (CO), ground level ozone, nitrogen dioxide (NO_2), sulfur dioxide (SO_2), and suspended particulate matter (i.e., PM_{10} and $PM_{2.5}$). These pollutants are described in more detail below. In San Mateo County, ozone and particulate matter are the pollutants of greatest concern because measured air pollutant levels exceed these concentrations at times.

Table IV.F-4: Annual Number of Days Exceeding Ambient Air Quality Standards

Pollutant	Standard	Monitoring Station	Days Exceeding Standard				
			2003	2004	2005	2006	2007
Ozone (O_3)	NAAQS 1-hr	Redwood City	0	0	X	X	X
		Bay Area	1	0	X	X	X
	NAAQS 8-hr	Redwood City	0	0	0	0	0
		Bay Area	7	0	1	12	1
	CAAQS 1-hr	Redwood City	1	1	0	0	0
		Bay Area	19	7	9	18	4
	CAAQS 8-hr	Redwood City	--	--	0	0	0
		Bay Area	--	--	9	22	9
Fine Particulate Matter (PM_{10})	NAAQS 24-hr	Redwood City	0	0	0	0	0
		Bay Area	0	0	0	0	0
	CAAQS 24-hr	Redwood City	0	1	2	2	1
		Bay Area	6	7	6	15	4
Fine Particulate Matter ($PM_{2.5}$)	NAAQS 24-hr[a]	Redwood City	0	0	0	1	1
		Bay Area	0	1	0	10	14
All Other (CO, NO_2, Lead, SO_2)	All Other	Redwood City	0	0	0	0	0
		Bay Area	0	0	0	0	0

[a] Based on standard of 65 $\mu g/m^3$ that was in place until September 21, 2006, then 35 $\mu g/m^3$ standard adopted in 2006.
X = Standard revoked in 2004.
NA = Data Not Available.
Source: BAAQMD, 2008.

Carbon Monoxide. CO, a colorless and odorless gas, interferes with the transfer of oxygen to the brain. It can cause dizziness and fatigue, and can impair central nervous system functions. CO is emitted almost exclusively from the incomplete combustion of fossil fuels.

The highest CO concentrations measured in Redwood City (the closest air monitoring station to the project site) have been well below the national and State ambient standards. Since the primary source of CO is automobiles, the highest concentrations would be found near congested roadways that carry large volumes of traffic. Carbon monoxide emitted from a vehicle is highest near the origin of a trip and considerably lower when a vehicle is operating in a hot-stabilized mode (usually 5 to 10 minutes into a trip). However, this pattern is different for vehicles of different ages, where older cars require a longer time to reach a hot-stabilized running mode. A vehicle sitting idle for over 1 hour is normally considered to return to a cold start mode. Vehicle operation on freeways is usually in a hot-stabilized mode so the individual emission rates are much lower than those encountered on arterial roadways leading to the freeway. Measured concentrations in the area are below both State and federal ambient air quality standards; however, CO is a localized air pollutant that can be found in high concentrations near the source (e.g., congested roadways).

Ozone. While ozone serves a beneficial purpose in the upper atmosphere (stratosphere) by reducing ultraviolet radiation potentially harmful to humans, when it reaches elevated concentrations in the lower atmosphere it can be harmful to the human respiratory system and to sensitive species of plants. Ozone concentrations build to peak levels during periods of light winds, bright sunshine, and high temperatures. Short-term ozone exposure can reduce lung function in children, make persons susceptible to respiratory infection, and produce symptoms that cause people to seek medical treatment for respiratory distress. Long-term exposure can impair lung defense mechanisms and lead to emphysema and chronic bronchitis. Sensitivity to ozone varies among individuals, but about 20 percent of the population is sensitive to ozone, with exercising children being particularly vulnerable.

Ozone is formed in the atmosphere by a complex series of photochemical reactions that involve "ozone precursors" that are two families of pollutants: oxides of nitrogen (NO_x) and reactive organic gases (ROG). NO_x and ROG are emitted from a variety of stationary and mobile sources. NO_x, a combustion pollutant, includes nitrogen oxide (NO), nitrogen dioxide (NO_2) and nitrous oxide (NO_4). Most NO_x is emitted in the form of NO, but all NO_x can react with ROG to form ozone. While NO_2, an oxide of nitrogen, is another criteria pollutant itself, ROG are not in that category, but are considered in this discussion to be ozone precursors. ROG is a class of organic compounds that react most rapidly in the atmosphere with NO_x to form ozone. Most ROG is emitted through combustion or evaporation. U.S. EPA recently established a new more stringent standard of 0.075 ppm for 8-hour exposures, based on a review of the latest new scientific evidence.

