15. AIR QUALITY

This EIR chapter describes the impacts of the proposed project on local and regional air quality.

The chapter was prepared using methodologies and assumptions recommended within the air quality impact assessment recommendations of the Bay Area Air Quality Management District (BAAQMD).[1] In keeping with these recommendations, the chapter describes existing air quality, project construction-related air emissions impacts, potential long-term air quality-based land use conflicts, direct and indirect emissions associated with long-term operation of the project, the impacts of these emissions on both the local and regional scale, and mitigation measures warranted to reduce or eliminate any identified significant air quality impacts.

15.1 SETTING

15.1.1 Air Basin Characteristics (Pollution Climatology)

The project is located within the San Francisco Bay Air Basin, which is contiguous with the BAAQMD boundaries. During the summer, winds flowing from the northwest are drawn inland through the Golden Gate and over the lower portions of the San Francisco Basin. Northwest winds are most common in Redwood City, reflecting the orientation of the Crystal Springs gap within the mountains of the San Francisco Peninsula. Winds are persistent and strong, providing excellent ventilation and carrying pollutants downwind. On the average, winds are lightest in fall and winter.

The persistent winds in Redwood City result in a moderate potential for air pollution. Even so, in fall and winter there are periods of several days when winds are very light and local pollutants can build up. In addition, the area is affected by pollutants released upwind farther up the San Francisco Peninsula.

15.1.2 Air Quality Standards

Both the U.S. Environmental Protection Agency (EPA) and the California Air Resources Board have established ambient air quality standards for common pollutants. These standards represent safe levels of contaminants that avoid specific adverse health effects associated with each pollutant (see Table 15.1 herein). The ambient air quality standards cover what

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

Table 15.1
MAJOR CRITERIA AIR POLLUTANTS AND HEALTH EFFECTS SUMMARY

Pollutant	Characteristics	Health Effects	Major Sources
Ozone	A highly reactive photochemical pollutant created by the action of sunshine on ozone precursors (primarily reactive hydrocarbons and oxides of nitrogen). Often called photochemical smog.	■ Eye Irritation. ■ Respiratory function impairment.	The major sources ozone precursors are combustion sources such as factories and automobiles, and evaporation of solvents and fuels.
Carbon Monoxide (CO)	Carbon monoxide is an odorless, colorless gas that is highly toxic. It is formed by the incomplete combustion of fuels.	■ Impairment of oxygen transport in the bloodstream. ■ Aggravation of cardiovascular disease. ■ Fatigue, headache, confusion, dizziness. ■ Can be fatal in the case of very high concentrations.	Automobile exhaust, combustion of fuels, combustion of wood in woodstoves and fireplaces.
Nitrogen Dioxide (NO_2)	Reddish-brown gas that discolors the air, formed during combustion.	■ Increased risk of acute and chronic respiratory disease.	Automobile and diesel truck exhaust, industrial processes, fossil-fueled power plants.
Sulfur Dioxide (SO_2)	Sulfur dioxide is a colorless gas with a pungent, irritating odor.	■ Aggravation of chronic obstruction lung disease. ■ Increased risk of acute and chronic respiratory disease.	Diesel vehicle exhaust, oil-powered power plants, industrial processes.
Particulate Matter (PM_{10} and $PM_{2.5}$)	Solid and liquid particles of dust, soot, aerosols, and other matter which are small enough to remain suspended in the air for a long period of time.	■ Aggravation of chronic disease and heart/lung disease symptoms.	Combustion, automobiles, field burning, factories, and unpaved roads. Also a result of photochemical processes.

SOURCE: Donald Ballanti, Certified Consulting Meteorologist, June 2002.

are called "criteria" pollutants because the health and other effects of each pollutant are described in criteria documents. Individuals vary as to their sensitivity to air pollutants, so the national and state standards have been set at levels that protect groups that are more sensitive (e.g., asthmatics).

