F. AIR QUALITY AND GLOBAL CLIMATE CHANGE

This section describes current climate and air quality conditions within and surrounding the Study Area as well as the potential impacts to climate and air quality that could result from the implementation of vegetation management and fuel reduction activities as identified in the East Bay Regional Park District's (EBRPD's) Wildfire Hazard Reduction and Resource Management Plan (Plan). The information presented herein has been prepared using methods and assumptions recommended in the air quality impact assessment guidelines of the Bay Area Air Quality Management District (BAAQMD), where applicable.[1] Mitigation measures to reduce or eliminate potentially significant air quality impacts are identified and presented, where appropriate.

1. Setting

The following discussion provides an overview of existing climate and air quality conditions in the region and Study Area. Air quality standards and the regulatory framework relating to air quality are summarized. Climate, air quality conditions, and typical pollutant types and sources are described.

Air quality is a function of local climate combined with local sources of air pollution; it represents the balance of the atmosphere's natural dispersal capacity with emissions of air pollutants from human uses of the environment. Both climate and air quality conditions are considered in wildfire hazard reduction planning.

a. Air Quality Standards, Regulatory Framework, and Attainment Status. Air quality standards, the regulatory framework, and State and federal attainment status are discussed below.

(1) Air Quality Standards. Both the State of California and the federal government have established health-based Ambient Air Quality Standards for six air pollutants: carbon monoxide (CO), ozone (O_3), nitrogen dioxide (NO_2), sulfur dioxide (SO_2), lead (Pb), and suspended particulate matter (PM). In addition, the State has set standards for sulfates, hydrogen sulfide, vinyl chloride, and visibility-reducing particles. These standards are designed to protect the health and welfare of the populace with a reasonable margin of safety.

In addition to primary and secondary Ambient Air Quality Standards, the State has also established a set of episode criteria for O_3, CO, NO_2, SO_2, and PM. These criteria refer to episode levels representing periods of short-term exposure to air pollutants that threaten public health. Health effects are progressively more severe as pollutant levels increase from Stage One to Stage Three.

California Ambient Air Quality Standards and National Ambient Air Quality Standards for the criteria air pollutants are listed in Table IV.F-1. Health effects of these criteria pollutants are described in Table IV.F-2.

(2) Regulatory Framework. The BAAQMD is primarily responsible for regulating air pollution emissions from stationary sources (e.g., factories) and indirect sources (e.g., traffic associated with new development), as well as for monitoring ambient pollutant concentrations. BAAQMD's jurisdiction encompasses seven counties—Alameda, Contra Costa, Marin, San Francisco, San Mateo,

[1] Bay Area Air Quality Management District, 1999. *BAAQMD CEQA Guidelines: Assessing the Air Quality Impacts of Projects and Plans.* December.

Table IV.F-1: Federal and State Ambient Air Quality Standards

Pollutant	Averaging Time	California Standards[a]		Federal Standards[b]		
		Concentration[c]	Method[e]	Primary[b,e]	Secondary[c,f]	Method[g]
Ozone (O_3)	1-Hour	0.09 ppm (180 $\mu g/m^3$)	Ultraviolet Photometry	No federal standard	Same as Primary Standard	Ultraviolet Photometry
	8-Hour	0.07 ppm (137 $\mu g/m^3$)		0.075 ppm (147 $\mu g/m^3$)		
Respirable Particulate Matter (PM_{10})	24-Hour	50 $\mu g/m^3$	Gravimetric or Beta Attenuation	150 $\mu g/m^3$	Same as Primary Standard	Inertial Separation and Gravimetric Analysis
	Annual Arithmetic Mean	20 $\mu g/m^3$		–		
Fine Particulate Matter ($PM_{2.5}$)	24-Hour	No Separate State Standard		35 $\mu g/m^3$	Same as Primary Standard	Inertial Separation and Gravimetric Analysis
	Annual Arithmetic Mean	12 $\mu g/m^3$	Gravimetric or Beta Attenuation	15 $\mu g/m^3$		
Carbon Monoxide (CO)	8-Hour	9.0 ppm (10 mg/m^3)	Nondispersive Infrared Photometry (NDIR)	9 ppm (10 mg/m^3)	None	Nondispersive Infrared Photometry (NDIR)
	1-Hour	20 ppm (23 mg/m^3)		35 ppm (40 mg/m^3)		
	8-Hour (Lake Tahoe)	6 ppm (7 mg/m^3)		–		
Nitrogen Dioxide (NO_2)	Annual Arithmetic Mean	0.030 ppm (56 mg/m^3)	Gas Phase Chemiluminescence	0.053 ppm (100 $\mu g/m^3$)	Same as Primary Standard	Gas Phase Chemilumines cence
	1-Hour	0.18 ppm (339 $\mu g/m^3$)		–		
Lead	30-day average	1.5 $\mu g/m^3$	Atomic Absorption	–	–	High-Volume Sampler and Atomic Absorption
	Calendar Quarter	–		1.5 $\mu g/m^3$	Same as Primary Standard	
Sulfur Dioxide (SO_2)	Annual Arithmetic Mean	–	Ultraviolet Fluorescence	0.030 ppm (80 $\mu g/m^3$)	–	Spectrophoto-metry (Pararosanilin e Method)
	24-Hour	0.04 ppm (105 $\mu g/m^3$)		0.14 ppm (365 $\mu g/m^3$)	–	
	3-Hour	–		–	0.5 ppm (1300 $\mu g/m^3$)	
	1-Hour	0.25 ppm (655 $\mu g/m^3$)		–	–	
Visibility-Reducing Particles	8-Hour	Extinction coefficient of 0.23 per kilometer - visibility of 10 miles or more (0.07–30 miles or more for Lake Tahoe) due to particles when relative humidity is less than 70 percent. Method: Beta Attenuation and Transmittance through Filter Tape.		**No Federal Standards**		
Sulfates	24-Hour	25 $\mu g/m^3$	Ion Chromatography			
Hydrogen Sulfide	1-Hour	0.03 ppm (42 $\mu g/m^3$)	Ultraviolet Fluorescence			
Vinyl Chloride[h]	24-Hour	0.01 ppm (26 $\mu g/m^3$)	Gas Chromatography			

Source: California Air Resources Board (ARB), 2008.

Footnotes:

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

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

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

[d] Any equivalent procedure that can be shown to the satisfaction of the ARB to give equivalent results at or near the level of the air quality standard may be used.

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

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

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

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

Table IV.F-2: Health Effects of Major Criteria Pollutants

Pollutant	Health Effects	Examples of Sources
Suspended Particulate Matter ($PM_{2.5}$ and PM_{10})	• Reduced lung function. • Aggravation of the effects of gaseous pollutants. • Aggravation of respiratory and cardio respiratory diseases. • Increased cough and chest discomfort. • Soiling. • Reduced visibility.	• Stationary combustion of solid fuels. • Construction activities. • Industrial processes. • Atmospheric chemical reactions.
Ozone (O_3)	• Breathing difficulties • Lung damage	• Formed by chemical reactions of air pollutants in the presence of sunlight; common sources are motor vehicles, industries, and consumer products
Carbon Monoxide (CO)	• Chest pain in heart patients • Headaches, nausea • Reduced mental alertness • Death at very high levels	• Any source that burns fuel, such as cars, trucks, construction and farming equipment, and residential heaters and stoves
Nitrogen Dioxide (NO_2)	• Lung damage	• See carbon monoxide sources
Toxic Air Contaminants	• Cancer • Chronic eye, lung, or skin irritation • Neurological and reproductive disorders	• Cars and trucks, especially diesels • Industrial sources such as chrome platers • Neighborhood businesses such as dry cleaners and service stations • Building materials and products

Source: ARB, 2005.

Santa Clara and Napa—and portions of Solano and Sonoma counties. The California Air Resources Board (ARB) and the U.S. Environmental Protection Agency (EPA) regulate direct emissions from motor vehicles.

Federal Regulations. The Federal 1970 Clean Air Act authorized the establishment of national health-based air quality standards and also set deadlines for their attainment. The Federal Clean Air Act Amendments of 1990 changed deadlines for attaining National Ambient Air Quality Standards as well as the remedial actions required of areas of the nation that exceed the standards. Under the Clean Air Act, State and local agencies in areas that exceed the National Ambient Air Quality Standards are required to develop State Implementation Plans to show how they will achieve the National Ambient Air Quality Standards for O_3 by specific dates.

The Clean Air Act requires that projects receiving federal funds demonstrate conformity to the approved State Implementation Plan and local air quality attainment plan for the region. Conformity with the State Implementation Plan requirements would satisfy the Clean Air Act requirements. EPA currently does not regulate greenhouse gas emissions. In Massachusetts v. EPA, decided April 2, 2007, the United States Supreme Court held that the EPA has the statutory authority to regulate emissions of greenhouse gases from motor vehicles. EPA has promoted a number of voluntary programs to reduce greenhouse gas emissions but has not adopted any mandatory regulations or standards.

Bay Area Air Quality Management District. In 1988, the California Clean Air Act required that all air districts in the State endeavor to achieve and maintain California Ambient Air Quality Standards for O_3, CO, SO_2 and NO_2 by the earliest practical date. Plans for attaining California Ambient Air Quality Standards were submitted to the California Air Resource Board by June 30 of the following years: 1991, 1994, 1997, 2000, and 2004. The California Clean Air Act provides air quality districts with new authority to regulate indirect sources and mandates that air quality districts focus particular attention on reducing emissions from transportation and area-wide emission sources. Each district plan is to achieve a 5 percent annual reduction, averaged over consecutive 3-year periods, in district-wide emissions of each nonattainment pollutant or its precursors. Additional physical or economic development within the region would tend to impede the emissions reduction goals of the California Clean Air Act.