Nitrogen Dioxide. NO_2, a reddish-brown gas, irritates the lungs, and can cause breathing difficulties at high concentrations. Like ozone, NO_2 is not directly emitted, but is formed through a reaction between nitric oxide (NO) and atmospheric oxygen. NO and NO_2 are collectively referred to as nitrogen oxides (NO_x) and are major contributors to ozone formation. NO_2 also contributes to the formation of PM_{10} (see discussion of PM_{10} below). Monitored levels of the pollutant in the Bay Area are well below ambient air quality standards.

Sulfur Oxides. Sulfur oxides, primarily SO_2, are a product of high-sulfur fuel combustion. The main sources of SO_2 are coal and oil used in power stations, in industries, and for domestic heating. SO_2 is a gas that irritates the throat and lungs. It can cause acute respiratory symptoms and diminished ventilator function in children. SO_2 concentrations have been reduced to levels well below the State and national standards, but further reductions in emissions are needed to attain compliance with standards for PM_{10}, to which SO_2 contributes.

PM_{10} and $PM_{2.5}$. Particulate matter pollution consists of very small particles suspended in the air, which can include smoke, soot, dust, salts, acids, and metals. Particulate matter also forms when gaseous pollutants undergo chemical reactions in the atmosphere. Respirable particulate matter (PM_{10}) and fine particulate matter ($PM_{2.5}$) represent particulate matter of different sizes. PM_{10} refers to particulate matter less than 10 microns in diameter and $PM_{2.5}$ refers to particulate matter that is 2.5 microns or less in diameter. $PM_{2.5}$ is generated primarily by diesel fuel combustion (from motor vehicles, power generation, and industrial facilities), residential fireplaces, and wood stoves. PM_{10} includes all $PM_{2.5}$ sources as well as emissions from dust generated by construction, landfills and agriculture, wildfires and brush/waste burning, industrial sources, windblown dust from open lands, and atmospheric chemical and photochemical reactions. PM_{10} and $PM_{2.5}$ pose a greater health risk than larger-size particles because these tiny particles can penetrate the human respiratory system's natural defenses and damage the respiratory tract, increasing the number and severity of asthma attacks, and can cause or aggravate bronchitis and other lung diseases, and reduce the body's ability to fight infections. Whereas larger particles tend to collect in the upper portion of the respiratory system, $PM_{2.5}$ is miniscule and can penetrate deeper into the lungs and damage lung tissues.

Suspended particulates also damage and discolor surfaces on which they settle, as well as produce haze and reduce regional visibility. The U.S. EPA recently adopted a new more stringent standard of 35 $\mu g/m^3$ (micrograms per cubic meter) for 24-hour exposures based on a review of the latest new scientific evidence. At the same time, U.S. EPA revoked the annual PM_{10} standard due to a lack of scientific evidence correlating long-term exposures of ambient PM_{10} with adverse health effects.

e. Attainment Status. The federal Clean Air Act (CAA) and the California CAA of 1988 require that the State ARB, based on air quality monitoring data, designate portions of the State where the federal or State ambient air quality standards are not met as "nonattainment areas." Because of the differences between the national and State standards, the designation of nonattainment areas is different under the federal and State legislation.

Menlo Park is within the jurisdiction of the BAAQMD, which regulates air quality in the San Francisco Bay Area. Air quality conditions in the San Francisco Bay Area have improved significantly since the BAAQMD was created in 1955. Ambient concentrations of air pollutants and the number of days during which the region exceeds air quality standards have fallen dramatically.

However, the Bay Area as a whole does not meet State or federal ambient air quality standards for ground level ozone or State standards for PM_{10} and $PM_{2.5}$. The U.S. EPA designated the entire Bay Area as nonattainment for $PM_{2.5}$ on December 22, 2008. Most nonattainment areas have until 2015 to attain the standards, with some extensions to 2020 possible.

