4.3 AIR QUALITY

This section describes the existing air quality within the plan area and the Bay Area air basin, and evaluates the effects of future project-related emissions on regional and local air quality, including sensitive receptors. Information provided in this section is based on research conducted for the New General Plan project by Illingworth & Rodkin, Inc. in March 2010.

4.3.1 ENVIRONMENTAL SETTING

Physical Setting

The plan area is located within the western portion of the San Francisco Bay Area Air Basin (Bay Area Basin), which includes the counties of San Francisco, Santa Clara, San Mateo, Marin, Napa, Contra Costa County, and Alameda, along with the southeast portion of Sonoma County and the southwest portion of Solano County. The local air quality regulatory agency responsible for this basin is the Bay Area Air Quality Management District (BAAQMD).

The climate of the plan area is characterized by warm, dry summers and cool, moist winters. The proximity of the San Francisco Bay and Pacific Ocean has a moderating influence on the climate. Air is often condensed into fog or stratus clouds by the cool Pacific Ocean. This condition is typical of the warmer months of the year from roughly May through October. When a strong high pressure develops over the region in late spring and summer, the resulting warm conditions and a weak or non-existent marine inversion create clear skies and relatively dry atmospheric conditions.

In the winter, high pressure over the eastern Pacific weakens and generally shifts south, allowing transitional weather systems associated with the polar jet stream to affect northern California on a regular basis. Low pressure systems produce periods of cloudiness, strong shifting winds, and precipitation. The plan area receives about 15 to 20 inches of precipitation annually, with about 90 percent of this rainfall falling from November through April. Fog and haze are also common in the plan area during winter, when high-pressure systems influence the weather.

During the fall and winter months, the high pressure condition over the interior regions of the western United States (known as the Great Basin High) can produce extended periods of light winds and low-level temperature inversions. This condition is frequently characterized by poor atmospheric mixing resulting in degraded regional air quality. Ozone (O₃) pollution typically occurs when this condition occurs during the warmer months of the year.

Criteria Air Pollutants and Effects

Air quality studies generally focus on the pollutants that are most commonly measured and regulated: carbon monoxide (CO), ground level ozone (O₃), nitrogen dioxide (NO₂), sulfur dioxide (SO₂), suspended particulate matter (specifically, PM₁₀ and PM₂.₅), and lead...
(Pb). These pollutants and their characteristics, health effects, and major sources are listed in Table 4.3-1. In San Mateo County, O₃ and particulate matter are the pollutants of greatest concern, as measured air pollution levels show high concentrations of these pollutants at times.

Table 4.3–1 Major Criteria Pollutants

<table>
<thead>
<tr>
<th>Pollutant</th>
<th>Characteristics</th>
<th>Health Effects</th>
<th>Major Sources</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Carbon Monoxide (CO)</strong></td>
<td>Non-reactive, colorless and odorless gas that dissipates relatively quickly; ambient CO concentrations generally located near vehicular traffic. Highest CO concentrations measured in the Bay Area are recorded during the winter</td>
<td>Interferes with the transfer of oxygen to the brain; causes dizziness and fatigue; can impair central nervous system functions</td>
<td>Automobile exhaust, residential wood burning in fireplaces and woodstoves</td>
</tr>
<tr>
<td><strong>Ozone (O₃)</strong></td>
<td>Colorless toxic gas and the chief component of urban smog. Present in relatively high concentrations within portions of the Bay Area; highest concentrations occur during summer and early autumn on days with low wind speeds or stagnant air, warm temperatures, and cloudless skies</td>
<td>Irritates eyes; impairs respiratory function; interferes with the transfer of oxygen, depriving sensitive tissues in the heart and brain of oxygen</td>
<td>Although not directly emitted from a particular source, it forms in the atmosphere through a chemical reaction between reactive organic gas (ROG) and nitrogen oxides (NOₓ) under sunlight; ROG and NOₓ are primarily emitted from automobiles, and industrial sources</td>
</tr>
<tr>
<td><strong>Nitrogen Dioxide (NO₂)</strong></td>
<td>Reddish-brown gas that irritates the lungs; NO and NO₂ are collectively referred to as NOₓ and are major contributors to O₃ formation; NO₂ also contributes to the formation of PM₁₀. Levels of NO₂ in the Bay Area are relatively low</td>
<td>Irritates lungs; can cause breathing difficulties at high concentrations</td>
<td>Like O₃, NO₂ is not directly emitted, but is formed through a reaction between nitric oxide (NO) and atmospheric oxygen; NO is primarily emitted from automobile and diesel truck exhaust, industrial processes, and fossil-fueled power plants</td>
</tr>
<tr>
<td><strong>Sulfur Oxides (SO₂)</strong></td>
<td>Sulfur oxides are colorless gases with a pungent, irritating odor. Due to the lack of sources, levels of SO₂ in the Bay Area are relatively low</td>
<td>Increases risk of acute and chronic respiratory disease; can cause diminished ventilator function in children</td>
<td>Product of high-sulfur fuel combustion from coal and oil used in power stations, industries, and for domestic heating; industrial chemical manufacturing; diesel vehicle exhaust</td>
</tr>
<tr>
<td><strong>Suspended Particulate Matter (PM₂·₅/PM₁₀)</strong></td>
<td>Very small liquid and solid particles suspended in the air, which can include smoke, soot, dust, salts, acids, and metals; can produce haze and reduce regional visibility. PM₁₀: Particulate matter less than 10 microns in diameter, about one-seventh the thickness of a human</td>
<td>Damages respiratory tract; increases the number and severity of asthma attacks; causes or aggravates bronchitis and other lung diseases; reduces the body's ability to fight infections</td>
<td>Motor vehicles; wood burning stoves and fireplaces; dust from construction, landfills, and agriculture; wildfires and brush/waste burning; industrial sources; windblown dust from open lands; atmospheric chemical and...</td>
</tr>
</tbody>
</table>
Pollutant | Characteristics | Health Effects | Major Sources
--- | --- | --- | ---
Hair. PM$_{2.5}$: Particulate matter 2.5 microns or less in diameter | photochemical reactions

<table>
<thead>
<tr>
<th>Pollutant</th>
<th>Characteristics</th>
<th>Health Effects</th>
<th>Major Sources</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lead (Pb)</td>
<td>Occurs in atmosphere as particulate matter</td>
<td>Damages blood-forming, nervous, urinary, and reproductive systems.</td>
<td>Primarily emitted by gasoline-powered motor vehicles, although use of lead in fuel has been virtually eliminated</td>
</tr>
</tbody>
</table>


### Ambient Air Quality Conditions

Air quality is described by the concentration of various pollutants in the atmosphere. The ambient air quality in a given area depends on the quantities of pollutants emitted within the area, transport of pollutants to and from surrounding areas, local and regional meteorological conditions, and the topography of the air basin. Units of concentration are generally expressed in parts per million (ppm) or micrograms per cubic meter (µg/m³). State and federal air quality standards have been established to define the allowable pollutant concentrations in a given air basin. These standards are designed to ensure that public health and welfare are protected, while including a reasonable margin of safety to protect the more sensitive individuals in the population. Both state and federal ambient air quality standards are presented in Table 4.3-2.

### Attainment Status

Areas that do not violate ambient air quality standards are considered to be in attainment status for each regulated air pollutant. Violations of ambient air quality standards are based on air pollutant monitoring data and are judged for each air pollutant. The Bay Area as a whole does not meet state or federal ambient air quality standards for ground level ozone and state standards for PM$_{10}$ and PM$_{2.5}$.

In June 2004, under the Federal Clean Air Act, the United States Environmental Protection Agency (EPA) classified the Bay Area Air Basin as marginally in nonattainment for the 8-hour ozone standard. In 2008, the EPA adopted a more stringent 8-hour ozone National Ambient Air Quality Standards (NAAQS). In 2009, the EPA, under a new administration, began the process of new rulemaking action to reconsider the 2008 ozone NAAQS upon reconsideration of the scientific advisory committee recommendations used to establish the 2008 NAAQS. In January 2010, the EPA announced that upon review of scientific data they were proposing to further lower the ozone NAAQS. The EPA was poised to promulgate nonattainment designations under the 2008 ozone NAAQS in December 2009, which would have included the Bay Area. These nonattainment designations would have become effective by March 12, 2010. However, on January 19, 2010, the EPA announced delay of the final designations for the 2008 NAAQS until
Table 4.3–2  California and National Ambient Air Quality Standards (NAAQS)

<table>
<thead>
<tr>
<th>Pollutant</th>
<th>Averaging Time</th>
<th>California Standards</th>
<th>National Standards&lt;sup&gt;a&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>(ppm)</td>
<td>(µg/m³)</td>
</tr>
<tr>
<td>Ozone</td>
<td>8-hour</td>
<td>0.070 ppm (154 µg/m³)</td>
<td>0.075 ppm (176 µg/m³) —</td>
</tr>
<tr>
<td></td>
<td>1-hour</td>
<td>0.09 ppm (180 µg/m³)</td>
<td>—</td>
</tr>
<tr>
<td>Carbon monoxide</td>
<td>8-hour</td>
<td>9.0 ppm (10 µg/m³)</td>
<td>9 ppm (10 µg/m³) —</td>
</tr>
<tr>
<td></td>
<td>1-hour</td>
<td>20 ppm (23 µg/m³)</td>
<td>35 ppm (40 µg/m³) —</td>
</tr>
<tr>
<td>Nitrogen dioxide</td>
<td>Annual</td>
<td>—</td>
<td>0.053 ppm (100 µg/m³) Same as primary</td>
</tr>
<tr>
<td></td>
<td>1-hour</td>
<td>0.18 ppm (339 µg/m³)</td>
<td>0.10 ppm (189 µg/m³) —</td>
</tr>
<tr>
<td>Sulfur dioxide</td>
<td>Annual</td>
<td>—</td>
<td>0.03 ppm (80 µg/m³) —</td>
</tr>
<tr>
<td></td>
<td>24-hour</td>
<td>0.04 ppm (105 µg/m³)</td>
<td>0.14 ppm (365 µg/m³) —</td>
</tr>
<tr>
<td></td>
<td>3-hour</td>
<td>—</td>
<td>0.5 ppm (1,300 µg/m³)</td>
</tr>
<tr>
<td></td>
<td>1-hour</td>
<td>0.25 ppm (655 µg/m³)</td>
<td>—</td>
</tr>
<tr>
<td>PM&lt;sub&gt;10&lt;/sub&gt;</td>
<td>Annual</td>
<td>20 µg/m³</td>
<td>50 µg/m³ Same as primary</td>
</tr>
<tr>
<td></td>
<td>24-hour</td>
<td>50 µg/m³</td>
<td>150 µg/m³ Same as primary</td>
</tr>
<tr>
<td>PM&lt;sub&gt;2.5&lt;/sub&gt;</td>
<td>Annual</td>
<td>12 µg/m³</td>
<td>15 µg/m³</td>
</tr>
<tr>
<td></td>
<td>24-hour</td>
<td>—</td>
<td>35 µg/m³</td>
</tr>
<tr>
<td>Lead</td>
<td>Calendar quarter</td>
<td>—</td>
<td>1.5 µg/m³ Same as primary</td>
</tr>
<tr>
<td></td>
<td>30-day average</td>
<td>1.5 µg/m³</td>
<td>—</td>
</tr>
</tbody>
</table>

