4.4

CLIMATE CHANGE

4.4.1 Introduction

This section describes the existing climate change conditions, regulations applicable to climate change, impacts on climate change that may result from implementing the General Plan Update, and mitigation measures that would reduce the significance of these impacts. Cumulative impacts on climate change are discussed near the end of the section.

4.4.2 Existing Conditions

This section describes the prevailing climatic conditions in the Project region, identifies the major greenhouse gases (GHGs) and the drivers of climate change, and discusses current GHG inventories at the federal and state level. The section also provides data on the city's 1990 and recent 2007 GHG emissions by sector. Finally, this section describes anticipated climate changes in California that will affect water resources, air quality, and wildfires.

Current Climatic Conditions in Southern California

The distinctive climate of the SCAB is determined by its terrain and geographic location, which includes a coastal plain with connecting broad valleys and low hills, bounded by the Pacific Ocean to the southwest and high mountains elsewhere. The general region lies in the semi-permanent high pressure zone of the eastern Pacific, resulting in a mild climate tempered by cool sea breezes with light average wind speeds. The usually mild climatological pattern is interrupted occasionally by periods of extremely hot weather, winter storms, or Santa Ana winds (warm west winds blowing from east of Los Angeles).

Greenhouse Effect and Climate Change

According to the federal Environmental Protection Agency (EPA), a GHG is any gas that absorbs infrared radiation in the atmosphere. This absorption traps heat within the atmosphere, maintaining Earth's surface temperature at a level higher than would be the case in the absence of GHGs. GHGs include water vapor, carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), halogenated chlorofluorocarbons (HCFCs), ozone (O_3), perfluorinated carbons (PFCs), and hydrofluorocarbons (HFCs). Naturally occurring GHGs include water vapor, CO_2, CH_4, N_2O, and O_3. Human activities add to the levels of most of these naturally occurring gases. The sources and sinks of each GHG are discussed later in this section.

Increasing levels of GHG in the atmosphere result in an increase in the temperature of the Earth's lower atmosphere, a phenomenon which is commonly referred to as *global warming*. Warming of the Earth's lower atmosphere induces a suite of additional changes including changes in: global precipitation patterns; ocean circulation, temperature, and acidity; global mean sea level; species distribution and diversity; and changes in the timing of biological processes. These large-scale changes are collectively referred to as *climate change*.

The Intergovernmental Panel on Climate Change (IPCC) has been established by the World Meteorological Organization and United Nations Environment Programme to assess scientific, technical, and socioeconomic information relevant to the understanding of climate change, its potential impacts, and options for adaptation and mitigation. As the leading authority on climate change science, their best estimates are that the average global temperature rise between 2000 and 2100 could range from 0.6°C (with no increase in GHG emissions above 2000 levels) to 4.0°C (with substantial increase in GHG emissions) (IPCC 2007c). Large increases in global temperatures could have massive deleterious impacts on the natural and human environments.

Since the industrial revolution (approximately 1800), the concentration of CO_2 in the Earth's atmosphere has increased from 270 ppm to roughly 379 ppm. Atmospheric concentrations of CH_4 and N_2O have similarly increased since the beginning of the industrial age (IPCC 2007c). Over this same time period, global average surface temperature has increased by 0.6°C, global average sea level has increased by nearly 60 mm, and northern hemisphere snow cover (data available since 1920) has decreased nearly 3 million square kilometers (IPCC 2007c). These recently recorded changes can be attributed with a high degree of certainty to increased concentrations of GHGs in the atmosphere (IPCC 2007c). Sinks of CO_2[1] (which remove, rather than emit, CO_2), include uptake by vegetation and dissolution into the ocean. Global GHG emissions

[1] A CO_2 sink is a resource that absorbs CO_2 from the atmosphere. The classic example of a sink is a forest in which vegetation absorbs CO_2 and produces oxygen through photosynthesis.

greatly exceed the removal capacity of natural sinks. As a result, concentrations of GHG in the atmosphere are increasing (California Energy Commission 2006).

GHGs are global pollutants, unlike criteria air pollutants (such as ozone precursors) and TACs. Criteria air pollutants, such as O_3 precursors and TACs, are pollutants solely of regional and local concern, and local concentrations respond to locally implemented control measures. The long atmospheric lifetimes of GHGs allow them to be transported long distances from sources and to become well-mixed, unlike criteria air pollutants, which typically exhibit strong concentration gradients away from point sources.

Climate Change Impacts in California

Increases in the globally averaged atmospheric concentration of GHGs will cause the lower atmosphere to warm, in turn inducing a myriad of changes to the global climate system. These large scale changes will have unique and potentially severe impacts in the western United States, California, and the region surrounding the city. Current research efforts coordinated through the CARB, California Energy Commission (CEC), California EPA (Cal/EPA), University of California (UC) system, and others are examining the specific changes to California's climate that will occur as the Earth's surface warms.

Existing evidence indicates that climate change could impact the natural environment in California in the following ways, among others:

- rising sea levels along the California coastline, including the San Francisco Bay and the San Joaquin Delta, due to ocean expansion;
- extreme-heat conditions, such as heat waves and very high temperatures, which could last longer and become more frequent;
- an increase in heat-related human deaths, infection diseases, and a higher risk of respiratory problems caused by deteriorating air quality;
- reduced snow pack and stream flow in the Sierra Nevada mountains, affecting winter recreation and water supplies;
- potential increase in the severity of winter storms, affecting peak stream flows and flooding;
- changes in growing season conditions that could affect California agriculture, causing variations in crop quality and yield; and
- changes in distribution of plant and wildlife species due to changes in temperature, competition from colonizing species, changes in hydrologic cycles, changes in sea levels, and other climate-related effects.

With the exception of rising sea level, there is currently no information available regarding the occurrence and severity of these changes at the local or regional level.

These alterations of California's climate and ecosystems are occurring at a time when California's population is expected to increase from 34 million to 59 million by 2040 (CEC 2006). As such, the number of people potentially affected by climate change, as well as the amount of anthropogenic GHG emissions, is expected to significantly increase. Similar changes as those noted above for California also would occur in other parts of the world, with regional variations in vulnerabilities and affected resources.

Greenhouse Gases

The greenhouse gases listed by the IPCC (CO_2, CH_4, N_2O, HFCs, PFCs, and sulfur hexafluoride [SF_6]) are documented in this section, in order of abundance in the atmosphere. Water vapor, although the most abundant GHG, is not included in this list because, natural concentrations and fluctuations far outweigh anthropogenic influences. The sources and sinks of each of these gases are discussed in detail below.

To simplify reporting and analysis, methods have been set forth to describe emissions of GHGs in terms of a single gas, CO_2. Generally, GHG emissions are quantified in terms of metric tons of carbon dioxide equivalents (CO_2e) emitted per year. GHGs are compared in terms of their respective global warming potentials (GWP), that is, the warming capacity per molecule given an atmospheric lifetime of 100 years. The IPCC defines the GWP of various GHG emissions on a normalized scale that recasts all GHG emissions in terms of CO_2e, which compares the gas in question to that of the same mass of CO_2 (CO_2 has a GWP of 1 by definition).

The atmospheric residence time of a gas is equal to the total atmospheric abundance of the gas divided by its rate of removal. The atmospheric residence time of a gas is, in effect, a half-life measurement of how long a gas is expected to persist in the atmosphere when taking into account removal mechanisms such as chemical transformation and deposition. Table 4.4-1 lists the GWP of each GHG, its lifetime, and abundance in the atmosphere in parts per trillion (ppt), parts per billion (ppb) or parts per million (ppm).

Table 4.4-1. Lifetimes, Global Warming Potentials, and Abundances of Several Significant Greenhouse Gases

Gas	Global Warming Potential (100 years)	Lifetime (years)	2005 Atmospheric Abundance (ppm)
CO_2	1	50–200	379
CH_4	21	9–15	1.7
N_2O	310	120	0.32
HFC-23	11,700	264	1.8×10^{-5}
HFC-134a	1,300	14.6	3.5×10^{-5}
HFC-152a	140	1.5	3.9×10^{-6}
CF_4	6,500	50,000	7.4×10^{-5}
C_2F_6	9,200	10,000	2.9×10^{-6}
SF_6	23,900	3,200	5.6×10^{-6}

Notes: CF_4 and C_2F_6 are PFCs. The GWP values presented above are based on the IPCC Second Assessment Report (SAR) and United Nations Framework Convention on Climate Change (UNFCCC) reporting guidelines (IPCC 1996; UNFCCC 2006). Although the IPCC Fourth Assessment Report (AR4) presents different GWP estimates, the current inventory standard relies on SAR GWPs to comply with reporting standards and consistency with regional and national inventories (EPA 2009).

Sources: IPCC 1996, 2001, 2007c.

Carbon Dioxide

CO_2 is the most important anthropogenic GHG and accounts for more than 75% of all anthropogenic GHG emissions. Its long atmospheric lifetime (on the order of decades to centuries) ensures that atmospheric concentrations of CO_2 will remain elevated for decades even after GHG mitigation efforts to reduce GHG concentrations are promulgated (IPCC 2007b).

Primary sources of anthropogenic CO_2 in the atmosphere are the burning of fossil fuels (including motor vehicles), gas flaring, cement production, and land use changes, including deforestation. CO_2 emissions due to the burning of fossil fuels represent nearly 60% of total GHG emissions worldwide, of which approximately 23% is from the transportation sector. As shown below in Figure 4.4-2, in California the percentage of transportation-related CO_2 emissions is approximately 39%.CO_2 emissions resulting from deforestation are the second largest source of GHGs worldwide (17%).

Methane

CH_4, the main component of natural gas, is the second most abundant GHG and has a GWP of 21 (IPCC 1996). Sources of anthropogenic emissions of CH_4 include growing rice, raising cattle, combusting natural gas, landfill outgassing, and mining coal (NOAA 2005). Atmospheric CH_4 has increased from a pre-industrial concentration of 715 ppb to 1,775 ppb in 2005 (IPCC 2007a).

Nitrous Oxide

N_2O is a powerful GHG, with a GWP of 310 (IPCC 1996). Anthropogenic sources of N_2O include agricultural processes, nylon production, fuel-fired power plants, nitric acid production, and vehicle emissions. N_2O also is used in rocket engines, racecars, and as an aerosol spray propellant. More than 70% of U.S. N_2O emissions are related to agricultural soil management practices, particularly fertilizer application. N_2O concentrations in the atmosphere have increased from pre-industrial levels of 270 ppb to 319 ppb in 2005, an 18% increase (IPCC 2007a).

