4.14 GREENHOUSE GAS EMISSIONS

This section includes a description of current science describing greenhouse gas (GHG) emissions, a summary of applicable federal and State regulations, a description of existing emissions in the planning area and adaptation issues affecting Citrus Heights, and an evaluation of how adoption and implementation of the Draft General Plan and GGRP would affect GHG emissions and adaptation in the planning area.

4.14.1 REGIONAL CLIMATE CHARACTERISTICS

Climate is the accumulation of daily and seasonal weather events over a long period of time, whereas weather is defined as the condition of the atmosphere at any particular time and place (Ahrens 2003). The planning area is located in a climatic zone characterized as dry-summer subtropical or Mediterranean on the Köppen climate classification system. The Köppen system's classifications are primarily based on annual and monthly averages of temperature and precipitation.

The Sacramento Valley Air Basin (SVAB) is relatively flat, bordered by mountains to the east, west, and north. The climate is characterized by hot, dry summers and cool, rainy winters. Periods of dense and persistent low-level fog that are most prevalent between storms are characteristic of SVAB winter weather. The extreme summer aridity of the Mediterranean climate is caused by sinking air of subtropical high pressure regions. In the case of the SVAB, the ocean has less influence than in the coastal areas, giving the interior Mediterranean climate (abbreviated Csa on the Köppen climate system) more seasonal temperature variation (Ahrens 2003).

Most precipitation in the area results from air masses that move in from the Pacific Ocean during the winter months. These storms usually move from the west or northwest. More than half the total annual precipitation falls during the winter rainy season (November–February); the average winter temperature is a moderate 49 degrees Fahrenheit (°F). During the summer, daily temperatures range from 50°F to more than 100°F. The inland location and surrounding mountains shelter the area from much of the ocean breezes that keep the coastal regions moderate in temperature.

4.14.2 GREENHOUSE GAS FUNDAMENTALS

Certain gases in the earth's atmosphere, classified as GHGs, play a critical role in determining the earth's surface temperature. Solar radiation enters the earth's atmosphere from space. A portion of the radiation is absorbed by the earth's surface, and a smaller portion of this radiation is reflected back toward space. However, infrared radiation is selectively absorbed by GHGs; as a result, infrared radiation released from the earth that otherwise would have escaped back into space is instead "trapped," resulting in a warming of the atmosphere. This phenomenon, known as the "greenhouse effect," is responsible for maintaining a habitable climate on Earth. Without the *naturally occurring* greenhouse effect, Earth would not be able to support life as we know it.

Human-caused emissions of these GHGs leading to atmospheric levels in excess of natural ambient concentrations are responsible for intensifying the greenhouse effect and have led to a trend of unnatural warming of the earth's atmosphere and oceans, with corresponding effects on global circulation patterns and climate (IPCC 2007:665). Prominent GHGs contributing to the greenhouse effect are carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfur hexafluoride (SF_6).

HFCs, PFCs and SF_6 are considered high global warming potential (high-GWP) GHGs. GWP is a concept developed to compare the ability of each GHG to trap heat in the atmosphere relative to another gas; the global warming potential is based on several factors, including the relative effectiveness of a gas to absorb infrared radiation and length of time that the gas remains in the atmosphere ("atmospheric lifetime"). The GWP of each gas is measured relative to CO_2, the most abundant GHG. GHGs with lower emissions rates than CO_2 may still contribute to climate change because they are more effective at absorbing outgoing infrared radiation than CO_2.

The concept of CO_2-equivalency (CO_2e) is used to account for the different GWP potentials of GHGs to absorb infrared radiation.

GHGs are global pollutants, unlike criteria air pollutants and toxic air contaminants (TACs), which are pollutants of regional and local concern (see the Air Quality section of this EIR for more information on criteria air pollutants and TACs). Whereas pollutants with localized air quality effects have relatively short atmospheric lifetimes (about one day), GHGs have long atmospheric lifetimes (one year to several thousand years). GHGs persist in the atmosphere for a long enough time to be dispersed around the globe. Although the exact lifetime of any particular GHG molecule depends on multiple variables and cannot be pinpointed, more CO_2 is currently emitted into the atmosphere than is stored, or "sequestered."

