Table of Contents

Tables

Figures

None

11 Greenhouse Gases and Climate Change

This chapter provides an overview of the environmental setting for greenhouse gases (GHGs) and climate change, based on Appendix C. The American Meteorological Society refers to climate change as any systematic change in the long-term statistics of climate elements (such as temperature, pressure, or winds) sustained over several decades or longer. The Society also indicates that climate change may be due to natural external forcings, such as changes in solar emission or slow changes in the Earth's orbital elements; natural internal processes of the climate system; or anthropogenic forcing (AMS 2015). The climate system can be influenced by changes in the concentration of various GHGs in the atmosphere that affect the Earth's absorption of radiation. This chapter concludes with an evaluation of the Proposed Program's contribution to GHG emissions.

11.1 Environmental Setting

11.1.1 Global Climate Change

Climate change refers to any measurable alteration of climate lasting for an extended period of time – several decades or longer – and includes recordable changes in temperature, precipitation, or wind patterns. The average temperature of the Earth has increased about 0.7 to 1.5°F (0.4 to 0.8°C) over the past century, and is projected to rise another 2 to 11.5°F (1.1 to 6.4°C) over the next 100 years (IPCC 2001; USEPA 2012d). Seemingly, small changes in the average temperature of the planet can translate to large and potentially hazardous shifts in climate and weather. Climate change is suspected as the cause of changes in rainfall amounts and distribution that can result in flooding, droughts, or more frequent and severe heat waves. Also, oceans are warming and becoming more acidic, polar ice caps are melting, glaciers are receding, and sea levels are rising due to thermal expansion and ice loss. Long-term studies indicate that ocean surface temperatures have been rising at an average rate of 0.13°F (0.07°C) per decade and since 1901, average sea level has increased by about 8 inches (20 centimeters) during the same period, and average pH has decreased (acidified) by about 0.05 pH units since the mid-1980s. Late summer Arctic Ocean sea ice coverage has decreased by half since 1979, and glaciers have receded and lost significant mass since the 1970s (USEPA 2012d). As climate change progresses in the coming decades, it will likely present challenges to society and the environment.

11.1.1.1 Local Climate

The Program Area climate is characterized by moderately wet winters and dry summers. For the region including the Alameda County Mosquito Abatement District (ACMAD; the District) about 90 percent of the annual total rainfall is received in the November through April period. Between June and September, normal rainfall is typically less than 0.6 inch (1.5 centimeters). Temperatures in the Program Area average about 60°F (15°C) annually, with average summer highs in the 70 to 80°F (21 to 27°C) range and average winter lows in the 40 to 50°F (4 to 10°C) range. Precipitation averages about 23 inches (58 centimeters) per year, although annual precipitation can vary significantly from year to year. Annual average wind speeds in the Program Area are about 8 miles per hour (3.6 meters per second). The predominant direction of air pollution transport in the Program Area is inland from the coastal areas (BAAQMD 2010a; World Climate 2012; NOAA 2008).

11.1.2 The Greenhouse Effect

Over the past century, human activities have released large amounts of carbon dioxide (CO_2) and other GHGs into the atmosphere. The majority of GHGs are the by-product of burning fossil fuels to release energy in the form of heat, although deforestation, industrial processes, and some agricultural practices also emit GHGs into the atmosphere. GHGs trap solar energy in the atmosphere and cause it to warm.

This phenomenon is called the greenhouse effect and is necessary to support life on Earth; however, excessive buildup of GHGs can change Earth's climate and result in undesirable effects on ecosystems, which affect human health and welfare (USEPA 2012d).

In its *Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990–2013* (USEPA 2014e), the USEPA provides summary information on the work of the United Nations Framework Convention on Climate Change (UNFCCC 2009) and the Intergovernmental Panel on Climate Change (IPCC 1990-2013); key information from that report is summarized below – more details may be found in the cited source documents.

The UNFCCC defines climate change as "a change of climate which is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and which is in addition to natural climate variability observed over comparable time periods" (UNFCCC 2009). In its *Second Assessment Report* of the science of climate change, the IPCC concluded "human activities are changing the atmospheric concentrations and distributions of greenhouse gases and aerosols" (IPCC 1995). These changes can produce a radiative forcing by changing either the reflection or absorption of solar radiation, or the emission and absorption of terrestrial radiation." Building on this conclusion, the IPCC *Third Assessment Report* (IPCC 2001) asserted "concentrations of atmospheric greenhouse gases and their radiative forcing have continued to increase as a result of human activities."

The IPCC reports the global average surface temperature of the Earth has increased by 1.1 ± 0.4°F (0.6 ± 0.2°C) over the 20th century. This value is about 0.27°F (0.15°C) larger than that estimated by the Second Assessment Report, which reported for the period up to 1994, "owing to the relatively high temperatures of the additional years (1995 to 2000) and improved methods of processing the data."

While the *Second Assessment Report* (1995) concluded, "the balance of evidence suggests there is a discernible human influence on global climate," the *Third Assessment Report* (2001) more directly connects the influence of human activities on climate. IPCC concluded, "In light of new evidence and taking into account the remaining uncertainties, most of the observed warming over the last 50 years is likely to have been due to the increase in greenhouse gas concentrations."

In its *Fourth Assessment Report* (2007), IPCC stated warming of Earth's climate is unequivocal, and that warming is very likely attributable to increases in atmospheric GHGs caused by human activities (IPCC 2007). IPCC further stated changes in many physical and biological systems, such as increases in global temperatures, more frequent heat waves, rising sea levels, coastal flooding, loss of wildlife habitat, spread of infectious disease, and other potential environmental impacts, are linked to changes in the climate system, and some changes might be irreversible.

In its most recently released *Fifth Assessment Report* (2013), the IPCC reinforced evidence for the warming of the climate system since the 1950s based on observed changes over decades to millennia. The atmosphere and ocean have warmed, the amounts of snow and ice have diminished, sea level has risen, and the concentrations of GHGs have increased. Each of the last 3 decades has been successively warmer at the Earth's surface than any preceding decade since 1850. In the Northern Hemisphere, 1983 to 2012 was likely the warmest 30-year period of the last 1,400 years. IPCC reports (IPCC 2013):

> The atmospheric concentrations of CO_2, methane (CH_4), and nitrous oxide (N_2O) have all increased since 1750 due to human activity. In 2011, average concentrations of CO_2, CH_4, and N_2O were 390, 1.8, and 0.3 part per million by volume (ppmv), respectively, which are higher than pre-industrial levels by about 40, 150, and 20 percent, respectively.

> The globally averaged combined land and ocean surface temperature data, as calculated by a linear trend, showed an average warming of 1.5°F (0.85°C) over the period 1880 to 2012. The average total increase between the 1850 to 1900 period and the 2003 to 2012 period was 1.4°F (0.78°C).

> Ocean warming dominates the increase in energy stored in the climate system, accounting for more than 90 percent of the energy accumulated between 1971 and 2010. The rate of sea-level rise since

the mid-19th century has been larger than the mean rate during the previous 2 millennia. Over the period 1901 to 2010, global mean sea level rose by 0.19 meter (0.62 foot).

Over the last 2 decades, the Greenland and Antarctic ice sheets have been losing mass, glaciers have continued to shrink almost worldwide, and Arctic sea ice and Northern Hemisphere spring snow cover have continued to decrease in extent.

The mobile sources used in mosquito control activities emit GHGs and, therefore, contribute incrementally to climate change; however, as described in Section 11.2.2, these emissions comprise a very small fraction of the Bay Area, California, and national GHG inventories. This fact precludes any meaningful analysis of quantitative effects that mosquito control operations may specifically have on climate, although taken together with regional, national, and worldwide GHG emissions, global effects are as described above.

11.1.3 Greenhouse Gases and Their Emissions

11.1.3.1 The Atmosphere

Air is a mixture of constituent gases and its composition varies slightly with location and altitude. For 20th century scientific and engineering purposes, it became necessary to define a standard composition known as the US Standard Atmosphere. In addition to the common gases (nitrogen, oxygen, CO_2, methane [CH_4], hydrogen, nitrous oxide [N_2O]), the atmosphere contains noble or inert gases (argon, neon, helium, krypton, xenon). Radon is also present in low concentrations near ground level in limited geographic areas where it is naturally emitted from certain types of rock and soil. Table 11-1 shows the typical composition of dry standard air, which is over 99 percent nitrogen and oxygen (UIG 2008; USEPA 2014e). The apparent molecular weight of dry standard air is 28.966 grams per mole (Jennings 1970; du Pont 1971).

Table 11-1 Standard Composition of Dry Air

Principal Gas	Chemical Symbol	Gas MW g/mole	Concentration ppmv	Fraction Percent	Fraction MW g/mole
Nitrogen	N_2	28.014	780,805.00	78.080500	21.873471
Oxygen	O_2	31.998	209,440.00	20.944000	6.701661
Argon	Ar	39.948	9,340.00	0.934000	0.373114
Carbon Dioxide	CO_2	44.009	387.69	0.038769	0.017062
Neon	Ne	20.183	18.21	0.001821	0.000368
Helium	He	4.003	5.24	0.000524	0.000021
Methane	CH_4	16.043	1.81	0.000181	0.000029
Krypton	Kr	83.800	1.14	0.000114	0.000096
Hydrogen	H_2	2.016	0.50	0.000050	0.000001
Nitrous Oxide	N_2O	44.013	0.32	0.000032	0.000014
Xenon	Xe	31.300	0.09	0.000009	0.000003
Totals			**1,000,000.00**	**100.000**	**28.966**

Sources: UIG 2008 ; USEPA 2014e ; du Pont 1971 ; Jennings 1970

Notes:

MW = molecular weight, g/mole

ppmv = parts per million by volume (10^{-6})

The atmosphere consists of five basic altitude zones: troposphere (sea level to 8 miles), stratosphere (8 to 32 miles), mesosphere (32 to 50 miles), thermosphere (50 to 350 miles), and exosphere (350 to 500 miles). Within the stratosphere is the ozone layer (9 to 22 miles), which absorbs ultraviolet wavelengths; and within the mesosphere is the ionosphere (62 to 190 miles), which reflects shortwave radio signals and produces auroras. These approximate altitude ranges vary with latitude, season, solar activity, and turbulence. GHGs persist mainly in the troposphere and stratosphere – some in the mesosphere – for different lengths of time, ranging from less than 5 years to over 50,000 years, long enough to become well-mixed, meaning that atmospheric concentrations are about the same all over the world, regardless of source locations (USEPA 2012e). Thus, the homogeneous composition of the lower atmosphere is the global setting for climate change.

11.1.3.2 Greenhouse Gases

Gases that trap heat in the atmosphere are called GHGs. Principal GHGs include CO_2, CH_4, N_2O, hydrofluorocarbons, perfluorocarbons, sulfur hexafluoride (SF_6), and other fluorinated gases including nitrogen trifluoride and hydrofluorinated ethers. GHGs occur naturally because of volcanoes, forest fires, and biological processes such as enteric fermentation and aerobic decomposition. They are also produced by combustion of fuels, industrial processes, agricultural operations, waste management, and land use changes such as loss of farmland to urbanization. The most common GHG from human activity (fuel combustion) is CO_2, followed by CH_4 and N_2O (USEPA 2012e).

