# 6

# AIR QUALITY

## INTRODUCTION

This chapter discusses the potential impacts of the implementation of the proposed Project on the local and regional air quality. Residential development projects generally contribute to air quality pollutants through construction-phase emissions and dust and operational emissions including vehicle emissions.

The discussion of criteria pollutants and toxic air contaminants in this chapter is based on the Air Quality Technical Report prepared for this EIR by Illingworth & Rodkin, included in Appendix C.

## SETTING[1]

### METEOROLOGY

The Project site is located in the Peninsula subregion of the San Francisco Bay Area Air Basin. The Peninsula subregion extends from northwest of San Jose to the Golden Gate. The Santa Cruz Mountains run up the center of the peninsula, with elevations exceeding 2000 feet at the southern end, decreasing to 500 feet in South San Francisco. Coastal towns experience a high incidence of cool, foggy weather in the summer. Cities in the southeastern peninsula experience warmer temperatures and fewer foggy days because the marine layer is blocked by the ridgeline to the west.

The blocking effect of the Santa Cruz Mountains results in variations in summertime maximum temperatures in different parts of the peninsula. Mean minimum temperatures during the winter months are in the high-30's to low-40's on the eastern side of the Peninsula.

Annual average wind speeds range from 5 to 10 mph throughout the peninsula, with higher wind speeds usually found along the coast. On the east side of the mountains, winds are generally from the west, although wind patterns in this area are often influenced greatly by local topographic features.

Air pollution potential is highest along the southeastern portion of the peninsula. This is the area most protected from the high winds and fog of the marine layer. Pollutant transport from upwind sites is common. In the southeastern portion of the peninsula, air pollutant emissions are relatively high due to motor vehicle traffic as well as stationary sources.

### CRITERIA AIR POLLUTANTS

Ambient air quality standards have been established by state and federal environmental agencies for specific air pollutants most pervasive in urban environments. These pollutants are referred to as criteria air pollutants because the standards established for them were developed to meet specific health and welfare criteria set forth in the enabling legislation. The criteria air pollutants emitted by development, traffic and other activities anticipated under the proposed Project include ozone, ozone

[1] Setting information is based on Bay Area Air Quality Management District CEQA Guidelines, May 2017.

precursors oxides of nitrogen and reactive organic gases ($NO_x$ and ROG), carbon monoxide (CO), nitrogen dioxide ($NO_2$), and suspended particulate matter ($PM_{10}$ and $PM_{2.5}$). Other criteria pollutants, such as lead and sulfur dioxide ($SO_2$), would not be substantially emitted by the proposed development or traffic, and air quality standards for them are being met throughout the Bay Area so these are not further discussed here. A brief description of adverse health impacts of relevant criteria air pollutants is provided below.

Ozone and Ozone Precursors Oxides of Nitrogen ($NO_x$) and Reactive Organic Gasses (ROG)

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 not generally emitted directly into the environment, but is formed in the atmosphere by a complex series of photochemical reactions between "ozone precursors" that are two families of pollutants: $NO_x$ and ROG. While state and national ambient air quality standards relate to ozone levels, ozone levels are regulated indirectly through regulation of its precursors $NO_x$ and ROG. $NO_x$ and ROG are emitted from a variety of stationary and mobile sources, with vehicle emissions being the single largest source of ozone precursors. Other than $NO_2$, an oxide of nitrogen, which is discussed below, the health effects of $NO_x$ and ROG are indirect, relating to the formation of ozone and its potential health effects (discussed above).

Carbon Monoxide (CO)

CO is an odorless, colorless gas formed by the incomplete combustion of fuels. The single largest source of CO in the Bay Area is motor vehicles. When inhaled at high concentrations, CO combines with hemoglobin in the blood and reduces the oxygen-carrying capacity of the blood. This results in reduced oxygen reaching the brain, heart, and other body tissues. Even healthy people exposed to high CO concentrations can experience headaches, dizziness, fatigue, unconsciousness, and even death. People with cardiovascular diseases, chronic lung disease or anemia, as well as fetuses, are even more sensitive to high concentrations of CO.

Emission controls placed on automobiles and the reformulation of vehicle fuels have resulted in a sharp decline in CO levels, especially since 1991.

