4.3 AIR QUALITY

This section has been prepared using the methodologies and assumptions contained in the San Joaquin Valley Air Pollution Control District's (SJVAPCD) *Guidance for Assessing and Mitigating Air Quality Impacts* (GAMAQI).[1] In keeping with these guidelines, this section describes existing air quality and the regulatory framework for air quality. The section also describes the potential effects of the proposed Specific Plan on air quality, including the effects of construction and operational traffic associated with the proposed Specific Plan on regional pollutant levels and health risks. The following analysis is based on the anticipated buildout as described in Chapter 3, Project Description, and as included in Table 3.A. Mitigation measures to reduce potentially significant air quality impacts are identified, as necessary.

4.3.1 Environmental Setting

The following discussion provides an overview of existing air quality conditions in the region and in the City of Madera. Ambient air quality standards and the regulatory framework are summarized and climate, air quality conditions, and typical air pollutant types and sources are also described.

4.3.1.1 Specific Plan Area

The City of Madera is located in Madera County in the San Joaquin Valley Air Basin (SJVAB). The Air Basin consists of Kings, Madera, San Joaquin, Merced, Stanislaus, and Fresno counties, as well as a portion of Kern County. The local agency with jurisdiction over air quality in the Basin is the SJVAPCD. Regional and local air quality is impacted by topography, dominant airflows, atmospheric inversions, location, and season.

4.3.1.2 Air Pollutants and Health Effects

Both State and federal governments have established health-based Ambient Air Quality Standards for six criteria air pollutants: carbon monoxide (CO), ozone (O_3), nitrogen dioxide (NO_2), sulfur dioxide (SO_2), lead (Pb), and suspended particulate matter. In addition, the State has set standards for sulfates, hydrogen sulfide, vinyl chloride and visibility-reducing particles. These standards are designed to protect the health and welfare of the populace with a reasonable margin of safety. Two criteria pollutants, O_3 and NO_2, are considered regional pollutants because they (or their precursors) affect air quality on a regional scale. Pollutants such as CO, SO_2, and Pb are considered local pollutants that tend to accumulate in the air locally.

The primary pollutants of concern in the project area are O_3, CO, and suspended particulate matter. Significance thresholds established by an air district are used to manage total regional and local emissions within an air basin based on the air basin's attainment status for criteria pollutants. These emission thresholds were established for individual development projects that would contribute to regional and local emissions and could adversely affect or delay the air basin's projected attainment target goals for nonattainment criteria pollutants.

[1] San Joaquin Valley Air Pollution Control District. 2015. *Guidance for Assessing and Mitigating Air Quality Impacts*. March 19. Website: www.valleyair.org/transportation/ceqa_idx.htm (accessed February 2020).

Because of the conservative nature of the significance thresholds, and the basin-wide context of individual development project emissions, there is no direct correlation between a single project and localized air quality-related health effects. One individual project that generates emissions exceeding a threshold does not necessarily result in adverse health effects for residents in the project vicinity. This condition is especially true when the criteria pollutants exceeding thresholds are those with regional effects, such as ozone precursors like nitrogen oxides (NO_x) and reactive organic gases (ROG).

Occupants of facilities such as schools, daycare centers, parks and playgrounds, hospitals, and nursing and convalescent homes are considered to be more sensitive than the general public to air pollutants because these population groups have increased susceptibility to respiratory disease. Persons engaged in strenuous work or exercise also have increased sensitivity to poor air quality. Residential areas are considered more sensitive to air quality conditions, compared to commercial and industrial areas, because people generally spend longer periods of time at their residences, with greater associated exposure to ambient air quality conditions. Recreational uses are also considered sensitive compared to commercial and industrial uses due to greater exposure to ambient air quality conditions associated with exercise.

Air pollutants and their health effects, and other air pollution-related considerations are summarized in Table 4.3.A and are described in more detail below. Table 4.3.B presents a summary of State and Federal ambient air quality standards (AAQS).

Ozone. Ozone is a secondary air pollutant produced in the atmosphere through a complex series of photochemical reactions involving ROG and NO_x. The main sources of ROG and NO_x, often referred to as ozone precursors, are combustion processes (including combustion in motor vehicle engines) and the evaporation of solvents, paints, and fuels. Automobiles are the single largest source of ozone precursors. Ozone is referred to as a regional air pollutant because its precursors are transported and diffused by wind concurrently with ozone production through the photochemical reaction process. Ozone causes eye irritation, airway constriction, and shortness of breath and can aggravate existing respiratory diseases such as asthma, bronchitis, and emphysema.

Carbon Monoxide. CO is an odorless, colorless gas usually formed as the result of the incomplete combustion of fuels. The single largest source of CO is motor vehicles. CO transport is limited - it disperses with distance from the source under normal meteorological conditions. However, under certain extreme meteorological conditions, CO concentrations near congested roadways or intersections may reach unhealthful levels that adversely affect local sensitive receptors (e.g., residents, schoolchildren, the elderly, and hospital patients). Typically, high CO concentrations are associated with roadways or intersections operating at unacceptable levels of service (LOS) or with extremely high traffic volumes. Exposure to high concentrations of CO reduces the oxygen-carrying capacity of the blood and can cause headaches, nausea, dizziness, and fatigue, impair central nervous system function, and induce angina (chest pain) in persons with serious heart disease. Extremely high levels of CO, such as those generated when a vehicle is running in an unventilated garage, can be fatal.

Table 4.3.A: Sources and Health Effects of Air Pollutants

Pollutants	Sources	Primary Effects
Carbon Monoxide (CO)	• Incomplete combustion of fuels and other carbon-containing substances, such as motor exhaust. • Natural events, such as decomposition of organic matter.	• Reduced tolerance for exercise. • Impairment of mental function. • Impairment of fetal development. • Death at high levels of exposure. • Aggravation of some heart diseases (angina).
Nitrogen Dioxide (NO_2)	• Motor vehicle exhaust. • High temperature stationary combustion. • Atmospheric reactions.	• Aggravation of respiratory illness. • Reduced visibility. • Reduced plant growth. • Formation of acid rain.
Ozone (O_3)	• Atmospheric reaction of organic gases with nitrogen oxides in sunlight.	• Aggravation of respiratory and cardiovascular diseases. • Irritation of eyes. • Impairment of cardiopulmonary function. • Plant leaf injury.
Lead (Pb)	• Contaminated soil.	• Impairment of blood functions and nerve construction. • Behavioral and hearing problems in children.
Suspended Particulate Matter ($PM_{2.5}$ and PM_{10})	• Stationary combustion of solid fuels. • Construction activities. • Industrial processes. • Atmospheric chemical reactions. • Soil/Dust	• Reduced lung function. • Aggravation of the effects of gaseous pollutants. • Aggravation of respiratory and cardiorespiratory diseases. • Increased cough and chest discomfort. • Reduced visibility.
Sulfur Dioxide (SO_2)	• Combustion of sulfur-containing fossil fuels. • Smelting of sulfur-bearing metal ores. • Industrial processes.	• Aggravation of respiratory diseases (asthma, emphysema). • Reduced lung function. • Irritation of eyes. • Reduced visibility. • Plant injury. • Deterioration of metals, textiles, leather, finishes, coatings, etc.

Source: California Air Resources Board (2015).

Table 4.3.B: Federal and State Ambient Air Quality Standards

Pollutant	Averaging Time	California Standards[a]		Federal Standards[b]		
		Concentration[c]	Method[d]	Primary[c,e]	Secondary[c,f]	Method[g]
Ozone (O3)[h]	1-Hour	0.09 ppm (180 µg/m³)	Ultraviolet Photometry	–	Same as Primary Standard	Ultraviolet Photometry
	8-Hour	0.07 ppm (137 µg/m³)		0.070 ppm (137 µg/m³)		
Respirable Particulate Matter (PM10)[i]	24-Hour	50 µg/m³	Gravimetric or Beta Attenuation	150 µg/m³	Same as Primary Standard	Inertial Separation and Gravimetric Analysis
	Annual Arithmetic Mean	20 µg/m³		–		
Fine Particulate Matter (PM2.5)[i]	24-Hour	-		35 µg/m³	Same as Primary Standard	Inertial Separation and Gravimetric Analysis
	Annual Arithmetic Mean	12 µg/m³	Gravimetric or Beta Attenuation	12.0 µg/m³		
Carbon Monoxide (CO)	8-Hour	9.0 ppm (10 mg/m³)	Non-Dispersive Infrared Photometry (NDIR)	9 ppm (10 mg/m³)	–	Non-Dispersive Infrared Photometry (NDIR)
	1-Hour	20 ppm (23 mg/m³)		35 ppm (40 mg/m³)		
	8-Hour (Lake Tahoe)	6 ppm (7 mg/m³)		–	–	
Nitrogen Dioxide (NO2)[j]	Annual Arithmetic Mean	0.03 ppm (57 µg/m³)	Gas Phase Chemi-luminescence	53 ppb (100 µg/m³)	Same as Primary Standard	Gas Phase Chemi-luminescence
	1-Hour	0.18 ppm (339 µg/m³)		100 ppb (188 µg/m³)	-	
Lead (Pb)[l,m]	30-Day Average	1.5 µg/m³	Atomic Absorption	–	–	High-Volume Sampler and Atomic Absorption
	Calendar Quarter	–		1.5 µg/m³ (for certain areas)[l]	Same as Primary Standard	
	Rolling 3-Month Average[i]	–		0.15 µg/m³		
Sulfur Dioxide (SO2)[k]	24-Hour	0.04 ppm (105 µg/m3)	Ultraviolet Fluorescence	0.14 ppm (for certain areas)	–	Ultraviolet Fluorescence; Spectro-photometry (Pararosaniline Method)
	3-Hour	–		–	0.5 ppm (1300 µg/m³)	
	1-Hour	0.25 ppm (655 µg/m³)		75 ppb (196 µg/m³)[k]	–	
	Annual Arithmetic Mean	–		0.030 ppm (for certain areas)[k]	–	
Visibility-Reducing Particles[l]	8-Hour	See footnote n	Beta Attenuation and Transmittance through Filter Tape.	No Federal Standards		
Sulfates	24-Hour	25 µg/m³	Ion Chromatography			
Hydrogen Sulfide	1-Hour	0.03 ppm (42 µg/m³)	Ultraviolet Fluorescence			
Vinyl Chloride[j]	24-Hour	0.01 ppm (26 µg/m³)	Gas Chromatography			

Table notes are provided on the following page.

Source: California Air Resources Board (2016).

[a] California standards for ozone, carbon monoxide (except 8-hour Lake Tahoe), sulfur dioxide (1- and 24-hour), nitrogen dioxide, and particulate matter (PM_{10}, $PM_{2.5}$, and visibility reducing particles), are values that are not to be exceeded. All others are not to be equaled or exceeded. California ambient air quality standards are listed in the Table of Standards in Section 70200 of Title 17 of the California Code of Regulations.

[b] National standards (other than ozone, particulate matter, and those based on annual arithmetic mean) are not to be exceeded more than once a year. The ozone standard is attained when the fourth highest 8-hour concentration measured at each site in a year, averaged over three years, is equal to or less than the standard. For PM_{10}, the 24-hour standard is attained when the expected number of days per calendar year with a 24-hour average concentration above 150 µg/m^3 is equal to or less than one. For $PM_{2.5}$, the 24-hour standard is attained when 98 percent of the daily concentrations, averaged over three years, are equal to or less than the standard. Contact USEPA for further clarification and current national policies.

[c] Concentration expressed first in units in which it was promulgated. Equivalent units given in parentheses are based upon a reference temperature of 25°C and a reference pressure of 760 torr. Most measurements of air quality are to be corrected to a reference temperature of 25°C and a reference pressure of 760 torr; ppm in this table refers to ppm by volume, or micromoles of pollutant per mole of gas.

[d] Any equivalent measurement method which can be shown to the satisfaction of the CARB to give equivalent results at or near the level of the air quality standard may be used.

[e] National Primary Standards: The levels of air quality necessary, with an adequate margin of safety to protect the public health.

[f] National Secondary Standards: The levels of air quality necessary to protect the public welfare from any known or anticipated adverse effects of a pollutant.

[g] Reference method as described by the USEPA. An "equivalent method" of measurement may be used but must have a "consistent relationship to the reference method" and must be approved by the USEPA.

[h] On October 1, 2015, the national 8-hour ozone primary and secondary standards were lowered from 0.075 to 0.070 ppm.