Notes:
<sup>a</sup>Standards, other than for ozone and those based on annual averages, are not to be exceeded more than once a year. The ozone standard is attained when the expected number of days per calendar year with maximum hourly average concentrations above the standard is equal to or less than one. Concentrations are expressed first in units in which they were promulgated. Equivalent units given in parenthesis.
<sup>b</sup>Primary Standards: The levels of air quality necessary, with an adequate margin of safety to protect the public health. Each state must attain the primary standards no later than 3 years after that state’s implementation plan is approved by the U.S. EPA.
<sup>c</sup>Secondary Standards: The levels of air quality necessary to protect the public welfare from any known or anticipated adverse effects of a pollutant.
ppm= parts per million
µg/m³ = micrograms per cubic meter
March 12, 2011 to allow adequate time for reconsideration and possible revision of the 2008 NAAQS. The range of standards under consideration would be a significant change, which would undoubtedly result in a nonattainment designation for the Bay Area and much of California. Final standard will be issued by August 31, 2010. Designations of nonattainment areas will become affective one year later in 2011.

The EPA also recently designated the Bay Area Air Basin as nonattainment for the 2006 24-hour PM$_{2.5}$ standard, as recent monitoring data indicate levels slightly above the standard (from measurements conducted in the cities of San Jose and Vallejo). Most PM$_{2.5}$ nonattainment areas would have until 2015 to attain the standards with some extensions to 2020 if necessary.

The Bay Area has met the CO standards for over a decade and is classified in attainment (with a maintenance plan) by the EPA. The EPA designates the Bay Area Air Basin as unclassified for all other air pollutants, which include PM$_{10}$.

At the state level, the Bay Area Air Basin is considered serious nonattainment for ground level ozone and nonattainment for PM$_{10}$ and PM$_{2.5}$, as California Ambient Air Quality Standards (CAAQS) are more stringent that the national ambient air quality standards. The BAAQMD is required to adopt plans on a triennial basis that show progress towards meeting the state ozone standard. The area is considered attainment or unclassified under state standards for all other pollutants.

**Air Quality Monitoring Data**

The BAAQMD monitors air quality conditions at more than 30 locations throughout the Bay Area. One monitoring station is located within the plan area at 897 Barron Avenue at the border of the North Fair Oaks and Redwood Village neighborhoods. **Table 4.3-3** summarizes the number of days per year that air pollutant levels exceeded state or national standards at the Redwood City monitoring station and within the Bay Area as a whole. In comparison to the Bay Area, the plan area has fewer days of exceedance for all criteria pollutants.

As indicated in **Table 4.3-3**, the NAAQS for ozone were not exceeded in Redwood City over the last 5 years. The Bay Area, as a whole, exceeded the 8-hour ozone NAAQS on 0 to 12 days annually and the 8-hour CAAQS on 9 to 22 days (statistics kept since 2005). The 1-hour state standard for ozone was exceeded once in 2004 and on 4 to 19 days annually in the Bay Area as a whole. Most exceedances of the ozone standard in the Bay Area occur in downwind portions of the basin, such as Livermore, Concord, and Gilroy.

The highest CO concentrations measured have been well below the national and state ambient standards. Since the primary source of CO in the Bay Area is automobiles, highest concentrations would be found near congested roadways that carry large volumes of traffic, known as “hot spots.”
Table 4.3–3 Summary of Measured Air Quality Exceedances

<table>
<thead>
<tr>
<th></th>
<th></th>
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<th></th>
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<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Ozone (O$_3$)</td>
<td>NAAQS 8-hr</td>
<td>Redwood City</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>BAY AREA</td>
<td>0</td>
<td>1</td>
<td>12</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>CAAQS 1-hr</td>
<td>Redwood City</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>BAY AREA</td>
<td>7</td>
<td>9</td>
<td>18</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>CAAQS 8-hr</td>
<td>--</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>--</td>
<td>9</td>
<td>22</td>
<td>9</td>
<td>9</td>
<td>9</td>
<td>9</td>
<td>9</td>
</tr>
<tr>
<td>Respirable Particulate Matter (PM$_{10}$)</td>
<td>NAAQS 24-hr</td>
<td>Redwood City</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>--</td>
</tr>
<tr>
<td></td>
<td></td>
<td>BAY AREA</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>CAAQS 24-hr</td>
<td>Redwood City</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td></td>
<td></td>
<td>BAY AREA</td>
<td>7</td>
<td>6</td>
<td>15</td>
<td>4</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Fine Particulate Matter (PM$_{2.5}$)</td>
<td>NAAQS 24-hr*</td>
<td>Redwood City</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>BAY AREA</td>
<td>1</td>
<td>0</td>
<td>10</td>
<td>14</td>
<td>14</td>
<td>14</td>
</tr>
<tr>
<td>All Other (CO, NO$_2$, Pb, SO$_2$)</td>
<td>All Other</td>
<td>Redwood City</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>BAY AREA</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

* "Bay Area" exceedances represent the cumulative total of all exceedances in the Bay Area Air Basin. Source: BAAQMD, Bay Area Air Pollution Summaries, 2004-2008.

Measured exceedances of the PM$_{10}$ standards occurred on 0 to 2 sampling days per year over the last five years in the plan area. The older PM$_{2.5}$ NAAQS of 65 µg/m$^3$ was not exceeded in the plan area, but the new 35 µg/m$^3$ standard set in 2006 was exceeded once in 2006 and once in 2007 for the Bay Area as a whole. The primary sources of these pollutants are wood smoke and local traffic, with the greatest buildup of these pollutants during the evenings and early morning periods.

Other criteria pollutants, such as nitrogen dioxide, sulfur dioxide, and lead have historically been measured at low levels in the plan area and the rest of the Bay Area, and are not anticipated to pose a major air pollution concern to the plan area.

Toxic Air Contaminants

Toxic Air Contaminants (TACs), identified under the California Clean Air Act, are a broad class of compounds known to cause mortality (usually because they cause cancer) and include, but are not limited to, the criteria air pollutants listed in Table 4.3-1. TACs tend to be localized, especially in urban areas, and are caused by industry, agriculture, fuel combustion, and commercial operations. TACs are typically found in relatively low concentrations in ambient air, although chronic exposure can result in adverse health effects, and they are therefore regulated at the local, state, and federal level.
Diesel exhaust is the predominant TAC in urban air, and is estimated to represent about two-thirds of the cancer risk from TACs (based on the statewide average). Diesel exhaust is a complex mixture of gases, vapors, and fine particles, which complicates the evaluation of its health effects. The California Air Resources Board (CARB) previously identified some of the chemicals in diesel exhaust (e.g., benzene, formaldehyde) as TACs; they are listed as carcinogens either under the State’s Proposition 65 or under the Federal Hazardous Air Pollutants program. To reduce diesel particulates, California has adopted a comprehensive diesel risk-reduction program to reduce diesel particulate matter emissions by 85 percent by 2020. In 2006, the EPA also enacted low-sulfur diesel fuel standards for delivery and transport trucks that are expected to reduce diesel particulate matter substantially.

Smoke from residential wood combustion can also be a source of TACs. Wood smoke is typically emitted during the winter months when dispersion conditions are poor. Localized concentrations of TACs can result when cold stagnant air traps smoke near the ground and there is no wind. The pollution can persist for many hours, especially in sheltered valleys during winter. TACs, such as wood smoke, also contain a significant amount of PM$_{10}$ and PM$_{2.5}$. Wood smoke is an irritant and is implicated in worsening asthma and other chronic lung problems.

Typical TACs measured by BAAQMD in the plan area include benzene, 1,3-butadiene, carbon tetrachloride, chloroform, ethylene dibromide, ethylene dichloride, methyl tert butyl ether (MTBE), methylene chloride, acetaldehyde, perchloroethylene, toluene, 1,3-butadiene, formaldehyde, and polycyclic aromatic hydrocarbons (PAH). Since the ambient concentrations of these TACs are very small, they are measured and reported as parts per billion (ppb), or nanograms per cubic meter (ng/m$^3$) on a volume basis. Table 4.3-4 lists sources of the major TACs in the plan area. As shown, primary sources of TACs in the plan area include fuel combustion in cars, trucks, buses, and construction equipment.