The most recent BAAQMD plan for attaining California Ambient Air Quality Standards, the Bay Area 2005 Ozone Strategy, was adopted by BAAQMD's Board of Directors on January 4, 2006. The 2005 Ozone Strategy demonstrates how the San Francisco Bay Area will achieve compliance with the State 1-hour air quality standard for ozone and how the region will reduce transport of ozone and ozone precursors to neighboring air basins. The Ozone Strategy also includes stationary source control measures, mobile source control measures and transportation control measures.

The BAAQMD has begun a process to update the Bay Area 2005 Ozone Strategy. The 2007 Ozone Strategy will be prepared in cooperation with the Metropolitan Transportation Commission (MTC) and the Association of Bay Area Governments (ABAG). The 2007 Ozone Strategy will review progress achieved in the 2004-2006 period, and establish control measures to be adopted in the 2007-2009 timeframe.

BAAQMD Regulation 5 generally prohibits open burning, but allows for exemptions such as agricultural burning; disposal of hazardous materials; fire training; and managed burning of range, forest, and wildlife areas. The following section of Regulation 5 specifically addresses prescribed burning and wildland vegetation management burn requirements:

- Regulation 5, Section 5-200 Definitions.

  5-213 Prescribed Burning: The planned, controlled application of fire to vegetation to achieve a specific natural resource management objective(s) on land areas selected in advance of that application. The fire is conducted within the limits of a plan and prescription that describes both the acceptable range of weather, moisture, fuel and fire behavior parameters to achieve the desired effects. For the purposes of this regulation, prescribed burning also means any Forest Management fire, Range Management fire, Hazardous Material fire not related to Public Resources Code Section 4291, or any Crop Replacement fire for the purpose of establishing an agricultural crop on previously uncultivated land, that is expected to exceed 10 acres in size or burn piled vegetation cleared or generated from more than 10 acres of land. These specific fire types shall be regulated as Wildland Vegetation Management fires and subjected to all of the requirements applicable to subsection 5-401.15. In addition, prescribed burning includes any naturally ignited wildland fire managed for resource benefits that is subject to the applicable requirements in Section 5-408.

- Regulation 5, Section 5-401 Allowable Fires: The following fires may be allowed on permissive burn days:

  401.15 Wildland Vegetation Management: Prescribed burning by a state or federal agency, or through a cooperative agreement or contract involving the state or federal agency, conducted on land predominately covered with chaparral, trees, grass, coastal scrub, or standing brush. Any person seeking to set fires under this provision shall comply with the requirements of Section 5-408 and receive written approval of the smoke management plan by the APCO prior to any burn. Until June 1, 2002, this fire may be conducted on other than a permissive burn day, as defined in Section 5-206, if approved by the APCO pursuant to subsection 5-408.2. Effective June 1, 2002, fires may not be conducted on other than a permissive burn day.

- Regulation 5, Section 5-408 Wildland Vegetation Management Burn Requirements: Any person who seeks to conduct or conducts prescribed burning pursuant to subsection 5-401.5 shall comply with the following requirements:

  408.1 Submit a smoke management plan to the APCO for review at least 30 calendar days prior to the proposed burning that is consistent with the most current USEPA guidance on wildland and prescribed fires (interim Air Quality Policy on Wildland and Prescribed Fires, USEPA 1998, or any subsequent document that supersedes this document), and provides the following information:

  a. location and specific objectives of each proposed burn;
  b. acreage, tonnage, type and arrangement of vegetation to be burned;
  c. directions and distances to nearby sensitive receptor areas;
  d. fuel condition, combustion and metrological prescription elements for the project;
  e. projected burn schedule and expected duration of project ignition, combustion, and burn down (hours or days);
  f. specifications for monitoring and of verifying critical parameters including meteorological conditions and smoke behavior before and during the burn;
  g. specifications for disseminating project information to the public;
  h. contingency actions that will be taken during the burn to reduce exposure if smoke intrusions impact any sensitive receptor area;
  i. certification by a qualified professional resource ecologist, biologist, or forester that the proposed burning is necessary to achieve the specific management objective(s) of the plan;
  j. a copy of the environmental impact analysis prepared for the plan that includes an evaluation of alternatives to burning, if such an analysis was required by state or federal law or statute;
  k. project fuel loading estimate (tons vegetation/acre) by vegetation types(s) and a description of the calculation method; and
  l. particulate matter emissions estimate including referenced emission factor(s) and a description of the calculation method used.

408.2 Until June 1, 2002, permission to burn on other than a permissive burn day shall be governed by the 48-hour forecast issued by the APCO. Effective June 1, 2002, permission to burn shall be governed by the acreage burning allocation issued by the APCO.

408.3 Until June 1, 2002, prior to ignition, notify the APCO on the day of each burn. Effective June 1, 2002, receive and acreage burning allocation from the APCO prior to ignition.

408.4 For each day on which burning occurs, report the total acreage and tonnage of vegetation actually burned to the APCO by telephone no later than 12:00 p.m. local time the following day.

408.5 Within 30 calendar days following completion of the burn project, provide a written post-burn evaluation to the APCO that addresses whether the project objectives were met and describes actual smoke behavior.

EBRPD Fire Weather Operating Plan. EBRPD implements a District-wide system of use restrictions and park closures to allow the District to respond to the changing patterns of weather and fuel conditions that pose fire threats to park users, resources, and neighbors.

Fire weather in EBRPD-jurisdiction lands, including those in the Study Area, is monitored by a network of remote automated weather stations operated by EBRPD and other local agencies. The stations transmit weather data hourly. This data is processed through the National Fire Danger Rating System (NFDRS) via the U.S. Department of Agriculture's National Computer Center in Kansas City. The data processed through the NFDRS provides indices that are used to determine if park closures, restrictions or extra staffing requirements will be invoked. Additionally, the National Weather Service may issue a "fire weather watch," or, in extreme conditions, a "fire weather warning." The District's communications center notifies the Fire Chief, Fire Captain, the on-duty Police Commander, and the Chief of Park Operations upon the issuance of high fire danger warnings. The communications center also issues an "all-call" on the District's radio system to notify park staff of impending fire weather conditions.

The District's General Manager or designee is authorized by law to impose use restrictions or close lands to ensure the health and safety of persons and to protect EBRPD lands and its neighbors during high risk fire weather. Use restrictions during periods of high fire danger range from restricting smoking or open campfires to the closure of parks. When parks are closed due to high fire danger, organized groups may remain in the parks only if directly supervised by park staff. Special Fire Weather Patrols are instituted to contact park visitors and provide fire safety information, or if necessary, assist in closing the park until the high fire danger subsides.

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

The U.S. EPA designates areas for O_3, CO, and NO_2 as either "does not meet the primary standards," or "cannot be classified," or "better than national standards." For SO_2, areas are designated as "does not meet the primary standards," "does not meet the secondary standards," "cannot be classified" or "better than national standards." In 1991, new nonattainment designations were assigned to areas that had previously been classified as Group I, II, or III for PM_{10} based on the likelihood that they would violate national PM_{10} standards. All other areas are designated "unclassified."

Table IV.F-3 provides a summary of the attainment status for the San Francisco Bay Area with respect to national and State ambient air quality standards.

b. Existing Climate and Air Quality. Regional air quality, local climate and air quality in the San Francisco Bay Area, and air pollution climatology are described below. The amount of a given air pollutant in the atmosphere is determined by the amount of pollutant released and the atmosphere's ability to transport and/or dilute that pollutant. The major determinants of transport and dilution are wind, atmospheric stability, terrain and, for photochemical pollutants, sunshine.

(1) Regional Air Quality. The Study Area is located in the western portions of Alameda and Contra Costa Counties, which are located in the East Bay of the San Francisco Bay Area Air Basin, a large, shallow air basin ringed by hills which taper into a number of sheltered valleys around the perimeter. Two primary atmospheric outlets exist: one is through the strait known as the Golden Gate, which is a direct outlet to the Pacific Ocean, and the second extends to the northeast of the San Francisco Bay along the west delta region of the Sacramento and San Joaquin Rivers.

Air quality conditions in the San Francisco Bay Area have improved significantly since the BAAQMD was created in 1955. Ambient concentrations of air pollutants and the number of days in which the region exceeds air quality standards have fallen dramatically. Public health benefits, improved visibility, and reduce damage to plants and materials are among the benefits of this cleaner air. BAAQMD's Bay Area Clean Air Plans (CAPs) contain district-wide control measures to reduce carbon monoxide and ozone precursor emissions. The State standards for these pollutants are more stringent than the federal standards.

(2) Climatological Subregions. The hillside parks within the Study Area follow a generally north-south orientation and serve as the primary wind barrier to prevailing winds from the west, which flows from the San Francisco Bay across the shoreline parks and upslope across the hillside parks. EBRPD's jurisdiction also has varying climatological conditions: the hillside parks are located within both the (1) Diablo and San Ramon Valleys and (2) North Alameda and West Contra Costa Counties climatological subregions.

Diablo and San Ramon Valleys. The eastern borders of Wildcat Canyon, Tilden, Sibley Volcanic, and Redwood regional parks are located adjacent to the Diablo and San Ramon Valley subregion. These valleys, located east of the Coast Range, are oriented northwest to southeast; the northern portion is known as Diablo Valley and the southern portion as San Ramon Valley. The Diablo Valley is bordered to the north by the Carquinez Strait and to the south by the San Ramon Valley; the san Ramon Valley is long and narrow and extends south from the City of Walnut Creek to the City of Dublin. At its southern end, the San Ramon Valley opens onto the Amador Valley.

