12. AIR QUALITY

This EIR chapter describes the impacts of the proposed Downtown Precise Plan and the potential Plan-facilitated buildout scenarios (Maximum Intensity and Moderate Intensity) on local and regional air quality. The chapter was prepared using methodologies and assumptions recommended within the air quality impact assessment guidelines of the Bay Area Air Quality Management District (BAAQMD).[1] In keeping with these guidelines, the chapter describes existing air quality, potential short-term construction-related impacts, potential direct and indirect long-term emissions associated with the Plan-facilitated buildout scenarios, the impacts of these emissions on both the local and regional scale, and mitigation measures warranted to reduce or eliminate any identified significant impacts.

12.1 SETTING

12.1.1 Air Basin Characteristics

The amount of a given pollutant in the atmosphere is determined by the amount of 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.

The project area is located in Redwood City, San Mateo County. Its location near San Francisco Bay strongly influences on the climate and air quality of the area. Bay breezes from the north dominate the area during the spring and summer months. The dominance of the Bay or sea breeze results in a mild climate. Low clouds during the late night and early morning are common in spring and summer.

The prevailing wind direction is from the southwest. Average wind speed (measured in nearby Palo Alto) is 11.1 miles per hour annually, with June having the highest average wind speed and December having the lowest.[2] The Precise Plan area often experiences persistent afternoon winds in the spring and summer months.

Temperatures are mild. January is the coolest month with an average maximum temperature of 58 degrees F, while July and August are the warmest with an average maximum of 81 degrees F. Precipitation is about 20 inches per year.

The pollution potential of the Plan area is moderate compared to other portions of the Bay Area. Ventilation is relatively good; however, pollutant transport from upwind urban areas is common.

[1]Bay Area Air Quality Management District. BAAQMD CEQA Air Quality Guidelines; April 1996 (Revised December 1999).

[2]Western Regional Climate Center, http://www.wrcc.dri.edu/htmlfiles/westwind.final.html

During periods of light or calm winds, which typically occur in the fall and winter months, the entire Bay Area air basin is subject to stagnation and poor air quality.

12.1.2 Current Regulatory Environment

The Federal Clean Air Act (CAA) governs air quality in the United States. In addition to being subject to federal requirements, air quality in California is also governed by more stringent regulations under the California Clean Air Act. At the federal level, the United States Environmental Protection Agency (EPA) administers the Clean Air Act. The California Clean Air Act is administered by the California Air Resources Board (CARB) and by the Air Quality Management Districts at the regional and local levels. The Bay Area Air Quality Management District (BAAQMD) regulates air quality at the regional level, which includes the nine-county Bay Area.

(a) United States Environmental Protection Agency (EPA). The EPA is responsible for enforcing the federal CAA. The EPA is also responsible for establishing the National Ambient Air Quality Standards (NAAQS). The NAAQS are required under the 1977 Clean Air Act and subsequent amendments. The EPA regulates emission sources that are under the exclusive authority of the federal government, such as aircraft, ships, and certain types of locomotives. The agency has jurisdiction over emission sources outside state waters (e.g., beyond the outer continental shelf) and establishes various emission standards, including those for vehicles sold in states other than California. Automobiles sold in California must meet the stricter emission standards established by the CARB.

(b) California Air Resources Board (CARB). In California, the CARB, which is part of the California Environmental Protection Agency, is responsible for meeting the state requirements of the federal Clean Air Act, administering the California Clean Air Act, and establishing the California Ambient Air Quality Standards (CAAQS). The California Clean Air Act, as amended in 1992, requires all air districts in the State to endeavor to achieve and maintain the CAAQS. The CARB regulates mobile air pollution sources, such as motor vehicles. The agency is responsible for setting emission standards for vehicles sold in California and for other emission sources, such as consumer products and certain off-road equipment. The CARB established passenger vehicle fuel specifications, which became effective on March 1996. The CARB oversees the functions of local air pollution control districts and air quality management districts, which in turn administer air quality activities at the regional and county level.

(c) Bay Area Air Quality Management District (BAAQMD). In 1955, the California Legislature created the BAAQMD. The agency's role is to achieve clean air to protect public health and the environment, with a primary responsibility of attaining and maintaining national and California ambient air quality standards. The BAAQMD is also responsible for adopting and enforcing rules and regulations concerning air pollutant sources, issuing permits for stationary sources of air pollutants, inspecting stationary sources of air pollutants, responding to citizen complaints, monitoring ambient air quality and meteorological conditions, awarding grants to reduce motor vehicle emissions, and conducting public education campaigns, as well as many other activities. The BAAQMD has jurisdiction over much of the nine-county Bay Area counties, including San Mateo County.