Bay Area cancer risks represent the number of excess cancer cases per million people based on a lifetime exposure (70-year) to the annual average concentration in the Bay Area. CARB published maps showing the 2001 total inhalation health risk in the State. According to cancer risk maps prepared by BAAQMD, the 2005 inhalation health risk in Redwood City ranged from 250 to below 500 cases per million, which is generally below the Bay Area average risk of about 460 cases per million. More densely populated urban areas, such as San Francisco, Oakland, and San Jose had health risks of nearly 1,000 cases per million. With all diesel risk reduction measures implemented, CARB predicts that the overall inhalation health risk for Redwood City would decrease to less than 250 cases per million by 2010. It should be noted, however, that the health risks are based on the average concentration for the entire air basin and the health risk at individual locations will vary considerably. Since 1990, average concentrations of TACs and associated health risks have been reduced by about 50 percent for most compounds.
Table 4.3-4 Toxic Air Contaminants in the Plan Area

<table>
<thead>
<tr>
<th>Toxic Air Contaminant</th>
<th>Source of Emission</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diesel Particulate Matter (DPM)</td>
<td>Heavy-duty trucks, buses, construction equipment, and electrical generation.</td>
</tr>
<tr>
<td>1,3 Butadiene</td>
<td>Primarily on-road vehicles. Like CO, older model vehicles without adequate catalytic converters have much higher emission rates.</td>
</tr>
<tr>
<td>Benzene</td>
<td>Primarily on-road motor vehicles and gasoline evaporation.</td>
</tr>
<tr>
<td>Formaldehyde</td>
<td>Emitted both directly and indirectly into the atmosphere. Sources of emissions leading to elevated formaldehyde levels are fuel combustion from a variety of mobile and stationary sources, such as motor vehicle operations.</td>
</tr>
</tbody>
</table>


Air Quality Trends

BAAQMD, along with CARB, conducts detailed computer modeling of ozone levels in the Bay Area and levels transported to other areas. The modeling is a regional effort used to identify sources of air pollution to further reduce emissions. The modeling is also conducted to predict attainment of air quality standards. Table 4.3-5 shows the trend in the emission inventory for the Bay Area since 1975. Emissions of ozone precursors have decreased considerably over the last 30 years, by approximately 77 percent between 1975 and 2005. During the past 10 years, ozone precursor emissions have decreased by 30 to 40 percent. As shown on Figure 4.3-1, however, the substantial reduction in ozone precursor emissions only subtly affects ozone levels. Nonetheless, the trend toward lower ozone levels has been fairly consistent for the last 20 years. In fact, the downward trend appears to have been sufficient to show attainment of the 1997 8-hour NAAQS for ozone. Ozone precursor emissions are projected to decrease by 25 to 40 percent over the next 15 years, while population and vehicle use increases. The reductions are the result of rules and regulations that are or will be implemented into the future, such as new vehicle standards.

Table 4.3-5 shows that PM$_{10}$ emissions have increased by about 10 percent over the last 10 years and are anticipated to increase by another 7 percent between 2005 and 2015. The trend in PM$_{2.5}$ has been more subtle, as PM$_{2.5}$ is primarily a by-product of combustion. Large sources of PM$_{10}$ emissions are difficult to control. Although PM$_{10}$ emissions are expected to remain relatively flat, some additional reductions in PM$_{10}$ concentrations are anticipated between 2005 and 2020. Many of the sources that contribute to ozone formation also lead to PM$_{10}$ formation through chemical reactions in the atmosphere.
Recent Trend in SF Bay Area Ozone Levels

Recent Trend in SF Bay Area PM$_{10}$ Levels

Recent Trend in SF Bay Area PM$_{2.5}$ Levels

Source: Illingworth & Rodkin, 2009
These secondary particulates contribute to overall PM$_{10}$ and PM$_{2.5}$ concentrations. Thus, efforts to reduce ozone precursor emissions should also provide some reduction to PM$_{10}$ and PM$_{2.5}$ concentrations. The trends in PM$_{10}$ and PM$_{2.5}$ concentrations are shown in Figure 4.3-1.

### Table 4.3–5 Trends in San Francisco Bay Area Air Basin Emissions

<table>
<thead>
<tr>
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<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>NOX</td>
<td>943</td>
<td>918</td>
<td>821</td>
<td>797</td>
<td>720</td>
<td>622</td>
<td>496</td>
<td>423</td>
<td>348</td>
<td>301</td>
</tr>
<tr>
<td>ROG</td>
<td>1430</td>
<td>1320</td>
<td>1047</td>
<td>764</td>
<td>646</td>
<td>525</td>
<td>382</td>
<td>330</td>
<td>302</td>
<td>290</td>
</tr>
<tr>
<td>PM$_{10}$</td>
<td>181</td>
<td>182</td>
<td>195</td>
<td>194</td>
<td>189</td>
<td>218</td>
<td>210</td>
<td>220</td>
<td>230</td>
<td>241</td>
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<tr>
<td>PM$_{2.5}$</td>
<td>81</td>
<td>79</td>
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<td>83</td>
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<td>84</td>
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<td>83</td>
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<td>87</td>
</tr>
<tr>
<td>CO</td>
<td>9075</td>
<td>8334</td>
<td>7011</td>
<td>5325</td>
<td>3917</td>
<td>2961</td>
<td>2041</td>
<td>1617</td>
<td>1363</td>
<td>1230</td>
</tr>
</tbody>
</table>


### Existing Sources of Air Pollution

Automobile traffic or on-road vehicles is the primary source of air pollution in and around the plan area, with traffic accounting for about 40 to 50 percent of the emissions of ozone precursor pollutants (NO$_x$ and reactive organic gases). Other emissions sources, such as construction activities, residential wood smoke, off-road travel, and agriculture, account for the greatest portion of PM$_{10}$ emissions, representing about 80 percent of such emissions. These sources also account for over 50 percent of the PM$_{2.5}$ emissions. However, PM$_{2.5}$ is also formed from reactions of NO$_x$ and other gaseous air pollutants in the atmosphere. Table 4.3-6 identifies the existing sources of air pollution for San Mateo County and the Bay Area. Mobile sources of air pollution make up a large portion of the emissions inventory for San Mateo County, including traffic, boats, construction equipment, trains, and aircraft. Approximately 65 percent of the reactive organic gases and 93 percent of the NO$_x$ emitted in San Mateo County comes from mobile sources.

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1 Mobile sources include both on- and off-road sources such as passenger cars, motorcycles, trucks, busses, heavy-duty construction equipment, recreational vehicles, marine vessels, lawn and garden equipment, and small utility engines. Non-mobile/stationary sources include power plants, refineries, and manufacturing facilities which emit air pollutants.
Table 4.3–6  2005 Air Pollutant Emissions Inventory for Ozone Precursors and Particulate Matter for San Mateo County and the Bay Area

<table>
<thead>
<tr>
<th>Source of Air Pollution</th>
<th>Reactive Organic Gases (ROG)</th>
<th>Nitrous Oxide (NOx)</th>
<th>PM$_{10}$</th>
<th>PM$_{2.5}$</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>San Mateo County</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stationary Source</td>
<td>5.7</td>
<td>1.4</td>
<td>0.9</td>
<td>0.7</td>
</tr>
<tr>
<td>Area-Wide Sources</td>
<td>9.1</td>
<td>2.3</td>
<td>17.6</td>
<td>5.1</td>
</tr>
<tr>
<td>Mobile Sources — On-Road</td>
<td>12.9</td>
<td>19.2</td>
<td>0.9</td>
<td>0.6</td>
</tr>
<tr>
<td>Mobile Sources — Off-Road</td>
<td>9.4</td>
<td>47.4</td>
<td>2.9</td>
<td>2.8</td>
</tr>
<tr>
<td>TOTAL (rounded)</td>
<td>37.2</td>
<td>70.2</td>
<td>22.3</td>
<td>9.2</td>
</tr>
<tr>
<td><strong>Bay Area</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stationary Source</td>
<td>73.3</td>
<td>47.6</td>
<td>15.3</td>
<td>11.4</td>
</tr>
<tr>
<td>Area-Wide Sources</td>
<td>88.0</td>
<td>19.7</td>
<td>176.1</td>
<td>53.</td>
</tr>
<tr>
<td>Mobile Sources — On-Road</td>
<td>128.4</td>
<td>233.7</td>
<td>10.4</td>
<td>7.4</td>
</tr>
<tr>
<td>Mobile Sources — Off-Road</td>
<td>79.4</td>
<td>191.1</td>
<td>11.1</td>
<td>9.9</td>
</tr>
<tr>
<td>TOTAL (rounded)</td>
<td>369.2</td>
<td>492.0</td>
<td>212.8</td>
<td>81.7</td>
</tr>
</tbody>
</table>

Notes: * PM$_{10}$ includes PM$_{2.5}$
http://www.arb.ca.gov/aqd/almanac/almanac07/almanac07.htm

While the plan area includes multiple minor stationary sources of emissions, such as industrial plants in the Bayfront area, the plan area does not have any major stationary air pollutant sources. The primary stationary sources in the plan area include dry cleaning operations, gasoline dispensing stations, and facilities associated with the Port of Redwood City.

**Toxic Air Contaminants (TACs)**

Emissions of TACs from stationary sources in the plan area can be found in the most recent version of BAAQMD’s annual Toxic Contaminant Control Report. The majority of these sources are dry cleaning facilities, which emit perchloroethylene. However, the most prevalent toxic contaminants in the plan area and San Mateo County (excluding diesel particulate matter) are benzene and 1,3-Butadiene from mobile sources and formaldehyde that comes from a variety of sources, as documented in Table 4.3-4.

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2 A major stationary air pollutant source is defined by the BAAQMD as a single facility that emits more than 0.05 tons per day of a criteria air pollutant (BAAQMD, 2005 Baseline Emissions Inventory, 2008).
Dust

Construction activities and vehicle travel result in the generation of dust, which leads to elevated PM$_{10}$ levels in the Bay Area Air Basin. Dust from construction activities can affect nearby active land uses. However, activities that generate visible dust clouds extending beyond their boundaries are a source of air pollution that can be controlled.

Odors

Significant sources of offending odors are typically identified based on complaint histories received and compiled by the BAAQMD. It is difficult to identify sources of odors without requesting BAAQMD information. Typical large sources of odors that result in complaints are wastewater treatment facilities, landfills, food processing facilities and agricultural operations. Of these types of sources, the plan area includes a wastewater treatment plant. The South Bayside System Authority wastewater treatment plant is located at 1400 Radio Road, within Redwood Shores.