Table IV.F-3: Bay Area Attainment Status

Pollutant	Averaging Time	California Standards[a]		National Standards[b]	
		Concentration	Attainment Status	Concentration	Attainment Status
Carbon Monoxide (CO)	8-Hour	9 ppm (10 mg/m^3)	Attainment	9 ppm (10 mg/m^3)	Attainment[c]
	1-Hour	20 ppm (23 mg/m^3)	Attainment	35 ppm (40 mg/m^3)	Attainment
Nitrogen Dioxide (NO_2)	Annual Mean	0.030 ppm (56 mg/m^3)	Attainment	0.053 ppm (100 µg/m^3)	Attainment
	1-Hour	0.18 ppm (338 µg/m^3)	Attainment	Not Applicable	Not Applicable
Ozone (O_3)	8-Hour	0.07 ppm (137 µg/m^3)	Not Established	0.08 ppm (157µg/m^3)	Nonattainment
	1-Hour	0.09 ppm (180 µg/m^3)	Nonattainment	Not Applicable	Not Applicable[d]
Suspended Particulate Matter (PM_{10})	Annual Mean	20 µg/m^3	Nonattainment		
	24-Hour	50 µg/m^3	Nonattainment	150 µg/m^3	Unclassified
Suspended Particulate Matter ($PM_{2.5}$)	Annual Mean	12 µg/m^3	Nonattainment	15 µg/m^3	Attainment
	24-Hour	Not Applicable	Not Applicable	35 µg/m^3	Unclassified
Sulfur Dioxide (SO_2)	Annual Mean	Not Applicable	Not Applicable	80 µg/m^3 (0.03 ppm)	Attainment
	24-Hour	0.04 ppm (105 µg/m^3)	Attainment	365 µg/m^3 (0.14 ppm)	Attainment
	1-Hour	0.25 ppm (655 µg/m^3)	Attainment	Not Applicable	Not Applicable

[a] California standards for O_3, CO (except Lake Tahoe), SO_2 (1-hour and 24-hour), NO_2 and PM_{10} are values that are not to be exceeded. If the standard is for a 1-hour, 8-hour, or 24-hour average, then some measurements may be excluded. In particular, measurements are excluded that ARB determines would occur less than once per year on average.
[b] National standards other than for 0_3 and those based on annual averages or annual arithmetic means are not to be exceeded more than once a year. For example, the 0_3 standard is attained if, during the most recent 3-year period, the average number of days per year with maximum hourly concentrations above the standard is equal to or less than 1.
[c] In April 1998, the Bay Area was redesignated to Attainment for the national 8-hour CO standard.
[d] The National 1-hour ozone standard was revoked by U.S. EPA on June 15, 2005.

Lead (Pb) is not listed in the above table because it has been in attainment since the 1980s.

ppm = parts per million
mg/m^3 = milligrams per cubic meter
µg/m^3 = micrograms per cubic meter

Source: Bay Area Air Quality Management District, 2007. Bay Area Attainment Status.

The hills on the west side of these valleys, which include the hillside parks of the Study Area, block much of the marine air flowing from the San Francisco Bay to the west from reaching the valleys. Two types of air flow patterns predominate during the day: an up-valley flow from the north, and a westerly flow across the lower elevations of the Coast Range. On clear nights, surface inversions separate the flow of air into two layers: the surface flow and the upper layer flow. When this occurs, drainage surface winds often flow down-valley toward the Carquinez Strait.[2]

[2] Ibid.

Air temperatures in these valleys are cooler in the winter and warmer in the summer than areas farther to the east, which are too distant to experience the moderating effects of the San Francisco Bay and Pacific Ocean. Mean summer maximum temperatures are in the low to mid 80s in degrees Fahrenheit (°F). Mean winter minimum temperatures are in the high 30s °F to low 40s °F.

Northern Alameda and Western Contra Costa Counties. This climatological subregion stretches from the City of Richmond to the City of San Leandro. Its western boundary is defined by the San Francisco Bay, and its eastern boundary by the Oakland-Berkeley Hills. The ridgeline height of the Oakland-Berkeley Hills is approximately 1,500 feet, providing a significant barrier to air flow. The most densely-populated area of the subregion lies in the strip of land between the San Francisco Bay and the lower Oakland-Berkeley Hills.

In this area, a dominant weather factor is the marine air that travels through the Golden Gate, as well as across the City of San Francisco and its peninsula through the San Bruno Gap. The Oakland-Berkeley Hills cause the westerly flow of air to split off to the north and south of the City of Oakland, which causes diminished wind speeds. The prevailing winds for most of this subregion are from the west, although at the northern end near the City of Pinole, prevailing winds are from the south-southwest. Temperatures in this subregion have a narrow range due to the proximity of the moderating marine air. Maximum summer temperatures are in the mid 70s °F, with minimums in the mid 50s °F. Winter highs are in the mid to high 50s °F, with lows in the low to mid 40s °F.

The air pollution potential is lowest for the parts of the subregion that are closest to the San Francisco Bay, due largely to good ventilation and less influx of pollutants from upwind sources. The occurrence of light winds in the evenings and early mornings occasionally causes elevated pollution levels.[3]

c. Air Quality and Climate Conditions. As previously noted, air quality is a function of both local climate and local sources of air pollution. This section discusses the factors that contribute to air quality and climate conditions, including wind patterns, temperature, and precipitation.

(1) Air Quality. Pollutant monitoring results for 2004 to 2006 at the Livermore – Rincon Avenue, Fremont – Chapel Way, and San Pablo – Rumrill Boulevard ambient air quality monitoring stations (see Tables IV.F-4, -5, and -6, respectively) indicate generally good air quality in the Study Area. There were one to three violations of State PM_{10} standards recorded each year from 2004 to 2006 at the three monitoring stations. However, there were no recorded violations of federal PM_{10} standards in that time frame. The federal $PM_{2.5}$ standard was exceeded once during the three-year period; this exceedence occurred at the San Pablo monitoring station. State 1-hour ozone (O_3) standards were exceeded one to thirteen times at these monitoring stations each of the past three years. Federal 8-hour O_3 standards were exceeded once in 2005 and five times in 2006 at the Livermore monitoring station. Federal and State carbon monoxide (CO), sulfur dioxide (SO_2), and nitrogen dioxide (NO_2) standards have not been exceeded within the past three years at these monitoring stations.

[3] Ibid.

Table IV.F-4: Ambient Air Quality at the Livermore Monitoring Station

Pollutant	Standard	2004	2005	2006
Carbon Monoxide (CO)				
Maximum 1 hour concentration (ppm)		3.5	3.4	3.3
Number of days exceeded:	State: > 20 ppm	0	0	0
	Federal: > 35 ppm	0	0	0
Maximum 8 hour concentration (ppm)		1.8	1.8	1.8
Number of days exceeded:	State: > 9 ppm	0	0	0
	Federal: > 9 ppm	0	0	0
Ozone (O_3)				
Maximum 1 hour concentration (ppm)		0.113	0.120	0.127
Number of days exceeded:	State: > 0.09 ppm	5	6	13
Maximum 8 hour concentration (ppm)		0.080	0.090	0.101
Number of days exceeded:	State: > 0.07 ppm	ND	ND	ND
	Federal: > 0.08 ppm	0	1	5
Coarse Particulates (PM_{10})				
Maximum 24 hour concentration (μ/m^3)		47	48	68
Number of days exceeded:	State: > 50 μ/m^3	0	0	3
	Federal: > 150 μ/m^3	0	0	0
Annual arithmetic average concentration (μ/m^3)		20	19	22
Exceeded for the year:	State: > 20 μ/m^3	No	No	Yes
	Federal: > 50 μ/m^3	No	No	No
Fine Particulates ($PM_{2.5}$)				
Maximum 24 hour concentration (μ/m^3)		41	32	51
Number of days exceeded:	Federal: > 65 μ/m^3	0	0	0
Annual arithmetic average concentration (μ/m^3)		10.3	9.0	9.8
Exceeded for the year:	State: > 12 μ/m^3	No	No	No
	Federal: > 15 μ/m^3	No	No	No
Nitrogen Dioxide (NO_2)				
Maximum 1 hour concentration (ppm)		0.063	0.072	0.064
Number of days exceeded:	State: > 0.25 ppm	0	0	0
Annual arithmetic average concentration (ppm)		0.014	0.014	0.014
Exceeded for the year:	Federal: > 0.053 ppm	No	No	No
Sulfur Dioxide (SO_2)				
Maximum 1 hour concentration (ppm)		ND	ND	ND
Number of days exceeded:	State: > 0.25 ppm	ND	ND	ND
Maximum 3 hour concentration (ppm)		ND	ND	ND
Number of days exceeded:	Federal: > 0.5 ppm	ND	ND	ND
Maximum 24 hour concentration (ppm)		ND	ND	ND
Number of days exceeded:	State: > 0.04 ppm	ND	ND	ND
	Federal: > 0.14 ppm	ND	ND	ND
Annual arithmetic average concentration (ppm)		ND	ND	ND
Exceeded for the year:	Federal: > 0.030 ppm	ND	ND	ND

Source: ARB and EPA Web sites, 2007.
ppm = parts per million
μ/m^3 = micrograms per cubic meter
ND = No data. There was insufficient (or no) data to determine the value.