[i] On December 14, 2012, the national annual PM2.5 primary standard was lowered from 15 µg/m^3 to 12.0 µg/m^3. The existing national 24- hour PM2.5 standards (primary and secondary) were retained at 35 µg/m^3, as was the annual secondary standard of 15 µg/m^3. The existing 24-hour PM10 standards (primary and secondary) of 150 µg/m^3 also were retained. The form of the annual primary and secondary standards is the annual mean, averaged over 3 years.

[j] To attain the 1-hour national standard, the 3-year average of the annual 98th percentile of the 1-hour daily maximum concentrations at each site must not exceed 100 ppb. Note that the national 1-hour standard is in units of parts per billion (ppb). California standards are in units of parts per million (ppm). To directly compare the national 1-hour standard to the California standards the units can be converted from ppb to ppm. In this case, the national standard of 100 ppb is identical to 0.100 ppm.

[k] On June 2, 2010, a new 1-hour SO_2 standard was established and the existing 24-hour and annual primary standards were revoked. To attain the 1-hour national standard, the 3-year average of the annual 99th percentile of the 1-hour daily maximum concentrations at each site must not exceed 75 ppb. The 1971 SO_2 national standards (24-hour and annual) remain in effect until one year after an area is designated for the 2010 standard, except that in areas designated nonattainment for the 1971 standards, the 1971 standards remain in effect until implementation plans to attain or maintain the 2010 standards are approved.

Note that the 1-hour national standard is in units of parts per billion (ppb). California standards are in units of parts per million (ppm). To directly compare the 1-hour national standard to the California standard the units can be converted to ppm. In this case, the national standard of 75 ppb is identical to 0.075 ppm.

[l] The CARB has identified lead and vinyl chloride as 'toxic air contaminants' with no threshold level of exposure for adverse health effects determined. These actions allow for the implementation of control measures at levels below the ambient concentrations specified for these pollutants.

[m] The national standard for lead was revised on October 15, 2008, to a rolling 3-month average. The 1978 lead standard (1.5 µg/m^3 as a quarterly average) remains in effect until one year after an area is designated for the 2008 standard, except that in areas designated nonattainment for the 1978 standard, the 1978 standard remains in effect until implementation plans to attain or maintain the 2008 standard are approved.

[n] In 1989, the CARB converted both the general Statewide 10-mile visibility standard and the Lake Tahoe 30-mile visibility standard to instrumental equivalents, which are "extinction of 0.23 per kilometer" and "extinction of 0.07 per kilometer" for the Statewide and Lake Tahoe Air Basin standards, respectively.

°C = degrees Celsius
CARB = California Air Resources Board
USEPA = United States Environmental Protection Agency
ppb = parts per billion
ppm = parts per million
mg/m^3 = milligrams per cubic meter
µg/m^3 = micrograms per cubic meter

Particulate Matter. Particulate matter is the term used for a mixture of solid particles and liquid droplets found in the air. Coarse particles are those that are 10 microns or less in diameter, or PM_{10}. Fine, suspended particulate matter with an aerodynamic diameter of 2.5 microns or less, or $PM_{2.5}$, is not readily filtered out by the lungs. Nitrates, sulfates, dust, and combustion particulates are major components of PM_{10} and $PM_{2.5}$. These small particles can be directly emitted into the atmosphere as byproducts of fuel combustion; through abrasion, such as tire or brake lining wear; or through fugitive dust (wind or mechanical erosion of soil). They can also be formed in the atmosphere through chemical reactions. Particulates may transport carcinogens and other toxic compounds that adhere to the particle surfaces and can enter the human body through the lungs.

Nitrogen Dioxide. NO_2 is a reddish brown gas that is a byproduct of combustion processes. Automobiles and industrial operations are the main sources of NO_2. Aside from its contribution to ozone formation, NO_2 also contributes to other pollution problems, including a high concentration of fine particulate matter, poor visibility, and acid deposition. NO_2 may be visible as a coloring component on high pollution days, especially in conjunction with high ozone levels. NO_2 decreases lung function and may reduce resistance to infection.

Sulfur Dioxide. SO_2 is a colorless, irritating gas formed primarily from incomplete combustion of fuels containing sulfur. Industrial facilities also contribute to gaseous SO_2 levels in the region. SO_2 irritates the respiratory tract, can injure lung tissue when combined with fine particulate matter, and reduces visibility and the level of sunlight.

Lead. Lead is a metal found naturally in the environment as well as in manufactured products. The major sources of lead emissions have historically been mobile and industrial sources. As a result of the phase-out of leaded gasoline, metal processing is currently the primary source of lead emissions. The highest levels of lead in air are generally found near lead smelters. Other stationary sources are waste incinerators, utilities, and lead-acid battery factories. Twenty years ago, mobile sources were the main contributor to ambient lead concentrations in the air. In the early 1970s, the USEPA established national regulations to gradually reduce the lead content in gasoline. In 1975, unleaded gasoline was introduced for motor vehicles equipped with catalytic converters. The United States Environmental Protection Agency (USEPA) banned the use of leaded gasoline in highway vehicles in December 1995. As a result of the USEPA's regulatory efforts to remove lead from gasoline, emissions of lead from the transportation sector and levels of lead in the air decreased dramatically.

Odors. Odors are also an important element of local air quality conditions. Specific activities can raise concerns related to odors on the part of nearby neighbors. Major sources of odors include restaurants and manufacturing plants. Other odor producers include the industrial facilities within the region. While sources that generate objectionable odors must comply with air quality regulations, the public's sensitivity to locally-produced odors often exceeds regulatory thresholds.

Toxic Air Contaminants. In addition to the criteria pollutants discussed above, toxic air contaminants (TACs) are another group of pollutants of concern. TACs are injurious in small quantities and are regulated by the USEPA and California Air Resources Board (CARB). Some examples of TACs include benzene, butadiene, formaldehyde, and hydrogen sulfide. The identification, regulation, and monitoring of TACs is relatively recent compared to that for criteria pollutants.

TACs do not have ambient air quality standards, but are regulated by the USEPA, CARB, and the SJVAPCD. In 1998, the CARB identified particulate matter from diesel-fueled engines as a TAC. The CARB has completed a risk management process that identified potential cancer risks for a range of activities using diesel-fueled engines.[2] High-volume freeways, stationary diesel engines, and facilities attracting heavy and constant diesel vehicle traffic (e.g., distribution centers and truck stops) were identified as posing the highest risk to adjacent receptors. Other facilities associated with increased risk include warehouse distribution centers, large retail or industrial facilities, high-volume transit centers, and schools with a high volume of bus traffic. Health risks from TACs are a function of both concentration and duration of exposure.

Unlike TACs emitted from industrial and other stationary sources noted above, most diesel particulate matter is emitted from mobile sources—primarily "off-road" sources such as construction and mining equipment, agricultural equipment, and truck-mounted refrigeration units, as well as trucks and buses traveling on freeways and local roadways.

Although not specifically monitored, recent studies indicate that exposure to diesel particulate matter may contribute significantly to a cancer risk (a risk of approximately 500 to 700 in 1,000,000) that is greater than all other measured TACs combined.[3] The technology for reducing diesel particulate matter emissions from heavy-duty trucks is well established, and both State and Federal agencies are moving aggressively to regulate engines and emission control systems to reduce and remediate diesel emissions. The CARB anticipated that in 2020, average statewide diesel particulate matter concentrations will decrease by 85 percent from levels in 2000 with full implementation of the CARB's Diesel Risk Reduction Plan,[4] meaning that the statewide health risk from diesel particulate matter is expected to decrease from 540 cancer cases in 1,000,000 to 21.5 cancer cases in 1,000,000. It is likely that cancer risk in the SJVAB from diesel particulate matter will decrease by a similar factor by 2020.

High Volume Roadways. Air pollutant exposures and their associated health burdens vary considerably within places in relation to sources of air pollution. Motor vehicle traffic is perhaps the most important source of intra-urban spatial variation in air pollution concentrations. Air quality research consistently demonstrates that pollutant levels are substantially higher near freeways and busy roadways, and human health studies have consistently demonstrated that children living within 100 to 200 meters (328 to 656 feet) of freeways or busy roadways have reduced lung function and higher rates of respiratory disease. At present, it is not possible to attribute the effects of roadway proximity on non-cancer health effects to one or more specific vehicle types or vehicle pollutants. Engine exhaust, from diesel, gasoline, and other combustion engines, is a complex mixture of particles and gases, with collective and individual toxicological characteristics.

Valley Fever. Valley fever is a fungal infection caused by coccidioides organisms. It can cause fever, chest pain and coughing, among other signs and symptoms. The coccidioides species of fungi that cause valley fever are commonly found in the soil in certain areas, including Madera County. These

2 California Air Resources Board. 2000. Stationary Source Division and Mobile Source Control Division. *Risk Reduction Plan to Reduce Particulate Matter Emissions from Diesel-Fueled Engines and Vehicles.* October.

3 Ibid.

4 California Air Resources Board. 2000, op. cit.

fungi can be stirred into the air by anything that disrupts the soil, such as farming, construction and wind. The fungi can then be breathed into the lungs and cause valley fever, also known as acute coccidioidomycosis. A mild case of valley fever usually goes away on its own. In more severe cases of valley fever, doctors prescribe antifungal medications that can treat the underlying infection. Valley Fever is not contagious and therefore does not spread from person to person. Most cases (approximately 60 percent) have no symptoms or only very mild flu-like symptoms and do not see a doctor. When symptoms are present, the most common are fatigue, cough, fever, profuse sweating at night, loss of appetite, chest pain, generalized muscle and joint aches particularly of the ankles and knees. There may also be a rash that resembles measles or hives but develops more often as tender red bumps on the shins or forearms.

Asbestos. Asbestos is the name given to a number of naturally occurring fibrous silicate minerals that have been mined for their useful properties such as thermal insulation, chemical and thermal stability, and high tensile strength. The three most common types of asbestos are chrysotile, amosite, and crocidolite. Chrysotile, also known as white asbestos, is the most common type of asbestos found in buildings. Chrysotile makes up approximately 90 to 95 percent of all asbestos contained in buildings in the United States.

Construction sometimes requires the demolition of existing buildings that may include materials containing asbestos. Asbestos is also found in a natural state known as naturally occurring asbestos. Exposure and disturbance of rock and soil that naturally contain asbestos can result in the release of fibers into the air and consequent exposure to the public. Asbestos most commonly occurs in ultramafic rock that has undergone partial or complete alteration to serpentine rock (serpentinite) and often contains chrysotile asbestos. In addition, another form of asbestos, tremolite, can be found associated with ultramafic rock, particularly near faults. Sources of asbestos emissions include unpaved roads or driveways surfaced with ultramafic rock, construction activities in ultramafic rock deposits, or rock quarrying activities where ultramafic rock is present.

Exposure to asbestos is a health threat; exposure to asbestos fibers may result in health issues such as lung cancer, mesothelioma (a rare cancer of the thin membranes lining the lungs, chest, and abdominal cavity), and asbestosis (a non-cancerous lung disease that causes scarring of the lungs).

The CARB has an Air Toxics Control Measure for construction, grading, quarrying, and surface mining operations requiring the implementation of mitigation measures to minimize emissions of asbestos-laden dust. The measure applies to road construction and maintenance, construction and grading operations, and quarries and surface mines when the activity occurs in an area where naturally occurring asbestos is likely to be found. Areas are subject to the regulation if they are identified on maps published by the Department of Conservation as ultramafic rock units or if the Air Pollution Control Officer or owner/operator has knowledge of the presence of ultramafic rock, serpentine, or naturally occurring asbestos on the site. The measure also applies if ultramafic rock, serpentine, or asbestos is discovered during any operation or activity.

4.3.1.3 Background

The following provides a discussion of the local and regional air quality and climate in the Madera area.

Existing Climate and Air Quality. Air quality is a function of both local climate and local sources of air pollution. The amount of a given pollutant in the atmosphere is determined by the amount of the pollutant released and the atmosphere's ability to transport and dilute the pollutant. The major determinants of transport and dilution are wind, atmospheric stability, terrain, and for photochemical pollutants, sunshine.

