4.2 AIR QUALITY

4.2.1 INTRODUCTION

This section presents existing air quality conditions in the project area and provides a description of the regulatory framework for air quality management on a federal, state, regional, and local level. In addition, this section evaluates the types and quantities of air emissions that would be generated over the long term due to campus operation and from ongoing construction on the campus under the proposed Campus Master Plan and analyzes the potential air quality impacts from those emissions.

The analysis of air quality impacts is based on air quality regulations administered by the US Environmental Projection Agency (US EPA), the California Air Resources Board (CARB), and the Bay Area Air Quality Management District (BAAQMD), with each agency responsible for different aspects of the proposed project's activities. The roles of these agencies are discussed in detail under **Subsection 4.2.4, Regulatory Considerations**. Other sources of information used in this assessment include:

- *BAAQMD California Environmental Quality Act (CEQA) Guidelines: Assessing the Air Quality Impacts of Projects and Plans* (BAAQMD 1999)
- *Bay Area 2000 Clean Air Plan and Triennial Assessment* (BAAQMD 2000)
- *2001 Ozone Attainment Plan* (BAAQMD 2001)
- *2005 Ozone Strategy* (BAAQMD 2006)
- *The California State University CEQA Handbook* (CSU n.d.)
- *Technical Advisory – CEQA and Climate Change: Addressing Climate Change through California Environmental Quality Act (CEQA) Review* (OPR 2008)

4.2.2 ENVIRONMENTAL SETTING

4.2.2.1 Climate and Meteorology

The climate of the Bay Area is Mediterranean in character, with mild, rainy winter weather from November through March and warm, dry weather from June through October. In summer, the Pacific high-pressure system typically remains near the coast of California; subsidence of warm air over the cooler marine air associated with the Pacific high creates frequent summer atmospheric temperature inversions. Subsidence inversions may be several hundred to several thousand feet deep, effectively trapping pollutants in a stagnant volume of air near the ground with little dispersion ability. Typically, May through October is considered the ozone smog season when transport studies have shown ozone

precursor emissions generated in Hayward are often transported to other regions of the Bay Area and beyond (e.g., Central Valley) that are more conducive to the formation of ozone. In winter, the Pacific high-pressure system moves southward, allowing ocean-formed storms to move through the region. The frequent storms and infrequent periods of sustained sunny weather are not conducive to ozone formation. Radiational cooling during the evening, however, sometimes creates thin inversions and concentrates air pollutant emissions near the ground.

Mean minimum temperatures in the project area range from high 50s in the summer to the low 40s in the winter. The average temperature in the area is the mid 50s with mean maximum summer temperatures in the low 80s and winter temperatures in the low 60s. Annual and daily temperatures in the region have fairly small oscillations due to the moderating effects of the nearby ocean. In contrast to the steady temperature regime, rainfall is highly variable and confined almost exclusively to the "rainy" period from November through April. The area receives approximately 30 inches of rainfall annually, of which about 95 percent occurs during November to April. Precipitation may vary widely from year to year as a shift in the annual storm track of a few hundred miles can mean the difference between a very wet year and drought conditions. Winds in the project area typically vary diurnally. The usual pattern consists of daytime winds originating offshore from the west and northwest as air is funneled through the Golden Gate, and nighttime winds originating from the east and southeast due to the cooling of land areas. Summer afternoon sea breezes can often exceed 20 miles per hour. Peak annual winds occur during winter storms. South and southeast winds typically also precede weather systems passing through the region.

4.2.2.2 Regional Air Quality

The project site is located within the San Francisco Bay Area Air Basin (SFBAAB or the Basin). The Basin includes all of Alameda, Contra Costa, Marin, Napa, San Francisco, San Mateo, and Santa Clara counties, as well as the southern half of Sonoma County and the southwestern portion of Solano County. The air pollutants within the Basin are generated by two categories of sources: stationary and mobile. Stationary sources are known as "point sources," which have one or more emission sources at a single facility, or "area sources," which are widely distributed and produce many small emissions. Point sources are usually associated with manufacturing and industrial uses, such as refinery boilers or combustion equipment that produce electricity or process heat. Examples of area sources include residential water heaters, painting operations, lawn mowers, agricultural fields, landfills, and consumer products, such as barbecue lighter fluid and hair spray. "Mobile sources" refer to operational and evaporative emissions from on- and off-road motor vehicles.

The air quality of the Basin is affected by the pollutants generated within dense population centers of the Basin, heavy vehicular traffic, and industry; however, as discussed above, coastal sea breezes tend to transport pollutants generated within the Basin to inland locations.

Ambient Air Quality Standards

The federal Clean Air Act (CAA) requires the US EPA to set ambient (outdoor) air quality standards for the nation for pollutants that are considered harmful to public health and the environment. These pollutants are referred to by the US EPA as "criteria pollutants," and they include: carbon monoxide (CO), nitrogen dioxide (NO_2), ozone (O_3), sulfur dioxide (SO_2), respirable particulate matter (PM_{10}), fine particulate matter ($PM_{2.5}$), and lead.[1]

The US EPA Office of Air Quality Planning and Standards has set primary and secondary National Ambient Air Quality Standards (NAAQS) for these pollutants. Primary standards are considered the maximum levels of ambient (outdoor) air pollutants considered safe, with an adequate margin of safety, to protect the public health and welfare. Secondary standards were set to protect against decreased visibility, damage to animals, crops, vegetation, and buildings. The secondary standards are the same as the primary standards, with the exception of CO and SO_2. There is no secondary standard for CO and the secondary standard for (SO_2) is less restrictive than is the primary standard.

California Health and Safety Code (Section 39606) authorizes CARB to set state ambient air quality standards to protect public health, safety, and welfare. The California Ambient Air Quality Standards (CAAQS) are for the federal criteria pollutants, as well as for sulfates, visibility-reducing particles, hydrogen sulfide, and vinyl chloride. In general, California standards are more restrictive than national standards. A summary of state and federal primary ambient air quality standards and the relevant health effects of the pollutants are shown in **Table 4.2-1, Ambient Air Quality Standards**.

1 The term "criteria air pollutant" derives from the requirement that the US EPA must describe the characteristics and potential health and welfare effects of these pollutants. This term is used by both the US EPA and CARB.

Table 4.2-1
Ambient Air Quality Standards

Air Pollutant	State Standard	Federal Primary Standard[1]	Most Relevant Health Effects[2]
Ozone	0.070 ppm, 8-hr avg. 0.09 ppm, 1-hr. avg.	0.075 ppm, 8-hr avg. (3-year average of annual 4th-highest daily maximum)	(a) Pulmonary function decrements and localized lung edema in humans and animals; (b) Risk to public health implied by alterations in pulmonary morphology and host defense in animals; (c) Increased mortality risk; (d) Risk to public health implied by altered connective tissue metabolism and altered pulmonary morphology in animals after long-term exposures and pulmonary function decrements in chronically exposed humans; (e) Vegetation damage; and (f) Property damage
Carbon Monoxide	9.0 ppm, 8-hr avg. 20 ppm, 1-hr avg.	9 ppm, 8-hr avg. 35 ppm, 1-hr avg.	(a) Aggravation of angina pectoris and other aspects of coronary heart disease; (b) Decreased exercise tolerance in persons with peripheral vascular disease and lung disease; (c) Impairment of central nervous system functions; and (d) Possible increased risk to fetuses
Nitrogen Dioxide[3]	0.18 ppm, 1-hr avg. 0.030 ppm, annual arithmetic mean	0.053 ppm, annual arithmetic mean	(a) Potential to aggravate chronic respiratory disease and respiratory symptoms in sensitive groups; (b) Risk to public health implied by pulmonary and extra-pulmonary biochemical and cellular changes and pulmonary structural changes; and (c) Contribution to atmospheric discoloration
Sulfur Dioxide	0.04 ppm, 24-hr avg. 0.25 ppm, 1-hr. avg.	0.030 ppm, annual arithmetic mean 0.14 ppm, 24-hr avg.	Bronchoconstriction accompanied by symptoms which may include wheezing, shortness of breath and chest tightness, during exercise or physical activity in person with asthma
Respirable Particulate Matter (PM_{10})	20 $\mu g/m^3$, annual arithmetic mean 50 $\mu g/m^3$, 24-hr avg.	150 $\mu g/m^3$, 24-hr avg.	(a) Exacerbation of symptoms in sensitive patients with respiratory or cardiovascular disease; (b) Declines in pulmonary function growth in children; and (c) Increased risk of premature death from heart or lung diseases in the elderly
Fine Particulate Matter ($PM_{2.5}$)	12 $\mu g/m^3$, annual arithmetic mean	15 $\mu g/m^3$, annual arithmetic mean (3-year average) 35 $\mu g/m^3$, 24-hr avg. (3-year average of 98th percentile)	(a) Exacerbation of symptoms in sensitive patients with respiratory or cardiovascular disease; (b) Declines in pulmonary function growth in children; and (c) Increased risk of premature death from heart or lung diseases in the elderly

Air Pollutant	State Standard	Federal Primary Standard[1]	Most Relevant Health Effects[2]
Sulfates	25 µg/m^3, 24-hr avg.	None	(a) Decrease in ventilatory function; (b) Aggravation of asthmatic symptoms; (c) Aggravation of cardio-pulmonary disease; (d) Vegetation damage; (e) Degradation of visibility; and (f) Property damage
Lead[4]	1.5 µg/m^3, 30-day avg.	1.5 µg/m^3, calendar quarterly average	(a) Increased body burden; and (b) Impairment of blood formation and nerve conduction
Visibility-Reducing Particles	Reduction of visual range to less than 10 miles at relative humidity less than 70%, 8-hour avg. (10 AM – 6 PM)	None	Visibility impairment on days when relative humidity is less than 70 percent
Hydrogen Sulfide	0.03 ppm, 1-hr avg.	None	Odor annoyance
Vinyl Chloride[4]	0.01 ppm, 24-hr avg.	None	Known carcinogen

µg/m^3 = microgram per cubic meter.
ppm = parts per million by volume.

[1] *The federal primary standard is the level of air quality deemed necessary by the federal government with an adequate margin of safety to protect the public health.*

[2] *South Coast Air Quality Management District.* Final Program Environmental Impact Report for the 2007 Air Quality Management Plan*, June 2007, Table 3.1-1, p. 3.1-3. July 2, 2007 http://www.aqmd.gov/ceqa/documents/2007/aqmd/finalEA/07aqmp/ch3.1_FPEIR.pdf.*

[3] *The NO_2 state standard was amended on February 22, 2007 to lower the 1-hour state standard to 0.18 ppm and establish a new annual state standard of 0.030 ppm. These changes became effective on March 20, 2008.*

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

Air Quality Attainment Designations

The US EPA is responsible for enforcing the federal CAA and the federal ambient air quality standards (i.e., the NAAQS). CARB is the state agency charged with coordinating efforts to attain and maintain the NAAQS and the CAAQS. Both agencies designate air basins as being in "attainment" or "nonattainment" for each of the criteria pollutants. The determination of whether an area meets the state and federal standards is based on long-term air quality monitoring data.

Attainment Areas

Attainment areas are those with air quality that is better than the standards shown in **Table 4.2-1**. Under the CCAA, an area is in attainment for a particular pollutant if the CAAQS for that pollutant was not

violated at any site in the area during a three-year period (CARB 2003). Under the CAA, an area is in attainment for a particular pollutant if the area meets the national primary or secondary ambient air quality standard for that pollutant (US EPA 2008a).

Nonttainment Areas

Under the CCAA, an area is in nonattainment for a particular pollutant if there was at least one violation of the CAAQS for that pollutant in the area (CARB 2003). Under the CAA, a nonattainment area for a pollutant is any area that does not meet (or that contributes to ambient air quality in a nearby area that does not meet) the primary or secondary NAAQS for that pollutant (US EPA 2008a). Air basins designated as nonattainment for the ozone-8 hour NAAQS are ranked as marginal, moderate, serious, severe, or extreme depending on the area's 8-hour design value calculated using the most recent 3 years of data. Air basins designated as nonattainment for the CO NAAQS are ranked as not classified, moderate, or serious (US EPA 2008a). CARB has another subcategory referred to as nonattainment/transitional. This designation refers to nonattainment areas that are close to attaining the CAAQS for the pollutant in nonattainment (CARB 2003).

Unclassified Areas

Some areas are unclassified, which means there is insufficient monitoring data for supporting an attainment or nonattainment designation. Unclassified areas are typically treated as being in attainment.

Table 4.2-2, San Francisco Bay Area Air Basin Attainment Status, identifies the Basin's attainment status relative to the primary NAAQS and the CAAQS. Because the attainment/nonattainment designation is pollutant specific, an area may be classified as nonattainment for one pollutant and attainment for another. Similarly, because the state and federal ambient air quality standards differ, an area could be classified as attainment under the federal standards and as nonattainment under the state standards for the same pollutant. As shown in **Table 4.2-2**, the SFBAAB is in nonattainment/marginal for the federal standard for ozone-8 hour, and is in nonattainment for the state standards of ozone-1 hour, ozone-8 hour, PM_{10}, and $PM_{2.5}$.

Table 4.2-2
San Francisco Bay Area Air Basin Attainment Status

Pollutant	Federal Standards	State Standards
Ozone-1 hour	No federal standard[1]	Nonattainment[2]
Ozone-8 hour	Nonattainment/Marginal	Nonattainment
PM_{10}	Unclassifiable	Nonattainment
$PM_{2.5}$	Attainment/Unclassifiable	Nonattainment
CO	Attainment/Unclassifiable	Attainment
Nitrogen dioxide	Attainment/Unclassifiable	Attainment[3]
Sulfur dioxide	Attainment	Attainment
Lead	Attainment	Attainment
Hydrogen sulfide	No federal standards	Unclassified
Sulfates	No federal standards	Attainment
Vinyl Chloride[4]	No federal standards	Unclassified
Visibility-Reducing particulates	No federal standards	Unclassified

Sources: California Air Resources Board. "Area Designations Maps/State and National." http://www.arb.ca.gov/desig/adm/adm.htm. September 11, 2007.

United States Environmental Protection Agency. "Region 9: Air Programs – Air Quality Maps." http://www.epa.gov/region09/air/maps/maps_top.html. August 8, 2008

[1] The 1-hour ozone NAAQS was revoked on June 15, 2005.

[2] CARB has not issued area classifications based on the new state 8-hour standard. The previous classification for the 1-hour ozone standard was Severe.

[3] CARB has not issued new area classifications based on the new state 1-hour and annual arithmetic mean NO_2 standards. The designation shown is based on the previous 0.25 ppm 1-hour standard.

[4] CARB has identified lead and vinyl chloride as "toxic air contaminants" with no threshold level of exposure for adverse health effects determined.

4.2.2.3 Local Air Quality

CARB has established and maintains a network of sampling stations in conjunction with local air pollution control districts (APCDs) and air quality management districts (AQMDs), private contractors, and the National Park Service. The air quality sampling stations are referred to as the State and Local Air Monitoring Stations (SLAMS) network. The SLAMS network provides air quality monitoring data, including real time meteorological data and ambient pollutant levels, as well as historical data. The SLAMS network in the SFBAAB consists of 29 monitoring stations.

The nearest monitoring station to the project site is located at 3466 La Mesa Drive in the City of Hayward, approximately 1 mile to the east. The only pollutant monitored at this station is O_3. The next nearest monitoring station to the project site is located at 40733 Chapel Way in Fremont, approximately 8 miles

southeast of the project site. Monitored pollutants from this station that are used in this impact analysis include PM_{10}, $PM_{2.5}$, CO, and NO_2. Finally, the closest monitoring station to the project site that monitors SO_2 is located at 2956 Treat Boulevard in Concord, located approximately 14 miles north of the project site.

Table 4.2-3, Ambient Pollutant Concentrations Registered Nearest to the Project Site, lists the measured ambient pollutant concentrations and the violations of state and federal standards that have occurred at the abovementioned monitoring stations from 2003 through 2007, the most recent years in which data are available. As shown, the Hayward monitoring station registered values above state and federal standards for O_3, although the federal standard has not been exceeded since 2003. The state standard for PM_{10} at the Fremont monitoring station was exceeded from 2005 to 2007. The standards for CO, NO_2, $PM_{2.5}$, or SO_2 were not exceeded during 2003 through 2007. Concentrations of CO, NO_2, lead and sulfate have not been exceeded anywhere within the Basin for several years. Values for lead and sulfate are not presented in the table below since ambient concentrations statewide are well below the state standards. Hydrogen sulfide, vinyl chloride and visibility reducing particles were not monitored by CARB or the BAAQMD in the SFBAAB during the period of 2003 to 2007.

Table 4.2-3
Ambient Pollutant Concentrations Registered Nearest to the Project Site

Pollutant	Standards[1, 2]	Year				
		2003	2004	2005	2006	2007
OZONE (O_3)						
Maximum 1-hour concentration monitored (ppm)		0.116	0.088	0.093	0.101	0.075
Maximum 8-hour concentration monitored (ppm)		0.092	0.070	0.070	0.071	0.065
Number of days exceeding state 1-hour standard	0.09 ppm	3	0	0	2	1
Number of days exceeding state 8-hour standard	0.070 ppm	3	1	0	1	0
Number of days exceeding federal 8-hour standard [3]	0.075 ppm	1	0	0	0	0
CARBON MONOXIDE (CO)						
Maximum 1-hour concentration monitored (ppm)		3.2	3.0	3.2	2.9	2.5
Maximum 8-hour concentration monitored (ppm)		1.87	1.66	1.96	1.81	1.57
Number of days exceeding state 8-hour standard	9.0 ppm	0	0	0	0	0
Number of days exceeding federal 8-hour standard	9 ppm	0	0	0	0	0
NITROGEN DIOXIDE (NO_2)						
Maximum 1-hour concentration monitored (ppm)		0.076	0.060	0.069	0.063	0.058
Annual average concentration monitored (ppm)		0.017	0.015	0.015	0.015	0.014
Number of days exceeding state 1-hour standard [4]	0.18 ppm	0	0	0	0	0

Pollutant	Standards[1, 2]	Year 2003	2004	2005	2006	2007
PARTICULATE MATTER (PM_{10})						
Maximum 24-hour concentration monitored ($\mu g/m^3$)		37.1	46.3	51.7	54.0	57.5
Annual average concentration monitored ($\mu g/m^3$)		18.2	18.6	17.8	20.0	19.6
Number of samples exceeding state standard	50 $\mu g/m^3$	0	0	1	1	1
Number of samples exceeding federal standard	150 $\mu g/m^3$	0	0	0	0	0
PARTICULATE MATTER ($PM_{2.5}$)						
Maximum 24-hour concentration monitored ($\mu g/m^3$)		33.5	39.9	33.4	43.9	51.2
Annual average concentration monitored ($\mu g/m^3$)		—	9.4	9.0	—	8.7
Number of samples exceeding federal standard[5]	35 $\mu g/m^3$	0	0	0	0	0
SULFUR DIOXIDE (SO_2)						
Maximum 24-hour concentration monitored (ppm)		0.003	0.010	0.008	0.006	0.005
Number of samples exceeding 24-hour state standard	0.04 ppm	0	0	0	0	0
Number of samples exceeding federal 24-hour standard	0.14 ppm	0	0	0	0	0

Sources: California Air Resource Board, "Air Quality Data Statistics," http://www.arb.ca.gov/adam/welcome.html.
US Environmental Protection Agency, "Air Data: Access to Air Pollution Data," http://www.epa.gov/air/data/.
— Insufficient data to determine average annual value.
[1] Parts by volume per million of air (ppm), micrograms per cubic meter of air ($\mu g/m^3$), or annual arithmetic mean (aam).
[2] Federal and state standards are for the same time period as the maximum concentration measurement unless otherwise indicated.
[3] US EPA revised the 8-hour standard effective May 27, 2008. The statistics are based on the previous standard of 0.08 ppm.
[5] CARB revised the 1-hour standard effective March 20, 2008. The statistics are based on the previous standard of 0.25 ppm. In addition, CARB adopted an annual standard of 0.030 ppm, which is more stringent than the federal standard of 0.053 ppm.
[6] The federal standard for $PM_{2.5}$ was changed to 35 $\mu g/m^3$ in 2006. Statistics shown are based on the 65 $\mu g/m^3$ standard.