Under the Federal CAA, the U.S. EPA has classified the region as marginally nonattainment for the 8-hour ozone standard. U.S. EPA required the region to attain the standard by 2007. Monitoring data indicate that the Bay Area has met the 8-hour ozone standard of 0.08 ppm that was established in 1997. However, the BAAQMD and ARB have not made a formal redesignation request to U.S. EPA. Recently, U.S. EPA adopted a more stringent 8-hour ozone standard of 0.075 ppm. An attainment designation for this standard will be made by March 2010. An attainment designation for an area signifies that pollutant concentrations did not exceed the standard for a specific pollutant in that area. The Bay Area has met the CO standards for over a decade and is classified attainment maintenance by the U.S. EPA. The U.S. EPA grades the region "unclassified" for all other air pollutants, which include PM_{10} and $PM_{2.5}$.

At the State level, the region is considered under serious nonattainment status for ground level ozone and nonattainment status for PM_{10} and $PM_{2.5}$. As noted above, California ambient air quality standards are more stringent than the national ambient air quality standards. The region is required to adopt plans on a triennial basis that show progress towards meeting the State ozone standard. The area is considered attainment or unclassified for all other pollutants.

f. Bay Area Clean Air Plan. AAQMD, along with the other regional agencies (i.e., Association of Bay Area Governments and the Metropolitan Transportation Commission), has prepared an Ozone Attainment Plan to address the 1-hour NAAQS for ozone. Although U.S. EPA revoked the 1-hour NAAQS, commitments made in the Ozone Attainment Plan, along with emissions budgets, remain valid until the region develops an attainment demonstration/maintenance plan for the 8-hour federal AAQS for ozone. The region will be required to submit a maintenance plan and demonstration of attainment with a request for redesignation to U.S. EPA when the 8-hour ozone federal AAQS is met. A Carbon Monoxide Maintenance Plan was approved in 1998 by U.S. EPA, which demonstrates how the federal AAQS for CO standard would be maintained.

Air quality plans addressing the California Clean Air Act are developed about every 3 years. The plans are meant to demonstrate progress toward meeting the more stringent 1-hour ozone State AAQS. The latest plan, which was adopted in January 2006, is called the Bay Area 2005 Ozone Strategy. This plan includes a comprehensive strategy to reduce emissions from stationary, area, and

mobile sources. The plan indicates how the region would make progress toward attaining the stricter State air quality standards, as mandated by the California CAA. The plan is designed to achieve a region-wide reduction of ozone precursor pollutants through the expeditious implementation of all feasible measures. The plan proposes expanded implementation of transportation control measures (TCMs) and programs such as Spare the Air. Spare the Air is a public outreach program designed to educate the public about air pollution in the Bay Area and promote individual behavior changes that improve air quality. Some of these measures or programs rely on local governments for implement-tation.

The clean air planning efforts for ozone will also reduce PM_{10} and $PM_{2.5}$, since a substantial amount of these air pollutants come from combustion emissions such as vehicle exhaust. In addition, BAAQMD adopts and enforces rules to reduce particulate matter emissions and develops public outreach programs to educate the public to reduce PM_{10} and $PM_{2.5}$ emissions (e.g., Spare the Night Program). Senate Bill (SB) 656 requires further action by ARB and air districts to reduce public exposure to PM_{10} and $PM_{2.5}$.

g. Sensitive Receptors and Toxic Air Contaminant Sources. The BAAQMD defines sensitive receptors as facilities where sensitive population groups (children, elderly, acutely and/or chronically ill) are likely to be located. These land uses include residences, schools, playgrounds, child care centers, retirement homes, convalescent homes, hospitals, and medical clinics. The site currently contains no sensitive receptors. However, senior housing is located immediately adjacent to the project site off of Glenwood Avenue. In addition, residential uses are planned on the Derry Lane site, east of the project site.

