4.3 Air Quality and Health Impacts/Risks

This section analyzes the impacts of the 2040 MTP/SCS on local and regional air quality. Both temporary impacts relating to construction activities and long-term impacts associated with population and employment growth and associated growth in vehicle traffic and energy consumption are discussed. Greenhouse gas emissions are analyzed in Section 4.8, *Greenhouse Gas Emissions/Climate Change.*

4.3.1 Setting

a. Local Climate and Topography

Air quality is affected by the rate and location of pollutant emissions and by climatic conditions that influence the movement and dispersion of pollutants. Atmospheric conditions, such as wind speed, wind direction and air temperature gradients, along with local and regional topography, mediate the relationship between air pollutant emissions and air quality.

The North Central Coast Air Basin (NCCAB) is comprised of Monterey, Santa Cruz and San Benito counties. The Basin lies along the central coast of California and covers an area of 5,159 square miles. The Diablo Range marks the northeastern boundary and, together with the southern extent of the Santa Cruz Mountains, forms the Santa Clara Valley, which extends into the northeastern tip of the NCCAB. Further south, the Santa Clara Valley transitions into the San Benito Valley, which runs northwest-southeast and has the Gabilan Range as its western boundary. To the west of the Gabilan Range is the Salinas Valley, which extends from Salinas at its northwestern end to King City at its southeastern end. The western side of the Salinas Valley is formed by the Sierra de Salinas, which also forms the eastern side of the smaller Carmel Valley. The coastal Santa Lucia Range defines the western side of the Carmel Valley (MBUAPCD 2008).

The semi-permanent high pressure cell in the eastern Pacific is the basic controlling factor in the climate of the NCCAB. In the summer, the high pressure cell is dominant and causes persistent west and northwest winds over the entire California coast. Air descends in the Pacific High forming a stable temperature inversion of hot air over a layer of cool coastal air. The onshore air currents pass over cool ocean waters to bring fog and relatively cool air into the coastal valleys. The warmer air loft acts as a lid to inhibit vertical air movement (MBUAPCD 2008).

The generally northwest-southeast orientation of mountainous ridges tends to restrict and channel the summer onshore air currents. Surface heating in the interior portion of the Salinas and San Benito Valleys creates a weak low pressure which intensifies the onshore air flow during the afternoon and evening. In the fall, the surface winds become weak, and the marine layer grows shallow, dissipating altogether on some days. The air flow is occasionally reversed in a weak offshore movement, and the relatively stationary air mass is held in place by the Pacific High pressure cell, which allows pollutants to build up over a period of a few days. It is most often during this season that the north or east winds develop to transport pollutants from either the San Francisco Bay Area or the Central Valley into the NCCAB (MBUAPCD 2008).

During the winter, the Pacific High migrates southward and has less influence on the NCCAB. Air frequently flows in a southeasterly direction out of the Salinas and San Benito Valleys, especially during night and morning hours. Northwest winds are nevertheless still dominant in winter, but easterly flow is more frequent. The general absence of deep, persistent inversions and the

occasional storm systems usually result in good air quality for the NCAAB as a whole in winter and early spring (MBUAPCD 2008).

In Santa Cruz County, coastal mountains exert a strong influence on atmospheric circulation, which results in generally good air quality. Small inland valleys such as Scotts Valley with low mountains on two sides have poorer circulation than at Santa Cruz on the coastal plain. In addition, Scotts Valley is downwind of major pollutant generating centers, and these pollutants have time to form oxidants during transit Scotts Valley. Consequently, air pollutants tend to build up more in Scotts Valley than in Santa Cruz (MBUAPCD 2008).

Monterey Bay is a 25-mile wide inlet, which allows marine air at low levels to penetrate the interior. The Salinas Valley is a steep-sloped coastal valley which opens out on Monterey Bay and extends southeastward with mountain ranges of two to three thousand feet elevation on either side. The broad area of the valley floor near the mouth is 25 miles wide, narrowing to about six miles at Soledad, which is 40 miles inland, and to three miles wide at King City, which is about 60 miles from the coast. At Salinas, near the northern end of the Valley, west and northwest winds occur about one-half the time during the entire year. Although the summer coastal stratus rarely extends beyond Soledad, the extended sea breeze, which consists of warmer and drier air currents, frequently reaches far down the Salinas Valley. In the southern end of the Valley, which extends into the South Central Coast Air Basin to Paso Robles, winds are generally weaker most of the year except during storm periods (MBUAPCD 2008).

b. Air Pollutants of Primary Concern

The federal and State Clean Air Acts (CAA) mandate the control and reduction of certain air pollutants, referred to as "criteria pollutants." Under these laws, the U.S. Environmental Protection Agency (U.S. EPA) and the California Air Resources Board (CARB) have established ambient air quality standards for criteria pollutants. Primary criteria pollutants are emitted directly from a source (e.g., vehicle tailpipe, an exhaust stack of a factory, etc.) into the atmosphere and include carbon monoxide (CO), reactive organic gasses (ROG), nitrogen oxides (NO_X), fine particulate matter (PM_{10} and $PM_{2.5}$), sulfur dioxide (SO_2) and lead (Pb). Secondary criteria pollutants are created by atmospheric chemical and photochemical reactions. ROG, together with nitrogen oxides, form the building blocks for the creation of photochemical (secondary) pollutants. Secondary pollutants include oxidants, ozone (O_3) and sulfate and nitrate particulates (smog). The characteristics, sources and effects of critical air contaminants are provided in Table 8.

Table 8 Description of Selected Air Contaminants

Photochemical Oxidant (Ox)
Characteristics. The term "photochemical oxidant" can include several different pollutants, but consists primarily of ozone (more than 90 percent) and a group of chemicals called organic peroxynitrates. Photochemical oxidants are created in the atmosphere rather than emitted directly into the air. Reactive organic gases and oxides of nitrogen are the emitted contaminants, which participate in the reaction. Ozone is a pungent, colorless toxic gas, which is produced by the photochemical process. Photochemical oxidant is a characteristic of southern California-type smog, and reaches highest concentrations during the summer and early fall.
Sources. Ozone is caused by complex atmospheric reactions involving oxides of nitrogen and reactive organic gases with ultraviolet energy from sunlight. Motor vehicles are the major source of oxides of nitrogen and reactive organic gases in the basin.
Effects. The common manifestations of ozone and other photochemical oxidants are damage to vegetation and cracking of untreated rubber. Ozone in high concentrations (ranging from 0.15 ppm to 0.50 ppm) can also directly affect the lungs, causing respiratory and coronary irritation and possible changes in lung functions. These health problems are particularly acute in children and elderly people exposed to these pollutants.

Carbon Monoxide (CO)

Characteristics. CO is a colorless, odorless, toxic gas produced through the incomplete combustion of fossil fuels. Concentrations are higher in winter when more fuel is burned for heating purposes and weather conditions favor the build-up of directly emitted contaminants.

Sources. The use of gasoline-powered engines is the major source of this contaminant, with automobiles being the primary contributor. CO emissions from gasoline-powered engines are higher during winter months due to poor engine efficiency in cold temperatures. Various industrial processes also produce CO emissions through incomplete combustion of fossil fuels.

Effects. CO does not irritate the respiratory tract. However, it passes through the lungs directly into the blood stream and, by interfering with the transfer of oxygen, deprives sensitive tissues of oxygen.

Nitrogen Oxides (NO_X)

Characteristics. NO_X primarily consists of nitric oxide (NO) (a colorless, odorless gas formed from atmospheric nitrogen and oxygen when petroleum combustion takes place under high temperatures and/or pressure) and nitrogen dioxide (NO_2) (a reddish-brown irritating gas formed by the combination of nitric oxide with oxygen). Due to the role they play as ozone precursors, oxides of nitrogen are one of the two criteria pollutants subject to federal ozone requirements.

Sources. High combustion temperatures cause nitrogen and oxygen to combine and form nitric oxide. Further reaction produces additional oxides of nitrogen. Combustion in motor vehicle engines, power plants, refineries and other industrial operations are the primary sources in the region. Ships, railroads and aircraft are other significant emitters.

Effects. Oxides of nitrogen are direct participants in photochemical smog reactions. The emitted compound, nitric oxide, combines with oxygen in the atmosphere in the presence of sunlight, to form nitrogen dioxide and ozone. Nitrogen dioxide, the most significant of these pollutants, can color the atmosphere at concentrations as low as 0.5 ppm on days of 21 0-mile visibility. NO_2 is an important air pollutant in the region because it is a primary receptor of ultraviolet light. The latter initiates photochemical reactions, helping to form ozone and/or particulate nitrate. It will also react in the air to form nitrate particulates.

Sulfur Dioxide (SO_2)

Characteristics. SO_2 is a colorless, pungent, irritating gas formed primarily by the combustion of sulfur-containing fossil fuels. In humid atmospheres, SO_2 can form sulfur trioxide and sulfuric acid mist, with some of the latter eventually reacting to produce sulfate particulates.

Sources. This contaminant is the natural combustion product of sulfur or sulfur-containing fuels. Fuel combustion is the major source, while chemical plants, sulfur recovery plants and metal processing are minor contributors.

Effects. At sufficiently high concentrations, sulfur dioxide irritates the upper respiratory tract. At lower concentrations, when in conjunction with particulates, SO_2 appears able to do still greater harm by injuring lung tissues. Sulfur oxides, in combination with moisture and oxygen, can yellow the leaves of plants, dissolve marble and eat away iron and steel. Sulfur oxides can also react to form sulfates, which reduce visibility.

Particulates (Total Suspended Particles and PM_{10})

Characteristics. Atmospheric particulates are made up of finely divided solids or liquids, such as soot, dust, aerosols, fumes and mists. About 90 percent by weight of the emitted particles are larger than 10 microns in diameter, but about 10 percent by weight, or 90 percent of the total *number* of particulates, are less than 5 microns in diameter. The aerosols formed in the atmosphere, primarily sulfate and nitrate, are usually smaller than 1 micron. In areas close to major sources, particulate concentrations are generally higher in the winter, when more fuel is burned for heating and meteorological conditions favor the build-up of directly-emitted contaminants. However, in areas remote from major sources and subject to photochemical smog (ozone), particulate concentrations can be higher during summer months because the presence of ozone increases the potential for SO_2 and NO_2 to convert to sulfate and nitrate particulates.

Sources. Particulate matter consists of particles in the atmosphere resulting from many kinds of dust and fume-producing industrial and agricultural operations, from combustion and from atmospheric photochemical reactions. Re-entrained road dust from vehicles is a significant source of particulates. Natural activities also put particulates into the atmosphere; wind-raised dust and ocean spray are two such sources of particulates.

Effects. In the respiratory tract, very small particles of certain substances may produce injury by themselves, or may contain absorbed gases that are injurious. Suspended in the air, particulates less than 5 microns in diameter can both scatter and absorb sunlight, producing haze and reducing visibility. They can also cause a wide range of damage to materials.

Diesel Particulate Matter (DPM)

Characteristics. Diesel particulate matter is part of a complex mixture that makes up diesel exhaust. Diesel exhaust is commonly found throughout the environment. Diesel exhaust is composed of two phases, either gas or particle, and both phases contribute to the risk. The gas phase is composed of many of the urban hazardous air pollutants, such as acetaldehyde, acrolein, benzene, 1,3-butadiene, formaldehyde and polycyclic aromatic hydrocarbons. Diesel exhaust has a distinct odor, which is primarily a result of hydrocarbons and aldehydes contained in diesel fuel. The particle phase also has many different types of particles that can be classified by size or composition. The size of diesel particulates that are of greatest health concern are those that are in the categories of fine and ultra-fine particles. The composition of these fine and ultra-fine particles may be composed of elemental carbon with adsorbed compounds such as organic compounds, sulfate, nitrate, metals and other trace elements.

Sources. Diesel exhaust is emitted from a broad range of diesel engines: the on-road diesel engines of trucks, buses and cars and the off-road diesel engines that include locomotives, marine vessels and heavy-duty equipment.