Sensitive Receptors

In the context of air quality analyses, sensitive receptors include individuals and locations with individuals who are particularly susceptible to the adverse effects of air pollution. CARB has identified sensitive receptors to include children under the age of 14, persons over 65, athletes, and people with cardiovascular and chronic respiratory diseases. Locations that contain a high concentration of these sensitive population groups include hospitals, schools, playgrounds, daycare facilities, elder care facilities, elementary schools, and parks. Both state and national ambient air quality standards were developed with the intent to protect sensitive receptors from the adverse impacts of air pollution.

4.3.2 Regulatory Setting

United States Environmental Protection Agency (EPA)

The EPA is responsible for enforcing the Federal Clean Air Act. The EPA is also responsible for establishing the NAAQS. 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 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 CARB.

California Air Resources Board (CARB)

The CARB is the state air pollution control agency and is part of the California Environmental Protection Agency, responsible for meeting the state requirements of the Federal Clean Air Act, administering the California Clean Air Act, and establishing the CAAQS. The California Clean Air Act requires all air districts in the state to endeavor to achieve and maintain CAAQS. CARB regulates mobile air pollution sources, such as motor vehicles, and is responsible for setting emission standards for vehicles sold in California, for other emission sources such as consumer products, and for certain off-road
equipment. CARB has established passenger vehicle fuel specifications and oversees the functions of local air pollution control districts and air quality management districts, which in turn prepare air quality attainment plans at the regional level. CARB also conducts or supports research into the effects of air pollution on the public and develops innovative approaches to reduce air pollutant emissions. Furthermore, CARB provides oversight for local air pollution control programs and compiles or develops innovative control measures and is responsible for submitting State Implementation Plans (SIPs) to the EPA that demonstrate how each nonattainment air basin will meet the NAAQS.

**CARB Air Quality and Land Use Handbook**

In 2005, CARB released the final version of the Air Quality and Land Use Handbook, which is intended to encourage local land use agencies to consider the risks from air pollution prior to making decisions that approve the siting of new sensitive receptors, such as homes or daycare centers, near sources of air pollution. Unlike industrial or stationary sources of air pollution, siting of new sensitive receptors does not require air quality permits, but could result in adverse air quality issues. The primary purpose of the Handbook is to highlight the potential health impacts associated with close proximity to common air pollution sources and to encourage local land use agencies to consider those issues in the planning process. CARB makes recommendations regarding the siting distance of new sensitive land uses near freeways, truck distribution centers, dry cleaners, gasoline dispensing stations, and other air pollution sources. CARB acknowledges that land use agencies have to balance other siting considerations, such as housing and transportation needs, economic development priorities and other quality of life issues. In addition, siting some sensitive receptors, such as residences, near transportation facilities, employment centers and services would reduce overall emissions from a community. These "advisory" siting recommendations (or buffer distances), summarized in Table 4.3-7, are based primarily on modeling information and may not be entirely reflective of conditions in the plan area.

**Freeways or Busy Arterials**

U.S. 101 and I-280 are the primary freeways/busy arterials that run through the plan area. CARB recommends that land use decisions avoid placing new sensitive receptors near freeways or busy arterials. CARB has recommended that new sensitive land uses should avoid being placed within 500 feet of freeways and urban roadways with 100,000 or more vehicles per day. A review of air pollution studies by CARB indicates that residing close to freeways or busy roadways may result in adverse health effects beyond those typically found in urban areas. Several studies found an association between adverse non-cancer health effects (e.g., asthma) and living or attending school near heavily traveled urban roadways. These proximity studies (and others) found that the roadway and truck traffic densities were key factors associated with adverse health impacts. For urban roadways, the association of traffic-related emissions with adverse health impacts was generally strongest between 300 and 1,000 feet.
Table 4.3–7  CARB Recommended Setback Distance for Sensitive Uses from Common Sources of Toxic Air Contaminants

<table>
<thead>
<tr>
<th>Source Type</th>
<th>Recommended Buffer Distance</th>
<th>Source in Redwood City</th>
</tr>
</thead>
<tbody>
<tr>
<td>Freeways and busy arterial roadways&lt;sup&gt;1&lt;/sup&gt;</td>
<td>500 feet</td>
<td>U.S. 101, I-280</td>
</tr>
<tr>
<td>Distribution centers with 100 or more daily truck trips or 40 daily truck trips that use refrigeration units</td>
<td>1,000 feet</td>
<td>No major truck distribution centers. Could apply for smaller facilities.</td>
</tr>
<tr>
<td>Dry cleaners (onsite dry cleaning)</td>
<td>300 feet for any dry cleaning operation. Up to 300 feet for large gas stations</td>
<td>Located in urban areas.</td>
</tr>
<tr>
<td>Large gasoline stations (i.e. over 3.6 million gallons pumped per year)</td>
<td>50 feet for typical gas stations. Up to 300 feet for large gas stations</td>
<td>Located in urban areas, along transportation corridors.</td>
</tr>
<tr>
<td>Ports</td>
<td>Avoid siting sensitive land uses immediately downwind of ports in the most heavily impacted zones (e.g., consult with BAAQMD)</td>
<td>Port of Redwood City</td>
</tr>
</tbody>
</table>

<sup>1</sup> Freeways and busy arterials are designated by the CARB as facilities that accommodate 100,000 Average Daily Trips (ADT).

**Truck Distribution Centers**

CARB identified proximity to truck distribution centers or warehouses as a potential source of diesel particulate matter exposure. In the plan area, this includes operations at the Port of Redwood City. The range of exposure for these centers varies greatly, based on size, number of diesel trucks, types of trucks, on-site diesel equipment, and use of auxiliary diesel-powered equipment (e.g., diesel-powered transport refrigeration units). CARB modeled a distribution center that had over 40 transport refrigeration units (TRUs), each loading and unloading for one hour each day, seven days per week. CARB modeling results for 2000 indicate that significant cancer risks could extend out about 500 meters or about 1,600 feet from such a facility. CARB recommends a buffer of 1,000 feet between large distribution centers and sensitive receptors. However, there are no identified major truck distribution centers in the plan area, other than operations at the Port of Redwood City. Buffers for smaller facilities should be considered on a case-by-case basis that depends on the size, activity and types of trucks or equipment used at the facilities.

**Dry Cleaning Operations**

Perchlorethylene (Perc) is solvent used commonly in dry cleaning. Perc is a TAC, because it has the potential to cause cancer. Other non-cancer health effects can occur at higher exposures. Dry cleaning operations are typically located in urban areas. Some of these operations can occur in mixed-use buildings that also have residential occupants. CARB reviewed air-sampling studies and found a wide range of exposures, depending on the type
and maintenance of dry cleaning equipment. For exposures in the same building, a well maintained state of the art system results in cancer risks in the range of 10 in one million, while a poorly maintained machine with leaks can have risk much higher. The risk created by dry cleaning operations that use Perc is dependent on the amount of Perc emissions, proximity of sensitive receptors to the source, and how the emissions are dispersed. Most dry cleaning operations in California have one dry cleaning machine per facility, with a recommended buffer of 300 feet. Some larger facilities may have two machines; an increased buffer of 500 feet is recommended for such facilities.

As a result of identifying Perc as a TAC, CARB developed an Air Toxic Control Measure (ATCM) addressing Perc emissions from dry cleaning operations in 1993. A study conducted by CARB staff in 2003 found that emissions had been reduced by 70 percent, but that further reductions were achievable. In 2007, CARB approved amendments to the Dry Cleaning ATCM and the adoption of requirements for Perc manufacturers and distributors. The amendments, which became State law in December 2007, will over time phase out the use of Perc dry cleaning machines and related equipment by 2023. The sale or lease of any new Perc dry cleaning equipment was unlawful beginning in 2008. Beginning July 2010, all Perc machines at buildings co-located with residences must be removed and any machine over 15 years of age cannot be operated. The anticipated exposures from Perc will be reduced significantly as a result of the new ATCM amendments that affect dry cleaning operations. Cancer risks, upon which CARB based their recommended buffers, are computed over a 70-year almost continuous exposure. The Perc exposures would be reduced by 80 percent or more as a result of the new ACTM amendments. As a result, the recommended buffer for siting of new sensitive receptors has been reduced to 100 feet of these operations. It should be noted that many dry cleaners contract to have their cleaning done off-site.

Gasoline Dispensing Stations

Benzene, a potent carcinogen, is released into the air during motor vehicle refueling. Most benzene is emitted from motor vehicles and motor vehicle related activity. Refueling results in a small fraction of overall benzene emissions. However, gasoline-dispensing stations can have high localized emissions, as benzene is part of the volatile gases that evaporate into the atmosphere during refueling. Due to improved vapor recovery systems (i.e., vapor sleeves on pump hoses), benzene emissions have been reduced by over 75 percent in California since 1990.

Some gasoline dispensing stations in the plan area are located close to residential uses. CARB estimates that the benzene emissions from the larger gasoline stations (i.e., over 3.6 million gallons pumped per year) may result in elevated health risks in the local proximity. Well maintained vapor recovery systems, which are required in the Bay Area, can decrease benzene emissions by 90 percent. CARB makes recommendations regarding the siting of new sensitive land uses near gasoline dispensing stations and other air pollution sources. CARB recommends a setback distance of 50 feet for standard gasoline stations and 300 feet for larger gasoline stations. These ”advisory” recommendations are based primarily on modeling information and may not be entirely reflective of conditions in the plan area. As such, the siting of new sensitive land uses within these advisory distances may be
possible, but only after site-specific studies are conducted to identify the actual health risks.

Port Facilities

The Port of Redwood City (Port) is working with BAAQMD and other ports on the “Green Ports Initiative,” which focuses on setting air quality goals to reduce air pollutants from marine port activities, particularly port-related heavy industrial activities. Currently, general emission inventories for port activities are being developed. CARB regulations and voluntary programs will likely reduce the diesel particulate matter emissions from these activities. CARB recommends that lead agencies avoid siting sensitive land uses downwind of ports and/or maritime shipping facilities.