Hydrofluorocarbons

HFCs are human-made chemicals used in commercial, industrial, and consumer products and have high GWPs (EPA 2006). HFCs generally are used as substitutes for ozone-depleting substances (ODS) in automobile air conditioners and refrigerants. As seen in Table 4.4-1, the most abundant HFCs, in order from most abundant to least, are HFC-134a (35 ppt), HFC-23 (17.5 ppt), and HFC-152a (3.9 ppt). Concentrations of HFCs have risen from zero to current levels since pre-industrial times.

Perfluorocarbons (PFCs)

The most abundant PFCs are CF_4 (PFC-14) and C_2F_6 (PFC-116). These human-made chemicals are emitted largely from aluminum production and semiconductor manufacturing processes. PFCs are extremely stable compounds that are destroyed only by very high-energy ultraviolet rays, which results in the very long lifetimes of these chemicals, as shown in Table 4.4-1 (EPA 2006).

Sulfur Hexafluoride

SF_6, another human-made chemical, is used as an electrical insulating fluid for power distribution equipment, in the magnesium industry, and in semiconductor manufacturing; and also as a trace chemical for the study of oceanic and atmospheric processes (EPA 2006).

In 1998, atmospheric concentrations of SF_6 were 4.2 ppt and steadily increasing in the atmosphere. SF_6 is the most powerful of all GHGs listed in IPCC studies, with a GWP of 23,900 (IPCC 1996).

GHG Inventories

A GHG inventory is a quantification of all GHG emissions and sinks within a selected physical and/or economic boundary. GHG inventories can be performed on a large scale (i.e., for global and national entities) or on a small scale (i.e., for a particular building or person). This section discusses GHG inventory results for the U.S., California, and the city.

GHG emission and sink quantifications are complicated by various factors. First, some GHG emissions are the result of processes that are easily characterized and well understood, while other GHG sources or sinks are not known with accuracy. Second, the attribution of sources and sinks of GHGs requires the delineation of boundaries that may be more in-line with governmental or financial boundaries than the physical process emitting GHGs. As such, GHG protocols are currently under development, and ad-hoc tools must be developed to quantify emissions from certain sources and sinks. The inventories described below represent the best available methodologies for assessing emissions at the national, state, and local levels.

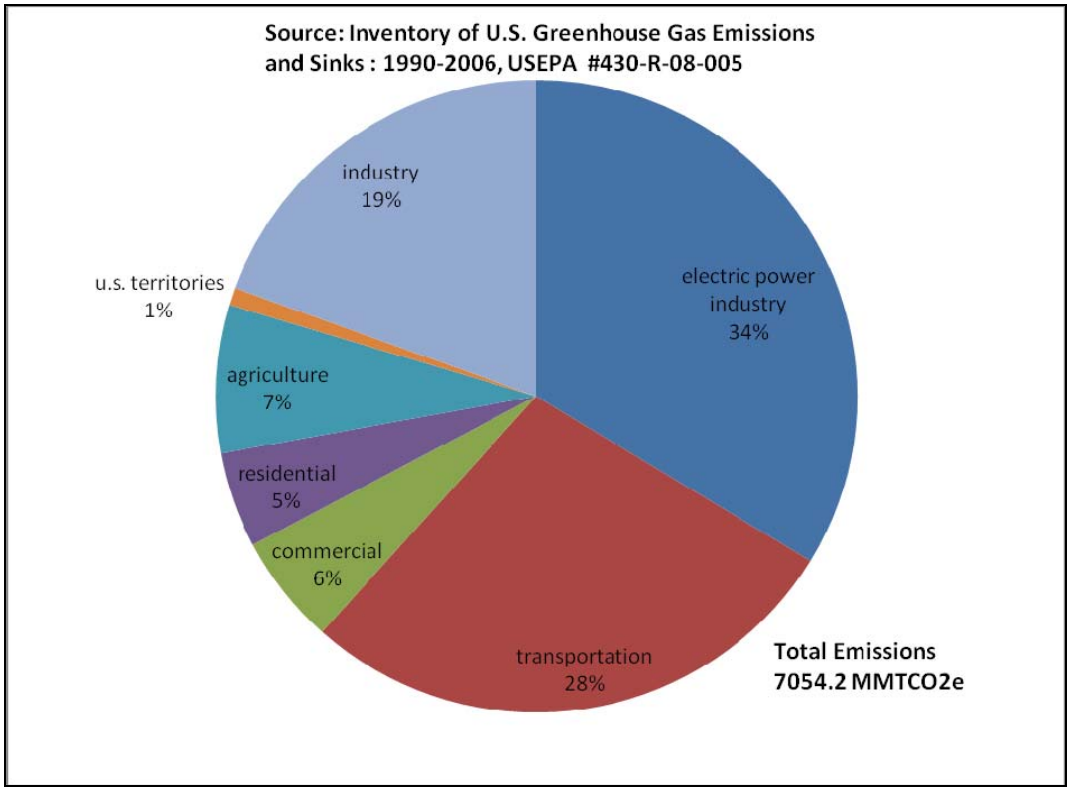
U.S. GHG Emissions Inventory

As estimated by the U.S. Department of Energy, total U.S. GHG emissions in 2006 were 7,054.2 million metric tons of carbon dioxide equivalents ($MMTCO_2e$) (EPA 2008a). Figure 4.4-1 presents 2006 U.S. GHG emissions by sector.

Production of electric power (33.7%) and transportation (27.9%) are responsible for nearly 62% of U.S. GHG emissions. Emissions from industry (19.4%), agriculture (7.6%) and other sources (11.4%) account for the remaining U.S. emissions. Emissions in the electricity generation; transportation; and residential, commercial, and industrial sectors are primarily emissions of CO_2. GHG emissions due to agriculture are predominantly CH_4 and N_2O. In general, industrial emissions in the U.S. have declined over the last decade while

emissions in other sectors, such as transportation, have grown steadily. Although not shown in Figure 4.4-1, GHG sinks are also accounted for in the U.S. Inventory. CO_2 was emitted and sequestered by a variety of activities related to forest management practices, tree planting in urban areas, the management of agricultural soils, and landfilling of yard trimmings. CO_2 removal through these activities in 2006 was roughly 883.7 $MMTCO_2e$, or 13% of total emissions. (EPA 2008a).

Figure 4.4-1. U.S. Greenhouse Gas Emissions by Sector—2006

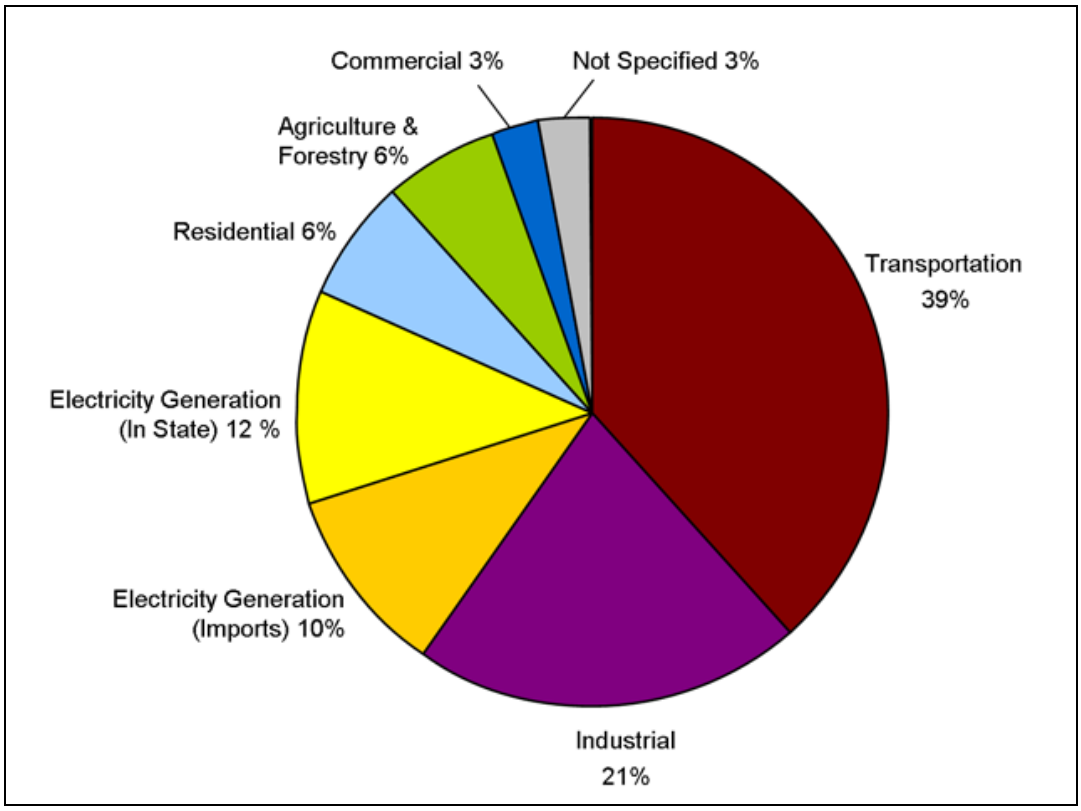


Note: High-GWP gases include HFCs, PFCs, and SF_6.

California GHG Emissions Inventory

Worldwide, California is the 12th to 16th largest emitter of CO_2 and is responsible for approximately 2% of the world's CO_2 emissions (CEC 2006). CEC's Inventory of Greenhouse Gas Emissions and Sinks: 1990–2004 estimates that California is the second-largest state emitter of GHG emissions in the United States, behind Texas in absolute emissions. However, California has relatively low carbon intensity when considering per capita GHG emissions or GHG emissions per unit gross state product. Figure 4.4-2 presents 2006 California GHG emissions by sector.

Figure 4.4-2. California Greenhouse Gas Emissions by Sector—2006



Source: CARB 2009a

Transportation is responsible for 39% of the state's GHG emissions, followed by the industrial sector (21%), electricity generation (22%), agriculture and forestry (6%) and other sources (12%) (CARB 2009a). In general, California's sectoral emissions are similar to the pattern of emissions at the national level. Emissions associated with electricity generation for California customers (22%) are slightly less than those for the U.S as a whole (33.7%), due to the diminished role of coal in California's power mix. Emissions from the residential and commercial sectors are primarily due to onsite combustion of fossil fuels (i.e., natural gas) for heating or cooking.

CARB estimates that 2006 state-wide GHG emissions were 483.87 $MMTCO_2e$, while in 1990 they were 433.29 $MMTCO_2e$. Factoring in the reduction in GHG emissions due to the functioning of existing forests and rangeland as carbon sinks, California's GHG emissions in 2006 were 479.80 $MMTCO_2e$ (CARB 2009a). CARB forecasts California's business-as-usual (BAU) 2020 net GHG emissions will amount to 596.4 $MMTCO_2e$, representing a 24% increase from 2006 emissions (CARB 2009b).