Effects. Acute exposure to diesel exhaust may cause irritation to the eyes, nose, throat and lungs and some neurological effects such as lightheadedness. Acute exposure may also elicit a cough or nausea as well as exacerbate asthma. Chronic exposure in experimental animal inhalation studies has shown a range of dose-dependent lung inflammation and cellular changes in the lung and there are also diesel exhaust immunological effects. Based upon human and laboratory studies, there is considerable evidence that diesel exhaust is a likely carcinogen. Human epidemiological studies demonstrate an association between diesel exhaust exposure and increased lung cancer rates in occupational settings.

Hydrocarbons and Other Organic Gases (Total Hydrocarbons, CH_4NMHC (non-methane), AHC, NHC)

Characteristics. Any of the vast family of compounds consisting of hydrogen and carbon in various combinations are known as hydrocarbons. Fossil fuels are included in this group. Many hydrocarbon compounds are major air pollutants, and those which can be classified as olefins or aromatics are highly photochemically reactive. Atmospheric hydrocarbon concentrations are generally higher in winter because the reactive hydrocarbons react more slowly in the winter and meteorological conditions are more favorable to their accumulating in the atmosphere to higher concentration before producing photochemical oxidants. Due to the role they play as ozone precursors, reactive hydrocarbons are one of the two criteria pollutants subject to federal ozone requirements.

Sources. Motor vehicles are a major source of anthropogenic hydrocarbons (AHC) in the basin. Other sources include evaporation of organic solvents and petroleum refining and marketing operations. Trees are the principal emitters of biogenic or natural hydrocarbons (NHC).

Effects. Certain hydrocarbons can damage plants by inhibiting growth and causing flowers and leaves to fall. Levels of hydrocarbons currently measured in urban areas are not known to cause adverse effects in humans. However, certain members of this contaminant group are important components in the reactions which produce photochemical oxidants.

Lead (Pb)

Characteristics. Lead is an elemental heavy metal found naturally in the environment as well as in manufactured products. Lead can be released directly into the air, as suspended particles. It is soft, malleable and melts at a relatively low temperature. When freshly cut, it has a bluish-white tint; it tarnishes to a dull gray upon exposure to air. Lead has several properties that make it useful: high density, low melting point, ductility and relative inertness to oxidation. Combined with relative abundance and low cost, these factors resulted in the extensive worldwide use of lead. Lead is persistent in the environment and accumulates in soils and sediments through deposition from air sources, direct discharge of waste streams to water bodies, mining and erosion.

Sources. The major sources of lead emissions historically have been mobile and industrial sources. As a result of phasing out leaded gasoline, metal processing currently is the primary source of Pb emissions. The highest level of lead in the air is generally found near lead smelters. Other stationary sources include waste incinerators, utilities and lead-acid battery manufacturers.

Effects. Humans may be exposed to lead from air pollution directly, through inhalation, or through the incidental ingestion of lead that has settled out from the air onto soil or dust. Depending on the level of exposure, lead can adversely affect the nervous system, kidney function, immune system, reproductive and developmental systems and the cardiovascular system. Lead exposure also affects the oxygen carrying capacity of the blood. The lead effects most commonly encountered in current populations are neurological effects in children and cardiovascular effects (e.g., high blood pressure and heart disease) in adults. Infants and young children are especially sensitive to even low levels of lead, which may contribute to behavioral problems, learning deficits and lowered IQ. Elevated lead in the environment can result in decreased growth and reproductive rates in plants and animals and neurological effects in vertebrates.

Source: U.S. EPA 2017, https://www.epa.gov/criteria-air-pollutants

Ozone is the main pollutant of concern for the NCCAB; ROGs and NO_X join in photochemical reactions that produce ozone and thus are also of concern. The region is "NO_X sensitive," meaning that ozone formation from local emissions is limited by the availability of NO_X as opposed to the availability of ROGs (MBARD 2017). The primary sources of ROGs within the AMBAG region are on- and off-road motor vehicles, petroleum production and marketing, solvent evaporation and prescribed burning. The primary sources of NO_X are on- and off-road motor vehicles and stationary sources. In 2015, daily emissions of ROG were estimated at 59 tons per day, which consisted of 60 percent from area-wide sources, 23 percent from mobile sources and 17 percent from stationary sources (MBARD 2017). Daily emissions of NO_X were estimated at 39 tons per day, which consisted of 60 percent from mobile sources, 21 percent from stationary sources and 11 percent from area-wide sources (MBARD 2017). PM_{10} is the other major pollutant of concern for the NCCAB. The highest particulate levels and most frequent violations occur in the coastal corridor, which experiences fugitive dust from various geological and man-made sources. Nearly three quarters of all NCCAB exceedances occurred at these coastal sites, where sea salt is often the main factor causing exceedance (MBUAPCD 2005). In 2005, daily emissions of PM_{10} were estimated at 102 tons per day. Of this, entrained road dust represented 35 percent of all PM_{10} emission, windblown dust 20 percent, agricultural tilling operations 15 percent, waste burning 17 percent, construction 4 percent, and mobile sources, industrial processes and other sources made up 9 percent (MBUAPCD 2008).

Diesel engine fuel combustion is an important contributor to PM emissions. Particulates in diesel emissions, referred to as diesel particulate matter (DPM), are very small and readily respirable. The particles have hundreds of chemicals adsorbed onto their surfaces, including many known or suspected mutagens and carcinogens. The California Office of Environmental Health Hazard Assessment (OEHHA) completed a comprehensive health assessment of diesel exhaust in 1998, which formed the basis for CARB to formally identify the particles in diesel exhaust as a toxic air contaminant (TAC). In California, DPM has a significant impact since it is estimated that 70 percent of total known cancer risk related to air toxics is attributable to DPM. According to CARB, DPM is estimated to increase statewide cancer risk by 520 cancers per million residents exposed over a lifetime (CARB 2016b).

DPM can also be responsible for elevated localized exposures ("hotspots"). Risk characterization scenarios conducted by CARB have determined the potential cancer risk resulting from proximity to DPM sources, such as school buses and high-volume freeways. California freeway studies show about a 70% drop off in particulate pollution levels at 500 feet from freeways and high-traffic roads (CARB 2005).

Besides DPM, several other pollutants are emitted by vehicle exhaust are a public health concern. U.S. EPA has identified five pollutants of highest priority in addition to DPM: acrolein, acetaldehyde, formaldehyde, benzene and 1,3-butadiene. The latter five pollutants are found in organic gases emitted by vehicles.

c. Regulatory Setting

The federal CAA governs air quality in the United States. At the federal level, the U.S. EPA administers the CAA. CARB administers the CAA at the State level and the local air districts such as Air Quality Management Districts (AQMD) administers the CAA at the regional and local levels. In addition to being subject to federal requirements, air quality in California is also governed by more stringent regulations under the California Clean Air Act, which is administered by the CARB at the State level and the AQMDs at the regional and local levels. The Monterey Bay Air Resources District

(MBARD) regulates air quality in the AMBAG region, which includes Monterey, San Benito and Santa Cruz counties. Table 9 summarizes the current federal and State air quality standards.

Table 9 Current Federal and State Ambient Air Quality Standards

Pollutant	Averaging Time	Federal Primary Standards	California Standards
Ozone	1-Hour	---	0.09 ppm
	8-Hour	0.070 ppm	0.070 ppm
Carbon Monoxide	8-Hour	9.0 ppm	9.0 ppm
	1-Hour	35.0 ppm	20.0 ppm
Nitrogen Dioxide	Annual	0.053 ppm	0.030 ppm
	1-Hour	0.100 ppm	0.18 ppm
Sulfur Dioxide	Annual	---	---
	24-Hour	---	0.04 ppm
	1-Hour	0.075 ppm	0.25 ppm
PM_{10}	Annual	---	20 $\mu g/m^3$
	24-Hour	150 $\mu g/m^3$	50 $\mu g/m^3$
PM_{25}	Annual	12 $\mu g/m^3$	12 $\mu g/m^3$
	24-Hour	35 $\mu g/m^3$	---
Lead	30-Day Average	---	1.5 $\mu g/m^3$
	3-Month Average	0.15 $\mu g/m^3$	---
Visibility Reducing Particles	8-Hour	---	Extinction of 0.23 per kilometer*
Sulfates	24-Hour	---	25 $\mu g/m^3$
Hydrogen Sulfide	1-Hour	---	0.03 ppm (42 $\mu g/m^3$)
Vinyl Chloride	24-Hour	---	0.01 ppm 0.02 (26 $\mu g/m^3$)

ppm = parts per million;

$\mu g/m^3$ = micrograms per cubic meter

* In 1989, the ARB 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.

Source: CARB 2016a.

Federal

The U.S. EPA is responsible for enforcing the federal CAA, which defines nonattainment areas as geographic regions designated as not meeting one or more of the national ambient air quality standards (NAAQS) that are required under the 1977 CAA and subsequent amendments. The federal CAA requires that a State Implementation Plan (SIP) be prepared for each nonattainment area and a maintenance plan be prepared for each former nonattainment area that subsequently demonstrated compliance with the standards. A SIP is a compilation of a state’s air quality control plans and rules, approved by the U.S. EPA. Section 176(c) of the CAA provides that federal agencies cannot engage, support, or provide financial assistance for licensing, permitting, or approving any project unless the project conforms to the applicable SIP. The state and the U.S. EPA’s goals are to

eliminate or reduce the severity and number of violations of the NAAQS and to achieve expeditious attainment of these standards.

Pursuant to 176(c) of the federal CAA (42 USC §7506(c)), MPOs and the United States Department of Transportation (U.S. DOT) must make a determination that the Regional Transportation Plan (RTP) and the Regional Transportation Improvement Program (RTIP) conform to the SIP for air quality. Currently, the AMBAG region is designated as in attainment for the federal air quality standards (MBARD 2017); therefore, the 2040 MTP/SCS is not required to include an Air Quality Conformity Analysis or demonstrate SIP conformity.

The U.S. EPA also regulates emission sources that are under the exclusive authority of the federal government, such as aircraft, ships and certain types of locomotives. The agency has jurisdiction over emission sources outside state waters (e.g. beyond the outer continental shelf) and establishes various emission standards, including those for vehicles sold in states other than California. Automobiles sold in California must meet the stricter emission standards established by CARB.

State

In California, CARB is responsible for meeting the State requirements of the federal CAA, administering the California CAA and establishing the California ambient air quality standards (CAAQS). The California CAA, as amended in 1992, requires all air districts in the State to endeavor to achieve and maintain the CAAQS. The CAAQS are generally more stringent than the corresponding federal standards and incorporate additional standards for sulfates, hydrogen sulfide, vinyl chloride and visibility reducing particles. CARB regulates mobile air pollution sources, such as motor vehicles. The agency is responsible for setting emission standards for vehicles sold in California and for other emission sources, such as consumer products and certain off-road equipment. CARB established passenger vehicle fuel specifications, which became effective in March 1996. More recently, CARB developed a new certification fuel for 2015 and newer vehicles, which contains 10 volume percent ethanol (E10). In addition, California Legislature enacted Senate Bill 656 (SB 656) to reduce public exposure of airborne particulate matter in 2003, which required CARB to develop and adopt a list of readily available, feasible and cost-effective control measures that could be employed by CARB and local air districts. CARB oversees the functions of local air pollution control districts and air quality management districts, which in turn administer air quality activities at the regional and county level.

The California Office of Environmental Health Hazard Assessment (OEHHA) is the lead agency for the assessment of health risks posed by environmental contaminants. OEHHA, which is an office within the California Environmental Protection Agency (CalEPA), aims to protect human health and the environment through scientific evaluation of risks posed by hazardous substances. In addition, OEHHA develops health-protective exposure levels for contaminants in air, water and soil as guidance for regulatory agencies and the public. These include public health goals for contaminants in drinking water and both cancer potency factors and non-cancer reference exposure levels for the Air Toxics Hot Spots Program. The Air Toxics “Hot Spots” Information and Assessment Act (Assembly Bill 2588) was enacted in 1987 to require stationary sources to report the types and quantities of substances identified as having a localized health risk. This act aims to ascertain health risks, notify nearby residents of significant risks and to reduce significant risks to acceptable levels.