4.2.2.4 Sensitive Receptors

According to the *BAAQMD CEQA Guidelines*, "sensitive receptors are facilities that house or attract children, the elderly, and persons with illnesses, or others who are especially sensitive to the effects of air pollutants." Schools, hospitals, and convalescent homes are sensitive receptors because infants, children, the elderly, and people with health afflictions (especially respiratory ailments) are more susceptible to respiratory infections and other air-quality-related health problems than the general public.

Residential areas are also considered sensitive to air pollution because residents (including children and the elderly) tend to be at home for extended periods of time, resulting in sustained exposure to any pollutants present. Recreational areas for children are also considered sensitive locations due to vigorous exercise associated with these types of land uses (exercise causes an increased breathing rate that will lead to greater exposure to ambient air pollutants).

Existing sensitive land uses on the campus include the Pioneer Heights I, II, and III student housing complexes. Sensitive land uses in the vicinity of the campus include multi-family residential developments to the north and east, single-family residences to the east, Garin Regional Park to the south, and a limited number of residences to the west.

4.2.2.5 Localized Carbon Monoxide Concentrations

Traffic congestion along roadways and at intersections has the potential to generate localized high levels of CO. The BAAQMD monitoring stations have not recorded exceedances of the state or federal CO standards since 1991. However, because elevated CO concentrations are generally localized, heavy traffic volumes and congestion at specific intersections or roadway segments can lead to high levels of CO (referred to as "hotspots") although concentrations at the nearest air quality monitoring station may be below state and federal standards.

4.2.2.6 Surrounding Sources of Air Emissions

Land uses surrounding the campus include single- and multi-family residential developments, open space, public and quasi-public uses, and commercial uses. To the west of the campus a mix of residential, retail and commercial, and auto-oriented and auto-serving uses adjoin Mission Boulevard, a major north-south arterial in the City. Major sources of air pollutants associated with these uses include motor vehicle emissions, natural gas combustion for water and space heating, and periodic landscape maintenance. It is anticipated that surrounding land uses result in emissions that do not have an adverse effect on campus students, employees, and visitors.

4.2.2.7 Global Climate Change

Global climate change refers to any significant change in climate measurements, such as temperature, precipitation, or wind, lasting for an extended period (i.e., 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;
- Natural processes within the climate system (e.g., changes in ocean circulation, reduction in sunlight from the addition of GHG and other gases to the atmosphere from volcanic eruptions); and
- Human activities that change the atmosphere's composition (e.g., through burning fossil fuels) and the land surface (e.g., deforestation, reforestation, urbanization, desertification).

Greenhouse Effect

Heat retention within the atmosphere is an essential process to sustain life on Earth. The natural process through which heat is retained in the troposphere2 is called the "greenhouse effect." The greenhouse effect traps heat in the troposphere through a three-fold process as follows: Short-wave radiation emitted by the Sun is absorbed by the Earth; the Earth emits a portion of this energy in the form of long-wave radiation; and greenhouse gases (GHGs) in the upper atmosphere absorb this long-wave radiation and emit this long-wave radiation into space and toward the Earth. This "trapping" of the long-wave (thermal) radiation emitted back toward the Earth is the underlying process of the greenhouse effect. Without the greenhouse effect, the Earth's average temperature would be approximately -18 degrees Celsius (°C) (0° Fahrenheit [°F]) instead of its present 14 °C (57 °F) (National Climatic Data Center 2008). The most abundant GHGs are water vapor and carbon dioxide. Many other trace gases have greater ability to absorb and re-radiate long-wave radiation; however, these gases are not as plentiful. For this reason, and to gauge the potency of GHGs, scientists have established a Global Warming Potential (GWP) for each GHG based on its ability to absorb and re-radiate long-wave radiation. The GWP of a gas is determined using carbon dioxide as the reference gas with a GWP of 1. The Intergovernmental Panel on Climate Change (IPCC) sets the GWPs and regularly updates them in its assessment reports.

Greenhouse Gases

Primary Greenhouse Gases

The following gases are considered to be the primary GHGs and are regulated under the Kyoto Protocol, with the exception of water vapor (IPCC 1996):

- Carbon dioxide. Carbon dioxide is primarily generated by fossil fuel combustion in stationary and mobile sources. Due to the emergence of industrial facilities and mobile sources in the past 250 years, the concentration of CO_2 in the atmosphere has increased 35 percent (US EPA 2008b). Carbon dioxide is the most widely emitted GHG and is the reference gas (GWP of 1) for determining GWPs for other GHGs. In 2004, 83.8 percent of California's GHG emissions were carbon dioxide (CEC 2006).

- Methane (CH_4). Methane is emitted from biogenic sources, incomplete combustion in forest fires, landfills, manure management, and leaks in natural gas pipelines. In the United States, the top three sources of methane come from landfills, natural gas systems, and enteric fermentation (US. EPA 2006a). Methane is the primary component of natural gas, which is used for space and water heating, steam production, and power generation. The GWP of methane is 21.

2 The troposphere is the bottom layer of the atmosphere, which varies in height from the Earth's surface to 10 to 12 kilometers).

- Nitrous oxide (N_2O). Nitrous oxide is produced by both natural and human-related sources. Primary human-related sources include agricultural soil management, animal manure management, sewage treatment, mobile and stationary combustion of fossil fuel, adipic acid production, and nitric acid production. The GWP of nitrous oxide is 310.

- Hydrofluorocarbons (HFCs). HFCs are typically used as refrigerants for both stationary refrigeration and mobile air conditioning. The use of HFCs for cooling and foam blowing is growing as the continued phase-out of chlorofluorocarbons (CFCs) and hydrochlorofluorocarbons (HCFCs) gains momentum. The GWP of HFCs range from 140 for HFC-152a to 6,300 for HFC-236fa.

- Perfluorocarbons (PFCs). Perfluorocarbons are compounds consisting of carbon and fluorine. They are primarily created as a byproduct of aluminum production and semiconductor manufacturing. PFCs are potent GHGs with a GWP several thousand times that of carbon dioxide, depending on the specific PFC. Another area of concern regarding PFCs is their long atmospheric lifetime (up to 50,000 years). The GWPs of PFCs range from 5,700 to 11,900.

- Sulfur hexafluoride (SF_6). Sulfur hexafluoride is a colorless, odorless, nontoxic, nonflammable gas. It is most commonly used as an electrical insulator in high voltage equipment that transmits and distributes electricity. SF_6 is the most potent GHG that has been evaluated by the IPCC with a GWP of 23,900. However, its global warming contribution is not as high as the GWP would indicate due to its low mixing ratio compared to carbon dioxide (4 parts per trillion [ppt] in 1990 versus 365 parts per million [ppm]) (US EPA 2006b).

- Water vapor. Although water vapor has not received the scrutiny of other GHGs, it is the primary contributor to the greenhouse effect. Water vapor and clouds contribute 66 to 85 percent of the greenhouse effect (water vapor alone contributes 36 to 66 percent) (Real Climate 2005). Natural processes, such as evaporation from oceans and rivers, and transpiration from plants contribute 90 percent and 10 percent of the water vapor in our atmosphere, respectively (US Geological Survey 2008). The primary human-related source of water vapor comes from fuel combustion in motor vehicles; however, this is not believed to contribute a significant amount to atmospheric concentrations of water vapor (Energy Information Administration 2008). Therefore, the control and reduction of water vapor emissions is not within reach of human actions. The IPCC has not determined a GWP for water vapor.

Other Greenhouse Gases

In addition to the six major GHGs discussed above (excluding water vapor), many other compounds have the potential to contribute to the greenhouse effect. Some of these substances were previously identified as stratospheric ozone depletors; therefore, their gradual phase-out is currently in effect. A few of these compounds are discussed below:

- Hydrochlorofluorocarbons (HCFCs). HCFCs are solvents, similar in use and chemical composition to CFCs. The main uses of HCFCs are for refrigerant products and air conditioning systems. As part of the Montreal Protocol, all developed countries that adhere to the protocol are subject to a consumption cap and gradual phase-out of HCFCs. The United States is scheduled to achieve a 100 percent reduction to the cap by 2030. The GWPs of HCFCs range from 93 for HCFC-123 to 2,000 for HCFC-142b (US EPA 1996).

- 1,1,1-trichloroethane. 1,1,1-trichloroethane or methyl chloroform is a solvent and degreasing agent commonly used by manufacturers. In 1992, the US EPA issued Final Rule 57 FR 33754 scheduling the phase-out of methyl chloroform by 2002 (US EPA 2008c). Therefore, the threat posed by methyl chloroform as a GHG will diminish. Nevertheless, the GWP of methyl chloroform is 110 times that of carbon dioxide (US EPA 1996).

- Chlorofluorocarbons (CFCs). CFCs are used as refrigerants, cleaning solvents, and aerosol spray propellants. CFCs were also part of the US EPA's Final Rule 57 FR 3374 for the phase-out of ozone depleting substances. CFCs have been replaced by HFCs in cooling systems and a variety of alternatives for cleaning solvents. Nevertheless, CFCs remain suspended in the atmosphere, contributing to the greenhouse effect. CFCs are potent GHGs with GWPs ranging from 4,000 for CFC-11 to 11,700 for CFC-13 (US EPA 2008d).

- Ozone. Ozone occurs naturally in the stratosphere where it is largely responsible for filtering harmful ultraviolet (UV) radiation. In the troposphere, ozone acts as a GHG by absorbing and re-radiating the infrared energy emitted by the earth. As a result of the industrial revolution and rising emissions of oxides of nitrogen (NO_x) and volatile organic compounds (VOCs) (ozone precursors), the concentrations of ozone in the troposphere have increased (IPCC 2008). Due to the short life span of ozone in the troposphere, its concentration and contribution as a GHG is not well established. However, the greenhouse effect of tropospheric ozone is considered small, as the radiative forcing[3] of ozone is 25 percent of that of carbon dioxide (IPCC 2007, Figure TS.5)

Contributions to Greenhouse Gas Emissions

Global

Anthropogenic GHG emissions worldwide as of 2005 (the latest year for which data are available for Annex 1 countries) totaled approximately 30,800 CO_2 equivalent million metric tons ($MMTCO_2E$).[4] The global emissions inventory data are not all from the same year and may vary depending on the source of the emissions inventory data (UNFCCC 2008a and UNFCCC 2008b).[5] Six countries and the European Community accounted for approximately 70 percent of the total global emissions (See **Table 4.2-4, Six Top GHG Producer Countries and the European Community**). The GHG emissions in more recent years may be substantially different than those shown in **Table 4.2-4**.

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3 Radiative forcing, measured in Watts/m^2, is an externally imposed perturbation (e.g., stimulated by greenhouse gases) in the radiative energy budget of the Earth's climate system (i.e., energy and heat retained in the troposphere minus energy passed to the stratosphere).

4 The CO_2 equivalent emissions are commonly expressed as "million metric tons of carbon dioxide equivalent ($MMTCO_2E$)" The carbon dioxide equivalent for a gas is derived by multiplying the tons of the gas by the associated GWP, such that $MMTCO_2E$ = (million metric tons of a GHG) x (GWP of the GHG). For example, the GWP for methane is 21. This means that emissions of one million metric tons of methane are equivalent to emissions of 21 million metric tons of CO_2.

5 The global emissions are the sum of Annex I and non-Annex I countries without counting Land-Use, Land-Use Change and Forestry (LULUCF). For countries that 2004 data were unavailable, the UNFCCC data for the most recent year were used.

Table 4.2-4
Six Top GHG Producer Countries and the European Community

Emitting Countries	GHG Emissions ($MMTCO_2E$)*
United States	7,241.5[1]
China	4,882.7[2]
European Community	4,192.6[1]
Russian Federation	2,132.5[1]
India	1,606.5[2]
Japan	1,359.9[1]
Germany[3]	1,001.5[1]
Total	21,415.7

Sources:
[1] *United Nations Framework Convention on Climate Change "Annex I Parties – GHG total without LULUCF." http://unfccc.int/ghg_emissions_data/ghg_data_from_unfccc/time_series_annex_i/items/3841.php. Online Review August 2008.*
[2] *GHG emissions for China and India (Calendar Year 2000) were obtained from World Resources Institute. Climate Analysis Indicators Tool 5.0 (CAIT), August 2008.*
[3] *Germany's GHG emissions are included in the European Community.*
* *Excludes emissions/removals from land use, land-use change and forestry (LULUCF)*

United States

As noted in **Table 4.2-4**, the United States was the top producer of greenhouse gas emissions as of 2005. The primary greenhouse gas emitted by human activities in the United States was CO_2, representing approximately 84 percent of total greenhouse gas emissions. Carbon dioxide from fossil fuel combustion, the largest source of US greenhouse gas emissions, accounted for approximately 80 percent of US GHG emissions (US EPA 2008e).

State of California

Based upon the 2004 GHG inventory data (the latest year available) compiled by CARB for the California 1990 greenhouse gas emissions inventory, California emitted 484 $MMTCO_2E$, including emissions resulting from out-of-state electrical generation (CARB 2007). Based on the CARB inventory and GHG inventories for countries contributing to the worldwide GHG emissions inventory compiled by the United Nations Framework Convention on Climate Change (UNFCCC) for 2005, California's GHG emissions rank second in the United States (Texas is number one) with emissions of 423 $MMTCO_2E$

(excluding emissions related to imported power) and internationally between Ukraine (418.9 $MMTCO_2E$) and Spain (440.6 $MMTCO_2E$) (UNFCCC 2008a).

A California Energy Commission (CEC) emissions inventory report placed CO_2 produced by fossil fuel combustion in California as the largest source of GHG emissions in 2004, accounting for 81 percent of the total GHG emissions. CO_2 emissions from other sources contributed 2.8 percent of the total GHG emissions, methane emissions 5.7 percent, nitrous oxide emissions 6.8 percent, and the remaining 2.9 percent was composed of emissions of high-GWP gases (CEC 2006). These high GWP gases are largely composed of refrigerants and a small contribution of sulfur hexafluoride (SF_6) used as insulating materials in electricity transmission and distribution.

The primary contributors to GHG emissions in California are transportation, electric power production from both in-state and out-of-state sources, industry, agriculture and forestry, and other sources, which include commercial and residential activities. These primary contributors to California's GHG emissions and their relative contributions are presented in **Table 4.2-5, California GHG Emissions by Sector in 2004**.

Table 4.2-5
California GHG Emissions by Sector in 2004

Source Category	Emissions Including Imported Electricity [1]		Emissions Excluding Imported Electricity	
	GHG Emissions ($MMTCO_2E$)	Percent of Total	GHG Emissions ($MMTCO_2E$)	Percent of Total
Agriculture	27.9	5.8%	27.9	6.6%
Commercial Uses	12.8	2.6%	12.8	3.0%
Electricity Generation	119.8	24.7%	58.5	13.8%
Forestry (excluding sinks)	0.2	0.0%	0.2	0.0%
Industrial Uses	96.2	19.9%	96.2	22.7%
Residential Uses	29.1	6.0%	29.1	6.9%
Transportation	182.4	37.7%	182.4	43.1%
Other[c]	16.0	3.3%	16.0	3.8%
Totals	484.4	100.0%	423.1	100.0%

Source: California Air Resources Board. Staff Report: California 1990 Greenhouse Gas Emissions Level and 2020 Emissions Limit. November 16, 2007.
[1] Emissions from imported electricity account for 61.3 $MMTCO_2E$.

Emissions from each of these economic sectors are not confined to emissions from a single process, since there is crossover with other sectors. For example, the GHG emissions from cement production places clinker manufacturing in its own category and the fuel used to heat the cement production process within another category (the industrial fuel category). In the case of landfills, methane emissions and CO_2 emissions and sinks are reported in their respective portions of the inventory. Taken together, the CO_2 sinks approximately offset the landfill methane emissions. Additionally, fuel-related GHG emissions from transporting wastes to landfills are included in transportation fuels.

Indications of Anthropogenic Influences

The impact of anthropogenic activities on global climate change is readily apparent in the observational record. For example, surface temperature data shows that 11 of the 12 years from 1995 to 2006 rank among the 12 warmest since 1850, the beginning of the instrumental record for global surface temperature. In addition, the atmospheric water vapor content has increased since at least the 1980s over land, sea, and in the upper atmosphere, consistent with the capacity of warmer air to hold more water vapor; ocean temperatures are warmer to depths of 3,000 feet; and a marked decline has occurred in mountain glaciers and snowpack in both hemispheres, and in polar ice and ice sheets in both the arctic and Antarctic regions (IPCC 2007).