Nitrogen Dioxide ($NO_2$)

$NO_2$ is a reddish-brown gas that is a by-product of combustion processes. Automobiles and industrial operations are the main sources of $NO_2$. High concentration of $NO_2$ can irritate airways in the respiratory system. Such exposure over short periods can aggravate respiratory diseases, particularly asthma, leading to respiratory symptoms (such as coughing, wheezing or difficulty breathing), hospital admissions, and visits to emergency rooms. Longer exposures to elevated concentrations of $NO_2$ may contribute to the development of asthma and potentially increase susceptibility to respiratory infections such as colds, flu, and bronchitis. People with asthma, as well as children and the elderly are generally at greater risk for the health effects of $NO_2$.

$NO_2$, along with other $NO_x$, is an ozone precursor compound and contributes indirectly to health impacts related to ozone, as discussed above. $NO_2$ may be visible as a coloring component of a brown cloud on high pollution days, especially in conjunction with high ozone levels, potentially reducing visibility.

Particulate Matter (PM)

Respirable particulate matter, $PM_{10}$, and fine particulate matter, $PM_{2.5}$, consist of particulate matter that is 10 microns or less in diameter and 2.5 microns or less in diameter, respectively. $PM_{10}$ and $PM_{2.5}$ represent fractions of particulate matter that can be inhaled and cause adverse health effects. $PM_{10}$ and $PM_{2.5}$ are a health concern, particularly at levels above the federal and State ambient air quality standards. $PM_{2.5}$ (including diesel exhaust particles) is thought to have greater effects on health because minute particles are able to penetrate to the deepest parts of the lungs. Scientific studies have suggested links between fine particulate matter and numerous health problems including asthma, bronchitis, acute and chronic respiratory symptoms such as shortness of breath and painful breathing. Children are more susceptible to the health risks of $PM_{2.5}$ because their immune and respiratory systems are still developing. Very small particles of certain substances (e.g., sulfates and nitrates) can also directly cause lung damage or can contain absorbed gases (e.g., chlorides or ammonia) that may be injurious to health.

Particulate matter in the atmosphere results from many kinds of dust- and fume-producing industrial and agricultural operations, fuel combustion, and atmospheric photochemical reactions. Some sources of particulate matter, such as mining and demolition and construction activities, are more local in nature, while others, such as vehicular traffic, have a more regional effect. In addition to health effects, particulates also can damage materials and reduce visibility. Dust comprised of large particles (diameter greater than 10 microns) settles out rapidly and is more easily filtered by human breathing passages. This type of dust is considered more of a soiling nuisance rather than a health hazard.

In 1983, the California Air Resources Board (CARB) replaced the standard for "suspended particulate matter" with a standard for suspended $PM_{10}$ or "respirable particulate matter." This standard was set at 50 $\mu g/m^3$ for a 24-hour average and 30 $\mu g/m^3$ for an annual average. CARB revised the annual $PM_{10}$ standard in 2002, pursuant to the Children's Environmental Health Protection Act. The revised $PM_{10}$ standard is 20 $\mu g/m^3$ for an annual average. $PM_{2.5}$ standards were first promulgated by the EPA in 1997, and were recently revised to lower the 24-hour $PM_{2.5}$ standard to 35 $\mu g/m^3$ for 24-hour exposures and revoked the annual $PM_{10}$ standard due to lack of scientific evidence correlating long-term exposures of ambient $PM_{10}$ with health effects. CARB has adopted an annual average $PM_{2.5}$ standard, which is set at 12 $\mu g/m^3$ and is more stringent than the Federal standard of 15 µg/m3.

## TOXIC AIR CONTAMINANTS (TACS)

Besides the "criteria" air pollutants, there is another group of substances found in ambient air referred to as Hazardous Air Pollutants under the Federal Clean Air Act and Toxic Air Contaminants (TACs) by CARB. TACs are a broad class of compounds known to cause morbidity or mortality (usually because they cause cancer). 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. Because chronic exposure can result in adverse health effects, TACs are regulated at the regional, State, and federal level.

Diesel particulate matter (DPM) from the exhaust of diesel-fueled vehicles and equipment is the predominant TAC in urban air and is estimated to represent about three-quarters of the cancer risk from TACs (based on the Bay Area average). According to 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 complicated 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. The most recent California State Office of Environmental Health Hazard Assessment (OEHHA) risk assessment guidelines were published in February of 2015 and were used in this analysis.[2]

### ODORS

Odor refers to the perception or sensation experienced when one or more volatilized chemical compounds come in contact with receptors on the olfactory nerves. Odorant refers to any volatile chemical in the air that is part of the perception of odor by a human. The difference in sensory and physical responses experienced by individuals is responsible for the significant variability in the individual sensitivity to the quality and intensity of an odorant.