Furthermore, California Air Resources Board’s (ARB’s) *Air Quality and Land Use Handbook: A Community Health Perspective* recommends that local agencies avoid siting new, sensitive land uses within specific distances of potential sources of TACs, such as freeways and high-traffic roads, distribution centers, railroads and ports (ARB 2005). Specifically, ARB recommends that local

agencies avoid siting new, sensitive land uses within 500 feet of a freeway. The primary concern is the effect of diesel exhaust particulate, a TAC, on sensitive uses.

Regional

MBARD (previously the Monterey Bay Unified Air Pollution Control District [MBUAPCD]) is the agency primarily responsible for ensuring that NAAQS and CAAQS are not exceeded and that air quality conditions are maintained in Monterey, San Benito and Santa Cruz counties. Responsibilities of MBARD include, but are not limited to: preparing plans for the attainment of ambient air quality standards, adopting and enforcing rules and regulations concerning sources of air pollution, issuing permits for stationary sources of air pollution, inspecting stationary sources of air pollution and responding to citizen complaints, monitoring ambient air quality and meteorological conditions and implementing programs and regulations required by the FCAA and the CCAA. Since the passage of the 1990 Federal Clean Air Act Amendments (FCAAA), eight plan updates have been adopted by MBARD. The most recent regional plan is MBARD's 2012-2015 Air Quality Management Plan.

The 2012-2015 Air Quality Management Plan (AQMP) was prepared to ensure continued progress towards clean air and compliance with State and federal requirements. This AQMP is an update to elements included in the 2012 Triennial Plan Revision and shows how the State AAQS for ozone would be met in the NCCAB. According to the emission reduction strategy in the AQMP, MBARD's priority is to continue to pursue reduction of ozone precursor emissions from mobile sources. Although the 2008 AQMP detailed transportation control measures (TCMs), these measures have not been listed in more recent updates of AMBAG's Metropolitan Transportation Improvement Program (MTIP) because the region has come into attainment of all NAAQS (MBARD 2017). MBARD continues to foster and support programs that reduce ozone precursor emissions, implement rules when necessary, and continue to maintain robust permitting and enforcement programs. Mobile source emission reductions are primarily achieved through the MBARD's incentive programs. To support reducing on-road vehicle emissions, the MBARD's AB 2766 grant program focuses funding on direct emission reduction projects. These projects include roundabout design and construction as well as the application of adaptive traffic signal control at intersections. In 2016, MBARD implemented the Monterey Bay Clean Vehicle Program, which offered cash rebates to the public for purchasing or leasing battery electric and plug-in hybrid electric vehicles. In addition, the Plug-in Monterey Bay Electric Vehicle Charge Station Infrastructure program was implemented in January 2017 to establish DC fast charge and Level 2 charge station multi-centers. Furthermore, MBARD is also evaluating whether to implement a voluntary accelerated vehicle retirement (VAVR) and/or voluntary repair of vehicles (VRV) to reduce light-duty vehicle emissions in accordance with the Carl Moyer Program, which provides funding to encourage replacement of older heavy duty motors/engines in the tri-county region. Each of these reduction projects would reduce emissions in the region by encouraging cleaner vehicles.

MBUAPCD's *CEQA Air Quality Guidelines* (2008) establish thresholds of significance for air pollutants, which are described in Section 4.3.2, Methodology and Significance Thresholds.

In 2005 MBUAPCD adopted the 2005 Particulate Matter Plan to fulfill the requirements of Senate Bill 656, which was approved by the California Legislature in 2003 with the objective of reducing public exposure to particulate matter. In 2011, CARB approved the latest regulation to reduce emissions of DPM and nitrogen oxides from existing on-road heavy-duty diesel fueled vehicles (Title 13 Section 2205). The regulation requires affected vehicles to meet specific performance requirements between 2012 and 2023, with all affected diesel vehicles required to have 2010 model-year engines or the equivalent by 2023. These requirements are phased in over the

compliance period and depend on the model year of the vehicle. With implementation of CARB's Risk Reduction Plan, DPM concentrations are expected to be reduced by 85 percent in 2020 from the estimated year-2000 level (CARB 2000).

Local

City and county general plans within the AMBAG area contain policies to protect air quality. Listed below are the policies from each county in the region. Cities in the region have generally similar policies.

Monterey County

The Monterey County General Plan (Monterey County, 2010a) contains policies in the Conservation/Open Space Element that pertain to air quality as shown below.

Policy OS-10.1. Land use policy and development decisions shall be consistent with the natural limitations of the County's air basins.

Policy OS-10.2. Mass transit, bicycles, pedestrian modes of transportation and other transportation alternatives to automobiles shall be encouraged.

Policy OS-10.3. Monterey County shall promote conservation of naturally vegetated and forested areas for their air purifying functions.

Policy OS-10.4. Monterey County shall encourage concentrating industrial and commercial development in areas that are more easily served by public transit.

Policy OS-10.5. Mixed land uses that reduce the need for vehicular travel shall be encouraged.

Policy OS-10.6. The Monterey Bay Unified Air Pollution Control District's air pollution control strategies, air quality monitoring and enforcement activities shall be supported.

Policy OS-10.7. Use of the best available technology for reducing air pollution emissions shall be encouraged.

Policy OS-10.8. Air quality shall be protected from naturally occurring asbestos by requiring mitigation measures to control dust and emissions during construction, grading, quarrying, or surface mining operations. This policy shall not apply to Routine and Ongoing Agricultural Activities except as required by state and federal law.

Policy OS-10.9. The County of Monterey shall require that future development implement applicable Monterey Bay Unified Air Pollution Control District control measures. Applicants for discretionary projects shall work with the Monterey Bay Unified Air Pollution Control District to incorporate feasible measures that assure that health-based standards for diesel particulate emissions are met. The County of Monterey will require that future construction operate and implement MBUAPCD PM_{10} control measures to ensure that construction-related PM_{10} emissions do not exceed the MBUAPCD's daily threshold for PM_{10}. The County shall implement MBUAPCD measures to address off-road mobile source and heavy-duty equipment emissions as conditions of approval for future development to ensure that construction-related NO_X emissions from non-typical construction equipment do not exceed the MBUAPCD's daily threshold for NO_X.

Policy OS-10.10. In the design of future development within Community Areas and Rural Centers, the following sustainable land use strategies shall be considered to reduce energy consumption, minimize greenhouse gas emissions and foster healthier environments for people:

- Take an integrated approach to siting, design and operation of buildings and infrastructure
- Incorporate multiple-uses for infrastructure (e.g., recreational fields designed to capture stormwater and reduce urban runoff)
- Design development to take advantage of solar orientation
- Recycle brownfield sites
- Employ individual and systematic water conservation measures (e.g., native vegetation, bioswales, graywater reuse, high efficiency appliances)
- Promote Transit Oriented Development (TOD) to increase mobility and reduce auto dependency
- Provide preferential carpool/vanpool parking spaces
- Implement a parking surcharge for single occupant vehicles
- Provide for shuttle/mini bus service
- Provide bicycle storage/parking facilities and shower/locker facilities
- Provide onsite child care centers
- Provide transit design features within the development
- Develop park-and-ride lots
- Employ a transportation/rideshare coordinator
- Implement a rideshare program
- Provide incentives to employees to rideshare or take public transportation
- Implement compressed work schedules
- Implement telecommuting program
- Provide bicycle paths within major subdivisions that link to an external network
- Provide pedestrian facilities within major subdivisions
- Locate development of new sensitive land uses (schools, hospitals, facilities for the elderly) at least 500 feet from a freeway carrying more than 100,000 vehicles per day

Future development shall be designed to maximize energy efficiency to the extend feasible and accommodate energy infrastructure (i.e., transmission lines, power plants and pipelines and fueling stations), including the potential for distributed renewable generation.

Policy OS-10.11. Within 24 months of the adoption of the General Plan, Monterey County shall develop and adopt a Greenhouse Gas (GHG) Reduction Plan with a target to reduce emissions by 2020 to a level that is 15% less than 2005 emission levels. At a minimum, the Plan shall:

a. Establish an inventory of 2005 GHG emissions in the County of Monterey including but not limited to residential, commercial, industrial and agricultural emissions;
b. Forecast GHG emissions for 2020 for County operations;
c. Forecast GHG emissions for areas within the jurisdictional control of the County for "business as usual" conditions;
d. Identify methods to reduce GHG emissions;
e. Quantify the reductions in GHG emissions from the identified methods;
f. Establish requirements for monitoring and reporting of GHG emissions;
g. Establish a schedule of actions for implementation;

h. Identify funding sources for implementation;

i. Identify a reduction goal for the 2030 Planning Horizon

j. Quantify carbon sequestration in agricultural soils and crops

During preparation of the Greenhouse Gas Reduction Plan, the County shall also evaluate potential options for changes in County policies regarding land use and circulation, as necessary, to further achieve the 2020 and 2030 reduction goals and measures to promote urban forestry and public awareness concerning climate change.

Policy OS-10.12. Within 24 months of the adoption of the General Plan, the County shall adopt a Green Building Ordinance to require green building practices and materials for new civic buildings and new private residential, commercial and industrial buildings that will include, but are not limited to, the following technologies, strategies, or their functional equivalent:

- All new County government projects and major renovations shall meet, at a minimum, LEED-Silver standards or an equivalent rating system
- All new commercial buildings shall meet requirements of the LEED rating system for commercial buildings or an equivalent rating system
- All new residential projects of 6 units or more shall meet the GreenPoint Rating System for residential buildings, or an equivalent alternate rating system
- The County shall require consideration of solar building orientation, solar roofs, cool pavements and planting of shade trees in development review of new commercial and industrial projects and new residential projects of 6 units or more
- Prioritized parking within new commercial and retail areas for electric vehicles, hybrid vehicles, bicycles and alternative fuel vehicles shall be provided for new commercial and institutional developments
- New commercial and industrial projects greater than 25,000 square feet shall be required to provide an on-site renewable energy generation as part of their development proposal. This requirement can be met through a solar roof or other means.

Policy OS-10.13. The County shall use Geographic Information Systems (GIS) to map and assess local renewable resources, the electric and gas transmission and distribution system, community growth areas anticipated to require new energy services and other data useful to deployment of renewable technologies. The County shall adopt an Alternative Energy Promotion ordinance that will:

- Identify possible sites for production of energy using local renewable resources such as solar, wind, small hydro and biogas;
- Consider the potential need for exemption from other General Plan policies concerning visual resources, ridgelines protection, or biological resources;
- Evaluate potential land use, environmental, economic and other constraints affecting renewable energy development; and
- Adopt measures to protect renewable energy resources, such as utility easement, right-of-way and land set-asides, as well as visual and biological resources.

The County shall also complete the following:

- Evaluate the feasibility of Community Choice Aggregation (CCA) for the County. CCA allows cities and counties, or groups of them, to aggregate the electric loads of customers within

their jurisdictions for purposes of procuring electrical services. CCA allows the community to choose what resources will serve their loads and can significantly increase renewable energy;

- If CCA is ultimately not pursued, the County shall evaluate the feasibility of purchasing renewable energy certificates to reduce the County's contribution to GHG emissions related to County electricity use; and
- The County shall develop a ministerial permit process for approval of small-scale wind and solar energy systems for on-site home, small commercial and farm use.

Policy OS-10.14. The County of Monterey shall require that construction contracts be given to those contractors who show evidence of the use of soot traps, ultra-low sulfur fuels and other diesel engine emissions upgrades that reduce PM10 emissions to less than 50% of the statewide PM10 emissions average for comparable equipment.