Bay Area Air Quality Management District

The BAAQMD is primarily responsible for assuring that the national and state ambient air quality standards are attained and maintained in the Bay Area. BAAQMD is also responsible for adopting and enforcing rules and regulations concerning air pollutant sources, issuing permits for and inspecting stationary sources of air pollutants, responding to citizen complaints, monitoring ambient air quality and meteorological conditions, awarding grants to reduce motor vehicle emissions, conducting public education campaigns, as well as many other activities. BAAQMD has jurisdiction over much of the nine Bay Area counties, including San Mateo County, in which the plan area is located. Much of BAAQMD’s regulatory authority is the control of stationary air pollution sources.

The BAAQMD develops CEQA guidelines for local jurisdictions to use in evaluating air quality impacts from projects and plans reviewed through the CEQA process. The District has no regulatory authority to enforce this guidance; however, most lead agencies use the guidance to evaluate air quality impacts.

Air Quality Plans

The BAAQMD develops air quality plans addressing the California Clean Air Act and updates them approximately every three years toward meeting the CAAQS.

Bay Area Clean Air Plan, 1991

The Bay Area Clean Air Plan was prepared in 1991 to address the more stringent requirements of the California Clean Air Act with respect to $O_3$. This plan includes a comprehensive strategy to reduce emissions from stationary, area, and mobile sources. The plan objective is to indicate how the Bay Area Air Basin would make progress toward attaining the stricter state air quality standards, as mandated by the California Clean Air Act. The plan was designed to achieve a region-wide reduction of $O_3$ precursor pollutants through the expeditious implementation of all feasible measures. Air quality plans addressing the California Clean Air Act are developed on a triennial basis, with the latest approved update to the plan developed in 2005 (i.e., 2005 Bay Area Ozone Strategy, described below).
2005 Bay Area Ozone Strategy

In early 2006, BAAQMD adopted the Bay Area 2005 Ozone Strategy, which includes a comprehensive strategy to reduce ozone precursor emissions from stationary, area, and mobile sources. This plan implements transportation control measures to address the 1-hour NAAQS for O₃ and achieve basin-wide reductions in ozone precursor pollutants. The clean air planning efforts for ozone also will reduce PM₁₀ and PM₂.₅, as a substantial amount of particulate matter comes from combustion emissions such as vehicle exhaust.

The Bay Area 2005 Ozone Strategy proposes expanded implementation of Transportation Control Measures (TCMs) and programs such as Spare the Air, 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.

The BAAQMD is currently in the process of updating this plan, as required by the California Clean Air Act. In addition to implementing all feasible measures to reduce ozone, the plan will consider impacts of ozone control measures on particulate matter, TACs, and greenhouse gases in a single integrated plan.

Draft Bay Area 2010 Clean Air Plan

In March 2010, the BAAQMD released the Draft Bay Area 2010 Clean Air Plan (CAP). This will be the latest update to the 1991 Bay Area Clean Air Plan that is required to include all feasible measures to reduce emissions of ozone precursors. Unlike previous Bay Area Clean Air Plans, the 2010 CAP is a multi-pollutant air quality plan addressing four categories of air pollutants:

- Ground-level ozone and the key ozone precursor pollutants (reactive organic gases and NOₓ), which is the purpose of the plan as required by State law;
- Particulate matter, primarily PM₂.₅ as well as the precursors to secondary PM₂.₅;
- Toxic air contaminants; and
- Greenhouse gases.

While the CAP addresses State requirements, it will provide the basis for developing future control plans to meet federal plan requirements for the NAAQS (i.e., standards for ozone and PM₂.₅). The region is required to prepare a federally enforceable plan to meet the NAAQS for PM₂.₅ (due in December 2012). In addition, U.S. EPA is likely to adopt a more stringent NAAQS for ozone this summer. This will likely trigger new planning requirements for the Bay Area to plan for attainment of these standards.

While previous CAPs have relied upon a combination of stationary, mobile and transportation control measures, the 2010 CAP adds two new types of control measures: Land Use and Local Impact Measures and Energy and Climate measures. In addition, the plan includes Further Study Measures, which will be further evaluated as potential control measures.
Regulation 6, Rule 3: Wood Burning Devices

BAAQMD adopts and enforces rules to reduce particulate matter emissions and develops public outreach programs to educate the public to reduce PM$_{10}$ and PM$_{2.5}$ emissions (e.g., Spare the Night Program). On July 9, 2008, the BAAQMD Board adopted Regulation 6, Rule 3: Wood-Burning Devices, which is intended to reduce emissions that come from residential wood burning. This new rule restricts wood burning when air quality is unhealthy and a wintertime Spare the Air Advisory is issued. The rule also requires that only cleaner burning EPA-certified stoves and inserts be installed in new construction or remodels, including natural gas fireplaces. The rule applies to new woodstove and fireplace inserts. The regulation also places limits on excessive smoke, prohibits the burning of garbage and other harmful materials, and also requires the labeling of firewood and solid fuels sold within the Bay Area.

BAAQMD CEQA Guidelines

BAAQMD has prepared CEQA Guidelines to assist lead agencies, analysts, project proponents, and other interested parties in evaluating potential air quality impacts of projects and plans proposed in the Bay Area. The guidelines recommend procedures for evaluating projects or plans and thresholds to determine whether the impacts are significant; the guidelines are used in this analysis (see Section 4.3.3) to establish thresholds of significance for environmental impacts. These guidelines also provide direction for identifying measures to mitigate impacts related to air quality.

BAAQMD’s current CEQA guidelines were adopted in 1999. BAAQMD is currently updating these guidelines and has issued a series of Draft CEQA Air Quality Guidelines. The latest version of BAAQMD’s Draft CEQA Guidelines was issued in December 2009. These guidelines propose new emission-based thresholds for project-level analysis, new procedures and thresholds for evaluating community risk, and greenhouse gas thresholds. Public Hearings were held in late 2009 and early 2010. As of April 2010, BAAQMD is conducting a series of workshops with lead agencies and the public. The BAAQMD Board is expected to consider adoption of these guidelines in June 2010.

Except for the community risk assessment and greenhouse gas emissions provisions, the draft significance thresholds and procedures for evaluating impacts of plans on air quality are similar to the current guidelines. The draft guidelines recommend that plans identify special overlay zones around existing and planned sources of TACs and special overlay zones on each side of freeways and other high-volume roads. As discussed below, the proposed Guidelines would also include a recommendation that impacted communities adopt Community Risk Reduction Plans intended to reduce health risks and exposures from TACs and PM$_{2.5}$.

BAAQMD’s draft guidance for addressing emissions of greenhouse gases is addressed in Section 4.16, Greenhouse Gas Emissions.
Air Toxic “Hot Spots” Information and Assessment Act

The Air Toxic “Hot Spots” Information and Assessment Act was enacted by the California Legislature in 1987. Also known as Assembly Bill 2588 (AB 2588), the main objective of this program is to reduce public exposure to toxic air contaminants. AB 2588 is intended to identify toxic air contaminant hot spots where emissions from specific sources may expose individuals to elevated risk of adverse health effects associated with air quality. Businesses or establishments (including dry cleaning facilities) identified as significant sources of toxic air emissions are required to notify the affected population and provide them with information about the associated health risk. The implementation and enforcement provisions of AB 2588 are the responsibility of BAAQMD. To date, BAAQMD has taken a risk-based approach, using health risk assessments to determine what types of pollutants and sources should be controlled and the degree to which controls should be imposed.

After the level of risk from a new project has been determined, a decision must be made as to the significance of this level risk. If a new source has a cancer risk of one in a million or less over a 70-year-lifetime exposure period, and will not result in non-cancer health effects, it is considered a non-significant risk and no further review of all health impacts is required. If a project has a risk greater than one in a million, it must be further evaluated in order to determine acceptability. Factors that affect acceptability include the presence of controls on the rate of emissions, the location of the site in relation to residential areas and schools, and contaminant reductions in other media such as water. In general, projects with risks greater than one in a million, but less than ten in a million, are considered acceptable if other determining factors are also acceptable, while projects with risks greater than ten in a million are typically not considered acceptable. Projects whose risks are considered to be unacceptable may be reevaluated if emissions are reduced, thus reducing their health risks associated with air quality.

BAAQMD CARE Program

BAAQMD’s Community Air Risk Evaluation (CARE) program was initiated in 2004 to evaluate and reduce health risks associated with exposures to outdoor TACs in the Bay Area (see http://www.baaqmd.gov/CARE/). The program examines TAC emissions from point sources, area sources and on-road (e.g., cars and trucks) and off-road (e.g., construction equipment, trains, and aircraft) mobile sources with an emphasis on diesel particulate matter (DPM). The goal is to identify sensitive populations that are exposed to high emissions of TACs and use that information to guide policies, regulations, incentive funding, and other programs to reduce exposures.

In Phase 1 of the program, a 2-kilometer by 2-kilometer gridded inventory of TAC emissions was developed for the year 2000. The data were analyzed and then updated to include the most recent 2005 emission data. This emissions inventory was risk-weighted to reflect the differences in potency of the various TACs. For example, benzene has far higher cancer potency than many other compounds such as MTBE. While DPM is not as potent as benzene, the emissions are much more prevalent. The Phase 1 report documents results and presents the emissions inventory along with demographics regarding sensitive
populations and asthma hospitalization rates for children. The Phase I study identifies diesel emissions from heavy-duty trucks as a major source of TAC emissions and identifies programs available to reduce these emissions. New (i.e., model 2007 or newer) trucks have much lower emission rates. However, turnover of the fleet will only slowly reduce these emissions as trucks tend to be in place on roadways for many years. The Phase I study identified the cost of targeting BAAQMD funding mechanisms to reduce these emissions.

In Phase II of the CARE program, BAAQMD performed regional and local-scale modeling to determine the significant sources of DPM and other TAC emissions locally in the priority communities as well as for the entire Bay Area. The BAAQMD has partnered with CARB, the Port of Oakland, Pacific Institute, West Oakland Environmental Indicators Project, and the railroads to prepare specific health risk assessments.