The quantity of GHGs that it takes to ultimately result in climate change is not precisely known, but the quantity is enormous, and no single project could measurably contribute to a noticeable incremental change in the global average temperature, or to global, local, or micro-climate.

GREENHOUSE GAS EMISSION SOURCES

Emissions of GHGs contributing to global climate change are attributable in large part to human activities associated with the transportation, industrial/manufacturing, utility, residential, commercial and agricultural emissions sectors (ARB 2010a). In California, the transportation sector is the largest emitter of GHGs, followed by electricity generation (ARB 2010a).

Emissions of CO_2 are byproducts of fossil fuel combustion. CH_4, a highly potent GHG, is largely associated with agricultural practices and landfills. N_2O is also largely attributable to agricultural practices and soil management. CO_2 sinks, or reservoirs, include vegetation and the ocean, which absorb CO_2 through sequestration and dissolution, respectively, two of the most common processes of CO_2 sequestration.

Land use decisions and development projects are not themselves GHG emissions sectors. Instead, land use development projects can generate GHG emissions from several sectors (e.g., transportation, electricity, and waste), as described in more detail below. Land use decisions and development projects can affect the generation of GHG emissions from multiple sectors that result from their implementation. Development projects can result in direct or indirect GHG emissions that would occur on- or off-site. For example, electricity consumed in structures within a project would indirectly cause GHGs to be emitted at a utility provider. The residents of and the visitors to a development project would drive vehicles that generate off-site GHG emissions, which are associated with the transportation sector. The following sections describe the major GHG emission sectors and their associated emissions at the state and local level.

4.14.3 CLIMATE CHANGE EFFECTS

FORESEEABLE INDICATORS AND CONSEQUENCES

Despite the level of action taken on the part of the world's governments to reduce GHG emissions, the earth is already committed to a certain level of climate change due to GHG emissions that have occurred over the last 150 years. Thus, a certain degree of climate change effects can be considered foreseeable. The City will want to plan for resilience in light of the foreseeable effects of climate change on California and recognizes the need to adapt to an environmental setting that will change over time.

According to the Intergovernmental Panel on Climate Change (IPCC), which was established in 1988 by the World Meteorological Organization and the United Nations Environment Programme, global average temperature is expected to increase by 3–7°F by the end of the century, depending on future GHG emission scenarios (IPCC 2007). Resource areas other than air quality and global average temperature could be indirectly affected by the accumulation of GHG emissions. For example, an increase in the global average temperature is expected to result

in a decreased volume of precipitation falling as snow in California and an overall reduction in snowpack in the Sierra Nevada. Snowpack in the Sierra Nevada provides both water supply (runoff) and storage (within the snowpack before melting), which is a major source of supply for the state (including the project site). According to the California Energy Commission (CEC 2006b), the snowpack portion of the water supply could potentially decline by 30–90% by the end of the 21st century. A study cited in a report by the California Department of Water Resources (DWR) projects that approximately 50% of the statewide snowpack will be lost by the end of the century (Knowles and Cayan 2002). Although current forecasts are uncertain, it is evident that this phenomenon could lead to significant challenges in securing an adequate water supply for a growing population. An increase in precipitation falling as rain rather than snow also could lead to increased potential for floods because water that would normally be held in the Sierra Nevada until spring could flow into the Central Valley concurrently with winter storm events. This scenario would place more pressure on California's levee/flood control system (DWR 2006).

Another outcome of global climate change is sea level rise. Sea level rose approximately 7 inches during the last century and it is predicted to rise an additional 7–22 inches by 2100, depending on the future levels of GHG emissions (IPCC 2007). If this occurs, resultant effects could include increased coastal flooding, saltwater intrusion (especially a concern in the low-lying Sacramento–San Joaquin River Delta, where pumps delivering potable water could be threatened), and disruption of wetlands (CEC 2006b). As the existing climate throughout California changes over time, the ranges of various plant and wildlife species could shift or be reduced, depending on the favored temperature and moisture regimes of each species. In the worst cases, some species would become extinct or be extirpated from the state if suitable conditions are no longer available.