Influence of Industrialization

Air trapped by ice has been extracted from core samples taken from polar ice sheets to determine the global atmospheric variation of carbon dioxide, methane, and nitrous oxide from before the start of the industrialization, around 1750, to over 650,000 years ago. For that period, it was found that carbon dioxide concentrations ranged from 180 ppm to 300 ppm. For the period from around 1750 to the present, global carbon dioxide concentrations increased from a pre-industrialization period concentration of 280 ppm to 379 ppm in 2005, with the 2005 value far exceeding the upper end of the pre-industrial period range (IPCC 2007). Global methane and nitrous oxide concentrations show similar increases for the same period (see **Table 4.2-6, Comparison of Global Pre-Industrial and Current GHG Concentrations**).

Table 4.2-6
Comparison of Global Pre-Industrial and Current GHG Concentrations

Greenhouse Gas	Early Industrial Period Concentrations (ppm)	Natural Range for Last 650,000 Years (ppm)	2005 Concentrations (ppm)
Carbon Monoxide	280	180 to 300	379
Methane	715	320 to 790	1774
Nitrous Oxide	270	NA	319

Source: Intergovernmental Panel on Climate Change. Climate Change 2007: The Physical Science Basis, Technical Summary. *Cambridge: Cambridge University Press, 2007.*

Effects of Global Climate Change

The primary effect of global climate change has been a rise in the average global tropospheric temperature of 0.2° Celsius per decade, determined from meteorological measurements world-wide between 1990 and 2005. Climate change modeling using 2000 emission rates shows that further warming would occur, which would induce further changes in the global climate system during the current century (IPCC 2007). Changes to the global climate system and ecosystems and to California would include, but would not be limited to:

- Declining sea ice and mountain snowpack levels, thereby increasing sea levels and 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 (IPCC 2007);
- Rising average global sea levels primarily due to thermal expansion and the melting of glaciers, ice caps, and the Greenland and Antarctic ice sheets (IPCC 2007);
- Changing weather patterns, including changes to 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 (IPCC 2007);
- Declining Sierra snowpack levels, which account for approximately half of the surface water storage in California, by 70 percent to as much as 90 percent over the next 100 years (CalEPA 2006);
- Increasing the number of days conducive to ozone formation by 25 to 85 percent (depending on the future temperature scenario) in high ozone areas located in the Southern California area and the San Joaquin Valley by the end of the 21st century (CalEPA 2006); and
- Increasing the potential for erosion of California's coastlines and sea water intrusion into the Delta and associated levee systems due to the rise in sea level (CalEPA 2006).

4.2.3 REGULATORY CONSIDERATIONS

Air quality within the SFBAAB is addressed through the efforts of various federal, state, regional and local government agencies. These agencies work jointly, as well as individually, to improve air quality through legislation, regulations, planning, policymaking, education, and a variety of programs. Regulations governing global climate change are addressed through international, federal, and state agencies. The BAAQMD would administer most of the air quality requirements of the proposed project.

The agencies primarily responsible for improving the air quality within the Basin and for regulating greenhouse gas emissions are discussed below along with their individual responsibilities.

4.2.3.1 Federal Laws and Regulations

The US EPA is responsible for enforcing the Clean Air Act (CAA) and the NAAQS that the act establishes. This agency also has regulatory and enforcement jurisdiction over emission sources beyond state waters (outer continental shelf), and those that are under the exclusive authority of the federal government, such as aircraft, locomotives, and interstate trucking.

The CAA was originally adopted in 1970, but was amended most recently in 1990 with regulations that better protect the public's health and create more efficient methods of lowering pollutant emissions. The major areas of improvement resulting from the amendments include air basin designations (previously discussed), automobile/heavy-duty engine emissions, and toxic air pollutants. The amendments established more stringent standards for hydrocarbons, oxides of nitrogen (NO_X), and CO emissions in order to reduce O_3 and CO levels in heavily populated areas. Fuels became more strictly regulated, requiring new fuels to be less volatile, contain less sulfur (regarding diesel fuels), and have higher levels of oxygenates (oxygen-containing substances to improve fuel combustion).

States with basins that are not in attainment with the NAAQS are required to submit a State Implementation Plan (SIP) that describes how the air basin will achieve the federal standards by specified dates. The SIP includes strategies and control measures to attain the NAAQS by deadlines established by the CAA. The CAA amendments dictate that states containing areas violating the NAAQS revise their SIP to include extra control measures to reduce air pollution.

SIPs are not single documents, but are a compilation of state regulations, air quality management/attainment plans, programs, and air district rules that are continuously revised to meet CAA amendment requirements.

Local air districts, such as the BAAQMD, and other agencies prepare air quality management/attainment plans and submit them to CARB for review and approval. Once a plan is approved, CARB forwards the plan to the US EPA as a SIP revision. The US EPA reviews the plan to determine if it conforms to the 1990 amendments and would achieve that air basin's air quality goals. Upon a satisfactory review, approval of the plan is published in the *Federal Register*.

In general, air quality management/attainment plans contain a discussion of ambient air data and trends; a baseline emissions inventory; future-year projections of emissions, which account for growth projections and already adopted control measures; a comprehensive control strategy of additional measures needed to reach attainment; attainment demonstration, which generally involves complex modeling; and contingency measures. Plans may also include interim milestones for progress toward attainment. The status of the SFBAAB with respect to attainment with the NAAQS is summarized above in **Table 4.2-2**.

The 1990 amendments also list 189 hazardous air pollutants (HAPs), which are carcinogenic, mutagenic, and/or reproductive toxicants, to be reduced. The air toxics program under the CAA involves locating all major (greater than 10 tons per year [tpy]) and area emission sources in order to implement Maximum Achievable Control Technology (MACT) to reduce HAP emissions and their associated health impacts.

4.2.3.2 State Laws and Regulations

The California Clean Air Act (CCAA) established a legal mandate for air basins to achieve the CAAQS by the earliest practical date. The CAAQS, established by CARB, apply to the same seven NAAQS, as well as for sulfates, visibility-reducing particles, hydrogen sulfide, and vinyl chloride. CAAQS are more stringent than the NAAQS, and in the case of PM_{10} and SO_2, far more stringent.

As a branch of the California Environmental Protection Agency (Cal/EPA), CARB oversees air quality monitoring, planning, and control throughout California. It is primarily responsible for implementing the CCAA, ensuring conformance with CAA requirements, and for regulating emissions from motor vehicles and consumer products within the state. In addition, CARB sets the CAAQS and control measures for toxic air contaminants (TACs). CARB approves the regional air quality management/attainment plans for incorporation into the SIP and is responsible for preparing those portions of the SIP related to mobile source emissions. CARB establishes new standards for vehicles sold in California and for various types of commercially available equipment. It also sets fuel specifications to further reduce vehicular emissions.

CARB also makes area designations for O_3, CO, NO_2, SO_2, PM_{10}, $PM_{2.5}$, sulfates, lead, hydrogen sulfide, and visibility-reducing particles. Health and Safety Code Section 39607(e) requires CARB to establish and periodically review area designation criteria. These designation criteria provide the basis for CARB to

designate areas of the state as "attainment," "nonattainment," or "unclassified" according to state standards. In addition, Health and Safety Code Section 39608 requires CARB to use the designation criteria to classify areas of the state and to annually review those area designations. The status of the SFBAAB with respect to attainment with the CAAQS is also summarized above in **Table 4.2-2**.

4.2.3.3 Regional Regulations

Association of Bay Area Governments

The Association of Bay Area Governments (ABAG) is a council of governments for the Counties of Alameda, Contra Costa, Marin, Napa, San Francisco, San Mateo, Santa Clara, Sonoma, and Solano. ABAG is a regional planning agency and serves as a forum for regional issues relating to transportation, the economy, community development, and the environment. ABAG also serves as the regional clearinghouse for projects requiring environmental documentation under federal and state law. In this role, ABAG reviews proposed projects to analyze their impacts on its regional planning efforts.

Although ABAG is not an air quality management agency, it is responsible for several air quality planning issues. Specifically, as the designated Metropolitan Planning Organization for the nine counties, it is responsible, pursuant to Section 176(c) of the 1990 Amendments to the federal CAA, for providing current population, employment, travel and congestion projections for regional air quality planning efforts. ABAG is required to quantify and document the demographic and employment factors influencing expected transportation demand, including land-use forecasts. ABAG is also responsible for preparing and approving the portions of the Basin's clean air plan (CAP) relating to demographic projections and integrated regional land use, housing and employment, as well as transportation programs, measures, and strategies.

Bay Area Air Quality Management District

Management of air quality in the Basin is the responsibility of the BAAQMD. The BAAQMD is responsible for monitoring ambient air pollutant levels throughout the Basin and developing and implementing attainment strategies, and rules and regulations to ensure that future emissions will be within federal and state standards. The SFBAAB is currently in nonattainment/marginal for the federal standard for ozone-8 hour, and in nonattainment for the state standards of ozone-1 hour, ozone-8 hour, PM_{10}, and $PM_{2.5}$ (see **Table 4.2-2**). Therefore, the BAAQMD, in cooperation with ABAG and the Metropolitan Transportation Commission (MTC), prepared the following plans that include strategies to attain the federal and state standards:

- *Bay Area 2000 Clean Air Plan and Triennial Assessment*

- *2001 Ozone Attainment Plan*
- *2005 Ozone Strategy*

The *Bay Area 2000 Clean Air Plan* and the *2005 Ozone Strategy* fulfill the planning requirements of the CCAA, while the *2001 Ozone Attainment Plan* fulfills the federal CAA requirements.

The BAAQMD also adopted specific rules and regulations that limit emissions generated by various uses and/or activities, as well as identify specific pollution reduction measures that must be implemented in association with various uses and activities.

The BAAQMD is not required to develop a PM plan because the Basin is currently unclassifiable for the federal standard for PM_{10} and in attainment for the federal standard for $PM_{2.5}$. However, the US EPA lowered the 24-hour $PM_{2.5}$ standard from 65 $\mu g/m^3$ to 35 $\mu g/m^3$ in 2006 and is required to designate the Basin's attainment status for the new standard by December of 2009 (BAAQMD 2008a). If the Basin is found to be in nonattainment for the new national standard, the BAAQMD would be required to prepare a PM plan.

The BAAQMD reviewed the list of 103 potential particulate matter control measures prepared by CARB in compliance with SB 656, and prepared and adopted the *SB656 Particulate Matter Implementation Schedule*. The schedule was adopted by the District's Board of Directors on November 16, 2005 (BAAQMD 2005).

Bay Area 2000 Clean Air Plan and Triennial Assessment

The CCAA requires areas not complying with the one-hour average ozone standard to prepare plans to reduce ozone. The first clean air plan (CAP) adopted by the BAAQMD to achieve this standard was in 1991. The CAP was subsequently updated in 1994 and 1997. The most recent update was in December 2000 when the *Bay Area 2000 Clean Air Plan and Triennial Assessment* was adopted (BAAQMD 2000). The 2000 CAP represents the third triennial update to the 1991 CAP.

The goal of each of the CAPs is to reduce emissions of ROG and NOx, which are precursors to the formation of ozone in the lower atmosphere. The CAPs are intended to focus on the near-term actions through amendments of existing regulations and promulgation of new district regulations. The 2000 CAP continues the air pollution reduction strategies established by the 1991 CAP and prior updates.

Like the 1997 CAP, the 2000 CAP continues to discourage urban sprawl while strongly endorsing high-density mixed-use developments near transit centers in order to reduce the need for commuting by personal vehicles. The transportation control measures (TCMs) in the 2000 CAP also remain unchanged

from the 1997 CAP. Updates to the 1997 CAP include changes in the organization and scheduling of some existing control measures, new stationary source control measures, revisions to previous stationary source measures, and deletion of some control measures deemed no longer feasible by BAAQMD staff.

The BAAQMD is in the process of preparing the 2009 Bay Area Clean Air Plan, which will update the 2000 CAP and the *Bay Area 2005 Ozone Strategy* (discussed below) in accordance with the requirements of the CCAA to implement "all feasible measures" to reduce ozone. It will also consider the impacts of ozone control measures on particulate matter, air toxics, and greenhouse gases in a single, integrated plan; review progress in improving air quality in recent years; and establish emission control measures to be adopted or implemented in the 2009 -2012 timeframe (BAAQMD 2008b).

Ozone Attainment Plan

On October 24, 2001, the BAAQMD, ABAG, and MTC adopted *Revised San Francisco Bay Area Ozone Attainment Plan for the 1-Hour National Ozone Standard* (*Revised Ozone Attainment Plan*) as a guideline to achieve the then federal 1-hour ozone standard of 12 ppm that was in effect at that time (BAAQMD 2001). The plan was approved by CARB on November 1, 2001 and submitted to the US EPA on November 30, 2001. In April 2004, the US EPA determined that the Basin had attained the federal 1-hour ozone standard and the status of the Basin for the federal 1-hour ozone standard was changed to attainment. Due to the attainment status of the Basin, the 1-hour ozone requirements set forth in the *Revised Ozone Attainment Plan* were no longer required.

A year later, in 2005, the federal 1-hour ozone standard was revoked by the US EPA for a new and more health-protective 8-hour standard. The SFBAAB is presently designated nonattainment/marginal for the federal ozone-8 hour standard. Although designated as nonattainment, areas designated as marginal nonattainment or less were not required to submit new attainment plans. Nonetheless, the control measures and strategies described in the *Revised Ozone Attainment Plan* for the 1-hour standard will also help achieve attainment with the 8-hour standard.

2005 Ozone Strategy

On January 4, 2006, the BAAQMD, ABAG, and MTC adopted the *Bay Area 2005 Ozone Strategy* in order to meet CCAA standards. The 2005 Ozone Strategy is a comprehensive document mapping how the SFBAAB will achieve attainment of the state 1-hour ozone standard as expeditiously as possible and how the Basin will reduce transport of ozone and ozone precursors to neighboring air basins (BAAQMD 2006). The 2005 Ozone Strategy outlines how the Basin will meet the CCAA planning requirements and transport mitigation requirements through implementation of control measures and strategies. The document describes plans to implement stationary source control measures through district regulations;

mobile source control measures through incentive programs; and transportation control measures through transportation programs in cooperation with MTC, transit agencies, and local governments.

The district has begun a process to update the *2005 Ozone Strategy* in cooperation with ABAG and MTC. The 2007 Ozone Strategy will address achieving attainment for both the state 1-hour and 8-hour ozone standard, and will continue to focus on reducing transport of ozone and ozone precursors to neighboring air basins. In addition, a review of the progress achieved from 2004 to 2006 will be evaluated and used to establish meaningful and effective control measures for 2007 to 2009.

BAAQMD Rules and Regulations

The BAAQMD is responsible for limiting the amount of emissions that can be generated throughout the Basin by stationary sources. Specific rules and regulations have been adopted that limit emissions that can be generated by various uses and/or activities and identify specific pollution reduction measures that must be implemented in association with various uses and activities. These rules regulate not only the emissions of pollutants regulated under the NAAQS and the CAAQS, but also the emissions of toxic air contaminants. The rules are also subject to ongoing refinement by the BAAQMD.

In general, all stationary sources with air emissions are subject to BAAQMD's rules governing their operational emissions. Some emissions sources are further subject to regulation through the BAAQMD's permitting process. Through this permitting process, the BAAQMD also monitors the amount of stationary emissions being generated and uses this information in developing the CAP. Some of the stationary emission sources that would be constructed as part of the project (e.g., boilers) will be subject to the BAAQMD's permitting requirements. The primary BAAQMD rules that are applicable to the proposed project are as follows:

Regulation 2, Rule 1 (General Requirements): This rule requires new and modified sources of air pollution to acquire permits (e.g., Authority to Construct, Permit to Operate) in order to monitor stationary source emissions under BAAQMD's jurisdiction. The rule also includes a list of equipment and processes that would be exempt from permitting requirements. Among others, these include cooling towers and boilers with a heat input rating less than 10 million British thermal units (BTU) per hour fired exclusively with natural gas, liquefied petroleum gas, or a combination; and laboratories located in a building where the total number of fume hoods within the building is fewer than 50 or the total laboratory space is less than 25,000 square feet, provided that responsible laboratory management practices are used.

Regulation 2, Rule 2 (New Source Review): For new and modified stationary sources subject to permitting requirements (see Regulation 2, Rule 1), this series of rules prescribes the use of Best Available Control Technology (BACT) and the provision of emission offsets (i.e., mitigation) for equipment with emissions that exceed specified thresholds. The applicability of these requirements would be determined upon submittal of an application for an Authority to Construct under Regulation 2, Rule 1.

Regulation 2, Rule 5 (New Source Review for Toxic Air Contaminants): For new and modified stationary sources of toxic air contaminants subject to permitting requirements (see Regulation 2, Rule 1), this rule evaluates potential public exposure and health risk and provides measures for mitigating potentially significant health risks from these exposures, including the use of Maximum Available Control Technology (MACT).

Regulation 8, Rule 3 (Architectural Coatings): This rule sets limits on the VOC content in architectural coatings sold, supplied, offered for sale, or manufactured within the BAAQMD's jurisdiction. The rule also includes time schedules that specify when more stringent VOC standards are to be enforced. The rule applies during the construction phase of a project. In addition, any periodic architectural coating maintenance operations are required to comply with this rule.

Regulation 8, Rule 15 (Emulsified and Liquid Asphalts): This rule sets limits on the VOC content in emulsified and liquid asphalt used for maintenance and paving operations. The rule includes specific VOC content requirements for various types of asphalt (e.g., emulsified asphalt, rapid-cure liquid asphalt, slow-cure liquid asphalt). This rule applies during the construction phase of a project. In addition, any future asphalt maintenance of a project's roads would be required to comply with the VOC standards set in Rule 15.

Regulation 9, Rule 6 (Nitrogen Oxide Emission from Natural Gas-Fired Water Heaters): This rule sets a limit on the NO_x emissions from natural gas-fired water heaters. The rule applies to natural gas-fired water heaters manufactured after July 1, 1992 with a heat input rating of less than 75,000 BTU/hr. Water heaters subject to the rule must not emit more than 40 nanograms of NO_x per joule of heat output.

Regulation 9, Rule 7 (Nitrogen Oxide and Carbon Monoxide from Industrial, Institutional, and Commercial Boilers, Steam Generators, and Process Heaters): This rule limits the NO_x and CO emissions from industrial, institutional, and commercial boilers, steam generators, and process heaters. The rule applies to boilers with a heat input rating greater than 10 million BTU/hr fired exclusively with natural gas, liquefied petroleum gas, or a combination or boilers with a heat input rating greater than 1 million BTU/hr fired with other fuels.