Some land uses commonly associated with odors include agriculture, wastewater treatment plants, food processing and rendering facilities, chemical plants, composting facilities, landfills, waste transfer stations, and dairies. In addition, the occurrence and severity of odor impacts depend on numerous factors, including the nature, frequency, and intensity of the source; wind speed and direction; and the presence of sensitive receptors. Although offensive odors rarely cause any physical harm, they can still be unpleasant, leading to distress and often generating citizen complaints to local governments and regulatory agencies.

### SENSITIVE RECEPTORS

There are groups of people more affected by air pollution than others. CARB has identified the following persons who are most likely to be affected by air pollution: children under 16, the elderly over 65, athletes, and people with cardiovascular and chronic respiratory diseases. These groups are classified as sensitive receptors. 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. Infants and small children are the most sensitive receptors, since they are more susceptible to cancer causing TACs. Therefore, for a worst case analysis, residential locations are assumed to include infants and small children. All other populations would have the same or lessened risk levels than those of infants and small children. The closest sensitive receptors to the site are residents in the single-family homes adjacent to the northern property border. Once constructed, the Project would introduce new sensitive receptors (i.e., residents) to the area.

## REGULATORY FRAMEWORK

### UNITED STATES

In 1990, the federal Clean Air Act Amendments (CAAA) established a number of requirements, including new deadlines for attaining clean air standards and the development of State Implementation Plans (SIPs). The EPA administers the CAAA, and has established National Ambient Air Quality Standards (NAAQS) for several air pollutants on the basis of human health and welfare criteria. To date, NAAQS have been established for CO, $O_3$, $SO_2$, $NO_2$, $PM_{10}$, $PM_{2.5}$ and Pb (lead).

[2] OEHHA, *Air Toxics Hot Spots Program Risk Assessment Guidelines, The Air Toxics Hot Spots Program Guidance Manual for Preparation of Health Risk Assessments,* February 2015.

## CALIFORNIA

Under the California Clean Air Act (CCAA), the CARB is responsible for research activities, the establishment of California Ambient Air Quality Standards (CAAQS), guidelines for air quality management, and the regulation of both stationary and mobile emission sources. The CAAQS are generally more stringent than corresponding federal standards.

In July 2007, the CARB adopted the In-Use Off-Road Diesel Vehicle Regulation and amended it in December 2011.[3,4] The regulation requires owners of off-road mobile equipment powered by diesel engines 25 horsepower or larger to meet the fleet average or BACT requirements for NOX and PM emissions by January 1 of each year. The regulation also establishes idling restrictions, limitations on buying/selling of older off-road diesel vehicles (Tier 0), reporting requirements, and retrofit and replacement requirements. The requirements and compliance dates vary by fleet size, with performance requirements for large fleets beginning in 2014, medium fleets in 2017, and small fleets in 2019.

## STATE OF CALIFORNIA AND FEDERAL AIR QUALITY STANDARDS

As noted above, both the California Air Resource Board and the U.S. Environmental Protection Agency have established ambient air quality standards for common pollutants, including ozone, CO, $NO_2$, $PM_{10}$ and $PM_{2.5}$. These ambient air quality standards represent levels that avoid specific adverse health effects associated with each pollutant. Individuals vary widely in their sensitivity to air pollutants, and standards are set to protect more pollution-sensitive populations (e.g., children and the elderly). National and state standards are reviewed and updated periodically based on new health studies. California ambient standards tend to be at least as protective as national ambient standards, and are often more stringent. National and California ambient air quality standards are shown in **Table 6.1**.

**Table 6.1: Health-Based Ambient Air Quality Standards**

| Pollutant | Averaging Time | California Standard | National Standard |
|---|---|---|---|
| Ozone | 1 Hour | 0.09 ppm | --- |
| | 8 Hour | 0.070 ppm | 0.070 ppm |
| Carbon Monoxide | 1 Hour | 20 ppm | 35 ppm |
| | 8 Hour | 9.0 ppm | 9 ppm |
| Nitrogen Dioxide | 1 Hour | 0.18 ppm | 0.100 ppm |
| | Annual | 0.030 ppm | 0.053 ppm |
| Particulates | 24 Hour | 50 $\mu g/m^3$ | 150 $\mu g/m^3$ |
| < 10 microns | Annual | 20 $\mu g/m^3$ | --- |
| Particulates | 24 Hour | --- | 35 $\mu g/m^3$ |
| < 2.5 microns | Annual | 12 $\mu g/m^3$ | 12 $\mu g/m^3$ |

Concentrations: ppm = parts per million $\mu g/m^3$ = micrograms per cubic meter

Source: Bay Area Air Quality Management District, Bay Air Quality Standards and Attainment Status, available at http://www.baaqmd.gov/research-and-data/air-quality-standards-and-attainment-status.