City of La Cañada Flintridge GHG Emissions Inventory

The 2007 GHG inventory and 1990 inventory back-cast for the city is summarized in Table 4.4-2 and discussed below. The inventory methodology is described in detail in Appendix C and summarized briefly below for each sector.

Table 4.4-2. La Cañada Flintridge Community Emissions and Sinks Summary

1990 Estimate, 2007 Community Inventory, and BAU (2020) Projections ($MTCO_2e$)						
Sector	**1990**		**2007**		**2020**	
	Emissions	Percent	Emissions	Percent	Emissions	Percent
Emission Sources						
Residential Energy	56,971	19.9	56,823	18.9	57,104	16.6
Commercial Energy[1]	61,326	21.4	60,464	20.1	64,121	18.6
Mobile Sources: On-road	149,848	52.3	162,385	53.9	186,378	54.1
Mobile Sources: Off-road	314	0.1	638	0.2	731	0.2
Waste	8,897	3.1	6,889	2.3	7,275	2.1
Wastewater Treatment	4,190	1.5	3,042	1.0	3,057	0.9
Water Supply[2]	1,976	0.7	1,940	0.6	2,414	0.7
High-GWP GHGs	2,720	1.0	8,932	3.0	23,204	6.7
Subtotal	**286,242**	**100.0**	**301,113**	**100.0**	**344,283**	**100.0**
Emission Sinks						
Landfill Carbon	(2,583)	33.4	(2,000)	28.0	(2,112)	29.1
Forest Land / Open Space[3]	(775)	10.0	(775)	10.8	(775)	10.7
Urban Forest[3]	(4,377)	56.6	(4,377)	61.2	(4,377)	60.3
Subtotal	**(7,734)**	**100.0**	**(7,151)**	**100.0**	**(7,263)**	**100.0**
Net Emissions (Sources and Sinks)	**278,508**	**100.0**	**293,961**	**100.0**	**337,019**	**100.0**

[1] La Cañada Flintridge does not have industrial land uses. This sector also includes emissions associated with water pumping and treatment occurring within the city.

[2] This sector represents emissions associated with water pumping and treatment occurring outside city boundaries.

[3] These estimates are based on average sequestration rates for California, and are therefore only approximations of actual sequestration occurring in the city.

The GHG inventory (including the 1990 back-cast and 2020 forecast) includes GHG emissions from the following sectors: residential and commercial building energy use, fuel consumption by on- and off-road mobile sources, waste, wastewater, potable water supply, and high-GWP gases. Building energy use includes electricity and natural gas consumed by residents and businesses for heating and cooking. Methane emissions from waste generation in the city result from the decomposition of the waste in landfills. In contrast to other emissions sources such as automobiles or onsite natural gas combustion, the landfill methane emissions from one year's waste occur over the entire time period

required for the waste to decompose (approximately 30 years). Emissions estimated from the water and wastewater sector are due to energy consumed to transport, distribute, and treat water.

In 2007, net GHG emissions in the city totaled 293,961 $MTCO_2e$. On-road vehicles contributed 162,385 $MTCO_2e$, or 53.9%, and off-road equipment contributed an additional 0.2%, or 638 $MTCO_2e$. Approximately 39% of the 2007 GHG emissions can be attributed to electricity and natural gas used to power or heat residences, homes, and commercial buildings. Waste generated by city residents and businesses in 2007 will produce 6,889 metric tons of GHGs (due to landfill methane) over the next 30 years. Wastewater treatment resulted in 3,042 metric tons of CO_2e, and emissions associated with the city's water supply were 1,940 $MTCO_2e$. High-GWP gases added an additional 8,932 $MTCO_2e$, or 3% of the total budget. The city does not have industrial land uses.

The 2020 emissions projection represents BAU emissions associated with the city in 2020. This projection scales current emissions based on population growth, job growth, or other appropriate metrics and assumes that the City does not take any action to curb emissions going forward. Population growth and associated development in the city will result in additional GHG emissions primarily from on-road vehicles, electricity and natural gas consumption by homes and businesses, and increased high-GWP GHG emissions associated with the phase-out of ozone-depleting substances. 2020 projected emissions are 344,283 $MTCO_2e$ (or 14.3% above current conditions), and 2020 net emissions (including sinks) are 337,019 $MTCO_2e$ (or 14.6% above current conditions).

The 1990 emissions estimate is based on the 2007 inventory as well as historical population, activity, and growth information. This estimate will support the development of a GHG reduction policy, but it is not used to evaluate GHG emissions impacts that are anticipated under the City's General Plan Update.

As provided in State CEQA Guidelines Section 15125, the existing environment at the time the NOP is released is normally the baseline for analysis. Therefore, the evaluation of GHG emissions impacts uses 2007 as its baseline.

4.4.3 Regulatory Setting

This section discusses federal, state, and local legislation, policies, and regulations related to the analysis of climate change and GHG emissions in the city. Globally distributed sources and the well-mixed nature of GHGs pose a significant challenge to mitigation programs. As such, the regulatory framework for mitigating emissions is still evolving.

Federal

Although there is currently no federal overarching law or policy related to climate change or regulation of GHGs, recent activity suggests that regulation may be forthcoming. Foremost among recent developments has been the U.S. Supreme Court's decision in *Massachusetts v. EPA*, the "Endangerment Finding," and "Cause or Contribute Finding," which is described below. Despite these findings, the future of GHG regulations at the federal level is still uncertain. EPA regulation may be pre-empted by congressional action should a cap and trade bill be passed prior to adoption of EPA regulation.

The following summarizes recent legal cases, legislation, and policies related to climate change and GHG regulation.

Massachusetts et al. v. U.S. Environmental Protection Agency (2007)

Twelve U.S. states and cities including California, in conjunction with several environmental organizations, sued the EPA in an effort to force the agency to regulate GHG as a pollutant pursuant to the CAA in *Massachusetts et al. v. Environmental Protection Agency*. On April 2, 2007, the U.S. Supreme Court held that the EPA has the authority to regulate GHG emissions as pollutants pursuant to the CAA. However, at the time of the ruling, the court did not decide whether the EPA is required to regulate GHG emissions, or may exercise discretion to not regulate at this time.

Energy Independence and Security Act of 2007

The Energy Independence and Security Act of 2007 mandates a host of actions that would aid in the reduction of GHG emissions. These include (but are not limited to): fuel economy standard of 35 miles per gallon (mpg) by 2020; improved energy efficiency in lighting and appliances; and investments in efficiency and renewable energy use (White House 2008).

Update to Corporate Average Fuel Economy (CAFE) Standards (2009)

The new CAFE standards incorporate stricter fuel economy standards promulgated by the State of California into one uniform standard. Additionally, automakers are required to cut GHG emissions in new vehicles by roughly 25%

by 2016. Rule-making to adopt these new standards is still in process and thus the standards are not yet in effect. When the national program takes effect, California has committed to allowing automakers who show compliance with the national program to also be deemed in compliance with state requirements (EPA 2010).

HR 2454: American Clean Energy and Security Act of 2009

On June 26, 2009, the U.S. House of Representatives passed the American Clean Energy and Security Act, also known as the Waxman-Markey Clean Energy Bill. The bill's centerpiece is the establishment of a cap and trade program for GHGs and includes the following key provisions: (1) requirement that electric utilities meet 20% of their demand with renewable sources of power by 2020; (2) investments of $190 billion in clean energy technologies and energy efficiency; (3) mandates for new energy saving standards for buildings, appliances, and industry; and (4) goal set to reduce GHG emissions from U.S. sources by 17% before 2020 and 80% by 2050.

The passage of the legislation marked the first time that either house of Congress passed a bill limiting the emissions of GHGs. On July 7, 2009, the bill was placed on the Senate Legislative Calendar. At the writing of this document, a companion bill has been drafted by Senators Barbara Boxer and John Kerry (S. 1733: Clean Energy Jobs and American Power Act). The bill was approved by the Committee on Environment and Public Works in November of 2009 but has not yet been debated by the Senate.

EPA Rule: Mandatory Reporting of GHGs (2009)

Under the rule, suppliers of fossil fuels or industrial GHGs, manufacturers of vehicles and engines, and facilities that emit 25,000 metric tons or more per year of GHG emissions are required to report annual emissions to the EPA. The first annual reports for the largest emitting facilities, covering calendar year 2010, will be submitted to the EPA in 2011. The mandatory reporting rule does not limit GHG emissions but establishes a standard framework for emissions reporting and tracking of large emitters (EPA 2010).

EPA "Endangerment Finding" and "Cause or Contribute Finding" (2009)

In its "Endangerment Finding," the Administrator of the EPA found that GHGs in the atmosphere, as described above, threaten the public health and welfare of current and future generations. The Administrator also found that the combined

emissions of these well-mixed GHGs from new motor vehicles and new motor vehicle engines contribute to the GHG pollution that threatens public health and welfare. Although the Endangerment Finding does not place requirements on industry, it is an important step in the EPA's process to develop regulation. This action is a prerequisite to finalizing the EPA's proposed GHG emission standards for light-duty vehicles, which were jointly proposed by EPA and the Department of Transportation's National Highway Safety Administration on September 15, 2009 (EPA 2010).

In its "Cause or Contribute Finding" the Administrator found that the combined emissions of these well-mixed GHGs from new motor vehicles and new motor vehicle engines contribute to the GHG pollution that threatens the public health and welfare (EPA 2010).

Council on Environmental Quality (CEQ) NEPA Guidance on Consideration of Effects of Climate Change and GHG Emissions (2010)

This guidance was intended to help explain how agencies of the Federal government should analyze the environmental effects of GHG emissions and climate change when they describe the environmental effects of a proposed agency action in accordance with Section 102 of NEPA and the CEQ Regulations for Implementing the Procedural Provisions of NEPA, 40 CFR 1500–1508. The guidance affirmed the requirements of the statute and regulations and their applicability to GHGs and climate change impacts. CEQ proposed to advise federal agencies that they should consider opportunities to reduce GHG emissions caused by proposed federal actions and adapt their actions to climate change impacts throughout the NEPA process and address these issues in their agency NEPA procedures.

The guidance advised federal agencies to consider whether analysis of the direct and indirect GHG emissions from their proposed actions may provide meaningful information to decision makers and the public. The guidance identified a "reference point" of 25,000 metric tons of direct CO_2-equivalent GHG emissions as an "indicator" that the proposed federal action's anticipated GHG emissions warrant detailed consideration in a NEPA review. For indirect GHG emissions (i.e., GHG emissions that have a causal nexus to, but are not directly emitted by, or the direct result of, the project), the guidance did not propose a reference point indicating when such indirect emissions are significant, and cautioned that any consideration of indirect GHG emissions needed to recognize the limits of feasibility in evaluating upstream and downstream effects of proposed federal actions.

