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 2014). 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 2012b). 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 2012b). 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 Napa County Mosquito Abatement District (NCMAD; 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 2012b)

In its *Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990–2012* (USEPA 2012c, 2014c), 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 Control (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 newly 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 and vector 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 and vector 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, CH_4, hydrogen, 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 2012c). 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 2012c; du Pont 1971; Jennings 1970

Notes:

MW = molecular weight, g/mole

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

The atmosphere consists of 5 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 2012d). 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 2012d)

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 cubic centimeter diluted in 1,000 cubic meters, and 1 ppt is 1 cubic centimeter diluted in 1,000,000 cubic meters. (USEPA 2012d)

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 2012d; 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 2012c, 2012d, 2014c)

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 2012c, 2012d, 2014c)

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 2012c, 2012d, 2014c)

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 2012c, 2012d, 2014c)

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 2012c, 2014c). 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 2012d):

- 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 and/or vector control activities include onroad fleet vehicles (light- and medium-duty trucks, vans, passenger cars), offroad ATVs, watercraft (motorboats, airboats), aircraft (helicopters and fixed-wing), portable equipment (pumps, sprayers, generators), and small equipment (handheld sprayers, foggers, dusters). Except for 2-stroke engines used in small lightweight equipment (spark ignition, 50:1 gas/oil mix), engines are 4-stroke gasoline (spark ignition) or diesel fuel (compression ignition). The dominant fuel used for these mobile sources is motor gasoline along with some diesel fuel (larger trucks), aviation gasoline (fixed-wing aircraft), 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 2012c, 2011a

Notes:

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

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

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

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 the California Air Resources Board (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 and vector control activity emissions would occur in the Bay Area portion of the NCMAD Program Area (i.e., Napa County, southern Sonoma County, and western Solano County), and only minor amounts would occur in northern Sonoma County, eastern Solano County, Yolo County, and Lake 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.

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 and vector control activity emissions for the District presented in Section 11.2.2.

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 2012c; 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.

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	Air District Emissions Percent	Air District Emissions MMT CO_2e
Alameda	16.4%	15.7
Contra Costa	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	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

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	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	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

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	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	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

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 and vector control activities, BMPs include fuel conservation, which minimizes GHG emissions by the Program, as described in Section 11.2.11. In addition, the District's installation of solar panels and LED lighting at its main facility reduces electric power usage and, thus, its carbon footprint.

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 and vector control activities. However, in the context of the Scoping Plan discussed in Section 11.1.4.1, implementation of the Low Carbon Fuel Standard (Executive Order S-1-7, below) would indirectly apply to mosquito and vector 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 in Section 11.1.7.3.

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 mmBTU 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 CO2, CH4, N2O, and hydrofluorocarbons, perfluorocarbons, SF6, and other fluorinated gases including nitrogen trifluoride and hydrofluorinated 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 nonaffected 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, the California Energy Commission, 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 NCMAD's request, the GHG analysis will follow the 2010/2011 significance

[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

thresholds. This decision is because NCMAD has determined that Appendix D of the guidelines, in 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 and vector 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 and vector control activities comprise mobile and portable sources similar to construction, no quantitative GHG significance thresholds would specifically apply to the Program since such activities 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 and vector control activities, as presumptive "land use" projects.

11.1.7.3.2 Other Air Districts' CEQA Guidelines

Portions of the NCMAD Program Area are outside the BAAQMD, i.e., in northern Sonoma County, eastern Solano County, Yolo County, and Lake County, which are in the jurisdiction of other air districts. Neither the NSCAPCD, YSAQMD, nor LCAQMD have applicable CEQA thresholds for GHGs, as discussed below.

Since the southern portion of Sonoma County is within the BAAQMD, NSCAPCD (2014) generally follows BAAQMD guidelines as appropriate for countywide consistency.

The YSAQMD *Handbook for Assessing and Mitigating Air Quality Impacts* (2007) contains Appendix A3.3 "Characteristics and Health Effects of Air Pollutants," in which GHGs are briefly discussed. With respect

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.

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

to CEQA, the YSAQMD acknowledges that "the issue of climate change has become increasingly connected to the CEQA process in recent years." Further, the YSAQMD "recommends that impacts to climate change be evaluated for every CEQA project" and cites a "number of helpful resources exist to assist with this evaluation" including the California Air Pollution Control Officers Association's document *CEQA & Climate Change* (2008). However, this document contains no quantitative criteria for evaluating projects that are not stationary sources or land use developments. Thus, YSAQMD presently has no quantitative GHG thresholds applicable to the Program and the BAAQMD thresholds presumptively apply. (YSAQMD 2013b)

LCAQMD (2014) provides a number of "Climate Change Website Links" related to CEQA, but has no specific guidelines or thresholds related to GHGs and the BAAQMD thresholds presumptively apply.