Table IV.F-5: Ambient Air Quality at the Fremont Monitoring Station

Pollutant	Standard	2004	2005	2006
Carbon Monoxide (CO)				
Maximum 1 hour concentration (ppm)		3.0	3.2	2.9
Number of days exceeded:	State: > 20 ppm	0	0	0
	Federal: > 35 ppm	0	0	0
Maximum 8 hour concentration (ppm)		1.7	2.0	1.8
Number of days exceeded:	State: > 9 ppm	0	0	0
	Federal: > 9 ppm	0	0	0
Ozone (O_3)				
Maximum 1 hour concentration (ppm)		0.090	0.105	0.102
Number of days exceeded:	State: > 0.09 ppm	0	1	4
Maximum 8 hour concentration (ppm)		0.071	0.078	0.074
Number of days exceeded:	State: > 0.07 ppm	ND	ND	ND
	Federal: > 0.08 ppm	0	0	0
Coarse Particulates (PM_{10})				
Maximum 24 hour concentration (μ/m^3)		46	52	54
Number of days exceeded:	State: > 50 μ/m^3	0	1	1
	Federal: > 150 μ/m^3	0	0	0
Annual arithmetic average concentration (μ/m^3)		18	17	20
Exceeded for the year:	State: > 20 μ/m^3	No	No	No
	Federal: > 50 μ/m^3	No	No	No
Fine Particulates ($PM_{2.5}$)				
Maximum 24 hour concentration (μ/m^3)		40	33	44
Number of days exceeded:	Federal: > 65 μ/m^3	0	0	0
Annual arithmetic average concentration (μ/m^3)		9.4	9.1	10.3
Exceeded for the year:	State: > 12 μ/m^3	No	No	No
	Federal: > 15 μ/m^3	No	No	No
Nitrogen Dioxide (NO_2)				
Maximum 1 hour concentration (ppm)		0.060	0.069	0.063
Number of days exceeded:	State: > 0.25 ppm	0	0	0
Annual arithmetic average concentration (ppm)		0.015	0.015	0.015
Exceeded for the year:	Federal: > 0.053 ppm	No	No	No
Sulfur Dioxide (SO_2)				
Maximum 1 hour concentration (ppm)		ND	ND	ND
Number of days exceeded:	State: > 0.25 ppm	ND	ND	ND
Maximum 3 hour concentration (ppm)		ND	ND	ND
Number of days exceeded:	Federal: > 0.5 ppm	ND	ND	ND
Maximum 24 hour concentration (ppm)		ND	ND	ND
Number of days exceeded:	State: > 0.04 ppm	ND	ND	ND
	Federal: > 0.14 ppm	ND	ND	ND
Annual arithmetic average concentration (ppm)		ND	ND	ND
Exceeded for the year:	Federal: > 0.030 ppm	ND	ND	ND

Source: ARB and EPA Web sites, 2007.
ppm = parts per million
μ/m^3 = micrograms per cubic meter
ND = No data. There was insufficient (or no) data to determine the value.

Table IV.F-6: Ambient Air Quality at the San Pablo Monitoring Station

Pollutant	**Standard**	**2004**	**2005**	**2006**
Carbon Monoxide (CO)				
Maximum 1 hour concentration (ppm)		3.2	2.8	2.5
Number of days exceeded:	State: > 20 ppm	0	0	0
	Federal: > 35 ppm	0	0	0
Maximum 8 hour concentration (ppm)		1.8	1.3	1.4
Number of days exceeded:	State: > 9 ppm	0	0	0
	Federal: > 9 ppm	0	0	0
Ozone (O_3)				
Maximum 1 hour concentration (ppm)		0.105	0.066	0.061
Number of days exceeded:	State: > 0.09 ppm	1	0	0
Maximum 8 hour concentration (ppm)		0.069	0.057	0.050
Number of days exceeded:	State: > 0.07 ppm	0	0	0
	Federal: > 0.08 ppm	0	0	0
Coarse Particulates (PM_{10})				
Maximum 24 hour concentration (μ/m^3)		62	40	58
Number of days exceeded:	State: > 50 μ/m^3	ND	0	ND
	Federal: > 150 μ/m^3	0	0	0
Annual arithmetic average concentration (μg/m^3)		21	18	21
Exceeded for the year:	State: > 20 μ/m^3	Yes	No	Yes
	Federal: > 50 μ/m^3	No	No	No
Fine Particulates ($PM_{2.5}$) (Concord-Treat Boulevard nearest monitoring station)				
Maximum 24 hour concentration (μ/m^3)		74	49	62
Number of days exceeded:	Federal: > 65 μ/m^3	1	0	0
Annual arithmetic average concentration (g/m^3)		10.8	9.1	9.5
Exceeded for the year:	State: > 12 μ/m^3	No	No	No
	Federal: > 15 μ/m^3	No	No	No
Nitrogen Dioxide (NO_2)				
Maximum 1 hour concentration (ppm)		0.055	0.054	0.055
Number of days exceeded:	State: > 0.25 ppm	0	0	0
Annual arithmetic average concentration (ppm)		0.013	0.012	0.013
Exceeded for the year:	Federal: > 0.053 ppm	No	No	No
Sulfur Dioxide (SO_2)				
Maximum 1 hour concentration (ppm)		0.019	0.025	0.017
Number of days exceeded:	State: > 0.25 ppm	0	0	0
Maximum 3 hour concentration (ppm)		0.010	0.013	0.012
Number of days exceeded:	Federal: > 0.5 ppm	0	0	0
Maximum 24 hour concentration (ppm)		0.005	0.006	0.005
Number of days exceeded:	State: > 0.04 ppm	0	0	0
	Federal: > 0.14 ppm	0	0	0
Annual arithmetic average concentration (ppm)		0.002	0.002	0.002
Exceeded for the year:	Federal: > 0.030 ppm	No	No	No

Source: ARB and EPA Web sites.
ppm = parts per million
μ/m^3 = micrograms per cubic meter
ND = No data. There was insufficient (or no) data to determine the value.

(2) Wind Patterns. During the summer, winds flowing from the northwest are drawn inland through the Golden Gate and over the lower portions of the San Francisco Peninsula. Immediately south of Mount Tamalpais, the northwesterly winds accelerate considerably and are more directly from the west as they stream through the Golden Gate. This channeling of wind through the Golden Gate produces a jet that sweeps eastward and splits off to the northwest toward Richmond and to the southwest toward San Jose where it meets the East Bay Hills.

"Diablo wind" is the term used to describe the hot, dry offshore wind from the northeast that typically occurs during the spring and fall in the San Francisco Bay Area. Named for Mount Diablo, Diablo winds originate from areas of strongly sinking air aloft, associated with the proximity of storms north of California. As the air sinks, it heats up by compression, adding to the heat picked up by the wind as it crosses the Central Valley and the Diablo Valley. If the pressure gradient is strong enough, winds can become very strong and gusty, particularly along the ridges of the Coast Range where the air stream is forced to squeeze over them. The Diablo winds also cause the air to dry out significantly with relative humidity in the single digits. During the fall months, dry vegetation combined with hot dry winds leads to extreme fire danger. This meteorological scenario created the erratic fire behavior and fire suppression difficulties that led to the 1991 Oakland Hills fire.

(3) Temperature. Summer temperatures in the East Bay are determined in large part by the effect of differential heating between land and water surfaces. Because land tends to heat up and cool off more quickly than water, large-scale local gradients are often produced along the shorelines of the ocean and bays. The temperature gradient near the ocean is also exaggerated, especially in summer, because of the upwelling of cold ocean bottom water along the coast. Thus, on summer afternoons, the temperatures at the coast can be 35 °F cooler than temperatures 15 to 20 miles inland. At night, this contrast usually decreases to less than 10 °F. Average summer high temperatures in Oakland range from 70 to 75 °F. In the winter, the relationship of minimum and maximum temperatures is reversed. During the day, the temperature contrast between the coast and inland areas is small, whereas at night the variation in temperature is large.[4]

(4) Precipitation. The Bay Area is characterized by moderately wet winters and dry summers. Winter rains account for about 75 percent of the average annual rainfall. Even within short distances, the amount of annual precipitation can vary greatly from one part of the San Francisco Bay Area to another. In general, total annual rainfall can reach 40 inches in the mountains, but it is often less than 16 inches in sheltered valleys.[5] The mean annual rainfall in the vicinity of the Study Area ranges from about 28 inches per year in the central uplands to about 22 inches per year in the lower elevations of the northern and southern portions of the Study Area. The vast majority of rainfall occurs between October and May.[6]

During rainy periods, ventilation (rapid horizontal movement of air and injection of leaner air) and vertical mixing are usually high, and thus pollution levels tend to be low. However, frequent dry periods do occur during the winter where mixing and ventilation are low and pollutant levels build up.

[4] BAAQMD, op.cit.

[5] Ibid.

[6] Western Regional Climate Center, 2004. Website: www.wrcc.dri.edu/cgi-bin/cliMAIN.pl?carchm+sfo.

(5) Fog. The East Bay is marked by persistent morning fog during the summer months. As comparatively warm, moist Pacific air passes over the bank of cooler water off the San Francisco coast, a bank of fog is formed that is often swept inland through the Golden Gate and lower portions of the San Francisco peninsula. During the summer months, heat is added to the air as it moves inland causing moisture-laden air to rise and form a deck of low clouds that extend inland. Typically, this deck of clouds extends inland during the night, receding to the vicinity of the coast during the day. This layer of maritime air is usually from 1,500 to 2,000 feet deep while above this layer the air is relatively warm, dry, and cloudless.

In the fall, when the temperature differences between land and water decrease, the "push-pull" effect that created the coastal winds and fogs no longer takes place. As on-shore winds and resulting upwelling decrease, the coastal fog bank fades to a few wisps and then ceases.

d. Air Quality Issues. Six key air quality issues – CO hotspots, vehicle emissions, fugitive dust, odors, construction equipment exhaust, and global climate change – are described below.

(1) Local Carbon Monoxide Hotspots. Local air quality is most affected by CO emissions from motor vehicles. CO is typically the pollutant of greatest concern because it is created in abundance by motor vehicles and it does not readily disperse into the air. Because CO does not readily disperse, areas of vehicle congestion can create "pockets" of high CO concentration called "hot spots." These pockets have the potential to exceed the State 1-hour standard of 20 ppm and/or the 8-hour standard of 9.0 ppm.

While CO transport is limited, it does disperse over time and with distance from the source under normal meteorological conditions. However, under certain extreme meteorological conditions, CO concentrations near congested roadways or intersections may reach unhealthful levels that adversely affect local sensitive receptors (e.g., residents, school children, the elderly, and hospital patients). Typically, high CO concentrations are associated with roadways or intersections operating at unacceptable levels of service or with extremely high traffic volumes. In areas with high ambient background CO concentration, modeling is recommended to determine a project's effect on local CO levels.

(2) Vehicle Emissions. Long-term air emission impacts are those associated with changes in automobile travel within the region. Mobile source emissions would result from vehicle trips associated with increased vehicular travel. As is true throughout much of the U.S., motor vehicle use is projected to increase substantially in the region. The BAAQMD, local jurisdictions, and other parties responsible for protecting public health and welfare are continually seeking ways of minimizing the air quality impacts of growth and development in order to avoid further exceedances of the air quality standards.