The latest inventory of major Toxic Air Contaminant (TAC) sources prepared by the BAAQMD shows no major industrial sources in the vicinity of the project site.[3] ARB reports that recent air pollution studies have shown that diesel exhaust and other cancer-causing toxic air contaminants emitted from vehicles are responsible for much of the overall cancer risk from TACs in California. Particulate matter emitted from diesel-fueled engines (diesel particulate matter (DPM)) was found to comprise much of that risk. In August 1998, ARB formally identified DPM as a TAC. Diesel particulate matter is of particular concern since it can be distributed over large regions, thus leading to widespread public exposure. Diesel engines emit particulate matter at a rate about 20 times greater than comparable gasoline engines. The vast majority of diesel exhaust particles (over 90 percent) consist of $PM_{2.5}$, which are particles that can be inhaled deep into the lungs. Like other particles of this size, a portion will eventually become trapped within the lungs, possibly leading to adverse health effects. While the gaseous portion of diesel exhaust also contains TACs, ARB's 1998 action was specific to DPM, which accounts for much of the cancer-causing potential from diesel exhaust. California has adopted a comprehensive diesel risk reduction program to reduce DPM emissions 85 percent by 2020. The U.S. EPA and CARB adopted low sulfur diesel fuel standards in 2006 that would reduce diesel particulate matter substantially. The railroad tracks to the north of the project site are a source of diesel emissions, although diesel concentrations immediately adjacent to the project site are not expected to be substantial based on the volume of train traffic and low rates of idling. Smoke from residential wood combustion can also be a source of TACs. Wood smoke is typically emitted during wintertime, when dispersion conditions are poor. Localized high TAC concentrations can result when cold stagnant air traps smoke near the ground and, with no wind, the pollution can

[3] Bay Area Air Quality Management District, 2003. *Toxic Air Contaminant Control Program Annual Report 2003.*

persist for many hours, especially in sheltered valleys during winter. Wood smoke also contains a significant amount of PM_{10} and $PM_{2.5}$. Wood smoke is an irritant and is implicated in worsening asthma and other chronic lung problems.

Currently, BAAQMD is proposing a rule to address residential wood burning. The rule would restrict operation of any indoor or outdoor fireplace, fire pit, wood or pellet stove, masonry heater or fireplace insert on specific days during the winter when air quality conditions are forecasted to exceed the federal AAQS for $PM_{2.5}$. The proposed rule would also limit excess visible emissions from wood burning devices and require clean burning technology for wood burning devices sold (or resold) or installed in the Bay Area.

2. Impacts and Mitigation Measures

This section analyzes the impacts related to air quality that could result from implementation of the proposed project. This discussion begins with criteria of significance, which establish the thresholds for determining whether a project impact is significant. The latter part of this section presents the potential air quality impacts associated with the proposed project. Mitigation measures are provided as appropriate.

The project would affect air quality both during construction and operation. Operational impacts would be mainly indirect (related to vehicle trips generated by proposed land uses within the project site). The project would also result in diversion of traffic on a changed roadway network (the Garwood Way extension), which would affect air quality locally.

a. Criteria of Significance. The document *BAAQMD CEQA Guidelines—Assessing the Air Quality Impacts of Projects and Plans*[4] provides the following definitions of a significant air quality impact:

(1) Construction Impacts. The BAAQMD does not consider construction impacts to be significant if the District's control measures for construction emissions for PM_{10} are implemented.

(2) Project Operation Impacts. The project would result in a significant air quality impact if it would:

- Violate the District's air quality standards or contribute substantially to an existing or projected air quality violation by:
  - Contributing to CO concentrations exceeding the State ambient air quality standards of 9 ppm averaged over 8 hours and 20 ppm for 1 hour; or
  - Generating criteria air pollutant emissions of ROG, NO_x, or PM_{10} in excess of 15 tons per year, or 80 pounds per day (*Air Quality Criterion A*).
- Frequently expose members of the public to objectionable odors (*Air Quality Criterion B*).
- Expose sensitive receptors (including residential areas) or the general public to toxic air contaminants in excess of the following thresholds:

[4] Bay Area Air Quality Management District, 1999. op. cit.

- Probability of contracting cancer for the Maximally Exposed Individual (MEI) exceeds 10 in 1,000,0000; or
- Ground-level concentrations of non-carcinogenic toxic air contaminants would result in a Hazard Index greater than one for the MEI (*Air Quality Criterion C*).

- Result in a cumulative air quality impact. Projects that would individually have a significant air quality impact due to project operations would also result in a cumulative air quality impact. For projects that do not individually have significant operational air quality impacts, a cumulative impact would result if the project would cause the City's General Plan to conflict with the Clean Air Plan (CAP) or (if the City's General Plan is already inconsistent with the CAP), the project would combine with other reasonably foreseeable future projects to either: (1) exceed the BAAQMD individual operational thresholds of significance, or (2) exceed the CAP population and vehicle miles traveled (VMT) assumptions for growth in the City or County (*Air Quality Criterion D*).

b. Less-Than-Significant Impacts. The less-than-significant impacts associated with the proposed project are discussed below.