12.1.3 Air Pollutants and Ambient Standards

Air pollutant levels are typically described in terms of "concentrations," which refers to the amount of pollutant material per volumetric unit of air. Concentrations are measured in parts per million (ppm) or micrograms per cubic meter ($\mu g/m^3$). The federal and California Clean Air Acts have established ambient air quality standards for different pollutants. NAAQS were established by the federal Clean Air Act for six criteria pollutants, including ozone (O_3), carbon monoxide (CO), nitrogen dioxide (NO_2), sulfur dioxide (SO_2), particulates (PM_{10} and $PM_{2.5}$), and lead (Pb). Pollutants regulated under the California Clean Air Act are similar to those regulated under the Federal Clean Air Act. The federal and California ambient air quality standards are summarized in Table 12.1. The CAAQS are generally more stringent than the corresponding federal standards and incorporate additional standards for sulfates, hydrogen sulfide, vinyl chloride, and visibility-reducing particles. Both the EPA and the CARB review ambient air quality standards on a regular basis and make necessary adjustments in response to updated scientific information.

(a) Ozone (O_3). Ground-level ozone is the principal component of smog. Ozone is not directly emitted into the atmosphere, but instead forms through a photochemical reaction of reactive organic gases (ROG) and nitrogen oxides (NO_X), which are known as ozone precursors. Ozone levels are highest from late spring through autumn when precursor emissions are high and meteorological conditions are warm and stagnant. Motor vehicles create the majority of reactive organic gas and nitrogen oxide emissions in the South Bay region.

Exposure to levels of ozone above current ambient air quality standards can lead to human health effects such as lung inflammation and tissue damage and impaired lung functioning. Ozone exposure is also associated with symptoms such as coughing, chest tightness, shortness of breath, and the worsening of asthma symptoms. The greatest risk for harmful health effects belongs to outdoor workers, athletes, children, and others who spend greater amounts of time outdoors during smoggy periods. Elevated ozone levels can reduce crop and timber yields, as well as damage native plants. Ozone can also damage materials such as rubber, fabrics, and plastics.

In April 2005, the CARB approved a new eight-hour standard of 0.070 ppm and retained the one-hour ozone standard of 0.09 ppm after an extensive review of the scientific literature. Evidence from the reviewed studies indicate that significant harmful health effects could occur among both adults and children if exposed to levels above these standards.

(b) Carbon Monoxide (CO). CO is a non-reactive pollutant that is highly toxic, invisible, and odorless. It is formed by the incomplete combustion of fuels. The largest sources of CO emissions are motor vehicles, wood stoves, and fireplaces. Unlike ozone, CO is directly emitted to the atmosphere. The highest CO concentrations occur during the nighttime and early mornings in late fall and winter. CO levels are strongly influenced by meteorological factors such as wind speed and atmospheric stability.

The health threat from elevated ambient levels of CO is most serious for those who suffer from heart disease, like angina, clogged arteries, or congestive heart failure. For a person with heart disease, a single exposure to CO at relatively low levels may cause chest pain and reduce that person's ability to exercise; repeated exposure may contribute to other cardiovascular effects. High levels of CO can affect even healthy people. People who breathe high levels of CO can

Table 12.1
FEDERAL AND STATE AMBIENT AIR QUALITY STANDARDS

Pollutant	Averaging Time	Federal Primary Standard[1]	State Standard[2]
Ozone (O_3)	1-Hour	---	0.09 PPM
	8-Hour	0.08 PPM	0.07 PPM
Carbon Monoxide (CO)	8-Hour	9.0 PPM	9.0 PPM
	1-Hour	35.0 PPM	20.0 PPM
Nitrogen Dioxide (NO_2)	Annual Average	0.05 PPM	---
	1-Hour	---	0.25 PPM
Sulfur Dioxide (SO_2)	Annual Average	0.03 PPM	---
	24-Hour	0.14 PPM	0.05 PPM
	1-Hour	---	0.25 PPM
Particulates (PM_{10})	Annual Average	50 ug/m3	20 ug/m3
	24-Hour	150 ug/m3	50 ug/m3
Particulates ($PM_{2.5}$)	Annual Average	15 ug/m3	12 ug/m3
	24-Hour	65 ug/m3	--
Lead (Pb)	3 month	1.5 ug/m3	--
	30 day	--	1.5 ug/m3

SOURCE: California Air Resources Board, Ambient Air Quality Standards (5/17/05) and http://www.arb.ca.gov.aqs/aaqs2.pdf.

ppm = Parts Per Million, ug/m3 = Micrograms Per Cubic Meter

[1] National standards other than for ozone and those based on annual averages or annual arithmetic means are not to be exceeded more than once a year.

[2] California standards for ozone, carbon monoxide (except Lake Tahoe), sulfur dioxide (1-hour and 24-hour), nitrogen dioxide, and PM_{10} are values that are not to be exceeded. The standards for lead are not to be equaled or exceeded. If the standard is for a 1-hour, 8-hour or 24-hour average, then some measurements may be excluded. In particular, measurements are excluded that CARB determines would occur less than once per year on the average.

develop vision problems, reduced ability to work or learn, reduced manual dexterity, and difficulty performing complex tasks. At extremely high levels, CO is poisonous and can cause death. CO levels measured in the Bay Area are well below the health-based standards.