11.1.7.3.3 Napa 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.

Napa County

CEQA Guidelines

In Napa County, the CEQA Guidelines must be used in conjunction with *Napa County's Local Procedures for Implementing the California Environmental Quality Act* by the Napa County Planning Division (NPCD 2010) to determine the local policies and procedures to be followed in implementing CEQA. Appendix C of the County Procedures specifically delegates the definition of applicable GHG thresholds to the BAAQMD or CARB in the context of CEQA Guidelines Appendix G, Environmental Checklist Form, Section VII. Napa County asks whether the project would:

a) Generate a net increase in greenhouse gas emissions in excess of applicable thresholds adopted by the Bay Area Air Quality Management District or the California Air Resources Board which may have a significant impact on the environment?

b) Conflict with a county-adopted climate action plan or another applicable plan, policy, or regulation adopted for the purpose of reducing the emissions of greenhouse gases?

Pursuant to Section 101 of the County Procedures – Applicability, Napa County requires that the procedures established in the guidelines be applicable to both public and private projects under the County's jurisdiction and may be used by districts whose boundaries are coterminous with or are entirely encompassed by the County (NCPD 2010). Thus, the NCMAD Program is subject to the BAAQMD GHG thresholds, i.e., the 1,100 MT CO_2e per year significance threshold for presumptive "land use" projects.

Climate Action Plan

The Napa County Department of Planning, Building, and Environmental Services has been developing the Napa County Climate Action Plan (Plan) for the County for several years. The Plan is intended to quantify and reduce GHG emissions in unincorporated Napa County, and its adoption would implement a climate change action item from Napa County's 2008 General Plan Update. (NCPBES 2011)

The Draft Plan describes the 2005 baseline GHG emissions, forecasted GHG emissions for 2020, and identifies feasible measures the County intends to implement to reduce emissions by 2020 to a level 15 percent below the 2005 levels. Further, the Plan would require discretionary projects approved by the

County to reduce their "business as usual" emissions by 39 percent. A proposed checklist would be used by project applicants to select the emission reduction strategies they would implement to comply with CEQA. (NCPBES 2011)

The Draft Plan identifies the GHG reductions that are possible through the application of state, local, and project-level reduction measures. Relevant to the NCMAD Program, the Plan identifies the use of offroad vehicles and equipment (commercial/industrial) as emitting about 15,900 MT CO_2e in 2005 and projected to emit about 18,800 MT CO_2e in 2020 assuming "business as usual" projections (NCPBES 2011). Thus, to contribute to the goals of an adopted Plan, NCMAD would need to reduce its GHG emissions from offroad vehicles and equipment by 15 percent. This reduction would be accomplished by avoiding unnecessary use (running time), proper ongoing maintenance, and through replacement of older, less efficient equipment with newer, more efficient equipment over a span of several years (see Section 11.2.11 Best Management Practices).[4]

General Plan

The Napa County General Plan Conservation Element (NCPD 2009) acknowledges growing concerns about climate change in relation to energy generation and energy use. Because Napa County is primarily rural, the amount of GHGs emitted is small compared to the other counties in the Bay Area; however, transportation is the largest single contributor of GHG emissions in the County. Since Napa County would be affected by climate change, the County's contributing efforts are focused mainly on reductions in the two major sources of GHGs in the County: the use of energy derived from the burning of fossil fuels and the use of fossil fuels in motor vehicles. (NCPD 2009)

City of Napa

The City of Napa Planning Division provides a comprehensive planning review and evaluation of all current development projects in accordance with State Planning Law, CEQA, the City's General Plan, Zoning Ordinance, and other land use standards. General Plan Chapter 7 – Natural Resources – contains the Air Quality Element, which acknowledges that the City is within BAAQMD's jurisdiction. Thus, BAAQMD CEQA thresholds apply for projects within City limits – including GHG thresholds. Planning policies include promoting (1) alternative modes of transportation; (2) mixed land use and local-serving commercial; (3) energy conservation; (4) compliance with state and federal air quality standards; (5) compliance with applicable BAAQMD rules, regulations and permit requirements; and (6) optimizing traffic flow (i.e., synchronized signals). The City has also taken action related to climate change and drought by implementing a water conservation program. (City of Napa Planning Division 1998)