(3) Fugitive Dust. Fugitive dust emissions are generally associated with agriculture operations, demolition, land clearing, exposure of soils to the air, and cut and fill operations. Dust generated during construction varies substantially on a project-by-project basis, depending on the level of activity, the specific operation, and weather conditions.

The U.S. EPA has developed an approximate emission factor for construction-related emissions of total suspended particulate of 1.2 tons per acre per month of activity. This factor assumes a moderate activity level, moderate silt content in soils being disturbed, and a semi-arid climate. The California Air Resources Board estimates that 64 percent of construction-related total suspended particulate emissions occur in the form of PM_{10}. Therefore, the emission factors for uncontrolled construction-related PM_{10} emissions are:

- 0.77 tons per acre per month of PM_{10}; or
- 51 pounds per acre per day of PM_{10}.

However, construction emissions can vary greatly depending on the level of activity, the specific operations taking place, the equipment being operated, local soils, weather conditions, and other factors. There are a number of feasible control measures that can be reasonably implemented to significantly reduce PM_{10} emissions from construction. Rather than attempting to provide detailed quantification of anticipated construction emissions from projects, the BAAQMD suggests the following:

> The determination of significance with respect to construction emissions should be based on a consideration of the control measures to be implemented. From the BAAQMD's perspective, quantification of emissions is not necessary, although a Lead Agency may elect to do so. If all of the control measures indicated as appropriate, depending on the size of the project, are implemented, then air pollution from emissions from construction activities would be considered a less-than-significant impact.[7]

(4) Odors. Odors are also an important element of local air quality conditions. Specific activities allowed within each of the County's major general plan land use categories can raise concerns on the part of nearby neighbors. Major sources of odors include restaurants, manufacturing plants, and agricultural operations. Other odor producers include the industrial facilities within the region. While sources that generate objectionable odors must comply with air quality regulations, the public's sensitivity to locally produced odors often exceeds regulatory thresholds.

(5) Construction Equipment Exhaust. Construction activities cause combustion emissions from utility engines, heavy-duty construction vehicles, equipment hauling materials to and from construction sites, and motor vehicles transporting construction crews. Exhaust emissions from construction activities vary daily as construction activity levels change. The use of construction equipment results in localized exhaust emissions.

(6) Global Climate Change. Global climate change is the observed increase in the average temperature of the Earth's atmosphere and oceans along with other significant changes in climate (such as precipitation or wind) that last for an extended period of time. The term "global climate change" is often used interchangeably with the term "global warming," but "global climate change" is preferred to "global warming" because it helps convey that there are other changes in addition to rising temperatures. Global surface temperatures have risen by 0.74°C ± 0.18°C over the last 100 years (1906 to 2005). The rate of warming over the last 50 years is almost double that over the last 100 years.[8] The prevailing scientific opinion on climate change is that most of the warming observed

[7] Bay Area Air Quality Management District, 1996. *BAAQMD CEQA Guidelines Assessing the Air Quality Impacts of Projects and Plans*. April. (Amended in December 1999.)

[8] Intergovernmental Panel on Climate Change (IPCC), 2007. *Climate Change 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the IPCC.*

over the last 50 years is attributable to human activities. The increased amounts of carbon dioxide (CO_2) and other GHGs are the primary causes of the human-induced component of warming. GHGs are released by the burning of fossil fuels, land clearing, agriculture, and other activities, and lead to an increase in the greenhouse effect.[9]

GHGs are present in the atmosphere naturally, are released by natural sources, or are formed from secondary reactions taking place in the atmosphere. The gases that are widely seen as the principal contributors to human-induced global climate change are:[10]

- Carbon dioxide (CO_2)
- Methane (CH_4)
- Nitrous oxide (N_2O)
- Hydrofluorocarbons (HFCs)
- Perfluorocarbons (PFCs)
- Sulfur Hexafluoride (SF_6)

Over the last 200 years, human activities have caused substantial quantities of GHGs to be released into the atmosphere. These extra emissions are increasing GHG concentrations in the atmosphere, and enhancing the natural greenhouse effect, which is believed to be causing global warming. While manmade GHGs include naturally-occurring GHGs such as CO_2, methane, and N_2O, some gases, like HFCs, PFCs, and SF_6 are completely new to the atmosphere.

Certain other gases, such as water vapor, are short-lived in the atmosphere. Others remain in the atmosphere for significant periods of time, contributing to climate change in the long term. Water vapor is excluded from the list of GHGs above because it is short-lived in the atmosphere and its atmospheric concentrations are largely determined by natural processes, such as oceanic evaporation. For the purposes of this EIR, the term “GHGs” will refer collectively to the gases listed above only.

These gases vary considerably in terms of Global Warming Potential (GWP), which is a concept developed to compare the ability of each greenhouse gas to trap heat in the atmosphere relative to another gas. The global warming potential is based on several factors, including the relative effectiveness of a gas to absorb infrared radiation and length of time that the gas remains in the atmosphere (“atmospheric lifetime”). The GWP of each gas is measured relative to carbon dioxide, the most abundant GHG. The definition of GWP for a particular greenhouse gas is the ratio of heat trapped by one unit mass of the greenhouse gas to the ratio of heat trapped by one unit mass of CO_2 over a specified time period. GHG emissions are typically measured in terms of tons of “CO_2 equivalents” (CO_2eq). Table IV.F-7 shows the GWPs for each type of GHG. For example, sulfur hexafluoride is 22,800 times more potent at contributing to global warming than carbon dioxide.

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[9] The temperature on Earth is regulated by a system commonly known as the "greenhouse effect." Just as the glass in a greenhouse lets heat from sunlight in and reduce the amount of heat that escapes, greenhouse gases like carbon dioxide, methane, and nitrous oxide in the atmosphere keep the Earth at a relatively even temperature. Without the greenhouse effect, the Earth would be a frozen globe; thus, although an excess of greenhouse gas results in global warming, the *naturally occurring* greenhouse effect is necessary to keep our planet at a comfortable temperature.

[10] The greenhouse gases listed are consistent with the definition in Assembly Bill (AB) 32 (Government Code 38505), as discussed later in this section.

Table IV.F-7: Global Warming Potentials

Gas	Atmospheric Lifetime (Years)	Global Warming Potential (100-year Time Horizon)
Carbon Dioxide	50-200	1
Methane	12	25
Nitrous Oxide	114	298
HFC-23	270	14,800
HFC-134a	14	1,430
HFC-152a	1.4	124
PFC: Tetrafluoromethane (CF_4)	50,000	7,390
PFC: Hexafluoromethane (C_2F_6)	10,000	12,200
Sulfur Hexafluoride (SF_6)	3,200	22,800

Source: IPCC, 2007. *Climate Change 2007: The Physical Science Basis*. Contribution of Working Group I to the Fourth Assessment Report of the IPCC.

The following discussion summarizes the characteristics of the six primary GHGs.

Carbon Dioxide (CO_2). In the atmosphere, carbon generally exists in its oxidized form, as CO_2. Natural sources of CO_2 include the respiration (breathing) of humans, animals and plants, volcanic outgassing, decomposition of organic matter and evaporation from the oceans. Human-caused sources of CO_2 include the combustion of fossil fuels and wood, waste incineration, mineral production, and deforestation. The Earth maintains a natural carbon balance and when concentrations of CO_2 are upset, the system gradually returns to its natural state through the natural processes. Natural changes to the carbon cycle work slowly, especially compared to the rapid rate at which humans are adding CO_2 to the atmosphere. Natural removal processes, such as photosynthesis by land- and ocean-dwelling plant species, cannot keep pace with this extra input of man-made CO_2, and consequently, the gas is building up in the atmosphere. The concentration of CO_2 in the atmosphere has risen about 30 percent since the late 1800s.[11]

In 2002, CO_2 emissions from fossil fuel combustion accounted for approximately 98 percent of man-made CO_2 emissions and approximately 84 percent of California's overall GHG emissions (CO_2eq). The transportation sector accounted for California's largest portion of CO_2 emissions, with gasoline consumption making up the greatest portion of these emissions. Electricity generation was California's second largest category of GHG emissions.

Methane (CH_4). Methane is produced when organic matter decomposes in environments lacking sufficient oxygen. Natural sources include wetlands, termites, and oceans. Anthropogenic sources include rice cultivation, livestock, landfills and waste treatment, biomass burning, and fossil fuel combustion (burning of coal, oil, natural gas, etc.). Decomposition occurring in landfills accounts for the majority of human-generated CH_4 emissions in California, followed by enteric fermentation (emissions from the digestive processes of livestock).[12] Agricultural processes such as manure management and rice cultivation are also significant sources of manmade CH_4 in California. Methane

[11] California Environmental Protection Agency. 2006. *Climate Action Team Report to Governor Schwarzenegger and the Legislature*. March.

[12] California Air Resources Board, Greenhouse Gas Inventory Data - 1990 to 2004. http://www.arb.ca.gov/cc/inventory/data/data.htm. Accessed November 2008.

accounted for approximately 6 percent of gross climate change emissions (CO_2eq) in California in 2002.[13]

It is estimated that over 60 percent of global methane emissions are related to human-related activities.[14] As with CO_2, the major removal process of atmospheric methane – a chemical breakdown in the atmosphere – cannot keep pace with source emissions, and methane concentrations in the atmosphere are increasing.

Nitrous Oxide (N_2O). Nitrous oxide is produced naturally by a wide variety of biological sources, particularly microbial action in soils and water. Tropical soils and oceans account for the majority of natural source emissions. Nitrous oxide is a product of the reaction that occurs between nitrogen and oxygen during fuel combustion. Both mobile and stationary combustion emit N_2O, and the quantity emitted varies according to the type of fuel, technology, and pollution control device used, as well as maintenance and operating practices. Agricultural soil management and fossil fuel combustion are the primary sources of human-generated N_2O emissions in California. Nitrous oxide emissions accounted for nearly 7 percent of man-made GHG emissions (CO_2eq) in California in 2002.