4.14.4 REGULATORY FRAMEWORK

Numerous federal, State, regional, and local laws, rules, regulations, plans, and policies define the framework that regulates and will potentially regulate climate change. The following discussion focuses on climate change requirements applicable to the Draft General Plan and GGRP.

FEDERAL PLANS, POLICIES, REGULATIONS, AND LAWS

Supreme Court Ruling on California Clean Air Act Waiver

The U.S. Environmental Protection Agency (EPA) is the Federal agency responsible for implementing the Federal Clean Air Act (CAA). The Supreme Court of the United States ruled on April 2, 2007, that EPA has authority to regulate CO_2 as an air pollutant as defined under the CAA, as well as the authority to regulate emissions of GHGs. However, there are no Federal regulations or policies regarding GHG emissions applicable to Draft General Plan and GGRP.

Energy and Independence Security Act of 2007 and Corporate Average Fuel Economy Standards

The Energy and Independence Security Act of 2007 (EISA) amended the Energy Policy and Conservation Act (EPCA) to further reduce fuel consumption and expand production of renewable fuels. The EISA's most significant amendment includes a statutory mandate for the National Highway Traffic Safety Administration (NHTSA) to set passenger car corporate average fuel economy (CAFE) standards for each model year (MY) at the maximum feasible level. This statutory mandate also eliminates the old default CAFE standard of 27.5 miles per gallon (mpg). The EISA requires that CAFE standards for MY 2011-2020 be set sufficiently high to achieve the goal of an industry-wide passenger car and light-duty truck average CAFE standard of 35 mpg.

Endangerment and Cause or Contribute Findings for Greenhouse Gases under the Federal Clean Air Act

On December 7, 2009, EPA adopted its Proposed Endangerment and Cause or Contribute Findings for Greenhouse Gases under the CAA (Endangerment Finding). The Endangerment Finding is based on Section 202(a) of the CAA, which states that the EPA Administrator should regulate and develop standards for "emission[s] of air pollution from any class of classes of new motor vehicles or new motor vehicle engines, which in [its] judgment cause, or contribute to, air pollution which may reasonably be anticipated to endanger public health or welfare." The rule addresses Section 202(a) in two distinct findings. The first addresses whether or not the concentrations of the six key GHGs (i.e., CO_2, CH_4, N_2O, HFCs, PFCs, and SF_6) in the atmosphere threaten the health and welfare of current and future generations. The second addresses whether or not the combined emissions of GHGs from new motor vehicles and motor vehicle engines contribute to atmospheric concentrations of GHGs and thus to the threat of climate change.

The Administrator found that atmospheric concentrations of GHGs endanger public health and welfare within the meaning of Section 202(a) of the CAA. The Administrator also found that GHG emissions from new motor vehicles and motor vehicle engines are contributing to air pollution, which is endangering public health and welfare.

STATE PLANS, POLICIES, REGULATIONS, AND LAWS

Several statewide initiatives relevant to GHG emissions, climate change, and the General Plan are summarized below. Related energy legislation is summarized in Section 4.13, Energy.

Executive Order S-3-05

Executive Order S-3-05 (2005) proclaims that California is vulnerable to the impacts of climate change. It declares that increased temperatures could reduce the Sierra Nevada snowpack, further exacerbate California's air quality problems, and potentially cause a rise in sea level. To combat those concerns, the Executive Order established statewide GHG emission targets. Specifically, emissions are to be reduced to the 2000 level by 2010, the 1990 level by 2020, and to 80% below the 1990 level by 2050.

The Executive Order directed the Secretary of the California Environmental Protection Agency (CalEPA) to coordinate a multiagency effort to reduce GHG emissions to the target levels. The Secretary also is to submit biannual reports to the Governor and State Legislature describing:

- progress made toward reaching the emission targets;
- impacts of global warming on California's resources; and
- mitigation and adaptation plans to combat these impacts.

To comply with the Executive Order, the Secretary of the CalEPA created the California Climate Action Team (CCAT), which consists of representatives from state agencies and commissions. CCAT released its first report in March 2006. The report proposed to achieve the targets by building on voluntary actions of California businesses, local government and community actions, as well as through state incentive and regulatory programs.