Policy OS-10.15. Within 12 months of adoption of the General Plan, the County shall quantify the current and projected (2020) GHG emissions associated with County operations and adopt a GHG Reduction Plan for County Operations. The goal of the plan shall be to reduce GHG emissions associated with County Operations by at least 15% less than 2005 emission levels. Potential elements of the County Operations GHG Reduction Plan shall include, but are not limited to, the following measures:

- An energy tracking and management system;
- Energy-efficient lighting;
- Lights-out-at-night policy;
- Occupancy sensors;
- Heating, cooling and ventilation system retrofits;
- ENERGY STAR appliances;
- Green or reflective roofing;
- Improved water pumping energy efficiency;
- Central irrigation control system;
- Energy-efficient vending machines;
- Preference for recycled materials in purchasing;
- Use of low or zero-emission vehicles and equipment;
- Recycling of construction materials in new county construction;
- Solar roofs; and
- Conversion of fleets (as feasible) to: electric vehicles, ultra low-emission vehicles, methanol fleet vehicles, liquid propane gas fleet vehicles, or compressed natural gas fleet vehicles.

San Benito County

The San Benito County 2035 General Plan (San Benito County, 2015a) contains policies in the Health and Safety Element that pertain to air quality as shown below.

Policy HS-5.1 – New Development. The County shall use the CEQA process to ensure development projects incorporate feasible mitigation measures to reduce construction and operational air quality emissions and consult with the Monterey Bay Unified Air Pollution Control District early in the development review process.

Policy HS-5.2 – Sensitive Land Use Locations. The County shall ensure adequate distances between sensitive land use and facilities or operations that may produce toxic or hazardous air pollutants or substantial odors.

Policy HS-5.3 – Early Coordination with the Air Quality Control District. The County shall notify and coordinate with the Monterey Bay Unified Air Pollution Control District when industrial developments are proposed within the county to ensure applicants comply with applicable air quality regulations and incorporate design features and technologies to reduce air emissions.

Policy HS-5.4 – PM10 Emissions from Construction. The County shall require developers to reduce particulate matter emissions from construction (e.g., grading, excavation and demolition) consistent with standards established by the Monterey Bay Unified Air Pollution Control District.

Policy HS-5.5 – PM10 Emissions from Industrial Facilities. The County shall require industrial facilities to incorporate best management practices to reduce PM2.5 and PM10 emissions consistent with standards established by the Monterey Bay Unified Air Pollution Control District.

Policy HS-5.6 – New Construction Mitigation. The County shall work in coordination with the Monterey Bay Unified Air Pollution Control District to minimize air emissions from construction activities associated with proposed development.

Policy HS-5.7 – Greenhouse Gas Emission Reductions. The County shall promote greenhouse gas emission reductions by supporting carbon efficient farming methods (e.g., methane capture systems, no-till farming, crop rotation, cover cropping); supporting the installation of renewable energy technologies; and protecting grasslands, open space, oak woodlands, riparian forest and farmlands from conversion to urban uses.

Policy HS-5.8 – GHG Reduction Targets. The County acknowledges that the state endeavors to achieve 1990 greenhouse gas (GHG) emission levels and establish a long-term goal to reduce GHG emissions by 80 percent below 1990 levels by 2050. The County will encourage projects that support these goals, recognizing that these goals can be met only if the state succeeds in decarbonizing its fuel supply.

Policy HS-5.9 – GHG Reduction Monitoring. The County shall monitor its greenhouse gas emissions and encourage appropriate adjustments to its programs and standards to further efforts to make progress towards achieving the state's GHG reduction targets.

Policy HS-5.10 – Vehicle Emissions Reductions. The County shall study alternatives for improving circulation (e.g., roundabouts, one ways, etc.), when feasible, to reduce idling motor vehicle emissions.

Policy HS-5.11 – Prepare and implement a GHG Reduction Strategy. To reduce GHG emissions, the County shall prepare and adopt a greenhouse gas reduction strategy that meets the following CEQA Guidelines § 15183.5 standards:

1. Quantifies greenhouse gas emissions, both existing and projected over a specified time period, resulting from activities within a defined geographic area,
2. Establishes a level, based on substantial evidence, below which the contribution to greenhouse gas emissions from activities covered by the plan would not be cumulatively considerable, i.e., in alignment with General Plan Policy HS-5.8,

3. Identifies and analyzes the greenhouse gas emissions resulting from specific actions or categories of actions anticipated within the geographic area,
4. Specifies measures or a group of measures, including performance standards, that substantial evidence demonstrates, if implemented on a project-by-project basis, would collectively achieve the specified emissions level, and
5. Be adopted in a public process following environmental review.

Policy HS-5.12 – Air Quality Management Plans. The County shall encourage regional planning agencies to consider the County's population projections during the preparation of future Air Quality Management Plans.

Policy HS-5.13 – Reduce Air Pollution from Wood Burning. No permanently installed wood-burning devices shall be allowed in any new development, except when necessary for food preparation in a restaurant or other commercial establishment serving food.

Policy HS-5.14 – Notify Project Applicants of Air District Requirements. The County shall work with the Air District to obtain materials to give to project applicants regarding relevant information about Air District requirements.

Santa Cruz County

The Santa Cruz County General Plan and Local Coastal Program (Santa Cruz County, 1994) contains policies in the Conservation and Open Space Element that pertain to air quality as shown below.

Policy 5.18.1 – New Development. Ensure new development projects are consistent at a minimum with the Monterey Bay Unified Air Pollution Control District Air Quality Management Plan and review such projects for potential impact on air quality.

Policy 5.18.2 – Non-Attainment Pollutants. Prohibit any net increase in emissions of non-attainment pollutants or their precursors from new or modified stationary sources which emit 25 tons per year or more of such pollutants.

Policy 5.18.3 – Air Quality Mitigations. Require land use projects generating high levels of air pollutants (i.e., manufacturing facilities, hazardous waste handling operations) to incorporate air quality mitigations in their design.

Policy 5.18.4 – Offshore Oil Development. Prohibit development, construction, or installation of any onshore facility necessary for or intended to support offshore oil or gas exploration and development unless a General Plan and Local Coastal Program amendment is approved by the voters of the County which allows such development.

Policy 5.18.4 – Onshore Oil and Gas Development. Prohibit development, construction, installation, or use of any facility necessary for or intended to support oil or gas exploration or development from any surface location within the unincorporated area of the County of Santa Cruz, whether the subsurface portion(s) of such facility is within or outside the unincorporated area of the County of Santa Cruz, and prohibit development, construction, installation or use of any facility necessary for or intended to support oil or gas explorations or development from surface locations outside the unincorporated area of the County of Santa Cruz which may begin, pass through or terminate below the surface of land located within the unincorporated area of the County of Santa Cruz. This prohibition applies to facilities directly involved in oil and gas exploration, production and refinement such as wells, pipelines and pumps.

Policy 5.18.5 – Sensitive Land Uses. Locate air pollution sensitive land uses, including hospitals, schools and care facilities, away from major sources of air pollution such as manufacturing, extracting facilities.

Policy 5.18.6 – Plan for Transit Use. Encourage commercial development and higher density residential development to be located in designated centers or other areas that can be easily served by transit.

Policy 5.18.7 – Alternatives to the Automobile. Emphasize transit, bicycle and pedestrian modes of transportation rather than automobiles.

Policy 5.18.8 – Encouraging Landscaping. Maintain vegetated and forested areas, and encourage cultivation of street trees and yard trees for their contributions to improved air quality.

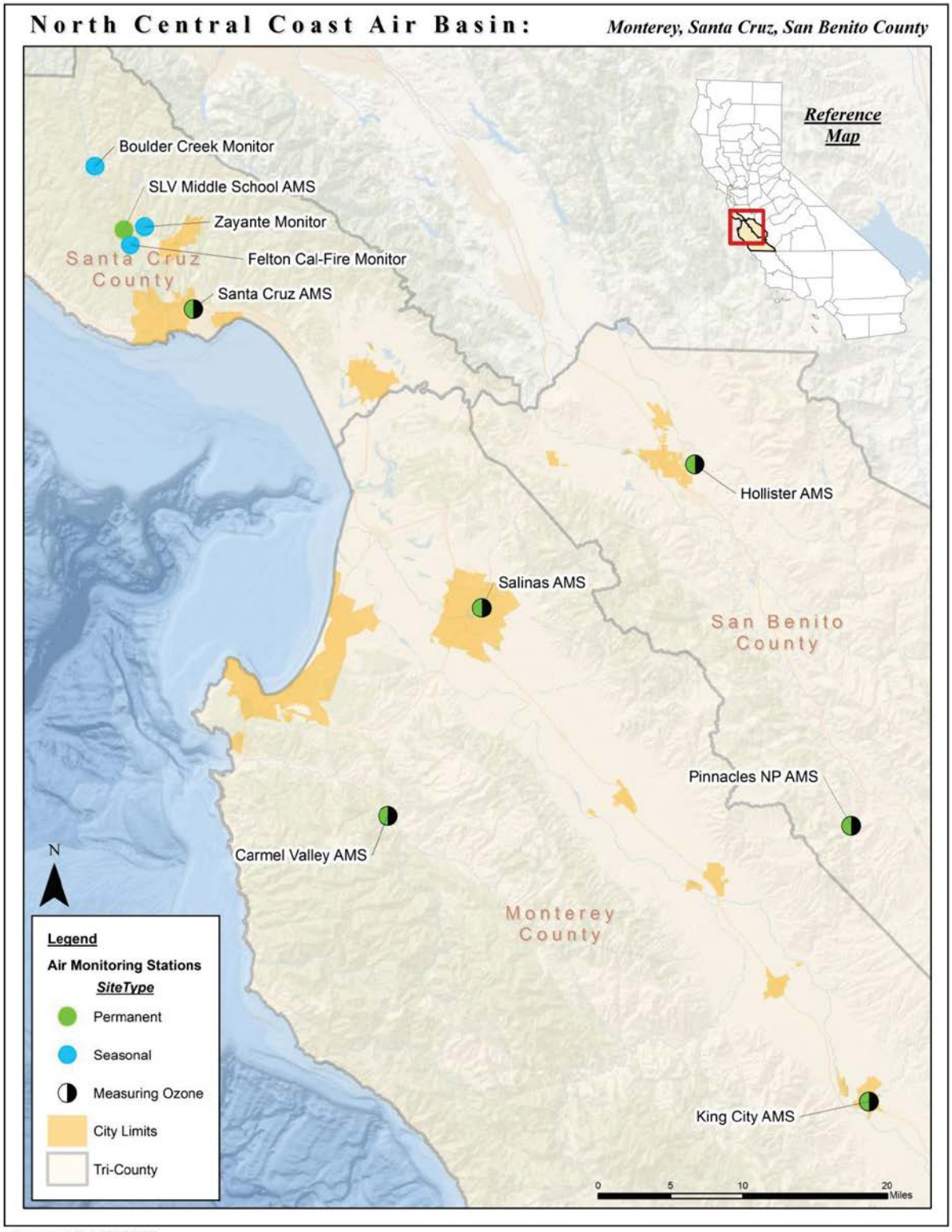
Policy 5.18.9 – Greenhouse Gas Reduction. Implement state and federal legislation promoting the national goal of 35% reduction of carbon dioxide and other greenhouse gases by 2000.

Policy 5.18.10 – Elimination of Ozone Depleting Chemicals. Support and implement local actions to achieve the most rapid possible international, national, state and local elimination of the emission of ozone-depleting chemicals.

d. Current Ambient Air Quality

MBARD is required to monitor air pollutant levels to assure that ambient air quality standards are met and, in the event they are not, to develop strategies to meet these standards. Monitoring of ambient air pollutant concentrations is conducted by the CARB, MBARD and industry. Ambient air quality is currently monitored at seven permanent stations in the NCCAB, which are shown in Figure 13. Depending on whether measured air pollutant concentrations fall within or exceed standards, the local air basin is classified as being in “attainment” or “non-attainment.” The NCCAB is currently in non-attainment of the State PM_{10} standard and eight-hour ozone standard. The NCCAB is in attainment or unclassifiable for all other State standards and all federal standards (MBARD 2017). Basin-wide historical data on the number of 1- and 8-hour State and 8-hour federal exceedances are provided in Figure 14. Data from Pinnacles National Park Monitoring Station is shown since this is the NCCAB’s peak “hot spot” station with the highest measured ozone concentrations (MBARD 2017). Table 10 and Table 11 show the emissions inventory and forecast for ROG, NO_X and PM_{10} within the NCCAB.