The guidance did not propose this reference point as an indicator of a level of GHG emissions that may significantly affect the quality of the human environment, but rather as a minimum standard for reporting emissions under the Clean Air Act.

State

The State of California has adopted legislation, and regulatory agencies have enacted policies, addressing various aspects of climate change and GHG emissions mitigation. Much of this legislation and policy activity is not directed at citizens or jurisdictions but rather establishes a broad framework for the state's long-term GHG mitigation and climate change adaptation program. This program includes research, energy conservation and infrastructure, transportation, emissions reporting protocols, the role of local governments, and adaptation planning. Additionally, the Governor has issued several executive orders related to the state's evolving climate change policy..

Assembly Bill 1493 (Pavley)

Known as "Pavley I," Assembly Bill (AB) 1493 standards are the nation's first GHG standards for automobiles. AB 1493 requires CARB to adopt vehicle standards that will lower GHG emissions from new light duty autos to the maximum extent feasible beginning in 2009. Additional strengthening of the Pavley standards (Pavley II) has been proposed for vehicle model years 2017–2020. Together, the two standards are expected to increase average fuel economy to roughly 43 mpg by 2020 and reduce GHG emissions from the transportation sector in California by approximately 14%. In June 2009, the EPA granted California's waiver request enabling the state to enforce its GHG emissions standards for new motor vehicles beginning with the current model year. The new federal CAFE standards, described above, are the analogous national policy.

Executive Order S-03-05 (2005)

Executive Order (EO) S-03-05 established the following GHG emission reduction targets for California's state agencies:

- By 2010, reduce GHG emissions to 2000 levels;
- By 2020, reduce GHG emissions to 1990 levels; and
- By 2050, reduce GHG emissions to 80% below 1990 levels.

Executive orders are binding only on state agencies. Accordingly, EO S-03-05 will guide state agencies' efforts to control and regulate GHG emissions but will have no direct binding effect on local efforts. The Secretary of Cal/EPA is required to report to the Governor and state legislature biannually on the impacts of global warming on California, mitigation and adaptation plans, and progress made toward reducing GHG emissions to meet the targets established in this executive order.

SB 1078/SB 107—Renewable Portfolio Standard

Senate Bills (SB) 1078 and 107—California's Renewable Portfolio Standard (RPS)— obligate investor-owned utilities (IOUs), energy service providers (ESPs), and Community Choice Aggregations (CCAs) to procure an additional 1% of retail sales per year from eligible renewable sources until 20% is reached, no later than 2010. The California Public Utilities Commission (CPUC) and CEC are jointly responsible for implementing the program. EO S-14-08 set forth a longer range target of procuring 33% of retail sales by 2020.

Assembly Bill 32 (2006)—The California Global Warming Solutions Act

AB 32 codified the state's GHG emissions target by requiring that the state's global warming emissions be reduced to 1990 levels by 2020. Since being adopted, the CARB, CEC, CPUC, and Building Standards Commission have been developing regulations that will help meet the goals of AB 32 and EO S-03-05. The Scoping Plan for AB 32 identifies specific measures and actions to reduce GHG emissions to 1990 levels by 2020, and requires CARB and other state agencies to develop and enforce regulations and other initiatives for reducing GHGs.

AB 32 Scoping Plan

A Scoping Plan for AB 32 (CARB 2008a) was adopted by CARB in December 2008 and identifies measures to reduce GHG emissions to 1990 levels, which is approximately 30% less than BAU emission levels projected for 2020, or about 15% less than current levels as they were in 2008. The Scoping Plan includes GHG reduction strategies in the following focus areas: a cap and trade program with other western states, vehicle fuel economy, building energy efficiency, renewable power sources, carbon intensity of transport fuels, agriculture, forestry, mass transit, industrial sources, water, waste, and recycling. The Scoping Plan has a range of GHG reduction actions, including direct regulations, alternative compliance mechanisms, monetary and non-monetary incentives, voluntary actions, and market-based mechanisms such as a cap-and-trade

system. It requires CARB and other state agencies to develop and enforce regulations and other initiatives reducing GHGs by 2012. The complete AB 32 Scoping Plan as well as additional information about individual programs can be found through the AB 32 Scoping Plan website: (http://www.arb.ca.gov/cc/scopingplan/scopingplan.htm).

Senate Bill 97, Chapter 185, Statutes of 2007

SB 97 of 2007 requires the Office of Planning and Research (OPR) to prepare guidelines to submit to the California Resources Agency regarding feasible mitigation of GHG emissions or the effects of GHG emissions as required by CEQA. . The Natural Resources Agency adopted Amendments to the CEQA Guidelines for GHG emissions on December 30, 2009. On February 16, 2010, the Office of Administrative Law approved the Amendments, and filed them with the Secretary of State for inclusion in the California Code of Regulations. The Amendments became effective on March 18, 2010.

Executive Order S-01-07, Low Carbon Fuel Standard

EO S-01-07 essentially mandates the following: (1) that a statewide goal be established to reduce the carbon intensity of California's transportation fuels by at least 10% by 2020; and (2) that a Low Carbon Fuel Standard (LCFS) for transportation fuels be established in California.

Senate Bill 375—Sustainable Communities Strategy, Chapter 728, Statues of 2008

SB 375 (provides for a new planning process that coordinates land use planning, regional transportation plans, and funding priorities in order to help California meet the GHG reduction goals established in AB 32.. Further, SB 375 provides incentives to locate housing developments closer to where people work and go to school, allowing them to reduce vehicle miles traveled (VMT) every year.

SB 375 requires regional transportation plans, developed by metropolitan planning organizations (MPOs) relevant to the project area, including SCAG, to incorporate a "sustainable communities strategy" (SCS) in their Regional Transportation Plans (RTPs). The goal of the SCS is to reduce regional VMT through land use planning and consequent transportation patterns. The CARB will set regional GHG reduction targets that will focus each SCS. The regional targets are scheduled to be released by the CARB in September 2010. SB 375 also includes provisions for streamlined CEQA review for some infill projects such as transit-oriented development. However, those provisions will not become

effective until an SCS is adopted. SCAG has not yet developed an SCS and is not expected to adopt an RTP incorporating an SCS until the next RTP update in 2012.

California Energy Efficiency Standards for Residential and Non-Residential Buildings (Title 24)

Energy Conservation Standards for new residential and nonresidential buildings were adopted by California Energy Resources Conservation and Development Commission in June 1977 and most recently revised in 2008 (24 CCR 6). Title 24 requires that building shells and building components be designed to conserve energy. The standards are updated periodically to allow consideration and possible incorporation of new energy efficiency technologies and methods. This program has been partially responsible for keeping California's per capita energy use approximately constant over the past 30 years.

On July 17, 2008, the California Building Standards Commission adopted the nation's first green building standards. The California Green Building Standards Code (proposed Part 11, Title 24) was adopted as part of the California Building Standards Code (24 CCR). Part 11 establishes voluntary standards that will become mandatory in the 2010 edition of the code, including planning and design for sustainable site development, energy efficiency (in excess of the California Energy Code requirements), water conservation, material conservation, and internal air contaminants.

Assembly Bill 939, Titles 14, 17, and 27 (Chapter 1095, Statutes of 1989)

GHG emissions from landfills are regulated under AB 939, as set out in Titles 14, 17, and 27 of the CCR. AB 939 mandated local jurisdictions to meet waste diversion goals of 25% by 1995 and 50% by 2000. In addition, AB 939 established an integrated statewide system for compliance and program implementation. Titles 14 and 27 contain detailed rules on daily operations, handling of specific waste types, monitoring, closure, and record-keeping.

At its June 25, 2009, public hearing, the CARB approved for adoption CCR, title 17, article 4, sub-article 6, sections 95460 to 95476, Methane Emissions from Municipal Solid Waste Landfills. This regulation is a discrete early action GHG reduction measure, as described in the California Global Warming Solutions Act of 2006 (AB 32; Stats. 2006, chapter 488). It will reduce methane emissions from landfills primarily by requiring owners and operators of certain uncontrolled landfills to install gas collection and control systems, and by requiring existing and newly installed gas collection and control systems to operate optimally.

CARB Mandatory GHG Reporting Rule (Title 17)

In December of 2007, the CARB approved a rule requiring mandatory reporting of GHG emissions from certain sources, pursuant to AB 32. Facilities subject to the mandatory reporting rule must report their emissions from the calendar year 2009 and have those emissions verified by a third party in 2010. In general the rule applies to facilities emitting more than 25,000 metric tons of CO_2e in any given calendar year or electricity generating facilities with a nameplate generating capacity greater than 1 megawatt (MW) and/or emitting more than 2,500 metric tons CO_2e per year. Additional requirements also apply to cement plants and entities that buy and sell electricity in the state.

CARB Local Government Operations Protocol

On September 25, 2008, the Local Government Operations Protocol (LGOP) was adopted by the CARB. The protocol, prepared by the CARB, California Climate Action Registry, ICLEI—Local Governments for Sustainability, and the Climate Registry, provides methods and techniques for the preparation of GHG emissions inventories for local government municipal operations. The adopted protocol does not contain recommendations for GHG reductions by local governments (CARB 2008b).

Local

South Coast Air Quality Management District GHG Regulations

The SCAQMD has jurisdiction over an area of approximately 10,743 square miles that includes all of Orange County, all of Los Angeles County except for the Antelope Valley, the non-desert portion of western San Bernardino County, and the western and Coachella Valley portions of Riverside County. The SCAQMD does not currently have any regulations in place related to climate change or to the CEQA analysis of GHG emissions. However, along with several other air districts, SCAQMD is currently in the process of developing and adopting regulations related to GHG emissions and their treatment in the CEQA process.

The SCAQMD released its interim GHG significance thresholds in October 2008, and its governing board adopted the staff proposal on December 5, 2008. The draft GHG significance thresholds utilize a tiered approach, with some suggesting multiple approaches for determining whether a project's GHG emissions are significant. The SCAQMD's proposed approach is as follows:

- Tier 1: if the project qualifies for any applicable exemption under CEQA, then no further GHG analysis is required. If not, then it would move on to the next tier.
- Tier 2: if the project is consistent with a local GHG reduction plan, it is not significant for GHG emissions. If it is not consistent with a local GHG plan or there is no approved plan, the project would move on to Tier 3.
- Tier 3: projects are screened based on prescribed thresholds. The proposed thresholds are 10,000 $MTCO_2e$/yr for industrial and 3,000 $MTCO_2e$/yr for commercial and residential projects. Projects that are expected to be below these thresholds are still required to include energy efficiency components.
- Tier 4: consists of three decision tree options to demonstrate that the project is not significant for GHG emission:
  - Incorporate design features to achieve 30% reduction from BAU.
  - Implement applicable AB 32 Scoping Plan measures early.
  - Establish sector-based efficiency performance standards, such as pounds of GHGs per person, pounds per square foot, etc.
- Tier 5: Remaining projects would be required to purchase offsite offsets to reduce GHG emissions to less than the proposed screening level thresholds. Offsets would be purchased for the life of the projects, which is defined as 30 years. For projects that are unable to purchase sufficient offsets, incorporate design features, or implement GHG reduction measures to reduce GHG emission impacts to less than the appropriate screening level, GHG emissions from the project would be considered significant.