Assembly Bill 32, the California Global Warming Solutions Act of 2006

Assembly Bill (AB) 32 establishes regulatory, reporting, and market mechanisms to achieve quantifiable reductions in GHG emissions and a cap on statewide GHG emissions. AB 32 requires that statewide GHG emissions be reduced to 1990 levels by 2020. This reduction will be accomplished through an enforceable statewide cap on GHG emissions that will be phased in starting in 2012. AB 32 requires that the California Air Resources Board (ARB) develop and implement regulations to reduce statewide GHGs from stationary sources.

AB 32 also includes guidance to institute emissions reductions in an economically efficient manner and conditions to ensure that businesses and consumers are not unfairly affected by the reductions.

Climate Change Scoping Plan

On December 11, 2008 ARB adopted its *Climate Change Scoping Plan* (Scoping Plan), which functions as a roadmap of ARB's plans to achieve GHG reductions in California required by AB 32 through subsequently enacted regulations (ARB 2008). The Scoping Plan contains the main strategies California will implement to reduce CO_2e emissions by 169 million metric tons (MMT), or approximately 28%, from the state's projected 2020 emissions level of 596 MMT of CO_2e under a "business as usual" scenario. This is a reduction of 42 MMT CO_2e, or almost 10%, from 2002–2004 average emissions. Per capita reductions will have to be even greater in light of population and economic growth anticipated through 2020.

The Scoping Plan also breaks down the amount of GHG emissions reductions ARB recommends for each emissions sector of the state's GHG inventory. The Scoping Plan calls for the largest reductions in GHG emissions to be achieved by implementing the following measures and standards:

- improved emissions standards for light-duty vehicles (estimated reductions of 31.7 MMT CO_2e);
- the Low Carbon Fuel Standard (15.0 MMT CO_2e);
- energy efficiency measures in buildings and appliances and the widespread development of combined heat and power systems (26.3 MMT CO_2e); and
- a renewable portfolio standard for electricity production (21.3 MMT CO_2e).

ARB has not yet determined what amount of GHG emissions reductions it recommends from local government land use decisions. However, the Scoping Plan does state that successful implementation of the plan relies on local governments' land use planning and urban growth decisions because local governments have primary authority to plan, zone, approve, and permit land development to accommodate population growth and the changing needs of their jurisdictions. ARB further acknowledges that decisions on how land is used will have large effects on the GHG emissions that will result from the transportation, housing, industry, forestry, water, agriculture, electricity, and natural gas emission sectors. Also, the Scoping Plan states that the ultimate assignment to local government operations (which is distinct from communitywide land use/transportation related emissions) is to be determined (ARB 2008).

The Scoping Plan expects a reduction of approximately 5.0 MMT CO_2e from integrating development patterns and the transportation network in a way that achieves the reduction of GHG emissions while meeting regional planning objectives.[1] The Scoping Plan does not include any direct discussion about GHG emissions generated by construction activity.

On December 16, 2010, ARB adopted a resolution to approve the proposed "California Cap and Trade Program." The final regulation must be submitted to the Office of Administrative Law prior to October 28, 2011, and the program will begin in 2012. The program, as implemented through the regulation, "caps" GHG emissions by issuing annual allowances (each covering the equivalent of one metric ton of carbon dioxide equivalent [MT CO_2e]) to regulated entities. The program and regulation covers approximately 360 types of businesses representing 600 facilities throughout California. Covered entities include those that meet the inclusion threshold

[1] These emission reductions are not intended to represent SB 375's regional reduction targets. The regional targets and associated GHG emission reductions for SB 375 are established by ARB in collaboration with the Regional Target Advisory Committee and a public consultation process with Metropolitan Planning Organizations (MPOs) and other stakeholders. The requirements of SB 375 are discussed further below.

of 25,000 MT CO2e per year. The program does not impose company-specific limits on emissions. Instead, companies must supply a sufficient number of allowances and/or offset credits to cover their annual GHG emissions at the end of each compliance period. ARB will then permanently retire those allowances and issue a new and reduced set of allowances for the following compliance period.