Regulation 9, Rule 8 (Nitrogen Oxides and Carbon Monoxide from Stationary Internal Combustion Engines): This rule limits the NO_x and CO emissions from stationary internal combustion engines. The rule applies to engines rated at greater than 50 brake horsepower, but it exempts emergency generators that would not run for more than 100 hours per year.

BAAQMD CEQA Guidelines

In April 1996, the BAAQMD prepared *BAAQMD CEQA Guidelines [for] Assessing the Air Quality Impacts of Projects and Plans* (BAAQMD CEQA Guidelines) as a guidance document to provide lead government agencies, consultants and project proponents with uniform procedures for assessing air quality impacts and preparing the air quality sections of environmental documents for projects subject to CEQA. The BAAQMD CEQA Guidelines were last revised by the BAAQMD in December 1999. This document describes the criteria that the BAAQMD uses when reviewing and commenting on the adequacy of environmental documents, such as this EIR. The BAAQMD CEQA Guidelines recommend thresholds for use in determining whether projects would have significant adverse environmental impacts, identify methodologies for predicting project emissions and impacts, and identify measures that can be used to avoid or reduce air quality impacts. This EIR section was prepared following these recommendations.

4.2.3.4 Local Plans and Policies

The following sections summarize elements from *Cal State East Bay/Hayward Campus Master Plan*, and objectives and policies the *City of Hayward General Plan* that relate to air quality.

Cal State East Bay/Hayward Campus Master Plan

Elements of the Access, Circulation and Parking Framework of the Campus Master Plan that would have a direct effect on air emissions from the proposed project include:

Improved Transit Service

- Enhanced AC Transit Route 92 service to the Downtown Hayward BART station, ensuring 15-minute headways from 6 AM to 10 PM; or continued and enhanced campus shuttle service providing a direct connection between campus and Downtown Hayward BART.

Alternative Mode Use Incentives

- Discounted or free AC Transit passes for all students, faculty and staff
- Discounted BART tickets for students, faculty and staff through the Commuter Check program or a similar program; or a 'Clean Air Cash' program where those choosing to commute by BART receive a cash payment and are not allowed to purchase a normal parking permit

- Carpool matching service and vanpool program
- Preferential parking for carpools and vanpools
- Continued participation in the Alameda County Congestion Management Agency's Guaranteed Ride Home program for alternative mode users
- Provision of a flexible car rental service program (carsharing) on campus to provide access to vehicles for those who choose not to commute to campus by car or residents who do not maintain a car on campus
- Provision for participants in alternative mode programs to purchase a certain number of single-day parking permits to allow for commute flexibility and promote alternative mode use for those who may occasionally need to use a car.

Parking Management

- Provide a scaled parking permit pricing structure that ties the cost of parking to the level of use and location, and that provides the funding needed to maintain and operate the parking system, including provision of new parking lots/structures
- Discourage on-campus residents from bringing cars to campus, and encourage the use of transit service(s) and the flexible rental car service (when instituted) for travel off-campus.

City of Hayward General Plan

The following conservation and environmental protection policies and strategies that pertain to air quality are contained in the Conservation Element of the *City of Hayward General Plan*.

Policy 10: **Incorporate measures to improve air quality in the siting and design of new development.**

Strategy 1: Provide adequate buffers between sources of toxic air contaminants or odors and existing or potential sensitive receptors.

Strategy 2: Evaluate hazardous air pollutant emissions in review of proposed land uses that may handle, store or transport hazardous materials.

Strategy 3: Consider measures, including a local ordinance, which would reduce PM_{10} emissions from fireplaces and wood stoves.

Policy 11: **Maintain improved air quality by creating efficient relationships between transportation and land use.**

Strategy 1: Guide development into patterns that reduce dependency on automobile usage.

Strategy 2: Require pedestrian-, bicycle-, and transit-oriented features in new development projects.

Strategy 3: Encourage compact development featuring a mix of uses that locates residences near jobs and services.

Policy 12: Support implementation of Transportation Control Measures adopted by the Bay Area Air Quality Management District.

Strategy 1: Work with regional and local organization to promote ridesharing opportunities.

Strategy 2: Review and evaluate the Bicycle Facilities Master Plan to determine if revisions are necessary to promote bicycle usage.

Strategy 3: Encourage employers and developers to provide bicycle access and facilities.

Strategy 4: Continue ongoing local signal timing programs.

Strategy 5: Incorporate subdivision, zoning and site design measures that reduce the number and length of single-occupant automobile trips.

Strategy 6: Promote demonstration projects to develop new strategies to reduce motor vehicle emissions, such as projects that include Low Emission Vehicle (LEV) fleets and refueling infrastructure.

Strategy 7: Emphasize pedestrian travel through establishment of pedestrian-friendly design standards and inclusion of pedestrian improvements in capital improvement programs.

Strategy 8: Consider traffic calming strategies in capital improvement program.

4.2.3.5 Global Climate Change Regulations

International Activities

Kyoto Protocol

The original Kyoto Protocol was negotiated in December 1997 and came into force on February 16, 2005. As of May 13 2008, 181 countries and the European Economic Community have ratified the agreement (UNFCCC 2008c). Notably, however, the United States has not ratified the protocol. Participating nations are separated into Annex 1 (i.e., industrialized countries) and Non-Annex 1 (i.e., developing countries) countries that have differing requirements for GHG reductions. The goal of the protocol is to achieve

overall emissions reduction targets for six GHGs by the period 2008 to 2012. The six GHGs regulated under the protocol are carbon dioxide, methane, nitrous oxide, sulfur hexafluoride, HFCs, and PFCs. Each nation has an emissions reduction target under which they must reduce GHG emissions a certain percentage below 1990 levels (e.g., 8 percent reduction for the European Union, 6 percent reduction for Japan). The average reduction target for nations participating in the Kyoto Protocol is approximately 5 percent below 1990 levels (Pew Center 2008). Although the United States has not ratified the protocol, in 2002 President Bush committed the nation to a comprehensive strategy to reduce the greenhouse gas emission intensity of the American economy by 18 percent by 2012 (CEQ 2008). Greenhouse gas intensity is the ratio of GHG emissions to economic output (i.e., gross domestic product).

Intergovernmental Panel on Climate Change

The World Meteorological Organization and United Nations Environmental Program established the Intergovernmental Panel on Climate Change (IPCC) in 1988. The goal of the IPCC is to evaluate the risk of climate change caused by human activities. Rather than performing research or monitoring climate, the IPCC relies on peer-reviewed and published scientific literature to make its assessment. The IPCC assesses information (i.e., scientific literature) regarding human-induced climate change, impacts of human-induced climate change, and options for adaptation and mitigation of climate change. The IPCC reports its evaluation through special reports called "assessment reports." The latest assessment report (i.e., *Fourth Assessment Report*, consisting of three working group reports and a synthesis report based on the first three reports) was published in 2007.[6]

Federal Activities

On April 2, 2007, the Supreme Court released its ruling in the case of the *Massachusetts vs. EPA*. In that case, the Supreme Court held that the US EPA has the statutory authority under Section 202 of the CAA to regulate GHGs from new motor vehicles. The court did not hold that the US EPA was required to regulate GHG emissions; however, it indicated that the agency must decide whether GHGs from motor vehicles cause or contribute to air pollution that is reasonably anticipated to endanger public health or welfare. Upon the final decision, President Bush signed Executive Order 13432 on May 14, 2007, directing the US EPA, along with the Departments of Transportation, Energy, and Agriculture, to initiate a regulatory process that responds to the Supreme Court's decision. The order requires the US EPA to coordinate closely with other federal agencies and to consider the president's Twenty-in-Ten plan in this process. The Twenty-in-Ten plan establishes a process whereby US gasoline consumption would be reduced by 20 percent within ten years from the date Executive Order 13432 was signed, or by 2017,

6 The IPCC's Fourth Assessment Report is available online at http://www.ipcc.ch/.

thereby stemming the projected growth of CO_2 emissions from cars, light trucks, and SUVs. The two primary ways of achieving this reduction would be by increasing the supply of renewable and alternative fuels, and by improving average fuel economy standards for cars and light trucks.

Following issuance of this decision, President Bush signed Executive Order 13432 on May 14, 2007, directing the US EPA, along with the Departments of Transportation, Energy, and Agriculture, to initiate a regulatory process that responds to the Supreme Court's decision. The order requires the US EPA to coordinate closely with other federal agencies and to consider the president's Twenty-in-Ten plan in this process. The Twenty-in-Ten plan would establish a new alternative fuel standard that would require the use of 35 billion gallons of alternative and renewable fuels by 2017. The US EPA will be working closely with the Department of Transportation in developing new automotive efficiency standards.

Most recently, on July 11, 2008, the US EPA issued an Advance Notice of Proposed Rulemaking (ANPRM) on regulating GHGs under the Clean Air Act. The ANPRM reviews the various CAA provisions that may be applicable to the regulation of GHGs and presents potential regulatory approaches and technologies for reducing GHG emissions. In the ANPRM, the US EPA seeks further public comment on the regulation of GHG emissions under the CAA.

State Activities

Assembly Bill 1493

In response to the transportation sector's contribution of more than half of California's carbon dioxide (CO_2) emissions, Assembly Bill 1493 (AB 1493, Pavley) was enacted on July 22, 2002. AB 1493 requires CARB to set GHG emission standards for passenger vehicles, light-duty trucks, and other vehicles whose primary use is noncommercial personal transportation. The bill requires CARB to set the GHG emission standards for motor vehicles manufactured in 2009 and all subsequent model years. In setting these standards, CARB must consider cost-effectiveness, technological feasibility, economic impacts, and provide maximum flexibility to manufacturers. CARB adopted the standards in September 2004. These standards are intended to reduce emissions of carbon dioxide and other greenhouse gases (e.g., nitrous oxide, methane). The new standards would phase in during the 2009 through 2016 model years. When fully phased in, the near-term (2009–2012) standards will result in a reduction of about 22 percent in greenhouse gas emissions compared to the emissions from the 2002 fleet, while the mid-term (2013–2016) standards will result in a reduction of about 30 percent. Some currently used technologies that achieve GHG reductions include small engines with superchargers, continuously variable transmissions, and hybrid electric drive.

In December 2004, these regulations were challenged in federal court by the Alliance of Automobile Manufacturers, who claimed that the law regulated vehicle fuel economy, a duty assigned to the federal government. The case had been put on hold by a federal judge in Fresno pending the US Supreme Court's decision in *Massachusetts v. EPA*. The US Supreme Court's ruling in favor of the state of Massachusetts has been interpreted as a likely vindication of state efforts to control GHG emissions. In December 2007, Judge Ishii of the US District Court for the Eastern District dismissed the case against the AB 1493 regulations by the Alliance of Automobile Manufacturers.

However, before these regulations may go into effect, the US EPA must grant California a waiver under the federal Clean Air Act, which ordinarily preempts state regulation of motor vehicle emission standards. Following the issuance of the *Massachusetts v. EPA* decision, the US EPA announced that it would decide whether to grant California a waiver by December 2007. On December 19, 2007, in a letter to Governor Arnold Schwarzenegger, Stephen Johnson, the US EPA Administrator, denied the waiver citing the need for a national approach to reducing greenhouse gas emissions, the lack of a "need to meet compelling and extraordinary conditions," and the benefits to be achieved through the Energy Independence and Security Act of 2007. The California Attorney General subsequently filed suit in January 2008 to overturn the administrator's decision. The ultimate implementation status of the AB 1493 regulations is unknown at this time.

Executive Order S-3-05

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: GHG emissions should be reduced to 2000 levels by 2010, 1990 levels by 2020, and 80 percent below 1990 levels by 2050. The Secretary of CalEPA is required to coordinate efforts of various agencies in order to collectively and efficiently reduce GHGs. Some of the agency representatives involved in the GHG reduction plan include the Secretary of the Business, Transportation and Housing Agency, the Secretary of the Department of Food and Agriculture, the Secretary of the Resources Agency, the Chairperson of CARB, the Chairperson of the California Energy Commission (CEC), and the President of the Public Utilities Commission. Representatives from each of the aforementioned agencies comprise the Climate Action Team. The Climate Action Team is responsible for implementing global warming emissions reduction programs. In order to achieve these goals, the Climate Action Team is organized into two subgroups: the market-based options subgroup and the scenario analysis subgroup. The CalEPA secretary is required to submit a biannual progress report from the Climate Action Team to the governor and state legislature disclosing the progress made toward GHG emission reduction targets. In addition, another biannual report must be submitted illustrating the impacts of global warming on California's water supply, public health, agriculture, the coastline, and forestry, and reporting possible mitigation and adaptation plans to combat

these impacts. The Climate Action Team has fulfilled both of these report requirements through its March 2006 Climate Action Team Report to Governor Schwarzenegger and the Legislature (CAT 2006). Some strategies currently being implemented by state agencies include CARB introducing vehicle climate change standards and diesel anti-idling measures, the Energy Commission implementing building and appliance efficiency standards, and the Cal/EPA implementing their green building initiative. The Climate Action Team also recommends future emission reduction strategies, such as using only low-GWP refrigerants in new vehicles, developing ethanol as an alternative fuel, reforestation, solar power initiatives for homes and businesses, and investor-owned utility energy efficiency programs. According to the report, implementation of current and future emission reduction strategies have the potential to achieve the goals set forth in Executive Order S-3-05.

Assembly Bill 32

In furtherance of the goals established in Executive Order S-3-05, the Legislature enacted Assembly Bill 32 (AB 32, Nuñez and Pavley), the California Global Warming Solutions Act of 2006, which Governor Schwarzenegger signed on September 27, 2006. AB 32 represents the first enforceable statewide program to limit GHG emissions from all major industries with penalties for noncompliance.

CARB is responsible for carrying out and developing the programs and requirements necessary to achieve the goals of AB 32—the reduction of California's GHG emissions to 1990 levels by 2020. The first action under AB 32 resulted in CARB's adoption of a report listing three specific early action greenhouse gas emission reduction measures on June 21, 2007. On October 25, 2007, CARB approved an additional six early action GHG reduction measures under AB 32. These early action GHG reduction measures are to be adopted and enforced before January 1, 2010, along with 32 other climate-protecting measures CARB is developing between now and 2011. The early action measures are divided into three categories:

- Group 1 - GHG rules for immediate adoption and implementation
- Group 2 - Several additional GHG measures under development
- Group 3 - Air pollution controls with potential climate co-benefits

The original three adopted early action regulations meeting the narrow legal definition of "discrete early action GHG reduction measures" include:

- A low-carbon fuel standard to reduce the "carbon intensity" of California fuels;
- Reduction of refrigerant losses from motor vehicle air conditioning system maintenance to restrict the sale of "do-it-yourself" automotive refrigerants; and

- Increased methane capture from landfills to require broader use of state-of-the-art methane capture technologies.

The additional six early action regulations adopted on October 25, 2007, also meeting the narrow legal definition of "discrete early action GHG reduction measures," include:

- Reduction of aerodynamic drag, and thereby fuel consumption, from existing trucks and trailers through retrofit technology;
- Reduction of auxiliary engine emissions of docked ships by requiring port electrification;
- Reduction of perfluorocarbons from the semiconductor industry;
- Reduction of propellants in consumer products (e.g., aerosols, tire inflators, and dust removal products);
- Require that all tune-up, smog check and oil change mechanics ensure proper tire inflation as part of overall service in order to maintain fuel efficiency; and
- Restriction on the use of sulfur hexafluoride (SF_6) from non-electricity sectors if viable alternatives are available.

As required under AB 32, on December 6, 2007, CARB approved the 1990 greenhouse gas emissions inventory, thereby establishing the emissions limit for 2020. The 2020 emissions limit was set at 427 MMT carbon dioxide equivalents (CO_2E). The inventory revealed that in 1990 transportation, with 35 percent of the state's total emissions, was the largest single sector, followed by industrial emissions, 24 percent; imported electricity, 14 percent; in-state electricity generation, 11 percent; residential use, 7 percent; agriculture, 5 percent; and commercial uses, 3 percent.

In addition to the 1990 emissions inventory, CARB also adopted regulations requiring the mandatory reporting of GHG emissions for large facilities on December 6, 2007. The mandatory reporting regulations require annual reporting from the largest facilities in the state, which account for approximately 94 percent of greenhouse gas emissions from industrial and commercial stationary sources in California. About 800 separate sources fall under the new reporting rules and include electricity generating facilities, electricity retail providers and power marketers, oil refineries, hydrogen plants, cement plants, cogeneration facilities, and industrial sources that emit over 25,000 tons of carbon dioxide each year from on-site stationary combustion sources. Transportation sources, which account for 38 percent of California's total greenhouse gas emissions, are not covered by these regulations but will continue to be tracked through existing means. Affected facilities will begin tracking their emissions in 2008, to be reported beginning in 2009 with a phase-in process to allow facilities to develop reporting systems and train personnel in data collection. Emissions for 2008 may be based on best available emission data. Beginning in 2010, however, emissions reporting requirements will be more rigorous and will be subject

to third-party verification. Verification will take place annually or every three years, depending on the type of facility.

As indicated above, AB 32 requires CARB to adopt a scoping plan by January 2009 indicating how reductions in significant GHG sources will be achieved through regulations, market mechanisms, and other actions. After receiving public input on their discussion draft of the Proposed Scoping Plan released in June 2008, CARB released the Climate Change Proposed Scoping Plan in October 2008 that contains an outline of the proposed State strategies to achieve the 2020 greenhouse gas emission limits. Key elements of the Proposed Scoping Plan include the following recommendations:

- Expanding and strengthening existing energy efficiency programs as well as building and appliance standards;
- Achieving a statewide renewables energy mix of 33 percent;
- Developing a California cap-and-trade program that links with other Western Climate Initiative partner programs to create a regional market system;
- Establishing targets for transportation-related greenhouse gas emissions for regions throughout California and pursuing policies and incentives to achieve those targets;
- Adopting and implementing measures pursuant to existing State laws and policies, including California's clean car standards, goods movement measures, and the Low Carbon Fuel Standard; and
- Creating targeted fees, including a public goods charge on water use, fees on high global warming potential gases, and a fee to fund the administrative costs of the State's long-term commitment to AB 32 implementation.

Under the Proposed Scoping Plan, approximately 85 percent of the State's emissions are subject to a cap-and-trade program where covered sectors are placed under a declining emissions cap that. The emissions cap incorporates a margin of safety whereas the 2020 emissions limit will still be achieved even in the event that uncapped sectors do not fully meet their anticipated emission reductions. Emissions reductions will be achieved through regulatory requirements and the option to reduce emissions further or purchase allowances to cover compliance obligations. It is expected that emission reduction from this cap-and-trade program will account for a large portion of the reductions required by AB 32. The Proposed Scoping Plan will be considered for approval at a two-day meeting of the CARB Governing Board on December 11-12, 2008.