The GHG significance determination thresholds described above have not yet been adopted by the SCAQMD Board of Directors and were not considered when determining the significance of impacts associated with climate change in this Draft PEIR. Their adoption, however, is likely during the lifetime of the General Plan Update and subsequent actions taken by the City as a result of the General Plan Update would necessarily be compliant with future regulations adopted by the air district in this regard.

City of La Cañada Flintridge Programs

La Cañada Flintridge is currently implementing the following programs and initiatives that will, in part, help to reduce GHG emissions from municipal operations, community activities, and other sources:

- **Alternative Modes of Transportation—**The City encourages high quality multi-family residential and mixed-use development on Foothill Boulevard as a means of promoting pedestrian activity and reducing dependence on automobiles. The City encourages future development to provide a pedestrian-, bicycle-, and transit-oriented environment, reduce trip lengths,

and accommodate access through transit and/or non-motorized transportation. The City has also pursued opportunities to improve signal timing, implement a shuttle system and a school bus program, expand transit services, and replace vehicles with low emission vehicles. These activities act to reduce the length of trips and the mode of transportation, thereby reducing VMT within the community and consequent tailpipe emissions.

- **Development**—The City has multiple policies and programs preserving open space, including zoning requirements that minimize landform alteration, preserve significant environmental features, protect biological resources, and control development densities.
- **Trails Master Plan**—The City is implementing a plan to develop, enhance, and protect the city's trails network. This will encourage walking and bicycling, thereby reducing the number of vehicle trips.
- **Solid Waste Reduction**—The City has implemented a waste reduction program, a Recycling and Diversion of Construction and Demolition Debris Ordinance, and is working with solid waste disposal companies to reduce the per capita production of solid waste. This reduction in the city's waste stream will minimize CH_4 production by the landfill receiving the city's waste.
- **Pedestrian Infrastructure**—The City has implemented programs to enhance the walkability of the city, including sidewalk development and access. This encourages residents to forgo short vehicle trips, thereby reducing GHG emissions from vehicles.
- **Bicycle Transportation Plan**—The City has adopted a bicycle plan to implement bicycle routes, bicycle-related support facilities, safety programs, and public education. This encourages residents to forgo short vehicle trips, thereby reducing GHG emissions from vehicles.
- **Energy Conservation**—The City has conducted energy audits at municipal facilities to identify areas where energy efficiency can be increased, and encourages owners and/or operators of other facilities to do the same. The City also encourages the use of energy conservation devices and passive design concepts and has upgraded the City's residential building and design standards to ensure energy efficiency. Reductions in energy demand reduce the GHG emissions that would otherwise result from energy generation.

4.4.4 Impact Analysis

This section discusses thresholds of significance, methodology, and impact analyses of the city's GHG emissions anticipated under the General Plan Update. This section also discusses the anticipated changes to the climate in California and includes an analysis of resulting climate change impacts on water resources, air quality, and wildfire in the region as they relate to adoption of the General Plan Update.

Methodology

The impact analysis is a program-level analysis that evaluates development that is reasonably foreseeable if the General Plan Update is adopted and implemented. Although the General Plan Update would not directly cause development, the land use policy contained within the General Plan Update would prescribe the acceptable land uses throughout the city. Implementation of the proposed land use designations could, therefore, indirectly lead to types of development considered acceptable under the General Plan Update. Based on the existing conditions described above, the impact analysis programmatically and qualitatively assesses the cumulative climate change impacts from the potential construction of approximately 814 residential units and 1,355,783 square feet of commercial space within the Project area as well as the implementation of the proposed goals and policies of the General Plan Update.

The conclusions of this Draft PEIR are based on the GHG emissions projected for 2020 shown in Table 4.4-2 and described in detail in Appendix C. These projected emissions are calculated from anticipated growth in population, households, and jobs in 2020, as identified by the California Department of Finance and the Southern California Association of Governments (Appendix C).

Thresholds of Significance

As discussed above, the State of California (e.g., CARB, OPR, or the Resources Agency), the SCAQMD, and the City of La Cañada Flintridge have yet to adopt any standards or thresholds of significance for GHG impacts. Although CARB was initially going to develop such thresholds, currently CARB is leaving the development of thresholds to the air quality control and management districts throughout the state.

The California Resources Agency, with input from OPR and the public, recently adopted revisions to the State CEQA Guidelines that address GHG impacts in the context of CEQA documents. While the new State CEQA Guidelines do not specifically establish significance thresholds, they do describe some of the factors that agencies should consider in determining whether GHG impacts are significant. Specifically, a Lead Agency should consider the following factors, among others, when assessing the significance of GHG emissions:

- the extent to which a project may increase or reduce GHG emissions as compared to the existing environment;
- whether the project emissions exceed a threshold of significance that the lead agency determines applies to the project; and

- the extent to which the project complies with regulations or requirements adopted to implement a statewide, regional, or local plan for GHG reduction or mitigation.

Based on the first of these three factors, and in the absence of regulatory standards for GHG emissions, lead agencies should undertake a project-by-project analysis to determine the GHG impacts of the project and whether such impacts are cumulatively considerable.

Additionally, a lead agency should consider whether the climate change would significantly impact the proposed project (in this case the General Plan Update). In conducting such an evaluation, the agency should focus on the long-term impacts of the project that are more likely to experience the effects of climate change in the future.

Individual projects, when considered in isolation, are not responsible for anthropogenic climate change, since an individual project's emissions are insufficient to change the radiative balance of the atmosphere. However, even small emissions from a single source contribute to the global GHG emissions total. Because climate change is the result of GHG emissions, and GHGs are emitted by innumerable sources worldwide, global climate change is a significant cumulative impact of human development and activity. Thus, the discussion below references analysis of cumulative contributions to a significant global impact.

On a state level, AB 32 identified that an acceptable level of GHG emissions in California in 2020 is 427 $MMTCO_2e$, which is the same as the 1990 GHG emissions level. This target level is approximately 15% less than current GHG emissions and about 28% less than projected 2020 BAU conditions. Consequently, the AB 32 Scoping Plan recommends that local governments aim to reduce their emissions by 15% from current emissions. In terms of determining whether GHG emissions in the city will be cumulatively considerable, this Draft PEIR evaluates whether the city meets requirements set forth in the AB 32 Scoping Plan for local governments; specifically, whether it establishes a goal for community emissions that parallels the state's commitment to reduce GHG emissions by 15% from current levels by 2020 (CARB 2008a). Because the state's GHG reduction goal is directed at the 2020 target year and the significance thresholds used in this Draft PEIR rely on conformance with the state's goal, this Draft PEIR assesses impacts related to GHG emissions at the 2020 target year and not the General Plan Update buildout year of 2030. A detailed discussion of how data related to buildout of the General Plan Update in 2030 was used in developing the 2020 emissions forecast can be found in Appendix C.

A certain amount of environmental change is inevitable in the region surrounding the city due to current and previous GHG emissions and unavoidable future increases in GHG emissions worldwide. Foreseeable shifts in regional climate will likely spur changes in local patterns of flooding, wildfire potential, water availability, energy demand, environmental health, and heat-wave events (CEC 2009a). New development allowed by the General Plan Update could place persons and property at higher levels of risk to climate change effects if the General Plan Update does not anticipate reasonably foreseeable changes in environmental conditions.

In summary, the General Plan Update would result in a cumulatively significant contribution to climate change if it would:

CC-1: result in GHG emissions that are inconsistent with GHG emission reduction goals for local governments established by AB 32; or

CC-2: allow property and persons to be adversely affected by the physical effects of climate change including flooding, public health, wildfire risk, and other impacts resulting from climate change.

Impacts and Mitigation Measures

Threshold CC-1: Would the Project result in GHG emissions that are inconsistent with GHG emission reduction goals for local governments established by AB 32?

Building Energy Use Sources (Residential and Commercial)

Projected GHG emissions due to building energy use in 2020 are shown in Table 4.4-2. These projected GHG emissions in 2020 are estimated to be 57,104 and 64,121 $MTCO_2e$ for residential and commercial buildings, respectively. This represents increases of 0.5 and 6% as compared to 2007 levels. GHG emissions were estimated using data provided by primary energy providers to La Cañada Flintridge (Pacific Gas and Electric for electricity and Southern California Gas Company for natural gas) and the appropriate provider specific emission factors (refer to Table 1 in Appendix C). GHG emissions due to the consumption of electricity in California are controlled by a variety of factors and vary considerably from year to year and broadly relate to electricity supply and demand within the state. It should be noted that the 2020 forecast does not take into account emissions reductions that may be associated with the state RPS.

The General Plan Update includes numerous policies that will act to reduce GHG emissions from the building energy sector in 2020 as compared to the BAU emissions for this sector. Policies associated with the following overarching General Plan Update goals and objectives promote energy conservation as well as the development of alternative energy within the city.

> **CNE Objective 1.3:** Promote efficient and sustainable use of energy resources through conservation and demand-reduction activities.

LUE Goal 3: Ensure that new and rehabilitated development is designed and constructed in an environmentally sustainable and sensitive manner and protects the safety of persons and property.

> **AQ Objective 3.3:** Reduce air pollution and GHG emissions through new emission control technologies, increased energy efficiency, and use of renewable energy.

HOUSING Goal 4: Ensure that housing is sensitive to the existing natural and built environment.

Under these goals and objectives, the General Plan Update includes specific measures to develop or encourage the following: Green Building strategies; Energy-Star rated buildings; Cool Communities strategies; changes to the building code to improve energy efficiency; and incorporation of passive design concepts. Additional measures address energy consumption by outdoor lighting and facilitate solar installations on municipal, commercial, and residential buildings. Public outreach and various incentive programs will support the goals of all General Plan Update policies that act to reduce building electricity and natural gas demand in the city.