[3] California Air Resources Board (CARB), 2011b. Regulation for In-Use Off-Road Diesel-Fueled Fleets. Title 13, California Code of Regulations, Section 2449.

[4] California Air Resources Board (CARB), 2012. In-Use Off-Road Diesel Vehicle Regulation.

## SAN FRANCISCO BAY AREA

For planning purposes, regions like the San Francisco Bay Area are given an air quality status designation by the federal and state regulatory agencies. Areas with monitored pollutant concentrations that are lower than ambient air quality standards are designated "attainment" on a pollutant-by-pollutant basis. When monitored concentrations exceed ambient standards within an air basin, it is designated "nonattainment" for that pollutant.

In general, the Bay Area experiences low concentrations of most pollutants when compared to federal and state standards. The Bay Area is considered "attainment" (or unclassified) for all of the national standards, with the exception of ozone and the 24-hour $PM_{2.5}$ standard. For State air quality standards, the Bay Area is considered "nonattainment" for all averaging times for ozone and particulate matter ($PM_{10}$ and $PM_{2.5}$).[5]

Clean Air Plan

In 1991, BAAQMD, Metropolitan Transportation Commission (MTC) and the Association of Bay Area Governments (ABAG) prepared the Bay Area 1991 Clean Air Plan. This air quality plan addresses the California Clean Air Act. The plan was meant to demonstrate progress toward meeting the more stringent 1-hour ozone CAAQS. The latest update to the plan, which was adopted in April 2017, is referred to as the Bay Area 2017 Clean Air Plan (CAP).[6] The 2017 CAP includes a multi-pollutant strategy represented by 85 control strategies to simultaneously reduce emissions and ambient concentrations of ozone, fine particulate matter, and toxic air contaminants, as well as greenhouse gases that contribute to climate change.

The 2017 CAP includes the Bay Area's first-ever comprehensive Regional Climate Protection Strategy, which identifies potential rules, control measures, and strategies that the BAAQMD can pursue to reduce greenhouse gasses in the Bay Area. Measures of the 2017 CAP addressing the transportation sector are in direct support of Plan Bay Area, which was prepared by ABAG and MTC and includes the region's Sustainable Communities Strategy and the 2040 Regional Transportation Plan. Highlights of the 2017 CAP control strategy include:

- Limit Combustion: Develop a region-wide strategy to improve fossil fuel combustion efficiency at industrial facilities, beginning with the three largest sources of industrial emissions: oil refineries, power plants, and cement plants.
- Stop Methane Leaks: Reduce methane emissions from landfills and oil and natural gas production and distribution.
- Reduce Exposure to Toxics: Reduce emissions of toxic air contaminants by adopting more stringent limits and methods for evaluating toxic risks at existing and new facilities.
- Put a Price on Driving: Implement pricing measures to reduce travel demand.
- Advance Electric Vehicles: Accelerate the widespread adoption of electric vehicles.
- Promote Clean Fuels: Promote the use of clean fuels and low or zero carbon technologies in trucks and heavy-duty vehicles.

[5] BAAQMD, Ambient Air Quality Standards and Bay Area Attainment, via website http://www.baaqmd.gov/pln/air_quality/ambient_air_quality.htm , accessed February 27, 2009.

[6] Bay Area Air Quality Management District, *Clean Air Plan 2017: Spare the Air, Cool the Climate*, Adopted April 2017.

- Accelerate Low Carbon Buildings: Expand the production of low-carbon, renewable energy by promoting on-site technologies such as rooftop solar and ground-source heat pumps.
- Support More Energy Choices: Support community choice energy programs throughout the Bay Area.
- Make Buildings More Efficient: Promote energy efficiency in both new and existing buildings.
- Make Space and Water Heating Cleaner: Promote the switch from natural gas to electricity for space and water heating in Bay Area buildings.

To achieve the goals of the CAP, it identifies 85 emissions control measures for implementation by BAAQMD in collaboration with local government agencies, the business community, and Bay Area residents. The control measures target the following emissions sources: stationary sources (40 measures); transportation (23 measures); energy (2 measures); buildings (4 measures); agriculture (4 measures); natural and working lands (3 measures); waste management (4 measures); water (2 measures); super-GHGs (3 measures); and further study (miscellaneous stationary, building, and agriculture sources) (11 measures).