Concentration, or abundance, is the amount of a particular gas in the air. Larger GHG emissions lead to higher concentrations in the atmosphere. GHG concentrations are measured in units of parts per million (ppm), parts per billion (ppb), and parts per trillion (ppt). One ppm is equivalent to 1 cubic centimeter (cc) of pure gas diluted in 1 cubic meter of air. Similarly, 1 ppb is 1 cc diluted in 1,000 cubic meters, and 1 ppt is 1 cc diluted in 1,000,000 cubic meters (USEPA 2012e).

11.1.3.2.1 Carbon Dioxide

CO_2 enters the atmosphere through burning fossil fuels (coal, natural gas, and petroleum products), decomposition of solid waste, trees and wood products, fermentation, and also as a result of certain chemical reactions, such as manufacture of cement. CO_2 is removed from the atmosphere (or "sequestered") when it is absorbed by plants as part of the biologic carbon cycle. In the carbon cycle, carbon in various molecular forms is cycled among atmospheric, oceanic, land biotic, marine biotic, and mineral reservoirs. Atmospheric CO_2 is part of this global carbon cycle. CO_2 concentrations in the atmosphere have increased from about 280 ppm in preindustrial times to about 390 ppm today, a 39 percent increase. The IPCC notes that “this concentration has not been exceeded during the past 420,000 years, and likely not during the past 20 million years. The rate of increase over the past century is unprecedented, at least during the past 20,000 years.” The IPCC definitively states that “the present atmospheric CO_2 increase is caused by anthropogenic emissions of CO_2” (USEPA 2012e; IPCC 2007).

Global Warming Potential (GWP) is a quantified measure of the globally averaged relative radiative forcing impacts of a particular GHG. It is defined as the cumulative radiative forcing both direct and indirect effects integrated over a period of time from the emission of a unit mass of gas relative to a reference gas. CO_2 is the reference gas with a GWP of unity (1). Carbon dioxide equivalents (CO_2e) are calculated by summing the products of mass GHG emissions by species times their respective USEPA official GWP coefficients. The persistence of CO_2 in the atmosphere is estimated to be in the range of 50 to 200 years, depending on variations in the carbon cycle (USEPA 2012e, 2014e).

11.1.3.2.2 Methane

CH_4 is primarily produced through anaerobic decomposition of organic matter in biological systems. Agricultural processes such as wetland rice cultivation, enteric fermentation in ruminant animals (e.g., cows), and the decomposition of animal wastes emit CH_4, as does the decomposition of municipal solid

wastes. CH_4 is also fugitively emitted during the production and distribution of natural gas and petroleum, and is released as a by-product of coal mining and incomplete fossil fuel combustion. Pipeline-quality natural gas is over 90 percent CH_4 by volume and is considered a "clean fuel" by industry with CO_2 and water vapor as its main combustion by-products. Atmospheric concentrations of CH_4 have increased by about 160 percent since preindustrial times, although the rate of increase has been declining. The IPCC has estimated that slightly more than half of the current CH_4 flux to the atmosphere is anthropogenic, from human activities such as agriculture, fossil fuel use, and waste disposal. The USEPA's official GWP coefficient of CH_4 is 21, and its persistence in the atmosphere is estimated to be about 9 to 15 years (USEPA 2012e, 2014e).

11.1.3.2.3 Nitrous Oxide

N_2O is emitted during agricultural and industrial activities, as well as during combustion of fossil fuels and solid waste. Anthropogenic sources of N_2O emissions include agricultural soils, especially the use of synthetic and manure fertilizers; fossil fuel combustion, especially from mobile combustion; adipic (nylon) and nitric acid production; wastewater treatment and waste combustion; and biomass burning. The atmospheric concentration of N_2O has increased by about 19 percent since 1750, from a preindustrial value of about 270 to about 320 ppb today, a concentration that has not been exceeded during the last thousand years. The USEPA's official GWP coefficient of N_2O is 310, and its persistence in the atmosphere is estimated to be about 110 to 120 years (USEPA 2012e, 2014e).

11.1.3.2.4 Fluorinated Gases

Hydrofluorocarbons, perfluorocarbons, and SF_6 are synthetic, powerful GHGs that are emitted from a variety of industrial processes. Fluorinated gases are sometimes used as substitutes for ozone-depleting substances (e.g., chlorofluorocarbons, hydrochlorofluorocarbons, and halons). In the electric utility industry, SF_6 is used as a dielectric gas in high-voltage equipment, such as switchgear and circuit breakers. As man-made gas, SF_6 in the atmosphere has increased from 0 to about 7 ppt in modern times. Due to their expense, all of these fluorinated gases are typically emitted (lost) in small quantities relative to combustion by-products, but because they are potent GHGs, they are sometimes referred to as "High GWP gases" with estimated persistence in the atmosphere ranging from 1.5 to 50,000 years. Of these, SF_6 is the most potent, with an USEPA official GWP of 23,900 and an estimated persistence of about 3,200 years (USEPA 2012e, 2014e).

11.1.3.3 Emission Sources

The USEPA tracks GHG emissions in the US and publishes the *Inventory of U.S. Greenhouse Gas Emissions and Sinks*, which is updated annually (USEPA 2014e). This detailed report contains estimates of the total national GHG emissions and removals associated with human activities in all 50 states. From the current report, the main sources of GHG emissions in the US are identified below (USEPA 2012e):

> Electric power generation

> Transportation

> Industry

> Commercial and residential

> Agriculture

Land Use and Forestry offsets (absorbs or sequesters) about 15 percent of GHG emissions nationwide. Land areas can act as GHG sinks (absorbing CO_2 from the atmosphere) or GHG sources. Since 1990, well-managed forests and other lands have absorbed more CO_2 from the atmosphere than they emit.

11.1.3.4 Mobile Sources

While stationary sources such as power plants and oil refineries emit large quantities of GHGs, mobile sources, due to their sheer numbers nationwide, also emit significant amounts. Mobile sources include onroad vehicles (e.g., automobiles, trucks, motorcycles), offroad equipment (e.g., earthmovers, cranes, portable pumps, ATVs, and generators), trains (e.g., freight, passenger, light rail), vessels (e.g., boats, ships, watercraft), and aircraft (e.g., general aviation, commercial, military). Mobile source fuels include gasoline, diesel, heavy fuel oil (large marine vessels), and jet fuel, all of which emit GHGs when combusted.

Mobile sources used in mosquito control activities include onroad fleet vehicles (light- and medium-duty trucks, vans, passenger cars), offroad ATVs, aircraft (helicopters and fixed-wing), portable equipment (pumps, sprayers, generators), and small equipment (handheld sprayers, foggers). Except for 2-stroke engines used in small lightweight equipment (spark ignition, 50:1 gas/oil mix), engines are 4-stroke gasoline (spark ignition). The dominant fuel used for these mobile sources is motor gasoline and jet fuel (turbine-powered helicopters). Light trucks, vans, and passenger cars are normally used for responding to public service requests and disease surveillance. Typical GHG contents of common fuels are presented in Table 11-2.

Table 11-2 Typical GHG Contents of Common Fuels

Fuel	CO_2 kg/mmBTU	CH_4 kg/mmBTU	N_2O kg/mmBTU	CO_2e lb/mmBTU	Energy BTU/gal	CO_2e lb/gal
Diesel Fuel No. 2	73.96	0.0105	0.0006	163.97	138,300	22.68
Kerosene	73.19	0.0105	0.0006	162.27	138,700	22.51
Jet Fuel	72.23	0.0105	0.0006	160.17	135,000	21.62
Motor Gasoline	71.35	0.0105	0.0006	158.23	122,600	19.40
Aviation Gasoline	69.15	0.0105	0.0006	153.38	120,200	18.44
Propane	62.22	0.0053	0.0001	137.49	91,300	12.55
Pipeline Natural Gas	53.02	0.0053	0.0001	117.20	—	—

Sources: USEPA 2014e, 2011a

Notes:

kg/mmBTU = kilogram(s) per million British Thermal Units

lb/mmBTU = pound(s) per million British Thermal Units

BTU = the amount of energy (heat) required to raise 1 pound of liquid water 1 degree Fahrenheit from 39 to 40°F

11.1.3.5 Sensitive Receptors

Certain population groups are considered more sensitive to air pollution and odors than others; in particular, children, elderly, and acutely ill and chronically ill persons, especially those with cardiorespiratory diseases such as asthma and bronchitis. Sensitive receptors (land uses) indicate locations where such individuals are typically found, namely schools, daycare centers, hospitals, convalescent homes, residences of sensitive persons, and parks with active recreational uses, such as youth sports.

None of the GHGs described in Section 11.2.2 are considered toxic; however, all are classified as asphyxiants. Thus, in high enough concentrations in confined spaces they can displace the oxygen in air and present hazards to industrial workers, however, GHG concentrations in ambient air (see Table 11-1) are far below any danger levels. Therefore, no risk to sensitive receptors or the general public is posed by GHGs emitted to outdoor air, either from stationary or mobile sources.

11.1.4 California Climate Impacts

Climate change is already affecting California. Average temperatures have increased, leading to more extreme hot days and fewer cold nights. Shifts in the water cycle have been observed, with less winter precipitation falling as snow, and both snowmelt and rainwater running off earlier in the year. Sea levels have risen. Wildland fires are becoming more frequent and intense due to dry seasons that start earlier and end later. These climate-driven changes affect resources critical to the health and prosperity of California (CEC 2010).

If the state takes no action to reduce or minimize expected impacts from future climate change, the costs could be severe. In November 2008, the Governor directed the California Natural Resources Agency to develop a climate adaptation strategy for California. The Natural Resources Agency coordinated with ten state agencies, multiple scientists, a consulting team, and stakeholders to develop the first statewide, multisector adaptation strategy in the country. The resulting report, *2009 California Climate Adaptation Strategy*, summarizes the best-known science to assess the vulnerability of the state to climate change impacts, and outlines possible solutions that can be implemented within and across state agencies to promote resiliency. This strategy is the first step in an evolving process to reduce California's vulnerability to climate change impacts (CEC 2010).

11.1.4.1 State Policies

The Global Warming Solutions Act of 2006 (Assembly Bill [AB] 32) (see Appendix C) required CARB to prepare a Scoping Plan to achieve substantial GHG emissions reductions, both from within the state and from "exported" emissions, such as importing electric power generated at coal-fired power plants located in neighboring western states. The 2008 Scoping Plan outlines a wide range of strategies for reducing statewide GHG emissions to 1990 levels by 2020. This goal will be achieved by cutting about 30 percent from business-as-usual emission levels projected for 2020, or about 15 percent from 2008 levels. Allowing for population growth, the goal is to reduce annual per capita emissions from 14 metric tonnes (MT) CO_2e down to about 10 MT CO_2e per capita by 2020 (CARB 2008b).

11.1.5 Emissions Inventories

The bulk of mosquito control activity emissions would occur in the Alameda County Mosquito Abatement District Service Area (i.e., Alameda County), and minor amounts would occur in Contra Costa County, San Joaquin County, Stanislaus County, and Santa Clara County. Therefore, the comprehensive 2007 Bay Area GHG inventory is used as the regional benchmark for comparison purposes.