The Specific Plan Area is located within the SJVAB and is under the jurisdiction of the SJVAPCD. A region's topographic features have a direct correlation with air pollution flow and therefore are used to determine the boundary of air basins. The SJVAB is comprised of approximately 25,000 square miles and covers of eight counties including Fresno, Kings, Madera, Merced, San Joaquin, Stanislaus and Tulare, and the western portion of Kern. The SJVAB is defined by the Sierra Nevada mountains in the east (8,000 to 14,000 feet in elevation), the Coast Ranges in the west (averaging 3,000 feet in elevation), and the Tehachapi mountains in the south (6,000 to 8,000 feet in elevation). The valley is basically flat with a slight downward gradient to the northwest. The valley opens to the sea at the Carquinez Straits where the San Joaquin-Sacramento Delta empties into San Francisco Bay. An aerial view of the SJVAB would simulate a "bowl" opening only to the north. These topographic features restrict air movement through and out of the basin.

Although marine air generally flows into the basin from the San Joaquin River Delta, the Coast Range hinders wind access into the SJVAB from the west, the Tehachapi Mountains prevent southerly passage of air flow, and the high Sierra Nevada range is a significant barrier to the east. These topographic features result in weak air flow which becomes blocked vertically by high barometric pressure over the SJVAB. As a result, the SJVAB is highly susceptible to pollutant accumulation over time. Most of the surrounding mountains are above the normal height of summer inversion layers (1,500 to 3,000 feet).

Local climatological effects, including wind speed and direction, temperature, inversion layers, precipitation and fog, can exacerbate the air quality in the SJVAB. Wind speed and direction play an important role in dispersion and transport of air pollutants. Wind at the surface and aloft can disperse pollution by mixing vertically and by transporting it to other locations. For example, in the summer, wind usually originates at the north end of the SJVAB and flows in a south-southeasterly direction through the SJVAB, through Tehachapi pass, into the Southeast Desert Air Basin. In the winter, wind direction is reversed and flows in a north-northwesterly direction. In addition to the seasonal wind flow, a sea breeze flows into SJVAB during the day and a land breeze flowing out of the SJVAB at night. The diversified wind flow enhances the pollutant transport capability within SJVAB.

The annual average temperature varies throughout the SJVAB, ranging from the low 40s to high 90s, measured in degrees Fahrenheit (°F). With a more pronounced valley influence, inland areas show more variability in annual minimum and maximum temperatures than coastal areas. The climatological station closest to the site is the Madera (045533) AP Station. The monthly average maximum temperature recorded at this station from January 1928 to June 2016 ranged from 54.0°F in January to 98.2°F in July, with an annual average maximum of 76.6°F. The monthly average minimum temperature recorded at this station ranged from 35.7°F in December to 61.4°F in July,

with an annual average minimum of 47.5°F.[5] These levels are still representative of the project area. January and December are typically the coldest months and July is typically the warmest month in this area of the SJVAB.

The majority of annual rainfall in the SJVAB occurs between November and March. Summer rainfall is minimal and is generally limited to scattered thundershowers in desert regions and slightly heavier showers near the lower portion of the Basin and along the Sierra Nevada mountains to the east. Average monthly rainfall during that period varied from 0.01 inches in July to 2.46 inches in February, with an annual total of 6.17 inches.[6] Patterns in monthly and yearly rainfall totals are predictable due to the recognizable differences in seasons within the valley.

The vertical dispersion of air pollutants in the SJVAB is limited by the presence of persistent temperature inversions. Because of cooling of the atmosphere, air temperature usually decreases with altitude. A reversal of this atmospheric state, where the air temperature increases with height, is termed an inversion. Inversions can exist at the surface, or at any height above the ground. The height of the base of the inversion is known as the "mixing height." This is the level within which pollutants can mix vertically. Air above and below the inversion base does not mix because of the differences in air density. Semi-permanent systems of high barometric pressure fronts frequently establish themselves over the SJVAB, preventing low pressure systems that might otherwise bring rain and winds that clean the air.

Inversion layers are significant in determining ozone formation, and CO and PM_{10} concentrations. Ozone and its precursors will mix and react to produce higher ozone concentrations under an inversion. The inversion will also simultaneously trap and hold directly emitted pollutants such as carbon monoxide. PM_{10} is both directly emitted and created in the atmosphere as a chemical reaction. Concentration levels of pollutants are directly related to inversion layers due to the limitation of mixing space.

Surface or radiation inversions are formed when the ground surface becomes cooler than the air above it during the night. The earth's surface goes through a radiative process on clear nights, where heat energy is transferred from the ground to a cooler night sky. As the earth's surface cools during the evening hours, the air directly above it also cools, while air higher up remains relatively warm. The inversion is destroyed when heat from the sun warms the ground, which in turn heats the lower layers of air; this heating stimulates the ground level air to float up through the inversion layer.

The combination of stagnant wind conditions and low inversions produces the greatest pollutant concentrations. On days of no inversion or high wind speeds, ambient air pollutant concentrations are lowest. Periods of low inversions and low wind speeds are conditions favorable to high concentrations of CO and PM_{10}. In the winter, the greatest pollution problems are CO and NO_x because of extremely low inversions and air stagnation during the night and early morning hours. In

[5] Western Regional Climate Center. n.d. Madera, California (045233), Period of Record Monthly Climate Summary. Website: wrcc.dri.edu/cgi-bin/cliMAIN.pl?ca5233 (accessed January 2021).

[6] Ibid.

the summer, the longer daylight hours and the brighter sunshine combine to cause a reaction between hydrocarbons and oxides of nitrogen to form photochemical smog.

Attainment Status. The CARB is required to designate areas of the State as attainment, nonattainment or unclassified for all State standards. An *attainment* designation for an area signifies that pollutant concentrations did not violate the standard for that pollutant in that area. A *nonattainment* designation indicates that a pollutant concentration violated the standard at least once, excluding those occasions when a violation was caused by an exceptional event, as defined in the criteria. An *unclassified* designation signifies that data does not support either an attainment or nonattainment status. The California Clean Air Act divides districts into moderate, serious, and severe air pollution categories, with increasingly stringent control requirements mandated for each category.

The USEPA also designates areas as attainment, nonattainment, or classified. The air quality data are also used to monitor progress in attaining air quality standards. Table 4.3.C provides a summary of the attainment status for the SJVAB with respect to national and State ambient air quality standards.

Table 4.3.C: Attainment Status of Criteria Pollutants in the San Joaquin Valley Air Basin

Pollutant	State	Federal
O_3 1-hour	Nonattainment/Severe	No Federal Standard[1]
O_3 8-hour	Nonattainment	Extreme Nonattainment[2]
PM_{10}	Nonattainment	Attainment[3]
$PM_{2.5}$	Nonattainment	Nonattainment[4]
CO	Attainment/Unclassified	Attainment/Unclassified
NO_2	Attainment	Attainment/Unclassified
SO_2	Attainment	Attainment/Unclassified
Lead	Attainment	No Designation/Classification
All others	Attainment/Unclassified	N/A

Source: Ambient Air Quality Standards and Valley Attainment Status (SJVAPCD 2020).

[1] Effective June 15, 2005, the U.S. Environmental Protection Agency (USEPA) revoked the federal 1-hour ozone standard, including associated designations and classifications. USEPA had previously classified the SJVAB as extreme nonattainment for this standard. USEPA approved the 2004 Extreme Ozone Attainment Demonstration Plan on March 8, 2010 (effective April 7, 2010). Many applicable requirements for extreme 1-hour ozone nonattainment areas continue to apply to the SJVAB.

[2] Though the Valley was initially classified as serious nonattainment for the 1997 8-hour ozone standard, USEPA approved Valley reclassification to extreme nonattainment in the Federal Register on May 5, 2010 (effective June 4, 2010).

[3] On September 25, 2008, USEPA re-designated the San Joaquin Valley to attainment for the PM_{10} National Ambient Air Quality Standard (NAAQS) and approved the PM_{10} Maintenance Plan.

[4] The Valley is designated nonattainment for the 1997 $PM_{2.5}$ NAAQS. USEPA designated the Valley as nonattainment for the 2006 $PM_{2.5}$ NAAQS on November 13, 2009 (effective December 14, 2009).

CO = carbon monoxide
N/A = not applicable
NO_2 = nitrogen dioxide
O_3 = ozone
PM_{10} = particulate matter less than 10 microns in size
$PM_{2.5}$ = particulate matter less than 2.5 microns in size
SO_2 = sulfur dioxide

Air Quality Monitoring Results. Air quality monitoring stations are located throughout the nation and maintained by the local air pollution control district and state air quality regulating agencies. Ambient air data collected at permanent monitoring stations are used by the USEPA to identify regions as attainment or nonattainment depending on whether the regions met the requirements stated in the primary National Ambient Air Quality Standards (NAAQS). Attainment areas are required to maintain their status through moderate, yet effective air quality maintenance plans. Nonattainment areas are imposed with additional restrictions as required by the USEPA. In addition, different classifications of attainment such as marginal, moderate, serious, severe, and extreme are used to classify each air basin in the state on a pollutant-by-pollutant basis. Different classifications have different mandated attainment dates and are used as guidelines to create air quality management strategies to improve air quality and comply with the NAAQS by the attainment date. A region is determined to be unclassified when the data collected from the air quality monitoring stations do not support a designation of attainment or nonattainment, due to lack of information, or a conclusion cannot be made with the available data.

The SJVAPCD, together with CARB, maintains ambient air quality monitoring stations in the SJVAB. The air quality monitoring station closest to the site is the Madera – 28261 Avenue 14 monitoring station. The air quality trends from this station are used to represent the ambient air quality in the project area. Ambient air quality in the project area from 2017 to 2019 is shown in Table 4.3.D. The pollutants monitored were O_3, $PM_{2.5}$, and PM_{10}. Air quality trends for CO, NO_2, and SO_2 are not monitored at this air quality monitoring station; therefore, CO (2017 and 2018) and NO_2 data were obtained from the Madera County – Road 29 ½, north of Avenue 8 monitoring station and CO (2019) and SO_2 data were obtained from the Fresno – 3727 North First Street monitoring station.

As indicated in the monitoring results, the State 1-hour O_3 standard was exceeded 3 times in 2017, 2 times in 2018, and an unknown number of times in 2019 and the State 8-hour O_3 standard was exceeded 29 times in 2017, 17 times in 2018, and an unknown number of times in 2019. In addition, the federal 8-hour O_3 standard was exceeded 27 times in 2017, 14 times in 2018, and 10 times in 2019. The State PM_{10} standard was exceeded an unknown number of times in 2017, 2018, and 2019. The federal $PM_{2.5}$ standard was exceeded 16 times in 2017 and 23 times in 2018. The CO, NO_2, and SO_2 standards were not exceeded in this area during the 3-year period.

In addition, Table 4.3.E shows the emissions for Madera County. Emissions within the City of Madera are included in these emissions, though it also includes other emissions in the County. As shown in Table 4.3.E, the main source of NO_x and CO is from on-road mobile vehicles (cars and trucks on the road). The main source of total organic gases (TOG), ROG, particulate matter (PM), PM_{10}, and $PM_{2.5}$ is from miscellaneous processes. The main source of sulfur oxides (SO_x) is from industrial processes.