BAAQMD Guidelines

BAAQMD also provides a document titled *California Environmental Quality Act Air Quality Guidelines* ("BAAQMD Guidelines"), which provides guidance for consideration by lead agencies, consultants, and other parties evaluating air quality impacts in the San Francisco Bay Area Air Basin conducted pursuant to CEQA. The document provides guidance on evaluating air quality impacts of development projects and local plans, determining whether an impact is significant, and mitigating significant air quality impacts. The most recent version of the Guidelines is dated May 2017.[7]

## TOWN OF PORTOLA VALLEY

Portola Valley General Plan

Portola Valley's General Plan includes goals, policies, and actions to reduce exposure of the town's population to exposure of air pollution and toxic air contaminants or TACs. The following goals, policies, and actions are applicable to the proposed Project:

Sustainability Goal: New Buildings - Encourage, and where feasible, require new buildings to adhere to "green" building design standards.

> Objective 1. Require all new buildings to achieve a minimum level of sustainability based on an accepted "green" rating system

Sustainability Goal: Transportation – Provide for transportation needs by methods that reduce greenhouse gas emissions.

> Objective 3. Reduce motor vehicle trips in the town.
>
> Objective 4. Encourage and enable use of energy efficient low or zero emission vehicles and /or those powered by non-petroleum-based alternative fuels.

[7] Bay Area Air Quality Management District, *California Environmental Quality Act Air Quality Guidelines*, May 2017.

### CURRENT AND HISTORICAL AIR QUALITY MONITORING

BAAQMD monitors air quality at several locations within the San Francisco Air Basin, although none are located in Portola Valley. The monitoring site closest to the Project site is located in Redwood City. **Table 6.2** presents a summary of air quality trends in the area for the most recent years available, 2017 through 2019, represented as the number of days air quality standards were exceeded at the Redwood City monitoring station and throughout the Bay area. The table shows that ambient air quality standards are generally met in the Bay area, with a few days of exceedances, usually related to $PM_{2.5}$ and ozone.

**Table 6.2: Summary of Criteria Air Pollution Monitoring Data**

| Pollutant | Standard | Monitoring Site | Days Standard Exceeded | | |
|---|---|---|---|---|---|
| | | | 2017 | 2018 | 2019 |
| Ozone | State 1-Hour | Redwood City | 2 | 0 | 0 |
| | | SF Bay Area | 6 | 2 | 6 |
| Ozone | Federal 8-Hour | Redwood City | 2 | 0 | 2 |
| | | SF Bay Area | 6 | 3 | 9 |
| Ozone | State 8-Hour | Redwood City | 2 | 0 | 2 |
| | | SF Bay Area | 6 | 3 | 9 |
| $PM_{10}$ | Federal 24-Hour | Redwood City | - | - | - |
| | | SF Bay Area | 0 | 1 | 0 |
| $PM_{10}$ | State 24-Hour | Redwood City | - | - | - |
| | | SF Bay Area | 6 | 6 | 5 |
| $PM_{2.5}$ | Federal 24-Hour | Redwood City | 6 | 13 | 0 |
| | | SF Bay Area | 18 | 18 | 1 |
| Carbon Monoxide | State/Federal 8-Hour | Redwood City | 0 | 0 | 0 |
| | | SF Bay Area | 0 | 0 | 0 |
| Nitrogen Dioxide | Federal 1-Hour | Redwood City | 0 | 0 | 0 |
| | | SF Bay Area | 1 | 0 | 0 |
| Nitrogen Dioxide | State 1-Hour | Redwood City | 0 | 0 | 0 |
| | | SF Bay Area | 0 | 0 | 0 |

Notes: Dash (-) indicates pollutant is not monitored at that site.
Source: Bay Area Air Quality Management District Air Pollution Summaries (http://www.baaqmd.gov/about-air-quality/air-quality-summaries). As of January 2022, the 2019 data is the latest available data.

## IMPACTS AND MITIGATION MEASURES

### THRESHOLDS OF SIGNIFICANCE

Under the CEQA Guidelines, Appendix G – Environmental Checklist Form, development of the Project site as proposed would have a significant environmental impact if it were to result in the following:

1. Conflict with or obstruct implementation of the applicable air quality plan;
2. Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable federal or state ambient air quality standard;
3. Expose sensitive receptors to substantial pollutant concentrations; or
4. Result in other emissions (such as those leading to odors) adversely affecting a substantial number of people.

The CEQA Guidelines state that, where available, the significance criteria established by the applicable air quality management or air pollution control district may be relied upon to make the

above determinations. The analysis in this chapter is based on the thresholds presented in the latest BAAQMD Guidelines (May 2017), as detailed under each impact discussion below.