One of highlights of the CARE program is the development of the Mitigation Action Plan where risk reduction activities are focused on the most at-risk communities. This plan identified 6 different at-risk communities within the Bay Area, based on TAC emissions and presence of sensitive receptor groups, that it determined would benefit from targeted mitigation. Figure 4.3-2 shows the six at-risk areas identified by BAAQMD. One of the six communities encompasses Bayside portions of Redwood City and Menlo Park, along with portions of East Palo Alto. The Mitigation Action Plan calls for the following:

- Allocating grant and incentives to the priority communities;
- Conducting outreach efforts in these communities to solicit and gain feedback from the community as how best to address and reduce TAC emissions;
- Working with local city and county health departments to reduce TAC emissions in these communities;
- Developing local land use guidance to assist city and county planners, community members, and developers in assessing risks from land use projects and exposure to mobile and stationary sources of TAC emissions (note that this guidance is likely to be included as part of a major update to the BAAQMD’s CEQA Guidelines);
- Developing rules and regulations that would require reduction of TAC emissions from significant sources.

In Phase III, BAAQMD plans to conduct an extensive exposure assessment to identify and rank the communities as to their potential TAC exposures and determine the types of activities that places them at highest risk. BAAQMD will also pursue additional mitigations and attempt to develop a metric to measure the effectiveness of these measures.

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BAAQMD encourages the development and adoption of a Community Risk Reduction Plan (CCRP) for impacted communities identified under BAAQMD’s CARE program. These plans should include the following:

- Defined CCRP planning area (typically the entire community);
- Base and future year emission inventories for TACs and PM$_{2.5}$;
- Establish risk and exposure reduction targets for the community;
- Identify measures to reduce emissions and exposures;
- BAAQMD-approved risk modeling;
- Procedures for monitoring and updating TAC/ PM$_{2.5}$ inventories; and
- Public participation.

The concept of the CCRP is new; as of April 2010, BAAQMD is developing procedures, information, and tools that communities may use in developing such plans. As of April 2010, BAAQMD is meeting with lead agencies and conducting workshops to assist with the development of the plans. BAAQMD plans to contract with a Consultant to develop emission inventories in the CARE impacted communities.

**4.3.3 Thresholds of Significance**

Redwood City has not established local CEQA significance thresholds as described in Section 15064.7 of the State CEQA Guidelines. Therefore, significance determinations utilized in this Section are from the BAAQMD guidelines for evaluating General Plans. The standards established by these guidelines address the CEQA thresholds identified in Appendix G.

**Clean Air Plan Consistency**

The BAAQMD has developed guidelines and thresholds of significance for General Plans. Inconsistency with the most recently adopted Clean Air Plan (CAP) is considered a significant impact. The most recently adopted CAP is the 1991 Clean Air Plan, as updated by the 2005 Bay Area Ozone Strategy; these standards are used in this DEIR to evaluate the potential air quality impacts of the General Plan. According to the BAAQMD, the following criteria must be satisfied for a local plan to be determined to be consistent with the CAP and not have a significant air quality impact:

- The local plan should be consistent with the CAP population and Vehicle Miles Traveled (VMT) assumptions. This is demonstrated if the population growth over the planning period will not exceed the values included in the current CAP (Note: because the CAP usually lags behind current regional population projections, BAAQMD recommends that population estimates should be derived from the most recent ABAG projections and the rate of increase in vehicle trips can be used in lieu of VMT where VMT data are not available);
- The local plan demonstrates reasonable efforts to implement the TCMs included in the CAP that identify cities as implementing agencies; and
• For local plans to have a less than significant impact with respect to potential toxic air contaminants and/or odors, buffer zones should be established around existing and proposed land uses that would emit these air pollutants.

In addition, the plans should not lead to development that would lead to violations of ambient air quality standards.

Local Carbon Monoxide Concentrations
A project would have a significant adverse impact if it causes a violation of any air quality standard or contributes substantially to an existing or projected air quality violation. A significant impact to local air quality is defined under the current and draft guidelines as increased CO concentrations at the closest sensitive receptors that cause a violation of the most stringent ambient standard for CO (20 ppm for the one-hour averaging period, 9.0 ppm for the eight-hour averaging period).

Total Emissions
A significant impact on air quality caused by a project is defined under the current BAAQMD Guidelines as an increase in emissions of any ozone precursor pollutant (i.e., reactive organic gases or nitrogen oxides) or PM$_{10}$ exceeding 80 pounds per day (or 15 tons/year). The thresholds under the draft guidelines are 54 pounds per day (10 tons/year) for ozone precursor pollutants and PM$_{2.5}$, and 82 pounds per day (or 15 tons/year) for PM$_{10}$. These same thresholds would also apply to construction exhaust emissions under the draft guidelines. Total operational emissions include both direct and indirect emissions. This criterion (the same under both the existing and draft guidelines) applies to project-specific analyses and not the evaluation of long-range plan documents, such as the New General Plan. Future development proposals will continue to be evaluated in terms of these thresholds.

Toxic Air Contaminants
Exposing sensitive receptors or the public to substantial levels of toxic air contaminants would be considered significant. A significant impact is defined under the existing guidelines as follows: 1) the probability of contracting cancer for the Maximally Exposed Individual (MEI) exceeds ten in one million; or 2) ground-level concentrations of non-carcinogenic toxic air contaminants would result in a hazard index greater than one for the MEI.

Odors
Any project with the potential to expose members of the public frequently to objectionable odors would be considered significant. Analysis of potential odor impacts should be analyzed for both of the following situations: 1) sources of odorous emissions locating near existing receptors, and 2) receptors locating near existing odor sources. The existing BAAQMD CEQA Guidelines identify screening distances between potential odor sources and receptors that should be considered when evaluating odor impacts. BAAQMD’s draft
CEQA guidelines include the same thresholds, but require that land use plans identify special overlay zones around existing and planned sources of odors.

Construction Impacts

BAAQMD normally considers onsite construction-related emissions as short-term in duration. PM$_{10}$, caused by onsite dust generation, is the pollutant of greatest concern. Other emissions from construction equipment are included in emission inventories that are the basis for regional air quality planning. The existing and draft BAAQMD CEQA Guidelines identify feasible control measures for emissions of PM$_{10}$ that would greatly reduce the impacts from construction activities. Under the guidelines, proper incorporation of these measures would result in less than significant construction-related impacts to local air quality. The existing guidelines do not include quantifiable significance thresholds for temporary construction exhaust emissions. BAAQMD's Draft CEQA Air Quality Guidelines propose daily emission thresholds for construction exhaust emissions, which would apply to project-level studies.

4.3.4 Environmental Impacts and Mitigation Measures

Impacts Not Discussed Further

Total Emissions

BAAQMD’s current and draft guidelines establish threshold criteria for a project’s emissions of any ozone precursor or PM$_{10}$. The New General Plan is a long-range planning document; adoption of the New General Plan would result in no direct emissions. Future developments proposed in the plan area will continue to be use BAAQMD’s screening thresholds to determine whether a project could result in significant emissions.

Project Impacts

Impact 4.3-1: The projected population growth allowed by the New General Plan would be inconsistent with growth projections in the current regional Clean Air Plan, in that the projected population allowed by the New General Plan would increase at a greater rate than regional projections utilized within the Clean Air Plan. (Significant Unavoidable)

A key element in air quality planning is to make reasonably accurate projections of future human activities that are related to air pollutant emissions. When the Bay Area 2005 Ozone Strategy, which updated the 1991 Clean Air Plan, was developed for the Bay Area it utilized the most recent projections developed by the Association of Bay Area Governments (ABAG). The BAAQMD regional air quality monitoring used ABAG population projections and vehicles miles travelled (VMT) projected by the Metropolitan Transportation Commission (MTC), which were also based on ABAG population projections. ABAG projections are based on information provided by cities and counties.

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using land use designators and are not available for the plan area (City plus sphere of influence). ABAG projections are also based in part on a community’s existing general plan.

As allowed by the New General Plan, the population within the city limits could increase by up to 19 percent between 2008 and 2030. ABAG projections, used by BAAQMD for air quality planning, show a rate of growth within the City of just under 14 percent during this same time period. The population growth anticipated by the New General Plan would therefore be about 5 percent higher than the population growth projected by ABAG and used by BAAQMD in the updated CAP. The population could increase by about 17 percent for the entire plan area. Because the most current regional CAP (Bay Area 2005 Ozone Strategy) analyses are based on ABAG projections, the CAP also assumed a lower increment of population growth than would be allowable under the New General Plan. On this basis, the New General Plan would be inconsistent with the population assumptions utilized by the in the regional CAP. In accordance with the BAAQMD criterion, this inconsistency represents a significant air quality impact.

The VMT forecasts developed by MTC are also based on ABAG population estimates. The MTC data is based on Bay Area-wide information and tracks VMT generated by residents and employees. This method is consistent with SB 375, which is meant to track VMT generated by Redwood City land uses. The VMT projections do not include the movements of freight. Moreover, this modeling approach does not include VMT for vehicles travelling through Redwood City that have no origins or destinations within the General Plan area. The regional modeling conducted by BAAQMD incorporated the VMT projections developed by MTC. Similarly, the local modeling of VMT (as part of the greenhouse gas analysis; see discussion below and Appendix D) was also based on MTC baseline data.

Local level VMT estimates were computed for the New General Plan as part of the modeling of greenhouse gas emissions. Consistent with BAAQMD’s Draft CEQA Guidelines for the evaluation of plan-level greenhouse gas emissions, the City utilized a GIS-based modeling tool (INDEX) to examine existing and several future plan-level scenarios for greenhouse gas emissions. The VMT data used in the greenhouse gas analysis was based on MTC data for the area, which focuses only on trips with an origin or destination in Redwood City. Briefly, the INDEX model utilized a series of formulas or algorithms to evaluate how land use, transportation, and energy related changes proposed as part of the New General Plan would affect anticipated emissions of greenhouse gases. Output from the INDEX modeling also computed anticipated changes in VMT from implementing the proposed changes. As summarized in Appendix D, the INDEX model started with base year VMT for Redwood City provided by the Metropolitan Transportation Commission (MTC).  