National ambient air quality standards (NAAQS) were established by the federal Clean Air Act of 1970 (amended in 1977 and 1990) for six "criteria" pollutants. These criteria pollutants include carbon monoxide (CO), ozone (O_3), nitrogen dioxide (NO_2), particulates (since changed to inhalable particulate matter--PM_{10} and $PM_{2.5}$), sulfur dioxide (SO_2), and lead (Pb). These are considered the most prevalent air pollutants known to be hazardous to human health.

California established ambient air quality standards as early as 1969 through the Mulford-Carroll Act. The California Clean Air Act of 1988 (amended in 1992) requires attainment of the California ambient air quality standards (CAAQS). In many cases, these standards are more stringent than the national ambient air quality standards.

The federal and California state ambient air quality standards are summarized in Table 15.2 for important ("criteria") pollutants. The federal and state ambient standards were developed independently with differing purposes and methods, although both processes attempted to avoid health-related effects. As a result, the federal and state standards differ in some cases. In general, the California state standards are more stringent. This is particularly true for ozone and PM_{10}.

The EPA has adopted new national air quality standards for ground-level ozone and for fine particulate matter (diameter 2.5 microns or less). The existing 1-hour ozone standard of 0.12 parts per million (ppm) will be phased out and replaced by an 8-hour standard of 0.08 ppm. New national standards for fine particulate matter have also been established for 24-hour and annual averaging periods. Although currently in effect, the planning process to determine compliance with these new standards and the development of control programs to meet these standards, if needed, is in its initial stages.

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 despite the absence of criteria documents. The identification, regulation, and monitoring of TACs is relatively recent compared to that for criteria pollutants. Unlike criteria pollutants, TACs are regulated on the basis of risk rather than specification of safe levels of contamination.

15.1.3 Current Air Quality

The BAAQMD monitors air quality at several locations within the San Francisco Bay Air Basin. The monitoring station closest to the project site is located in Redwood City. Table 15.3

Table 15.2

FEDERAL AND STATE AMBIENT AIR QUALITY STANDARDS

Pollutant	Averaging Time	Federal Primary Standard		State Standard	
Ozone	1-Hour	0.12	ppm	0.09	ppm
	8-Hour	0.08	ppm	--	
Carbon Monoxide	8-Hour	9	ppm	9.0	ppm
	1-Hour	35	ppm	20.0	ppm
Nitrogen Dioxide	Annual	0.05	ppm	---	
	1-Hour	---		0.25	ppm
Sulfur Dioxide	Annual	0.03	ppm	---	
	24-Hour	0.14	ppm	0.05	ppm
	1-Hour	---		0.25	ppm
Particulates (PM_{10})	Annual	50	ug/m3	30	ug/m3
	24-Hour	150	ug/m3	50	ug/m3
Particulates ($PM_{2.5}$)	Annual	15	ug/m3	--	
	24-Hour	65	ug/m3	--	
Lead	30-Day Avg.	---		1.5	ug/m3
	3-Month Avg.	1.5	ug/m3	---	

SOURCE: Donald Ballanti, Certified Consulting Meteorologist, June 2002.

ppm = Parts Per Million

ug/m3 = Micrograms Per Cubic Meter

Table 15.3

AIR QUALITY DATA FOR REDWOOD CITY, 1999 TO 2001

		Days Exceeding Ambient Standards During:		
Pollutant	Standard	1999	2000	2001
Ozone	Federal 1-Hour	0	0	0
Ozone	State 1-Hour	0	0	1
Ozone	Federal 8-Hour	0	0	0
Carbon Monoxide	State/Federal 8-Hour	0	0	0
Nitrogen Dioxide	State 1-Hour	0	0	0
PM_{10}	Federal 24-Hour	0	0	0
PM_{10}	State 24-Hour	3	1	3
$PM_{2.5}$	Federal 24-Hour	0	0	0

SOURCE: California Air Resources Board, Aerometric Data Analysis and Management (ADAM), 2002.

summarizes exceedances of the state and federal standards at the monitoring station. The table indicates that all of the ambient air quality standards are met in the project area with the exception of the state standards for ozone and PM_{10}. For comparison, these same standards, as well as the federal ozone standards, are also exceeded in other parts of the San Francisco Basin.