(c) Nitrogen Dioxide (NO_2). NO_2 is an essential ingredient in the formation of ground-level ozone pollution. NO_2 is one of the nitrogen oxides (NO_x) emitted from high-temperature combustion processes, such as those occurring in trucks, cars, and power plants. Home heaters and gas stoves also produce NO_2 in indoor settings.

Besides causing adverse health effects, NO_2 is responsible for the visibility reducing reddish-brown tinge seen in smoggy air in California. NO_2 is a reactive, oxidizing gas capable of damaging cells lining the respiratory tract. Studies suggest that NO_2 exposure to levels near the current standard may worsen the effect of allergens in allergic asthmatics, especially in children. Due to potential health effects at or near the current air quality standard, CARB staff recommended that the state ambient air quality standard for NO_2 should be a high priority for review. The staff has completed their scientific literature review on nitrogen dioxide and recommended revisions to the standard. Levels measured in the Bay Area are well below current or CARB-recommended standards.

(d) Sulfur Dioxide (SO_2). SO_2 is a colorless gas with a pungent, irritating odor. Its major sources are diesel vehicle exhaust, oil-powered power plants, and various industrial processes. SO_2 can aggravate "chronic obstruction" lung disease and increase the risk of acute and chronic respiratory disease.

(e) Particulate Matter (PM_{10} and $PM_{2.5}$). Particulate matter (PM) is a complex mixture of tiny particles that consists of dry solid fragments, solid cores with liquid coatings, and small droplets of liquid. These particles vary greatly in shape, size, and chemical composition, and can be made up of many different materials such as metals (including lead), soot, soil, and dust. Particles 10 microns or less in diameter are defined as "respirable particulate matter" or "PM_{10} ".

Fine particles are 2.5 microns or less in diameter ($PM_{2.5}$) and can contribute significantly to regional haze and reduction of visibility. Inhalable particulates come from smoke, dust, aerosols, and metallic oxides. Although particulates are found naturally in the air, most particulate matter found in the Bay Area are emitted either directly or indirectly by motor vehicles, industry, construction, agricultural activities, and wind erosion of disturbed areas. Most $PM_{2.5}$ is comprised of combustion products such as smoke.

Extensive research reviewed by the CARB indicates that exposure to outdoor PM_{10} and $PM_{2.5}$ levels exceeding current ambient air quality standards is associated with increased risk of hospitalization for lung and heart-related respiratory illness, including emergency room visits for asthma. PM exposure is also associated with increased risk of premature deaths, especially in the elderly and people with pre-existing cardiopulmonary disease. In children, studies have shown associations between PM exposure and reduced lung function and increased respiratory symptoms and illnesses. Besides reducing visibility, the acidic portion of PM (nitrates, sulfates) can harm crops, forests, and aquatic and other ecosystems.

In June 2002, the CARB adopted new ambient air quality standards for PM_{10} and $PM_{2.5}$, resulting from an extensive review of the health-based scientific literature.

(f) Toxic Air Contaminants (TAC). TACs are a broad class of compounds known to cause morbidity or mortality (usually because they cause cancer or serious illness) and include, but are not limited to, the criteria air pollutants listed above. TACs are found in ambient air, especially in urban areas, and are caused by industry, agriculture, fuel combustion, and commercial operations (e.g., dry cleaners). TACs are typically found in low concentrations, even near their source (e.g., benzene near a freeway). Because chronic exposure can result in adverse health effects, TACs are regulated at the regional, state, and federal level. The identification, regulation, and monitoring of TACs is relatively new compared to that for criteria air pollutants that have established ambient air quality standards. TACs are regulated or evaluated on the basis of risk to human health rather than comparison to an ambient air quality standard or emission-based threshold.

(g) Diesel Exhaust. Diesel exhaust is the predominant TAC in urban air, with the potential to cause cancer. It is estimated to represent about two-thirds of the cancer risk from TACs (based on the statewide average). According to the CARB, diesel exhaust is a complex mixture of gases, vapors, and fine particles. This complexity makes the evaluation of health effects of diesel exhaust a complex scientific issue. Some of the chemicals in diesel exhaust, such as benzene and formaldehyde, have been previously identified as TACs by the CARB, and are listed as carcinogens either under the state's Proposition 65 or under the federal Hazardous Air Pollutants programs. California has adopted a comprehensive diesel risk reduction program. The EPA and CARB have adopted low sulfur diesel fuel standards that will reduce diesel particulate matter substantially. These standards went into effect in June 2006.

12.1.4 Current Air Quality

The BAAQMD operates a network of monitoring sites throughout the Bay Area, including a site adjacent to Redwood City at 897 Barron Avenue (in North Fair Oaks), about 1.25 miles southeast of City Hall. Table 12.2 summarizes air quality data from this monitoring site during the five-year period 2001-2005. Table 12.3 shows the number of days that the state or federal standard was exceeded for several major pollutants, both in Redwood City and throughout the Bay Area.