Table 11-3 shows aggregated national, state, and regional GHG emissions for all sources on a gross basis (i.e., CO_2e emissions only, not including CO_2 sinks such as forestry and agriculture) bracketing the 2007 BAAQMD GHG inventory by 2 years (i.e., from 2005 through 2009). As shown, California accounts for about 7 percent of gross CO_2e emissions in the US annually, and the Bay Area accounts for about 20 percent of gross CO_2e emissions in California.

Table 11-3 Greenhouse Gas Emissions Inventories - Gross Basis

Summary Year	National MMT CO_2e	California MMT CO_2e	Bay Area MMT CO_2e
2005	7,204	482.5	—
2006	7,159	481.9	—
2007	7,253	488.8	95.8
2008	7,048	484.7	—
2009	6,608	456.8	—
5-Year Average	**7,054**	**478.9**	—
Average Annual Variation	**2.6%**	**1.8%**	—

Sources: USEPA 2014e; CARB 2011; BAAQMD 2010c

Notes:

MMT = million metric tonnes (annual)

1 metric tonne = 1,000 kilograms or 2,204.6 pounds

2009 is most recent CARB published data; Bay Area for 2007 only

The bulk of the District's GHG emissions would occur in the San Francisco Bay Area. Tables 11-4, 11-5, 11-6, and 11-7 present progressively focused Bay Area GHG emissions inventory data for 2007 broken down by sectors, counties, and applicable subsectors. The District's Program Area counties within the BAAQMD are shown in bold. This information will be used as a basis for comparisons with estimated mosquito control activity emissions for the District presented in Section 11.2.2.

Table 11-4 Bay Area GHG Emissions by Sector

End-Use Sector	Air District Emissions Percent	Air District Emissions MMT CO_2e
Industrial / Commercial	36.4%	34.9
Residential Fuel Use	7.1%	6.8
Local Electric Power Generation	8.5%	8.1
Imported Electric Power Generation	7.4%	7.1
Offroad Equipment	3.0%	2.9
Transportation	36.4%	34.9
Agriculture / Farming	1.2%	1.1
Totals	**100.0%**	**95.8**

Source: BAAQMD 2010c

Notes:

MMT = million metric tonnes (annual)

1 metric tonne = 1,000 kilograms or 2,204.6 pounds

Table 11-5 Bay Area GHG Emissions by County

County	District Emissions Percent	District Emissions MMT CO_2e
Alameda	**16.4%**	**15.7**
Contra Costa (within BAAQMD)	**32.9%**	**31.5**
Marin	2.8%	2.7
Napa	1.8%	1.7
San Francisco	7.4%	7.1
San Mateo	8.9%	8.5
Santa Clara (within BAAQMD)	**19.6%**	**18.8**
Solano (within BAAQMD)	5.9%	5.7
Sonoma (within BAAQMD)	4.3%	4.1
Totals	**100.0%**	**95.8**

Source: BAAQMD 2010c Counties that fall within the ACMAD Program Area are shown in bold

Notes:

MMT = million metric tonnes (annual)

1 metric tonne = 1,000 kilograms or 2,204.6 pounds

Table 11-6 Mobile Sectors GHG Emissions by County

County	Offroad MT CO_2e	Transportation MT CO_2e
Alameda	**569,000**	**8,351,000**
Contra Costa (within BAAQMD)	**406,000**	**4,998,000**
Marin	99,000	1,286,000
Napa	50,000	917,000
San Francisco	415,000	2,673,000
San Mateo	270,000	4,850,000
Santa Clara (within BAAQMD)	**790,000**	**7,859,000**
Solano (within BAAQMD)	147,000	1,834,000
Sonoma (within BAAQMD)	175,000	2,103,000
Totals	**2,921,000**	**34,871,000**

Source: BAAQMD 2010c Counties that fall within the ACMAD Program Area are shown in bold

Notes:

MMT = million metric tonnes (annual)

1 metric tonne = 1,000 kilograms or 2,204.6 pounds

Values rounded to nearest 1,000 tonnes

"Offroad" is offroad equipment category

Table 11-7 Offroad Subsectors GHG Emissions by County

County	Utility MT CO_2e	Commercial MT CO_2e	Combined MT CO_2e
Alameda	**29,800**	**49,900**	**79,700**
Contra Costa (within BAAQMD)	**20,300**	**26,900**	**47,200**
Marin	7,900	12,300	20,200
Napa	2,900	4,300	7,200
San Francisco	14,200	43,900	58,100
San Mateo	14,200	27,200	41,400
Santa Clara (within BAAQMD)	**32,900**	**56,500**	**89,400**
Solano (within BAAQMD)	3,900	6,800	10,700
Sonoma (within BAAQMD)	7,800	13,500	21,300
Totals	**133,900**	**241,300**	**375,200**

Source: BAAQMD 2010c Counties that fall within the ACMAD Program Area are shown in bold

Notes:

MMT = million metric tonnes (annual)

1 metric tonne = 1,000 kilograms or 2,204.6 pounds

Values rounded to nearest 100 tonnes

"Utility" is small landscaping equipment selected for comparisons to Districts' activities

"Commercial" is light commercial equipment selected for comparisons to Districts' activities

11.1.6 Potential for Mitigation

With respect to mosquito control activities, BMPs include fuel conservation, which minimizes GHG emissions by the Program, as described in Section 11.2.11.

11.1.7 Regulatory Setting

Currently, no local, state, or federal regulatory standards directly apply to GHG emissions from temporary or intermittent mobile sources such as mosquito control activities. However, in the context of the Scoping Plan discussed in Section 11.1.4.1, implementation of Low Carbon Fuel Standard (Executive Order S-1-7, below) would indirectly apply to mosquito control activities via fuel usage. Principal federal, state, and local GHG statutes, regulations, and programs that affect other types of sources are presented in Appendix C with the CEQA guidelines summarized below:

11.1.7.1 Federal

11.1.7.1.1 40 CFR Part 98 – Greenhouse Gas Reporting

On October 30, 2009, the USEPA issued the Mandatory Reporting of Greenhouse Gases rule (74 FR 56260, 40 CFR 98, effective December 29, 2009), which requires reporting of GHG data and other relevant information from large sources and suppliers in the United States pursuant to Fiscal Year 2008 Consolidated Appropriations Act (HR 2764; Public Law 110-161).

The new rule facilitates collection of accurate and comprehensive emissions data to provide a basis for future USEPA policy decisions and regulatory initiatives. The rule requires specified industrial source categories and facilities with an aggregated heat input of 30 mm BTU or more per hour or that emit 25,000 metric tons or more per year of GHGs to submit annual reports to the USEPA. The gases covered by the rule are CO_2, CH_4, N_2O, and hydro-fluorocarbons, perfluorocarbons, SF_6, and other fluorinated gases

including nitrogen tri-fluoride and hydro-fluorinated ethers. Since the Programs do not meet the definition of an affected stationary source (i.e., mobile sources only); the GHG reporting rule does not apply.

Notwithstanding the GHG reporting rule, no federal regulations currently limit or curtail GHG emissions of CO_2 and CH_4, and USEPA cap-and-trade programs currently apply only to acid rain precursors SO_2 and NO_X (USEPA 2014d). However, emissions of N_2O are regulated, albeit indirectly, through limitation of NO_X emissions as a criteria pollutant under New Source Performance Standards and federal, state, and local operating permits.

11.1.7.1.2 General Conformity

A General Conformity determination is required for federally sponsored, permitted, or funded actions in NAAQS) nonattainment areas or in certain maintenance areas when the total direct and indirect net emissions of nonattainment pollutants (or their precursors) exceed specified thresholds (CAA Amendments of 1990 Section 176[c]). This regulation ensures that federal actions conform to SIPs and agency NAAQS attainment plans. Since GHGs are not regulated criteria air pollutants and the Programs are not federally sponsored, permitted, or funded actions, General Conformity does not apply.

11.1.7.2 State

11.1.7.2.1 Global Warming Solutions Act

The Global Warming Solutions Act of 2006 (AB 32) codifies California's goal of reducing statewide GHG emissions to 1990 levels by 2020. This reduction will be accomplished through an enforceable statewide cap on global warming emissions that will be phased in starting in 2012 to achieve maximum technologically feasible and cost-effective GHG emission reductions. To effectively implement the cap, AB 32 directs CARB to develop appropriate regulations and establish a mandatory reporting system to track and monitor global warming emissions levels.

On September 25, 2009, CARB adopted the AB 32 Cost of Implementation Fee Regulation (Health and Safety Code 38597). The regulation was approved by the Office of Administrative Law on June 17, 2010, and became effective on July 19, 2010. For the 1st year of the fee program, CARB will administratively provide compliance flexibility and will not enforce reporting and fee requirements until after the passage of the state budget for fiscal year 2010-11. Until the budget is enacted and CARB provides detailed compliance criteria, facilities subject to the regulation do not need to pay fees or report information required by the regulation. However, since the Programs are not affected stationary sources, the AB 32 fee regulation does not apply.

11.1.7.2.2 Cap and Trade

CARB's new "Cap and Trade" regulation (Subchapter 10, Article 5, Sections 95800 to 96023, Title 17, CCRR) is a set of rules (effective September 1, 2012) that establishes a limit on GHG emissions from the largest GHG sources in the state. The purpose of *California Cap on Greenhouse Gas Emissions and Market-Based Compliance Mechanisms* is to reduce emissions of GHGs from affected stationary sources through the establishment, administration, and enforcement of an aggregate GHG allowance budget and to provide a trading mechanism for compliance instruments (i.e., "GHG allowances" or "carbon credits"). Since the Programs are not affected stationary sources under the rule, Cap and Trade does not apply. No other statewide quantitative standards of significance for GHG impacts have been established for non-affected sources under CEQA.

11.1.7.2.3 Assembly Bill 939

California AB 939, known as the Integrated Waste Management Act of 1989, was enacted due to increasing waste stream volumes and decreasing landfill capacities in the state. As a result of AB 939, the California Integrated Waste Management Board was created. A disposal reporting system with its oversight was

established, and facility and program planning was required. AB 939 mandated that sanitation districts (jurisdictions) meet diversion goals of 25 percent by 1995 and 50 percent by 2000, primarily through recyclables collection and green waste compositing. AB 939 also established an integrated framework for program implementation, solid waste planning, and solid waste facility and landfill compliance.

11.1.7.2.4 Senate Bill 1368

California Senate Bill (SB) 1368 adds sections 8340 and 8341 to the Public Utilities Code (effective January 1, 2007) with the intent "to prevent long-term investments in power plants with GHG emissions in excess of those produced by a combined-cycle natural gas power plant" with the aim of "reducing emissions of GHGs from the state's electricity consumption, not just the state's electricity production." SB 1368 provides a mechanism for reducing the GHG emissions of electricity providers, both in-state and out-of-state, thereby assisting CARB in meeting its mandate under AB 32, the Global Warming Solutions Act of 2006.

11.1.7.2.5 Senate Bill 97

California SB 97 directs the Office of Planning and Research to prepare, develop, and transmit to the Resources Agency CEQA guidelines for the feasible mitigation of GHG emissions or their effects by July 1, 2009. The Resources Agency is required to certify or adopt those guidelines by January 1, 2010. SB 97 also protects, for a short time, certain projects funded by the Highway Safety, Traffic Reduction, Air Quality and Port Security Bond Act of 2006 or the Disaster Preparedness and Flood Protection Bond Act of 2006 (Proposition 1B or 1E) from claims of inadequate analysis of GHGs as a legitimate cause of action. This latter provision was repealed on January 1, 2010.