Table 4.2-7, AB 32 Proposed Scoping Plan Measures, lists CARB's preliminary recommendations for achieving greenhouse gas reductions under AB 32 along with a brief description of the requirements and applicability.

Table 4.2-7
AB 32 Proposed Scoping Plan Measures

Scoping Plan Measure	Description
SPM-1: California Cap-and-Trade Program linked to Western Climate Initiative	Implement a broad-based cap-and-trade program that links with other Western Climate Initiative Partner programs to create a regional market system. Ensure California's program meets all applicable AB 32 requirements for market-based mechanisms. Capped sectors include transportation, electricity, natural gas, and industry. Projected 2020 business-as-usual emissions are estimated at 512 MTCO2E; preliminary 202 emissions limit under cap-and-trade program are estimated at 365 MTCO2E (29 percent reduction).
SPM-2: California Light-Duty Vehicle GHG Standards	Implement adopted Pavley standards and planned second phase of the program. AB 32 states that if the Pavley standards (AB 1493) do not remain in effect, CARB shall implement equivalent or greater alternative regulations to control mobile sources.
SPM-3: Energy Efficiency	Maximize energy efficiency building and appliance standards, and pursue additional efficiency efforts. The Proposed Scoping Plan considers green building standards as a framework to achieve reductions in other sectors, such as electricity.
SPM-4: Renewables Portfolio Standard	Achieve 33 percent Renewables Portfolio Standard by both investor-owned and publicly owned utilities.
SPM-5: Low Carbon Fuel Standard	Develop and adopt the Low Carbon Fuel Standard (LCFS). CARB identified the LCFS as a Discrete Early Action item and is developing a regulation for Board consideration in late 2008. In January 2007, Governor Schwarzenegger issued Executive Order S-1-07, which called the reduction of the carbon intensity of California's transportation fuels by at least ten percent by 2020.
SPM-6: Regional Transportation-Related Greenhouse Gas Targets	Develop regional greenhouse gas emissions reduction targets for passenger vehicles. SB 375 requires CARB to develop, in consultation with metropolitan planning organizations (MPOs), passenger vehicle greenhouse gas emissions reduction targets for 2020 and 2035 by September 30, 2010. SB 375 requires MPOs to prepare a sustainable communities strategy to reach the regional target provided by CARB.
SPM-7: Vehicle Efficiency Measures	Implement light-duty vehicle efficiency measures. CARB is pursuing fuel-efficient tire standards and measures to ensure properly inflated tires during vehicle servicing.
SPM-8: Goods Movement	Implement adopted regulations for port drayage trucks and the use of shore power for ships at berth. Improve efficiency in goods movement operations.
SPM-9: Million Solar Roofs Program	Install 3,000 MW of solar-electric capacity under California's existing solar programs.
SPM-10: Heavy/Medium-Duty Vehicles	Adopt heavy- and medium-duty vehicle and engine measures. Measures targeting aerodynamic efficiency, vehicle hybridization, and engine efficiency are recommended.

Scoping Plan Measure	Description
SPM-11: Industrial Emissions	Require assessment of large industrial sources to determine whether individual sources within a facility can cost-effectively reduce greenhouse gas emissions and provide other pollution reduction co-benefits. Reduce greenhouse gas emissions from fugitive emissions from oil and gas extraction and gas transmission. Adopt and implement regulations to control fugitive methane emissions and reduce flaring at refineries.
SPM-12: High Speed Rail	Support implementation of a high-speed rail (HSR) system. This measure supports implementation of plans to construct and operate a HSR system between Northern and Southern California serving major metropolitan centers.
SPM-13: Green Building Strategy	Expand the use of green building practices to reduce the carbon footprint of California's new and existing inventory of buildings.
SPM-14: High GWP Gases	Adopt measures to reduce high global warming potential gases. The Proposed Scoping Plan contains 6 measures to reduce high GWP gases from mobile sources, consumer products, stationary sources, and semiconductor manufacturing.
SPM-15: Recycling and Waste	Reduce methane emissions at landfills. Increase waste diversion, composting, and commercial recycling. Move toward zero-waste.
SPM-16: Sustainable Forests	Preserve forest sequestration and encourage the use of forest biomass for sustainable energy generation. The federal government and California's Board of Forestry and Fire Protection has the regulatory authority to implement the Forest Practice Act to provide for sustainable management practices. This measure is expected to play a greater role in the 2050 goals.
SPM-17: Water	Continue efficiency programs and use cleaner energy sources to move water. California will also establish a public goods charge for funding investments in water efficiency that will lead to as yet undetermined reductions in greenhouse gases.
SPM-18: Agriculture	In the near-term, encourage investment in manure digesters and at the five-year Scoping Plan update determine if the program should be made mandatory by 2020. Increase efficiency and encourage use of agricultural biomass for sustainable energy production. CARB has begun research on nitrogen fertilizers and will explore opportunities for emission reductions.

Source: California Air Resources Board, Climate Change Proposed Scoping Plan, (2008).

Senate Bill 1368

Governor Schwarzenegger, just two days after signing AB 32, reiterated California's commitment to reducing GHGs by signing Senate Bill 1368 (SB 1368, Perata). SB 1368 requires the CEC to develop and adopt regulations for GHG emissions performance standards for the long-term procurement of electricity by local publicly-owned utilities. These standards must be consistent with the standards adopted by the Public Utilities Commission. This effort will help to protect energy customers from financial risks

associated with investments in carbon-intensive generation by allowing new capital investments in power plants whose GHG emissions are as low or lower than new combined-cycle natural gas plants, requiring imported electricity to meet GHG performance standards in California, and requiring that the standards be developed and adopted in a public process.[7]

Executive Order S-1-07

On January 18, 2007, California further solidified its dedication to reducing GHGs by setting a new Low Carbon Fuel Standard (LCFS) for transportation fuels sold within the state. Executive Order S-1-07 sets a declining standard for GHG emissions measured in CO_2-equivalent gram per unit of fuel energy sold in California. The target of the LCFS is to reduce the carbon intensity of California passenger vehicle fuels by at least 10 percent by 2020. The LCFS will apply to refiners, blenders, producers, and importers of transportation fuels and will use market-based mechanisms to allow these providers to choose how they reduce emissions during the "fuel cycle" using the most economically feasible methods. The Executive Order requires the Secretary of CalEPA to coordinate with the CEC, CARB, the University of California, and other agencies to develop a protocol to measure the "life-cycle carbon intensity" of transportation fuels. CARB is anticipated to implement the regulatory process for the new standard by December 2008.

Senate Bill 97

In August 2007, as part of the legislation accompanying the state budget negotiations, the legislature enacted SB 97 (Dutton), which directs the Governor's Office of Planning and Research (OPR) to develop guidelines under CEQA for the mitigation of greenhouse gas emissions. OPR is to develop proposed guidelines by July 1, 2009, and the Resources Agency is directed to adopt guidelines by January 1, 2010.

On June 19, 2008, OPR issued a technical advisory as interim guidance regarding the analysis of GHG emissions in CEQA documents (OPR 2008). This technical advisory is intended to provide informal guidance to be used by lead agencies until OPR and the Resources Agency fulfill their SB 97 obligations. The technical advisory notes that CEQA compliance, for purposes of greenhouse gas emissions, requires (1) the identification and quantification of GHG emissions including those associated with vehicular traffic, energy consumption, water usage, and construction activities; (2) an assessment of the project's impact on climate change; and (3) if the project is found to be individually or cumulatively significant, the identification and consideration of project alternatives and/or mitigation measures. The advisory did not recommend a specific threshold of significance—either quantitative or qualitative—leaving this to the

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7 The adopted SB 1368 regulations are available on the California Energy Commission's website at: http://www.energy.ca.gov/emission_standards/regulations/index.html.

lead agency's judgment and discretion, based upon factual data and guidance from regulatory agencies and other sources where available and applicable.

Senate Bill 375

The California Legislature passed SB 375 (Steinberg) on September 1, 2008. SB 375 would require CARB to set regional greenhouse gas reduction targets after consultation with local governments. The target must then be incorporated within that region's Regional Transportation Plan (RTP), which is used for long-term transportation planning, in a Sustainable Communities Strategy. SB 375 also requires each region's Regional Housing Needs Assessment (RHNA) to be adjusted based on the Sustainable Communities Strategy in its RTP. Additionally, SB 375 will reform the environmental review process to create incentives to implement the strategy, especially transit priority projects. The Governor signed SB 375 into law on September 30, 2008.

Other Statewide and Regional Activities

BAAQMD Climate Protection Program

On June 1, 2005 the BAAQMD Board of Directors adopted a resolution establishing a Climate Protection Program and acknowledging the link between climate protection and programs to reduce air pollution in the region. The goal of the Climate Protection Program is to integrate climate protection activities into existing air quality programs. The BAAQMD is continually seeking ways to integrates climate protection into current BAAQMD functions, including grant programs, CEQA commenting, regulations, inventory development, and outreach. In addition, the Climate Protection Program emphasizes collaboration with ongoing climate protection efforts at the local and State level, public education and outreach and technical assistance to cities and counties.

GHG Fee for Stationary Sources Adopted

On May 21, 2008, the BAAQMD Board of Directors approved a new fee on air pollution sources in the region to help defray the costs of the BAAQMD's climate protection work. Industrial facilities and businesses that are currently required to submit to the BAAQMD an air quality permit to operate will have the modest fee of 4.4 cents per metric ton of greenhouse gas emissions added to their permit bill. The fee will apply to Climate Protection Program activities related to stationary sources.

GHG Technology Studies

As part of the ongoing climate protection activities, the BAAQMD is conducting a study to identify potential greenhouse gas mitigation technologies specifically for permitted stationary sources in the Bay

Area. The goal of the study is to provide the BAAQMD with a comprehensive evaluation of technologies and processes available for the reduction of GHG emissions by stationary sources that are currently subject to the BAAQMD's permitting requirements. To date, the BAAQMD has released two phases of the study.

Phase 1 of the study was released in March 2007 and identifies additional or alternative processes and technologies that may be implemented to reduce GHG emissions from the highest emitting stationary sources. The BAAQMD conducted a region-wide study to identify and evaluate potential greenhouse gas emission control options for application at stationary sources in the Bay Area region in California. The study identified the industries and source categories, which most significantly contribute to greenhouse gas emissions and potential mitigation options for controlling those emissions. The study qualitatively evaluated the effectiveness, costs, and impacts of each of the most promising options.

Phase 2 of the study was released in April 2008 and is a follow-up to the Phase 1 report. Phase 2 pursues further study of two source categories from the previous study: (1) landfills and (2) industrial, institutional, and commercial boilers, steam generators, and process heaters. Both studies are available from the BAAQMD's website.

California Climate Action Registry

The California Climate Action Registry (CCAR) is a private non-profit organization formed by the State of California and serves as a voluntary GHG registry to protect and promote early actions to reduce GHG emissions by organizations. Senate Bill 1771 (SB 1771, Sher) formally established the CCAR with technical changes made to the statute in SB 527, which finalized the structure for the California Registry. The CCAR began with 23 Charter Members and currently has over 300 corporations, universities, cities and counties, government agencies and environment organizations voluntarily measuring, monitoring, and publicly reporting their GHG emissions using the CCAR protocols. The CCAR has published a General Reporting Protocol, as well as project- and industry-specific protocols for landfill activities, livestock activities, the cement sector, the power/utility sector, and the forest sector. The protocols provide the principles, approach, methodology, and procedures required for participation in the CCAR.

CAPCOA CEQA and Climate Change White Paper

The California Air Pollution Control Officers Association (CAPCOA) prepared a white paper on CEQA and Climate Change in January 2008. The white paper was intended to be used as a resource by lead agencies when considering policy options and not as a guidance document. Specifically, the white paper discusses three possible approaches to evaluating the significance of GHG emissions and possible mitigation measures; however, CAPCOA does not endorse any particular approach. The three alternative

significance approaches are: (1) not establishing a significance threshold for GHG emissions; (2) setting the GHG emission threshold at zero; and (3) setting the GHG emission threshold at some non-zero level. The white paper evaluates potential considerations and pitfalls associated with the three approaches. At the end of the white paper, CAPCOA provides a list of potential mitigation measures and discusses each in terms of emissions reduction effectiveness, cost effectiveness, and technical and logistical feasibility. While programs are still being developed by CARB, the white paper provides public agencies with information to ensure that GHG emissions are, according to CAPCOA, "appropriately considered and addressed under CEQA."

4.2.4 IMPACTS AND MITIGATION MEASURES

4.2.4.1 Significance Criteria

For the purposes of this EIR, air quality impacts would be considered significant if they would exceed the following standards of significance, which are based on Appendix G of the *State CEQA Guidelines*, the *BAAQMD CEQA Guidelines*, and *The California State University CEQA Handbook*. According to these guidelines, a project would normally have a significant impact on air quality if it would

- Conflict or obstruct with implementation of the applicable air quality plan;
- Violate any air quality standard or 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 nonattainment under an applicable federal or state ambient air quality standard (including releasing emissions which exceed quantitative thresholds for ozone precursors);
- Expose sensitive receptors to substantial pollution concentrations;
- Create objectionable odors affecting a substantial number of people;
- Exceed the probability of 10 in one million of a maximally exposed individual contracting cancer due to emissions of toxic air contaminants; or
- Have ground level concentrations of non-carcinogenic toxic air contaminants that would result in a Hazard Index greater than 1.0 for the maximally exposed individual.

The *CSU CEQA Handbook* defers to the thresholds of the governing air district, which would be the BAAQMD in the case of the proposed project (CSU n.d.). The *BAAQMD CEQA Guidelines* recommend analytical methodologies and provide evaluation criteria for determining the level of significance of project impacts under the above-listed general criteria. The BAAQMD's evaluation criteria for

determining air quality impacts provide defined screening thresholds for pollutant emissions. Screening thresholds for air quality impacts from the *BAAQMD CEQA Guidelines* are presented below.

Construction Emissions

PM_{10} is the pollutant of greatest concern with respect to construction activities. Construction emissions of PM_{10} can vary greatly depending upon the level of activity, construction equipment used, local soils and weather conditions, among other factors. As a result, the *BAAQMD CEQA Guidelines* specify that "[t]he District's approach to CEQA analyses of construction impacts is to emphasize implementation of effective and comprehensive control measures rather than detailed quantification of emissions." Therefore, the determination of significance with respect to construction emissions is based on a consideration of the control measures to be implemented. If the proposed project implements all of the applicable control measures for PM_{10} listed in Table 2, Feasible Control Measures for Construction Emissions of PM_{10}, of the *BAAQMD CEQA Guidelines*, air pollutant emissions from construction activities would be considered less than significant. If the proposed project does not implement all applicable control measures, air quality impacts from construction emissions would be considered significant unless the lead agency provides a detailed explanation as to why a specific measure is unnecessary or not feasible (BAAQMD 1999, p. 14).

Operational Emissions

Direct operational emissions are those that are emitted on a project site and include stationary sources and on-site mobile equipment, if applicable. Examples of direct sources of emissions are industrial operations and activities/equipment that would require an operating permit from the BAAQMD.

Indirect operational emissions come from mobile sources and are generally emitted outside the project boundaries. For many types of land development projects, motor vehicle trips represent the principal source of indirect operational emissions of criteria pollutants.

The *BAAQMD CEQA Guidelines* state that total criteria pollutant emissions from individual project operations that would exceed the following thresholds would result in a significant air quality impact (BAAQMD 1999, p. 16):

- 80 pounds per day of ROG;
- 80 pounds per day of NOx; and
- 80 pounds per day of PM_{10}.

Local Carbon Monoxide Concentrations

Congested intersections, roadways, and parking structures where high ambient concentrations of CO accumulate are termed CO "hotspots." Traffic-congested roadways and intersections that operate at levels of service (LOS) E, or F have the potential to generate localized high levels of CO within approximately 1,000 feet of a roadway. Indirect CO emissions are considered significant if they will contribute to a violation of the state standards for CO (9.0 ppm averaged over 8 hours and 20 ppm over 1 hour). The BAAQMD recommends CO modeling for projects in which (1) project vehicle emissions of CO would exceed 550 pounds per day; (2) project traffic would affect intersections or roadway links operating at level of service (LOS) E, or F, or would cause a LOS to decline to LOS E or F;[8] or (3) project traffic would increase traffic volumes on nearby roadways by 10 percent or more (unless the increase in traffic volume is less than 100 vehicles per hour).

As necessary, a simplified CO modeling analysis, described in the *BAAQMD CEQA Guidelines*, was used to determine localized CO concentrations at various intersections. If modeling demonstrates that the source would not cause a violation of the state standard at existing or reasonably foreseeable receptors, the motor vehicle trips generated by the project would not have a significant localized CO impact.

Greenhouse Gas Emissions

To date, no local or state air quality agency has adopted significance criteria for GHG emissions or guidance on how GHGs or global climate change should be addressed in CEQA documents. While the Global Warming Solutions Act (AB 32) created a framework for reducing GHGs in California, the act did not address the role of CEQA in achieving the goals of the act. As noted earlier, the *Technical Advisory-CEQA and Climate Change: Addressing Climate Change through California Environmental Quality Act (CEQA) Review* provides informal guidance to public agencies for addressing the issue of climate change in their CEQA documents. However, the advisory does not recommend a specific threshold of significance—either quantitative or qualitative—for GHG emissions, leaving this to the lead agency's judgment and discretion.

On October 24, 2008, CARB staff released a draft and preliminary proposal for determining whether the emissions related to proposed new projects are significant impacts under CEQA. The proposal is focused on not only helping lead agencies determine under which conditions a project may be found exempt from the preparation of an EIR, it also provides a guide for establishing significance thresholds for projects for which EIRs would be prepared regardless of the project's climate change impact. According to this

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8 Levels of Service (LOS) range from A (least congested) with a condition of free flow with low volumes and high speeds to F (most congested) with stop and go, low-speed conditions with little or poor maneuverability.

proposal, the threshold for determining whether a project's emissions are significant is not zero emissions, but must be a stringent performance-based threshold to meet the requirements of AB 32. If the project meets certain specific yet to be developed performance standards for several categories of emissions, including construction emissions, building energy use, water use, solid waste, and transportation ***and*** the project emits no more than a certain to be determined amount of metric tons of carbon equivalents per year, the project's impact would not be significant. According to CARB, California Energy Commission Tier II building energy use standards are proposed to be used, which generally require a reduction in energy usage of 30 per cent beyond Title 24 building code requirements. Although specific numeric significance criteria or thresholds are still to be developed by the CARB and/or BAAQMD, the climate change impacts of the proposed project in this EIR are evaluated based on the approach outlined in CARB's recent proposal.