## CONSISTENCY WITH CLEAN AIR PLAN

*1. Would the project conflict with or obstruct implementation of the applicable air quality plan?*

BAAQMD recommends analyzing a project's consistency with current air quality plan primary goals and control measures. The impact would be significant if the Project would conflict with or obstruct attainment of the primary goals or implementation of the control measures.

The primary goals of the Bay Area 2017 Clean Air Plan are:

- Attain all state and national air quality standards
- Eliminate disparities among Bay Area communities in cancer health risk from toxic air contaminants
- Reduce Bay Area GHG emissions 40 percent below 1990 levels by 2030, and 80 percent below 1990 levels by 2050. [This standard is addressed in the Greenhouse Gas Emissions chapter of this EIR.]

The Project is consistent with all applicable rules and regulations related to emissions and health risk and as detailed in this chapter, would not result in a new substantial source of emissions or TACs.

Many of the Clean Air Plan's control measures are targeted to government-driven area-wide improvements, large stationary source reductions, or large employers and these are not directly applicable to the proposed Project. However, the Project would not conflict with any control measures and would support the following control measures directly or indirectly:

- Energy Control Measure EN1 and Water Control Measure WR2: the Project would meet current standards of energy and water efficiency, which support these control measures with those objectives.
- Building Control Measures BL1 and BL2: The Project would meet the Town's current "Green Building" requirements including all-electric residences, which support these control measures to decarbonize and green buildings.
- Waste Management Control Measures WA3 and WA4: The Project would meet all recycling and green waste requirements, which support these control measures to promote these activities.
- Transportation Control Measures TR2 and TR8: These control measures promote employer trip reduction and carpooling/vanpooling. While the proposed Project is a residential project, many of the homes would be for Stanford University faculty, who would have access to the university's transportation demand management program for employees including free transit passes, priority carpool and vanpool parking, commute club, ride matching, and discounts on car shares or rentals. Stanford University's commuter benefits program (which would apply to the faculty living at the Project site) supports Control Measures TR2 and TR8.
- Transportation Control Measure TR14: The Project includes an electric vehicle charging station in the garage of each single-family home, supporting this control measure for the promotion of electric vehicles.

As described above and under the below topics in this chapter, the Project is consistent with all applicable control measures and with all applicable rules and regulations related to emissions and

health risk. Therefore, there would be ***no impact*** in relation to inconsistency with the applicable air quality plan.

## AIR QUALITY STANDARDS

2. *Would the project result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable federal or state ambient air quality standard?*

For the purpose of assessing impacts of a proposed Project on air quality standards, the BAAQMD-recommended thresholds are:

- Average daily emissions of 54 pounds per day of NOx, ROG or $PM_{2.5}$, and 82 pounds per day of $PM_{10}$ during the construction period.
- Average daily emissions as listed above during the operational period.
- Annual emissions of 10 tons per year of NOx, ROG or $PM_{2.5}$, and 15 tons per year of $PM_{10}$ during the operational period.

Construction Period

**Impact Air-1:** **Construction Period Dust and Emissions.** Construction activities would generate exhaust emissions from vehicles and equipment and fugitive dust particles that could affect local air quality. Although emissions would be below threshold levels, the impact is considered ***potentially significant*** unless basic control measures are implemented.

Construction emissions for all stages of construction were estimated using the most recent version 2016.3.2 of the California Emission Estimator Model (CalEEMod), the land-use model recommended by the BAAQMD for CEQA analyses, as updated with the most recent emissions factors (EMFAC2017). Sources of general construction emissions include off-gassing from pavement and architectural coating, exhaust from off-road and on-road construction vehicles and equipment, and fugitive emissions (dust) associated with site grading (see full report in Appendix C for detailed methodology, inputs, and results).

As shown in **Table 6.3** below, predicted construction period emissions would not exceed the applicable BAAQMD significance thresholds.

**Table 6.3: Construction Period Emissions**

| Description | ROG | NOx | $PM_{10}$ Exhaust | $PM_{2.5}$ Exhaust |
|---|---|---|---|---|
| Total construction emissions (tons) | 0.8 tons | 1.9 tons | 0.11 tons | 0.10 tons |
| Average daily emissions (pounds)[1] | 3.3 lbs./day | 8.4 lbs./day | 0.5 lbs./day | 0.4 lbs./day |
| *BAAQMD Thresholds (pounds per day)* | *54* lbs./day | *54* lbs./day | *82* lbs./day | *54* lbs./day |
| **Exceed Threshold?** | No | No | No | No |

Construction activities, particularly during site preparation and grading, would temporarily generate fugitive dust in the form of $PM_{10}$ and $PM_{2.5}$. Sources of fugitive dust would include disturbed soils at the construction site and trucks carrying uncovered loads of soils. Unless properly controlled, vehicles leaving the site would deposit mud on local streets, which could be an additional source of airborne dust after it dries. BAAQMD does not have a quantifiable threshold of significance for fugitive dust

impacts, but instead regards fugitive dust impacts as mitigated if appropriate management practices are implemented, as included in Mitigation Measure Air-1.