11.1.7.2.6 Senate Bill 375

California SB 375 aims to reduce GHG emissions by curbing sprawl, because the largest sources of GHG emissions in California are passenger vehicles and light trucks. SB 375 provides emission reduction goals for which regions can plan, integrates disjointed planning activities, and provides incentives for local governments and developers to follow new conscientiously planned growth patterns. SB 375 enhances CARB's ability to reach AB 32 goals by requiring metropolitan planning organizations to include defined sustainable community strategies in their regional transportation plans for the purpose of reducing GHG emissions, aligns planning for transportation and housing, and creates specified incentives for the implementation of the strategies.

11.1.7.2.7 Senate Bills 1078 and 10

California SB 1078 was signed into legislation in 2002 and required California load serving entities (electric utilities) to procure 20 percent of their retail customer load with renewable energy by the year 2017. Four years later (2006), SB 10 accelerated the 20 percent renewable deadline to 2010.

11.1.7.2.8 Executive Order S-20-04

On July 27, 2004, Executive Order S-20-04 was issued committing the state to aggressive action to reduce state-owned building electricity usage by retrofitting, building, and operating the most energy and resource efficient buildings by taking all cost-effective measures described in the Green Building Action Plan with the goal of reducing grid-based energy purchases by 20 percent by 2015. This order also directed the California Public Utilities Commission to support a campaign to improve commercial building energy efficiency to help achieve the 20 percent goal and to develop a benchmarking methodology.

11.1.7.2.9 Executive Order S-3-05

On June 1, 2005, Executive Order S-3-05 was issued establishing GHG emission reduction targets: by 2010, reduce GHG emissions to 2000 levels; by 2020, reduce GHG emissions to 1990 levels; and by 2050, reduce GHG emissions to 80 percent below 1990 levels.

11.1.7.2.10 Executive Order S-1-07

On January 18, 2007, the Low Carbon Fuel Standard (LCFS) was issued mandating a reduction of at least 10 percent in the carbon intensity of California's transportation fuels by 2020. It instructed the California Environmental Protection Agency to coordinate activities among the University of California, the California Energy Commission, and other state agencies to develop and propose a draft compliance schedule to meet the 2020 target. Furthermore, it directed CARB to consider initiating regulatory proceedings to establish and implement the LCFS. In response, CARB identified the LCFS as an early action item with a regulation to be adopted and implemented by 2010.

11.1.7.2.11 Executive Order S-13-08

On November 14, 2008, Executive Order S-20-04 was issued directing the California Resources Agency, in cooperation with the California Department of Water Resources (CDWR), the California Energy Commission (CEC), California's coastal management agencies, and the Ocean Protection Council to request that the National Academy of Sciences convene an independent panel to complete the first California Sea Level Rise Assessment Report by December 1, 2010. As part of this effort, the Resources Agency is to create an independent sea-level rise science and policy committee made up of state, national, and international experts and to hold public workshops to gather policy-relevant information.

11.1.7.3 Local

11.1.7.3.1 BAAQMD CEQA Guidelines

On June 2, 2010, the BAAQMD Board adopted a significant update to its December 1999 *CEQA Air Quality Guidelines*. BAAQMD issued clarifications and minor edits to the June 2010 guidelines. The *CEQA Air Quality Guidelines* is 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 document describes the criteria that BAAQMD uses when reviewing and commenting on the adequacy of environmental documents. It recommends quantitative thresholds for use in determining whether construction and operational activities associated with projects would have significant adverse environmental impacts, identifies methodologies for predicting project emissions and impacts, and identifies measures that can be used to avoid or reduce air quality and GHG impacts. (BAAQMD 2011, 2012)

However, due to a legal challenge,[1] the adopted 2011 Guidelines and significance thresholds (BAAQMD 2011) are no longer officially in effect. Per the revised and adopted 2012 Guidelines (BAAQMD 2012), lead agencies have the discretion to use either the adopted 1999 thresholds or the more stringent 2010/2011 thresholds.[2] At ACMAD's request, the GHG analysis will follow the 2010/2011 significance thresholds. This decision is because ACMAD has determined that Appendix D of the guidelines, in

[1] On March 5, 2012, the Alameda County Superior Court issued a judgment finding that the BAAQMD had failed to comply with CEQA when it adopted the Thresholds. The court did not determine whether the Thresholds were valid on the merits, but found that the adoption of the Thresholds was a project under CEQA. The court issued a writ of mandate ordering the BAAQMD to set aside the Thresholds and cease dissemination of them until the BAAQMD had complied with CEQA. The BAAQMD has appealed the Alameda County Superior Court's decision. The Court of Appeal of the State of California, First Appellate District, reversed the trial court's decision. The Court of Appeal's decision was appealed to the California Supreme Court, which granted limited review, and the matter is currently pending there.

[2] Due to the March 5, 2012, writ of mandate which set aside BAAQMD's adopted 2010 CEQA Thresholds of Significance; the BAAQMD cannot recommend specific thresholds of significance for use by local governments at this time (October 2014). Lead agencies will need to determine appropriate air quality thresholds to use for each project they review based on substantial evidence that they should include in the administrative record for the project. Lead agencies should examine the substantial evidence in determining appropriate air quality thresholds. Lead agencies may reference BAAQMD's 1999 Thresholds of Significance. Lead agencies may also reference BAAQMD's CEQA Thresholds Options and Justification Report developed by staff in 2009. The CEQA Thresholds Options and Justification Report, outlines substantial evidence supporting a variety of thresholds of significance. In accordance with the court order referenced above, the BAAQMD cannot and does not endorse or recommend any of the particular thresholds outlined therein.

combination with the BAAQMD Revised Draft Options and Justification Report (BAAQMD 2009), provides substantial evidence to support the 2010/2011 significance thresholds and, therefore, has determined they are appropriate for use in this analysis in lieu of the 1999 significance thresholds.

The 2010/2011 *CEQA Air Quality Guidelines* do not comprise enforceable rules or regulations per se; nevertheless, the guidelines established the following quantitative thresholds of significance for GHG emissions[3] (see Table 10-3):

> Stationary Sources: 10,000 MT CO_2e per year

> Other than Stationary Sources: 1,100 MT CO_2e per year or 4.6 MT CO_2e per SP per year

> Plans: 6.6 MT CO_2e per SP per year

Under the 2010/2011 *CEQA Air Quality Guidelines*, Program status would presumably be as follows:

> Mosquito control activities do not meet the regulatory definition of a stationary source of air contaminants; therefore, the 10,000 MT CO_2e per year stationary source GHG threshold would not apply.

> For nonstationary source land use development projects, BAAQMD's adopted "bright-line" threshold of significance differs from other proposed GHG thresholds currently under consideration in California. Under this threshold, to conclude that a project's GHG impacts are less than significant, a project would need to be in compliance with a "Qualified Greenhouse Gas Reduction Strategy," emit less than 1,100 MT CO_2e per year, or emit less than 4.6 MT CO_2e per year per capita SP (residents + employees). However, the Program does not qualify as a land use development project; therefore, these GHG thresholds would not apply.

> No GHG thresholds exist for temporary construction emissions from mobile and portable sources, neither daily nor annual, whether for stationary or nonstationary source projects. Since mosquito control activities comprise mobile and portable sources similar to construction, no quantitative GHG significance thresholds would apply to the Program since activities such as mosquito control are not specified, defined, or addressed in the guidelines.

Notwithstanding the above criteria, for evaluation purposes the estimated maximum annual Program emissions are compared to the 1,100 MT CO_2e per year significance threshold for projects that are not stationary sources, e.g., mosquito control activities, as presumptive "land use" projects.

11.1.7.3.2 Other Air Districts' CEQA Guidelines

Portions of the ACMAD Program Area are outside the BAAQMD, i.e., in eastern San Joaquin County, which are in the jurisdiction of the San Joaquin Valley Air Pollution Control District (SJVAPCD). The SJVAPCD do not have applicable CEQA thresholds for GHGs.

11.1.7.3.3 Alameda County and Cities Climate Change-Related Policies

Notwithstanding air district CEQA guidelines on GHGs and climate change, many counties and cities in California have developed climate change policies and action plans that are primarily used as planning and operations management tools. As planning tools, the general aim is to implement "smart growth" policies, prevent unmitigated sprawl, conserve energy and water, and reduce automobile dependence – all of which reduce climate impacts either directly or indirectly. As operations management tools, the general aim is to minimize direct and indirect GHG emissions from government operations, mainly through energy conservation.

[3] MT = metric tonne, 1,000 kilograms or 2,204.6 pounds; SP = Service Population, residents + employees

Alameda County

Alameda County Climate Protection Project

In June 2006 eleven local governments in Alameda County, CA committed to becoming members of International Council for Local Environmental Initiatives (ICLEI) – Local Governments for Sustainability and participating in the Alameda County Climate Protection Project (ACCPP). The participating jurisdictions include: Alameda, Berkeley, Newark, San Leandro, Alameda County, Emeryville, Oakland, Union City, Albany, Hayward, and Piedmont. The project was launched by ICLEI in partnership with the Alameda County Waste Management Authority & Recycling Board (StopWaste.Org) and the Alameda County Conference of Mayors. In committing to the project, the jurisdictions embarked on an ongoing, coordinated effort to reduce the emissions that cause global warming, improve air quality, reduce waste, cut energy use and save money. Toward that end, ICLEI and StopWaste.Org assisted each participating jurisdiction to conduct a baseline greenhouse gas emissions inventory, set a community-wide emissions reduction target, and develop a climate action plan (CAP) that consists of polices and measures that, when implemented, will enable each jurisdiction to meet its target.

A model CAP was developed for use by the 11 participating local governments to create tailored CAPs for their communities. Its purpose is to save participants' time and resources by providing a useful action plan format, background information on the science and impacts of global warming, and detailed suggestions on the types of policies that municipalities can implement to achieve the desired emissions reductions. In developing this resource, ICLEI relied on the expertise of StopWaste.Org staff as well as the experiences of the nationwide network of ICLEI member cities, each of which is working toward similar climate protection goals.

Alameda County Climate Action Plan

The Alameda County CAP outlines a course of action to reduce community-wide GHG emissions generated within the unincorporated areas of Alameda County. Successful implementation of the CAP will reduce GHG emissions to 15 percent below 2005 levels by 2020 and set the County on a path toward reducing emissions to 80 percent below 1990 levels by 2050.

Alameda County has a long history of promoting environmental sustainability and adopting actions that help to reduce GHG emissions.

In 2006, the Board of Supervisors voted unanimously to adopt the Climate Change Leadership Resolution (R-2006-20). This resolution committed the County to take steps to reduce GHG emissions and adapt to the effects of climate change. It also established the County's climate protection strategy, required an inter-agency approach for meeting the established reduction targets, and called for integrating climate protection into the County's planning, budgetary, and other processes.

In 2007, the Alameda County Board of Supervisors voted unanimously to sign the Cool Counties Climate Stabilization Declaration (R-2007-336), which committed the County to work towards achieving an 80 percent reduction in GHG emissions by 2050.