Figure 13 NCCAB Air Quality Monitoring Stations (2017)



Source: MBARD 2017

Figure 14 Historical NCCAPCD Ozone Exceedances (2016)

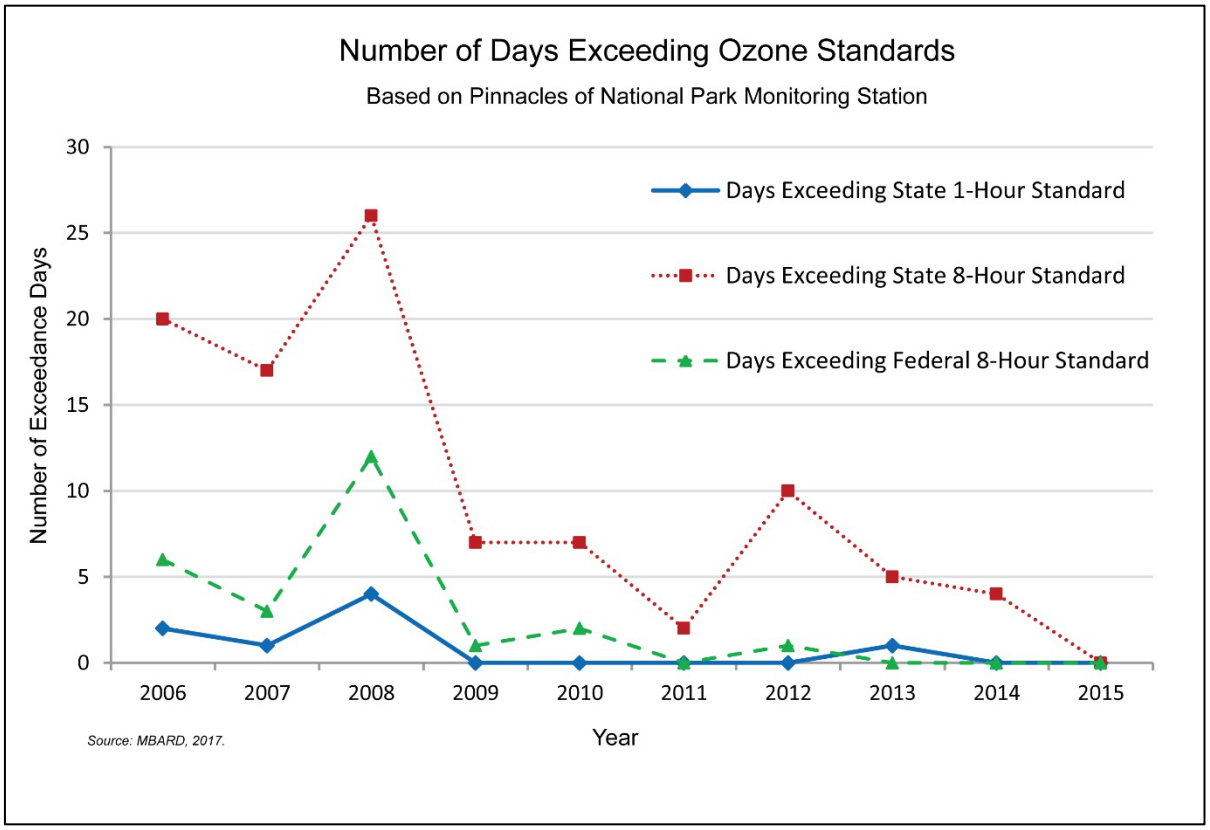


Table 10 Emissions Inventory and Forecasts for ROG and NO_X

Tons/Day	2000	2005	2010	2015	2020	2025	2030	2035
ROG	70.97	64.11	60.48	59.16	56.63	55.67	55.59	55.80
NO_X	80.49	60.53	45.58	38.81	31.61	27.18	25.62	25.34

Source: MBARD 2017.

Table 11 Emissions Inventory and Forecasts for PM_{10}

Tons/Day	2000	2005	2010	2015	2020	2025	2030	2035
PM_{10} (All Sources)	45.3	47.6	41.8	44.4	47.7	50.2	52.9	55.4
PM_{10} (Mobile Sources)	4.3	4.2	2.7	2.0	1.8	1.8	1.8	1.9

Source: CARB 2016, https://www.arb.ca.gov/app/emsinv/2017/emssumcat.php.

4.3.2 Impact Analysis

a. Methodology and Significance Thresholds

Significance Thresholds

This analysis follows the guidance and methodologies recommended in MBARD's *CEQA Air Quality Guidelines* and the CEQA Appendix G thresholds. The following criteria were identified for determining whether a project's impacts would have a significant impact on air quality:

1. Conflict with or obstruct implementation of the applicable air quality plan;
2. Violate any air quality standard or contribute substantially to an existing or projected air quality violation;
   - During construction, cause a violation of PM_{10} AAQS at nearby or upwind of sensitive receptors, based on whether the project would:
     - Emit greater than 82 lbs/day of PM_{10} if located nearby or upwind of sensitive receptors; or
   - Use equipment that is not "typical construction equipment" as specified in Section 5.3 of the MBARD CEQA Guidelines during operations:
     - Generate direct (area source or stationary) plus indirect (operational or mobile) emissions of either ROG or NO_X that exceed 137 lbs/day;
     - Generate on-site emissions of PM_{10} exceeding 82 lbs/day;
     - Generate direct emissions of CO exceeding 550 lbs/day;
     - Generate direct emissions of SO_X exceeding 150 lbs/day; or
     - Cause or substantially contribute to a violation of a CO standard.
3. Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is nonattainment under an applicable federal or state ambient air quality standard (including releasing emissions which exceed quantitative guidelines for ozone precursors);
4. Expose sensitive receptors to substantial pollutant concentrations; and/or
5. Create objectionable odors affecting a substantial number of people.

Short-Term Emissions Methodology

Emissions from construction activities represent temporary impacts that are typically short in duration, depending on the size, phasing and type of project. Air quality impacts can nevertheless be acute during construction periods, resulting in significant localized impacts to air quality. Construction-related emissions are speculative at the MTP/SCS level because such emissions are dependent on the characteristics of individual development projects. However, because construction of the 2040 MTP/SCS would generate temporary criteria pollutant emissions, primarily due to the operation of construction equipment and truck trips, a qualitative analysis is provided.

Long-Term Emissions Methodology

The methodology for determining the significance of air quality impacts compares baseline conditions as of 2015 to the future MTP/SCS conditions in 2040, as required in CEQA Section 15126.2(a). For informational purposes, the analysis of air quality also includes a comparison between the 2015 baseline conditions and the expected future conditions in 2040 if no MTP/SCS

were adopted ('no project' scenario). With respect to long-term impacts, 2040 MTP/SCS long-term impacts to air quality will be considered significant if buildout of the plan as a whole results in mobile source emissions that significantly exceed existing levels. In this case, the pollutants of concern are ozone precursors (NO_X and ROG) and fine particulate matter (PM_{10}), as these are the primary pollutants associated with vehicle transportation.

Air emissions from on-road mobile sources were calculated using emission factors from CARB's EMFAC 2014 model and regional vehicle miles travelled (VMT) from AMBAG's Regional Travel Demand Model (RTDM). EMFAC emission factors are established by CARB and accommodate mobility assumptions (e.g., vehicle fleets, speed, delay times, average trip lengths, time of day and total travel time) provided by AMBAG's RTDM, which include socioeconomic growth projections based on AMBAG's Draft 2018 Regional Growth Forecast (refer to "Modeling Methodology" in Appendix F to the 2040 MTP/SCS). The long-term emissions analysis uses 2015 emissions as a baseline because this is the most recent year for which accurate region-wide VMT data is available (as of the publishing of the NOP on December 21, 2015). Projected vehicle emissions on the AMBAG transportation network for the year 2040 under the 2040 MTP/SCS were compared with 2015 existing conditions. Future conditions under the 'no project' scenario were provided for informational purposes.

In addition, air emissions from land use were calculated for the 2015 baseline and the 2040 horizon year. ROG and NO_X emissions were based on the emission inventory and forecast for the region from the 2012-2015 AQMP, which provided emissions from stationary, area-wide and mobile sources for the planning inventory years 2000-2035. The emissions trajectory was extended to 2040 to obtain ROG and NO_X emissions from land use. PM_{10} emissions were based on CARB emission inventory data, which provided emissions from each source type for the years 2000-2035.

If total region-wide emissions caused by the 2040 MTP/SCS do not significantly exceed the 2015 baseline, impacts to long-term air quality would not be considered significant.

Health Impacts

Short-term and long-term exposure to criteria pollutants and TACs may result in adverse health effects, based on the information presented in Table 8. As discussed in that table, these effects may include: aggravated asthma, increases in respiratory symptoms like coughing and difficult or painful breathing, chronic bronchitis, decreased lung function, increased cancer risk, heart attack and premature death.

The ambient air quality standards are health-based standards. Therefore, in this impact analysis, when the proposed Plan would result in a new violation of a particulate standard or substantially contribute to an existing violation, it would also contribute to these adverse health effects. Health impacts of TACs are discussed separately under Impact AQ-4.

b. Project Impacts and Mitigation Measures

This section describes generalized air quality impacts associated with the 2040 MTP/SCS. Table 16 summarizes the specific projects that could result in the air quality impacts discussed in this section. For example, the extension project proposed for the Watsonville Municipal Airport (SC-AIR-P01-WAT) may generate air quality impacts during construction and operation. Due to the programmatic nature of the 2040 MTP/SCS, a precise, project-level analysis of the specific impacts associated with individual transportation and land use projects is not possible. In general, however, implementation of proposed transportation improvements and future projects under the land use scenario

envisioned by the 2040 MTP/SCS could result in air quality impacts as described in the following sections.

Threshold 1:	Conflict with or obstruct implementation of the applicable air quality plan

Impact AQ-1 SINCE THE 2040 MTP/SCS WOULD NOT CONFLICT WITH THE REGIONAL POPULATION FORECAST, AND WOULD REDUCE EMISSIONS OF OZONE PRECURSORS BELOW 2015 BASELINE LEVELS, IT WOULD NOT CONFLICT WITH OR OBSTRUCT IMPLEMENTATION OF THE AQMP. THEREFORE, IMPACTS WOULD BE LESS THAN SIGNIFICANT.

Conflicts or obstructions with the applicable air quality plan are typically determined by consistency with the population forecast or emissions forecast. The most recent air quality plan is MBARD's 2012-2015 AQMP, which is based on AMBAG's 2014 Regional Growth Forecast and includes socioeconomic assumptions for population, housing and employment. The 2040 MTP/SCS is based on the Draft 2018 Regional Growth Forecast, which includes new data and analysis of the current economy to provide a more accurate assessment of future growth, including updated population forecasts that are lower by 18,000-27,400 depending on the horizon year than the 2014 Regional Growth Forecast (i.e., for 2020 the Draft 2018 Regional Growth Forecast population forecast is 18,000 less than the 2014 Regional Growth Forecast, and for 2035 the Draft 2018 Regional Growth Forecast population forecast is 27,400 less than the 2014 Regional Growth Forecast). Differences in socioeconomic assumptions and forecast horizons are attributed to updated data providing more accurate assumptions for the post-recession economy and socioeconomic conditions in the region. These differences do not represent a significant impact regarding plan inconsistency, and the population forecast for the 2040 MTP/SCS is within the forecast on which the 2012-2015 AQMP is based.