(1) Carbon Monoxide Effects of Traffic (Criterion A). A screening form of the CALINE-4 computer simulation model was applied to select intersections near the project site. The model results were used to predict the maximum 1-hour and 8-hour concentrations of CO, corresponding to the 1-hour and 8-hour averaging times specified in the State and federal AAQS for CO. The screening model and the assumptions made in its use for this project are described in Appendix B of this EIR.

Table IV.F-5 shows the results of the CALINE-4 analysis for the peak 1-hour and 8-hour average air pollutant concentration periods in parts per million (ppm). The 1-hour peak period represents the highest average pollutant concentration during any given day, and does not correspond to a certain hour (e.g., 4:00 to 5:00 p.m.) or a specific day. The 1-hour values are to be compared to the federal 1-hour standard of 35 ppm and the State standard of 20 ppm. The 8-hour values in Table IV.F-5 are to be compared to the State and federal standards of 9 ppm. Because new project traffic would not cause any new violations of the 8-hour standards or 1-hour standards for carbon monoxide, or contribute substantially to an existing or projected violation, project impacts on local carbon monoxide concentrations are considered to be less than significant.

(2) Long-Term Project-Related Regional Emissions (Criterion A). Long-term air emission impacts are those associated with stationary sources and mobile sources involving any change related to the proposed project. Stationary source emissions result from the consumption of natural gas and electricity. Mobile source emissions result from vehicle trips generated by the project which affect the entire San Francisco Bay Air Basin. Regional emissions associated with the project's stationary and mobile sources were calculated using the URBEMIS model. URBEMIS output sheets are included in Appendix B.

Table IV.F-5: Worst-Case CO Concentrations Near Selected Intersections (in Parts Per Million (PPM))[a]

Intersection	Existing (2005)		Near-Term Baseline[b] (No Project)		Near-Term + Project[b]		Long-Term Baseline[b] (No Project)		Long-Term + Project[b]	
	1-hr	8-hr	1-hr	8-hr	1-hr	8-hr	1-hr	8-hr	1-hr	8-hr
El Camino Real & Menlo	6.76	4.16	7.00	4.40	7.01	4.41	7.15	4.55	7.17	4.57
El Camino Real & Glenwood	6.78	4.18	7.03	4.43	7.12	4.52	7.18	4.58	7.12	4.52
El Camino Real & Oak Grove	6.74	4.14	7.00	4.40	7.17	4.57	7.14	4.54	7.31	4.71
El Camino Real & Santa Cruz	6.62	4.02	6.89	4.29	6.99	4.39	7.01	4.41	7.13	4.53
El Camino Real & Menlo	7.21	4.61	7.55	4.95	7.62	5.02	7.81	5.21	7.80	5.20
El Camino Real & Robel	7.23	4.63	7.57	4.97	7.62	5.02	7.73	5.13	7.80	5.20
El Camino Real & Middle Ave.	7.22	4.62	7.54	4.94	7.59	4.99	7.71	5.11	7.76	5.16
El Camino Real & Cambridge	7.31	4.71	7.63	5.03	7.67	5.07	7.80	5.20	7.85	5.25
Valparaiso & University	5.50	2.90	5.55	2.95	5.56	2.96	5.60	3.00	5.61	3.01
Ravenswood & Alma Street	5.04	2.44	5.07	2.47	5.11	2.51	5.09	2.49	5.13	2.53
Oak Grove & Alma Street	5.25	2.65	5.33	2.73	5.35	2.75	5.35	2.75	5.39	2.79
Glenwood & Garwood	5.33	2.73	5.39	2.79	5.44	2.84	5.41	2.81	5.48	2.88
Oak Grove & Garwood	5.85	3.25	6.00	3.40	6.12	3.52	6.08	3.48	6.08	3.48
Glenwood & Laurel	5.08	2.48	5.11	2.51	5.17	2.57	5.13	2.53	5.19	2.59
Oak Grove & Laurel	5.27	2.67	5.33	2.73	5.35	2.75	5.35	2.75	5.39	2.79
Ravenswood & Laurel	5.74	3.14	5.88	3.28	5.89	3.29	5.94	3.34	5.95	3.35
Middlefield & Willow Road	5.89	3.29	6.12	3.52	6.13	3.53	6.21	3.61	6.23	3.63
Middlefield & Ridgewood	5.74	3.14	5.90	3.30	5.91	3.31	5.99	3.39	6.00	3.40
Middlefield Road & Ravenswood	5.74	3.14	5.90	3.30	5.92	3.32	5.99	3.39	6.02	3.42
Middlefield Road & Oak Grove Road	5.82	3.22	6.00	3.40	6.05	3.45	6.09	3.49	6.14	3.54
Middlesfield Road & Glenwood Ave.	5.91	3.31	6.11	3.51	6.16	3.56	6.21	3.61	6.26	3.66
Middlefield Road & Marsh Road	5.96	3.36	6.12	3.52	6.20	3.60	6.26	3.66	6.31	3.71
Most Stringent Standard	**20.0**	**9.0**	**20.0**	**9.0**	**20.0**	**9.0**	**20.0**	**9.0**	**20.0**	**9.0**
Exceed Standard?	**No**	**No**	**No**	**No**	**No**	**No**	**No**	**No**	**No**	**No**