Senate Bill 97

SB 97, signed August 2007, acknowledges that climate change is a prominent environmental issue that requires analysis under CEQA. This bill directs the California Office of Planning and Research (OPR) to prepare, develop, and transmit to the California Natural Resources Agency guidelines for the feasible mitigation of GHG emissions or the effects of GHG emissions, as required by CEQA by July 1, 2009. The California Natural Resources Agency adopted the text of those guidelines on December 30, 2009, and they became effective March 18, 2010.

The amended CEQA Guidelines (Section 15183.5) allow jurisdictions to analyze and mitigate the significant effects of GHGs at a programmatic level by adopting a plan for the reduction of GHG emissions. Later, as individual projects are proposed, project-specific environmental documents may tier from and/or incorporate by reference that existing programmatic review in their cumulative impacts analysis.

A project-specific environmental document that relies on the GGRP for its cumulative impacts analysis must identify the specific GGRP measures applicable to the project and how the project incorporates the measures. If the measures are not otherwise binding and enforceable, they must be incorporated as mitigation measures applicable to the project. If substantial evidence indicates that the GHG emissions of a proposed project may be cumulatively considerable, notwithstanding the project's compliance with specific measure in the GGRP, an EIR must be prepared for the project.

The City's proposed General Plan update and Greenhouse Gas Reduction Plan are intended to serve as a GHG emission reduction plan under CEQA Guidelines section 15183.5. The City intends that future, project-specific environmental documents prepared for projects consistent with the General Plan and GGRP may rely on the programmatic analysis of GHGs contained in this EIR.

Senate Bill 375

Senate Bill (SB) 375 (2008) aligns regional transportation planning efforts, regional GHG emission reduction targets, and land use and housing allocations. SB 375 requires Metropolitan Planning Organizations (MPOs) to adopt a Sustainable Communities Strategy (SCS) or Alternative Planning Strategy (APS), which will prescribe land use allocation in that MPO's Regional Transportation Plan (RTP). ARB, in consultation with MPOs, is to provide each affected region with reduction targets for GHGs emitted by passenger cars in the region for the years 2020 and 2035. For the SACOG region, these targets are 7% for 2020 and 16% for 2035 (ARB 2010b). These reduction targets will be updated every eight years, but can be updated every four years if advancements in emissions technologies affect the reduction strategies to achieve the targets. ARB is also charged with reviewing each MPO's SCS or APS for consistency with its assigned targets. If MPOs do not meet the GHG emission reduction targets, transportation projects would not be eligible for funding programmed after January 1, 2012.

This bill also extends the minimum time period for the Regional Housing Needs Allocation (RNHA) cycle from 5 years to 8 years for local governments located within an MPO that meets certain requirements. City or County land use policies (including general plans) are not required to be consistent with the RTP (and associated SCS or APS). However, new provisions of CEQA would incentivize qualified projects that are consistent with an approved SCS or APS, categorized as "transit priority projects."

Assembly Bill 1493

Assembly Bill (AB) 1493 required ARB to develop and adopt regulations that achieve "the maximum feasible reduction of greenhouse gases emitted by passenger vehicles and light-duty trucks and other vehicles determined by ARB to be vehicles whose primary use is noncommercial personal transportation in the state." To meet the requirements of AB 1493, in 2004 ARB approved amendments to the California Code of Regulations (CCR) adding GHG emissions standards to California's existing standards for motor vehicle emissions. Amendments to CCR Title 13, Sections 1900 and 1961 (13 CCR 1900, 1961), and adoption of Section 1961.1 (13 CCR 1961.1) require automobile manufacturers to meet fleet-average GHG emissions limits for all passenger cars, light-duty trucks within various weight criteria, and medium-duty passenger vehicle weight classes beginning with the 2009 model year. For passenger cars and light-duty trucks with a loaded vehicle weight (LVW) of 3,750 pounds or less, the GHG emission limits for the 2016 model year are approximately 37% lower than the limits for the first year of the regulations, the 2009 model year. For light-duty trucks with LVW of 3,751 pounds to gross vehicle weight (GVW) of 8,500 pounds, as well as medium-duty passenger vehicles, GHG emissions would be reduced approximately 24% between 2009 and 2016.