(a) Redwood City. As shown in Tables 12.2 and 12.3, the ambient air quality standards are met in Redwood City on most days. From 2001-2005, the state ozone (O_3) standard was exceeded in Redwood City on 0 or 1 day per year; federal ozone standards were not exceeded during the previous five years. PM_{10} and $PM_{2.5}$ are measured every sixth day, and the state PM_{10} standard was exceeded on 0 to 4 measurement days per year (equating to 0 to 24 days of exceedances per year); the federal $PM_{2.5}$ standard was not exceeded.

(b) San Francisco Bay Air Basin. The San Francisco Bay Air Basin as a whole exceeded the state ozone standard on 7 to 19 days per year and the federal 8-hour standard on 0 to 7 days per year. The state PM_{10} standard was exceeded on 6 to 10 measurement days per year; the federal $PM_{2.5}$ 24-hour standard was exceeded on 0 to 7 measurement days per year. From 2001-2005, no other exceedances of state or federal air quality standards were recorded in either Redwood City or the Bay Air Basin.

Table 12.2
SUMMARY OF AIR QUALITY DATA FOR REDWOOD CITY, 2001-2005

Pollutant	Average Time	Measured Air Pollutant Levels 2001	2002	2003	2004	2005
Ozone (O_3)	1-Hour	0.11 ppm	0.09 ppm	0.11 ppm	0.10 ppm	0.08 ppm
	8-Hour	0.07 ppm	0.06 ppm	0.08 ppm	0.07 ppm	0.06 ppm
Carbon Monoxide (CO)	8-Hour	3.9 ppm	2.8 ppm	2.6 ppm	2.1 ppm	1.6 ppm
Nitrogen Dioxide (NO_2)	1-Hour	0.07 ppm	0.07 ppm	0.08 ppm	0.06 ppm	0.05 ppm
	Annual	0.017ppm	0.017ppm	0.015ppm	0.015ppm	0.011ppm
Fine Particulate Matter (PM_{10})	24-Hour	65 $\mu g/m^3$	53 $\mu g/m^3$	38 $\mu g/m^3$	65 $\mu g/m^3$	81 $\mu g/m^3$
	Annual	23 $\mu g/m^3$	22 $\mu g/m^3$	20 $\mu g/m^3$	20 $\mu g/m^3$	21 $\mu g/m^3$
Respirable Particulate Matter ($PM_{2.5}$)	24-Hour	-- $\mu g/m^3$	43 $\mu g/m^3$	34 $\mu g/m^3$	36 $\mu g/m^3$	31 $\mu g/m^3$
	Annual	-- $\mu g/m^3$	12 $\mu g/m^3$	9 $\mu g/m^3$	9 $\mu g/m^3$	9 $\mu g/m^3$

SOURCE: California Air Resources Board (CARB), Aerometric Data Analysis and Management (ADAM), 2006.

Table 12.3
SUMMARY OF MEASURED AIR QUALITY EXCEEDANCES

Pollutant	Standard[a]	Monitoring Station	Days Exceeding Standard 2001	2002	2003	2004	2005
Ozone (O_3)	NAAQS 1-hr	Redwood City	0	0	0	0	--[b]
		Bay Area	3	1	2	1	--[b]
	NAAQS 8-hr	Redwood City	0	0	0	0	0
		Bay Area	4	7	7	7	0
	CAAQS 1-hr	Redwood City	1	0	1	1	0
		Bay Area	12	15	16	19	7
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	4	1	0	1	2
		Bay Area	7	10	6	6	7
Respirable Particulate Matter ($PM_{2.5}$)	NAAQS 24-hr	Redwood City	0	0	0	0	0
		Bay Area	1	5	7	0	1
All Other (CO, NO_2, Lead, SO_2)	All Other	Redwood City	0	0	0	0	0
		Bay Area	0	0	0	0	0

SOURCE: California Air Resources Board (CARB), Aerometric Data Analysis and Management (ADAM), 2006.

[a] NAAQS = National Ambient Air Quality Standard; CAAQS = California Ambient Air Quality Standard.

[b] US EPA revoked the 1-hour NAAQS for ozone in June 2005.

(c) Toxic Air Contaminants (TAC). The CARB periodically plots the estimated and predicted cancer risk from exposure to TACs for the entire state.[1] The 2001 cancer risk in Redwood City was estimated at 500 to 700 excess cancer cases per million people. This figure is predicted to decrease to 250 to 500 excess cases by 2010. If the CARB is successful in reducing diesel exhaust by 75 percent from 1990 levels (in accordance with the Diesel Risk Reduction Program), then the risk would be reduced to less than 250 excess cases per million people.

12.1.5 Existing Pollutant Sources and Sensitive Receptors in the Precise Plan Area

The largest existing sources of pollutants within the Precise Plan area are vehicles on the local roadway network. In addition, commercial businesses, houses, and industry within the area contribute air pollutants through fume-producing operations and the combustion of fuels for space heating and water heating.