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6 Note that for comparison purposes, only population projections within the City limits were compared with ABAG projections, since ABAG projections for the sphere of influence areas are not available.

7 Section 4.14 of this EIR, Transportation and Traffic, also discusses VMT. The analysis in that section derived a VMT computation based on existing and future roadway volumes. Traffic on these segments, in both
The 2030 plan modeling for greenhouse gas emissions (see Appendix D) indicates that total VMT in the plan area would increase by about 21 percent by 2030 under the New General Plan. In terms of population, the New General Plan would result in a 17 percent population increase relative to existing conditions.\(^8\)

The New General Plan includes numerous measures to minimize inconsistencies with future air quality planning efforts. Above all, the New General Plan focuses new residential development in already urbanized areas, many with proximity to transit and/or within a mixed-use project. Part of the New General Plan includes a conceptual plan for a future network of streetcars that would provide an even richer array of transit options for the areas expected to see most new residential development by 2030.

Under Public Safety Element Policy PS-1.1, the City would cooperate with neighboring cities and jurisdictions and regional agencies including the ABAG, MTC, and BAAQMD to reduce motor vehicle emissions. Policies PS-3.1 through PS-3.5 are intended to reduce air pollution generated by motor vehicles. Specifically, Policy PS-3.2 would support programs intended to increase ridesharing and reduce VMT.

The New General Plan includes numerous policies and implementing actions that could help to reduce the air pollution added by new development in Redwood City. The primary goals, policies and programs to reduce future air pollution from Redwood City are contained in the Public Safety Element. Goal PS-1 is to maintain good air quality through the reduction of local air pollution generation. This goal is supported by five policies that are intended to reduce air pollutant emissions through proper planning, automobile trip reductions, use of renewable energy sources, and application of best available air quality mitigation. Goal PS-3, also supported by five policies, would reduce air pollution from motor vehicles through trip reduction programs, land use planning, and support of alternative transportation modes. Four policies supporting Goal PS-4 would promote efficient management and use of energy resources to minimize greenhouse gas emissions that would also indirectly reduce air pollutant emissions. Furthermore, the City would conduct environmental review of projects using the BAAQMD CEQA Guidelines (Program PS-2).

Development of higher density and mixed uses in areas that are well served by all modes of transportation can reduce the rate of future emissions in the Bay Area. Redwood City is currently served by local and regional transit with future plans for regional ferry service. There are numerous policies included in the Built Environment Element to enhance mixed use developments, encourage pedestrian, bicycle and transit use. For example, Policies

\(^8\) When VMT is evaluated on a per capita basis, the New General Plan would actually allow for a decrease in per capita VMT relative to existing conditions. See Table 4.16-5 in Section 4.16, Greenhouse Gas Emissions.
BE-2.1 and 2.7 encourage mixed use developments. Policies BE-11.1 through 11.10 are specifically designed to encourage mixed use developments with enhancements to provide increased pedestrian, bicycle, and transit uses. Mixed uses would be encouraged along El Camino Real that supports walking, transit, and bicycling through Policies BE-12.1 through BE-12.6. Policies BE-13.1 through BE-13.6, Policies BE-14.1 through BE-14.10 encourage similar development along portions of Woodside Road and Middlefield Road. Similar policies are proposed for the downtown area (Policies BE-18.2, BE-18-18.5, and BE-18.6). Policy BE-19.4 encourages employment centers to utilize existing services and transit. Policy BE-23.7 promotes higher residential densities near or within commercial or employment areas with transportation corridors where neighborhood services are available.

In addition to transportation-related emissions, the General Plan update includes numerous policies and programs to indirectly reduce air pollution through energy efficiency or conservation. Program PS-9 of the Public Safety element provides incentives for developers to exceed required standards (e.g., Title 24 Building Code). Policies BE-24.1 through BE-24.14 support sustainable future development that would use less energy, reduce automobile reliance, and promote energy generation from local solar, wind or other alternative energy systems. Housing Element Policy H-1.6 promotes installation of energy- and waste-saving features in new and existing homes.

VMT under the New General Plan would grow at a greater rate than population by the year 2030. Thus, in spite of the numerous New General Plan policies and programs that would have ameliorative effects on VMT, the allowable population increase under the New General Plan would nonetheless result in an inconsistency with Clean Air Plan projections, which is considered a significant air quality impact.

No feasible mitigation is available to address this impact. In order to mitigate this impact, the allowable level of new population growth under the New General Plan would need to shrink to the same level as was utilized in the Clean Air Plan. Such a reduction in population would necessarily require significant alteration of the New General Plan land use map and/or allowable densities/intensities of the various New General Plan land use designations. Such alterations would be inconsistent with the project objectives identified in Chapter 3.0 of this EIR. The allowable densities and intensities of the New General Plan land use map express the City’s objectives, goals, and vision for the year 2030.

Notably, assuming the Clean Air Plan is revised in the future, after the New General Plan is adopted, the revised Clean Air Plan would be based on updated ABAG information, which in turn would be based on the City’s then-adopted (and, presumably, the New) General Plan.

In the absence of feasible mitigation measures, the impact remains significant and unavoidable.
Impact 4.3-2: The New General Plan includes policies and programs that address the seven TCMs requiring participation at the local level. These policies and programs demonstrate reasonable efforts to implement the TCMs included in the CAP. (Less than Significant)

The 2005 Ozone Strategy (i.e., BAAQMD’s most recent Clean Air Plan) includes 20 transportation control measures, of which seven require participation at the local level. The latest set of adopted TCMs, which identify local governments as implementing agencies, are listed by the BAAQMD in their CEQA Guidelines. To be consistent with the Clean Air Plan the City’s General Plan policies should include all those measures that are consistent with the City’s responsibility. Under Public Safety Element Policy PS-3.1, the City would support programs that increase ridesharing, reduce pollutants generated by vehicle use, and meet the transportation control measures recommended by BAAQMD in the most recent Clean Air Plan. The measures that require action by the city and future development projects to implement are described below.

TCM #1 Support Voluntary Employer-Based Trip Reduction Programs

The Circulation Element of the Built Environment includes policies (BE-31.4 through BE 31.10) supporting transportation demand management (TDM) programs and encouraging reduced parking supplies that would encourage non-automobile travel modes.

TCM #3 Improve Area Wide Transit Service

While this TCM is primarily meant for region-wide implementation, the New General Plan includes 10 policies contained in the Circulation chapter that would support the overall goal of utilizing the use of public transportation (Policies BE 27.1 through BE 27.10). Under Policy BE-21.3, the City develop a plan that accommodates passenger ferry service at the Port (region-wide transit service), which also supports the Clean Air Plan TCM# 7 that would improve regional ferry service. Circulation Element policies BE 28.1 through BE 28.3 support improved rail service in the City. As previously noted, the New General Plan also includes a conceptual streetcar system. If developed in the future, such a system would provide a new transit mode that would potentially link existing and planned transit services.

TCM# 9. Improve Bicycle Access and Facilities and TCM# 19. Pedestrian Travel

The New General Plan includes policies and implementation programs that reasonably implement these TCMs. In addition to the policies that promote mixed uses indirectly promoting alternative modes of transportation, the Circulation chapter of the Built Environment Element includes goals and policies to promote bicycle and pedestrian modes of travel. Policies BE-25.1 through BE-25.7 support a goal of balanced transportation system. Policies BE-26.1 through BE26.6 support the goal of improving the convenience, comfort and safety of walking, bicycling and electric scooter travel. Policies BE-19.3, BE-19.4, and BE-19.5 require new employment centers to include safe and convenient walking, biking and transit connections and include amenities to encourage these modes of transportation. Built Environment Policy BE-10.7 improves pedestrian, bicycle and transit linkages between Bayfront and the areas north of U.S. 101.
TCM# 15. Local Clean Air Plans, Policies and Programs and TCM# 17. Conduct Demonstration Projects

Public Safety Element Program PS-12 supports new technologies by replacing Redwood City fleet vehicles with hybrid, electric, or other new technologies that have lower emission rates. Program PS-18 of the Public Safety Element educates the public regarding best management practices to help improve air quality (also supporting TCM #10 that supports youth transportation). Circulation chapter Policy BE-26.12 would encourage more students to walk and bicycle to and from schools. In addition, the City would participate in the region’s Spare the Air program under Program PS-6. Under Program PS-14 and PS-15, the City will adopt a Climate Action Plan with greenhouse gas emissions reduction targets. Implementation of these programs would lead to greater reductions in emission of air pollutants. Much of the development under the New General Plan would be expected in the downtown areas that are served by transit and include a mix of uses. This type of development is supportive of the regionally approved Smart Growth Vision for the Bay Area that is part of TCM #5.

TCM# 20. Promote Traffic Calming Measures

In addition to Built Environment Element policies and programs that support mixed uses to encourage more walking, bicycling and use of transit, Circulation Policy BE-25.5 would continue to implement (PEDS) that would provide wider sidewalks, bicycle lanes, and transit amenities. Policy BE-29.2 pursues programs that reduce vehicle speeds and cut through traffic. Policy BE-30.2 minimizes potential conflicts between trucks and pedestrians, bicyclist or transit access.

The New General Plan policies and programs support the BAAQMD Clean Air Plan TCMs. The impact would therefore be less than significant. No mitigation is required.

Impact 4.3-3: Although the Redwood City New General Plan provides adequate buffers between new or existing sources of air pollutants (toxic air contaminants) and new or existing residences or sensitive receptors, the New General Plan does not address recent BAAQMD guidance on protecting people from the risks of TACs. Consequently, allowable development under the New General Plan may result in exposure of sensitive receptors to TACs. (Less than Significant with Mitigation)

BAAQMD’s proposed CEQA Guidelines recommend that local land use planning documents include a land use diagram that establishes buffer zones around existing and proposed sources of certain air pollutants, which buffer zones are also reflected in local policies and implementing ordinances.