Mobile Sources

Mobile GHG emissions are the result of fuel combustion by both on- and off-road vehicles. As described in Appendix C, on-road emissions were estimated using traffic modeling outputs and CARB's EMFAC 2007 v2.3 model. Table 4.4-2 indicates that on-road transportation would contribute 186,378 $MTCO_2e$ of total La Cañada Flintridge emissions in 2020. On-road emissions would increase by an estimated 14.8% by 2020, a result of modest population growth within the city and increased VMT occurring within city limits.

Off-road emissions are the result of operation of lawn and garden equipment, construction, off-road recreation vehicles, and other off-road equipment. The CARB's OFFROAD model was used to estimate GHG emissions from off-road vehicles and equipment, which are estimated to be 731 $MTCO_2e$ in 2020, or 0.2% of the total 2020 inventory for La Cañada Flintridge.

These projected vehicle emissions do not account for recent and future legislative actions that would reduce emissions such as the LCFS or the Pavley (AB 1493) fuel standards discussed above. Statewide, AB 1493 is estimated to yield GHG reductions on the order of 32 $MMTCO_2e$ by 2020, or 14% of the 2020 transportation sector emissions. The LCFS is expected to provide an additional 7% in GHG reductions when fully implemented. Given recent legislative and legal action on national and statewide fuel economy standards, significant increases in fuel economy beyond AB 1493 for future scenarios seem likely, but are not accounted for in the GHG forecast presented in Table 4.4-2.

The proposed General Plan Update transportation policies related to reduction of GHGs support public transportation and alternative transportation modes and reduce vehicle miles traveled. Some of the primary mechanisms by which GHG emissions in the transportation sector can be reduced are addressed within the following General Plan objectives:

CE Objective 2.1: Promote transit-supportive uses where appropriate.

CE Objective 2.2: Continue to improve transit service in the City to achieve trip reductions, improve air quality and reduce GHG emissions, and facilitate pedestrian and non-motorized travel.

CE Objective 4.1: Enhance the walkability of the City.

CE Objective 6.1: Provide a comprehensive network of bikeways. Support bicycle use as a mode of transportation by providing a comprehensive network of bikeways and enhancing infrastructure to accommodate bicycles and riders.

CE Objective 6.3: Pursue the integration of the non-motorized transportation facilities.

AQ Objective 1.1: Promote land use planning that provides for efficient distribution of land uses and development regulations to achieve reductions in vehicular trips. (Existing goal, modified).

AQ Objective 1.32: Reduce air pollution and greenhouse gas (GHG) emissions by proper planning for, and implementation of, the City's circulation infrastructure.

AQ Objective 2.1: Reduce the amount of vehicular emissions by promoting alternative modes of transportation and transportation demand management strategies.

AQ Objective 2.2: Encourage local employers and businesses to implement policies and programs that reduce their employees' dependence on single-passenger vehicles for travel to and from work.

Policies associated with the above-mentioned objectives will promote and facilitate the use of alternative modes of transit including biking, walking, carpooling and the use of alternative vehicles within the city. Numerous policies are devoted to establishing a safe and extensive bikeway system, which together with supporting facilities such as bike parking and storage should greatly encourage the use of bikes as a preferable mode of transport. Other policies aim to steer development such that multi-family and mixed-use areas are adjacent to pedestrian and bikeways and transit options. The General Plan Update includes additional measures directing cooperation within the region on transit- and circulation-related issues to reduce VMT throughout the area.

Waste Sources

Emission from waste is primarily CH_4, which is released over time when waste decomposes in a landfill. Waste generated within the city will either be diverted (via recycling, composting, etc.) or transported to a landfill outside of the city. These emissions will not occur within city boundaries, although the community is responsible for generating this waste. GHG emissions are also produced through the activities of composting and recycling. These emissions are discussed together with avoided emissions embodied in these activities in Appendix C but are not explicitly included in the inventory, in accordance with standard reporting protocols (CARB 2008b).

Landfill emissions due to the generation of waste by the city are projected to be 7,275 $MTCO_2e$ in 2020, a 5.6% increase over 2007 levels. The 2020 forecast of waste emissions is scaled to population growth. It does not assume any increases in the diversion percentage (amount of waste diverted from landfills to recycling or composting programs). Although the diversion percentage has been growing steadily since the mid-1990s in many municipalities, including the city, in part to meet the requirements of AB 939 (the Integrated Waste Management Act that requires an increasing percentage of waste be diverted from landfills at various time intervals), there is no available data upon which to base an estimate of how much more the diversion percentage will increase within the city. As such, the projected landfill emissions in 2020 are likely an overestimate of the actual emissions that will occur in 2020.

Lifecycle emissions from waste generated in the city were included in this inventory for informational purposes only and are described in detail in Table 9 of Appendix C. These include upstream emissions (emissions produced as a result of raw material manufacturing) and downstream emissions (emissions offset through the recycling process) and provide a more complete understanding of the city's GHG emissions "footprint" for this sector and may provide more opportunities for mitigation. Lifecycle emissions in 2020 are projected to be 35,360 $MTCO_2e$ in 2020 as compared to 33,484 $MTCO_2e$ in 2007, an increase of 5.6%.

General Plan Update policies within the Conservation and Air Quality Elements would help to reduce GHG emissions as a result of waste reduction and increased recycling. General Plan Update policies associated with the following objectives will act to increase diversion through a variety of means, thereby reducing landfill methane emissions. Specific policies can be found in the General Plan Update.

> **AQ Objective 3.5:** Reduce air pollutant and GHG emissions through waste reduction, diversion of solid waste from landfill operations, and recycling.
>
> **AQ Objective 5.4:** Use the City's purchasing power to promote reductions in GHG emissions by the suppliers of its goods and services.
>
> **AQ Objective 5.5:** Implement measures to reduce municipal waste generation.
>
> **CNE Objective 1.4:** Reduce the amount of solid waste generated and diverted to landfills.

Wastewater Sources

Total emissions (fugitive emissions plus indirect emissions from electricity use) from wastewater in 2020 for the city are projected to be 3,057 $MTCO_2e$. This is an increase of less than 1% from levels in 2007. Although population is expected to grow in the city, the emission intensity per person for non-septic wastewater systems is decreasing statewide (CARB 2009b) with improved technology.

Wastewater treatment emissions, as accounted for in the inventory (Tables 11 and 12 of Appendix C), include both fugitive CH_4 and N_2O emissions and indirect emissions from electricity consumption for wastewater transport and collection and wastewater treatment. The city also relies on septic systems to serve many residents, which results in larger per capita emissions than centralized wastewater treatment plants. Wastewater services for the city are provided by the Sanitation Districts of Los Angeles County (SDLAC). CH_4 is generated when microorganisms biodegrade soluble organic material in wastewater under anaerobic conditions. N_2O is generated during both nitrification and dentrification of the nitrogen present in wastewater, usually in the form of urea, ammonia, and proteins (EPA 2007). A detailed description of the methodology used to estimate emissions associated with wastewater generation, conveyance, and treatment is included in Appendix C.

The following General Plan Update policies would reduce emissions from wastewater by extending sewer service to residents who currently use septic systems. Centralized waste water treatment produces less GHG emissions per unit of water treated than septic systems.

LUE Policy 4.2.4: Require new development north of the A/B Development Line to tie into the public sewer and water supply system prior to occupancy.

HE Policy 4.7: Continue to provide residents the opportunity to approve benefit assessment districts for the installation of sewers.

Water Supply Sources

Total emissions associated with the city's water supply are forecast to be 2,414 $MTCO_2e$ in 2020 with 1,171 MT, 1,129 MT, and 113 MT of CO_2e due to importation, pumping, and distribution and treatment, respectively, an increase of 24% above 2007 levels.

GHG emissions associated with water supply include those due to indirect emissions from electricity consumption for transporting imported water to the city limits, water pumping and distribution within the city, and water treatment. It should be noted that electricity used for water pumping and treatment occurring within the city was included in the Commercial sector of the Building Energy Use Sources section above.

Imported water is supplied by four water districts: the Crescenta Valley Water District, the La Cañada Flintridge Irrigation District, the Mesa Crest Water Company, and the Valley Water Company. The Foothill Municipal Water District (FMWD) supplies these four agencies with water purchased from the Metropolitan Water District (MWD) (FMWD 2005). The FMWD supplies the four water districts serving the city through its main pump station located in Pasadena. Electricity used to pump this water is supplied by Southern California Edison (SCE). Although this electricity is consumed outside of city boundaries, it is required to pump water consumed within the city. Consequently, emissions associated with this electricity were included in the citywide inventory.

The General Plan Update includes policies related to reduction of water consumption and energy consumption. Specific water-related General Plan Update objectives are discussed below. Specific polices related to these objectives can be found in the General Plan Update.

CNE Objective 1.1: Promote water conservation and increase the use of recycled water to reduce the projected demand for water service.

LUE Objective 3.1: Promote sustainable development practices to protect the City's valuable resources and guide their utilization in a responsible manner; reduce vehicle miles travelled; and reduce GHG emissions.

Policies under Objectives CNE 1.1 and LUE 3.1 will encourage water conservation through various means including tiered pricing, increased availability of recycled water, development design options, and landscaping policies. In general, these measures will support the statewide goal of reducing water consumption by 20% before 2020 (CSWRCB 2009) and focus on outreach efforts to residents and local businesses.

High-GWP GHGs

High-GWP gases include SF_6 from electric utility applications, substitutes for ODS (primarily HFCs and PFCs) used in refrigeration and propellant applications, and other high-GWP gases used in semiconductor manufacturing and other industrial processes. Emissions of high-GWP GHGs were quantified from (1) substitutes for ODS and (2) SF_6 emissions from electricity transmission lines.

Total emissions of high-GWP GHGs in 2020 for the city are forecast to be 23,204 $MTCO_2e$ in 2020 as compared to 8,932 $MTCO_2e$ in 2007. This is an increase of 160% above 2007 levels. This increase is commensurate with increases nationwide as these compounds are being phased in as replacements for ODS (EPA 2009c). Emissions of HFCs and PFCs occur from their use in refrigeration and air conditioning systems. These high-GWP compounds are being phased in as ODS substitutes. The majority of anthropogenic high-GWP GHGs includes SF_6, HFCs, and PFCs. Electrical transmission and distribution systems emit SF_6, which is used to insulate power switching equipment and transformers (CEC 2006).

Individual jurisdictions only have jurisdictional control over the use of these compounds to the extent that they can moderate the end uses (e.g., the need for air conditioning or electricity demands). There are no specific General Plan Update policies aimed at reducing high GWPs; however increased building efficiency and reduced electricity demand may reduce high-GWP GHG emissions.