**Mitigation Measure Air-1:** **Basic Construction Management Practices.** The Project shall demonstrate proposed compliance with all applicable regulations and operating procedures prior to issuance of demolition, building or grading permits, including implementation of the following BAAQMD "Basic Construction Mitigation Measures".

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

The BAAQMD significance thresholds for construction dust impacts are based on the appropriateness of construction dust controls. With implementation of the Basic Construction Management Practices listed in Mitigation Measure Air-1, impacts related to construction period emissions would be considered ***less than significant with mitigation***. Because construction-period emissions do not exceed applicable significance thresholds, which have been set to avoid adverse health impacts to sensitive populations as discussed in the setting section above, additional construction mitigation measures would not be required to mitigate impacts.

Operation

*Regional Air Quality*

Operational air emissions from the Project would be generated primarily from vehicles driven by future residents. While a small portion of overall emissions, evaporative emissions from architectural

coatings and maintenance products (classified as consumer products) are also factored into the quantification of emissions for residential uses.

Operational-period emissions for criteria pollutants and precursors have been calculated using CalEEMod as discussed above (full details are included in Appendix C), with results summarized in **Table 6.4**.

**Table 6.4: Operational Period Emissions**

| Description | ROG | NOx | $PM_{10}$ | $PM_{2.5}$ |
|---|---|---|---|---|
| Project Annual Operational Emissions (*tons/year*) | 0.48 tons | 0.22 tons | 0.30 tons | 0.09 tons |
| *BAAQMD Thresholds (tons /year)* | *10 tons* | *10 tons* | *15 tons* | *10 tons* |
| ***Exceed Threshold?*** | *No* | *No* | *No* | *No* |
| Project Daily Operational Emissions (*lbs/day*) | 2.7 lbs. | 1.2 lbs. | 1.6 lbs. | 0.5 lbs. |
| *BAAQMD Thresholds (lbs/day)* | *54* lbs. | *54* lbs. | *82* lbs. | *54* lbs. |
| ***Exceed Threshold?*** | *No* | *No* | *No* | *No* |

As indicated in the table above, predicted operational period emissions would not exceed the BAAQMD significance thresholds and would therefore be a ***less than significant*** impact.

*Carbon Monoxide Hotspots*

Emissions and ambient concentrations of carbon monoxide have decreased greatly in recent years. These improvements are due largely to the introduction of cleaner burning motor vehicle engines and motor vehicle fuels. No exceedances of the State or National CO standard have been recorded at any of the Bay Area's monitoring stations since 1991. The Bay Area has attained the State and National CO standard.

However, elevated CO concentrations are generally fairly localized. Heavy traffic volumes and congestion can lead to high levels of CO, or "hotspots", while concentrations at the closest air quality monitoring station may be within State and National standards.

BAAQMD presents the screening level that localized carbon monoxide concentrations should be studied at affected intersections where traffic is increased to more than 44,000 vehicles per hour (or 24,000 vehicles per hour where mixing is substantially limited, such as in a tunnel). This screening level represents the volume of traffic at which a significant impact related to carbon monoxide would be possible. Based on traffic volumes in the vicinity, which show relatively low-volume roadways (e.g., the Alpine Road and Westridge Drive intersection carries just over 1,000 vehicles during the busiest peak hour), the Project would not affect intersections of that volume (see Chapter 14 for additional details) and therefore, the impact related to carbon monoxide is ***less than significant***.

## SENSITIVE RECEPTORS

*3. Would the project expose sensitive receptors to substantial pollutant concentrations?*

**Impact Air-3:** **Exposure of Sensitive Receptors.** The Project would result in emissions that could contribute to increased health risks during both the construction period and operations. However, the Project's contribution would not be substantial and is below applicable screening and threshold levels and the impact would be considered ***less than significant.***

This impact is described in more detail by construction and operational periods below.