Executive Order S-1-07

Executive Order S-1-07 (2007) proclaims that the transportation sector is the main source of GHG emissions in California, at over 40% of statewide emissions. It establishes a goal that the carbon intensity of transportation fuels sold in California should be reduced by a minimum of 10% by 2020. This order also directed ARB to determine if this Low Carbon Fuel Standard could be adopted as a discrete early action measure after meeting the mandates in AB 32. ARB adopted the Low Carbon Fuel Standard on April 23, 2009.

Regional and Local Plans, Policies, Regulations, and Laws

Sacramento Metropolitan Air Quality Management District

The Sacramento Metropolitan Air Quality Management District (SMAQMD) *Guide to Air Quality Assessment in Sacramento County* (SMAQMD 2009) includes recommendations for program-level analysis of General Plans. This guidance states that lead agencies may choose to analyze and mitigate GHG emissions in a GHG reduction plan or similar document. SMAQMD supports preparation of a GHG reduction plan detailing the jurisdiction's approach to reducing GHGs as a companion document implementing General Plans. The Citrus Heights GGRP employs this approach.

California Air Pollution Control Officers Association

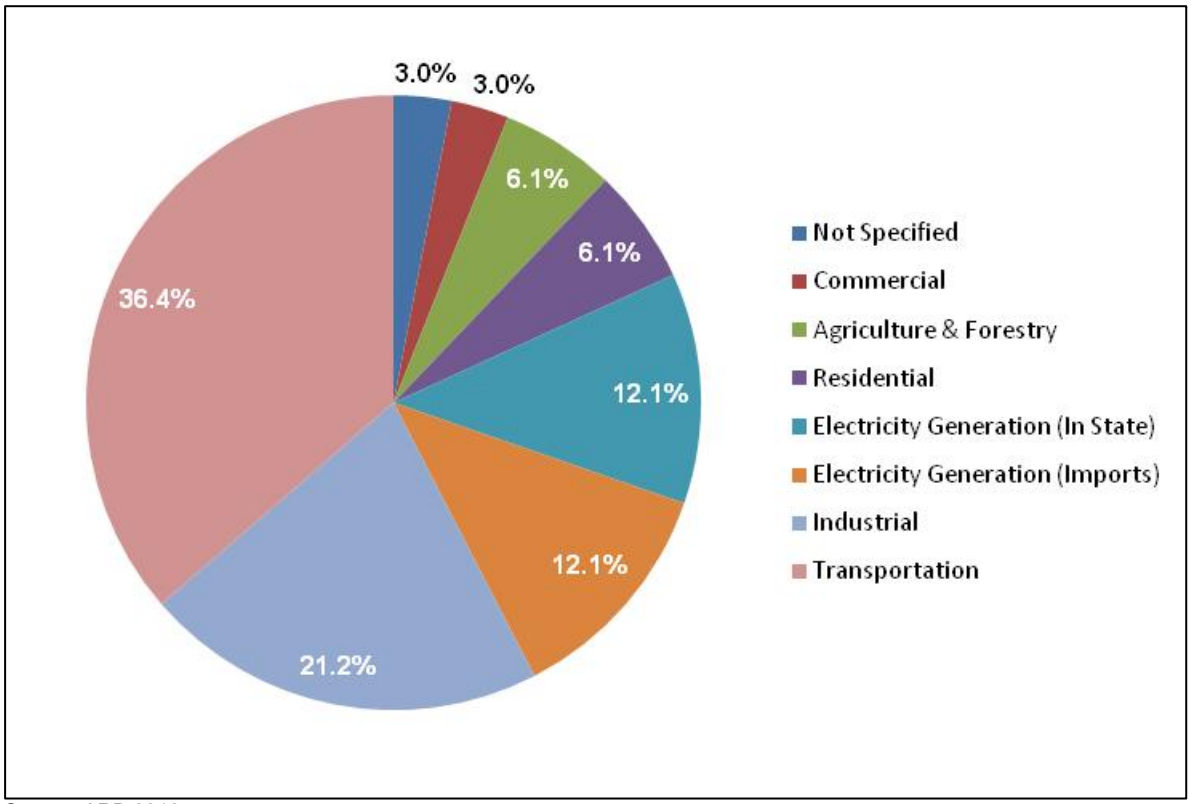
In June 2009, the California Air Pollution Control Officers Association (CAPCOA) published *Model Policies for Greenhouse Gasses in General Plans*. This document provides a generalized summary of policy approaches California cities and counties can use to reduce GHG emissions in nine categories (CAPCOA 2009):

- GHG reduction planning (overall);
- land use and urban design;
- transportation;
- energy efficiency;
- alternative energy;
- municipal operations;
- waste reduction and diversion;
- conservation and open space; and
- education.