Despite these differences, the policies and land use patterns facilitated by the 2040 MTP/SCS are projected to reduce emissions of ozone precursors below 2015 baseline levels, as discussed in Impact AQ-3 (see Table 12). This decrease in emissions is due to the proposed transportation improvements and land use projects envisioned by the 2040 MTP/SCS, which selectively increases residential and commercial land use capacity within high quality transit corridors. To accommodate future growth in the region while reducing emissions, the strategy of the 2040 MTP/SCS is to increase density along transit corridors to encourage active and public transportation. Shifting a greater share of future growth to these transit corridors, ultimately increasing density, would improve circulation and multimodal connections (refer to Section 4.14, *Transportation and Circulation*).

The 2040 MTP/SCS would not conflict with the population forecast in the AQMP, and would reduce emissions of ozone precursors below 2015 baseline levels. Therefore, implementation of the 2040 MTP/SCS would not conflict with or obstruct implementation of the AQMP, and this impact would be less than significant.

Mitigation Measures

None required.

Threshold 2:	Violate any air quality standard or contribute substantially to an existing or projected air quality violation
Threshold 3:	Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is nonattainment under an applicable federal or state ambient air quality standard (including releasing emissions which exceed quantitative guidelines for ozone precursors)

Impact AQ-2 CONSTRUCTION ACTIVITIES ASSOCIATED WITH TRANSPORTATION PROJECTS UNDER THE 2040 MTP/SCS, AS WELL AS THE LAND USE PROJECTS ENVISIONED BY THE 2040 MTP/SCS, WOULD CREATE FUGITIVE DUST AND OZONE PRECURSOR EMISSIONS AND COULD VIOLATE AIR QUALITY STANDARDS, CONTRIBUTE SUBSTANTIALLY TO EXISTING OR PROJECTED AIR QUALITY VIOLATIONS, OR RESULT IN A CUMULATIVELY CONSIDERABLE NET INCREASES IN PM_{10} OR OZONE PRECURSOR EMISSIONS. THIS IMPACT WOULD BE SIGNIFICANT AND UNAVOIDABLE.

There are three primary sources of short-term emissions that would be generated by construction of future transportation projects under the 2040 MTP/SCS, as well as the land use projects envisioned by the 2040 MTP/SCS:

1. Operation of the construction vehicles (i.e., scrapers, loaders, dump trucks);
2. The creation of fugitive dust during clearing and grading; and
3. The use of asphalt or other oil-based substances during the final construction phases, which also generate nuisance odors.

The significance of daily emissions, particularly ROG and NO_X emissions, generated by construction equipment utilized to build 2040 MTP/SCS transportation improvements and future development facilitated by the SCS land use scenario would depend on the type and quantity of equipment used and the hours of operation. The amount of ROG emissions generated by oil-based substances such as asphalt is dependent upon the type and amount of asphalt utilized. The significance of fugitive dust ($PM_{2.5}$ and PM_{10}) emissions would depend upon the following factors: (1) the aerial extent of disturbed soils; (2) the length of disturbance time; (3) whether existing structures are demolished; (4) whether excavation is involved (including the potential removal of underground storage tanks); and (5) whether transport of excavated materials offsite is necessary.

Intersection improvements such as signalization, re-striping, or signal coordination are not expected to generate significant short-term emissions impacts. However, other 2040 MTP/SCS projects as well as future development facilitated by the SCS land use scenario may involve grading and paving, or the construction of permanent facilities. For example, substantial grading and paving would be required for large highway improvements such as the SR 156 Corridor Widening Project. The precise quantity of emissions would need to be determined at the time of proposed construction of a given transportation improvement or development project. These emissions would be compared to MBARD's construction thresholds, as listed in Significance Thresholds in Section 1.1.2(a). Although any individual improvement or development project may not generate significant short-term emissions, it is probable that several projects would be under construction simultaneously, generating cumulative construction emissions that could impact air quality. Short-term impacts would be significant because construction emissions could violate air quality standards, contribute substantially to existing or projected air quality violations, or result in a cumulatively considerable net increases in PM_{10} or ozone precursor emissions. Implementation of mitigation measures for individual projects, would reduce PM10 and ozone precursor emissions. However, this impact would remain significant and unavoidable.

Mitigation Measures

For transportation projects under their jurisdiction, TAMC, SBtCOG and SCCRTC shall implement, and transportation project sponsor agencies can and should implement, the following mitigation measures developed for the 2040 MTP/SCS program where applicable for transportation projects that result in fugitive dust and ozone precursor emissions. Cities and counties in the AMBAG region can and should implement these measures, where relevant to land use projects implementing the 2040 MTP/SCS. Project-specific environmental documents may adjust these mitigation measures as necessary to respond to site-specific conditions.

AQ-2(a) Application of MBARD Feasible Mitigation Measures

For all projects, the implementing agency shall incorporate the most recent MBARD feasible mitigation measures and/or technologies for reducing inhalable particles based on analysis of individual sites and project circumstances. Current MBARD feasible mitigation measures include the following. Additional and/or modified measures may be adopted by MBARD prior to implementation of individual projects under the 2040 MTP/SCS. The most current list of feasible mitigation measures at the time of project implementation shall be used.

- Water all active construction areas at least twice daily. Frequency should be based on the type of operation, soil and wind exposure.
- Prohibit all grading activities during periods of high wind (over 15 mph).
- Apply chemical soil stabilizers on inactive construction areas (disturbed lands within construction projects that are unused for at least four consecutive days).
- Apply non-toxic binders (e.g., latex acrylic copolymer) to exposed areas after cut and fill operations and hydro seed area.
- Haul trucks shall maintain at least 2’0“ of freeboard.
- Cover all trucks hauling dirt, sand, or loose materials.
- Plant tree windbreaks on the windward perimeter of construction projects if adjacent to open land.
- Plant vegetative ground cover in disturbed areas as soon as possible.
- Cover inactive storage piles.
- Install wheel washers at the entrance to construction sites for all exiting trucks.
- Pave all roads on construction sites.
- Sweep streets if visible soil material is carried out from the construction site.
- Limit the area under construction at any one time.
- Post a publicly visible sign which specifies the telephone number and person to contact regarding dust complaints. This person shall respond to complaints and take corrective action within 48 hours. The phone number of the Monterey Bay Air Resources District shall be visible to ensure compliance with Rule 402 (Nuisance).

Implementing Agencies
Implementing agencies for AMBAG transportation projects include RTPAs and transportation project sponsor agencies. Implementing agencies for land use projects include cities and counties.

AQ-2(b) Diesel Equipment Emissions Standards

The implementing agency shall ensure, to the maximum extent feasible, that diesel construction equipment meeting CARB Tier 4 emission standards for off-road heavy-duty diesel engines is used. If use of Tier 4 equipment is not feasible, diesel construction equipment meeting Tier 3 (or if infeasible, Tier 2) emission standards shall be used. These measures shall be noted on all construction plans and the implementing agency shall perform periodic site inspections.

Implementing Agencies
Implementing agencies for AMBAG transportation projects include RTPAs and transportation project sponsor agencies. Implementing agencies for land use projects include cities and counties.

AQ-2(c) Electric Construction Equipment

The implementing agency shall ensure that to the extent possible, construction equipment utilizes electricity from power poles rather than temporary diesel power generators and/or gasoline power generators.

Implementing Agencies
Implementing agencies for AMBAG transportation projects include RTPAs and transportation project sponsor agencies. Implementing agencies for land use projects include cities and counties.

Significance After Mitigation

Implementation of Measures AQ-2(a) through AQ-2(c) would be required to reduce these emissions related to short-term construction emissions from individual projects and thus reduce the severity of impacts. However, implementation of these measures would not guarantee that the impact would be reduced to less than significant. Thus, because it cannot be determined if Measures AQ-2(a) through AQ-2(c) would fully mitigate the significant impact, this impact would remain significant and unavoidable. No additional mitigation measures to reduce this impact to less-than-significant levels are feasible.

Threshold 2:	Violate any air quality standard or contribute substantially to an existing or projected air quality violation
Threshold 3:	Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is nonattainment under an applicable federal or state ambient air quality standard (including releasing emissions which exceed quantitative guidelines for ozone precursors)

Impact AQ-3 IMPLEMENTATION OF THE 2040 MTP/SCS WOULD REDUCE OZONE PRECURSORS COMPARED TO 2015 EXISTING CONDITIONS. HOWEVER, IMPLEMENTATION OF THE 2040 MTP/SCS WOULD INCREASE PM_{10} EMISSIONS COMPARED TO 2015 EXISTING CONDITIONS, WHICH COULD CONTRIBUTE SUBSTANTIALLY TO A PROJECTED AIR QUALITY VIOLATION. LONG-TERM OPERATIONAL IMPACTS RELATED TO PM_{10} EMISSIONS WOULD BE SIGNIFICANT AND UNAVOIDABLE.

Projected on-road vehicle emissions of ozone precursors and particulate matter on the AMBAG transportation network and land use emissions in the AMBAG region for the year 2040 were compared to 2015 existing conditions. Table 12 compares the existing conditions for these pollutants in 2015 and 2040 conditions with implementation of the 2040 MTP/SCS. The conditions in 2040 without implementation of the 2040 MTP/SCS are also shown for informational purposes.

Table 12 Regional Emissions Analysis

Scenario	ROG (tons/day)	NO_X (tons/day)	PM_{10} (tons/day)[1]
2015 AMBAG Baseline			
On-Road Motor Vehicles	6.69	15.10	1.13
Land Use Emissions	51.95	23.23	42.46
Total Regional Emissions	58.64	38.33	43.59
2040 No Project			
On-Road Motor Vehicles	1.86	2.93	1.14
Land Use Emissions	54.37	16.24	54.10
Total Regional Emissions	56.23	19.17	55.24
2040 MTP/SCS			
On-Road Motor Vehicles	1.85	2.91	1.14
Land Use Emissions	54.37	16.24	54.10
Total Regional Emissions	56.22	19.15	55.24

[1] PM_{10} includes tire wear and brake wear emissions.

Source: On-road motor vehicle emissions were calculated by AMBAG using EMFAC. Land use emissions were estimated based on the 2012-2015 AQMP for ROG and NO_X and 2016 CARB data for PM_{10} (refer to Table 11). Refer to 2040 MTP/SCS Chapter 5 and Appendix G for complete methodology.

For mobile source emissions, projected 2040 emissions for ROG and NO_X with implementation of the 2040 MTP/SCS would be below the 2015 AMBAG baseline, and emissions of aPM_{10} would be slightly above the baseline. This result for ROG and NO_X is consistent with the State-wide downward trend as a result of CARB rules designed to reduce emissions from cars and trucks. ROG emissions are primarily due to gasoline vehicles and are lower due to improvements in vehicle emission rates (CARB 2013). NO_X emissions are primarily sourced from trucks and are substantially lower due to CARB rules designed to reduce NO_X emissions from diesel trucks and buses.

However, PM_{10} emissions from all sources would increase by 11.65 tons per day compared to the 2015 AMBAG baseline. Operational emissions from development projects implementing the SCS land use scenarios would be the major cause of this increase, although many sources of this increase would be controlled by MBARD regulations. Given this increase in PM_{10} emissions, long-term operational impacts would be significant because they could contribute substantially to a projected air quality violation.

In addition to ozone precursors and particulate matter, MBARD also regulates emissions of CO and SO_X. The primary source of CO is the use of gasoline-powered engines, with automobiles being the primary contributor. The primary source of SO_X is fuel combustion, while chemical plants, sulfur recovery plants and metal processing are minor contributors (U.S. EPA 2017). MBARD has not developed regional emissions inventories or projections for CO and SO_X. However, because both of these pollutants are primarily associated with fuel combustion and transportation, this analysis evaluates the change in CO and SO_X emissions associated with on-road motor vehicles, based on data and projections developed by AMBAG using EMFAC. The 2015 baseline emissions from on-road motor vehicles would be 56.0 tons/day of CO and 0.08 ton/day of SO_X. In 2040 without implementation of the 2040 MTP/SCS, emissions from on-road motor vehicles would be 12.90

tons/day of CO and 0.06 ton/day of SO_X. In 2040 with implementation of the 2040 MTP/SCS emissions from on-road motor vehicles would be 12.9 tons/day of CO and 0.06 ton/day of SO_X (refer to Chapter 5 and Appendix G of the 2040 MTP/SCS for complete methodology). Therefore, for mobile source emissions, projected 2040 emissions for CO and SO_X with implementation of the 2040 MTP/SCS would be below the 2015 AMBAG baseline.