Table 4.3.D: Ambient Air Quality at the 28261 Avenue 14, Madera Monitoring Station

Pollutant	Standard	2017	2018	2019
Carbon Monoxide (CO) [a]				
Maximum 1-hour concentration (ppm)		3.1	1.9	1.9[b]
Number of days exceeded:	State: > 20 ppm	0	0	0
	Federal: > 35 ppm	0	0	0
Maximum 8-hour concentration (ppm)		1.2	1.2	1.5[b]
Number of days exceeded:	State: > 9 ppm	0	0	0
	Federal: > 9 ppm	0	0	0
Ozone (O_3)				
Maximum 1-hour concentration (ppm)		0.101	0.097	0.091
Number of days exceeded:	State: > 0.09 ppm	3	2	ND
Maximum 8-hour concentration (ppm)		0.092	0.083	0.082
Number of days exceeded:	State: > 0.07 ppm	29	17	ND
	Federal: > 0.07 ppm	27	14	10
Coarse Particulates (PM_{10})				
Maximum 24-hour concentration (µg/m^3)		149.5	159.0	191.0
Number of days exceeded:	State: > 50 µg/m^3	ND	ND	ND
	Federal: > 150 µg/m^3	0	1	2
Annual arithmetic average concentration (µg/m^3)		35.3	ND	ND
Exceeded for the year:	State: > 20 µg/m^3	Yes	ND	ND
	Federal: > 50 µg/m^3	No	ND	ND
Fine Particulates ($PM_{2.5}$)				
Maximum 24-hour concentration (µg/m^3)		70.6	81.7	31.2
Number of days exceeded:	Federal: > 35 µg/m^3	16	23	0
Annual arithmetic average concentration (µg/m^3)		12.4	13.9	9.0
Exceeded for the year:	State: > 12 µg/m^3	Yes	Yes	No
	Federal: > 15 µg/m^3	No	No	No
Nitrogen Dioxide (NO_2) [a]				
Maximum 1-hour concentration (ppm)		0.049	0.047	0.032
Number of days exceeded:	State: > 0.250 ppm	0	0	0
Annual arithmetic average concentration (ppm)		0.006	0.006	0.006
Exceeded for the year:	Federal: > 0.053 ppm	No	No	No
Sulfur Dioxide (SO_2) [b]				
Maximum 1-hour concentration (ppm)		0.008	0.007	0.009
Number of days exceeded:	State: > 0.25 ppm	0	0	0
Maximum 3-hour concentration (ppm)		ND	ND	ND
Number of days exceeded:	Federal: > 0.50 ppm	ND	ND	ND
Maximum 24-hour concentration (ppm)		0.002	0.003	0.002
Number of days exceeded:	State: > 0.04 ppm	0	0	0
	Federal: > 0.14 ppm	0	0	0
Annual arithmetic average concentration (ppm)		0.0006	0.0006	0.0004
Exceeded for the year:	Federal: > 0.030 ppm	No	No	No

Source: CARB, USEPA, and BAAQMD (2020).

[a] Data from the Road 29 1/2 No. of Avenue 8, Madera County monitoring site.

[b] Data from the 3727 N First St, Fresno monitoring site.

ppm = parts per million

µg/m^3 = micrograms per cubic meter

ND = No data. There was insufficient (or no) data to determine the value.

Table 4.3.E: Madera County Emissions

Emissions Source	Emissions (tons per day)							
	TOG	ROG	CO	NO_x	SO_x	PM	PM_{10}	$PM_{2.5}$
Stationary Sources								
Fuel Combustion	0.2	0.1	0.9	1.3	0.1	0.2	0.2	0.2
Waste Disposal	6.2	0.0	-	-	-	-	-	-
Cleaning and Surface Coatings	1.0	0.9	-	-	-	0.0	0.0	0.0
Petroleum Production and Marketing	2.5	0.2	-	0.0	0.0	0.0	0.0	0.0
Industrial Processes	1.3	1.3	0.2	1.2	0.3	1.8	0.8	0.5
Total Stationary Sources	11.2	2.5	1.2	2.5	0.3	2.0	1.0	0.7
Area Wide Sources								
Solvent Evaporation	2.6	2.4	-	-	-	-	-	-
Miscellaneous Processes	32.1	4.9	4.7	0.4	0.0	32.8	16.7	2.8
Total Areawide Sources	34.7	7.3	4.7	0.4	0.0	32.8	16.7	2.8
Mobile Sources								
On-Road Motor Vehicles	1.5	1.3	8.9	4.7	0.0	0.4	0.0	0.2
Other Mobile Sources	1.9	1.6	10.1	4.2	0.0	0.3	0.3	0.2
Total Mobile Sources	3.3	3.0	19.0	8.9	0.0	0.7	0.6	0.4
Grand Total for Fresno County	**49.3**	**12.8**	**24.9**	**11.9**	**0.4**	**35.4**	**18.3**	**3.9**

Source: CARB (2016).

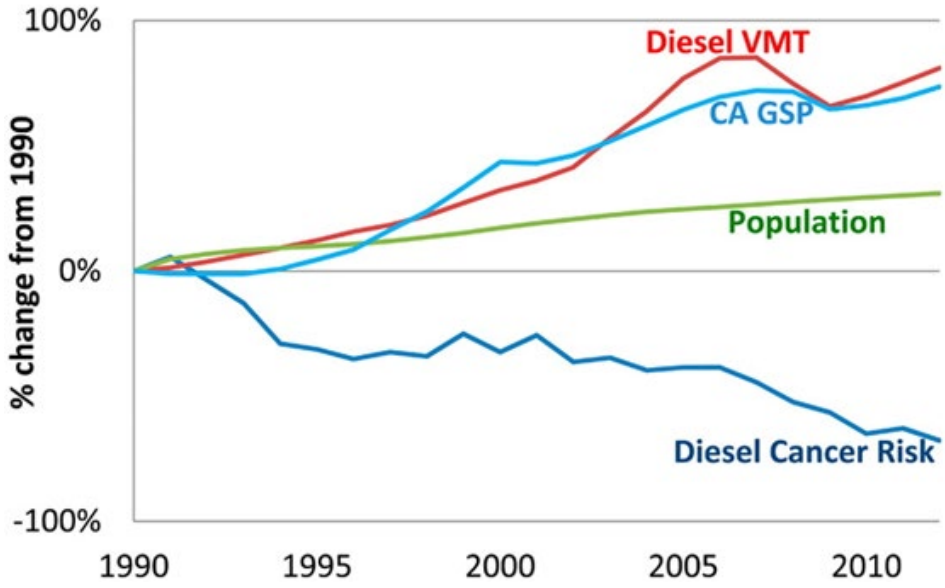
Toxic Air Contaminant Trends. In 1984, CARB adopted regulations to reduce TAC emissions from mobile and stationary sources, as well as consumer products. A CARB study showed that ambient concentrations and emissions of the seven TACs responsible for the most cancer risk from airborne exposure declined by 76 percent between 1990 and 2012.[7] Concentrations of diesel particulate matter, a key TAC, declined by 68 percent between 1990 and 2012, despite a 31 percent increase in State population and an 81 percent increase in diesel vehicle miles traveled (VMT), as shown on Figure 4.3-1. The study also found that the significant reductions in cancer risk to California residents from the implementation of air toxics controls are likely to continue.

The USEPA and the CARB regulate direct emissions from motor vehicles. The SJVAPCD is the regional agency primarily responsible for regulating air pollution emissions from stationary sources (e.g., factories) and indirect sources (e.g., traffic associated with new development), as well as monitoring ambient pollutant concentrations.

Federal Regulations. The 1970 Federal Clean Air Act authorized the establishment of national health-based air quality standards and also set deadlines for their attainment. The Federal Clean Air Act Amendments of 1990 changed deadlines for attaining national standards as well as the remedial actions required of areas of the nation that exceed the standards. Under the Clean Air Act, State and local agencies in areas that exceed the national standards are required to develop State Implementation Plans to demonstrate how they will achieve the national standards by specified dates.

[7] Propper, Ralph, et al. 2015. Ambient and Emission Trends of Toxic Air Contaminants in California. *American Chemical Society: Environmental Science & Technology*.

Figure 4.3-1: California Population, Gross State Product (GSP), Diesel Cancer Risk, and Diesel Vehicle Miles Traveled (VMT) Regulatory Context



Source: Propper, Ralph et al. (2015).

State Regulations. The CARB is the lead agency for implementing air quality regulations in the State. Key efforts by the State are described below.

California Clean Air Act. In 1988, the California Clean Air Act (CCAA) required that all air districts in the State endeavor to achieve and maintain California ambient air quality standards (CAAQS) for carbon monoxide, ozone, sulfur dioxide and nitrogen dioxide by the earliest practical date. The California Clean Air Act provides districts with authority to regulate indirect sources and mandates that air quality districts focus particular attention on reducing emissions from transportation and area-wide emission sources. Each nonattainment district is required to adopt a plan to achieve a 5 percent annual reduction, averaged over consecutive 3-year periods, in district-wide emissions of each nonattainment pollutant or its precursors. A Clean Air Plan shows how a district would reduce emissions to achieve air quality standards. Generally, the State standards for these pollutants are more stringent than the national standards.

California Air Resources Handbook. The CARB has developed an Air Quality and Land Use Handbook[8] which is intended to serve as a general reference guide for evaluating and reducing air pollution impacts associated with new projects that go through the land use decision-making process. According to the CARB Handbook, recent air pollution studies have shown an association between respiratory and other non-cancer health effects and proximity to high traffic roadways. Other studies have shown that diesel exhaust and other cancer-causing

[8] California Air Resources Board. 2005. *Air Quality and Land Use Handbook: A Community Health Perspective.* April.

chemicals emitted from cars and trucks are responsible for much of the overall cancer risk from airborne toxics in California. The CARB Handbook recommends that county and city planning agencies strongly consider proximity to these sources when finding new locations for "sensitive" land uses such as homes, medical facilities, daycare centers, schools and playgrounds.

Land use designations with air pollution sources of concern include freeways, rail yards, ports, refineries, distribution centers, chrome plating facilities, dry cleaners and large gasoline service stations. Key recommendations in the CARB Handbook include taking steps to avoid siting new, sensitive land uses:

- Within 500 feet of a freeway, urban roads with 100,000 vehicles/day or rural roads with 50,000 vehicles/day;
- Within 1,000 feet of a major service and maintenance rail yard;
- Immediately downwind of ports (in the most heavily impacted zones) and petroleum refineries;
- Within 300 feet of any dry cleaning operation (for operations with two or more machines, provide 500 feet); and
- Within 300 feet of a large gas station (defined as a facility with a throughput of 3.6 million gallons per year or greater).

The CARB Handbook specifically states that its recommendations are advisory and acknowledges land use agencies have to balance other considerations, including housing and transportation needs, economic development priorities, and other quality of life issues.

The recommendations are generalized and do not consider site specific meteorology, freeway truck percentages or other factors that influence risk for a particular project site within the Specific Plan Area. The purpose of the land use compatibility analysis is to further examine project sites within the Specific Plan Area for actual health risk associated with the location of new housing within the Specific Plan Area.

San Joaquin Valley Air Pollution Control District. The SJVAPCD has specific air quality-related planning documents, rules, and regulations. This section summarizes the local planning documents and regulations that may be applicable to the proposed Specific Plan as administered by the SJVAPCD with CARB oversight.

Rule 2280—Portable Equipment Registration. Portable equipment used at project sites for less than six consecutive months must be registered with the SJVAPCD. The SJVAPCD will issue the registrations 30 days after receipt of the application.[9]

[9] San Joaquin Valley Air Pollution Control District. 1996. Rule 2280 Portable Equipment Registration. Amended May 16.

Rule 2303—Mobile Source Emission Reduction Credits. A project may qualify for SJVAPCD vehicle emission reduction credits if it meets the specific requirements of Rule 2303 for any of the following categories: [10]

- Low-Emission Transit Buses
- Zero-Emission Vehicles
- Retrofit Passenger Cars, Light-Duty Trucks, and Medium-Duty Vehicles
- Retrofit Heavy-Duty Vehicles

Rule 4201 and Rule 4204—Particulate Matter Concentration and Emission Rates. Rule 4201 and Rule 4202 apply to operations that emit or may emit dust, fumes, or total suspended particulate matter.[11]

Rule 8011—General Requirements: Fugitive Dust Emission Sources. Fugitive dust regulations are applicable to outdoor fugitive dust sources. Operations, including construction operations, must control fugitive dust emissions in accordance with SJVAPCD Regulation VIII. According to Rule 8011, the SJVAPCD requires the implementation of control measures for fugitive dust emission sources. For projects in which construction-related activities would disturb equal to or greater than 1 acre of surface area, the SJVAPCD recommends that demonstration of receipt of an SJVAPCD-approved Dust Control Plan or Construction Notification Form, before issuance of the first grading permit, be made a condition of approval.

Rule 9510—Indirect Source Review. In December 2005, the SJVAPCD adopted the Indirect Source Rule (Rule 9510) to meet its emission reduction commitments in the PM_{10} and O_3 Attainment Plans. Indirect Source Review regulation applies to any development project that includes at least 2,000 square feet of commercial space. This Rule requires project applicants to reduce operation emission of NO_x by 33.3 percent of the project's operational baseline and 50 percent of the project's operational PM_{10} emissions.

Guidance for Assessing and Mitigating Air Quality Impacts. The SJVAPCD prepared the GAMAQI to assist lead agencies and project applicants in evaluating the potential air quality impacts of projects in the SJVAB. The GAMAQI provides SJVAPCD-recommended procedures for evaluating potential air quality impacts during the CEQA environmental review process. The GAMAQI provides guidance on evaluating short-term (construction) and long-term (operational) air emissions. The most recent version of the GAMAQI, adopted March 19, 2015, was used in this evaluation. It contains guidance on the following:

10 Ibid.

11 San Joaquin Valley Air Pollution Control District, 1992. Rule 4202 Particulate Matter – Emission Rate. Amended December 17, 1992.