The primary source of TAC emissions in Redwood City is U.S. 101 traffic, industrial uses (including their truck traffic generation), and the Port. All of these sources are located in the northern and eastern portions of the City. Most residences are located to the south and west. Planned residences associated with the New General Plan are located to the south and west. Implementation of the New General Plan may involve the placement of sensitive receptors (e.g., new residences) near localized sources of toxic air contaminants.
CARB recommends that lead agencies provide setbacks of 500 feet for freeways (or busy arterial roadways with average daily trips of 100,000 or more). CARB also recommends general setbacks for other uses such as large truck distribution centers, rail yards, and seaports. CARB does not provide recommendations for setbacks from railroad lines. Caltrain involves about 100 daily train passbys. Modeling studies of DPM exposure from these train passbys have not been conducted. However, the emissions associated with the Caltrain line would be much less than the emissions from truck traffic on US 101, so the buffer would be considerably less. Moreover, as discussed further in Chapter 6.0, Cumulative Impacts, by the year 2015, the entire Caltrain line is expected to be converted to electrical power, reducing future DPM emissions from trains.

The New General Plan includes policies and programs that prevent new development from exposing sensitive receptors to significant TAC levels. Goal PS-2, supported by five policies, would reduce the exposure of sensitive receptors to air pollution through buffers, filtration or rerouting of trucks. Program PS-7 would amend the Municipal Code and other regulations to require mitigation measures that protect sensitive receptors from common sources of air pollution, such as high volume roadways and the Port of Redwood City. Program PS-8 requires projects that would site new sensitive receptors within 500 feet of freeways to complete an analysis of the potential health risks before such projects can be approved. If necessary, this program would require a project to include mitigation measures to comply with BAAQMD adopted standards to reduce TAC impacts to acceptable levels. Policy PS-2.5 prohibits the establishment of new schools or senior housing near freeways. In addition, Built Environment Element Policy BE-2.5 protects neighborhoods from encroachment of incompatible activities or land uses.

The New General Plan includes policies to establish buffers or implement other measures to protect sensitive land uses from sources of TACs. However, BAAQMD has recently adopted new modifications to their cancer risk assessment guidance, resulting in higher predicted lifetime cancer risks than guidance used by CARB to develop their guidance for siting new sensitive receptors. Additionally, draft BAAQMD guidance identifies other busy roadways as potential sources of significant TACs. The draft BAAQMD guidance includes methodology for assessing PM2.5 as a contaminant to be analyzed.

For general plans, the draft BAAQMD CEQA Air Quality Guidelines recommend that special overlay zones be established around existing and planned sources of TACs, including special overlay zones along freeways and high-volume roadways. Since the New General Plan policies are based on older CARB guidance and do not have a means of identifying the impact of high volume roadways, future sensitive receptors may be exposed to increased levels of TACs. This would be a significant impact.

**Mitigation Measure 4.3-1:** New General Plan Public Safety Element Implementation Program PS-6 shall be revised to require that the potential air quality impacts from new development projects in the City be evaluated pursuant to the applicable BAAQMD CEQA Guidelines in effect at the time the City commences the air quality evaluation, including, as applicable, the establishment of specific overlay zones around existing and planned sources as TACs.
**Significance After Mitigation:** Implementation of Mitigation Measure 4.3-3 would reduce the impact to a less than significant level.

**Impact 4.3-4:** The increased population allowed by the New General Plan would increase traffic volumes along roadways, which could increase carbon monoxide emissions. An increase in carbon monoxide emissions from traffic along major roadways could violate air quality standards. *(Less than Significant)*

Carbon monoxide emissions from traffic would be the pollutant of greatest concern at the local level. Congested intersections with a large volume of traffic have the greatest potential to cause high-localized concentrations of carbon monoxide. Since the early 1990s, carbon monoxide levels in the Bay Area region have been State and federal standards. As a result, the region has been designated as attainment for the standards. The highest measured levels of carbon monoxide measured at the ambient air quality station in Redwood City are well below State and federal standards.

To identify the potential for increased carbon monoxide emissions to violate air quality standards, existing and projected future conditions along major roadways were evaluated. Carbon monoxide emissions from traffic along major roadway segments in Redwood City with high traffic volumes and poor level of service (LOS) were evaluated. This included the busiest City roadway segments operating at LOS of E or F. The traffic-generated emissions of carbon monoxide were predicted using a screening version of the Caline4 line source dispersion model developed by the BAAQMD. The model requires inputs of geometry, traffic volumes, emission factors and meteorology. Existing traffic volumes for selected roadway segments were used. Emission factors used were calculated using the EMFAC2007 model, developed by the California Air Resources Board, with default assumptions for the Bay Area during winter when carbon monoxide levels are highest. Meteorological conditions indicative of elevated carbon monoxide levels in the Bay Area were used, which include a low wind speed of 1 meter per second, worst-case wind angle, and a temperature of 40°F. Slow speeds of 5 miles per hour for roadways (depending on LOS) and 25 miles per hour for the freeway segments were used to develop the emission factors. The screening assessment represents a worst-case analysis, designed to over-predict carbon monoxide levels. Dispersion modeling was used where screening results indicated high concentrations that could result in adverse impacts.

The worst study roadway links in Redwood City, which include highest traffic volumes and high levels of congestion, were modeled to assess roadside carbon monoxide concentrations. Existing levels were found to be below ambient air quality standards. The existing and projected 2030 conditions along these roadways are shown in Table 4.3-8. Eight-hour concentrations were modeled since they represent the most prohibitive, stringent standard. Exceedance of the 1-hour NAAQS or CAAQS would result in an exceedance of the 8-hour standard.

As shown in the table, the projected 2030 overall concentrations would be well below the 8-hour ambient air quality standards, as well as below existing concentrations. This is because concentrations are anticipated to decrease substantially in the future with improvements to exhaust systems and reformulated fuels. Since modeled concentrations
would not exceed the 8-hour standard, they would not exceed the 1-hour standard. The impacts would therefore be less than significant.

Table 4.3–8 Predicted Roadside 8-Hour Carbon Monoxide Concentrations

<table>
<thead>
<tr>
<th>Description</th>
<th>Existing (2008)</th>
<th>Future with Project (2030)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Woodside &amp; Alameda De Las Pulgas</td>
<td>5.9 ppm</td>
<td>3.2 ppm</td>
</tr>
<tr>
<td>Woodside &amp; Middlefield</td>
<td>6.6 ppm</td>
<td>3.5 ppm</td>
</tr>
<tr>
<td>Woodside &amp; Broadway</td>
<td>5.8 ppm</td>
<td>3.4 ppm</td>
</tr>
<tr>
<td>Whipple &amp; El Camino Real</td>
<td>6.0 ppm</td>
<td>3.3 ppm</td>
</tr>
<tr>
<td>Jefferson &amp; El Camino Real</td>
<td>5.9 ppm</td>
<td>3.3 ppm</td>
</tr>
<tr>
<td>Brewster &amp; Veterans</td>
<td>4.9 ppm</td>
<td>3.0 ppm</td>
</tr>
</tbody>
</table>

BAAQMD Thresholds
(Current and Draft) 9.0 ppm (CAAQS)

Note: California ambient air quality standard for 8-hour carbon monoxide levels is 9.0 ppm. Modeled levels are added to an 8-hour background concentration of 2.4 ppm.


**Impact 4.3-5: Implementing the New General Plan policies would require adequate buffers between new or existing sources of odors and new or existing residences or sensitive receptors in accordance with the Clean Air Plan. (Less than Significant)**

The BAAQMD CEQA Guidelines provide project screening trigger levels for potential odor sources. To avoid significant impacts, the BAAQMD CEQA Guidelines recommend that buffer zones to avoid adverse impacts from odors should be reflected in local plan policies, land use maps, and implementing ordinances. Under Program PS-6 of the Public Safety Element, the City only allows new emission sources or odor sources if the minimum screening distances between sources and receptors established in the BAAQMD CEQA Guidelines or other appropriate source can be met, unless detailed project-specific studies demonstrate compatibility with adjacent uses despite separations that do not meet the screening distance requirements. Implementing Program PS-6 will ensure that appropriate buffers between sources of odors and sensitive receptors are provided and the impact is therefore less than significant.
Impact 4.3-6: Construction associated with development allowed under the New General Plan would generate dust and particulates that could affect local and regional air quality. (Less than Significant)

Future development in Redwood City as allowed under the New General Plan would generate dust and other particulate matter (PM$_{10}$), which could affect regional air quality. Dust is generated from a variety of project construction activities including grading, import/export of fill material, and vehicle travel on unpaved surfaces. Soil can also be tracked out onto paved roads where it is entrained in the air by passing cars and trucks. The rate of dust emissions is related to the type and size of the disturbance, meteorological conditions, and soil conditions.

Exhaust from diesel powered construction equipment affects regional ozone levels as well as localized particulate levels. Diesel particulate matter is considered a toxic air contaminant. Construction equipment will be replaced or retrofitted over the next several years leading to an overall decrease in emissions of exhaust particulate matter and ozone precursor emissions.

The existing BAAQMD CEQA Guidelines suggest that the significance of construction period emissions should be based on the application of standard, region-wide control measures. The BAAQMD recommends a set of feasible control measures to reduce PM$_{10}$ near construction sites. These apply to project-level studies. BAAQMD also recommends that control measures for equipment exhaust emissions also be included. The BAAQMD qualitative approach requires all construction projects to implement some level of control measures to reduce impacts. The significance of air quality impacts near construction sites is dependent mostly on the size of the site, level of activity and proximity of sensitive receptors. In its draft CEQA Guidelines, BAAQMD is proposing quantified thresholds for contraction exhaust emission that would apply to project-level review (in other words, subsequent projects developed under the framework of the New General Plan).

Programs to control emissions from construction activities are identified in the Public Safety element of the New General Plan. Under Program PS-2, the City adopts and enforces dust and emission abatement measures for construction activities based on the BAAQMD’s guidelines and other appropriate regulations. Program PS-4 requires developers to implement appropriate air pollution control plans to reduce exhaust emissions from construction equipment and minimize dust generation. Implementing these measures, which are in accordance with BAAQMD guidelines, would reduce overall impacts from construction activities to a less than significant level.
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