Hydrofluorocarbons (HFCs), Perfluorocarbons (PFCs), and Sulfur Hexafluoride (SF_6). HFCs are primarily used as substitutes for ozone-depleting substances regulated under the Montreal Protocol.[15] PFCs and SF_6 are emitted from various industrial processes, including aluminum smelting, semiconductor manufacturing, electric power transmission and distribution, and magnesium casting. There is no aluminum or magnesium production in California; however, the rapid growth in the semiconductor industry, which is active in California, leads to greater use of PFCs. HFCs, PFCs, and SF_6 accounted for about 3.5 percent of man-made GHG emissions (CO_2eq) in California in 2002.[16]

The latest projections, based on state-of-the art climate models, indicate that temperatures in California are expected to rise 3 to 10.5°F by the end of the century.[17] Because primary GHGs have a long lifetime in the atmosphere, accumulate over time, and are generally well-mixed, their impact on the atmosphere is mostly independent of the point of emission.

Climate change refers to any significant change in measures of climate (such as temperature, precipitation, or wind) lasting for an extended period (decades or longer). Climate change may result from:

- Natural factors, such as changes in the sun's intensity or slow changes in the Earth's orbit around the sun

[13] Ibid.

[14] IPCC, 2007. Climate Change 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the IPCC.

[15] The Montreal Protocol is an international treaty that was approved on January 1, 1989, and was designated to protect the ozone layer by phasing out the production of several groups of halogenated hydrocarbons believed to be responsible for ozone depletion.

[16] California Environmental Protection Agency. 2006. *Climate Action Team Report to Governor Schwarzenegger and the Legislature*. March.

[17] California Climate Change Center, 2006. *Our Changing Climate. Assessing the Risks to California.* July.

- Natural processes within the climate system (e.g., changes in ocean circulation and reduction in sunlight from the addition of GHGs and other gases to the atmosphere from volcanic eruptions)
- Human activities that change the atmosphere's composition (e.g., through burning fossil fuels) and the land surface (e.g., from deforestation, reforestation, urbanization, and desertification)

The primary effect of global climate change has been a rise in the average global tropospheric[18] temperature of 0.2°C per decade, determined from meteorological measurements worldwide between 1990 and 2005. Climate change modeling using 2000 emission rates shows that further warming could occur, which would induce further changes in the global climate system during the current century. Changes to the global climate system, ecosystems, and California would include, but would not be limited to:

- The loss of sea ice and mountain snow pack, resulting in higher sea levels and higher sea surface evaporation rates with a corresponding increase in tropospheric water vapor due to the atmosphere's ability to hold more water vapor at higher temperatures;
- Rise in global average sea level primarily due to thermal expansion and melting of glaciers and ice caps in the Greenland and Antarctic ice sheets;
- Changes in weather that include widespread changes in precipitation, ocean salinity, and wind patterns, and more energetic aspects of extreme weather, including droughts, heavy precipitation, heat waves, extreme cold, and the intensity of tropical cyclones;
- Decline of the Sierra snowpack, which accounts for approximately half of the surface water storage in California, by 70 percent to as much as 90 percent over the next 100 years;
- Increase in the number of days conducive to ozone formation by 25 to 85 percent (depending on the future temperature scenario) in high ozone areas of Los Angeles and the San Joaquin Valley by the end of the 21st century; and
- High potential for erosion of California's coastlines and seawater intrusion into the Delta and levee systems due to the rise in sea level.

According to ARB emission inventory estimates, California emitted approximately 480 million metric tons[19] of CO_2eq emissions in 2004.[20] This large number is due primarily to the sheer size of California compared to other States. By contrast, California has the fourth lowest per-capita carbon dioxide emission rate from fossil fuel combustion in the country, due to the success of its energy efficiency and renewable energy programs and commitments that have lowered the State's GHG emissions rate of growth by more than half of what it would have been otherwise.[21]

[18] The troposphere is the zone of the atmosphere characterized by water vapor, weather, winds, and decreasing temperature with increasing altitude.

[19] A metric ton is equivalent to approximately 1.1 tons.

[20] California Air Resources Board, Greenhouse Gas Inventory Data - 1990 to 2004. http://www.arb.ca.gov/cc/inventory/data/data.htm. Accessed November 2008.

[21] California Energy Commission (CEC), 2007. Inventory of California Greenhouse Gas Emissions and Sinks: 1990 to 2004 - Final Staff Report, publication # CEC-600-2006-013-SF, Sacramento, CA, December 22, 2006; and January 23, 2007 update to that report.

The California EPA Climate Action Team stated in its March 2006 report that the composition of gross climate change pollutant emissions in California in 2002 (expressed in terms of CO_2eq) was as follows:

- Carbon dioxide (CO_2) accounted for 83.3 percent;
- Methane (CH_4) accounted for 6.4 percent;
- Nitrous oxide (N_2O) accounted for 6.8 percent; and
- Fluorinated gases (HFCs, PFC, and SF_6) accounted for 3.5 percent.[22]

The ARB estimates that transportation is the source of approximately 38 percent of the State's GHG emissions in 2004, followed by electricity generation (both in-State and out-of-State) at 23 percent, and industrial sources at 20 percent. The remaining sources of GHG emissions are residential and commercial activities at 9 percent, agriculture at 6 percent, high global warming potential gases at 3 percent, and recycling and waste at 1 percent.[23]

ARB staff has projected 2020 unregulated GHG emissions, which represent the emissions that would be expected to occur in the absence of any GHG reduction actions. ARB staff estimates the State-wide 2020 unregulated GHG emissions will be 596 million metric tons (MMT) of CO_2eq. GHG emissions in 2020 from the transportation and electricity sectors as a whole are expected to increase, but remain at approximately 38 percent and 23 percent of total CO_2eq emissions, respectively. The industrial sector consists of large stationary sources of GHG emissions and the percentage of the total 2020 emissions is projected to be 17 percent of total CO_2eq emissions. The remaining sources of GHG emissions in 2020 are high global warming potential gases at 8 percent, residential and commercial activities at 8 percent, agriculture at 5 percent, and recycling and waste at 1 percent.[24]

The BAAQMD established a climate protection program in 2005 to acknowledge the link between climate change and air quality. The Air District regularly prepares inventories of criteria and toxic air pollutants to support planning, regulatory and other programs.In 2007, 102.6 million metric tons of CO_2eq of greenhouse gases were emitted by the San Francisco Bay Area. Fossil fuel consumption in the transportation sector was the single largest source of the San Francisco Bay Area's greenhouse gas emissions in 2007. The transportation sector, including on-road motor vehicles, locomotives, ships and boats, and aircraft, contributed over 40 percent of greenhouse gas emissions in the Bay Area. The industrial and commercial sector (excluding electricity and agriculture) was the second largest contributor with 34 percent of total GHG emissions. Energy production activities such as electricity generation and co-generation were the third largest contributor with approximately 15 percent of the total GHG emissions. Off-road equipment such as construction, industrial, commercial, and lawn and garden equipment contributed 3 percent of GHG emissions.

Currently there are no adopted federal regulations to control global climate change. However, recent authority has been granted to the EPA that may change the voluntary approach taken under the

[22] California Environmental Protection Agency, 2006. Climate Action Team Report to Governor Schwarzenegger and the Legislature. March.

[23] California Air Resources Board (ARB), 2008. http://www.climatechange.ca.gov/inventory/index.html. September.

[24] California Air Resources Board (ARB), 2008. http://www.climatechange.ca.gov/inventory/index.html. September.

current administration to address this issue. On April 2, 2007, the United States Supreme Court ruled that the EPA has the authority to regulate CO_2 emissions under the federal Clean Air Act (CAA).

In June 2005, Governor Schwarzenegger established California's GHG emissions reduction targets in Executive Order S-3-05. The Executive Order established the following goals for the State of California: GHG emissions should be reduced to 2000 levels by 2010; GHG emissions should be reduced to 1990 levels by 2020; and GHG emissions should be reduced to 80 percent below 1990 levels by 2050.

California's major initiative for reducing GHG emissions is outlined in Assembly Bill 32 (AB 32), the "Global Warming Solutions Act," passed by the California State legislature on August 31, 2006. This effort aims at reducing GHG emissions to 1990 levels by 2020.. The ARB has established the level of GHG emissions in 1990 at 427 million metric tons (MMT) of CO_2eq. The emissions target of 427 MMT requires the reduction of 169 MMT from the State's projected business-as-usual 2020 emissions of 596 MMT. AB 32 requires ARB to prepare a Scoping Plan that outlines the main State strategies for meeting the 2020 deadline and to reduce GHGs that contribute to global climate change. The Scoping Plan was approved by ARB on December 11, 2008, and includes measures to address GHG emission reduction strategies related to energy efficiency, water use, and recycling and solid waste, among other measures.[25] Emission reductions that are projected to result from the recommended measures in the Scoping Plan are expected to total 174 MMT of CO_2eq, which would allow California to attain the emissions goal of 427 MMT of CO_2eq by 2020.

In October 2007, ARB staff recognized that carbon stored in forests can be lost to fire, insects, disease, and other unplanned events, that there are projects and plans underway to reduce catastrophic wildfire in California, and that these measures have the potential to reduce GHG emissions.[26] ARB staff encouraged the pursuit of new methodologies to account for wildfire emissions avoidance but recognized there are significant technical issues involved in such a process and as such has not sought to provide a standard measure for determining GHG emissions avoidance.[27] ARB also recognized that biomass removed from forests could provide an additional climatic benefit if it is used as feedstock in biomass energy generation. To date, no additional guidelines have been created by ARB to assess potential GHG emissions or the effects of carbon storage in forests and wildland areas.