Mitigation Measures

The 2040 MTP/SCS already includes policies, alternative transportation projects and transportation demand management projects which would encourage the use of transportation modes other than passenger vehicles. However, the expected growth in the AMBAG region would still result in higher regional PM_{10} emissions compared to existing conditions. For land use projects under their jurisdiction, the cities and counties in the AMBAG region can and should implement the following measures to reduce PM_{10} emissions, where relevant to land use projects implementing the 2040 MTP/SCS. Project-specific environmental documents may adjust these mitigation measures as necessary to respond to site-specific conditions.

AQ-3 Project-Level PM_{10} Emissions Reduction

Implementing agencies shall evaluate PM_{10} emissions as part of project-specific CEQA review and discretionary approval decisions for land use projects in the NCCAB. Where project-level significant impacts are identified, implementing agencies shall identify and implement measures that reduce PM_{10} emissions below MBARD standards to the extent feasible. PM_{10} emissions reduction measures may include:

- Require new residential and commercial construction to apply dust suppressants, including water and non-toxic surfactants, and to comply with the maximum feasible dust and emissions control measures recommended by MBARD, to reduce particulate matter emissions from construction areas.
- Require new construction projects to use the newest available (Tier 3 or better) construction equipment, which generate lower emissions of diesel particulate matter when operating.
- Require new development to contribute mitigation fees to the MBARD Carl Moyer grant incentive programs that provide funding for regional PM10-reduction measures, including replacement of diesel engines in buses and other vehicles that reduce emissions of diesel particulate matter in the District.

Implementing Agencies
Implementing agencies for land use projects include cities and counties.

In addition, Mitigation Measure T-5, described in Section 4.14, *Transportation and Circulation*, requires implementing agencies to evaluate VMT as part of project-specific CEQA review and discretionary approval for land use projects, and to identify and implement measures that reduce VMT. Reducing VMT would further reduce PM_{10} emissions from entrained dust and diesel and gasoline fuel combustion.

Significance After Mitigation

If implementing agencies adopt and require the mitigation described above, impacts would be reduced because PM_{10} emissions from land use projects would be reduced. However, implementation of project-level daily PM_{10}-reducing measures may not be feasible and cannot be guaranteed on a project-by-project basis. Additionally, it is unlikely that an increase in daily PM_{10}

emissions above existing conditions could be fully avoided in 2040, due to factors unrelated to discretionary approvals, such as population growth in the region. Therefore, this impact would remain significant and unavoidable. No additional feasible mitigation measures are available that would reduce daily emissions below the 2015 AMBAG baseline.

Threshold 4:	Expose sensitive receptors to substantial pollutant concentrations
Threshold 5:	Create objectionable odors affecting a substantial number of people

Impact AQ-4 IMPLEMENTATION OF THE 2040 MTP/SCS WOULD NOT RESULT IN A SIGNIFICANT REGIONAL INCREASE IN TOXIC AIR EMISSIONS OR ODOROUS COMPOUNDS WHEN COMPARED TO 2015 EXISTING CONDITIONS. HOWEVER, FUTURE GROWTH AND DEVELOPMENT FACILITATED BY THE 2040 MTP/SCS LAND USE SCENARIO COULD EXPOSE SENSITIVE RECEPTORS TO SUBSTANTIAL HAZARDOUS AIR POLLUTANT CONCENTRATIONS AND OBJECTIONABLE ODORS. IMPACTS WOULD BE SIGNIFICANT AND UNAVOIDABLE.

Diesel particulate matter is classified as the primary airborne carcinogen in the State. CARB reports that diesel particulate matter represents about 70 percent of the potential cancer risk from vehicle travel on a typical urban freeway. As discussed above, the significance threshold for long-term public health risk is set at 10 excess cancer cases in a million for cancer risk. For non-cancer risk (i.e., chronic or acute risk), the significance level is set at a hazard index of greater than 1.0. If a formal health risk assessment shows that a significant impact results, mitigation measures to reduce the predicted levels of toxic air pollutants from the facility to a level of insignificance may be imposed by the lead agency. In addition, diesel exhaust has a distinct odor, which is primarily a result of hydrocarbons and aldehydes contained in diesel fuel. In addition to the health risks associated with diesel exhaust, the odors associated with diesel exhaust could be a nuisance to nearby receptors.

Since exposure of toxic air contaminants is primarily based on local parameters (e.g., average daily traffic on local roadway segments and wind direction in relation to source and receptor), health risks adjacent to high volume roadways and transportation facilities would remain higher than regional averages. To assess the impact of diesel on regional roadways, an analysis of on-road mobile source diesel $PM_{2.5}$ and PM_{10} emissions (primary) and diesel NO_X, SO_X, and CO (as surrogates for secondary PM_{10}) is shown in Table 13, which compares the existing conditions in 2015 and 2040 conditions with implementation of the 2040 MTP/SCS. The conditions in 2040 without implementation of the 2040 MTP/SCS are also shown for informational purposes. Projected emissions for 2040 with implementation of the 2040 MTP/SCS would result in lower diesel $PM_{2.5}$, PM_{10}, NO_X, and CO emissions, and the same amount of diesel SO_X emissions when compared to the 2015 AMBAG baseline. Since on-road mobile emissions with implementation of the 2040 MTP/SCS would decrease or remain the same for all pollutants compared to existing 2015 conditions, impacts related to diesel particulate matter exposure and associated health risks and nuisance odors at the regional level would be less than significant.

Table 13 On-Road Mobile Source Diesel Toxics Comparison

Scenario	Diesel $PM_{2.5}$ (tons/day)	Diesel PM_{10} (tons/day)[1]	Diesel NO_X (tons/day)	Diesel SO_X (tons/day)	Diesel CO (tons/day)
2015 AMBAG Baseline	0.22	0.43	8.25	0.02	1.46
2040 No Project	0.09	0.22	1.89	0.02	0.62
2040 MTP/SCS	0.09	0.22	1.89	0.02	0.62

[1] PM_{10} includes tire wear and brake wear emissions.

Source: On-road mobile source diesel toxics emissions were calculated by AMBAG using EMFAC. Refer to 2040 MTP/SCS Chapter 5 and Appendix G for complete methodology.

While overall toxic air contaminant concentrations, health risks and associated odors within any given distance of mobile sources in the region would generally decrease with implementation of the MTP/SCS (refer to Table 13), exposure is primarily based on local parameters such as average daily traffic (ADT) on local roadway segment, or wind direction in relation to source and receptor. As such, the health risks and nuisance odors adjacent to high volume roadways and transportation facilities (e.g., State Highway 1 and U.S. Highway 101) would remain higher than regional averages. See Section 4.14, *Transportation and Circulation*, for a description of high volume roadways and transportation facilities, such as railways, in the AMBAG region.

The population residing close to freeways or busy roadways may experience adverse health effects beyond those typically found in urban areas. In the *Air Quality and Land Use Handbook: A Community Health Perspective* (CARB 2011), CARB recommends avoiding siting new sensitive land uses, such as residences, schools, daycare centers, playgrounds, or medical facilities, within 500 feet of a freeway, urban roads with 100,000 vehicles/day, or rural roads with 50,000 vehicles/day. Although no high capacity urban or rural roadways exist in the AMBAG region, there are six major highway routes (Highway 1, 9, 17, 25, 68 and 101). Additional non-cancer health risk attributable to proximity to freeways was seen within 1,000 feet and was strongest within 300 feet. California freeway studies show about a 70 percent drop-off in particulate pollution levels at 500 feet (CARB 2005). As discussed above, proximity to freeways increases cancer risk and exposure to particulate matter. Similarly, proximity to heavily-travelled transit corridors and intersections would expose residents to higher levels of diesel particulate matter and carbon monoxide.

Vehicle delay, especially along corridors near sensitive residential receptors, increases idling emissions and associated health risks for nearby receptors. This increase in delay is largely a result of population growth that is anticipated throughout the region by 2040. As described in Section 4.14, *Transportation and Circulation*, although the 2040 MTP/SCS would reduce daily vehicle hours of delay in the region as a whole in 2040 when compared to conditions without the 2040 MTP/SCS, the 2040 MTP/SCS would nevertheless increase daily vehicle hours of delay compared to the 2015 baseline.

As discussed in Section 2.0, *Project Description*, as a result of 2040 MTP/SCS policies and land use scenario, the anticipated growth pattern would concentrate population adjacent to transit and other transportation facilities that could result in more people being exposed to elevated health risks and nuisance odors as compared to areas of the region more distant from such facilities. The location and pattern of the proposed 2040 MTP/SCS growth would influence travel behavior. A compact growth pattern served by an efficient and diverse transportation system facilitates a reduction in automotive travel and increases walking, bicycling and transit use—all of which reduce individual vehicle trips and associated vehicle delay (refer to Section 4.14, *Transportation and*

Circulation). Reduced vehicle delay and vehicle trips are directly linked to reduced regional criteria air pollutant emissions and toxic air emissions from mobile sources.

It is important to note that a variety of other factors contribute to the declines in contaminant emissions compared to existing conditions, including vehicle technology, cleaner fuels and fleet turnover. However, in order to achieve the greatest VMT reductions from a compact growth pattern, development also must necessarily be in relatively close proximity to public transit and major roadway corridors such as Highway 1 or U.S. Highway 101. Although the precise location and density of such development is not known at this time, the proposed 2040 MTP/SCS could result in new sensitive receptors close to existing and new hazardous air pollutant sources, potentially resulting in the exposure of sensitive receptors to substantial hazardous air pollutant concentrations and objectionable odors. Therefore, impacts would be significant. The siting of new sensitive receptors would be subject to an individual jurisdiction's land use approval processes and would be analyzed on an individual project basis and subject to mitigation measures identified below.

Mitigation Measures

For transportation projects under their jurisdiction, TAMC, SBtCOG and SCCRTC shall implement, and transportation project sponsor agencies can and should implement, the following mitigation measures developed for the 2040 MTP/SCS program where applicable for transportation projects. Cities and counties in the AMBAG region can and should implement these measures, where relevant to land use projects implementing the 2040 MTP/SCS. Project-specific environmental documents may adjust these mitigation measures as necessary to respond to site-specific conditions.

AQ-4 Health Risk Reduction Measures

Transportation implementing agencies shall implement the following measures:

- Retain a qualified air quality consultant to prepare a health risk assessment (HRA) in accordance with CARB and OEHHA requirements to determine the exposure of nearby residents to TAC concentrations.
- If impacts result in increased risks to sensitive receptors above significance thresholds, Plant trees and/or vegetation suited to trapping TACs and/or sound walls between sensitive receptors and the pollution source. This measure would trap TACs emitted from pollution sources such as highways, reducing the amount of TACs to which residents and other sensitive populations would be exposed.

In addition, consistent with the general guidance contained in CARB's Air Quality and Land Use Handbook (April 2005) and Technical Advisory on Strategies to Reduce Air pollution Exposure Near High-Volume Roadways (April 2017), for land use projects, appropriate and feasible measures shall be incorporated into project building design for residential, school and other sensitive uses located within 500 feet, or other distance as determined by the lead agency, of freeways, heavily travelled arterials, railways and other sources of diesel particulate matter, including roadways experiencing significant vehicle delays (CARB 2005). The appropriate measures shall include one or more of the following methods, as determined by a qualified professional, as applicable. The implementing agency shall incorporate health risk reduction measures based on analysis of individual sites and project circumstances. These measures may include:

- Avoid siting new sensitive land uses within 500 feet of a freeway or railway.