Through these and other resolutions, Alameda County has formally recognized that:

1. Climate change threatens long-term human and environmental health, social well-being, and economic vitality of the county.
2. Rapid and significant reductions of GHG emissions are needed to prevent higher temperatures and the associated severe local effects.
3. Counties have a unique role to play in climate action planning due to their jurisdiction over policy areas such as air quality, land use planning, transportation, forest preservation, water conservation, and wastewater and solid waste management.

Alameda County General Plan

In 2008, the Board of Supervisors adopted the Alameda County Strategic Vision, which identifies the environment and sustainability as key County priorities. The values expressed within the document further support the County's climate protection initiatives.

The CAP reflects the values embodied in the Strategic Vision and the GHG reduction goals of the previously mentioned resolutions. The plan also strives to achieve the following principles:

1. Create long term financial savings through the implementation of cost effective measures to achieve the highest levels of energy and resource efficiency possible;
2. Provide the highest quality, accessible service to its citizens;
3. Foster safe, healthy, and resilient communities and work environments;
4. Implement consistent policies and programs throughout the county that provide for flexibility in implementation; and
5. Coordinate efforts and leverage partnerships both between agencies and throughout the region to maximize the impact of the County's efforts.

Although the CAP lays out a comprehensive road map for reducing GHG, the origin of the County's efforts to mitigate its impact on climate change precedes this plan. Within its own operations, the County government has operated an extensive waste reduction, reuse, and recycling program; is the largest solar power producer of any county government in the United States; and has undertaken a number of initiatives to reduce the use of water, energy, and toxic chemicals. In parallel with the development of this Community CAP, the County has also produced a Government Services and Operations CAP.

Within the county's unincorporated areas, policies have been adopted that decrease the environmental footprint of these communities and reduce GHG emissions, including the following efforts:

1. Adoption of ordinance to achieve 75% waste diversion and reduction by 2010.
2. Establishment of green building standards, construction and demolition debris diversion requirements, internal water efficiency ordinance, environmental purchasing policies, commercial and curb side recycling and food waste collection programs.
3. Leadership in the development of a county-wide financing district to support energy efficiency retrofits for existing residential buildings.
4. Participation in regional land use planning efforts that support transit-oriented, pedestrian-friendly design.
5. Development of policies and programs that support sustainable, green business development
6. Coordination and facilitation of strategic partnerships to support green business development and green-collar jobs.
7. Promotion of local sustainable agriculture to reduce carbon emissions associated with food production, processing, and transport.

The County has also worked closely with its cities and various special districts to promote shared vision for a sustainable future.

1. In June 2006, the County and the 14 city governments within its boundaries joined the ACCPP. All participants agreed to establish a coordinated effort to reduce GHG emissions, improve air quality, reduce waste, reduce energy use, and save money.

2. In December 2006, representatives from the County and all 14 cities within its boundaries met at Summit 2016 to discuss local and global trends; climate change was identified as a top priority.
3. In July 2007, the Board of Supervisors sent a letter to all 57 counties within California encouraging them to join the Cool Counties campaign and adopt similar local emission reduction targets.
4. In January 2009, the County co-hosted a Climate Forum to promote strategic action, build partnerships, and share information. Over 175 representatives attended from local, regional, and state levels. Participants continue to work together in cross-jurisdictional teams focusing on key action areas, such as energy efficiency, public outreach, transportation, land use, and waste reduction.

City of Alameda

The City of Alameda is recognized nationally as having the lowest GHG emission rate per capita in Alameda County. Additionally, a large percentage of the energy utilized within the city is from carbon-free sources.

In July 2006, Alameda City Council adopted a resolution to join the Alameda County – Cities for Climate Protection Campaign. ICLEI – Local Governments for Sustainability launched the campaign in partnership with the Alameda County Waste Management Authority & Recycling Board and the Conferences of Mayors. Other participants included the jurisdictions of Alameda County, Albany, Berkeley, Emeryville, Hayward, Newark, Oakland, Piedmont, Pleasanton, San Leandro and Union City.

The Alameda City Council also appointed members to the Climate Protection Task Force and their recommendation is to further reduce the cities GHG emissions by at least an additional 25 percent by the year 2020.

In order to achieve this goal the following five initiatives were considered immediate priority:

1. Adopt “Zero Waste Strategy” Programs and Ordinances.
2. Develop a multi-faceted community outreach program to increase public awareness and participation in GHG reductions.
3. Amend the Alameda Municipal Code to include sustainable design and green building standards for all new, substantially expanded, and remodeled buildings.
4. Encourage the Alameda Public Utilities Board to require that Alameda Power & Telecom maintain and expand its source mix to 100% carbon-free energy.
5. Develop and fund alternative transportation strategies in the City’s budget.

The City of Alameda produced a handbook on Local Action Plan for Climate Protection (City of Alameda 2008). The Alameda Local Action Plan Handbook outlines five milestones the City pledges their leadership to promote public awareness about the impacts of climate change and how to reach our goal of reducing GHG and air pollution emissions throughout the community.

City of Albany

The City of Albany committed to becoming a member of ICLEI and participating in the ACCPP. A part of the project, the City conducted a baseline GHG Emissions Inventory, set a community-wide emissions reduction target, and developed a CAP.

The Albany City Council adopted the CAP in April 2010 (City of Albany 2010). The CAP is comprised of policies and measures that, when implemented, will enable the City to meet its target for GHG emission reductions. Several climate protection measures and policies are either in place or in the planning stages.

The CAP includes six major strategies intended to reduce GHG emissions:

1. Transportation and Land Use: Create an interconnected transportation system and land use pattern that shifts travel from personal automobiles to walking, biking, and public transit.
2. Buildings and Energy: Minimize energy consumption; create high performance buildings, and transition to clean, renewable energy sources.
3. Waste: Become a zero-waste community.
4. Green Infrastructure: Enhance natural assets that improve community quality of life.
5. Water Conservation: Celebrate water as an essential community resource.
6. Food and Agriculture: Create a sustainable and climate-friendly food system.

City of Berkeley

In 2006, Berkeley voters approved Measure G requiring a reduction of the communities' GHG emissions by 80% below 2000 levels by 2050. The Berkeley City Council approved the Berkeley CAP in 2009. The community's target for the year 2020 is to reduce community-wide GHG emissions 33% (below 2000 levels).

The Berkeley CAP was designed under the premise that local governments and the communities they represent are uniquely capable of addressing the main sources of the emissions that cause global warming: the energy consumed in buildings and for transportation, and the solid waste sent to landfills (City of Berkeley 2009). The core strategies for each category of action include:

1. Sustainable Transportation & Land Use. The plan is designed to reduce vehicle miles traveled in the community by making cycling, walking, public transit, and other sustainable mobility modes the mainstream and to increase vehicle fuel efficiency and the utilization of low carbon fuels.
2. Building Energy Use. The community's task is to reduce conventional energy use in every existing Berkeley home, business, and institution through high-quality energy efficiency retrofits and a greater reliance on renewable energy such as solar.
3. Waste Reduction & Recycling. These measures aim to eliminate solid waste at its source, i.e., the point of production, and to maximize reuse and recycling throughout the community.
4. Community Outreach & Empowerment. The success of local climate action efforts rests on behavior change. Actions designed to educate and empower community members are fundamental to this plan.
5. Preparing for Climate Change Impacts. The City will partner with local, regional, and state agencies to develop a plan of action for climate adaptation.

City of Dublin

The Climate Change Strategy for Dublin City 2008-2012, which was prepared by the Environment and Engineering SPC in association with CODEMA (City of Dublin Energy Management Agency), was adopted by Dublin City Council in May 2008.

Dublin City Council also hosted a Climate Change conference – 'the way forward for Local Authorities' in partnership with the Department of Environment, Heritage & Local Government led, Change Campaign, in October 2008. The Strategy was launched at the Conference, as part of an overall aim to give local, national and international perspectives to help and encourage all local authorities to play an important role in tackling the adverse effects of climate change.

The Climate Change Strategy for Dublin City builds on existing environmental policies, whilst responding to the challenge of climate change by primarily reducing our CO_2 emissions, through a cross cutting

approach that includes specific actions, targets and performance indicators in key areas such as; Energy, Planning, Transport,, Waste Management and Biodiversity (City of Dublin 2008).

City of Emeryville

The City of Emeryville has approved a CAP and goal for reducing its emissions to protect the climate (City of Emeryville 2008). By 2020, the city plans on reducing emissions from the whole community and the government operations by 25% over 2004 levels.

In March of 2006 the City of Emeryville pledged to take action against this destructive trend by passing a resolution to join more than 230 U.S. local governments and 770 local governments worldwide in ICLEI's Cities for Climate Protection® campaign. In so doing, Emeryville committed to ICLEI's 5-Milestone methodology for combating global warming. In December of 2006, the City approved the baseline inventory report from ICLEI and established a Climate Change Task Force to develop a Climate Action Goal and Plan. Then on May 1st, 2007, the City of Emeryville committed to reducing community-wide GHG emissions by 25% below 2004 levels by 2020.

The City of Emeryville has already initiated many programs toward increasing energy efficiency, reducing air pollution, and reducing solid waste. These programs are discussed in the City of Emeryville CAP.

City of Fremont

The City of Fremont has approved a CAP in 2012 (City of Fremont 2012). City staff prepared a CAP, adopting a goal of reducing the community's GHG emissions by 25% from 2005 levels by the year 2020. The City Mayor in 2009, signed the Bay Area Climate Collaborative Charter of the Bay Area Climate Change Compact.

The City's CAP is consistent with the goals and policies in the City's General Plan, as required by State Law. The CAP provides the specific strategies for working towards achieving the City's GHG emission reduction goal, and reinforces the principles of sustainability which underlies the General Plan.

The CAP has two main goals: First, to identify specific and achievable actions for reducing GHG emissions; Second to serve as a resource for the continued engagement, education motivation and inspiration of the community and City organization as they work together on this critical initiative. Similar to the other cities the Fremont CAP is based on the ICLEI's Five Milestones Process.

1. Milestone 1: Conduct a baseline GHG emissions inventory and forecast.
2. Milestone 2: Adopt an emissions reduction target.
3. Milestone 3: Develop a CAP for reducing emissions.
4. Milestone 4: Implement policies and measures.
5. Milestone 5: Monitor and verify results.

City of Hayward

The Hayward CAP was adopted by the City Council in 2009 (City of Hayward 2009). The purpose of the CAP is to make Hayward a more environmentally and socially sustainable community. The goals include reducing GHG emissions, decrease the community's dependence on non-renewable resources, increasing Hayward's potential for "green" economic development, and enhancing the health of all who live and work in Hayward.

In 2005, the Mayor of Hayward signed the U.S. Conference of Mayors Climate Protection Agreement. In June 2006, the City joined ten other local governments in Alameda County participating in the ACCPP. By joining ACCPP, Hayward embarked on an ongoing coordinated effort to reduce the emission of gasses that cause global warming. ACCPP was launched by the Alameda County Waste Management Authority

& Recycling Board (StopWaste.Org) in partnership with the Alameda County Conference of Mayors and ICLEI – Local Governments for Sustainability.