There is currently no CEQA statute, regulation, or judicial decision that requires an EIR to analyze the GHG emissions of a project, or whether a project will have a significant impact on global warming. However, Senate Bill 97 directed the Governor's Office of Planning and Research (OPR) to develop CEQA Guidelines to address GHG emissions. OPR is required to prepare, develop, and transmit these guidelines on or before July 1, 2009 and the Resources Agency is required to certify and adopt them by January 1, 2010. In April 2009, proposed CEQA Guideline amendments released by OPR included information on GHG emissions as a separate consideration and whether a project would generate GHG emissions, either directly or indirectly, such that a significant impact to the

[25] California Air Resources Board. 2008. *Climate Change Proposed Scoping Plan: a framework for change*. October.

[26] California Environmental Protection Agency Air Resources Board, Planning and Technical Support Division, Emissions Inventory Branch, 2007. *Staff Report: Proposed Adoption of California Climate Action Registry Forestry Greenhouse Gas Protocols for Voluntary Purposes*. October.

[27] Ibid.

environment is created. The proposed CEQA amendments currently state that a lead agency has discretion on whether to use a model or qualitative analysis to determine significance of a project's greenhouse gas emissions.

2. Impacts and Mitigation Measures

This section evaluates potential impacts to air quality resulting from implementation of the Plan. The evaluation of environmental effects presented in this section focuses on consistency with air quality management plans and potential air quality impacts associated with vegetation management and fuel reduction activities, vehicle emissions and exhaust, fugitive dust, odors, and emissions of greenhouse gases (or the decrease in their uptake) from vegetation management activities. Mitigation measures are proposed, where appropriate, to reduce the potential impacts to climate and air quality of vegetation management and fuel reduction activities.

a. Criteria of Significance. A significant impact to climate and air quality would occur with implementation of the Plan if it would:

- Conflict with or obstruct implementation of the Clean Air Plan.
- Violate any adopted air quality standard.
- Contribute substantially to an existing or projected air quality violation.
- Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is in non-attainment under an applicable federal or state ambient air quality standard.
- Expose sensitive receptors to substantial pollutant concentrations.
- Create objectionable odors affecting a substantial number of people.
- Conflict with or obstruct the implementation of GHG reduction goals under AB 32 or other State regulations.

The BAAQMD provides various quantitative thresholds that can be used to better define the above criteria. For reactive organic gases (ROG), NOx, and PM_{10}, a net increase of 80 pounds per day is considered significant, while for CO, an increase of 550 pounds per day would be considered significant if it leads to or contributes to CO concentrations exceeding the State Ambient Air Quality Standard of 9 ppm averaged over 8 hours and 20 ppm for 1 hour (i.e., if it creates a "hot spot"). Generally, if a project results in an increase in ROG, NOx, or PM_{10} of more than 80 pounds per day, then it would also be considered to contribute considerably to a significant cumulative effect. For projects that would not lead to a significant increase of ROG, NOx, or PM_{10} emissions, the cumulative effect is evaluated based on a determination of the consistency of the project with the regional Clean Air Plan. Impacts from $PM_{2.5}$ emissions have been identified; however there are no recommended significance thresholds from the BAAQMD.

It should be noted that the emission thresholds were established based on the attainment status of the air basin in regard to air quality standards for specific criteria pollutants. Because the concentration standards were set at a level that protects public health with adequate margin of safety (EPA), these emission thresholds are regarded as conservative and would tend to overstate an individual project's contribution to health risks.

Global warming and greenhouse gasses (GHGs) are an emerging environmental concern being raised on statewide, national, and global levels. Regional, State, and federal agencies are developing strategies to control pollutant emissions that contribute to global warming, including the State's Assembly Bills 1493 and 32, Executive Order S-3-05 and Executive Order S-01-07. However, neither CEQA nor the CEQA Guidelines mention or provide any methodology for analysis of GHGs, including CO_2, nor do they provide any significance thresholds. As is discussed in more detail below, there is no accepted methodology for evaluating how land use projects may contribute to climate change from mobile source emissions. Developing mitigation measures is particularly difficult because ARB and the air quality districts have not yet provided guidance regarding which measures are effective in reducing GHGs.

This air quality analysis follows all procedures and requirements of the State CEQA Guidelines and the BAAQMD. It also discusses available methodologies for determining any potential global warming effects resulting from the project, but concludes that the impacts of the project on global warming are too speculative too determine.

b. Less-than-Significant Climate and Air Quality Impacts. A discussion of several less-than-significant impacts of the Plan follows.

(1) Clean Air Plan (CAP) Consistency. The Plan, as proposed, incorporates guidelines and best management practices to ensure that the EBRPD's vegetation management and fuel reduction activities are in compliance with the BAAQMD's standards for air quality (per Chapter IV. Fuel Reduction Methods, Prescribed Burning). Moreover, implementation of the Plan would not increase vehicular traffic, population densities, building intensities, or other development pressures that customarily contribute the overwhelming portion of air pollution within the region. Because prescribed burning of selected recommended treatment areas within the Study Area would likely be necessary to reduce the risk of wildfire in these areas some level of additional pollution would be created, including PM and CO_2 released from the combustion of organic materials, but these levels would fall within acceptable standards provided by BAAQMD under its exceptions for wildland management (Regulation 5 as noted above.) As such, the Plan is considered consistent with the CAP and any potential impacts would be less-than-significant.

(2) Violate Any Adopted Air Quality Standard. Because the vegetation management and fuel reduction activities identified in the Plan are allowed under BAAQMD Regulation 5, any air pollution created as a result of such activities would also be exempt from measurement against the air quality standards currently in place. Some vegetation management activities, such as prescribed burning and mechanical treatments to remove understory vegetation and non-native plants to reduce wildfire risks, would create some measure of additional air pollution in the short-term, but these amounts would be far less than the air pollution created by a wildfire that could result if such vegetation were left untreated. Any air pollution created by the vegetation management and fuel reduction activities identified in the Plan would have only short-term negative impacts, whereas the amounts of air pollution created by wildfires would have more significant, longer-term impacts to health and safety of both sensitive receptors in the immediate vicinity as well as populations further from the Study Area due to prevailing wind patterns and the sheer volume of air pollutants sent into the area. Because the activities identified for vegetation management and fuel reduction in the Plan are allowed under BAAQMD Regulation 5, and because any air pollution created from these focused activities would be short-term in nature, any potential impacts from implementing the Plan to adopted air quality standards would be less-than-significant.

(3) Result in a Cumulatively Considerable Net Increase of Any Criteria Pollutant for Which the Project Region is in Non-Attainment. Despite great progress in improving air quality, approximately 105.6 million people nationwide lived in counties with pollution levels above the National Ambient Air Quality Standards (NAAQS) in 2006. In these nonattainment areas, however, the severity of air pollution episodes has decreased. Air quality in the San Francisco Bay Area Air Basin in the past 20 years has improved steadily and dramatically, even with the tremendous increase in population and vehicles and other sources.

As shown in Table IV.F-2, long term exposure to elevated levels of criteria pollutants could result in potential health effects. However, as stated in the thresholds of significance, emission thresholds established by BAAQMD are used to manage total regional emissions within an air basin, based on the air basin attainment status for criteria pollutants. These emission thresholds were established for individual projects (or, in this case, the Plan) that would contribute to regional emissions and pollutant concentrations that may affect or delay the projected attainment target year for certain criteria pollutants.

Because of the conservative nature of the thresholds and the basin-wide context of individual project emissions, there is no direct correlation of a single plan or project to localized health effects. One individual plan or project having emissions exceeding a threshold does not necessarily result in adverse health effects for residents in the project vicinity. This condition is especially true when the criteria pollutants exceeding thresholds are those with regional effects, such as ozone precursors like NOx and ROG.

While certain vegetation management activities included in the Plan, such as prescribed burning and mechanical treatments to reduce wildfire risks, are likely to produce short-term elevations in regional pollutant levels, the Plan contains a number of best management practices that will be implemented prior to, during, or following execution of prescribed vegetation management and fuel reduction activities in order to reduce the potential for elevated levels of pollution that may result from these activities. In addition, the potential pollution levels produced by such activities are significantly less, and are of a shorter duration, than the levels of pollution likely to be created in the event of a catastrophic wildfire in the Study Area. To further reduce these potential effects, EBRPD must also conduct certain activities, such as prescribed burns, according to stringent guidelines set forth by BAAQMD to ensure minimal creation of and exposure to any pollution generated by these activities.

Based on the above discussion, the potential for an individual plan or project to significantly deteriorate regional air quality or contribute to a significant health risk is small, even if the emission thresholds are exceeded. Because of the overall improvement trend on air quality in the air basin, it is unlikely the regional air quality or health risk would worsen from the current condition due to emissions from an individual vegetation management or fuel reduction activity including prescribed burning, conducted as part of implementing the Plan. Cumulatively, these vegetation management and fuel reduction activities will be dispersed across the calendar year according to the required conditions of the targeted vegetation, surrounding habitat requirements, and BAAQMD requirements, and as such would not substantially contribute to a net increase in any criteria pollutant in the region. As a result, any potential impacts would be considered less-than-significant.

(4) Create Objectionable Odors. The Study Area does not contain any major sources of odor, and vegetation management and fuel reduction activities to reduce wildfire risks in the Study Area would not be located in areas with existing objectionable odors. During vegetation management and fuel reduction activities where certain mechanical treatments, such as the use of tractors, mowers, or other diesel-fueled equipment is used, odors from diesel exhaust may be present; however, this would be a short-term impact localized to the recommended treatment area only and no sensitive receptors nearby would be adversely affected. Similarly, during prescribed burning the odor of burning wood and other organic materials would be present and could spread over a larger area according to prevailing wind patterns and current conditions, but these impacts would be localized and short-term in nature and would not create significant sustained levels that could have significant negative impacts to sensitive receptors. Implementation of the Plan, therefore, would not have the potential to frequently expose members of the public to objectionable odors and would be deemed to have a less-than-significant impact.

(5) Conflict with or Obstruct Greenhouse Gas (GHG) Emission Reduction Goals. The California Environmental Protection Agency Climate Action Team (CAT) and the ARB have developed several reports to achieve the Governor's GHG targets that rely on voluntary actions of California businesses, local government and community groups, and State incentive and regulatory programs. These include the CAT's 2006 "*Report to Governor Schwarzenegger and the Legislature*," ARB's 2007 "*Expanded List of Early Action Measures to Reduce Greenhouse Gas Emissions in California,*" and ARB's "*Climate Change Proposed Scoping Plan: a Framework for Change"* The reports identify strategies to reduce California's emissions to the levels proposed in Executive Order S-3-05 and AB 32.