The impact related to climate change is evaluated in this Draft EIR using the following significance threshold:

- The proposed project will be considered not to impede the emissions reduction targets developed by the state pursuant to AB 32 if it is consistent with applicable AB 32 Draft Scoping Plan measures.

4.2.4.2 Methodology

Air quality impacts resulting from the implementation of the proposed project fall into two categories: (1) short-term impacts from construction activities and (2) long-term impacts from the day-to-day campus operations as the campus builds out under the proposed Master Plan.

Construction Emissions

PM_{10}, ROG and NO_X emissions would be generated during project construction. PM_{10} that leaves the construction site is referred to as "fugitive dust." Fugitive dust emissions would be generated from demolition activities, as well as from ground disturbance during earthmoving and grading activities. PM_{10}, ROG, and NO_X emissions would be generated by heavy-duty construction equipment, on-road trucks used for equipment/material deliveries and waste-hauling, construction worker vehicles, and off-gassing from asphalt paving and architectural coatings. ROG and NO_X are ozone precursors that could potentially contribute to the ongoing nonattainment status of the Basin for ozone. CO emissions would also be generated by heavy-duty construction equipment, worker vehicles, and on-road heavy-duty haul trucks. Concentrations of CO have not been exceeded anywhere within the Basin for several years, and construction-related CO emissions are not expected to hamper maintenance of the current CO attainment status of the SFBAAB.

The *BAAQMD CEQA Guidelines* do not require the quantification of construction emissions. As mentioned above, compliance with standard control measures for PM_{10} specified in the *BAAQMD CEQA Guidelines* is considered sufficient to reduce construction impacts to less than significant. With respect to emissions of other criteria pollutants from construction activity within the Basin, those emissions are included in the Basin's plan. However, because construction would be an ongoing source of emissions on the campus, construction criteria pollutant emissions from campus development under the proposed Master Plan were estimated using URBEMIS2007 Version 9.2.4, a land use and transportation based air quality model developed in cooperation with CARB and designed to estimate air emissions from new development projects, including construction emissions.

Because the proposed project is a Master Plan for the development of the campus (and not a specific building project), there is no specific construction schedule or any other construction details that could be used to estimate construction emissions. Therefore, to estimate construction emissions, a conservative assumption was made that construction would occur over the following five construction subphases beginning on July 1, 2009 and ending on December 31, 2030:

1. **Demolition:** Calculation of demolition emissions assumes that 15 percent of the proposed construction would require some form of demolition that includes the complete or partial removal of existing improvements. Fifteen percent of 1.1 million square feet is 165,000 square feet. Since the demolished square footage would likely entail multi-story buildings, an average height of 10 feet is assumed per floor. All demolished material is assumed to be hauled off-site. If the campus construction projects recycle a portion of the demolished material within the campus boundaries, the vehicle miles travelled (VMT) and subsequent criteria pollutants generated from haul trucks would be reduced.

2. **Grading:** Calculation of grading emissions assumes a floor-area-ratio of 1:2 (i.e., for every square foot of building constructed, 2 square feet of land would be graded). With construction of 1.1 million square feet of space, 54.5 acres of the campus would be graded. Because of the compact development of the campus and the 22-year buildout of the master plan, the maximum rate of ground disturbance (including grading, excavation, landscaping, etc.) is assumed to be 2 acres per day, and would take place from July 1, 2009 to June 30, 2030. Fugitive dust control measures would be applied during this entire period to comply with the *BAAQMD CEQA Guidelines*.

3. **Paving:** Paving would occur from October 1, 2009 (three months after grading commences) to September 30, 2030, and approximately 25 percent of total disturbed acreage would be paved (this percentage is an URBEMIS2007 default assumption).

4. **Building Construction:** Building construction would take place from January 1, 2010 (six months after grading commences) to June 30, 2030. A total of 1.1 million square feet of campus space would be constructed along with 3,700 student beds (assuming 4 beds per student housing unit) and a maximum of 220 staff and faculty housing units. URBEMIS2007 allows the user only to enter the number of students for the university/college land use type. The corresponding amount of buildings to be constructed assumes 92 square feet per student. This value would underestimate the amount of

buildings for the Campus (i.e., 850,264 square feet for 9,242 students, which the difference between the 18,000 FTE capacity after the proposed project and the current student population of 8,758 FTE). Therefore, 11,956.52 students were entered in URBEMIS2007 to arrive at 1,100,000 square feet of building space that would be constructed. To account for the construction of 3,700 student beds and 220 staff and faculty housing units, 1,145 mid-rise apartments were entered into URBEMIS2007. In addition, due to the presence of a calculation error in the URBEMIS2007 model, vendor trips and worker trips associated with building construction are overestimated for multi-year projects. URBEMIS2007 calculates the number of vendor trips and worker trips based on the total square footage of buildings and residential units for the entire project. It does not take into account the fact that the project would be constructed gradually over a period of time. Therefore, the vendor trip and worker trip emissions associated with building construction were divided by 22 to account for the number of years of building construction assumed in this analysis.

5. **Architectural Coatings:** Architectural coatings would be applied from July 1, 2010 (six months after building construction commences) to December 31, 2030.

URBEMIS2007 model inputs include the schedules and assumptions described above and URBEMIS2007 default assumptions. The results of the modeling are shown in **Table 4.2-8, Estimated Construction Emissions for the Campus Master Plan (Unmitigated)**.

Table 4.2-8
Estimated Construction Emissions for the Campus Master Plan (Unmitigated)

Construction Year	Emissions in Pounds Per day					
	ROG	NO_X	CO	SO_X	PM_{10}	$PM_{2.5}$
2009	9.16	76.43	43.35	0.00	44.40	11.92
2010	25.70	114.61	75.89	0.01	47.48	14.72
2011	24.76	107.77	72.72	0.01	47.13	14.39
2012	23.84	101.23	69.94	0.01	46.61	13.92
2013	23.04	95.02	67.30	0.01	46.15	13.49
2014	22.22	88.63	64.88	0.01	45.63	13.01
2015	21.35	81.66	62.62	0.01	45.25	12.66
2016	20.58	75.26	60.63	0.01	44.85	12.29
2017	19.93	69.16	58.82	0.01	44.46	11.94
2018	19.20	63.46	57.20	0.01	44.07	11.58
2019	18.52	58.25	55.73	0.01	43.70	11.24
2020	17.95	53.52	54.46	0.01	43.47	11.03
2021	17.87	53.21	52.60	0.01	43.47	11.02
2022	17.87	53.21	52.60	0.01	43.47	11.02
2023	17.87	53.21	52.60	0.01	43.47	11.02
2024	17.87	53.21	52.60	0.01	43.47	11.02
2025	17.87	53.21	52.60	0.01	43.47	11.02

Construction Year	Emissions in Pounds Per day					
	ROG	NO_X	CO	SO_X	PM_{10}	$PM_{2.5}$
2026	17.83	53.07	51.56	0.01	43.46	11.02
2027	17.83	53.07	51.56	0.01	43.46	11.02
2028	14.65	31.40	32.69	0.01	41.80	9.98
2029	14.65	31.40	32.69	0.01	41.80	9.98
2030	14.65	31.40	32.69	0.01	41.80	9.98
Maximum Emissions in Any Year	25.70	114.61	75.89	0.01	47.48	14.72

Source: Impact Sciences, Inc. Emissions calculations are provided in ***Appendix 4.2****.*

Operational Emissions

Operational emissions of the proposed project would comprise mobile source emissions from vehicle trips, and on-site stationary (e.g., boilers) and area source (e.g., consumer products and landscape maintenance equipment) emissions. URBEMIS2007 was used to calculate the proposed project's mobile and area source emissions. Area source emissions calculated by URBEMIS2007 are for natural gas combustion, landscape maintenance equipment, and periodic architectural coating maintenance. As explained above, URBEMIS2007 allows the user only to enter the number of students for the university/college land use type. The corresponding amount of buildings to be constructed assumes 92 square feet per student. This value would underestimate the amount of buildings for the campus (i.e., 850,264 square feet for 9,242 students). Therefore, 11,956.52 students were entered in URBEMIS2007 to arrive at 1,100,000 square feet of buildings to calculate area source emissions. The mobile source emissions are based on the proposed project's trip generation, estimated trip distances, and emission factors specific to Alameda County. For mobile source emissions, 9,242 students were entered in URBEMIS2007. This value is based on the 18,000 FTE capacity after the proposed project and the 2007 enrollment of 8,758 FTE. The trip generation rate obtained from the traffic impact analysis for the proposed project was adjusted to arrive at the estimated total number of trips associated with the proposed project.

The proposed project includes a 2,250-ton chiller fueled by electricity; 7,500-ton electricity-fueled cooling towers; and a 33,000-square-foot main boiler house holding natural-gas fueled boilers, which would provide steam and hot water for the campus. The total heat input rating for the new boilers would be 61.46 million British thermal units per hour (MMBtu/hr). The emissions from the boilers were calculated using emission factors contained in the US EPA's *Compilation of Air Pollutant Emission Factors* (also referred to as AP 42), a compilation of emission factors for various area and point sources (US EPA 1995; 1998). Cooling towers would result in minor PM_{10} emissions that would not add a substantial amount of

emissions to the overall total. Therefore, the PM_{10} emissions associated with the coolers was not calculated. Once calculated, the sum of the daily operational mobile, stationary, and area source emissions were compared with the appropriate operational criteria pollutant emission thresholds for the BAAQMD.

A simplified CALINE4 screening model developed by the BAAQMD was used to predict future CO concentrations at 0 and 25 feet from the intersections in the study area that would operate at LOS D or worse with the proposed development. This methodology assumes worst-case conditions (i.e., wind direction is parallel to the primary roadway and 90 degrees to the secondary road, wind speed of less than 1 meter per second and extreme atmospheric stability) and provides a screening of maximum, worst-case, CO concentrations. If the screening model predicts a CO concentration in excess of the CAAQS standard (i.e., a CO hotspot), the complete CALINE4 model is run to more precisely predict future CO concentrations at the intersections in question.

4.2.4.3 Environmental Commitments included in the Proposed Project

The Campus Master Plan includes the following components that would help reduce air emissions.

Transit Plan

The Transit Plan includes a bus/shuttle connection linking the downtown Hayward BART station to the campus. Elements of the Access, Circulation and Parking Framework of the Campus Master Plan that were discussed in **Subsection 4.2.4, Regulatory Considerations**, would reduce air emissions of the proposed project by reducing the number of vehicle trips travelled. Implementation of these elements would be facilitated by the already-existing shuttle and bus service that connects the campus with the downtown Hayward BART station, other areas of the City of Hayward, and communities to the north and south.

Pedestrian Circulation Plan

The Pedestrian Circulation Plan outlines the locations of proposed primary pedestrian malls, major pedestrian circulation pathways, primary pedestrian entries, and pedestrian bridges. Pedestrian facilities in the immediate project area include sidewalks along a portion of the north side of Carlos Bee Avenue, and along Harder Road near the campus entrance.

Bicycle Circulation

Bicycle circulation throughout the campus is also included in the Access, Circulation, and Parking Framework. Class II and III bicycle routes already exist in the area.

Energy Consumption Reduction

The CSU Board of Trustees adopted a policy to reduce energy consumption and greenhouse gas emissions by requiring all new buildings on CSU campuses be built to a LEED NC (new commercial construction and major renovation projects) Silver rating or higher. In addition, the Hayward campus has one of the largest (1 mega watt) photovoltaic installations in northern California and is also in the final stages of procuring a multi-resource fuel cell installation. The electrical system along with building design and renewable energy options, including wind and solar power, will help the campus to achieve the goal of overall carbon neutrality by 2030.

4.2.4.4 Project Impacts and Mitigation Measures

The following sections describe specific impacts of the proposed project. Cumulative air quality impacts are discussed under **MP Impacts AIR-6** and **AIR-7.**

MP Impact AIR-1: **Construction of the Proposed Project would generate short-term emissions of fugitive dust and asbestos that could adversely affect local air quality in the vicinity of the construction site.**

Level of Significance: Significant

New building construction would add approximately 1.1 million square feet of building space to the campus, including 951,000 square feet of academic building space and approximately 145,000 square feet of academic and campus support building space. In addition, in the near term 600 student beds in approximately 150 housing units would be constructed associated with the Pioneer Heights Phase IV student housing, and through the buildout of the campus under the proposed Master Plan a maximum total of 3,700 new student beds and 220 staff and faculty housing units would be added to the campus. Some of the existing buildings on the campus may be demolished if renovation is determined to be infeasible, including the 400-bed Pioneer Heights I complex.

The magnitude of PM_{10} construction emissions would vary on a day-to-day basis depending on the need to demolish existing facilities, the size of areas being graded and excavated, the types and numbers of heavy-duty construction equipment utilized during each construction phase, and how long each piece of equipment is operated each day. Other variables that could change daily depending on the construction phase are the numbers of construction workers, material delivery trucks, and waste haul trucks. Although temporary in nature, construction emissions have the potential to cause adverse effects on local air quality in the vicinity of the construction site, and to generated fugitive dust that could adversely affect adjacent land uses.

BAAQMD does not require quantification of construction emissions; rather it emphasizes effective and comprehensive control measures to minimize the generation of PM_{10} fugitive dust. If all of the appropriate dust-control measures specified in the *BAAQMD CEQA Guidelines*, Table 2, Feasible Control Measures for Construction Emissions of PM_{10}, are implemented, the district considers the impact related to construction emissions to be less than significant (BAAQMD 1999, p. 14). In addition to the fugitive dust control measures, the project applicant would also be subject to the requirements of Regulation 11, Rule 2 (Asbestos Demolition, Renovation, and Manufacturing), which would reduce asbestos exposure impacts to a less than significant level. In the event that campus development projects did not implement BAAQMD recommended dust control measures or the requirements of Regulation 11, Rule 2, campus construction would result in a significant impact related to construction emissions. To address this, all campus construction projects would implement **MP Mitigation Measure AIR-1a**, and those construction projects that involve demolition would implement both **MP Mitigation Measures AIR-1a** and **-1b.**

MP MM AIR-1a: The control measures contained in Table 2 of the *BAAQMD CEQA Guidelines* listed below shall be implemented, as appropriate and feasible, during construction of each project under the proposed Campus Master Plan.

The following Basic Control Measures shall be implemented at all construction sites:

- Water all active construction areas at least twice daily.
- Cover all trucks hauling soil, sand, and other loose materials *or* require all trucks to maintain at least 2 feet of freeboard (i.e., the minimum required space between the top of the load and the top of the trailer).
- Pave, apply water three times daily (or as sufficient to prevent dust from leaving the site), or apply (non-toxic) soil stabilizers on all unpaved access roads, parking areas, and staging areas at construction sites.
- Sweep daily or as appropriate (with water sweepers using reclaimed water if possible) all paved access roads, parking areas, and staging areas at construction sites.
- Sweep streets daily or as appropriate (with water sweepers using reclaimed water if possible) if visible soil material is carried onto adjacent public streets.

In addition to the Basic Control Measures, the following Enhanced Control Measures shall be implemented at construction sites greater than 4 acres in area:

- Hydroseed or apply (non-toxic) soil stabilizers to inactive construction areas (previously graded areas inactive for 10 days or more).
- Enclose, cover, water twice daily (or as sufficient to prevent dust from leaving the site), or apply (non-toxic) soil stabilizers to exposed stockpiles (dirt, sand, etc.).

- Limit traffic speeds on unpaved roads to 15 miles per hour.
- Install sandbags or other erosion control measures to prevent silt runoff to public roadways.
- Replant vegetation in disturbed areas as quickly as possible.

The following Optional Control Measures are strongly encouraged at construction sites that are large in area or located near sensitive receptors, or may, for any other reason, warrant additional emissions reductions:

- Install wheel washers or wash off the tires or tracks of all trucks and equipment leaving the site.
- Install windbreaks or plant trees/vegetative windbreaks at the windward side(s) of construction areas.
- Suspend excavation and grading activity when sustained winds exceed 25 mph.

MP MM AIR-1b: The Campus shall consult with the BAAQMD's Enforcement Division prior to commencing demolition of a building containing asbestos building materials and implement any control measures required by the BAAQMD.

Significance After Mitigation: The mitigation measures identified above would reduce fugitive dust emissions (PM_{10} and $PM_{2.5}$). The effects of several of these mitigation measures are provided in **Table 4.2-9, Estimated Construction Emissions for the Campus Master Plan (Mitigated)**. The reductions were calculated in URBEMIS2007, which contains methodologies to calculate emissions reductions for most of the Basic and Enhanced Control Measures. The full extent of the control measures would reduce emissions beyond those presented in **Table 4.2-9**. As indicated in the table, emissions of PM_{10} and $PM_{2.5}$ would be substantially reduced compared to the unmitigated emissions presented in **Table 4.2-8**. The impact would be less than significant.

MP Impact AIR-2: Campus development under the proposed Master Plan would generate long-term operational emissions of criteria pollutants that would exceed the BAAQMD thresholds and could therefore conflict or obstruct with implementation of the regional air quality plan.

Level of Significance: Significant

Table 4.2-9
Estimated Construction Emissions for the Campus Master Plan (Mitigated)

Construction Year	Emissions in Pounds Per day	
	PM_{10}	$PM_{2.5}$
2009	6.91	4.09
2010	9.99	6.89
2011	9.63	6.56
2012	9.12	6.09
2013	8.65	5.66
2014	8.13	5.18
2015	7.75	4.83
2016	7.35	4.46
2017	6.96	4.11
2018	6.58	3.75
2019	6.21	3.41
2020	5.98	3.20
2021	5.97	3.19
2022	5.97	3.19
2023	5.97	3.19
2024	5.97	3.19
2025	5.97	3.19
2026	5.97	3.19
2027	5.97	3.19
2028	4.31	2.15
2029	4.31	2.15
2030	4.31	2.15
Maximum Emissions in Any Year	9.99	6.89

Source: Impact Sciences, Inc. Emissions calculations are provided in ***Appendix 4.2****.*

Campus development under the proposed Master Plan would generate operational criteria pollutant emissions from increased vehicular trips to and from the campus and from on-site stationary (e.g., a 25,000–35,0000-square-foot campus central heating and cooling plant that would house centralized chillers, cooling towers, boilers, and pumps) and area sources (e.g., consumer products and landscape maintenance equipment). In addition, as noted earlier, construction activity would occur almost continuously on the campus through buildout of the proposed Master Plan and would therefore be a constant source of criteria pollutant emissions. Should the proposed improvements generate emissions of

ROG, NO_X, or PM_{10} that exceed BAAQMD's operational thresholds, it would result in a significant air quality impact.