- Criteria and thresholds for determining whether a project may have a significant adverse air quality impact;
- Specific procedures and modeling protocols for quantifying and analyzing air quality impacts;
- Methods to mitigate air quality impacts; and
- Information for use in air quality assessments and environmental documents, including air quality, regulatory setting, climate, and topography data.

Regional Air Quality Management Plan. The SJVAPCD is responsible for formulating and implementing the Air Quality Management Plan (AQMP) for the SJVAB. The main purpose of an AQMP is to bring the area into compliance with federal and State air quality standards. The SJVAPCD does not have one single AQMP for criteria pollutants, rather the District address each criteria pollutant with its own Plan. The SJVAPCD has the following AQMPs:

- 2018 Plan for the 1997, 2006, and 2012 $PM_{2.5}$ Standards
- 2016 Moderate Area Plan for the 2012 $PM_{2.5}$ standard
- 2016 Plan for the 2008 8-Hour Ozone Standard
- 2013 Plan for the Revoked 1-Hour Ozone Standard
- 2007 PM_{10} Maintenance Plan
- 2004 Revision to the California State Implementation Plan for Carbon Monoxide

The SJVAPCD's AQMPs incorporate the latest scientific and technological information and planning assumptions, including updated emission inventory methodologies for various source categories. The SJVAPCD's AQMPs included the integrated strategies and measures needed to meet the national ambient air quality standards (NAAQS), implementation of new technology measures, and demonstrations of attainment of the 1-hour and 8-hour ozone NAAQS as well as the latest 24-hour and annual $PM_{2.5}$ standards.

The SJVAPCD's current air quality plans are discussed below.

Ozone Plans. The SJVAPCD's Governing Board approved the 2016 Plan for the 2008 8-Hour Ozone Standard on June 16, 2016. The comprehensive strategy in this plan will reduce NO_x emissions by over 60 percent between 2012 and 2031, and will bring the San Joaquin Valley into attainment of USEPA's 2008 8-hour ozone standard as expeditiously as practicable, no later than December 31, 2031.

Particulate Matter Plans. The SJVAPCD adopted the 2007 PM_{10} Maintenance Plan in September 2007 to assure the SJVAB's continued attainment of the USEPA's PM_{10} standard. The USEPA designated the valley as an attainment/maintenance area for PM_{10}.

The 2008 $PM_{2.5}$ Plan builds upon the comprehensive strategy adopted in the 2007 Ozone Plan to bring the Basin into attainment of the 1997 national standards for $PM_{2.5}$. The USEPA has identified NO_x and SO_2 as precursors that must be addressed in air quality plans for the 1997 $PM_{2.5}$ standards. The 2008 $PM_{2.5}$ Plan is a continuation of the SJVAPCD's strategy to improve the air quality in the SJVAB.

The SJVAPCD prepared the 2012 $PM_{2.5}$ Plan to bring the San Joaquin Valley into attainment of the USEPA's most recent 24-hour $PM_{2.5}$ standard of 35 µg/m^3. The CARB approved the SJVAPCD's 2012 $PM_{2.5}$ Plan at a public hearing on January 24, 2013. The plan, approved by the SJVAPCD Governing Board on December 20, 2012, will bring the Valley into attainment of USEPA's 1997 $PM_{2.5}$ standard as expeditiously as practicable, but no later than, December 31, 2020.

The SJVAPCD adopted the 2018 Plan for the 1997, 2006, and 2012 $PM_{2.5}$ Standards on November 15, 2018. This plan addresses the USEPA federal 1997 annual $PM_{2.5}$ standard of 15 µg/m^3 and 24-hour $PM_{2.5}$ standard of 65 µg/m^3; the 2006 24-hour $PM_{2.5}$ standard of 35 µg/m^3; and the 2012 annual $PM_{2.5}$ standard of 12 µg/m^3. This plan demonstrates attainment of the federal $PM_{2.5}$ standards as expeditiously as practicable.

City of Madera General Plan. The City of Madera addresses air quality in the Conservation Element of the General Plan.[12] The Conservation Element provides goals, policies, and action items that work to meet or exceed all State and federal air quality standards. The policies and action items from the Conservation Element, listed in Table 4.3.F, would be applicable to the proposed Specific Plan.

4.3.2 Impacts and Mitigation Measures

The following section presents a discussion of the impacts related to air quality that could result from implementation of the proposed Specific Plan. The section begins with the criteria of significance, which establish the thresholds to determine if an impact is significant. The latter part of this section presents the impacts associated with implementation of the proposed Specific Plan and the recommended mitigation measures. Mitigation measures are recommended, as appropriate, for significant impacts to eliminate or reduce them to a less-than-significant level. Cumulative impacts are also addressed.

[12] Madera, City of. 2009. *City of Madera General Plan. Conservation Element*. October 7.

Table 4.3.F: General Plan Policies Related to Air Quality

Policy/Action Item Number	Policy/Action Item
Conservation Element	
Policy CON-28	Residential development projects and projects categorized as sensitive receptors shall be located an adequate distance from existing and potential sources of toxic emissions such as freeways, major arterials, industrial sites, and hazardous material locations. "Adequate distance" will be based on site-specific conditions, on the types and amounts of potential toxic emissions, and other factors.
Policy CON-29	The City shall require new air pollution point sources (such as, but not limited to, industrial, manufacturing, and processing facilities) to be located an adequate distance from residential areas and other sensitive receptors. "Adequate distance" will be based on site-specific conditions, the type and location of sensitive receptors, on the types and amounts of potential toxic emissions, and other factors.
Policy CON-30	The creation of dust during construction/demolition activities should be reduced to the extent feasible.
Action Item CON-30.1	Work with the San Joaquin Valley Air Pollution Control District to reduce particulate emissions from construction, grading, excavation, and demolition through standard and/or special conditions on these activities.
Policy CON-31	The City seeks to reduce the urban heat island effect in the City, which causes increased temperatures and increases in ground level ozone formation through methods such as: • Increasing the amount of tree coverage in the city. • Green roofs and rooftop gardens. • The use of reflective treatments on roofs (such as those which qualify for the USEPA/Department of Energy's Energy Star rating). • The use of cool pavements such as permeable and light colored and reflective pavements.
Action Item CON-31.1	Develop and adopt a tree ordinance that protects existing trees in the public right of way and promotes the establishment of new tree resources in public areas, including the placement of trees in parkway strips to allow shading of streets. The tree ordinance could establish a City-approved tree-planting list and provide for the creation of a Master Tree Plan that would include an inventory of trees in public areas, including tree type, condition and size.
Action Item CON-31.2	Update or amend the City's zoning and building codes, and provide training to the City's Community Development Department staff, to incorporate features which will have the effect of reducing exterior heat gain, such as: • Allowances for the construction of green roofs; • Standards for surface shading of paved areas; • Standards for the use of paving materials with an enhanced solar reflective index (SRI); • Standards that provide for pervious pavement options.
Policy CON-43	The City shall consider air quality when making changes to planned land uses and transportation systems.

Source: City of Madera General Plan (October 2009).

4.3.2.1 Significance Criteria

The thresholds for impacts related to air quality used in this analysis are consistent with Appendix G of the State CEQA Guidelines. Development of the proposed Specific Plan would result in a significant impact related to air quality if it would:

Threshold 4.3.1 **Conflict with or obstruct implementation of the applicable air quality plan;**

Threshold 4.3.2 **Result in a cumulatively considerable net increase of any criteria pollutant for which the project is nonattainment under an applicable federal or state ambient air quality standard;**

Threshold 4.3.3 **Expose sensitive receptors to substantial pollutant concentrations; or**

Threshold 4.3.4 **Result in other emissions (such as those leading to odors) adversely affecting a substantial number of people.**

4.3.2.2 Project Impacts

The following discussion describes the potential impacts related to air quality that could result from implementation of the proposed Specific Plan.

Threshold 4.3.1 **Would the project conflict with or obstruct implementation of the applicable air quality plan?**

An air quality plan describes air pollution control strategies to be implemented by a city, county, or region classified as a non-attainment area. The main purpose of the air quality plan is to bring the area into compliance with the requirements of the federal and State air quality standards. To bring the San Joaquin Valley into attainment, the SJVAPCD has developed the 2013 Plan for the Revoked 1-Hour Ozone Standard (Ozone Plan), adopted on September 19, 2013. The SJVAPCD also adopted the 2016 Plan for the 2008 8-Hour Ozone Standard in June 2016 to satisfy Clean Air Act requirements and ensure attainment of the 75 parts per billion (ppb) 8-hour ozone standard.

To assure the SJVAB's continued attainment of the USEPA PM_{10} standard, the SJVAPCD adopted the 2007 PM_{10} Maintenance Plan in September 2007. SJVAPCD Regulation VIII (Fugitive PM_{10} Prohibitions) is designed to reduce PM_{10} emissions generated by human activity. The SJVAPCD adopted the 2018 Plan for the 1997, 2006, and 2012 $PM_{2.5}$ Standards in November 2018 to address the USEPA 1997 annual $PM_{2.5}$ standard of 15 µg/m^3 and 24-hour $PM_{2.5}$ standard of 65 µg/m^3, the 2006 24-hour $PM_{2.5}$ standard of 35 µg/m^3, and the 2012 annual $PM_{2.5}$ standard of 12 µg/m^3.

The proposed Specific Plan was assessed to determine if the impacts from implementation of the proposed Specific Plan would conflict with or obstruct the implementation of the applicable attainment plan. The SJVAPCD Guidelines identify two tests to determine if a proposed project conflicts or obstructs the applicable air quality plans. First, if development exceeds the growth projections used in the applicable attainment plan, it would produce a potentially significant impact. Second, if the proposed project includes goals, policies, and development standards that are in conflict with the development related control measures in the attainment plans, the proposed project would be potentially significant. As described below, under these tests, the proposed Specific Plan would not have a significant impact.

Buildout of the proposed Specific Plan is predicted to occur at growth rates consistent with those used by the SJVAPCD to develop plans for all nonattainment pollutants in the SJVAB. Implementation of the proposed Specific Plan would result in buildout by the year 2049.

The land use designations in the City's General Plan, in part, the foundation for the emissions inventory for the SJVAB in the SJVAPCD's attainment plans. The SJVAPCD's attainment plans are based on projections in population, employment, and VMT in the SJVAB. The population and growth associated with the proposed Specific Plan is consistent with, and was accounted for, in the City's General Plan. As such, the growth projections used for the proposed Specific Plan assume that growth in population, vehicle use, and other source categories will occur at historically robust rates that are consistent with the rates used to develop the SJVAPCD's attainment plans. In other words, the amount of growth predicted for the proposed Specific Plan is accommodated by the SJVAPCD's attainment plan and would not preclude the air basin from attainment of the 8-hour ozone standard by the 2023 attainment date. In addition, reductions anticipated from existing regulations and adopted control measures will result in emissions continuing to decline even though development and population will increase. Furthermore, implementation of the proposed Specific Plan would allow for implementation of sustainability efforts that reduce motor vehicle use and energy consumption. This is accomplished with more compact development achieved by increasing development density and by providing a land use pattern and transportation infrastructure more supportive of public transportation, walking, and bicycling. Therefore, implementation of the proposed Specific Plan would support the implementation of SJVAPCD's attainment plans and would meet this criterion.

In addition, review of the strategies contained in the proposed Specific Plan found them to be consistent with applicable control measures of the SJVAPCD attainment plans. The proposed Specific Plan includes numerous strategies that would reduce operational air pollutant emissions and increase energy efficiency. Specifically, the proposed Specific Plan encourages future development to exceed Title 24 standards and encourages the following energy efficiency strategies:

- Provide natural lighting, where feasible, to reduce reliance on artificial lighting.
- Use Low-E or EnergyStar windows.
- Use high-efficiency lighting systems with advanced lighting controls. For nonresidential buildings, consider providing motion sensors tied to dimmable lighting controls. Task lighting may be used to reduce general overhead light levels.
- Use a properly sized and energy-efficient heat/cooling system in conjunction with a thermally efficient building shell. Consider using light colors for roofing and wall finish materials, and installing high R-value wall and ceiling insulation.
- Implement some of the strategies of the EnergyStar program.
- For retail, commercial and office uses, use light colored roofing with a high solar reflectance to reduce the heat island effect from roofs.
- In retail, commercial and office development, encourage the provision of preferred parking spaces for hybrid, fuel cell, electric and/or other fuel-efficient vehicles.