The CAP provides a roadmap for achieving a measurable reduction in GHG emissions; so adopting the CAP will be a discernible step towards emissions reductions. The CAP recommends GHG emissions targets that will align Hayward's reduction targets with those of the State of California and presents a number of strategies that will make it possible for the City to meet the recommended targets. The CAP also suggests best practices for implementing the Plan and makes recommendations for measuring progress.

The CAP will be implemented over an extended period of time. Hayward recognizes that it may not be possible to implement some of the ideas presented in the Plan with the current economic conditions.

Nevertheless, it is important to keep ideas on the table that could make a cost-effective contribution to reducing emissions at some future time in the life of the Plan.

City of Livermore

The Livermore City Council adopted the Livermore CAP in November 2012 (City of Livermore 2012).

The CAP implements the General Plan Policies adopted in 2009 via a Climate Change Element of the Plan, to reduce GHG emissions to 15% below 2008 conditions by 2020.

Implementation of the CAP will also support the statewide effort, under the California Global Warming Solutions Act, to reduce GHG emissions in California to 1990 levels by 2020.

The City has already implemented numerous programs to reduce GHG emissions including:

1. Use of hybrid vehicles and city charging stations.
2. Use of recycled water and materials.
3. Use of rubberized asphalt concrete on city major arterial road paving projects.
4. Damaged asphalt recycling.

City of Newark

The Newark City Council adopted the City of Newark CAP Initial Framework in 2010 (City of Newark 2010). The CAP includes actions the City has successfully implemented, as well as sections that guide the City, residents, and businesses to participate in future GHG emissions reduction activities.

The City has now completed 3 of the 5 step process established by ICLEI, an organization that is leading the way for local governments to take action on climate issues. The five steps the city is working towards:

1. Inventory Baseline Emissions – ICLEI assisted the City of Newark in collecting 2005 data to create an inventory of baseline emissions from the government and community.
2. Set a Reduction Goal(s) – the City of Newark aligned its goals with the State of California and included them in the CAP.
3. Create an Action Plan – the CAP Initial Framework was adopted by the Newark City Council in 2010. This plan includes reports on emission reduction projects as well as research on potential future projects.
4. Implement the Action Plan – the City of Newark will seek grants and other opportunities to pursue action plan activities.
5. Monitor the Results – the City of Newark has access to many local government tools to evaluate the GHG emission reductions from CAP activities.

City of Oakland

The Oakland Energy and Climate Action Plan (ECAP) were adopted by the City Council in 2012 (City of Oakland 2012). The purpose is to identify and prioritize actions the City can take to reduce energy consumption and GHG emissions associated with Oakland. This plan establishes GHG reduction actions, as well as frameworks for coordinating implementation and monitoring and reporting on progress.

The ECAP outlines a ten year plan including more than 150 actions that will enable Oakland to achieve a 6% reduction in GHG emissions with respect to each of these GHG sources by 2020. Goals include:

1. 20% reduction in vehicle miles traveled annually as residents, workers and visitors.
2. 24 million gallons of oil saved annually due to less driving and more fuel efficient vehicles.
3. 32% decrease in electricity consumption through renewable generation and conservation.
4. 14% decrease in natural gas consumption through building retrofit and solar projects.
5. 62 million kWh and 2.7 million therms annually of new renewable energy.
6. 375,000 tons of waste diverted away from local landfills.

The primary focus of the ECAP is on Mitigation – reducing energy use and GHG emissions. Recommendations are also included for moving forward with Adaptation strategies. Progress is made in both areas simultaneously.

1. Mitigation refers to actions that reduce the creation of GHG emissions. These include strategies to reduce transportation fuels used to move people and goods around, reducing natural gas usage, reducing electricity usage, reducing consumption of material goods, and disposal of materials into landfills.
2. Adaptation refers to activities that can help communities adapt to the impacts of climate change. Projected local climate impacts include sea level rising, reduced water availability, and increasing occurrence of extreme heat events and wildfires.

City of Piedmont

In May 2006, the Piedmont City Council adopted a Resolution for the City to participate in the ACCPP, sponsored by StopWaste.Org and the Alameda County Conference of Mayors. In so doing, Piedmont became a member of ICLEI - Local Governments for Sustainability, completed a baseline 2005 GHG Emissions Inventory, and adopted a CAP that includes a GHG emissions reduction target of 15% below 2005 levels by 2020 (City of Piedmont 2009).

The Piedmont CAP consists of a summary chapter and six technical chapters. The summary chapter defines climate change and its potential effects, outlines the actions the State and City are taking to address climate change, and describes how residents and business owners can participate in GHG reduction efforts. The technical chapters detail the City's strategy to be consistent with applicable state regulation and provide guidance to City officials and departments charged with implementing the plan. They consist of the following:

1. Climate Change Effects.
2. California Regulatory Context.
3. GHG Baseline, Projections, and Targets.
4. Climate Action Strategies.
5. Implementation.
6. Public Participation.

In 2006, the City of Piedmont became a participant in ICLEI's Cities for Climate Protection campaign, joining more than 1,000 local governments worldwide in committing to a 5-Milestone methodology for combating global warming. The city completed the first milestone after determining a baseline emissions inventory that indicated the City of Piedmont released 47,754 MT of CO_2 in 2005. The second milestone was the City Council adopting a target to reduce community-wide GHG emissions by 15% below 2005 levels by 2020.

City of Pleasanton

In 2012, the Pleasanton City Council adopted a CAP (City of Pleasanton 2012). The City is committed to sustainability and reducing community-wide GHG emissions by 15% below 2005 levels by 2020.

The CAP, developed by Environmental Science Associates (ESA) the City and the Bay Area Air Quality Management District (BAAQMD), meets the requirement for a "Qualified Greenhouse Reduction Plan" as specified by BAAQMD's recently adopted CEQA guidelines.

This CAP serves to outline strategies, goals, and actions for reducing municipal and community-wide GHG emissions. This CAP has been structured to ensure that the City does its part to meet the mandates of California's Global Warming Solutions Act of 2006 (AB 32), while taking into account the City's General Plan vision and its goal to become the "greenest" city in California.

AB 32 directs the state to reduce state-wide GHG emissions to 1990 levels by 2020. In order to achieve these reductions, the California Air Resources Board (CARB) recommends that local governments target their 2020 emissions at 15% below 2005 levels, consistent with the state-wide commitment, to account for emissions growth that has occurred statewide since 1990.

The baseline 2005 GHG Emissions Inventory for Community of Pleasanton includes 770,844 MT CO_2e, with 5,370 MT of that (approximately 0.7%) coming from municipal operations. To meet its goal, the City must reduce its annual emissions to approximately 655,000 MT CO_2 per year by the year 2020.

Several initiatives at the state level will help the City reduce GHG emissions, but they alone will not be sufficient to meet the 2020 target. This CAP provides a roadmap for the City to be proactive in reducing GHGs through a schedule of local actions, so that the City can do its part to mitigate climate change while meeting the requirements of state law.

The City of Pleasanton conducted an analysis of hundreds of potential GHG-reduction strategies and actions. Best-suited measures were chosen primarily based on their GHG-reduction and cost-benefit characteristics, with additional considerations for funding availability and feasibility of implementation. The selected measures impact transportation and land use, energy consumption and generation, water use and wastewater treatment, community engagement, and solid waste disposal. For each emissions sector, the CAP presents goals, strategies, and specific actions for reducing emissions, along with quantified cost-benefit impacts where possible. An implementation and monitoring plan is also provided. The initial implementation timeframe will span approximately fifteen years, from 2011 through 2025.

City of San Leandro

In 2009, the City of San Leandro developed a CAP: a Vision of a Sustainable San Leandro (City of San Leandro 2009).

San Leandro CAP is based on the Local Governments for Sustainability ICLEI 5-Milestone process:

1. Conduct an inventory of city-wide GHG emissions. The City completed this milestone in 2005, conducting an emissions inventory for both community-wide emissions and emissions from municipal operations. In the base year 2005, the City of San Leandro emitted approximately 957,169 MT of CO_2e from the residential, commercial, industrial, transportation, waste, and municipal sectors.

2. Set a reduction target/goal. In 2006, the City completed this milestone by adopting a resolution to reduce community-wide emissions by 25% below 2005 levels by 2020.
3. Establish a CAP. In 2009, the City completed this milestone by adopting the CAP.
4. Implement a CAP. The CAP and GHG reduction measures and actions are structured around four general categories of GHG emissions; energy in buildings, transportation and land use, waste, and municipal operations.
5. Monitor and evaluate progress. The City joined 1,000 other U.S. cities, signing the U.S. Mayor's Climate Protection Commitment. The City also joined the ACCPP sponsored by Stopwaste.Org. The last climate action update to City Council was in 2013.

City of Union City

In 2010, the City Council for Union City adopted their CAP (City of Union City 2010). The City is committed to decreasing GHG emissions coming from energy use in buildings and fuel for transportation.

Union City's CAP presents a strategy to achieve the City Council's goal of reducing GHG emissions by 20% below 2005 levels by the year 2020. Union City GHG inventory for all sectors in 2005 was 42,297 MT of CO_2e for buildings, transportation, waste, and water. The CAP's GHG reduction action areas include:

1. Land Use.
2. Transportation.
3. Buildings and Energy.
4. Water Conservation.
5. Waste Reduction.
6. Green Infrastructure.
7. Community Engagement.
8. Climate Adaptation.

In May 2006, the City adopted Resolution 3167-06 authorizing the City's participation in the ACCPP and membership in ICLEI Local Governments for Sustainability. Shortly afterwards, the City commissioned ICLEI to calculate the City's 2005 GHG inventory. In addition, the City has been coordinating and working with other cities and outside agencies to implement sustainable development programs including, but not limited to: the Association of Bay Area Governments (ABAG), Stopwaste.Org, Pacific Gas and Electric (PG&E), Alameda County Water District (ACWD), and the Union Sanitary District (USD).

11.2 Environmental Impacts and Mitigations Measures

11.2.1 Evaluation Concerns and Criteria

The environmental concerns are those identified below from the CEQA Guidelines and from public scoping, comments made during other District activities, and historical questions raised by individuals. The public identified the following issues:

> Discuss impacts of GHG and climate change

The focus in this chapter is on the use of equipment to perform all Program activities and the resulting emissions impacts to generation of GHGs. The CEQA Guidelines cover the issues from public scoping.

As described in Section 11.1.7.3, no promulgated standards of significance exist for GHG impacts established under CEQA for mobile sources such as mosquito control activities. The PEIR addresses the

following qualitative criteria are used as standards of significance and are based on CEQA Guidelines Appendix G, Environmental Checklist Form, Section VII. Would the project:

> Generate GHG emissions, either directly or indirectly, that may have a significant impact on the environment?

> Conflict with any applicable plan, policy, or regulation of an agency adopted for the purpose of reducing the GHG emissions?

Determinations made with respect to significance criteria are documented in Sections 11.2.3 through 11.2.8.

See Section 11.1.7.3.1 for a discussion of CEQA thresholds of significance for GHGs.

11.2.2 Evaluation Methods and Assumptions

As described in Section 11.1.3, operation of onroad fleet vehicles, offroad all-terrain vehicles, watercraft, aircraft, portable equipment, and small equipment would result in GHG emissions in engine exhaust. Detailed lists of equipment, estimated usage, and emission calculations are provided in Appendix C. Equipment lists and annual activity schedules were provided by the District. Emission calculations were performed using the most recent and applicable emission factors published by CARB (2008a) and USEPA (2011a and 2014e).