Some groups of people are more affected by air pollution than others. The CARB has identified the following people who are most likely to be affected by air pollution: children under 14, the elderly (over 65), athletes, and people with cardiovascular and chronic respiratory diseases. These groups are classified as "sensitive receptors." Precise Plan area locations that may contain a high concentration of these sensitive population groups include residential areas, hospitals, daycare facilities, elder care facilities, elementary schools, and parks.

12.2 PERTINENT PLANS AND POLICIES

12.2.1 Regional Air Quality Plans

In 2001, the BAAQMD along with the other regional agencies (i.e., Association of Bay Area Governments, Metropolitan Transportation Commission) prepared an Ozone Attainment Plan towards achievement of National Ambient Air Quality Standards (NAAQS) for O_3. Although the EPA revoked the 1-hour NAAQS for ozone in 2005, the 2001 Ozone Attainment Plan is still considered to be a valid planning document and remains as an element of California's State Implementation Plan (SIP) for the national Clean Air Act. In particular, the "on-road emissions budgets"[2] from the 2001 Ozone Attainment Plan are used as temporary budgets for transportation conformity analyses and findings until a new budget is established for the new 8-hour O_3 standard. In addition, any BAAQMD commitments made in the 2001 Ozone Attainment Plan continue to be enforceable and must be implemented.

Currently, no new attainment plans are required for the Bay Area to address the 8-hour O_3 NAAQS, since the area's attainment date for this standard is 2007. The region will be required to submit a maintenance plan and demonstration of attainment to EPA with a request for redesignation when the 8-hour O_3 NAAQS is met.

A Carbon Monoxide Maintenance Plan was approved in 1998 by EPA, which demonstrated how the NAAQS for carbon monoxide would be maintained.

[1] California Air Resources Board, California Air Toxics Program, http://www.arb.ca.gov/toxics/cti/hlthrisk/hlthrisk.htm

[2] "Budget" refers to the calculated limit of ozone precursor pollutant emissions (i.e., ROG and NO_x) from transportation sources in the Bay Area using methods approved by EPA at the time the SIP was prepared.

Air quality plans addressing the California Clean Air Act are developed about every three years. The plans are meant to demonstrate progress toward meeting the more stringent 1-hour O_3 CAAQS. 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 objective is to indicate how the region would make progress toward attaining the stricter state air quality standards, as mandated by the California Clean Air Act. The plan is designed to achieve a region-wide reduction of O_3 precursor pollutants through the expeditious implementation of all feasible measures. The plan proposes 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 implementation.

A key element in air quality planning is to make reasonably accurate projections of future human activities that are related to air pollutant emissions. Most important is vehicle activity. The BAAQMD uses population projections made by the Association of Bay Area Governments (ABAG) (see chapter 6 of this EIR) and vehicle use trends made by the Metropolitan Transportation Commission (MTC) to formulate future air pollutant emission inventories. The basis for these projections comes from cities and counties. In order to provide the best plan to reduce air pollution in the Bay Area, accurate projections from local governments are necessary. When general plans are not consistent with these projections, they cumulatively reduce the effectiveness of air quality planning in the region.

12.2.2 Attainment Status

The federal Clean Air Act and California Clean Air Act require that the CARB, 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." Due to the differences between the national and state standards, the designation of nonattainment areas is different under the federal and state legislation.

(a) Federal. The EPA has designated the San Francisco Bay Area as a nonattainment area for the federal 8-hour ozone standard and as "attainment/unclassifiable" with respect to the federal PM_{10} and $PM_{2.5}$ standards and all other pollutants regulated under the NAAQS.

(b) State. Under the California Clean Air Act, San Mateo County is a nonattainment area for ozone and PM_{10}. The County is either an attainment area or unclassified for other pollutants. The CARB had not classified the County with respect to the $PM_{2.5}$ standard at the time this EIR analysis was prepared. The California Clean Air Act requires local air pollution control districts to prepare air quality attainment plans. These plans must provide for district-wide emission reductions of five percent per year averaged over consecutive three-year periods or, if not, provide for adoption of "all feasible measures on an expeditious schedule."

12.2.3 Redwood City Strategic General Plan

The adopted Redwood City Strategic General Plan *Land Use* and *Conservation Elements* (1990) contain the following policies related to air quality and pertinent to consideration of the air quality impacts of the proposed Precise Plan:

- *The City should take into consideration the cumulative air quality impacts from proposed developments and should establish and enforce appropriate land use as well as other regulations to reduce air pollution.* (Land Use Policy L-13, page 6-6)

- *Promote expansion and improvement of public transportation services and facilities, where appropriate, for their air quality benefits.* (Conservation Policy C-1, page 10-4)

12.3 IMPACTS AND MITIGATION MEASURES

12.3.1 Significance Criteria

Based on the CEQA Guidelines,[1] BAAQMD impact assessment guidelines[2] and current state and federal ambient air quality standards,[3] the proposed Draft Precise Plan and/or its anticipated growth-inducing effects would be considered to have a significant impact if they result in any of the following:

(1) conflict with or obstruct implementation of the applicable air quality plan;

(2) violate any air quality standard or contribute substantially to an existing or projected air quality violation;

(3) result in a cumulatively considerable net increase of any criteria pollutant for which the Precise Plan region is non-attainment under an applicable federal or state ambient air quality standard (including releasing emissions which exceed quantitative thresholds for ozone precursors);

(4) expose sensitive receptors to substantial pollutant concentrations, including, but not limited to, substantial levels of toxic air contaminants; or

(5) create objectionable odors affecting a substantial number of people.