Pursuant to the requirements of AB 32, ARB must prepare a plan demonstrating how the 2020 reduction target can be met. The Scoping Plan adopted in December 2008 contains broad goals and defined measures for various industry sectors.[28] The Forest Sector is unique in that it is the only sector that removes CO_2 from the atmosphere and sequesters it over the long-term. Carbon sequestration is the process by which atmospheric carbon dioxide is absorbed by trees through photosynthesis and stored as carbon in trunks, branches, foliage, roots and soils. However, several factors, such as large wildfires and forest land conversion, may cause a decline in the amount of carbon removed from the atmosphere. The Forest Sector strategy is a "No Net Loss" target, which would achieve reductions equivalent to the current statewide forest carbon budget (5 million metric tons of CO_2eq emissions), by preserving forest sequestration through sustainable management practices.[29]

One of the primary goals of the State strategy is to avoid large, uncontrolled wildfires and the associated GHG emissions. According to the Climate Action Team, measures taken to reduce wildfire severity through fuel reduction would: 1) reduce the intensity of wildfires and their associated climate change emissions; 2) increase the carbon stock of the remaining trees, 3) remove pests that create mortality of live stored carbon and reduce large damaging wildfires, and 4) reduce state and local fire suppression costs among other benefits.[30]

[28] California Air Resources Board. 2008. *Climate Change Proposed Scoping Plan: a framework for change*. October.

[29] Ibid.

[30] California Environmental Protection Agency. 2006. *Climate Action Team Report to Governor Schwarzenegger and the Legislature*. March.

Climate change may modify the natural fire regimes in ways that could have social, economic and ecological consequences. Due to decades of fire suppression activities, sustained drought, and increasing pest infestations, large, episodic, and unnaturally hot fires are an increasing trend on California's wildlands.[31] Reduced winter precipitation and earlier spring snowmelt deplete the moisture in soils and vegetation, leading to longer growing seasons and drought. These increasingly dry conditions create more favorable conditions for ignition and are believed to be the main reason for the increased trend in wildfire risk. Higher temperatures also increase evaporative water loss from vegetation, increasing the risk of rapidly spreading and large fires.[32]

The Plan provides policies, guidelines and recommendations to manage fuels and protect wildlands in a manner consistent with State strategies and long-term climate goals. While some of these activities (e.g., tree removal and prescribed burning) may appear to conflict with short-term GHG emission reduction goals, the State and District expect that there will be reductions in long-term overall emissions (associated with catastrophic and damaging wildfires) and larger net gains in vegetation health.[33] Tree removal and thinning or brush clearing may cause short term emissions (through the use of vehicles to transport personnel and mechanical equipment) and loss of some carbon sequestered in vegetation, but these emissions are expected to be offset by the promotion and regeneration of native and low fire hazard vegetation and growth and wood products. The activities identified in the Plan are intended to reduce the frequency and severity of wildfires, and as a result, CO_2 emissions will be reduced and more carbon will ultimately remain in wildland biomass in the cumulative condition. However, quantifying the specific GHG benefits associated with avoiding wildfire through fuels treatment would be speculative and is difficult because of the unpredictable nature of fire.

The Plan would not conflict with or impede implementation of reduction goals identified in AB 32, the Governor's Executive Order S-3-05, and other strategies to help reduce GHGs to the level proposed by the Governor. In addition, the Plan would also be subject to all applicable regulatory requirements, which would also reduce the GHG emissions of the project. With implementation of those elements, the Plan's contribution to cumulative GHG emissions would be less than significant.

(6) Prescribed Burning and Particulate Emissions. Prescribed burning could generate significant suspended particulate matter (PM_{10}) over a 24-hour period and expose sensitive receptors to substantial pollutant concentrations.

When prescribed burning is determined to be the most effective method for reducing fuel loads or managing resources in a recommended treatment area, EBRPD is required to conduct the burn in accordance with the guidelines set forth by BAAQMD for such activities, which are intended to increase the safety of such burns as well as generate the minimum amount of potential air pollutants possible. Smoke from prescribed burns cannot be eliminated, however, and short-term reduction in air quality is inevitable when prescribed burns are used. However, all burning activities can be designed and implemented in a manner that minimizes impacts to local and regional air quality. Each project

[31] Ibid.

[32] California Energy Commission. 2008. *The Future Is Now. An Update on Climate Change Science, Impacts, and Response Options for California.* September.

[33] California Board of Forestry and Fire Protection. 2008. *Draft Report to ARB on Meeting AB 32 Targets.* August 20.

and fuel type will need to be monitored for smoke production, dispersal, and transport, and each burn will be conducted in strict accordance with BAAQMD guidelines and the approved burn plan for each activity. In addition to these measures, implementation of the BMPs for smoke management in Chapter IV. Fuel Treatment Methods includes the following guidelines.

Plan Chapter IV. Fuel Treatment Methods Best Management Practices for Prescribed Burning - Smoke

Smoke from prescribed burns cannot be eliminated, and short-term reduction in air quality is inevitable when prescribed fires are used. However, most burning activities can be designed and implemented in a manner that minimizes impacts to local and regional air quality. Each project and fuel type will need to be monitored for smoke production, dispersal, and transport. The following BMPs can reduce potential impacts from smoke, and can be used singly or in combination:

- Each prescribed burn plan will include a smoke management plan describing avoidance techniques for sensitive areas and potential problems that could arise relating to smoke production and dispersion. The plan will include specific, detailed actions to be taken in the event onsite personnel or EBRPD determine negative impacts to be occurring in excess of acceptable levels.
- Prescribed fire actions will include measures to manage fuel moisture. Dry, dead fuels will be focused on for prescribed burns to minimize the amount of green materials being burned. If necessary, fuels should be modified prior to ignition to reduce high smoke-producing fuels; such actions could include the removal of heavy fuels, stacking and burning, or some combination of activities sufficient to reduce the amount of green fuels in the prescribed burn area prior to treatment. Burning prescriptions should balance the higher rate and level of consumption associated with burning under drier conditions with the increased atmospheric instability associated with wetter, cooler conditions and, therefore, less complete consumption.
- Each fuel type will be burned under its own prescription. Specific prescriptions should be created for understory burning of heavy, woody fuels; understory burning in duff and litter under mixed oak forests; and for slash piles and “jackpot” burning in heavy woody fuels. Prescriptions should emphasize “patchy” fuel consumption over much of the area defined for the prescribed burn. “Jackpots” of fuel should be removed during wetter, more fire-safe conditions, under conditions associated with greater smoke dispersal and dilution, and prior to broadcast understory burning.
- Prescribed burn areas may be divided into smaller ignition units to facilitate cessation of burning if air quality conditions deteriorate beyond acceptable levels.
- Prior to a prescribed burn, ladder fuels reaching into the tree canopy will be removed to increase fire safety and reduce the possibility of additional green fuels being torched. Personnel should lop and scatter prunings or pile and burn these materials prior to understory burning. Steps will be taken to protect high-value snags and large downed trees to prevent ignition and long-term smoldering of these materials.
- Personnel should predict smoke production from prescribed burn actions by using weather information. This information should be used to further delineate prescribed burn areas and timelines.
- Prescribed burns can only be conducted on designated burn days as authorized by the BAAQMD, to maximize the dispersal and dilution of smoke produced. Prescribed fires may be executed on non-burn days as necessitated by logistical concerns; the BAAQMD may provide a variance when the prescription has been reached. Such logistical concerns may include expected end-of-season precipitation, availability of personnel, or narrow prescriptions. A test burn will be conducted prior to full implementation of the action to determine whether actual smoke dispersal will meet the requirements of the burn’s smoke management plan.
- Personnel will patrol the burn to evaluate smoke dispersal and identify areas of smoke concentration near the outset of the prescribed burn action. Where areas of smoke concentration are identified additional measures (as stipulated in the prescribed burn plan) will be implemented by personnel.
- Ignition patterns should be managed such that smoke production is minimized; generally, burns should be ignited as backing fires against the wind and oriented such that fire spreads downhill, which will result in smaller particle sizes than those produced from a fire burning fast upslope. Smaller particle sizes produced generally equates to improved visibility during and after the prescribed burn. In all understory burn units, areas downslope from the upper blackline should be strip-burned or treated with spot fires where the local fire behavior permits. These practices can reduce fire residence time and total fuel burned, and increase the potential for lower duff ignition and subsequent smoldering.

- Prescribed burns should be conducted when wind patterns are expected to carry smoke away from sensitive areas.
- If smoke dispersal is determined by fire personnel to be inadequate or occurring in the wrong direction, or if smoke is determined to be spreading into sensitive areas, offending fires will be fully extinguished immediately.
- Adequate information concerning planned prescribed burning actions must be widely distributed prior to implementing the burn to reduce public concerns and criticisms. Notification of the burn should be distributed to adjacent residences and public service announcements should also be distributed to local media for dissemination. Smoke conditions should be monitored and documented on a smoke observation form, to be provided to EBRPD and fire personnel according to requirements in the prescribed burn plan. Any significant change in smoke emissions or column behavior will be reported to the onsite burn Incident Commander (burn boss).
- Highway visibility in areas potentially affected by smoke from prescribed burning will be monitored at regular intervals, and temporary caution signs warning drivers of potential reduced visibility will be posted in advance of areas where visibility could potentially be impaired. Prior to implementing the prescribed burn, the California Highway Patrol and County Sheriff will be notified when highway or other roadways could potentially be impacted by smoke produced from the prescribed burn activities.

c. Potentially Significant Climate and Air Quality Impacts. With implementation of the guidelines and BMPs listed above, implementation of the Plan would not result in any significant impacts to climate and air quality.