Summertime and wintertime mobile, area, stationary source emissions and on-going construction activity from the proposed project are presented in **Table 4.2-10**, **Estimated Ongoing Emissions (Unmitigated)**.

Table 4.2-10
Estimated Ongoing Emissions (Unmitigated)

	Emissions in Pounds per Day					
Emissions Source	**ROG**	**NO_X**	**CO**	**SO_X**	**PM_{10}**	**$PM_{2.5}$**
Summertime Emissions[1]						
Stationary Sources	3.98	17.70	54.58	2.17	5.50	5.50
Operational (Mobile) Sources	84.40	40.81	515.09	1.37	246.96	46.70
Area Sources	91.83	38.41	29.36	0.00	0.08	0.08
Construction Emissions[3]	18.87	65.97	54.90	0.01	44.22	11.79
Summertime Emission Totals	**199.08**	**162.89**	**653.93**	**3.55**	**296.76**	**64.07**
BAAQMD Thresholds	80	80	—	—	80	—
Exceeds Threshold?	**YES**	**YES**	—	—	**YES**	—
Wintertime Emissions[2]						
Stationary Sources	3.98	17.70	54.58	2.17	5.50	5.50
Operational (Mobile) Sources	53.28	60.61	541.84	1.18	246.96	46.70
Area Sources	91.58	38.37	26.27	0.00	0.07	0.07
Construction Emissions[3]	18.87	65.97	54.90	0.01	44.22	11.79
Wintertime Emission Totals	**231.78 167.71**	**182.65 182.65182.6**	**677.59677.5 9**	**3.36**	**296.73 296.75**	**64.06**
BAAQMD Thresholds	80	80	—	—	80	—
Exceeds Threshold?	**YES**	**YES**	—	—	**YES**	—

Source: Impact Sciences, Inc. Detailed URBEMIS2007 and stationary source emissions calculations are provided in ***Appendix 4.2****.*
Totals in table may not appear to add exactly due to rounding in the computer model calculations.
[1] *"Summertime Emissions" are representative of the conditions that may occur during the ozone season (May 1 to October 31).*
[2] *"Wintertime Emissions" are representative of the conditions that may occur during the balance of the year (November 1 to April 30).*
[3] *Average annual construction emissions (unmitigated) derived from numbers reported in* ***Table 4.2-8****.*

As shown above, ongoing emissions associated with the day-to-day activities of the campus under the proposed project, including on-going construction, would exceed the BAAQMD thresholds of emissions for ROG, NO_X, and PM_{10}. The values shown in **Table 4.2-10** include the maximum level of mitigation permitted in the URBEMIS2007 model for mobile source emissions. The proposed Master Plan includes measures that would further reduce future mobile and area source emissions from the proposed project.

Table 4.2-11, Strategies, Targets, and Benefits of the Campus Master Plan That Would Reduce Air Emissions, lists the elements of the proposed Master Plan that would have a direct beneficial effect on air emissions.

Table 4.2-11
Strategies, Targets, and Benefits of the Campus Master Plan That Would Reduce Air Emissions

Strategies	Targets	Benefits
Strategies to Reduce Carbon Emissions		
1. Right-size buildings 2. Reduce movement 3. Minimize energy use 4. Maximize use of renewables	Achieve a 60% carbon emissions reduction through operational, policy and design strategies.	Reduced GHG emissions
Strategies to Reduce Energy Demand		
1. Existing building retrofits and Re-Commissioning 2. Energy Load Reduction 3. Passive Energy Efficiency Strategies 4. Active Energy Strategies 5. Recover Energy 6. Renewable Energy Generation 7. Offsetting	Achieve 30% energy savings in existing buildings. Achieve 50% energy savings in new buildings when compared to typical, existing CSUEB buildings.	Reduced peak demand Reduced costs Reduced carbon emissions Improved occupant control
Strategies to Reduce Transportation Emissions		
1. Provide highly accessible, frequent bus and shuttle transit 2. Promote transit use through incentives 3. Discourage auto use by residents and commuters	Reduce drive alone rates for commuters from 79% to 64% and increase carpooling rates from 4% to 8% Increate transit ridership from 16% to 29% Reduce future parking supply from 0.49 spaces per FTE to 0.37 spaces per FTE	Reduced GHG emissions Less congestion on campus and regional roads

Source: Cal State University, Cal State East Bay, Hayward Campus Master Plan, (2008).

As the proposed project would result in significant air quality impacts, mitigation measures would be required to reduce the emissions. The mitigation measures identified below would reduce operational emissions associated with the proposed project. It is not possible to calculate the full extent of the

reductions based on these measures as it would depend upon the participation level of the recommended carpool and mass-transit programs. However, URBEMIS2007 does provide methodologies for calculating the reductions associated with energy efficiency beyond Title 24, local transit services, free transit passes, and parking supply reductions. The energy efficiency beyond Title 24 was assumed to be 30 percent, which is stated as a goal in the proposed Master Plan. The effects of these mitigation measures are provided in **Table 4.2-12, Estimated Operational Emissions for the Campus Master Plan (Mitigated)**. The full extent of the mitigation measures would reduce emissions beyond those presented in **Table 4.2-12.** However, as shown in **Table 4.2-12**, emissions of ROG, NO_x, and PM_{10} would remain significant after the implementation of mitigation measures.

The SFBAAB is currently in nonattainment/marginal for the federal standard for ozone-8 hour, and in nonattainment for the state standards of ozone-1 hour, ozone-8 hour, PM_{10}, and $PM_{2.5}$. *Bay Area 2000 Clean Air Plan and Triennial Assessment* (2000 CAP) is the regional clean air plan that is focused on reducing the regional emissions of ROG and NOx, which are precursors to the formation of ozone in the lower atmosphere. The 2000 CAP is intended to focus on the near-term actions through amendments of existing regulations and promulgation of new district regulations. The 2000 CAP continues to discourage urban sprawl while strongly endorsing high-density mixed-use developments near transit centers in order to reduce the need for commuting by personal vehicles. The 2000 CAP includes the transportation control measures (TCMs) to reduce emissions from automobiles. BAAQMD CEQA Guidelines state that if the population and vehicle miles traveled growth rates of a land use plan (such as the Campus Master Plan) are less than or equal to those in the most recent CAP, then the air quality impacts of the plan would not be significant. However, there is no information available at this time to indicate that the increment or the rate of population growth associated with the Campus Master Plan is included in the 2000 CAP and therefore, it appears that campus growth and the emissions associated with the campus growth are not accounted for in the regional CAP. Because the emissions are not likely accounted for in the 2000 CAP and because the emissions would not be reduced to levels below BAAQMD thresholds even with mitigation, the implementation of the proposed Master Plan would potentially hinder the attainment of the regional air quality plan.

The Campus will implement the following mitigation measures to reduce this impact to the maximum extent possible.

MP MM AIR-2a: Implement **MP Mitigation Measure TRANS-1**.

MP MM AIR-2b: To the extent feasible, future development within the campus shall incorporate the strategies to reduce energy demand and associated air emissions as listed in **Table 4.2-10**.

MP MM AIR-2c: The Campus will work with ABAG to ensure that campus growth is accounted for in the regional population forecasts and with the BAAQMD to ensure that campus growth-related emissions are accounted for in future air quality planning efforts.

Significance After Mitigation: The impact would be significant and unavoidable.

Table 4.2-12
Estimated Operational Emissions for the Campus Master Plan (Mitigated)

	Emissions in Pounds per Day					
Emissions Source	**ROG**	**NO_X**	**CO**	**SO_X**	**PM_{10}**	**$PM_{2.5}$**
Summertime Emissions[1]						
Stationary Sources	3.98	17.70	54.58	2.17	5.50	5.50
Operational (Mobile) Sources	62.13	20.18	254.68	0.68	122.11	23.09
Area Sources	90.98	26.90	21.48	0.00	0.06	0.06
Construction Emissions	18.87	65.97	54.90	0.01	6.73	3.96
Summertime Emission Totals	**175.966**	**130.75 130.75**	**385.644**	**2.86**	**134.40**	**32.61**
BAAQMD Thresholds	80	80	—	—	80	—
Exceeds Threshold?	**YES**	**YES**	—	—	**YES**	—
Wintertime Emissions[2]						
Stationary Sources	3.98	17.70	54.58	2.17	5.50	5.50
Operational (Mobile) Sources	26.35	29.67	267.91	0.58	122.11	23.09
Area Sources	90.73	26.86	18.39	0.00	0.05	0.05
Construction Emissions	18.87	65.97	54.90	0.01	6.73	3.96
Wintertime Emission Totals	**139.93**	**140.20**	**395.78**	**2.76**	**134.39**	**32.60**
BAAQMD Thresholds	80	80	—	—	80	—
Exceeds Threshold?	**YES**	**YES**	—	—	**YES**	—

Source: Impact Sciences, Inc. Detailed URBEMIS2007 and stationary source emissions calculations are provided in ***Appendix 4.2****.*
Totals in table may not appear to add exactly due to rounding in the computer model calculations.
[1] *"Summertime Emissions" are representative of the conditions that may occur during the ozone season (May 1 to October 31).*
[2] *"Wintertime Emissions" are representative of the conditions that may occur during the balance of the year (November 1 to April 30).*

MP Impact AIR-3: The Proposed Project would increase carbon monoxide concentrations at busy intersections and along congested roadways in the project vicinity but would not expose sensitive receptors to substantial pollution concentrations.

Level of Significance: Less than significant

The proposed project was evaluated for its potential to cause high levels of CO due to traffic associated with the development. Motor vehicles are a primary source of pollutants within the project vicinity. Traffic-congested roadways and intersections have the potential to generate localized high levels of CO. Localized areas where ambient concentrations exceed state and/or federal standards are termed CO "hotspots." CO is produced in greatest quantities from vehicle combustion and is usually concentrated at or near ground level because it does not readily disperse into the atmosphere. As a result, potential air quality impacts to sensitive receptors are assessed through an analysis of localized CO concentrations. Areas of vehicle congestion have the potential to create CO hotspots that exceed the state ambient air quality 1-hour standard of 20 ppm or the 8-hour standard of 9.0 ppm. The federal levels are less stringent than the state standards and are based on 1- and 8-hour standards of 35 and 9 ppm, respectively. Thus, an exceedance would occur based on the state standards prior to exceedance of the federal standard.

The proposed project was evaluated to determine if it would cause a CO hotspot utilizing a simplified CALINE4 screening model developed by the Bay Area Air Quality Management District (BAAQMD). The simplified model is intended as a screening analysis that identifies a potential CO hotspot. If a hotspot is identified, the complete CALINE4 model is then utilized to determine precisely the CO concentrations predicted at the intersections in question. This methodology assumes worst-case conditions (i.e., wind direction is parallel to the primary roadway and 90 degrees to the secondary road, wind speed of less than 1 meter per second and extreme atmospheric stability) and provides a screening of maximum, worst-case, CO concentrations.

This methodology is utilized to predict future CO concentrations 0 and 25 feet from the intersections in the study area based on projected traffic volumes from the intersections contained in the traffic study for the proposed project. The intersections were determined in the traffic study to operate at a level of service (LOS) between A through F. Intersections operating at a LOS of E or F are considered have to have the potential to create a CO hotspot (ITS 1997); therefore, for the purposes of this analysis, only intersections estimated to operate at LOS E or F under future cumulative plus project traffic conditions were analyzed.

Maximum future cumulative plus project CO concentrations were calculated for peak hour morning and evening traffic volumes. Background CO concentrations were included in the analysis. The results of these CO concentration calculations are presented in **Table 4.2-13**, **Cumulative (2030) Plus Project CO**

Concentrations-With Third Entrance, and **Table 4.2-14**, **Cumulative (2030) Plus Project CO Concentrations-Without Third Entrance.** Representative receptors are located 0 and 25 feet from each intersection.

Table 4.2-13
Cumulative (2030) Plus Project CO Concentrations
With Third Entrance

Intersection	0 Feet		25 Feet	
	1-Hour[1]	8-Hour[2]	1-Hour[1]	8-Hour[2]
2. Carlos Bee Blvd./West Loop Rd.	3.3	2.0	3.2	2.0
3. Harder Rd./West Loop Rd.	3.7	2.4	3.5	2.2
6. Foothill Blvd./Mattox Rd./Castro Valley Blvd.	4.9	3.2	4.2	2.7
7. Foothill Blvd./Grove Way	4.8	3.1	4.2	2.7
8. Foothill Blvd./A St.	4.7	3.1	4.2	2.7
9. Foothill Blvd./D St.	4.2	2.7	3.9	2.5
10. Foothill Blvd./Mission Blvd./Jackson St./E St.	5.1	3.3	4.4	2.8
12. Mission Blvd./Carlos Bee Blvd./Orchard Ave.	5.1	3.4	4.4	2.8
13. Mission Blvd./Harder Rd.	5.0	3.3	4.3	2.8
14. Mission Blvd./Tennyson Rd.	4.8	3.1	4.1	2.6
15. Jackson St./Santa Clara St./Harder Rd.	4.7	3.0	4.2	2.7
Exceeds state 1-hour standard of 20 ppm?	NO	—	NO	—
Exceeds federal 1-hour standard of 35 ppm?	NO	—	NO	—
Exceeds state 8-hour standard of 9.0 ppm?	—	NO	—	NO
Exceeds federal 8-hour standard of 9 ppm?	—	NO	—	NO

Source: Impact Sciences, Inc.
*Emissions calculations are provided in **Appendix 4.2**.*
[1] *State standard is 20 parts per million. Federal standard is 35 parts per million.*
[2] *State standard is 9.0 parts per million. Federal standard is 9 parts per million.*

Table 4.2-14
Cumulative (2030) Plus Project CO Concentrations
Without Third Entrance

Intersection	0 Feet		25 Feet	
	1-Hour[1]	8-Hour[2]	1-Hour[1]	8-Hour[2]
1. Carlos Bee Blvd./Hayward Blvd.	4.0	2.5	3.7	2.3
2. Carlos Bee Blvd./West Loop Rd.	3.3	2.1	3.3	2.0
6. Foothill Blvd./Mattox Rd./Castro Valley Blvd.	4.9	3.2	4.2	2.7
7. Foothill Blvd./Grove Way	4.8	3.1	4.2	2.7
8. Foothill Blvd./A St.	4.7	3.1	4.2	2.7
9. Foothill Blvd./D St.	4.2	2.7	3.9	2.5
10. Foothill Blvd./Mission Blvd./Jackson St./E St.	5.1	3.3	4.4	2.8
12. Mission Blvd./Carlos Bee Blvd./Orchard Ave.	5.2	3.4	4.4	2.8
13. Mission Blvd./Harder Rd.	5.0	3.3	4.3	2.8
14. Mission Blvd./Tennyson Rd.	4.8	4.7	4.1	2.6
15. Jackson St./Santa Clara St./Harder Rd.	4.7	3.0	4.2	2.7
Exceeds state 1-hour standard of 20 ppm?	NO	—	NO	—
Exceeds federal 1-hour standard of 35 ppm?	NO	—	NO	—
Exceeds state 8-hour standard of 9.0 ppm?	—	NO	—	NO
Exceeds federal 8-hour standard of 9 ppm?	—	NO	—	NO

Source: Impact Sciences, Inc.
*Emissions calculations are provided in **Appendix 4.2**.*
[1] *State standard is 20 parts per million. Federal standard is 35 parts per million.*
[2] *State standard is 9.0 parts per million. Federal standard is 9 parts per million.*

As shown above, the contribution of traffic from cumulative projects plus the proposed project would not generate CO concentrations that would exceed state CO ambient air quality standards at any of the intersections evaluated. Therefore, the project's impact under this significance criterion would be less than significant and the project would not expose sensitive receptors to a substantial CO concentration.

Mitigation Measure: No mitigation is required.

MP Impact AIR-4: **The Proposed Project would not create objectionable odors affecting a substantial number of people.**

Level of Significance: Less than significant

The BAAQMD method for determining potential odor impacts involves two steps (BAAQMD 1999, p. 17). The first step is to determine whether the proposed project would result in an odor source and whether receptors are within specified distances from the source. The second step is, if the project would result in an odor source within the specified distances to receptors, conduct a detailed analysis pursuant to *BAAQMD CEQA Guidelines*. The guidelines include the following of the types of facilities, presented in **Table 4.2-15, Odor Source Screening Distances**, known to emit objectionable odors and the screening distances from the odor source:

Table 4.2-15
Odor Source Screening Distances

Type of Operation	Project Screening Distance
Wastewater Treatment Plan	1 mile
Sanitary Landfill	1 mile
Transfer Station	1 mile
Composting Facility	1 mile
Petroleum Refinery	2 miles
Asphalt Batch Plant	1 mile
Chemical Manufacturing	1 mile
Fiberglass Manufacturing	1 mile
Painting/Coating Operations (e.g., auto body shops)	1 mile
Rendering Plant	1 mile
Coffee Roaster	1 mile

Source: Bay Area Air Quality Management District, CEQA Guidelines.

None of the facilities that would be constructed on the campus under the proposed Master Plan are amongst those listed in the table above and none of the facilities would involve sources of objectionable odors. Odors could potentially be generated during short-term architectural coating activities. Architectural coatings contain VOCs that may include odiferous compounds. However, any architectural coatings used in buildings constructed on the campus under the proposed Master Pan would be required to comply with the low-VOC requirements of BAAQMD Regulation 8, Rule 3 (Architectural Coatings). This rule limits the quantity of VOCs contained in architectural coatings sold, used, or manufactured within the district. Compliance with Regulation 8, Rule 3, would minimize any odor impacts from architectural coating operations. In addition, any odors associated with architectural coatings would cease following completion of the building project, except for minor periodic maintenance painting. Therefore, the project's impact with respect to odors would be considered less than significant.

The land uses surrounding the project site include residential units and recreational open space. These uses are not anticipated to constitute a significant odor source. Therefore, residents of the proposed project would not be exposed to objectionable odors from adjacent land uses and the impact with respect to this criterion would be less than significant.