[a] Includes ambient 1-hour concentration of 4.4 ppm and ambient 8-hour concentration of 2.2 ppm. Measured at the 897 Barron Ave., Redwood City, CA, Air Quality Monitoring Station (San Mateo County). Source: www.epa.gov/air/data
Source: LSA Associates, Inc., 2007.

The incremental daily emission increase associated with project operational trip generation is identified in Table IV.F-6 for reactive organic gases (ROG), nitrogen oxides (NO_x) (two precursors of ozone), and coarse particulate matter (PM_{10}). The BAAQMD has established thresholds of significance for ozone precursors and fugitive dust of 80 pounds per day. Proposed project emissions shown in Table IV.F-6 would not exceed these thresholds of significance, and therefore the proposed project would have a less-than-significant effect on regional air quality.

Table IV.F-6: Project Regional Emissions in Pounds Per Day

	Reactive Organic Gases	Nitrogen Oxides	PM_{10}
Project Emissions	47.5	74.8	75.7
BAAQMD Significance Threshold	**80.0**	**80.0**	**80.0**
Exceed Threshold?	**No**	**No**	**No**

Source: LSA Associates, Inc., 2007.

(3) Odor Impacts (Criterion B). The project would not contain any major sources of odor, and would not be located in an area with existing odors. As a result, it would not have the potential to frequently expose members of the public to objectionable odors.

(4) Toxic Air Contaminants (Criterion C). Implementation of the proposed project would not result in any new sources of Toxic Air Contaminants. However, the proposed project would be located near the Caltrain railroad tracks, which are an existing source of toxic air contaminants. Diesel concentrations immediately adjacent to the project site are not expected to be substantial based on the volume of train traffic and low rates of idling. The proposed project does not include residential uses which are considered sensitive receptors. Effects from toxic air contaminants are long term and carcinogenic, generally measured over a 70-year period. Because the project does not include the construction of residential uses, the project would not have the potential to expose sensitive receptors to substantial levels of toxic air contaminants and would be deemed to have a less-than-significant impact.

(5) Clean Air Plan (Criterion D). According to the *BAAQMD CEQA Guidelines*, any proposed project that would individually have a significant air quality impact would also be considered to have a significant cumulative air quality impact. Table IV.F-6 shows that the operational emissions of ROG, NOx and PM_{10} due to project-related traffic estimates based on the ARB model URBEMIS2007 would be less than the significance threshold of 80 pounds per day. For projects that individually have a less-than-significant impact on regional air quality, the BAAQMD Guidelines state that the cumulative impact should be determined based on the project's consistency with the applicable local Clean Air Plan, in this case, the 2005 Bay Area Ozone Strategy. For a project to be consistent with the 2005 Bay Area Ozone Strategy, the project must not conflict with or obstruct its implementation, and should be consistent with its underlying growth assumptions (i.e., the ABAG Projections 2003 forecasts, which are based on land use projections made by local jurisdictions (e.g., General Plan process)).

The proposed project is an urban infill project that would replace space formally used as a car dealership. The project responds to long-term market demand for commercial and office development in Menlo Park, based on projected population growth within the City. In this way, the proposed project is consistent with growth anticipated under the City's General Plan and falls within the population projections prepared by ABAG. No General Plan amendments would be required as part of the project. In addition, no direct population growth would result from the proposed project. As a result, the project would not conflict with the 2005 Bay Area Ozone Strategy.

c. Significant Air Quality Impacts. Two significant air quality impacts related to construction-period emissions and the nearby train operations would result from implementation of the project, as described below.