Carbon Sinks and Sequestration

Two categories of carbon sinks were analyzed within the city: (1) carbon sequestration from certain landfilled materials and (2) carbon sequestration from vegetated areas within the city. When food, yard trimmings, wood, and paper are landfilled, they do not fully decompose. Under natural conditions, however, virtually all carbon stored in these materials would be released as CO_2. Because landfills inhibit some decomposition of organic carbon, excess carbon stored in landfills is considered an anthropogenic sink of CO_2 (EPA 2006).

In addition, various land cover types within the city provide natural sequestration of carbon in vegetation and soils. Carbon sinks from forest land, land use change, and urban forestry are included in both the California and national GHG inventories (CARB 2009a, EPA 2009d). A detailed description of the methodology and key assumptions used to estimate carbon sequestration within the city is described in Appendix C. Total sinks of CO_2 in 2020 for the city are forecasted to be 7,263 $MTCO_2e$ in 2020. This is an increase of 2% above 2007 levels. Proposed General Plan Update policies that preserve open space and trees within the city will maintain the current level of carbon sequestration in urban forests. Policies that provide additional tree cover will increase sequestration capacity. The following General Plan Update policies and objectives are related to tree cover in the city:

> **AQ Policy 3.3.4**: Develop and adopt an Urban Heat Island Mitigation policy or program that includes the use of alternative materials for roads and roofing, the planting of shade trees over parking lots on public and private property, and other land use techniques to combat urban heat island effects.
>
> **AQ Policy 3.3.5**: Continue to implement the City's Preservation, Protection, and Removal of Trees Ordinance (La Cañada Flintridge Municipal Code [LCFMC] Chapter 4.26)
>
> **OSRE Objective 2.1:** Preserve or enhance open space for preservation of natural resources.

Preserving and expanding open space areas will increase the city's capacity to sequester atmospheric carbon dioxide. Planting trees and increasing tree canopy cover translates into reduced energy demand required for cooling and increased rates of carbon sequestration and, thus, reduced GHG emissions.

Impact Determination

As shown above in Table 4.4-2, GHG emissions for the city under BAU conditions would result in 2020 net emissions that are 14.6% higher than current 2007 GHG emissions, without consideration of currently adopted programs, including AB 1493 and SB 1078/SB 107. State measures are expected to reduce emissions within local jurisdictions by a significant amount, but additional action is still required by local jurisdictions to meet the AB 32 targets. Forecasted emissions for the city exceed the significance threshold of 15% less than current GHG emissions and demonstrate that further action is required. However, the General Plan Update policies do not provide a sufficiently comprehensive or quantitative framework for assessing the City's attainment of the reduction target. In the absence of mitigation, the impact of the General Plan Update on climate change would therefore be significant.

Impact CC-1: GHG emissions for the city under BAU conditions would exceed AB 32 target emissions, resulting in 2020 net emissions that are 14.6% higher than current 2007 GHG emissions. This impact would be significant.

Mitigation Measures

Considerations for mitigation measure MM CC-1a:

The State of California has developed a comprehensive plan for reducing statewide emissions to 15% below current levels (CARB 2008a). Clear articulation of the steps required to reach this goal as well as progress made to date by the state of California demonstrate that development of a quantitative plan to reduce GHG emissions by this amount is feasible at the local level. The Bay Area Air Quality Management District (BAAQMD 2009) estimates that State measures alone will on average reduce GHG emissions from local jurisdictions by roughly 20% from 2020 BAU projections, significantly lessening the burden of the local jurisdiction's CAP.

Although the specific policies or measures that will ultimately comprise the City's CAP and achieve the necessary reductions are unknown, numerous examples are available from other jurisdictions and indicate the make-up of a successful CAP. In addition to AQ Goal 4, which explicitly lists GHG reduction targets, many policies within the Air Quality, Conservation, Land Use, Circulation, and Open Space Elements of the General Plan Update act to reduce GHGs and can potentially be included in the CAP as is, or with some modification. These policies are too numerous to list here but provide a strong foundation on which to build the CAP. Through the Climate Action Planning Process the GHG reductions associated with these measures can be determined and the exact suite required to achieve the target identified.

MM CC-1a: Climate Action Plan. Within 24 months of adoption of the General Plan Update, the City shall prepare and adopt a Climate Action Plan (CAP) that, through its full implementation, will reduce emissions from the city to 15% below current levels.

At a minimum, the CAP shall:

- Quantify the 2020 reductions in GHG emissions using currently accepted methods.
- Quantify the impact of state and federal GHG reduction measures on projected 2020 BAU emissions in the city.
- Identify methods to reduce GHG emissions to a level that is 15% below recent (2006) levels by 2020.
- Identify additional measures or modified General Plan Update policies as needed for incorporation into the CAP.

- Require monitoring and reporting of GHG emissions.
- Establish a schedule of actions for implementation through 2020.
- Identify funding sources for implementation through 2020.
- Identify a process to set a reduction goal for 2030 by 2020.
- Adopt feasible, enforceable GHG reduction measures to be required of private activities by the City.
- Update the CAP by 2020 to include reduction measures to achieve the adopted 2030 reduction goal.

Considerations for mitigation measure MM CC-1b:

As discussed in mitigation measure MM CC-1a for the Community CAP, the General Plan Update policies provide a strong foundation on which to build the MCAP. Through the CAP planning process the GHG reductions associated with these measures can be determined, and the exact suite of measures required to achieve the target can be identified. Based on the AB 32 Scoping Plan and on MCAPs developed to date by other California jurisdictions, development of a plan to reduce GHG emissions from municipal operations in the city by 15% from current levels by 2020 is considered feasible.

MM CC-1b: Municipal Climate Action Plan. Within 24 months of adoption of the General Plan Update, the City shall prepare a Municipal Climate Action Plan (MCAP) that, through its full implementation, will reduce emissions from the Municipal Operations of the city by 15% as compared to current levels.

The MCAP shall meet the same basic requirements described above for the Community Climate Action Plan (mitigation measure MM CC-1a) but will address emissions due to the city's municipal operations only. The General Plan Update already identifies many specific objectives and policies that, once quantified through the MCAP process, can potentially be included in the MCAP. These include the following:

AQ Objective 5.1: Enhance the energy efficiency of City facilities.

AQ Policy 5.1.1: Prepare and implement a comprehensive plan to improve energy efficiency of municipal facilities, including:

a. Conducting energy audits for all municipal facilities;

b. Retrofitting facilities for energy efficiency where feasible and when remodeling or replacing components, including increased insulation, installing green or reflective roofs and low-emissive window glass;

c. Implementing an energy tracking and management system;

d. Installing energy-efficient exit signs, street signs, and traffic lighting;

e. Installing energy-efficient lighting retrofits and occupancy sensors, and institute a "lights out at night" policy;

f. Retrofitting heating and cooling systems to optimize efficiency (e.g., replace chillers, boilers, fans, pumps, belts, etc.);

g. Installing Energy Star® appliances and energy-efficient vending machines;

h. Improving efficiency of water pumping and use at municipal facilities, including a schedule to replace or retrofit system components with high-efficiency units (i.e., ultra-low-flow toilets, fixtures, etc.);

i. Providing chilled, filtered water at water fountains and taps in lieu of bottled water;

j. Installing a central irrigation control system and time its operation for off-peak use; and

k. Adopting an accelerated replacement schedule for energy inefficient systems and components.

AQ Policy 5.1.2: Require that any newly constructed, purchased, or leased municipal space meet minimum standards as appropriate, such as:

a. Requirements for new commercial buildings to meet LEED criteria established by the U.S. Green Building Council;

b. Incorporation of passive solar design features in new buildings, including day lighting and passive solar heating;

c. Retrofitting of existing buildings to meet standards under Title 24 of the California Building Energy Code, or to achieve a higher performance standard as established by the City/County; and

d. Retrofitting of existing buildings to decrease heat gain from non-roof impervious surfaces with cool paving, landscaping, and other techniques.

AQ Policy 5.1.3: Ensure that staff receives appropriate training and support to implement objectives and policies to reduce GHG emissions, including:

a. Providing energy efficiency training to design, engineering, building operations, and maintenance staff; and

b. Providing information on energy use and management, including data from the tracking and management system, to managers and other decision makers that influence energy use.

AQ Objective 5.2: Implement measures to reduce City employee vehicle trips and to mitigate emissions impacts from municipal travel.

AQ Policy 5.2.1: Implement a program to reduce vehicle trips by City employees, including:

a. Providing incentives and infrastructure for vanpooling and carpooling, such as pool vehicles, preferred parking, and a website or bulletin board to facilitate ride-sharing;

b. Providing subsidized passes for mass transit;

c. Offering compressed work hours, off-peak work hours, and telecommuting, where appropriate;

d. Offer a guaranteed ride home for employees who use alternative modes of transportation to commute.

AQ Objective 5.3: Manage the City's stock of vegetation to reduce GHG emissions.

AQ Policy 5.3.1: Conduct a comprehensive inventory and analysis of the urban forest, and coordinate tree maintenance responsibilities with all responsible departments, consistent with best management practices.

AQ Policy 5.3.2: Evaluate existing landscaping and options to convert reflective and impervious surfaces to landscaping, and install or replace vegetation with drought-tolerant, low-maintenance native species or edible landscaping that can also provide shade and reduce heat-island effects.

AQ Objective 5.4: Use the City's purchasing power to promote reductions in GHG emissions by the suppliers of its goods and services.

AQ Policy 5.4.1: Adopt purchasing practices and standards to support reductions in GHG emissions, including preferences for energy-efficient office equipment, and the use of recycled materials and manufacturers that have implemented green management practices.

AQ Policy 5.4.2: Establish bidding standards and contracting practices that encourage GHG emissions reductions, including preferences or points for the use of low or zero emission vehicles and equipment, recycled materials, and provider implementation of other green management practices.

AQ Objective 5.5: Implement measures to reduce municipal waste generation.

AQ Policy 5.5.1: Audit facilities to identify opportunities to reduce waste generation, increase material recovery, and increase beneficial use of organic material.

MM CC-1c. Alternative Energy Development Promotion. The city shall prepare an Alternative Energy Development Promotion study to determine the feasibility of implementing alternative energy strategies within the city. This study shall be prepared within 24 months and will include the following:

- Identify possible sites for the production of energy using local renewable resources such as solar, wind, small hydro, and biogas.
- Consider the potential need for exemption of alternative energy facilities from other General Plan Update policies concerning visual resources, ridgeline protection, and biological resources.
- Evaluate potential land use, environmental, economic, and other constraints affecting renewable energy development.
- Identify measures to protect renewable energy resources such as utility easements, rights-of-way, and land set-asides.
- Evaluate the feasibility of Community Choice Aggregation (CCA) for the city. CCA allows cities and counties, or groups of them, to aggregate the electric loads of customers within their jurisdictions for purposes of procuring electrical services. CCA lets the community choose what resources will serve their loads and can significantly increase renewable energy use. If CCA is ultimately not pursued, evaluate the feasibility of purchasing renewable energy certificates to reduce the city's contribution to GHG emissions related to county electricity use.
- Propose a ministerial permit process for approval of small-scale wind and solar energy systems for onsite home and small commercial.
- Allow faster expediting (possibly moving such applications to the top of the City's processing list) of projects that incorporate alternative energy sources.