15.1.4 Existing Pollutant Sources and Sensitive Receptors in the Project Vicinity

Land uses in the project site's Bair Island Road vicinity, including the area surrounding the Port of Redwood City, include a number of heavy industrial sources permitted by the BAAQMD. These land uses include asphalt and concrete batch plants, sand and gravel operations, and bulk materials handling facilities. These uses are located along Seaport Boulevard, east and northeast of the project site (see Figure 4.1 herein).

The BAAQMD defines sensitive receptors as facilities where sensitive receptor population groups (e.g., children, the elderly, the acutely ill, and the 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. In the project vicinity, there are multifamily residences on the parcel between the Peninsula Marina and Pete's Harbor properties ("Villas at Bair Island") and to the west of the project site (Marina Pointe), as well as the Docktown live-aboard boat community to the southeast across Redwood Creek from the site.

15.2 PERTINENT PLANS AND POLICIES

15.2.1 Redwood City Strategic General Plan

The adopted Redwood City Strategic General Plan *Land Use and Conservation Elements* (both adopted in 1990) contain the following objective and policies related to air quality and pertinent to the proposed project:

- *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)
- *Preserve and restore the natural characteristics of San Francisco Bay and adjacent lands, and recognize the role of the Bay's vegetation and water area in maintaining a favorable climate and good air and water quality.* (Conservation Objective 2, page 10-4)
- *Promote expansion and improvement of public transportation services and facilities, where appropriate, for their air quality benefits.* (Conservation Policy C-1, page 10-4)

15.2.2 Regional Air Quality Plan

The federal Clean Air Act and the California Clean Air Act of 1988 require the California Air Resources Board, based on air quality monitoring data, to designate as "nonattainment areas" those portions of the state where the federal or state ambient air quality standards are not met. Due to the differences between the national and state standards, the designation of nonattainment areas is different under the federal and state legislation.

The Bay Area had until recently attained all federal standards. The Bay Area was designated a maintenance area for CO on June 1, 1998, indicating that the federal and state ambient air quality standards had been attained. However, the EPA reclassified the Bay Area from "maintenance area" to "nonattainment" for ozone based on violations of the federal standards at several locations in the air basin.

15.3 IMPACTS AND MITIGATION MEASURES

Comment: new tab grid for indented text underneath boxes--(just the old one with 1.167 added)

15.3.1 Significance Criteria

The BAAQMD CEQA Guidelines[2] provide the following definitions of a significant air quality impact:

1. Any project contributing 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 1 hour;

2. Any project that generates criteria air pollutant emissions in excess of the BAAQMD annual or daily thresholds. The current thresholds are 15 tons per year or 80 pounds per day for reactive organic gases (ROG), nitrogen oxides (NO_x), or PM_{10}. Any proposed project that would individually have a significant air quality impact would also be considered to have a significant cumulative air quality impact;

3. Any project with the potential to frequently expose members of the public to objectionable odors;

4. Any project with the potential to expose sensitive receptors or the general public to substantial levels of toxic air contaminants; and

5. Any project that does not apply appropriate dust-control measures during construction. The BAAQMD significance thresholds for construction dust impacts are based on the appropriateness of construction dust controls. The BAAQMD Guidelines provide feasible control measures for construction emission of PM_{10}. If the appropriate construction controls are to be implemented, then air pollutant emissions for construction activities would be considered less-than-significant.