City of American Canyon

The City of American Canyon General Plan Chapter 8 – Natural & Historic/Cultural Element – contains Energy Resources Goal 8F, which outlines several measures under the theme of "reduce consumption of nonrenewable energy sources and support the development and utilization of new energy sources." They include (1) minimizing transportation-related energy consumption; (2) reducing energy consumption in buildings; (3) increasing public awareness of energy conservation needs and means to encourage informed choices about energy conservation by the general public; and (4) increasing the energy efficiency of City operations to save energy and reduce municipal costs while providing an example to the private sector. (ACCD 1994 [amended 2011])

Consistent with Goal 8F and AB 32, the Energy Efficiency Climate Action Plan identifies several feasible strategies and measures that cost-effectively reduce energy use and energy-related GHG emissions in

[4] NCMAD policy is to replace vehicles once they reach 80,000 miles of use; follow strict maintenance guidelines to minimize downtime and reduce fuel consumption; and use GPS tracking devices on vehicles to monitor fuel usage, speed, and idling time to verify efficient usage.

both municipal operations and across the community. The plan's aim is to provide the foundation for a comprehensive Climate Action Plan that will cover all sources of GHG emissions in the community, including waste and transportation, and will provide community measures to combat broader climate change issues such as water reliability and sea-level rise. (ACCD 2012)

Town of Yountville

The Town of Yountville General Plan Chapter IV – Environment – contains the Air Quality element, which states that most places and services in the Town can be accessed by walking and biking. The Town Structure establishes the interconnection of streets throughout the Town and reinforces walking and biking by extending existing streets into new developments and connecting new streets to one another. The Town also supports a local and regional bus transit system. The Energy element states that Yountville supports the energy conservation programs of Pacific Gas and Electric and other agencies through recycling programs, promoting the use of energy efficient building materials, and expanding its pedestrian and bike paths. (YPB 2003)

The Town of Yountville has adopted the State of California Model Water Efficient Landscape Ordinance, also CalGreen, the California green building code, which includes mandatory and voluntary energy conservation measures for construction projects with the overall goal of reducing GHG emissions. Yountville has also joined with the Napa County Transportation and Planning Agency and the other jurisdictions in Napa County to complete the *Napa Countywide Community Action Framework* (NCTPA 2009). The Framework includes a GHG emissions inventory for community-wide emissions in Yountville, an emissions reduction target, and a package of 53 actions (measures) that will help meet climate protection targets. The Town intends to use this Framework to create locally specific and appropriate programs to meet emission reduction targets. (YPB 2014)

City of St. Helena

The City of St. Helena General Plan Update Climate Change Element contains key findings, recommendations, goals, policies, and actions (measures) aimed at combating climate change in St. Helena. The Element focuses on energy conservation concerns, renewable energy production and use, transportation issues, sustainable business development, and responsible land use. The Element acknowledges that the transportation sector (traffic) is the largest source (55 percent) of GHG emissions within Napa County and that the high cost of housing in St. Helena has resulted in a largely nonresident commuter workforce. In 2005, per capita GHG emissions for St. Helena were the highest in Napa County at 1.77 MT CO_2e per year while the county average was 1.46 MT CO_2e per year. Thus, the Element also acknowledges the need for affordable housing. The Element contains a range of policies and implementing actions organized into six topical areas: (1) Transportation and Mobility; (2) Buildings and Energy; (3) Consumption and Solid Waste; (4) Agriculture, Natural Resources and Urban Forests; (5) Community Engagement; and (6) Local Government Operations. (St. Helena Planning 2012)

City of Calistoga

The City of Calistoga General Plan Chapter 9 – Open Space and Conservation Element – describes how the BAAQMD monitors air pollutant levels throughout the Bay Area, including the nearest sites in Napa and Santa Rosa. The Element states that the primary source of air pollution in and around Calistoga are mobile sources (traffic), with CO the pollutant of greatest concern at the local level. Further, wood burning from residential fireplaces and wood stoves are a substantial source of particulate matter pollution in wintertime. Under the topic of Global Conservation, the Element acknowledges that the City of Calistoga consumes a disproportionate share of global resources and that policies contained in the General Plan reinforce the need for the City to reduce consumption of nonrenewable fossil fuels which emit GHGs. (Calistoga Planning Department 2003)