These measures are consistent with the applicable control measures of the SJVAPCD attainment plan and would reduce operational air pollutant emissions and increase energy efficiency.

The SJVAPCD has adopted rules and regulations specifically designed to reduce the impacts of growth on the applicable air quality plans. For example, Rule 9510, Indirect Source Review, was adopted to provide emission reductions needed by the SJVAPCD to demonstrate attainment of the federal PM_{10} standard and contribute to reductions that assist in attaining federal ozone standards. Rule 9510 also contributes toward attainment of State standards for these pollutants. The SJVAPCD's Regulation VIII, Fugitive PM_{10} Prohibitions, requires controls for sources of particulate matter necessary for attaining the federal PM_{10} standards and achieving progress toward attaining the State PM_{10} standards. Rule 2201, New and Modified Stationary Source Review, requires new and modified stationary/industrial sources to provide emission controls and offsets that ensure that stationary sources decline over time and do not impact the applicable air quality plans. Development associated with the proposed Specific Plan would comply with these rules and regulations providing additional support for the conclusion that it would not interfere or obstruct with the application of the attainment plans.

Therefore, the proposed Specific Plan would be consistent with the air quality attainment plans and would result in a less than significant impact.

Level of Significance Without Mitigation: Less than Significant Impact. No mitigation is required.

Threshold 4.3.2 Would the project result in a cumulatively considerable net increase of any criteria pollutant for which the project is nonattainment under an applicable federal or state ambient air quality standard?

The SJVAB is designated as non-attainment for O_3 and $PM_{2.5}$ for federal standards and non-attainment for O_3, PM_{10}, and $PM_{2.5}$ for State standards. The SJVAPCD's nonattainment status is attributed to the region's development history. Past, present, and future development projects contribute to the region's adverse air quality impacts on a cumulative basis. By its very nature, air pollution is largely a cumulative impact. No single project is sufficient in size to, by itself, result in nonattainment of ambient air quality standards. Instead, a project's individual emissions contribute to existing cumulatively significant adverse air quality impacts. If a project's contribution to the cumulative impact is considerable, then the project's impact on air quality would be considered significant.

In developing thresholds of significance for air pollutants, the SJVAPCD considered the emission levels for which a project's individual emissions would be cumulatively considerable. If a project exceeds the identified significance thresholds, its emissions would be cumulatively considerable, resulting in significant adverse air quality impacts to the region's existing air quality conditions. The following analysis assesses the potential project-level construction- and operation-related air quality impacts.

Short-Term Construction Emissions. During construction, short-term degradation of air quality may occur due to the release of particulate emissions generated by grading, paving, building, and other activities. Emissions from construction equipment are also anticipated and would include CO, NO_x,

ROG, directly-emitted particulate matter ($PM_{2.5}$ and PM_{10}), and TACs such as diesel exhaust particulate matter.

Construction activities associated with implementation of the proposed Specific Plan would include grading, paving, and building activities. Construction-related effects on air quality from the proposed Specific Plan would be greatest during the site preparation phase due to the disturbance of soils. If not properly controlled, these activities would temporarily generate particulate emissions. Sources of fugitive dust would include disturbed soils at the construction site. Unless properly controlled, vehicles leaving the site would deposit dirt and mud on local streets, which could be an additional source of airborne dust after it dries. PM_{10} emissions would vary from day to day, depending on the nature and magnitude of construction activity and local weather conditions. PM_{10} emissions would depend on soil moisture, silt content of soil, wind speed, and the amount of operating equipment. Larger dust particles would settle near the source, while fine particles would be dispersed over greater distances from the construction site.

Fugitive dust emissions are generally associated with land clearing and exposure of soils to the air and wind, as well as cut-and-fill grading operations. Dust generated during construction varies substantially on a project-by-project basis, depending on the level of activity, the specific operations, and weather conditions at the time of construction. Construction projects would be required to comply with District Regulation VIII (Fugitive PM_{10} Prohibition) to control fugitive dust. SJVAPCD Rule 8011, General Requirements, and Rule 8021, Construction, Demolition Excavation, Extraction, and Other Earthmoving Activities, would also be applicable.

In addition to dust-related PM_{10} emissions, heavy trucks and construction equipment powered by gasoline and diesel engines would generate CO, SO_2, NO_x, volatile organic compounds (VOCs) and some soot particulate ($PM_{2.5}$ and PM_{10}) in exhaust emissions. If construction activities were to increase traffic congestion in the area, CO and other emissions from traffic would increase slightly while those vehicles idle in traffic. These emissions would be temporary in nature and limited to the immediate area surrounding the construction site.

Construction emissions were estimated for the proposed Specific Plan using the California Emissions Estimator Model version 2016.3.2 (CalEEMod). Table 4.3.G lists the tentative construction schedule for the proposed Specific Plan based on a start date in January 2021. All other construction details are not yet known; therefore, default assumptions (e.g., construction phasing and fleet activities) from CalEEMod were used. Based on CalEEMod default assumptions, this analysis assumes an approximately 28-year construction period with Phase I operational in 2029, Phase II operational in 2039, and Phase III operational in 2049. Table 4.3.H lists the potential construction equipment to be used during construction under each phase of construction. Construction-related emissions are presented in Table 4.3.I. CalEEMod output sheets are included in Appendix E.

Table 4.3.G: Tentative Project Construction Schedule

Phase Name	Phase Start Date	Phase End Date	Number of Days/Week	Number of Days
Phase I				
Site Preparation	1/4/2021	12/31/2021	5	260
Grading	1/4/2021	12/31/2021	5	260
Building Construction	1/3/2022	12/28/2029	5	2,085
Paving	1/3/2022	12/28/2029	5	2,085
Architectural Coating	1/3/2022	12/28/2029	5	2,085
Phase II				
Site Preparation	1/7/2030	1/3/2031	5	260
Grading	1/6/2031	1/2/2032	5	260
Building Construction	1/5/2032	12/30/2039	5	2,085
Paving	1/5/2032	12/30/2039	5	2,085
Architectural Coating	1/5/2032	12/30/2039	5	2,085
Phase III				
Site Preparation	1/2/2040	12/28/2040	5	260
Grading	1/7/2041	12/24/2041	5	255
Building Construction	12/30/2041	12/31/2049	5	2,090
Paving	12/30/2041	12/31/2049	5	2,090
Architectural Coating	12/30/2041	12/31/2049	5	2,090

Source: Compiled by LSA (March 2020).

Table 4.3.H: Diesel Construction Equipment Utilized by Construction Phase

Construction Phase	Off-Road Equipment Type	Off-Road Equipment Unit Amount	Hours Used per Day	Horsepower	Load Factor
Site Preparation	Rubber Tired Dozers	3	8	247	0.40
	Tractors/Loaders/Backhoes	4	8	97	0.37
Grading	Excavators	2	8	158	0.38
	Graders	1	8	187	0.41
	Rubber Tired Dozers	1	8	247	0.40
	Scrapers	2	8	367	0.48
	Tractors/Loaders/Backhoes	2	8	97	0.37
Building Construction	Cranes	1	7	231	0.29
	Forklifts	3	8	89	0.20
	Generator Sets	1	8	84	0.74
	Tractors/Loaders/Backhoes	3	7	97	0.37
	Welders	1	8	46	0.45
Architectural Coating	Air Compressors	1	6	78	0.48
Paving	Pavers	2	8	130	0.42
	Paving Equipment	2	8	132	0.36
	Rollers	2	8	80	0.38

Source: Compiled by LSA using CalEEMod defaults (March 2020).

Table 4.3.I: Unmitigated Maximum Annual Project Construction Emissions by Phase

Construction Year	Total Regional Pollutant Emissions[1] (tons/year)					
	ROG	NO_X	CO	SO_X	PM_{10}	$PM_{2.5}$
Phase I	11.1	18.6	28.6	0.1	7.8	2.4
Phase II	8.5	9.9	13.2	0.1	6.9	1.7
Phase III	7.7	10.2	12.8	0.1	7.0	1.9
Maximum	**11.1**	**18.6**	**28.6**	**0.1**	**7.8**	**2.4**
SJVAPCD Thresholds	**10.0**	**10.0**	**100.0**	**27.0**	**15.0**	**15.0**
Significant Emissions?	**Yes**	**Yes**	**No**	**No**	**No**	**No**

Source: LSA (April 2020).
[1] All on-site and off-site emissions are presented as construction mitigation in the CalEEMod model output files.
CO = carbon monoxide
NO_X = nitrogen oxides
$PM_{2.5}$ = particulate matter less than 2.5 microns in size
PM_{10} = particulate matter less than 10 microns in size
SJVAPCD = San Joaquin Valley Air Pollution Control District
SO_X = sulfur oxides
ROG = reactive organic gases

As shown in Table 4.3.I, construction emissions associated with the proposed Specific Plan would not exceed the SJVAPCD's thresholds for CO, SO_x, $PM_{2.5,}$ or PM_{10} emissions during all phases. However, construction emissions associated with the project would exceed ROG thresholds during construction of Phase I and would exceed NO_x thresholds during construction of Phase I and Phase III. In addition to the construction period thresholds of significance, the SJVAPCD has implemented Regulation VIII measures for dust control during construction. These control measures are intended to reduce the amount of PM_{10} emissions during the construction period. Implementation of Mitigation Measure AIR-2.1 would ensure that implementation of the proposed Specific Plan complies with Regulation VIII and further reduces the short-term construction period air quality impacts.

Mitigation Measure AIR-2.1 would be required to reduce construction emissions to the extent feasible. Table 4.3.J shows the proposed Specific Plan's mitigated construction emissions.

Table 4.3.J: Mitigated Maximum Annual Project Construction Emissions by Phase

Construction Year	Total Regional Pollutant Emissions[1] (tons/year)					
	ROG	NO_X	CO	SO_X	PM_{10}	$PM_{2.5}$
Phase I Maximum	10.8	15.1	27.4	0.1	7.7	2.1
Phase II Maximum	8.1	8.0	11.8	0.1	6.0	1.5
Phase III Maximum	7.5	8.9	11.5	0.1	7.0	1.9
Maximum	**10.8**	**15.1**	**27.4**	**0.1**	**7.7**	**2.1**
SJVAPCD Thresholds	**10.0**	**10.0**	**100.0**	**27.0**	**15.0**	**15.0**
Significant Emissions?	**Yes**	**Yes**	**No**	**No**	**No**	**No**

Source: LSA (April 2020).
[1] All on-site and off-site emissions are presented as construction mitigation in the CalEEMod model output files.
CO = carbon monoxide
NO_X = nitrogen oxides
$PM_{2.5}$ = particulate matter less than 2.5 microns in size
PM_{10} = particulate matter less than 10 microns in size
SJVAPCD = San Joaquin Valley Air Pollution Control District
SO_X = sulfur oxides
ROG = reactive organic gases

As indicated in Table 4.3.J, with implementation of Mitigation Measure AIR-2.1, the short-term construction emissions associated with implementation of the proposed Specific Plan would be still exceed SJVAPCD established significance thresholds for ROG and NO_x. Therefore, construction of the proposed Specific Plan would result in a significant and unavoidable impact.

Long-Term Operational Emissions. Long-term air pollutant emission impacts are those associated with area sources and mobile sources related to the proposed Specific Plan. In addition to the short-term construction emissions, implementation of the proposed Specific Plan would also generate long-term air pollutant emissions, such as those associated with changes in permanent uses within the Specific Plan Area. These long-term emissions are primarily mobile source emissions that would result from vehicle trips associated with the proposed Specific Plan. Area sources, such as landscape equipment, would also result in pollutant emissions.

PM_{10} emissions result from running exhaust, tire and brake wear, and the entrainment of dust into the atmosphere from vehicles traveling on paved roadways. Entrainment of PM_{10} occurs when vehicle tires pulverize small rocks and pavement and the vehicle wakes generate airborne dust. The contribution of tire and brake wear is small compared to the other PM emission processes. Gasoline-powered engines have small rates of particulate matter emissions compared with diesel-powered vehicles.