15.3.2 Short-Term Construction Impacts

Impact 15-1: Construction Emissions. Project construction activities, including proposed building demolition, excavation and grading operations, and filling and

[2]BAAQMD, 1996.

dredging, associated construction vehicle traffic, and wind blowing over resultant exposed earth, would generate exhaust emissions and fugitive particulate matter emissions that would affect local air quality. These possible effects represents a ***potentially significant impact*** (see criterion 5 in subsection 15.3.1, "Significance Criteria," above).

The proposed project would require demolition of existing buildings. The physical demolition of existing structures and other infrastructure are construction activities with a high potential for creating air pollutants. In addition to the dust created during demolition, substantial dust emissions could be created as debris is loaded onto 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 vehicular and equipment exhaust emissions 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-waterbase paints, thinners, some insulating materials, and caulking materials would evaporate into the atmosphere and would contribute to 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.

Mitigation 15-1. Dust emissions from demolition and construction activities can be greatly reduced by implementing fugitive dust control measures. The significance of construction impacts is, according to the BAAQMD Guidelines, determined by whether or not appropriate dust control measures are implemented. Implementation of the following conventional BAAQMD-recommended dust control measures would be expected to reduce this impact to a ***less-than-significant level:***

(1) Demolition Period. Require implementation of the following dust control measures by contractors during demolition of existing structures:

(a) Watering shall be used to control dust generation during demolition of structures and break-up of pavement;

(continued)

Mitigation 15-1 (continued).

(b) All trucks hauling demolition debris from the site shall be covered; and

(c) Whenever possible, dust-proof chutes shall be used for loading debris onto trucks.

(2) All Construction Phases. Require implementation of the following dust control measures by construction contractors during all construction phases:

(a) Water all active construction areas at least twice daily and more often during windy periods. Active construction areas adjacent to existing land uses must be kept damp at all times, or must be treated with non-toxic stabilizers or dust palliatives;

(b) Water or cover all stockpiles of debris, soil, sand, or other materials that can be blown by the wind;

(c) Cover all trucks hauling soil, sand, and other loose materials, or require all trucks to maintain at least two feet of freeboard;

(d) 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;

(e) Sweep daily (preferably with water sweepers) all paved access road, parking areas, and staging areas at construction sites;

(f) Sweep streets daily (preferably with water sweepers) if visible soil material is carried onto adjacent public streets;

(g) Hydroseed or apply non-toxic soil stabilizers to inactive construction areas;

(h) Enclose, cover, water twice daily, or apply non-toxic soil binders to exposed stockpiles (dirt, sand, etc.);

(i) Limit traffic speeds on unpaved roads to 15 miles per hour;

(j) Install sandbags or other erosion control measures to prevent silt runoff to public roadways; and

(k) Replant vegetation in disturbed areas as quickly as possible.

15.3.3 Long-Term Local Air Quality Effects

Increased Potential for Air Quality-Based Land Use Conflicts. The project would locate residential development in proximity to existing industrial uses located on the east side of the Port of Redwood City, increasing the potential for air quality-based land use conflicts (see Figure 4.1 herein). However, the project is separated from these industrial uses by Redwood Creek and is located upwind from these industrial uses under prevailing wind conditions.

Northeasterly through easterly winds, which would carry pollutants from these industrial sources to the project site, occur only approximately 3.1 percent of the time, based on long-term wind records at Moffett Naval Air Station.[3] Therefore, the potential for air quality-based land use conflicts would represent a ***less-than-significant impact.***

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

Changes in Local Carbon Monoxide Levels. Modeling results indicate that existing and future concentrations of local carbon monoxide near worst-case intersections used by project traffic would be well within state and federal air quality standards. The project's effect on local air quality would therefore represent a ***less-than-significant impact***.

At the local level, the pollutant of greatest concern is carbon monoxide. Concentrations of carbon monoxide are greatest near intersections and roadways with congested traffic. Carbon monoxide is a problem especially in wintertime when stagnant meteorological conditions occur (i.e., very little vertical or horizontal mixing of air in the lower atmosphere).