Table 11-8 shows Program alternatives applicability by percentage: surveillance, physical control, vegetation management, biological control, chemical control, or other activities. Table 11-9 shows land uses associated with selected alternatives: residential, commercial, industrial, agricultural, and open space.

As described in Section 11.1.7.3, no promulgated standards of significance exist for GHG impacts established under CEQA for mobile sources such as mosquito control activities. However, for evaluation purposes the estimated maximum annual Program emissions are compared to the 1,100 MT CO_2e per year significance threshold for projects that are not stationary sources, e.g., mosquito control activities, as presumptive “land use” projects. The existing Program activities are the basis for the quantitative evaluation and if compared strictly to existing activities at the time the NOP was published, the impact would be no change. Future Program activities would be similar and not result in substantial emission changes.

Table 11-8 Alameda County Mosquito Abatement District’s Selected Alternatives Applicability

Surveillance	Physical Control	Vegetation Management	Biological Control	Chemical Control	Other Activities
12%	7%	—	1%	64%	16%

Source: Appendix C, ACMAD

Table 11-9 Land Uses Associated with Selected Alternatives for Alameda County Mosquito Abatement District

Residential	Commercial	Industrial	Agricultural	Open Space
•	•	•	•	•

Source: Appendix C, ACMAD

Table 11-10 shows estimated ongoing annual GHG emissions as CO_2e by alternative. On the local level, the combined total of 134.6 MT CO_2e per year is below the presumptive 1,100 MT per year threshold and would be less than significant (LS) and would not be cumulatively considerable.

Table 11-10 Estimated Annual GHG Emissions for Selected Alternatives for Alameda County Mosquito Abatement District

Alternative	CO_2 MT/year	CH_4 MT/year	N_2O MT/year	CO_2e MT/year
Surveillance	16.3	0.0009	0.0004	16.4
Physical Control	9.4	0.0005	0.0002	9.5
Vegetation Management	0.0	0.0000	0.0000	0.0
Biological Control	1.0	0.0001	0.0000	1.1
Chemical Control	85.4	0.0048	0.0020	86.2
Other Activities	21.3	0.0012	0.0005	21.4
District Totals	**133.4**	**0.0075**	**0.0031**	**134.6**

Sources: CARB 2008a; USEPA 2011a, 2014e

To reduce GHG emissions the District also implements the following BMPs (Table 2-6, BMP A14):

> Minimize engine idling times either by shutting equipment and vehicles off when not in use or reducing the maximum idling time to 5 minutes.

> Maintain correct tire inflation in accordance with manufacturer‘s specifications on wheeled equipment and vehicles to prevent excessive rolling resistance.

> Maintain and properly tune all equipment and vehicles in accordance with manufacturer‘s specifications.

> A certified visible emissions evaluator will check all equipment if visible emissions are apparent to onsite staff.

11.2.3 Surveillance Alternative

The Surveillance Alternative would be a continuation of existing activities currently practiced by the District using applicable techniques, equipment, vehicles, and watercraft. Surveillance involves monitoring mosquito populations and habitat, their disease pathogens, and the human-mosquito interactions. Field counting/sampling and trapping are common mechanisms for surveillance. The environmental impact concerns are phrased as questions as follows for the Surveillance Alternative:

Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment?

GHG emissions from the Surveillance Alternative would not be expected to exceed average emissions shown in Table 11-10. The Surveillance Alternative would emit approximately 16.4 MT CO_2e per year which is below the presumptive 1,100 MT per year and would be less than significant (LS). Due to its small scale and GHG mitigations, the Surveillance Alternative would not individually affect the environment or impede the state’s ability to meet its 2020 GHG emission reduction goal because the incremental cumulative impact would not be considerable.

> **Impact GHG-1:** Based on estimated annual CO_2e emissions, the Surveillance Alternative would not result in a considerable amount of GHGs. Impacts would be **less than significant** and no mitigation is required.

Conflict with any applicable plan, policy, or regulation of an agency adopted for the purpose of reducing the greenhouse gas emissions?

On a statewide basis, agencies in California are in the process of implementing strategies to reduce GHG emissions pursuant to the Global Warming Solutions Act of 2006 (AB 32, Núñez, Chapter 488, Statutes of 2006), which requires that California reduce its statewide GHG emissions to 1990 levels by 2020. AB 32 required CARB to develop the Scoping Plan (2008b) in coordination with the California Energy Commission's (CEC's) Climate Action Team (2010). The Scoping Plan defines a comprehensive set of emission reduction measures such as energy efficiency, renewable energy, cap-and-trade, transportation measures, low-carbon fuels, and targeted GHG fees. Due to its small scale, the Surveillance Alternative would not conflict with state and local plans, policies, or regulations aimed at curbing GHG emissions.

> **Impact GHG-2:** Based on the general inclusion of Surveillance Alternative emissions in the local and statewide GHG emission inventories, the Surveillance Alternative would not conflict with applicable plans, policies, or regulations for reducing GHG emissions. Impacts would be **less than significant** and no mitigation is required.

11.2.4 Physical Control Alternative

The Physical Control Alternative would be a continuation of existing activities currently practiced by the District using applicable techniques, equipment, and vehicles. This alternative involves managing mosquito habitat using source control and permanent control methods that do not use biological agents or chemical pesticides, such as ditch maintenance, debris removal in natural channels, and blockage of access points. The District currently uses only hand tools but may potentially use heavy equipment in the future. The environmental impact concerns are phrased as questions as follows for the Physical Control Alternative:

Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment?

GHG emissions from the Physical Control Alternative would not be expected to exceed average emissions shown in Table 11-10. The Physical Control Alternative would emit approximately 9.5 MT CO_2e per year, which is below the presumptive 1,100 MT per year and would be less than significant (LS). Due to its small scale and GHG mitigations, the Physical Control Alternative would not individually affect the environment or impede the state's ability to meet its 2020 GHG emission reduction goal because the incremental cumulative impact would not be considerable.

> **Impact GHG-3:** Based on estimated annual CO_2e emissions, the Physical Control Alternative would not result in a considerable amount of GHGs. Impacts would be **less than significant** and no mitigation is required.

Conflict with any applicable plan, policy, or regulation of an agency adopted for the purpose of reducing the greenhouse gas emissions?

On a statewide basis, agencies in California are in the process of implementing strategies to reduce GHG emissions pursuant to the Global Warming Solutions Act of 2006 (AB 32, Núñez, Chapter 488, Statutes of 2006), which requires that California reduce its statewide GHG emissions to 1990 levels by 2020. AB 32 required CARB to develop the Scoping Plan (2008b) in coordination with the CEC's Climate Action Team (2010). The Scoping Plan defines a comprehensive set of emission reduction measures such as energy efficiency, renewable energy, cap-and-trade, transportation measures, low-carbon fuels, and targeted GHG fees. Due to its small scale, the Physical Control Alternative would not conflict with state and local plans, policies, or regulations aimed at curbing GHG emissions.

> **Impact GHG-4:** Based on the general inclusion of Physical Control Alternative emissions in the local and statewide GHG emission inventories, the Physical Control Alternative would

not conflict with applicable plans, policies, or regulations for reducing GHG emissions. Impacts would be **less than significant** and no mitigation is required.

11.2.5 Vegetation Management Alternative

The Vegetation Management Alternative would be primarily a continuation of existing activities currently practiced by the District using applicable techniques, equipment, and vehicles. Vegetation management is used to reduce the habitat value for mosquitoes. The majority of vegetation management implemented by the District involving the use of equipment occurs while ditching or clearing the blockage of access points and thus is reported under the Physical Control Alternative. The District uses hand tools but may use heavy equipment in the future to remove vegetation primarily in aquatic habitats. The District may also apply herbicides to remove vegetation. The environmental impact concerns are phrased as questions as follows for the Vegetation Management Alternative:

Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment?

GHG emissions from the Vegetation Management Alternative would not be expected to exceed average emissions shown in Table 11-10. The Vegetation Management Alternative has the potential to emit CO_2e but is currently at 0 MT, which is below the presumptive 1,100 MT per year and would be less than significant (LS). Future use of the Vegetation Management Alternative would not be expected to emit more CO_2e than any of the other Alternatives currently in use, all of which are below the presumptive 1,100 MT per year and would be less than significant (LS). Due to its small scale and GHG mitigations, the Vegetation Management Alternative would not individually affect the environment or impede the state's ability to meet its 2020 GHG emission reduction goal because the incremental cumulative impact would not be considerable.

> **Impact GHG-5:** Based on estimated annual CO_2e emissions, the Vegetation Management Alternative would not result in a considerable amount of GHGs. Impacts would be **less than significant** and no mitigation is required.

Conflict with any applicable plan, policy, or regulation of an agency adopted for the purpose of reducing the greenhouse gas emissions?

On a statewide basis, agencies in California are in the process of implementing strategies to reduce GHG emissions pursuant to the Global Warming Solutions Act of 2006 (AB 32, Núñez, Chapter 488, Statutes of 2006), which requires that California reduce its statewide GHG emissions to 1990 levels by 2020. AB 32 required CARB to develop the Scoping Plan (2008b) in coordination with the CEC's Climate Action Team (2010). The Scoping Plan defines a comprehensive set of emission reduction measures such as energy efficiency, renewable energy, cap-and-trade, transportation measures, low-carbon fuels, and targeted GHG fees. Due to its small scale, the Vegetation Management Alternative would not conflict with state and local plans, policies, or regulations aimed at curbing GHG emissions.

> **Impact GHG-6:** Based on the general inclusion of Vegetation Management Alternative emissions in the local and statewide GHG emission inventories, the Vegetation Management Alternative would not conflict with applicable plans, policies, or regulations for reducing GHG emissions. Impacts would be **less than significant** and no mitigation is required.

11.2.6 Biological Control Alternative

The Biological Control Alternative would be a continuation of existing activities currently practiced by the District using applicable techniques, equipment, and vehicles. It involves the use of mosquito predators, i.e., mosquitofish (*Gambusia affinis*). The environmental impact concerns are phrased as questions as follows for the Biological Control Alternative:

Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment?

GHG emissions from the Biological Control Alternative would not be expected to exceed average emissions shown in Table 11-10. The Biological Control Alternative would emit approximately 1.1 MT CO_2e per year, which is below the presumptive 1,100 MT per year and would be less than significant (LS). Due to its small scale and GHG mitigations, the Biological Control Alternative would not individually affect the environment or impede the state's ability to meet its 2020 GHG emission reduction goal because the incremental cumulative impact would not be considerable.

> **Impact GHG-7:** Based on estimated annual CO_2e emissions, the Biological Control Alternative would not result in a considerable amount of GHGs. Impacts would be **less than significant** and no mitigation is required.

Conflict with any applicable plan, policy, or regulation of an agency adopted for the purpose of reducing the greenhouse gas emissions?

On a statewide basis, agencies in California are in the process of implementing strategies to reduce GHG emissions pursuant to the Global Warming Solutions Act of 2006 (AB 32, Núñez, Chapter 488, Statutes of 2006), which requires that California reduce its statewide GHG emissions to 1990 levels by 2020. AB 32 required CARB to develop the Scoping Plan (2008b) in coordination with the CEC's Climate Action Team (2010). The Scoping Plan defines a comprehensive set of emission reduction measures such as energy efficiency, renewable energy, cap-and-trade, transportation measures, low-carbon fuels, and targeted GHG fees. Due to its small scale, the Biological Control Alternative would not conflict with state and local plans, policies, or regulations aimed at curbing GHG emissions.