In its Climate Action Plan, the City has adopted a GHG reduction target of 15 percent below 2005 emission levels by 2020. The Climate Action Plan (1) provides a brief summary of the science behind climate change, its potential local impacts, and current climate policy; (2) establishes a baseline inventory of community emissions and sets an emissions reduction target; (3) outlines a set of reduction strategies that will help the City work towards its GHG reduction targets; and (4) establishes a plan for implementation of the GHG reduction strategies. Specific GHG mitigation measures are organized into four areas: (1) transportation, (2) energy efficiency and renewable energy, (3) carbon sequestration, and (4) community engagement and advocacy. (Calistoga City Council 2014)

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. The public identified the following issue:

> Discuss impacts on greenhouse gases 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 and vector control activities. The PEIR addresses the following qualitative criteria used as standards of significance and are based on CEQA Guidelines Appendix G, Environmental Checklist Form, Section VII. Would the project:

> Generate greenhouse gas 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 greenhouse gas 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, 2012c, 2014c).

Table 11-8 shows Program alternatives applicability by percentage: surveillance, physical control, vegetation management, biological control, chemical control, or other nonchemical control. 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 and vector 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 and vector 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.

Tables 11-10 through 11-15 show estimated ongoing annual GHG emissions as CO_2e by alternative. On the local level, the combined "grand total" of 83 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 11-8 Napa County Mosquito Abatement District's Selected Alternatives Applicability

Surveillance	Physical Control	Vegetation Management	Biological Control	Chemical Control	Other Nonchemical
11%	13%	7%	2%	63%*	4%

Sources: Appendix C, NCMAD

* Chemical control includes the use of Bti, Bs. Approximately 85% of chemical control involves the use of Bti, Bs, and methoprene, which are larvicides used to control immature mosquitoes.

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

Residential	Commercial	Industrial	Agricultural	Open Space
•	•	•	•	•

Sources: Appendix C, NCMAD

Table 11-10 Estimated Annual GHG Emissions for Surveillance Alternative for Napa County Mosquito Abatement District

CO_2 MT/year	CH_4 MT/year	N_2O MT/year	CO_2e MT/year
8.9	0.0004	0.0002	8.9

Sources: CARB 2008a; USEPA 2011a, 2012c

Table 11-11 Estimated Annual GHG Emissions for Physical Control Alternative for Napa County Mosquito Abatement District

CO_2 MT/year	CH_4 MT/year	N_2O MT/year	CO_2e MT/year
10.4	0.0005	0.0003	10.5

Sources: CARB 2008a; USEPA 2011a, 2012c

Table 11-12 Estimated Annual GHG Emissions for Vegetation Management Alternative for Napa County Mosquito Abatement District

CO_2 MT/year	CH_4 MT/year	N_2O MT/year	CO_2e MT/year
5.6	0.0003	0.0001	5.7

Sources: CARB 2008a; USEPA 2011a, 2012c

Table 11-13 Estimated Annual GHG Emissions for Biological Control Alternative for Napa County Mosquito Abatement District

CO_2 MT/year	CH_4 MT/year	N_2O MT/year	CO_2e MT/year
1.3	0.0001	0.0000	1.4

Sources: CARB 2008a; USEPA 2011a, 2012c

Table 11-14 Estimated Annual GHG Emissions for Chemical Control Alternative for Napa County Mosquito Abatement District

CO_2 MT/year	CH_4 MT/year	N_2O MT/year	CO_2e MT/year
52.3	0.0027	0.0013	52.8

Sources: CARB 2008a; USEPA 2011a, 2012c

Table 11-15 Estimated Annual GHG Emissions for Other Nonchemical Control/Trapping Alternative for Napa County Mosquito Abatement District