Existing and future local carbon monoxide levels with and without the proposed project were modeled using a screening form of the CALINE-4 computer model. Carbon monoxide levels were modeled at seven signalized intersections meeting BAAQMD criteria for modeling using PM peak-hour traffic as input (as calculated for chapter 7, Transportation and Circulation, of this EIR). Modeled inputs included peak-hour traffic levels and meteorological conditions for wintertime, when the potential for elevated carbon monoxide levels is greatest. Carbon monoxide levels were modeled near the roadway edge (e.g., outside edge of sidewalk). The model and modeling assumptions are described in appendix 21.3 of this EIR.

The results of the CALINE-4 modeling for the seven intersections are shown in Table 15.4. The concentrations in Table 15.4 are to be compared to the state and federal ambient air quality standards: predicted 1-hour concentrations are to be compared to the state standard of 20 ppm and the federal standard of 35 ppm; predicted 8-hour concentrations are to be compared to the state and federal standard of 9 ppm.

[3]California Department of Water Resources. *Wind in California*, Bulletin No. 185, 1978.

Table 15.4
PROJECTED CARBON MONOXIDE CONCENTRATIONS NEAR MAJOR INTERSECTIONS
(IN PARTS PER MILLION)

Intersection	Existing (2002)[1] 1-Hour	Existing (2002)[1] 8-Hour	Background (2002) 1-Hour	Background (2002) 8-Hour	Project (2002) 1-Hour	Project (2002) 8-Hour	Cumulative (2020) 1-Hour	Cumulative (2020) 8-Hour
El Camino Real/ Whipple	10.9	5.3	11.0	5.3	11.1	5.4	8.7	4.1
Winslow/ Whipple	10.8	5.2	10.8	5.2	11.0	5.3	8.6	4.1
El Camino Real/ Jefferson	11.1	5.4	11.2	5.4	11.2	5.5	8.8	4.2
Alameda De Las Pulgas/Woodside	11.3	5.6	11.5	5.7	11.6	5.7	9.1	4.4
Middlefield/ Woodside	11.4	5.6	11.7	5.8	11.7	5.8	9.2	4.5
Marsh/Bayfront/ Haven	12.4	6.3	12.5	6.4	12.5	6.4	9.5	4.7
Bayfront/ Willow	12.7	6.5	12.8	6.6	12.7	6.5	9.8	4.9
Most Stringent Standard	20.0	9.0	20.0	9.0	20.0	9.0	20.0	9.0

SOURCE: Donald Ballanti, Certified Consulting Meteorologist, January 2003.

[1] The year in each column refers to the emissions factors used in the comparative calculations. Over time, emissions factors are reduced as older vehicles are replaced with lower-polluting, newer vehicles. Therefore, "cumulative" future (e.g., 2020) emissions are typically lower than "existing" emissions. In the table, constant 2002 emissions factors were applied to "existing," "background," and "project" conditions to make direct comparisons under a worst-case scenario, consistent with CEQA.

The modeling results indicate that carbon monoxide levels would be below the state and federal air quality standards for existing, background, project, and cumulative traffic conditions. Carbon monoxide levels associated with the project would not exceed state or federal air quality standards.

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

15.3.4 Long-Term Regional Air Quality Effects

Impact 15-2: Project and Cumulative Impacts on Regional Emissions. The additional vehicular traffic generated by the project would produce regional emissions exceeding the BAAQMD thresholds of significance for reactive organic gases (ROG), nitrogen oxides (NO_x), and PM_{10}. This effect would represent a ***significant project impact*** (see criterion 2 in subsection 15.3.1, "Significance Criteria," above). The BAAQMD Guidelines conclude that any project that would individually have a significant air quality impact would be considered to have a significant cumulative air quality impact. The proposed project, therefore, would also have a ***significant cumulative impact*** on regional air quality.