> **Impact GHG-8:** Based on the general inclusion of Biological Control Alternative emissions in the local and statewide GHG emission inventories, the Biological Control Alternative would not conflict with applicable plans, policies, or regulations for reducing GHG emissions. Impacts would be **less than significant** and no mitigation is required.

11.2.7 Chemical Control Alternative

The Chemical Control Alternative would be a continuation of existing activities currently practiced by the District using applicable techniques, equipment, vehicles, watercraft, and aircraft. It involves the application of insecticides to reduce populations of pest species. The environmental impact concerns are phrased as questions as follows for the Chemical Control Alternative:

Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment?

GHG emissions from the Chemical Control Alternative would not be expected to exceed average emissions shown in Table 11-10. The Chemical Control Alternative would emit approximately 86.2 MT CO_2e per year, which is below the presumptive 1,100 MT per year and would be less than significant (LS). Due to its small scale and GHG mitigations, the Chemical Control Alternative would not individually affect the environment or impede the state's ability to meet its 2020 GHG emission reduction goal because the incremental cumulative impact would not be considerable.

> **Impact GHG-9:** Based on estimated annual CO_2e emissions, the Chemical Control Alternative would not result in a considerable amount of GHGs. Impacts would be **less than significant** and no mitigation is required.

Conflict with any applicable plan, policy, or regulation of an agency adopted for the purpose of reducing the greenhouse gas emissions?

On a statewide basis, agencies in California are in the process of implementing strategies to reduce GHG emissions pursuant to the Global Warming Solutions Act of 2006 (AB 32, Núñez, Chapter 488, Statutes of

2006), which requires that California reduce its statewide GHG emissions to 1990 levels by 2020. AB 32 required CARB to develop the Scoping Plan (2008b) in coordination with the CEC's Climate Action Team (2010). The Scoping Plan defines a comprehensive set of emission reduction measures such as energy efficiency, renewable energy, cap-and-trade, transportation measures, low-carbon fuels, and targeted GHG fees. Due to its small scale, the Chemical Control Alternative would not conflict with state and local plans, policies, or regulations aimed at curbing GHG emissions.

> **Impact GHG-10:** Based on the general inclusion of Chemical Control Alternative emissions in the local and statewide GHG emission inventories, the Chemical Control Alternative would not conflict with applicable plans, policies, or regulations for reducing GHG emissions. Impacts would be **less than significant** and no mitigation is required.

11.2.8 Other Activities

As applicable, the Other Activities would be a continuation of existing activities currently practiced by the District using applicable equipment and vehicles. An example of these types of activities would be traveling to and from meetings, public education events, or the use of small equipment for facility maintenance. The environmental impact concerns are phrased as questions as follows for the Other Activities:

Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment?

GHG emissions from the Other Activities would not be expected to exceed average emissions shown in Table 11-10. The Other Activities would emit approximately 21.4 MT CO_2e per year, which is below the presumptive 1,100 MT per year and would be less than significant (LS). Due to its small scale and GHG mitigations, the Other Activities would not individually affect the environment or impede the state's ability to meet its 2020 GHG emission reduction goal because the incremental cumulative impact would not be considerable.

> **Impact GHG-11:** Based on estimated annual CO_2e emissions, the Other Activities would not result in a considerable amount of GHGs. Impacts would be **less than significant** and no mitigation is required.

Conflict with any applicable plan, policy, or regulation of an agency adopted for the purpose of reducing the greenhouse gas emissions?

On a statewide basis, agencies in California are in the process of implementing strategies to reduce GHG emissions pursuant to the Global Warming Solutions Act of 2006 (AB 32, Núñez, Chapter 488, Statutes of 2006), which requires that California reduce its statewide GHG emissions to 1990 levels by 2020. AB 32 required CARB to develop the Scoping Plan (2008b) in coordination with the CEC's Climate Action Team (2010). The Scoping Plan defines a comprehensive set of emission reduction measures such as energy efficiency, renewable energy, cap-and-trade, transportation measures, low-carbon fuels, and targeted GHG fees. Due to its small scale, the Other Activities would not conflict with state and local plans, policies, or regulations aimed at curbing GHG emissions.

> **Impact GHG-12:** Based on the general inclusion of Other Activities emissions in the local and statewide GHG emission inventories, the Other Activities would not conflict with applicable plans, policies, or regulations for reducing GHG emissions. Impacts would be **less than significant** and no mitigation is required.

11.2.9 Cumulative Impacts

Cumulative impacts from Program alternative GHG emissions are discussed in Section 13.9. Cumulative impacts were assessed in a qualitative manner by determining if the Program alternatives, in conjunction with other projects throughout the Program Area, would have the potential to contribute to a long-term cumulative impact on climate change. Given that GHG emissions and climate change are global issues, a

statewide framework or cumulative approach for consideration of environmental impacts may be most appropriate. Virtually every project in the state of California, as well as those outside the state, would have GHG emissions.

In developing thresholds of significance, BAAQMD considered the emission levels for which a project's individual emissions would be cumulatively considerable. Therefore, if a project would result in an increase in emissions at or above applicable mass thresholds, then it would be deemed to have a cumulatively considerable impact. Conversely, if a project would not exceed the significance thresholds, then its emissions would not be cumulatively considerable. (BAAQMD 2011).

In summary, all Program alternatives have the potential to generate GHG emissions and incrementally contribute to climate change, however minor. When all Program emissions are viewed in combination with global emissions levels that are contributing to the existing cumulative impact on global climate change, the incremental contribution of these Program emissions would not be cumulatively considerable because they occur intermittently on a very small scale (i.e., not stationary sources) and at 134.6 MT per year are nevertheless below the presumptive 1,100 MT per year threshold. Therefore, **all Program alternatives (either individually or in combination) would not have a cumulatively considerable impact on global climate change**. BMPs (see Section 11.2.11) as implemented will reduced Program impacts even further.

11.2.10 Environmental Impacts Summary

Table 11-11 presents a summary of GHG impacts associated with all the alternatives in comparison to existing conditions defined as existing GHG inventories as well as existing conditions as of May-June 2012. The GHG impact callouts correspond to those in Sections 11.2.3 through 11.2.8.

Table 11-11 Summary of Alternative Greenhouse Gas Impacts

Impact Statement	Surveillance	Physical Control	Vegetation Management	Biological Control	Chemical Control	Other Activities
Effects on GHG						
Impact GHG-1: Based on estimated annual CO_2e emissions, the Surveillance Alternative would not result in a considerable amount of GHGs. Impacts would be **less than significant** and no mitigation is required.	LS	na	na	na	na	na
Impact GHG-2: Based on the general inclusion of Surveillance Alternative emissions in the local and statewide GHG emission inventories, the Surveillance Alternative would not conflict with applicable plans, policies, or regulations for reducing GHG emissions. Impacts would be **less than significant** and no mitigation is required.	LS	na	na	na	na	na
Impact GHG-3: Based on estimated annual CO_{2e} emissions, the Physical Control Alternative would not result in a considerable amount of GHGs. Impacts would be **less than significant** and no mitigation is required.	na	LS	na	na	na	na
Impact GHG-4: Based on the general inclusion of Physical Control Alternative emissions in the local and statewide GHG emission inventories, the Physical Control Alternative would not conflict with applicable plans, policies, or regulations for reducing GHG emissions. Impacts would be **less than significant** and no mitigation is required.	na	LS	na	na	na	na
Impact GHG-5: Based on estimated annual CO_{2e} emissions, the Vegetation Management Alternative would not result in a considerable amount of GHGs. Impacts would be **less than significant** and no mitigation is required.	na	na	LS	na	na	na
Impact GHG-6: Based on the general inclusion of Vegetation Management Alternative emissions in the local and statewide GHG emission inventories, the Vegetation Management Alternative would not conflict with applicable plans, policies, or regulations for reducing GHG emissions. Impacts would be **less than significant** and no mitigation is required.	na	na	LS	na	na	na
Impact GHG-7: Based on estimated annual CO_{2e} emissions, the Biological Control Alternative would not result in a considerable amount of GHGs. Impacts would be **less than significant** and no mitigation is required.	na	na	na	LS	na	na

Table 11-11 Summary of Alternative Greenhouse Gas Impacts

Impact Statement	Surveillance	Physical Control	Vegetation Management	Biological Control	Chemical Control	Other Activities
Impact GHG-8: Based on the general inclusion of Biological Control Alternative emissions in the local and statewide GHG emission inventories, the Biological Control Alternative would not conflict with applicable plans, policies, or regulations for reducing GHG emissions. Impacts would be **less than significant** and no mitigation is required.	na	na	na	LS	na	na
Impact GHG-9: Based on estimated annual CO_{2e} emissions, the Chemical Control Alternative would not result in a considerable amount of GHGs. Impacts would be **less than significant** and no mitigation is required.	na	na	na	na	LS	na
Impact GHG-10: Based on the general inclusion of Chemical Control Alternative emissions in the local and statewide GHG emission inventories, the Chemical Control Alternative would not conflict with applicable plans, policies, or regulations for reducing GHG emissions. Impacts would be **less than significant** and no mitigation is required.	na	na	na	na	LS	na
Impact GHG-11: Based on estimated annual CO_{2e} emissions, the Other Activities would not result in a considerable amount of GHGs. Impacts would be **less than significant** and no mitigation is required.	na	na	na	na	na	LS
Impact GHG-12: Based on the general inclusion of Other Activities emissions in the local and statewide GHG emission inventories, the Other Activities would not conflict with applicable plans, policies, or regulations for reducing GHG emissions. Impacts would be **less than significant** and no mitigation is required.	na	na	na	na	na	LS

LS = Less-than-significant impact

N = No impact

na = Not applicable

SM = Potentially significant but mitigable impact

SU = Significant and unavoidable impact

11.2.11 Mitigation and Monitoring

All impacts are less than significant (LS) compared to existing conditions and require no mitigation. Notwithstanding significance, BMPs pursuant to California Air Toxics Control Measures (13 CCR Section 2485) and In-Use Offroad Diesel Vehicle Regulations (13 CCR Section 2449 et seq.) would also minimize criteria pollutant and GHG emissions from diesel and gasoline engine exhaust. The following BMPs are being implemented at present by the District and its contractors as part of the Program:

> Engine idling times will be minimized either by shutting equipment and vehicles off when not in use or reducing the maximum idling time to 5 minutes. Clear signage will be provided for workers at all access points. Correct tire inflation will be maintained in accordance with manufacturer‘s specifications on wheeled equipment and vehicles to prevent excessive rolling resistance. All equipment and vehicles will be maintained and properly tuned in accordance with manufacturer‘s specifications. All equipment will be checked by a certified, visible emissions evaluator if visible emissions are apparent to onsite staff. (Table 2-9, BMP A14)

Also, where practicable and available, the Program could use alternatively fueled equipment, such as compressed natural gas (CNG), liquefied natural gas (LNG), liquefied petroleum/propane gas (LPG), or biodiesel.