Therefore, the proposed project would not create objectionable odors affecting a substantial number of people, and would be less than significant under this significance criterion.

Mitigation Measure: No mitigation is required.

MP Impact AIR-5: The Proposed Project could expose individuals to toxic air contaminants.

Level of Significance: Potentially significant

Sources of toxic air contaminants (TACs) around and within the campus include diesel buses and trucks, laboratory emissions, central plant generators and boilers, water heaters/boilers in individual buildings, and emergency generators.

CARB is required by state law to identify and control toxic air contaminants and has prepared a stationary source air toxics emissions inventory. The inventory identifies air toxics emissions from sources in each California air district and, where feasible, quantifies these emissions based on information reported through the Air Toxics Hot Spots Program (Air Toxics Hot Spots Information and Assessment Act, AB 2588, Connelly as amended by SB 1731, Calderon). Air toxics monitoring stations are located throughout California. These stations, maintained either by CARB or the local APCD, monitor and record existing levels of various organic gases and metals in the air. There are a number of stations throughout the Bay Area that monitor toxic air contaminants.

The BAAQMD is responsible for administering federal and state regulations related to TACs. In compliance with federal law, BAAQMD Regulation 11, Hazardous Pollutants, implements federal national emissions standards for hazardous air pollutants (NESHAPs) and maximum achievable control technology (MACT) requirements through the federal operating permit program.

Regulation 2, Rule 5: New Source Review of Toxic Air Contaminants replaced the District's Risk Management guidelines on July 1, 2005. This rule provides preconstruction review for potential health impacts from new and modified sources of toxic air contaminants. Toxic emissions are estimated for all sources within a proposed project; if emissions from a proposed project exceed the trigger levels, a Health Risk Screening Analysis (HRSA) is required to determine project risk and risk from each source.

BAAQMD guidelines for performing a HRSA conform to the Health Risk Assessment Guidelines established by OEHHA for use in the Air Toxics Hot Spots Program

The BAAQMD will grant a permit for a new or modified stationary sources if the sources meet either of the following impact criteria (1) the estimated incremental cancer risk from the project is less than 1 in one million; or (2) the estimated incremental risk is less than 10 in one million, and the toxics best available control technology (TBACT), which are standards to reduce TAC emissions, will be implemented. Therefore, compliance with BAAQMD permit requirements for stationary sources of TACs would ensure that the impact would not be significant. The following mitigation measure would be implemented to address this potentially significant impact.

MP MM AIR-5: Prior to issuance of any permit for installation of boilers, chillers, and/or cooling towers within the CSU Hayward Campus, Campus officials shall work with the BAAQMD to ensure that environmental review of projects that will result in new TACs (e.g., installation of boilers, chillers, and/or cooling towers, laboratories) is closely coordinated with the BAAQMD's permitting process. The analysis of TACs from these new sources shall be conducted in accordance with the *BAAQMD CEQA Guidelines* and appropriate and feasible mitigation measures shall be developed as necessary to ensure that impacts are reduced to a less-than-significant level. In the event the cancer risk exceeds 10 in one million, BAAQMD will require implementation of measures that would reduce this risk to less than significant. Mitigation measures that could be incorporated into future projects include, but are not limited to, the establishment of buffer zones, the installation of control devices on equipment, and changes to operational practices.

Significance After Mitigation: Less than significant

MP Impact AIR-6: The Proposed Project would result in a cumulatively considerable net increase of criteria pollutants for which the project region is in nonattainment under an applicable federal or state ambient air quality standard.

Level of Significance: Significant

According to the *BAAQMD CEQA Guidelines*, any project that would individually have a significant air quality impact would also have a significant cumulative air quality impact. As discussed in **MP Impact AIR-2**, emissions associated with operation of the proposed project would exceed the BAAQMD-recommended operational threshold of significance for ROG and PM_{10} even after mitigation and the impact would be significant and unavoidable. Therefore, the project would have an individually

significant air quality impact. As a result, the proposed project would result in a cumulatively considerable net increase of criteria pollutants for which the project region is in nonattainment. This impact would be significant.

MP MM AIR-6: Implement **Mitigation Measures AIR-1**, **AIR-2a**, and **AIR-2b**.

Significance after Mitigation: For reasons presented in **MP Impact AIR-2**, the emissions of criteria pollutants would still exceed the thresholds and therefore this impact would remain significant and unavoidable.

MP Impact AIR-7: **Although the Proposed Project would result in greenhouse gas emissions, its contribution to the significant cumulative impact associated with greenhouse gas emissions would not be cumulatively considerable.**

Level of Significance: Less than significant

The proposed project would generate GHG emissions, which would contribute to potential cumulative impacts of GHG emissions on the global climate. Although, at the time of this analysis, no quantitative GHG threshold exists for evaluation of a project's impact on global climate, the BAAQMD recommends quantification of operational GHG emissions.[9] Therefore, operational emissions of GHG were estimated. Construction GHG emissions were also estimated because it is anticipated that some amount of construction activity would occur on the campus almost continuously between 2009 and 2030. The GHG emissions associated with construction and operational area and mobile sources were primarily estimated using URBEMIS2007. URBEMIS2007 provides estimates of CO_2 emissions for area sources, including natural gas combustion and landscape maintenance. URBEMIS2007 also provides an estimate of CO_2 emissions from vehicle emissions associated with travel to and from the proposed project site. The emissions of CO_2, the primary greenhouse gas associated with mobile and area sources estimated using URBEMIS2007 were adjusted to convert CO_2 emissions to GHG emissions on a carbon dioxide equivalent (CO_2E) basis:

- Construction diesel trucks and equipment: The CO_2 emissions associated with off-road and on-road equipment were multiplied by a factor based on the assumption that CO_2 represents approximately 99.4 and 99.0 percent, respectively, of the CO_2E emissions. These assumptions were derived from the California Climate Action Registry (CCAR 2008) and the California Energy Commission (CEC 2002).

9 Personal communication between Greg Tholen, Senior Environmental Planner, BAAQMD and George Lu, Impact Sciences Inc.

- Motor vehicles: The annual CO_2 emissions associated with motor vehicle trips were multiplied by a factor based on the assumption that CO_2 represents 95 percent of the (CO_2E) emissions associated with passenger vehicles, which account for most of the project-related trips (US EPA 2005).

- Area sources (natural gas combustion): The CO_2 emissions from natural gas consumption for water and space heating were adjusted based on emission factors for CO_2, CH_4, and N_2O for natural gas combustion from the US EPA's *Compilation of Air Pollutant Emission Factors* (US EPA 1998) and the global warming potential for each GHG.

The project would also result in indirect GHG emissions from various offsite sources. These include emissions due to the electricity demand, water demand, wastewater generation, and solid waste generation of the proposed project. Emission factors for GHGs due to electrical demand from the project's land uses were obtained from the CCAR *General Reporting Protocol*. This emission factor takes into account the current mix of energy sources used to generate electricity in the State and the relative carbon intensities of these sources, and includes natural gas, coal, nuclear, large hydroelectric, and other renewable sources of energy. The estimated annual electrical demand at Master Plan buildout was obtained from the campus.

In addition to electrical demand, the project would also result in indirect GHG emissions due to water demand, wastewater treatment, and solid waste generation. GHG emissions from water demand are due to the electricity needed to convey, treat, and distribute potable water. GHG emissions from wastewater are due to the electricity needed to treat wastewater and the treatment process itself, which primarily releases CH_4 into the atmosphere. GHG emissions from solid waste generation are due to the decomposition of organic material, which releases CH_4 into the atmosphere. The annual electrical demand factor for water was obtained from the California Energy Commission (CEC 2006). GHG emission factors for wastewater treatment were obtained from the US EPA (US EPA 1998). While solid waste generation would result in GHG emissions, the magnitude of these emissions were not quantified due to insufficient data on solid waste generation rates. The proposed project incorporates specific solid waste measures that would result in 75 to 100 percent diversion of solid waste thereby reducing the level of associated GHG emissions. Therefore, GHG emissions from solid waste generation would tend to account for a small fraction of the total GHG emissions when compared to the other sources previously described and would not substantially affect any impact determinations.

A detailed summary of the greenhouse gas emissions associated with the proposed construction and operational sources is included in **Appendix 4.2**. **Table 4.2-16, Estimated Construction Greenhouse Gas Emissions** and **Table 4.2-17**, **Estimated Net Operational Greenhouse Gas Emissions**, shows the construction and annual greenhouse gas emissions associated with the proposed project. As discussed for the operational emissions, the Campus Master Plan identifies mitigation measure that would reduce emissions associated with energy demand and transportation. Additionally, the Campus Master Plan

incorporates specific water conservation measures that would result in 35 percent less water consumption for the entire campus at buildout. While it is not possible to quantify the full extent of the emission reduction associated with all of the mitigation measures identified in the Campus Master Plan, the same quantification methodologies used to estimate some of the operational emission reductions are used to estimate some of the GHG emission reductions, including water conservation reductions. These reductions are quantified and presented in **Table 4.2-17**. "Business as usual" emissions are also presented in **Table 4.2-17**, which represents the unmitigated GHG emissions associated with the proposed project if mitigation measures and other GHG reducing strategies are not implemented.

Table 4.2-16
Estimated Construction Greenhouse Gas Emissions

Construction Year	GHG Emissions (Metric Tons CO_2E Per Year)
2009	287.80
2010	879.40
2011	1,001.34
2012	1,005.24
2013	1,005.29
2014	1,005.34
2015	1,005.38
2016	1,005.40
2017	1,001.57
2018	1,005.44
2019	1,005.45
2020	1,009.32
2021	1,005.53
2022	1,001.68
2023	1,001.68
2024	1,009.38
2025	1,005.53
2026	1,005.59
2027	1,005.59
2028	714.05
2029	716.79
2030	354.66

*Source: Impact Sciences, Inc. Emissions calculations are provided in **Appendix 4.2**.*

Table 4.2-17
Estimated Net Operational Greenhouse Gas Emissions

Emissions Source	GHG Emissions (Metric Tons CO_2E Per Year)		Percent Reduction
	Unmitigated ("Business as usual")	Mitigated	
Area Sources	8,605	6,024	30%
Mobile Sources	23,034	11,389	51%
Electricity Demand	5,645	3,952	30%
Water Supply	790	397	50%
Wastewater Treatment	304	179	41%
Stationary Sources	14,325	14,325	0%
Maximum Annual Emissions	**52,703**	**36,266**	31%

Source: Impact Sciences, Inc. Emissions calculations are provided in ***Appendix 4.2****.*

As discussed above, to date, no quantitative emission thresholds or similar criteria have been established to evaluate the cumulative impact of a single project on global climate. In the absence of quantitative emissions thresholds, consistency with adopted programs and policies is used by many jurisdictions to evaluate the significance of cumulative impacts. The project's consistency with the implementing programs and regulations to achieve the statewide GHG emission reduction goals established under Executive Order S-3-05 and AB 32 were used to evaluate the significance of the proposed project's impact with respect to cumulative GHG emissions. Towards this end, the sustainable strategies practices included in the Campus Master Plan are evaluated relative to pertinent measures included in CARB's Proposed Scoping Plan for the state's compliance with AB 32.

Table 4.2-18, Consistency of Campus Sustainable Strategies with AB 32 Proposed Scoping Measures, lists all pertinent measures included in CARB's Proposed Scoping Plan for the state's compliance with AB 32, and presents the goals, strategies, targets, project design features, and mitigation measures in this EIR that comply with the Proposed Scoping Plan measures.

Table 4.2-18
Consistency of Campus Sustainable Strategies with AB 32 Proposed Scoping Plan Measures

Scoping Plan Measure	MP Policy/Project Feature/Mitigation Measure
SPM-1: California Cap-and-Trade Program linked to Western Climate Initiative	Not applicable
SPM-2: California Light-Duty Vehicle GHG Standards	Not applicable
SPM-3: Energy Efficiency	**Energy Goals:** Achieve a sustainable energy balance that is resilient, efficient, and leads to carbon neutrality **Energy Strategies:** 1. Existing Building Retrofits and Re-commissioning 2. Energy Load Reduction (orientation, thermal massing) 3. Passive Energy Efficiency Strategies (bio-climatic design approach) 4. Active Energy Efficiency Strategies (radiant systems, under floor air distribution) 5. Recover Energy (heat pipe, heat wheel) 6. Renewable Energy Generation (PVs, wind, fuel cell) 7. Offsetting **Energy Targets:** Achieve 30% energy savings in existing buildings Achieve 50% energy savings in new buildings **Carbon Goals:** Achieve operational carbon neutrality **Carbon Strategies:** 1. Right-size buildings 2. Reduce movement 3. Minimize energy use 4. Maximize use of renewables **Carbon Targets:** Achieve a 60% carbon emissions reduction through operational, policy and design strategies Pursue off-site regenerative and credit programs to off-set the balance of emissions **Mitigation Measure AIR-2b** to minimize operational emissions.
SPM-4: Renewables Portfolio Standard	Not applicable
SPM-5: Low Carbon Fuel Standard	Not applicable

Scoping Plan Measure	MP Policy/Project Feature/Mitigation Measure
SPM-6: Regional Transportation-Related Greenhouse Gas Targets	**Transportation Goals:** Create a campus community utilizing alternate modes of transportation and with a larger on-campus population to help achieve carbon neutrality. **Transportation Strategies:** 1. Provide highly accessible, frequent bus and shuttle transit 2. Promote transit use through incentives 3. Discourage auto use by residents and commuters **Transportation Targets:** Reduce drive alone rates for commuters from 79% to 64% and increase carpooling rates from 4% to 8% Increate transit ridership from 16% to 29% Reduce future parking supply from 0.49 per FTE to 0.37 per FTE **Land Use and Site Development Goals:** Create a robust learning community that creates many opportunities for interaction. Keep the campus compact and walkable with abundant usable open space. Develop at adequate densities to ensure long term flexibility **Land Use and Site Development Strategies:** 1. Develop academic uses within a walkable core area 2. Locate residential neighborhoods in close proximity 3. Locate parking on periphery 4. Provide generous and well furnished open spaces **Land Use and Site Development Targets:** 5,000 student resident beds Provide appropriate balance of built and open space Provide convenient access to transit stops **Mitigation Measure AIR-2a** to minimize transportation emissions
SPM-7: Vehicle Efficiency Measures	Not applicable
SPM-8: Goods Movement	Not applicable
SPM-9: Million Solar Roofs Program	**Energy Goals:** Achieve a sustainable energy balance that is resilient, efficient, and leads to carbon neutrality **Energy Strategies:** 6. Renewable Energy Generation (PVs, wind, fuel cell) **Energy Targets:** Achieve 30% energy savings in existing buildings Achieve 50% energy savings in new buildings
SPM-10: Heavy/Medium-Duty Vehicles	Not applicable
SPM-11: Industrial Emissions	Not applicable
SPM-12: High Speed Rail	Not applicable

Scoping Plan Measure	MP Policy/Project Feature/Mitigation Measure
SPM-13: Green Building Strategy	**Energy Goals:** Achieve a sustainable energy balance that is resilient, efficient, and leads to carbon neutrality. **Energy Strategies:** 1. Existing Building Retrofits and Re-commissioning 2. Energy Load Reduction (orientation, thermal massing) 3. Passive Energy Efficiency Strategies (bio-climatic design approach) 4. Active Energy Efficiency Strategies (radiant systems, under floor air distribution) 5. Recover Energy (heat pipe, heat wheel) 6. Renewable Energy Generation (PVs, wind, fuel cell) 7. Offsetting **Energy Targets:** Achieve 30% energy savings in existing buildings Achieve 50% energy savings in new buildings **Carbon Goals:** Achieve operational carbon neutrality **Carbon Strategies:** 1. Right-size buildings 2. Reduce movement 3. Minimize energy use 4. Maximize use of renewables **Carbon Targets:** Achieve a 60% carbon emissions reduction through operational, policy and design strategies Pursue off-site regenerative and credit programs to off-set the balance of emissions **Mitigation Measure AIR-2b** to minimize operational emissions.
SPM-14: High GWP Gases	Not applicable
SPM-15: Recycling and Waste	**Solid Waste Goals:** Develop a campus that leads the regional and global efforts for closed material loops, landfill diversion and self-sustenance. **Solid Waste Strategies:** 1. Minimize Waste Generation 2. Maximize Recycling 3. Reuse Buildings and Demolition Materials 4. Compost Green Waste on Campus 5. Engage Students, Faculty, Staff and Visitors **Solid Waste Targets:** Achieve 75% - 100% solid waste diversion from landfills by 2030 Compost 100% of campus organic waste on-site
SPM-16: Sustainable Forests	Not applicable.

Scoping Plan Measure	MP Policy/Project Feature/Mitigation Measure
SPM-17: Water	**Water Goals:** Reduce future potable water needs to a level lower than existing use. **Water Strategies:** 1. Water Efficiency (Exterior) 2. Water Efficiency (Interior) 3. Alternate Water Sources (Low Energy) 4. Alternate Water Sources (High Energy) **Water Targets:** Reduce water by 35% without recycled water supply, or 60% with recycled water supply by full build out of campus **Landscape Goals:** Create and beautiful and sustainable campus setting to enhance the life of the University **Landscape Strategies:** 1. Understand soil and plant conditions 2. Create plant palettes with an emphasis on native species and those suited to the local climate
SPM-18: Agriculture	Not applicable

Source: Impact Sciences, Inc., (2008).

As indicated in **Table 4.2-18,** the proposed project is consistent with the implementing programs and regulations to achieve the statewide GHG emission reduction goals established under Executive Order S-3-05 and AB 32.

Additionally, the proposed project would result in fewer traffic trips with implementation of the elements of the Access, Circulation and Parking Framework of the Campus Master Plan (**MP Mitigation Measure AIR-2a**) and incorporate strategies to reduce energy demand and associated area source air emissions (**MP Mitigation Measure AIR-2b**). The reduction in mobile and area source emissions would have a corresponding reduction in greenhouse gas emissions, which is consistent with the overall goals of AB 32 and Executive Order S-3-05. As shown in **Table 4.2-17**, with the implementation of various programs that would encourage sustainable development on the campus, the total GHG emissions would be more than 30 percent lower than business as usual. Accordingly, the project will lessen the potential contribution to the cumulative impact of GHG emissions, and the impact would not be cumulatively considerable. The impact on global climate would be less than significant.

Mitigation Measure: No mitigation is required.

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