(6) contribute to carbon monoxide (CO) concentrations exceeding the State Ambient Air Quality Standard of 9 parts per million (ppm) averaged over 8 hours, or 20 ppm for one hour;

(7) generate criteria air pollutant emissions in excess of the BAAQMD annual or daily thresholds; the current thresholds are 15 tons/year or 80 pounds/day for reactive organic gases (ROG), nitrogen oxides (NO_x), or PM_{10}.

In addition, for construction-period air emissions impacts, the BAAQMD significance threshold for construction dust impact is based on the appropriateness of construction dust controls. The BAAQMD guidelines provide feasible control measures for construction emission of PM_{10}. If the

[1]CEQA Guidelines, Appendix G, item III(a-e).

[2]Bay Area Air Quality Management District, BAAQMD CEQA Air Quality Guidelines; April 1996 (Revised December 1999).

[3]See Table 12.1 below.

appropriate construction controls are to be implemented, then air pollutant emissions for construction activities would be considered less-than-significant.

12.3.2 Short-Term Construction Period Air Quality Impacts

Impact 12-1: Construction-Related Air Quality Impacts. Demolition or construction activities permitted and/or facilitated by the proposed Downtown Precise Plan under both the Maximum Intensity and Moderate Intensity alternatives may generate construction-period exhaust emissions and fugitive dust that could temporarily but noticeably affect local air quality. This would represent a ***potentially significant impact*** (see criteria 2, 4, and 5 in subsection 12.3.1, "Significance Criteria," above).

Construction activities associated with Precise Plan-facilitated public and private development in the Plan area may include building demolition, building renovation or modification, grading, new building construction, and paving. Such construction would generate pollutants intermittently. Generally, the most substantial air pollutant emissions would be dust generated from building demolition or site grading and diesel exhaust from construction equipment. The physical demolition of existing structures and other infrastructure can generate substantial dust. In addition to the dust created during demolition, substantial dust emissions could be created as debris is loaded into trucks for disposal. Without adequate dust control measures, visible dust clouds extending beyond the construction or demolition site could occur.

Wind erosion and disturbance to exposed (graded) ground areas would also be sources of dust emissions. Dust can affect local air quality during construction in terms of elevated PM_{10} levels. Construction activities can generate exhaust emissions, primarily in the form of particulate matter (PM_{10} and $PM_{2.5}$) and nitrogen oxides. These emissions would contribute to both local and regional air quality levels. Construction activities are also a source of organic gas emissions. Solvents in adhesives, non-waterbase paints, thinners, some insulating materials, and caulking materials can evaporate into the atmosphere and 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.

Some buildings that may be demolished under the Precise Plan Maximum Intensity or Moderate Intensity buildout alternatives may include materials containing asbestos that would have to be removed. Asbestos is a fibrous mineral, which is both naturally occurring in ultramafic rock (a rock type commonly found in California), and used as a processed component of building materials. Because asbestos has been proven to cause serious adverse health effects, such as asbestosis and lung cancer, it is strictly regulated either based on its natural widespread occurrence or in its use as a building material. The BAAQMD regulates the demolition of buildings and structures that may contain asbestos. The provisions that cover these operations are found in BAAQMD Regulation 11, Rule 2: *Hazardous Materials; Asbestos Demolition, Renovation and Manufacturing* (also see chapter 13 of this EIR).

The individual project contractor would be required to implement standard state and federal procedures for asbestos containment and worker safety. Specifically, the demolition,

renovation, or removal of asbestos-containing building materials is subject to the limitations of BAAQMD Regulation 11, Rule 2. The rule requires special handling of asbestos containing materials (e.g., by keeping materials continuously wetted). The Rule prohibits any visible emissions of asbestos-containing materials to outside air. Project applicants would be required to consult with the BAAQMD's Enforcement Division prior to commencing demolition of a building containing asbestos materials. If a project adheres to this requirement, asbestos-related impacts would be considered ***less-than-significant***.

If uncontrolled, construction emissions associated with fugitive dust and construction equipment could lead to both health and nuisance impacts. Although temporary, such effects would represent a ***significant adverse impact*** on local air quality.

Mitigation 12-1. For all discretionary grading, demolition, or construction activity in the Precise Plan area, require implementation of the following dust control measures by construction contractors, where applicable:

During ***demolition*** of existing structures:

- Water active demolition areas 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.