- Require development projects for new sensitive land uses to be designed to minimize exposure to roadway-related pollutants to the maximum extent feasible through inclusion of design components including air filtration and physical barriers.
- Do not locate sensitive receptors near the entry and exit points of a distribution center.
- Locate structures and outdoor living areas for sensitive uses as far as possible from the source of emissions. As feasible, locate doors, outdoor living areas and air intake vents primarily on the side of the building away from the freeway or other pollution source. As feasible, incorporate dense, tiered vegetation that regains foliage year-round and has a long life span between the pollution source and the project.
- Maintain a 50-foot buffer from a typical gas dispensing facility (under 3.6 million gallons of gas per year).
- Install, operate and maintain in good working order a central heating and ventilation (HV) system or other air take system in the building, or in each individual residential unit, that meets the efficiency standard of the MERV 13. The HV system should include the following features: Installation of a high efficiency filter and/or carbon filter-to-filter particulates and other chemical matter from entering the building. Either HEPA filters or ASHRAE 85% supply filters should be used. Ongoing maintenance should occur.
- Retain a qualified HV consultant or Home Energy Rating Systems (HERS) rater during the design phase of the project to locate the HV system based on exposure modeling from the mobile and/or stationary pollutant sources.
- Maintain positive pressure within the building.
- Achieve a performance standard of at least one air exchange per hour of fresh outside filtered air.
- Achieve a performance standard of at least 4 air exchanges per hour of recirculation. Achieve a performance standard of 0.25 air exchanges per hour of in unfiltered infiltration if the building is not positively pressurized.
- Require project owners to provide a disclosure statement to occupants and buyers summarizing technical studies that reflect health concerns about exposure to highway exhaust emissions.
- Implement feasible attenuation measures needed to reduce potential air quality impacts to sensitive receptors such as air filtration systems.

Implementing Agencies

Implementing agencies for AMBAG transportation projects include RTPAs and transportation project sponsor agencies. Implementing agencies for land use projects include cities and counties.

Significance After Mitigation

Although implementation of the above mitigation would reduce health risks, individual receptors may still be exposed to substantial hazardous air pollutant concentrations that would have significant health risk effects. Therefore, this impact remains significant and unavoidable. No additional mitigation measures to reduce this impact to less-than-significant levels are feasible.

Threshold 4: Expose sensitive receptors to substantial pollutant concentrations

Impact AQ-5 RE-ENTRAINED DUST HAS THE POTENTIAL TO INCREASE AIRBORNE PM_{10} AND $PM_{2.5}$ LEVELS IN MONTEREY, SAN BENITO AND SANTA CRUZ COUNTIES. THE INCREASE IN GROWTH EXPECTED THROUGH THE 2040 MTP/SCS PLANNING HORIZON WOULD RESULT IN ADDITIONAL VEHICLE MILES TRAVELED COMPARED TO BASELINE CONDITIONS, WHICH WOULD ADD TO THE PARTICULATE EMISSIONS LEVELS IN THE AREA. HOWEVER, TOTAL RE-ENTRAINED DUST LEVELS WOULD BE LOWER WITH IMPLEMENTATION OF THE 2040 MTP/SCS THAN 2015 EXISTING CONDITIONS. IMPLEMENTATION OF MBARD CONTROL MEASURES WOULD FURTHER REDUCE SUCH EMISSIONS. THEREFORE, IMPACTS WOULD BE LESS THAN SIGNIFICANT.

Re-entrained dust refers to roadway dust that is "kicked up" by moving vehicles on paved and unpaved roadways. This type of dust would be generated by roadway activity. In addition, dust from construction activity would add to regional dust levels. The synergistic effects of road dust (typically measured as PM_{10}) with ozone and the hazardous constituents of re-entrained road dust itself (carcinogens, irritants, pathogens) may affect human heath by contributing to respiratory illnesses such as asthma and allergies. Although motor vehicle emission control advances have allowed vehicle tailpipe emissions of some pollutants to decrease over the last 20 years, the number of vehicles in use and the amount of vehicle activity has continued to increase. This would suggest that re-entrained road dust has increased as well, as the amount of re-entrained dust is related to the number of vehicles on a road.

Table 14 compares total particulate emissions for the existing conditions in 2015 and 2040 conditions with implementation of the 2040 MTP/SCS. The conditions in 2040 without implementation of the 2040 MTP/SCS are also shown for informational purposes. As shown in Table 14, total particulate emissions would be lower with implementation of the 2040 MTP/SCS compared to existing conditions.

Table 14 Mobile Source Particulate (PM_{10} + $PM_{2.5}$) Emissions

Scenario	PM_{10} Emissions (tons/day)	$PM_{2.5}$ Emissions (tons/day)	Total PM (PM_{10} + $PM_{2.5}$) Emissions (tons/day)
2015 AMBAG Baseline	1.13	0.56	1.69
2040 No Project	1.14	0.47	1.61
2040 MTP/SCS	1.14	0.47	1.61

Source: Regional emissions were calculated by AMBAG using EMFAC. Total PM includes both PM_{10} and $PM_{2.5}$. Mobile source emissions were calculated by AMBAG using EMFAC. Refer to 2040 MTP/SCS Chapter 5 and Appendix G for complete methodology.

MBARD fugitive dust control measures described in Table 15 would further reduce re-entrained dust from unpaved roads within the region. In 2003, the California Legislature enacted Senate Bill 656 (SB 656) to reduce public exposure of airborne particulate matter. SB 656 required CARB to develop and adopt by January 1, 2005 a list of readily available, feasible and cost-effective control measures that could be employed by CARB and local air districts (i.e., MBARD) to reduce PM_{10} and $PM_{2.5}$. In response to SB 656, MBARD identified several control measures aimed at reducing PM_{10} and $PM_{2.5}$ emissions. The most applicable measures to mobile emissions listed in Table 15, specifically to re-entrained road dust, are D-1 and D-2. D-1 encourages the use of dust suppressants, including watering or gravel, applying non-toxic surfactants on unpaved roads and related equipment staging areas, recommending speed limits, limiting access to infrequently used unpaved roads or parking

areas and in situations involving high volumes of traffic (>100 vehicles per day), considering paving on a case by case basis. D-2 is an extension or enhancement of D-1 and evaluates the impact of vehicle speed on unpaved roads in creating fugitive dust, visibility impairment, nuisance and dust deposition in areas along the roadway corridor. All projects would be required to comply with the fugitive dust control measures listed in Table 12. Therefore, compliance with MBARD Fugitive Dust Control Measures would further reduce re-entrained road dust and impacts would be less than significant because sensitive receptors would not be exposed to substantial pollutant concentrations associated with re-entrained road dust.

Table 15 MBARD Fugitive Dust Control Measures

No.	Measure Description	Target Pollutant	Measure Type	Implementation Date
D-1	Unpaved Roads – Best Management Practices (BMPs)	Fugitive Dust	Educational and Grants	December 2006
D-2	Unpaved Roads – Speed Limit	Fugitive Dust	Educational or Regulatory	December 2006
D-3	Agricultural Tilling/Land Planning	Fugitive Dust	Policy	December 2006
D-4	Sea Salt Exemption	None	Regulatory	March 2006
D-5a	Mineral Processing	Fugitive Dust	Contingency Measure	June 2007
D-5b	Cement Manufacturing	Fugitive Dust	Regulatory	Implemented with Mineral Processing measure
D-6a	Integrate Air Quality Management Plan for Ozone	Secondary PM	Regulatory	June 2007
D-6b	Integrate Smoke Management Program	Smoke	Regulatory	June 2007
D-6c	Integrate Environmental Review Under CEQA	Fugitive Dust	Regulatory	October 2006
D-6d	Integrate Air Toxic Control Measure for Naturally Occurring Asbestos	Fugitive Dust	Regulatory	June 2007
D-6e	Integrate Expanding Moyer Program (AB 923)	Diesel Exhaust	Grants	June 2006
D-6f	Integrate Department of Motor Vehicles Renewal Fees (AB 2766)	PM_{10}	Educational and Grants	June 2006
D-7	Air Toxic Control Measure for Agricultural Irrigation Pumps	Fugitive Dust	Grants	June 2007

*All control measures adopted on December 14, 2005.

Source: MBARD 2005.

Mitigation Measures

None required.

c. Specific MTP Projects That May Result in Impacts

The proposed projects listed in Appendix B and summarized in Section 2.0, *Project Description*, would have the potential to result in air quality impacts. All projects that include a construction component would contribute to Impact AQ-2. Projects that include roadway, rail and transit features and/or expansions would contribute to Impacts AQ-3 through AQ-5. Moreover, any project that would expose sensitive receptors to hazardous air pollutants would contribute to Impact AQ-4. Additional specific analysis would be conducted as the individual projects are designed and implemented in order to determine the actual magnitude of impact. Mitigation measures discussed above could apply to these specific projects. Table 16 highlights 2040 MTP/SCS transportation projects that may result in air quality impacts as discussed above. Listed projects are representative of the types of air quality impacts and the types of transportation projects that may be affected in different localities.

Table 16 2040 MTP/SCS Projects that May Result in Air Quality Impacts

AMBAG Project No.	Projects	Location	Impact	Description of Impact
MON-CT044-SL	U.S. 101 – Harris Road Interchange	Monterey County	AQ-2, AQ-3, AQ-4, AQ-5	Potential impacts from construction equipment grading, dust, vehicle emissions
MON-CT031-CT	U.S. 101 – South County Frontage Roads	Monterey County	AQ-2, AQ-3, AQ-4, AQ-5	Potential impacts from construction equipment grading, dust, vehicle emissions
MON-CT030-SL	U.S. 101 – Salinas Corridor	Monterey County	AQ-2, AQ-3, AQ-4, AQ-5	Potential impacts from construction equipment grading, dust, vehicle emissions
SC-AIR-P01-WAT	Lump Sum Watsonville Municipal Airport Capital Projects	Santa Cruz County	AQ-2, AQ-3, AQ-4, AQ-5	Potential impacts from construction equipment grading, dust, vehicle emissions
SC-RTC-24e-RTC	Highway 1 – Auxiliary Lanes from Park Avenue to Bay Avenue/Porter Street	Santa Cruz County	AQ-2, AQ-3, AQ-4, AQ-5	Potential impacts from construction equipment grading, dust, vehicle emissions
SC-SC-P81-SCR	Highway 1/Mission Street at Chestnut/King/Union Intersection Modification	Santa Cruz County	AQ-2, AQ-3, AQ-4, AQ-5	Potential impacts from construction equipment grading, dust, vehicle emissions

d. Cumulative Analysis

As discussed in Section 3.4.3, the cumulative impact analysis area includes the AMBAG planning region as well as seven adjoining counties: San Mateo, Santa Clara, Merced, Fresno, Kings, Kern and San Luis Obispo. The AMBAG planning region falls within the jurisdiction of MBARD, while the adjoining counties fall within the jurisdiction of the Bay Area Air Quality Management District, San Joaquin Valley Air Pollution Control District, or San Luis Obispo Air Pollution Control District. Each of these four air districts has prepared an air quality plan to improve conditions and meet federal and state air quality standards. While each air district is primarily responsible for regulating its own emissions, the transport of emissions in one area can affect another area's ability to achieve attainment of pollutant standards. All four air districts currently exceed at least one federal and/or state air quality standard. Construction activities associated with transportation projects under the

2040 MTP/SCS, as well as the land use projects envisioned by the 2040 MTP/SCS, would create fugitive dust and ozone precursor emissions and have the potential to result in temporary adverse impacts on air quality. Although regional ozone precursors would be reduced with the 2040 MTP/SCS compared to existing 2015 conditions, regional PM_{10} emissions would increase beyond existing conditions leading to a significant cumulative impact. Therefore, the 2040 MTP/SCS would have a cumulatively considerable contribution to regional air quality impacts. The 2040 MTP/SCS contribution would remain cumulatively considerable after mitigation because it cannot be guaranteed that all future project-level impacts can be mitigated to a less than significant level.

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