CO_2 MT/year	CH_4 MT/year	N_2O MT/year	CO_2e MT/year
2.9	0.0001	0.0001	2.9

Sources: CARB 2008a; USEPA 2011a, 2012c

The District installed solar panels to meet electrical needs at the office/shop, and LED lights are included as part of the effort to conserve energy and reduce the District's carbon footprint. Furthermore, the District also implements the following BMPs (Table 2-9, 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 and vector populations and habitat, their disease pathogens, and the human/vector 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 be similar to the average emissions shown in Table 11-10. The Surveillance Alternative would emit approximately 9 MT CO_2e per year, which is below the presumptive 1,100 MT per year threshold 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 cumulatively considerable amount of GHGs, and neither would the incremental contribution of the District. 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, vehicles, and watercraft. This alternative involves managing vector 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 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 be similar to average emissions shown in Table 11-11. The Physical Control Alternative would emit approximately 11 MT CO_2e per year, which is below the presumptive 1,100 MT per year threshold 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 cumulatively considerable amount of GHGs, and neither would the incremental contribution of the District. 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, vehicles, and watercraft. Vegetation management is used to reduce the habitat value for mosquitoes and other vectors. The District uses hand tools and sometimes heavy equipment 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 be similar to average emissions shown in Table 11-12. The Vegetation Management Alternative would emit approximately 6 MT CO_2e per year, which is below the presumptive 1,100 MT per year threshold 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 cumulatively considerable amount of GHGs, and neither would the incremental contribution of the District. 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, vehicles, watercraft, and aircraft. It currently involves the use of mosquito predators, i.e., mosquitofish (*Gambusia affinis*), as they are the only commercially available biological control agents at this time. 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 be similar to average emissions shown in Table 11-13. The Biological Control Alternative would emit approximately 1 MT CO_2e per year, which is below the presumptive 1,100 MT per year threshold 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 cumulatively considerable amount of GHGs, and neither would the incremental contribution of the District. 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) 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 and rodenticides 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 be similar to average emissions shown in Table 11-14. The Chemical Control Alternative would emit approximately 53 MT CO_2e per year, which is below the presumptive 1,100 MT per year threshold 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 cumulatively considerable amount of GHGs, and neither would the incremental contribution of the District. 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 Nonchemical Control/Trapping Alternative

As applicable, the Other Nonchemical Control/Trapping Alternative would be a continuation of existing activities currently practiced by the District using applicable techniques, equipment, and vehicles. An example of these types of activities would be trapping of rodents and/or yellow jackets. The environmental impact concerns are phrased as questions as follows for the Other Nonchemical Control/Trapping Alternative:

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

GHG emissions from the Other Nonchemical Control/Trapping Alternative would be similar to average emissions shown in Table 11-15. The Other Nonchemical Control/Trapping Alternative would emit approximately 3 MT CO_2e per year, which is below the presumptive 1,100 MT per year threshold and would be less than significant (LS). Due to its small scale and GHG mitigations, the Other Nonchemical Control/Trapping 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-11:** Based on estimated annual CO_2e emissions, the Other Nonchemical Control/Trapping Alternative would not result in a cumulatively considerable amount of GHGs, and neither would the incremental contribution of the District. 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 Nonchemical Control/Trapping Alternative 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 Nonchemical Control/Trapping Alternative emissions in the local and statewide GHG emission inventories, the Other Nonchemical Control/Trapping 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.

11.2.9 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 six Program alternatives combined would 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 the Program emissions would not be cumulatively considerable because they occur intermittently on a very small scale (i.e., not stationary sources) and at 83 MT per year are nevertheless below the presumptive 1,100 MT per year threshold. Therefore, **the Program alternatives would not have a cumulatively considerable impact on global climate change**. BMPs (see Section 11.2.11) as implemented will reduce Program impacts even further.

11.2.10 Environmental Impacts Summary

Table 11-16 presents a summary of GHG impacts associated with the six 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 11-16 Summary of Greenhouse Gas Impacts by Alternative

Impact Statement	Surveillance	Physical Control	Vegetation Management	Biological Control	Chemical Control	Other Nonchemical/ Trapping
Effects on GHG						
Impact GHG-1: Based on estimated annual CO2e emissions, the Surveillance Alternative would not result in a cumulatively considerable amount of GHGs, and neither would the incremental contribution of the District. 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 CO2e emissions, the Physical Control Alternative would not result in a cumulatively considerable amount of GHGs, and neither would the incremental contribution of the District. 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 CO2e emissions, the Vegetation Management Alternative would not result in a cumulatively considerable amount of GHGs, and neither would the incremental contribution of the District. 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

Table 11-16 Summary of Greenhouse Gas Impacts by Alternative

Impact Statement	Surveillance	Physical Control	Vegetation Management	Biological Control	Chemical Control	Other Nonchemical/ Trapping
Impact GHG-7: Based on estimated annual CO2e emissions, the Biological Control Alternative would not result in a cumulatively considerable amount of GHGs, and neither would the incremental contribution of the District. Impacts would be **less than significant** and no mitigation is required.	na	na	na	LS	na	na
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 CO2e emissions, the Chemical Control Alternative would not result in a cumulatively considerable amount of GHGs, and neither would the incremental contribution of the District. 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 CO2e emissions, the Other Nonchemical Control/Trapping Alternative would not result in a cumulatively considerable amount of GHGs, and neither would the incremental contribution of the District. 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 Nonchemical Control/Trapping Alternative emissions in the local and statewide GHG emission inventories, the Other Nonchemical Control/Trapping 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	na	LS

LS = Less-than-significant impact
N = No impact
na = Not applicable
LS = Less than significant
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.

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