Residual Impacts

As shown above in Table 4.4-2, net city GHG emissions in 2020 would be 14.6% higher than recent (2007) GHG emissions. This amount exceeds the significance threshold of 15% below current emissions. Development and implementation of a CAP that achieves emissions reductions of 15% below recent (2007) conditions in 2020 would ensure that GHG emissions in the city would not contribute considerably to cumulative GHG emissions and associated climate change effects. This impact is considered significant and unavoidable.

Threshold CC-2: Would the Project allow property and persons to be adversely affected by the physical effects of climate change including: flooding, public health, wildfire risk, and other impacts resulting from climate change?

The natural environment in and around the city will be subject to climate change impacts from past, present, and some additional future GHG emissions regardless of the success of local, state, national, or international mitigation efforts. As the atmosphere continues to warm in response to previous and current emissions, the local impacts of large scale shifts in climate will be apparent. Impacts will vary by region, but efforts are underway at the state and national level to address the range of impacts anticipated throughout California. Without further planning, current policies may provide inadequate protection against adverse physical impacts and may not anticipate changed conditions from climate change.

The CEC recently published a report detailing ongoing work in California related to climate change impacts. "The Future is Now: An Update on Climate Change Science Impacts and Response Options for California" (CEC 2009a) analyses the impacts on California's natural environment under a range of climate scenarios resulting from temperature increases of 3.0–10.5°F (IPCC 2001). Substantial temperature increases would result in a variety of impacts on the people, economy, and environment of California including sea level rise, increased frequency of extreme heat events, changes in precipitation patterns, loss of Sierra snowpack, increased wildfire, and changes in distribution and range of plant and animal species. The following sections describe the anticipated climate change impacts most relevant to the region surrounding the city.

Public Health and Safety

Climate change could affect the health of city residents by increasing the frequency, duration, and intensity of exposure to harmful conditions. Of primary concern are increases in the number of days per year with dangerous air quality conditions and the number and duration of extreme heat events. Increased temperatures favor the formation of ozone, while increased temperatures and humidity favor the formation of both ozone and ammonium nitrate, a major component of particulate matter (Ying and Kleeman 2006). The city of Los Angeles historically experiences about 12 heat wave days per year. This number is projected to double or triple by 2050 depending on the climate model used for the projection (Hayhoe 2004). Similar patterns are projected for other California cities. Air quality is also anticipated to deteriorate as a secondary effect of increased wildfire incidence. In addition, climate change has the potential to influence asthma symptoms and the incidence of infectious disease (California Climate Change Center 2009).

Wildfire Frequency

The frequency of large wildfires in California is projected to increase over the next century by as much as 53% due to higher temperatures, changes in vegetative fuel load (transitioning forests to chaparral/grasslands, for example), and drying (CEC 2009b). Jurisdictions located at the edge of or close to forested or wildfire prone areas are at a particular risk.

Researchers are addressing several aspects of wildfire including the effects of urbanization on vegetation and fire risk in Southern California (Syphard et al. 2007), the effect of precipitation patterns on areas burned, and the effect of climate conditions on burn intensity and fire behavior (Fried et al. 2008). Additional studies are addressing the estimated costs in fire-related damages under a variety of climatic and planning scenarios (Westerling and Bryant 2008).

Hydrology/Flooding

California's Mediterranean-style climate requires that water management systems be designed to store water during the dry months and to simultaneously protect against flooding during months when heavy rains are frequent. This system will be increasingly challenged in coming years as a general pattern of drying due to climate change is expected to produce fewer winter rain storms but storms of greater intensity (California Natural Resources Agency [CNRA] 2009). Flooding may become more frequent in areas prone to winter flooding or in urban areas. Climate models also project a shift in the form of precipitation, from snow to rain for California as global average temperatures rise. This will also increase flooding, particularly in the Southern Sierra, where this shift will be most dramatic (Dettinger and Cayan 2007, Dettinger et al. 2009). Elevated peak stream flows and shifting precipitation patterns may increase the risk of flooding beyond the risk levels currently anticipated in the city.

Water Supplies

Nearly 75% of the state's available water supply originates in regions north of Sacramento, making the state as a whole, and Southern California in particular, heavily reliant on Sierra Nevada snowpack for its water supply. Earlier melting of snow and reduced precipitation and snowpack across the state will affect river flows which could adversely affect the capacity and reliability of water storage. Additionally, drought conditions throughout the west are expected to become more frequent and persistent over the next century (CNRA 2009). Several studies have shown that meeting California's water needs will become increasingly difficult due to decreased reliability of surface water storage and population growth (Jain et al. 2005, Medellin-Azaura 2008, Vicuna and Dracup 2007).

Increased temperatures may also increase evaporation levels for existing reservoirs. As noted above, it is unknown at present whether there may be changes in precipitation within the city due to climate change; however, because scientific research in this area is rapidly progressing, the City should closely follow the state's efforts to understand and predict resulting hydrologic changes at the regional scale.

Natural Ecosystems

Climate changes and increased CO_2 concentrations are expected to alter the extent and character of natural ecosystems. The distribution of species is expected to shift; the risk of climate-related disturbance such as wildfires, disease, and drought is expected to rise; and forest productivity is projected to increase or decrease—depending on species and region. In the city, these ecological changes could have significant implications for fire suppression, public health, and the sustainability of the city's natural ecosystems.

As discussed above, development allowed by the General Plan Update could result in an adverse affect on property and persons in the city through increased exposure to the physical effects of climate change such as poor air quality, extreme heat events, wildfire, flooding, water shortages, and changes to natural ecosystems. Although the General Plan Update includes policies that promote public health and safety, reduce wildfire risk, reduce risks from flooding, promote a sustainable water supply, and protect natural ecosystems, there are no specific policies integrating climate change adaptation considerations into planning for these subject areas. The likelihood that frequency, severity, and event patterns may change in the future as a result of climate change is currently not addressed. Therefore, in the absence of mitigation, the General Plan Update would have a significant impact related to climate change adaptation.

Impact Determination

Impact CC-2: Although the General Plan Update includes policies that promote public health and safety, reduce wildfire risk, reduce risks from flooding, promote a sustainable water supply, and protect natural ecosystems, there are no specific policies integrating climate change adaptation considerations into planning for these subject areas. The likelihood that frequency, severity, and event patterns may change in the future as a result of climate change would still need to be addressed. Implementation of mitigation measure MM CC-2 would seek to determine the frequency, severity, and event patterns by providing a coordinated planning effort with the overarching goal of reducing the physical effects from climate change; however, the effectiveness of this mitigation to reduce these impacts is not known at this time. Thus, Impact CC-2 would remain significant after mitigation.

Mitigation Measures

MM CC-2: Climate Change Preparedness Plan. The City shall work with local governments and regional planning agencies to develop a comprehensive plan for adapting to and preparing for the physical effects associated with climate change. The plan shall consider the following steps:

- Scope the climate change impacts to major city sectors and buildings to prepare for climate change.
- Identify planning areas relevant to climate change impacts.
- Conduct a vulnerability assessment based on climate change projections for the region, the sensitivity of planning areas to climate change impacts, and the ability of communities to adapt to climate change impacts.
- Conduct a risk assessment based on the consequences, magnitude, and probability of climate change impacts, as well as on an evaluation of risk tolerance and community values.
- Establish a vision and guiding principles for climate-resilient communities and set preparedness goals in priority planning areas based on these guiding principles.
- Develop, select, and prioritize possible preparedness actions.
- Develop measures of resilience, and use these to track the results of actions over time.
- Review assumptions and other essential information to ensure that planning remains relevant to the most salient climate change impacts.

To maximize effectiveness, the preparedness plan needs to be an ongoing commitment of the City. The first plan shall be completed and adopted no later than 5 years after the adoption of the General Plan Update and shall be updated at least every 5 years thereafter.

Residual Impacts

Although implementation of mitigation measure MM CC-2 would help to facilitate future planning and response efforts to address the reasonably foreseeable local effects of climate change, this effort would not guarantee that such effects would be reduced to a level less than significant. Thus, this impact would remain significant and unavoidable.

Cumulative Impacts

As discussed in "Thresholds of Significance," above, climate change is the result of cumulative global emissions. There is no single project, when taken in isolation, that can "cause" global warming, because a single project's emissions are insufficient to change the radiative balance of the atmosphere. Because global warming is the result of GHG emissions, and GHGs are emitted by innumerable sources worldwide, global climate change is a significant cumulative impact of human development and activity. The global increase in GHG emissions that has occurred and will occur in the future is the result of the actions and choices of individuals, businesses, local governments, states, and nations. Therefore, the analysis above addresses cumulative impacts. Without mitigation, the Project's contribution to cumulative impacts from past, present, and reasonably foreseeable future projects would be cumulatively considerable.

Impact Determination

Impact C-CC-1: As discussed above, in the absence of mitigation, the contribution of the General Plan Update on climate change, when combined with past, present, and reasonably foreseeable future projects, would be cumulatively significant.

Mitigation Measures

Implement mitigation measures MM CC-1a, -1b, and -1c, and MM CC-2.

Residual Impacts

With the implementation of mitigation measures MM CC-1a, -1b, and -1c, and MM CC-2, the Project's incremental contribution to cumulative impacts on climate change from past, present, and reasonable foreseeable projects would not be significant.

Significant and Unavoidable Adverse Impacts

Implementation of the proposed Project would result in the following significant and unavoidable adverse impacts related to climate change:

Impact CC-1: GHG emissions for the city under BAU conditions would exceed AB 32 target emissions, resulting in 2020 net emissions that are 14.6% higher than current 2007 GHG emissions. This impact would be significant.

Impact CC-2: Although the General Plan Update includes policies that promote public health and safety, reduce wildfire risk, reduce risks from flooding, promote a sustainable water supply, and protect natural ecosystems, there are no

specific policies integrating climate change adaptation considerations into planning for these subject areas. The likelihood that frequency, severity, and event patterns may change in the future as a result of climate change would still need to be addressed. Implementation of mitigation measure MM CC-2 would seek to determine the frequency, severity, and event patterns by providing a coordinated planning effort with the overarching goal of reducing the physical effects from climate change; however, the effectiveness of this mitigation to reduce these impacts is not known at this time. Thus, Impact CC-2 would remain significant after mitigation.