The project would attract and generate vehicle trips. Regional emissions of reactive organic gases, nitrogen oxides, and PM_{10} associated with project vehicle use have been calculated using the URBEMIS-2001 computer program.[4] The model is designed to evaluate total regional air pollutant emissions under different land use scenarios. The model-projected net daily emissions increases associated with vehicular trip generation under the proposed project (see chapter 7, Transportation and Circulation, herein) are identified in Table 15.5. The URBEMIS-2001 program and the assumptions made in its use are described in appendix 21.3 of this EIR.

The URBEMIS-2001 program estimates that vehicle trips associated with the proposed project would generate approximately 194 pounds per day of reactive organic gases, 143 pounds per day of nitrogen oxides, and 116 pounds per day of PM_{10}. Guidelines for the evaluation of project impacts issued by the BAAQMD consider emission increases of regional pollutants to be significant if they exceed 80 pounds per day for any of these pollutants.

The proposed project is a mixed use development that provides opportunities for non-auto travel and associated reductions in overall trip generation. The above emission projections

[4]San Joaquin Valley Unified Air Pollution Control District. URBEMIS for Windows Computer Program User's Guide, October 2000.

Table 15.5
REGIONAL EMISSIONS ASSOCIATED WITH PROJECT-RELATED NET INCREASE IN VEHICULAR TRIPS (IN POUNDS PER DAY)

	ROG	NO_x	PM_{10}
Net Project Emissions	194.4	142.9	115.6
Emissions With TDM	169.0	120.3	97.2
BAAQMD Significance Threshold	80.0	80.0	80.0

SOURCE: Donald Ballanti, Certified Consulting Meteorologist, January 2003.

ROG = reactive organic gases
NO_x = nitrogen oxides
PM_{10} = particulate matter, 10 microns
TDM = transportation demand management

assume that the mixed use nature of the project will reduce daily trip generation by 3 to 13 percent for the various types of project land uses.

Mitigation 15-2. In addition to the transportation demand management (TDM) mitigations identified in chapter 7 (Transportation and Circulation) of this EIR, require the office and retail components of the project to implement additional strategies that reduce vehicle usage by encouraging pedestrian, bicycle, and transit modes of travel (see below). Require project residential development to provide for features that reduce air emissions and encourage telecommuting (see below). The measures identified below and in chapter 7 can be expected to reduce project regional emissions by approximately 15 percent beyond that assumed in the air quality analysis. This level of reduction would fall short of the emissions reduction needed to reduce the project's impact to a less-than-significant level (see Table 15.5). Project-related regional emissions would therefore remain ***significant and unavoidable*** after implementation of the mitigation measures. According to BAAQMD significance thresholds, the proposed project would therefore also contribute to a ***significant unavoidable cumulative impact***.

The office and retail portions of the project should implement the following strategies to reduce vehicle usage:

- 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;
- Develop a transit use incentive program for employees and patrons, such as on-site distribution of passes and/or subsidized transit passes for local transit system;
- Provide transit information kiosks;
- Provide preferential parking for carpool/vanpool vehicles;
- Implement parking cash-out program for employees (non-driving employees receive transportation allowance equivalent to the value of subsidized parking); and
- Provide showers and lockers for employees bicycling or walking to work.

Project residential development should provide for the following strategy to reduce air emissions and encourage telecommuting:

- Wire each housing unit to allow use of emerging electronic communication technology.

In addition to those listed above, other TDM measures applicable to the project are expected to include financial incentive programs (e.g., Eco-Pass, transit subsidies) and provisions of a dedicated shuttle to the Redwood City downtown, Downtown Redwood City CalTrain station, and El Camino Real transit corridor. A separate run of the URBEMIS-2001 program was made to account for trip reductions through TDM. The results are indicated in Table 15.5. Indirect emissions from the project would be reduced by about 15 percent. This reduction would not reduce the long-term regional air quality impact to a less-than-significant level. The project's impact on regional air quality would remain a significant unavoidable impact.