<u>Impact AIR-1</u>: Demolition and construction-period activities would generate significant dust, exhaust, and organic emissions. (S)

The proposed project would require demolition of existing buildings and excavation/removal of substantial amounts of soil from the site. The physical demolition of existing structures and excavation of soil and other infrastructure improvements are construction activities with a high potential for creating air pollutants. In addition to the dust created during demolition and excavation, substantial dust emissions could be created as debris and soil are loaded into trucks for disposal.

After removal of existing structures, construction dust would continue to affect local air quality during construction of the project. Construction activities would generate exhaust emissions from vehicles/equipment and fugitive particulate matter emissions that would affect local air quality. Construction activities are also a source of organic gas emissions. Solvents in adhesives, non-water based paints, thinners, some insulating materials, and caulking materials would evaporate into the atmosphere and would participate in the photochemical reaction that creates urban ozone. Asphalt used in paving is also a source of organic gases for a short time after its application.

Construction dust could affect local air quality during implementation of the project. The dry, windy climate of the area during the summer months creates a high potential for dust generation. The effects of construction activities would be increased dust fall and locally elevated levels of particulate matter downwind of construction activity. Construction dust has the potential for creating a nuisance to nearby properties, including the senior residential uses to the west of the site.

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

Demolition. The following controls shall be implemented during demolition:

- Watering shall be used to control dust generation during demolition of structures and break-up of pavement.
- Cover all trucks hauling demolition debris from the site.
- Use dust-proof chutes to load debris into trucks whenever feasible.

Construction. The following controls shall be implemented at all construction sites:

- Water all active construction areas at least twice daily and more often during windy periods; active areas adjacent to existing land uses shall be kept damp at all times, or shall be treated with non-toxic stabilizers or dust palliatives;
- Cover all trucks hauling soil, sand, and other loose materials or require all trucks to maintain at least 2 feet of freeboard;
- Pave, apply water three times daily, or apply (nontoxic) soil stabilizers on all unpaved access roads, parking areas, and staging areas at construction sites;
- Sweep daily (with water sweepers) all paved access roads, parking areas, and staging areas at construction sites; water sweepers shall vacuum up excess water to avoid runoff-related impacts to water quality;
- Sweep streets daily (with water sweepers) if visible soil material is carried onto adjacent public streets;
- Apply nontoxic soil stabilizers to inactive construction areas;
- Enclose, cover, water twice daily, or apply non-toxic soil binders to exposed stockpiles (dirt, sand, etc.);
- Limit traffic speeds on unpaved roads to 15 mph;
- Install sandbags or other erosion control measures to prevent silt runoff to public roadways;
- Replant vegetation in disturbed areas as quickly as possible;

- Install wheel washers for all exiting trucks, or wash off the tires or tracks of all trucks and equipment leaving the site; and
- Suspend excavation and grading activity when winds (instantaneous gusts) exceed 25 mph.

Implementation of these mitigation measures would reduce construction period air quality impacts to a less-than-significant level. (LTS)

Impact AIR-2: Construction of the project would exacerbate the nonattainment of air quality standards for PM_{10}, $PM_{2.5}$, and ozone within the subregion and Basin and contribute to cumulative adverse air quality impacts. (S)

Implementation of the proposed project could significantly contribute to cumulative air quality impacts (*Criterion D*). A number of individual projects in the Menlo Park area may be under construction simultaneously with the proposed project. Depending on construction schedules and actual implementation of projects in the area, generation of fugitive dust and pollutant emissions during construction may result in substantial short-term increases in air pollutants. This would be a contribution to short-term cumulative air quality impacts. However, each individual project would be subject to the BAAQMD rules and regulations and other mitigation requirements during the construction process.

Currently, at the State level, the region is considered under serious nonattainment status for ground level ozone and nonattainment status for PM_{10} and $PM_{2.5}$. Construction of the proposed project, in conjunction with other planned developments within the cumulative study area and the subregion, would contribute to the existing nonattainment status. Thus, the proposed project would exacerbate nonattainment of air quality standards within the subregion and Basin and contribute to adverse cumulative air quality impacts.

Implementation of Mitigation Measure AIR-2 would reduce the overall contribution of the project to cumulative air quality impacts to a less-than-significant level.

Mitigation Measure AIR-2: Implement Mitigation Measure AIR-1. (LTS)