During ***all construction phases:***

- Water all active construction areas at least twice daily.
- Water or cover stockpiles of debris, soil, sand, or other materials that can be blown by the wind.
- Cover all trucks hauling soil, sand, and other loose materials, or require all trucks to maintain at least two feet of freeboard.
- Pave, apply water three times daily, or apply (non-toxic) 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.

(continued)

Mitigation 12-1 (continued):

- Sweep streets daily (with water sweepers) if visible soil material is carried onto adjacent public streets.
- Hydroseed or apply (non-toxic) soil stabilizers to inactive construction areas (previously graded areas inactive for ten days or more).
- 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 miles per hour.
- Install sandbags or other erosion control measures to prevent silt runoff to public roadways.
- Replant vegetation in disturbed areas as quickly as possible.
- Consult with BAAQMD prior to demolition of structures suspected to contain asbestos to ensure that demolition/construction work is conducted in accordance with BAAQMD rules and regulations.

The following are measures to control emissions by diesel-powered construction equipment used by construction contractors, where applicable:

- Ensure that emissions from all on-site, diesel-powered construction equipment do not exceed 40 percent opacity for more than three minutes in any one hour. Any equipment found to exceed 40 percent opacity (or Ringelmann 2.0) shall be repaired or replaced immediately.
- The contractor shall install temporary electrical service whenever possible to avoid the need for independently powered equipment (e.g., compressors).
- Diesel equipment standing idle for more than three minutes shall be turned off. This would include trucks waiting to deliver or receive soil, aggregate, or other bulk materials. Rotating drum concrete trucks could keep their engines running continuously as long as they were on-site and away from residences.
- Properly tune and maintain equipment for low emissions.

Implementation of these measures would reduce the construction-related air quality impact of the Precise Plan to a ***less-than-significant level***.

12.3.3 Long-Term Local Air Quality Effects

Changes in Local Carbon Monoxide Levels. Development activity resulting from both the Maximum Intensity and Moderate Intensity Precise Plan alternatives would generate new vehicle trips and change traffic patterns. At the local level, the resultant pollutant of greatest concern is carbon monoxide. Concentrations of carbon monoxide are greatest near intersections and roadways with congested traffic. Such carbon monoxide emissions can be a problem in wintertime when stagnant meteorological conditions occur (i.e., very little vertical or horizontal mixing of air in the lower atmosphere).

Screening calculations (using the BAAQMD method) indicate that the highest existing 8-hour carbon monoxide level at downtown Redwood City roadsides is 5.8 ppm. These levels would be less under both 15-year buildout scenarios (i.e., Maximum Intensity and Moderate Intensity) due to lower vehicle emission rates over time. The highest (worst-case) 8-hour carbon monoxide level would be 3.3 ppm under the Maximum Intensity scenario. The corresponding 1-hour carbon monoxide level would be 6.0 ppm. Future carbon monoxide levels under both 15-year buildout scenarios would be below the state and federal air quality standards, and the Precise Plan's impacts on local carbon monoxide levels are therefore considered to be ***less-than-significant***.

Mitigation. No significant local carbon monoxide impact has been identified; no mitigation is required.

12.3.4 Long-Term Regional Air Quality Effects

Impact 12-2: Long-Term Regional Emissions Increases. Development in accordance with the proposed Downtown Precise Plan under both the Maximum Intensity and Moderate Intensity alternatives would generate traffic-related regional air pollutant emissions increases that would exceed the applicable thresholds of significance for reactive organic gases (ROG), nitrous oxide (NO_x), and particulate matter (PM_{10}). This Precise Plan-related effect is considered to represent a ***significant project and cumulative impact*** (see criteria 1, 2, 3, 4, and 7 in subsection 12.3.1, "Significance Criteria," above).

(a) Beneficial Impacts on Regional Air Quality. Compared to land use policy under the current Redwood City Strategic General Plan, growth facilitated by both Precise Plan buildout alternatives would allow *more intensive* development in the Downtown area. The Maximum Intensity and Moderate Intensity Precise Plan alternatives would both provide for an increase in the number of residential units and in the amount of office, retail, and lodging uses over existing conditions; and a decrease in industrial square footage (see Table 3.1 in EIR chapter 3--Project Description). Precise Plan implementation would therefore result in an increase in *predicted* (i.e., based on current General Plan vs. propose Precise Plan) vehicle miles traveled, which the BAAQMD CEQA Guidelines suggest as a measure of significance for plans. However, the proposed Precise Plan also includes many features that would reduce vehicular trip generation within the Precise Plan area. In particular, the Plan would provide for more housing concentration near available local and regional transit and convenient to services and employment, and would provide relatively affordable housing within Redwood City to improve the citywide balance between housing and jobs.