Energy source emissions result from activities in buildings for which electricity and natural gas are used. The quantity of emissions is the product of usage intensity (i.e., the amount of electricity or natural gas) and the emission factor of the fuel source. Major sources of energy demand for the proposed Specific Plan could include building mechanical systems, such as heating and air conditioning, lighting, and plug-in electronics, such as refrigerators or computers. Greater building or appliance efficiency reduces the amount of energy for a given activity and thus lowers the resultant emissions. The emission factor is determined by the fuel source, with cleaner energy sources, like renewable energy, producing fewer emissions than conventional sources. Construction associated with implementation of the proposed Specific Plan would comply with the 2019 California Building Standards Code (California Code of Regulations, Title 24), which was accounted for in CalEEMod. Area source emissions associated with the proposed Specific Plan would include emissions from the use of architectural coatings, consumer products, and landscaping equipment.

Emission estimates for operation of the proposed Specific Plan were calculated using CalEEMod. Model results are shown in Table 4.3.K. For purposes of evaluating the proposed Specific Plan, the county in CalEEMod was specified as Madera County and the climate zone of 3 was selected. Based on this climate zone, CalEEMod assumed a wind speed of 2.9 meters per second and precipitation frequency of 51 days per year. The operational year was assumed to be 2029 for Phase I, 2040 for Phase II, and 2050 for Phase III. The utility company for the region was selected as Pacific Gas & Electric Company (PG&E) and the CO_2 intensity was determined to be 328.8 pounds per megawatt hour based on a 5-year average estimated by PG&E.

Table 4.3.K: Unmitigated Project Operational Emissions

Source	Pollutant Emissions (tons/year)					
	ROG	NO_X	CO	SO_X	PM_{10}	$PM_{2.5}$
Phase I						
Phase I Area Emissions	41.6	3.2	116.3	0.3	14.3	14.3
Phase I Energy Emissions	0.5	4.3	2.0	<0.1	0.3	0.3
Phase I Mobile Emissions	8.8	78.1	99.6	0.6	43.9	12.0
Total Phase I Emissions	**50.9**	**85.7**	**217.9**	**0.9**	**58.6**	**26.7**
Phase II						
Phase II Area Emissions	98.7	8.7	384.7	1.1	54.3	0.5
Phase II Energy Emissions	1.0	8.3	3.9	0.1	0.7	0.7
Phase II Mobile Emissions	9.1	99.5	104.3	0.8	95.5	25.9
Total Phase II Emissions	**108.8**	**116.5**	**492.3**	**1.9**	**96.7**	**27.1**
Phase III						
Phase III Area Emissions	140.5	12.3	528.7	1.5	73.7	73.7
Phase III Energy Emissions	1.4	12.1	5.7	0.1	1.0	1.0
Phase III Mobile Emissions	14.2	159.9	167.6	1.3	111.7	30.2
Total Phase III (Project Buildout) Emissions	**156.2**	**184.2**	**702.0**	**2.8**	**186.4**	**104.9**
SJVAPCD Thresholds	**10.0**	**10.0**	**100.0**	**27.0**	**15.0**	**15.0**
Significant?	**Yes**	**Yes**	**Yes**	**No**	**Yes**	**Yes**
Daily Project Buildout Emissions	**0.4**	**0.5**	**1.9**	**<0.1**	**0.5**	**0.3**

Source: LSA (April 2020).
CO = carbon monoxide
NO_X = nitrogen oxides
$PM_{2.5}$ = particulate matter less than 2.5 microns in size
PM_{10} = particulate matter less than 10 microns in size
SJVAPCD = San Joaquin Valley Air Pollution Control District
SO_X = sulfur oxides
ROG = reactive organic gases

Trip generation rates used in CalEEMod for the proposed Specific Plan were based on the project's trip generation estimates,[13] which assumes that Phase I of the proposed Specific Plan would typically generate approximately 31,250 average daily trips, Phase II of the proposed Specific Plan would typically generate approximately 56,825 average daily trips, and Phase III of the proposed Specific Plan would typically generate approximately 89,650 average daily trips.[14] Where project-specific data were not available, default assumptions from CalEEMod were used to estimate project emissions.

The primary emissions associated with the proposed Specific Plan are regional in nature, meaning that air pollutants are rapidly dispersed on release or, in the case of vehicle emissions associated with the proposed Specific Plan; emissions are released in other areas of the Air Basin. The annual emissions associated with operational trip generation, energy, and area sources are identified in Table 4.3.K for ROG, NO_x, CO, SO_x, PM_{10}, and $PM_{2.5}$. CalEEMod output sheets are included in Appendix E.

13 LSA. 2020. *Traffic Impact Analysis Village D Specific Plan*. May.
14 Ibid.

The results shown in Table 4.3.K indicate that the proposed Specific Plan would exceed the significance criteria for annual ROG, NO_x, CO, PM_{10}, and $PM_{2.5}$ emissions; therefore, the proposed Specific Plan could have a significant effect on regional air quality. Implementation of Mitigation Measure AIR-2.2 would be required to reduce construction-related impacts to the extent feasible. Table 4.3.L identifies the results of the analysis with implementation of Mitigation Measure AIR-2.2.

Table 4.3.L: Mitigated Project Operational Emissions

Source	Pollutant Emissions (tons/year)					
	ROG	NO_X	CO	SO_X	PM_{10}	$PM_{2.5}$
Phase I						
Phase I Area Emissions	32.1	1.8	30.1	<0.1	0.3	0.3
Phase I Energy Emissions	0.4	3.8	1.8	<0.1	0.3	0.3
Phase I Mobile Emissions	7.8	71.7	81.8	0.5	34.6	9.5
Total Phase I Emissions	**40.4**	**77.4**	**113.7**	**0.5**	**35.2**	**10.1**
Phase II						
Phase II Area Emissions	62.1	0.6	54.1	<0.1	0.3	0.3
Phase II Energy Emissions	0.9	7.3	3.4	<0.1	0.6	0.6
Phase II Mobile Emissions	8.2	93.9	89.0	0.6	53.8	14.6
Total Phase II Emissions	**71.2**	**101.8**	**146.5**	**0.7**	**54.7**	**15.5**
Phase III						
Phase III Area Emissions	91.0	2.2	80.4	<0.1	0.6	0.6
Phase III Energy Emissions	1.2	10.7	5.1	0.1	0.9	0.9
Phase III Mobile Emissions	12.7	150.6	141.5	1.1	91.7	24.8
Total Phase III (Project Buildout) Emissions	**104.9**	**163.6**	**227.0**	**1.1**	**93.2**	**26.2**
SJVAPCD Thresholds	**10.0**	**10.0**	**100.0**	**27.0**	**15.0**	**15.0**
Significant?	**Yes**	**Yes**	**Yes**	**No**	**Yes**	**Yes**
Daily Project Buildout Emissions	**0.3**	**0.4**	**0.6**	**<0.1**	**0.3**	**0.1**

Source: LSA (April 2020).
CO = carbon monoxide
NO_x = nitrogen oxides
$PM_{2.5}$ = particulate matter less than 2.5 microns in size
PM_{10} = particulate matter less than 10 microns in size
SJVAPCD = San Joaquin Valley Air Pollution Control District
SO_X = sulfur oxides
ROG = reactive organic gases

As shown in Table 4.3.L, SJVAPCD emissions of ROG, NO_x, CO, PM_{10}, and $PM_{2.5}$ would still exceed the SJVAPCD's thresholds even with mitigation. Therefore, operation of the proposed Specific Plan would result in a significant and unavoidable impact.

The State and the SJVAPCD continue to adopt additional regulations on emission sources to be implemented during the proposed Specific Plan buildout period and result in much greater reductions than is predicted with the adopted regulations included in the air quality models as of 2019 or with off-model quantification methods available pending the next model update. Expanded use of renewable fuels, zero emission vehicles, and replacing combustion sources with electrically powered alternatives will also result in reductions in criteria pollutant emissions. In addition, the proposed Specific Plan includes strategies and development patterns that will result in lower vehicle miles traveled and energy use compared to development projects constructed in the recent past that provide the basis for future emission projections.

As discussed in 4.16, Transportation, VMT per capita, VMT per service population, and VMT per employee for the project under horizon year (2042) were compared with corresponding values for the existing (2019) regional VMT per capita, VMT per service population, and VMT per employee respectively. The horizon year (2042) project VMT per capita is 24.6 percent lower than the existing (2019) regional average. Similarly, horizon year VMT per service population for the project is 20.1 percent lower than the existing (2019) regional average. The project's horizon year VMT per employee is 35.6 percent lower than existing (2019) regional average.

In addition, development projects would be required to implement District Rule 9510 (Indirect Source Review [ISR]). Implementation of Rule 9510 would reduce operational emissions of NO_x and PM_{10} by 33.3 percent and 50 percent respectively. Project Applicants will be required submit an Air Impact Assessment to the SJVAPCD consistent with Rule 9510 prior to obtaining building permits.

However, future development within the Specific Plan Area would result in increases in annual emissions that exceed SJVAPCD significance thresholds for all nonattainment pollutants. Although the growth in emissions is accounted for in SJVAPCD attainment plans, this analysis identifies the impact as significant under the ton per year quantitative threshold criterion as shown in Table 4.3-L.

Level of Significance Without Mitigation: Potentially significant.

Impact AIR-2: Implementation of the Specific Plan would result in a cumulatively considerable net increase of criteria pollutants for which the project region is non-attainment under an applicable federal or State ambient air quality standards.

Mitigation Measure AIR-2.1 Consistent with San Joaquin Valley Air Pollution Control District (SJVAPCD) Regulation VIII (Fugitive PM_{10} Prohibitions) and in order to reduce construction equipment emissions to the extent feasible, the following controls shall be included as specifications for the proposed Specific Plan and implemented during construction:

- All disturbed areas, including storage piles, which are not being actively utilized for construction purposes, shall be effectively stabilized of dust emissions using water, chemical stabilizer/suppressant, covered with a tarp or other suitable cover or vegetative ground cover.
- All on-site unpaved roads and off-site unpaved access roads shall be effectively stabilized of dust emissions using water or chemical stabilizer/suppressant.
- All land clearing, grubbing, scraping, excavation, land leveling, grading, cut and fill, and demolition activities shall be effectively controlled of fugitive dust emissions utilizing application of water or by presoaking.

- When materials are transported off-site, all material shall be covered, or effectively wetted to limit visible dust emissions, and at least six inches of freeboard space from the top of the container shall be maintained.

- All operations shall limit or expeditiously remove the accumulation of mud or dirt from adjacent public streets at the end of each workday. (The use of dry rotary brushes is expressly prohibited except where preceded or accompanied by sufficient wetting to limit the visible dust emissions. Use of blower devices is expressly forbidden.)

- Following the addition of materials to, or the removal of materials from, the surface of outdoor storage piles, said piles shall be effectively stabilized of fugitive dust emission utilizing sufficient water or chemical stabilizer/suppressant.

- The project contractor shall require all off-road diesel-powered construction equipment of greater than 50 horsepower used for the project meet the California Air Resources Board (CARB) Tier 4 emissions standards or better.

- The project contractor shall require the use of electric air compressors, cranes, excavators, forklifts, generator sets, and welders.

Mitigation Measure AIR-2.2 Prior to issuance of a building permit, the City of Madera Community Development Director or designee shall identify project design details and specifications, where feasible, to document implementation and compliance with the following emission reduction measures. Implementation of the following measures is considered to be applicable, feasible, and effective in reducing criteria pollutant emissions generated by the project:

- All Project Applicants shall provide Class I and Class II bicycle parking/storage facilities on-site. Bicycle parking facilities should be near destination points and easy to find. At least one bicycle parking space for every 20 vehicle parking spaces.

- All employers shall provide shower and locker facilities to encourage employees to bike and/or walk to work, typically one shower and three lockers for every 25 employees.

- All apartment complexes or condominiums without garages shall provide Class I bicycle parking.