Construction Period Exposure

Construction equipment and associated heavy-duty truck traffic generates diesel exhaust, which is a known TAC. Although it was concluded in the previous sections that construction exhaust air pollutant emissions would not be considered to contribute substantially to existing or projected air quality violations, construction exhaust emissions could still pose health risks for sensitive receptors such as surrounding residents. The primary community risk impact issues associated with construction emissions are cancer risk and exposure to $PM_{2.5}$. DPM from diesel exhaust poses both a potential health and nuisance impact to nearby receptors. A health risk assessment of the Project construction activities was conducted that evaluated potential health effects to nearby sensitive receptors from construction emissions of DPM and $PM_{2.5}$ using emissions results from CalEEMod and BAAQMD-recommended U.S. EPA AERMOD dispersion model utilizing local meteorological data (full details are included in Appendix C), with results summarized in **Table 6.5**.

**Table 6.5: Construction Risk Impacts at the Off-site Receptors (Maximum)**

| Source | Cancer Risk (per million) | Annual $PM_{2.5}$ ($\mu g/m^3$) | Hazard Index |
|---|---|---|---|
| Project Construction | 4.7 (infant) | 0.03 | <0.01 |
| ***BAAQMD Single-Source Threshold*** | ***>10.0*** | ***>0.3*** | ***>1.0*** |
| *Exceed Threshold?* | *No* | *No* | *No* |

As indicated in the table above, results of this community health risk assessment indicate that the maximum increased health risks would not exceed the BAAQMD significance thresholds and would therefore be a ***less than significant*** impact.

Community health risk assessments typically also look at all substantial sources of TACs that can affect sensitive receptors and are located within 1,000 feet of the Project site (i.e. influence area). These sources include railroads, freeways or highways, high-volume surface streets, and stationary sources identified by BAAQMD. A review of the Project area indicates that traffic on Alpine Road does not exceed the average daily traffic (ADT) threshold of 10,000 vehicles for consideration as a high-volume roadway. Likewise, the other roadways within the area are below the 10,000 ADT threshold. Additionally, there are no stationary sources of TACs located within the 1,000-foot influence area according to BAAQMD's Permitted Stationary Sources 2018 GIS website. Therefore, an additional cumulative community risk impact analysis is not warranted and the cumulative risk would also be ***less than significant***.

Operational Period Exposure

As a residential project, operation of the Project is not expected to cause any localized emissions that could expose sensitive receptors to unhealthy air pollutant levels. When operating, the Project would generate automobile traffic and infrequent truck traffic; however, these emissions are anticipated to result in fairly low impacts in terms of TAC or $PM_{2.5}$ exposure and there would be no other operational sources of TAC or $PM_{2.5}$, so operational sources of health risk would not be substantial and were not further evaluated. No stationary sources of TACs, such as generators, are proposed as part of the Project.

While not considered an impact to the environment under CEQA, the potential health risk to proposed new on-site sensitive receptors is sometimes presented as an information item. However, because there are no roadways near the Project with an ADT of 10,000 or greater and because there are no stationary sources of TACs within 1,000 feet of the Project, as discussed above, it can be concluded that health risk to proposed new on-site sensitive receptors (residents) would be below significance threshold levels.

## ODORS

*4. Would the project result in other emissions (such as those leading to odors) adversely affecting a substantial number of people?*

As described by the BAAQMD in its 2017 CEQA Guidelines, odors are generally regarded as an annoyance rather than a health hazard. Manifestations of a person's reaction to odors can range from psychological (e.g., irritation, anger, or anxiety) to physiological (e.g., circulatory and respiratory effects, nausea, vomiting, and headache). The ability to detect odors varies considerably among the population and overall is quite subjective. People may have different reactions to the same odor. An odor that is offensive to one person may be acceptable to another (e.g., coffee roaster). An unfamiliar odor is more easily detected and is more likely to cause complaints than a familiar one. Known as odor fatigue, a person can become desensitized to almost any odor and recognition only occurs with an alteration in the intensity. The occurrence and severity of odor impacts depend on the nature, frequency, and intensity of the source; wind speed and direction; and the sensitivity of receptors. Odor impacts should be considered for any proposed new odor sources located near existing receptors, as well as any new sensitive receptors located near existing odor sources. Generally, increasing the distance between the receptor and the odor source will mitigate odor impacts.

BAAQMD has identified typical sources of odor, a few examples of which include manufacturing plants, rendering plants, coffee roasters, wastewater treatment plants, sanitary landfills, and solid waste transfer stations. The Project is a residential project with an odor profile similar to other area residential development and would not include any of the above potential sources of objectionable odors or otherwise be considered a substantial source of objectionable odors or other emissions adversely affecting a substantial number of people (***no impact***).