These factors would tend to reduce the number of expected vehicle trips, and thus reduce air pollutant emissions. The Plan would also enhance pedestrian and bicycle use in the Precise Plan area, thereby reducing vehicle use. As described in EIR chapter 6 (Population and Housing), the Plan would improve the balance between employed residents and jobs, by providing more housing. This would reduce the number of people that are in-commuting to jobs located in Redwood City, thereby reducing air pollutant emissions.

(b) Adverse Impacts on Regional Air Quality. Nevertheless, the proposed Precise Plan is expected to induce an increased rate and amount of growth within the Plan area. Resultant additional vehicle trips to and from the Plan area would generate new mobile air pollutant emissions increases affecting the overall San Francisco Bay Air Basin. The effect of the Precise Plan Maximum Intensity and Moderate Intensity growth alternatives in terms of potential net additional air pollutant emissions was evaluated using the URBEMIS 2002 model (version 8.7). The incremental changes to land use under both potential Precise Plan scenarios (Maximum Intensity and Moderate Intensity) were input into the model assuming both alternatives would reach full buildout in 15 years (see Table 3.1 in EIR chapter 3--Project Description). The URBEMIS 2002 model calculates emissions from vehicle travel and area sources such as space/water heating and landscape equipment. Inputs to the model include size and types of land uses proposed, geographic region, season, and year of analysis. Model defaults for the San Francisco Bay Area were used. Results are shown in Table 12.4.

Guidelines for the evaluation of project impacts issued by the BAAQMD consider emission increases of ozone precursors and PM_{10} to be significant if they exceed 80 pounds per day.

Potential development in the Plan area facilitated by the Downtown Precise Plan under both Precise Plan alternatives (Maximum Intensity and Moderate Intensity) is expected to generate increases over existing conditions in reactive organic gases (ROG), oxides of nitrogen (NO_x), and particulate matter (PM_{10}) that would exceed the thresholds of significance used by the BAAQMD.

Table 12.4
FUTURE INCREMENTAL EMISSIONS FROM DEVELOPMENT IN THE DOWNTOWN PRECISE PLAN AREA

Project Alternative	Daily Emissions in Pounds (lbs/day)		
	ROG	NOx	PM_{10}
Maximum Intensity	379	129	261
Moderate Intensity	256	88	178
BAAQMD Project-Level Thresholds	*80*	*80*	*80*

SOURCE: Illingworth & Rodkin, Inc.
Notes:
1) URBEMIS 2002 Model considered a 15-year buildout period, or 2020.
2) Features of the Plan that include a mixed use environment--e.g., sidewalks, bike lanes, and close proximity to transit--were included in the modeling assumptions.

Mitigation 12-2. Apply the following emissions control strategies where applicable to Precise Plan-facilitated discretionary mixed use, residential, office, retail, and lodging development activities within the proposed Plan area in order to reduce overall emissions from traffic and area sources:

- Where practical, future development proposals shall include physical improvements, such as sidewalk improvements, landscaping, and the installation of bus shelters and bicycle parking, that would act as incentives for pedestrian, bicycle, and transit modes of travel.
- New or modified roadways should include bicycle lanes where reasonable and feasible.
- Provide transit information kiosks.
- Where practical, employment-intensive development proposals (i.e., office and retail) shall include measures to encourage use of public transit, ridesharing, van pooling, use of bicycles, and walking, as well as to minimize single passenger motor vehicle use.
- Develop parking enforcement and fee strategies that encourage alternative modes of transportation.

(continued)

Mitigation 12-2 (continued):

- Parking lots or facilities should provide preferential parking for electric or alternatively fueled vehicles.
- Require energy efficient building designs that exceed State Title 24 building code requirements.
- Discourage use of gasoline-powered landscape equipment.
- Implement and enforce truck idling restrictions of three minutes.
- Allow only low-emitting fireplaces for residential uses, such as those that burn only natural gas.
- Require large office or commercial land uses (e.g., 10,000 square feet or 25 employees) that would generate home-to-work commute trips to implement Transportation Demand Management (TDM) programs. Components of these programs should include the following:
  - a carpool/vanpool program, e.g., carpool ride-matching for employees, assistance with vanpool formation, provision of vanpool vehicles, etc.;
  - a transit use incentive program for employees, such as on-site distribution of passes and/or subsidized transit passes for local transit systems;
  - a guaranteed ride home program;
  - showers and lockers for employees bicycling or walking to work;
  - secure and conveniently located bicycle parking and storage for workers; and/or
  - a parking cash-out program for employees (where non-driving employees receive transportation allowance equivalent to the value of subsidized parking).

Implementation of these measures would assist in reducing identified Precise Plan-related and cumulative impacts on long-term regional ROG, NO_x, and PM_{10} emission levels by perhaps 5 to 10 percent beyond what the proposed Precise Plan itself may achieve through its "trip internalization" and alternative modes effects; however, since reductions of (in some cases) over 70 percent would be required to bring project-related regional emission increases to below BAAQMD significance thresholds, the project and cumulative effects on ROG, NO_X, and PM_{10} emission levels would represent a ***significant unavoidable impact***.