- All Project Applicants shall install Class I or II bike lanes on arterial/collector streets, or where a suitable route exists.
- All Project Applicants shall provide building access and paths which are physically separated from street parking lot traffic and that eliminate physical barriers such as walls, berms, landscaping and slopes that impede the use of pedestrians, bicycle facilities, or public transportation vehicles.
- All Project Applicants shall provide continuous sidewalks separated from the roadway by landscaping and on street parking.
- All Project Applicants shall provide on and off-site pedestrian facility improvements such as trails linking them to designated pedestrian commuting routes and/or on-site overpasses and wider sidewalks.
- All Project Applicants shall link cul-de-sacs and dead-end streets to encourage pedestrian and bicycle travel.
- All Project Applicants shall provide traffic reduction modifications to project roads, such as: narrower streets, speed platforms, bulb-outs and intersection modifications designed to reduce vehicle speeds and to encourage pedestrian and bicycle travel.
- All Project Applicants shall provide a parking lot design that includes clearly marked and shaded pedestrian pathways between transit facilities and building entrances.
- All Project Applicants shall provide pedestrian access between bus service and major transportation points and to destination points within the project.
- All Project Applicants shall provide a display case or kiosk displaying transportation information in a prominent area accessible to employees, residents, or visitors.
- All Project Applicants shall display bike route maps, bus schedules, and any other transportation information such as carpooling and car sharing.
- All Project Applicants shall design projects using models by the Local Government Commission (LGC) in the “Smart Growth Guidebook,” such as: street block patterns that from an

interconnected grid, short block faces, numerous alleys, and narrow streets.

- All Project Applicants shall develop and implement parking pricing strategies, such as charging parking lot fees to low occupancy (single occupant vehicles) vehicles.
- All Project Applicants shall provide preferential parking spaces near the entrance of buildings for those who carpool/vanpool/rideshare and provide signage.
- All Project Applicants shall install efficient heating, and other appliances, such as water heaters, cooking equipment, refrigerators, furnaces, and boiler units beyond Title 24 requirements.
- All Project Applicants shall use solar or low-emission water heaters and use central water heaters.
- All Project Applicants shall improve the thermal integrity/efficiency of buildings, and reduce the thermal load with automated and timed temperature controls or occupant sensors.
- All Project Applicants shall orient buildings to take advantage of solar heating and natural cooling and use passive solar designs.
- All employers shall implement at least one of the following: provide a guaranteed ride home; provide a carpool support system; provide a car-sharing services support system; provide a ride share program; employ or appoint an Employee Transportation Coordinator; provide incentives to employees to carpool/vanpool, take public transportation, telecommute, walk, and/or bike; participate in an employee "flash-pass" program, which provides free travel on transit buses; or provide transit pass subsidy and/or commute alternative allowance.
- If feasible, employers shall implement alternative work schedules such as compressed workweek schedules where weekly work hours are compressed into fewer than five days.

Level of Significance With Mitigation: Significant and Unavoidable Impact.

Threshold 4.3.3 Would the project expose sensitive receptors to substantial pollutant concentrations?

Sensitive receptors are defined as residential uses, schools, daycare centers, nursing homes, and medical centers. Individuals particularly vulnerable to diesel particulate matter are children, whose lung tissue is still developing, and the elderly, who may have serious health problems that can be aggravated by exposure to diesel particulate matter. Exposure from diesel exhaust associated with construction activity contributes to both cancer and chronic non-cancer health risks.

Known health effects related to ozone include worsening of bronchitis, asthma, and emphysema and a decrease in lung function. Particulate matter can also lead to a variety of health effects in people. These include premature death of people with heart or lung disease, heart attacks, irregular heartbeat, decreased lung function, and increased respiratory symptoms.

Project Construction. Existing and proposed residents in the vicinity of construction activities would be exposed to TAC emissions generated during construction of projects proposed under the proposed Specific Plan. The closest off-site sensitive receptors to the Specific Plan Area include the single-family residence located along Avenue 15, approximately 370 feet south of the Specific Plan Area boundary, the single-family residences located alone Caitlan Drive, located approximately 1,240 feet southeast of the Specific Plan Area boundary, and the single-family residences located along Camino Lane, approximately 2,180 feet east of the Specific Plan Area boundary. Construction of the projects proposed under the proposed Specific Plan may expose surrounding sensitive receptors to airborne particulates, as well as a small quantity of construction equipment pollutants (i.e., usually diesel-fueled vehicles and equipment). Construction of the projects proposed under the proposed Specific Plan would have the potential to exceed the SJVAPCD's health risk thresholds based on the size of the Specific Plan Area and distance to sensitive receptors; however, given the programmatic nature and duration of buildout of the proposed Specific Plan, it is not possible to determine the project-specific risk level based on the current information available and specific location of construction activities. Therefore, mitigation would be required to reduce potential health risks to the extent feasible. Implementation of Mitigation Measure AIR-3.1 would require all construction equipment of 50 horsepower or more be rated by the CARB as having Tier 4 (model year 2008 or newer) emission limits or better which would reduce off-site impacts to nearby residential receptors during the construction period. However, as timing of specific development projects within the Specific Plan Area is unknown, this impact would be considered significant and unavoidable.

Project Operation. Although the emissions from operations resulting from implementation of the proposed Specific Plan are expected to exceed the SJVAPCD's project level thresholds, this does not in itself constitute a significant health impact to the future residents within the Specific Plan Area and the SJVAB.

The SJVAPCD's project level thresholds are based in part on Section 180 (e) of the Clean Air Act. The project level thresholds are intended to provide a means of consistency in significance determination within the environmental review process.

Notwithstanding, simply exceeding the SJVAPCD's project level thresholds does not constitute a particular health impact to an individual nearby. The reason for this is that the project level thresholds are in tons/year emitted into the air, whereas health effects are determined based on the concentration of a pollutant in the air at a particular location (e.g., ppm by volume of air or

µg/$m^3$of air). CAAQS and NAAQS were developed to protect the most susceptible population groups from adverse health effects and were established in terms of ppm or µg/m^3 for the applicable emissions.

The total emissions inventory for Madera County is shown in Table 4.3.E. As shown in Table 4.3.L above, the daily increase in emissions associated with the implementation of the proposed Specific Plan would be a small fraction of the County's emissions.

Therefore, the emissions associated with implementation of the proposed Specific Plan would not be expected to exceed the most stringent applicable NAAQS or CAAQS for NO_X, $PM_{2.5}$, and PM_{10}. It should be noted that the AAQS are developed and represent levels at which the most susceptible persons (children and the elderly) are protected. In other words, the AAQS are purposefully set low to protect children, the elderly, and those with existing respiratory problems.

Furthermore, air quality trends for emissions of NO_X, VOCs, and ozone (which is a byproduct of NO_X and VOCs) have been trending downward within the SJVAB even as development has increased over the last several years. Therefore, continued implementation of the proposed Specific Plan is not expected to result in any Basin-wide increase in health effects.

As noted in the Brief of Amicus Curiae by the SJVAPCD (2015)[15], the SJVAPCD has acknowledged that currently available modeling tools are not equipped to provide a meaningful analysis of the correlation between an individual development project's air emissions and specific human health impacts. (See page 4 of the SJVAPCD Brief of Amicus Curiae).

Additionally, the SJVAPCD acknowledges that health effects quantification from ozone, as an example, is correlated with the increases in ambient level of ozone in the air (concentration) that an individual person breathes. The SJVAPCD indicates that it would take a large amount of additional emissions to result in a modeled increase in ambient ozone levels over the entire region. As such, it is not currently possible to accurately quantify ozone-related health impacts caused by NO_X or VOC emissions from relatively small projects (defined as projects with a regional scope) due to photochemistry and regional model limitations.

Therefore, the proposed Specific Plan's emissions are not sufficiently high enough to use a regional modeling program to correlate health effects on a Basin-wide level. Further, the SJVAPCD acknowledges the same:

> "…the Air District is simply not equipped to analyze and to what extent the criteria pollutant emissions of an individual CEQA project directly impact human health in a particular area…even for projects with relatively high levels of emissions of criteria pollutant precursor emissions." (See page 8 of the SJVAPCD Brief of Amicus Curiae.)

[15] San Joaquin Valley Unified Air Pollution Control District. 2015. *Amicus Curiae Brief of San Joaquin Valley Unified Air Pollution Control District*. April. Available online at: www.courts.ca.gov/documents/7-s219783-ac-san-joaquin-valley-unified-air-pollution-control-dist-041315.pdf (accessed January 2020).

The SJVAPCD Brief of Amicus Curiae is incorporated by reference into this environmental documentation for the proposed Specific Plan.

Current scientific, technological, and modeling limitations prevent the relation of expected adverse air quality impacts to likely health consequences. However, without quantification to guarantee a less than significant finding, this impact is considered to be significant and unavoidable.

Level of Significance Without Mitigation: Potentially Significant Impact.

Impact AIR-3: Implementation of the Specific Plan could expose sensitive receptors to substantial pollutant concentrations.

Mitigation Measure AIR-3.1 Prior to the approval of any construction or building permits for new development proposed under the Specific Plan, the Director of the City of Madera Planning Department or designee shall ensure that when construction occurs within 500 feet of existing residences, the project contractor(s) shall utilize construction equipment rated by the United States Environmental Protection Agency (USEPA) as having Tier 4 (model year 2008 or newer) emission limits. The construction equipment shall be properly serviced and maintained in accordance with manufacturer recommendations.

Level of Significance With Mitigation: Significant and Unavoidable Impact. Mitigation Measure AIR-3.1 would reduce potential impacts resulting from construction-related emissions, but without specific construction information, such as grading and other site preparation information, this impact would remain significant and unavoidable.

Threshold 4.3.4 Would the project result in other emissions (such as those leading to odors) adversely affecting a substantial number of people?

Heavy-duty equipment in the Specific Plan Area during construction would emit odors, primarily from the equipment exhaust. However, the construction activity would cease to occur after individual construction is completed. No other sources of objectionable odors have been identified for the proposed Specific Plan land uses, and no mitigation measures are required.

The SJVAPCD addresses odor criteria within the GAMAQI. The district has not established a rule or standard regarding odor emissions, rather, the district has a nuisance rule: “Any project with the potential to frequently expose members of the public to objectionable odors should be deemed to have a significant impact.” The proposed uses are not anticipated to emit any objectionable odors. Therefore, the proposed Specific Plan would not result in other emissions (such as those leading to odors) adversely affecting a substantial number of people.

Level of Significance Without Mitigation: Less than Significant. No mitigation is required.

4.3.2.3 Cumulative Impacts

As defined in Section 15130 of the State CEQA Guidelines, cumulative impacts are the incremental effects of an individual project when viewed in connection with the effects of past, current, and probable future projects within the cumulative impact area for air quality. The cumulative study area analyzed for potential air quality impacts is the Basin. Each project in the Basin is required to comply with SJVAB rules and regulations and is subject to independent review.

The Basin is currently designated as a nonattainment area for the federal 8-hour ozone standard and $PM_{2.5}$ standard and as a nonattainment area for the State ozone, PM_{10}, and $PM_{2.5}$ standard. Thus, the Basin has not met the federal and State standards for these air pollutants. Future development that may occur with the implementation of the proposed Specific Plan would contribute criteria pollutants to the area during the construction and operation phases of the proposed Specific Plan. However, future development under the proposed Specific Plan would be required to comply with CARB motor vehicle standards, SJVAPCD regulations from stationary sources and architectural coatings, and Title 24 energy efficiency standards. Specific standard conditions for future project developments that implement these policies and regulations are identified as mitigation measures to ensure that the intended environmental protections are achieved. Consequently, emissions generated by development projects in addition to existing sources within that would be considered to cumulatively contribute to the nonattainment designations of the Basin. Implementation of the proposed Specific Plan could contribute to an increase in frequency or severity of air quality violations and delay attainment of the AAQS due to the increase in vehicle trips associated with implementation of the proposed Specific Plan. Therefore, emissions generated from the proposed Specific Plan would result in a significant cumulative air quality impact.

Since the combination, number, and size of projects that could be under construction at any one time are unknown, even with implementation of mitigation measures, implementation of the proposed Specific Plan would result in significant cumulative construction emissions from criteria pollutants. Additionally, even with implementation of mitigation, operational impacts from criteria pollutant emissions would contribute to an ozone exceedance, which could hinder the attainment of air quality standards. Further, cumulative growth within the City could result in potential TAC health risks exceeding applicable standards and cumulatively contributing to elevated health risks in the Basin. Therefore, air quality emissions associated with future development that may occur with implementation of the proposed Specific Plan could result in cumulatively considerable impacts, even with implementation of mitigation.

Level of Significance Without Mitigation: Potentially Significant Impact.

Impact AIR-5: Implementation of the Specific Plan could result in cumulative air quality impacts.

Mitigation Measure AIR-5.1 Implement Mitigation Measures AIR-2.1 and AIR-2.2.

Level of Significance With Mitigation: Significant and Unavoidable Impact.

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