4.14.5 ENVIRONMENTAL SETTING

STATE GREENHOUSE GAS EMISSIONS INVENTORY

As the second largest emitter of GHG emissions in the United States and 12th to 16th largest in the world if California were considered a nation, the state contributes a significant quantity of GHGs to the atmosphere (CEC 2006b). Emissions of CO_2 are byproducts of fossil-fuel combustion and are attributable in large part to human activities associated with the transportation, industry/manufacturing, electricity and natural gas consumption, and agriculture (ARB 2010a). In California, the transportation sector is the largest emitter of GHGs, followed by electricity generation (ARB 2010a) (see Exhibit 4.14-1).



Source: ARB 2010a

2008 California GHG emissions by Sector (2000-2008 Emission Inventory) **Exhibit 4.14-1**

CITRUS HEIGHTS GREENHOUSE GAS EMISSIONS INVENTORY

A GHG emissions inventory was conducted for each incorporated city in Sacramento County, including the City of Citrus Heights, and the unincorporated area of Sacramento County (County) for the year 2005. The inventory estimated that communitywide GHG emissions in Citrus Heights totaled approximately 578,134 metric tons of carbon dioxide equivalent (CO_2e) emissions in 2005. Citrus Heights contributed approximately 4.2% of the GHG emissions generated in Sacramento County. On-road transportation emissions composed 42.8% of communitywide GHG emissions, followed by 27.7% from residential sources, and 10.8% from commercial/industrial sources (ICF Jones & Stokes 2009).

The inventory includes communitywide (i.e., those emissions attributable to all sources in Citrus Heights) and government-related operations (i.e., those emissions directly attributable to the City government operations). The

GHG emissions associated with government operations are a subset of the total community-wide emissions. GHG emissions associated with energy, transportation and waste (i.e., solid waste and wastewater), were modeled using the ICLEI-Local Governments for Sustainability Clean Air and Climate Protection (CACP) software, and other calculation methodologies that involved scaling of the statewide GHG emissions inventory prepared by ARB.

Community-wide Inventory

The purpose of the GHG emissions inventory is to assist policy makers and planners to identify the current emission sources, the relative contribution from each source, and the overall magnitude of the City's GHG emissions. This aids in development of more specific and effective policies and emissions control strategies to reduce GHG emissions consistent with State mandates (i.e., AB 32). The GHG emissions inventory is divided into the following GHG emission sectors: residential, commercial/industrial, industrial specific, on-road mobile sources, off-road mobile sources, waste, wastewater treatment, water-related, agriculture, and high GWP GHGs. All GHG emissions are presented in units of metric tons (MT) CO_2e/yr, which allows emissions of other GHGs such as CH_4 and N_2O to be normalized to a single unit of measure that accounts for GWP.

Table 4.14-1 and Exhibit 4.14-2 summarize the 2005 GHG emissions inventory.

Government Operations Inventory

Government operations include buildings, facilities, vehicle fleets, employee commutes, streetlights and traffic signals, and solid waste disposal that are under the jurisdiction of the City. The City's contribution to all GHG emissions sectors is captured in the community-wide inventory summarized in Table 4.14-1. Table 4.14-2 and Exhibit 4.14-3 summarize Citrus Heights' municipal GHG emissions for 2005.

GREENHOUSE GAS EMISSIONS (GGRP BASELINE)

There is currently no agency-adopted or recommended protocol to follow for preparation of community-wide GHG emissions inventories applicable to Citrus Heights. Thus, this field of practice and available tools and methods continue to evolve in the absence of standardized guidance. The City chose to refine certain aspects of the 2005 GHG emissions inventory that could potentially influence the Draft General Plan and development of the GGRP. Thus, the GHG data presented in this section represents the emissions baseline that will be relied upon for the GGRP and this EIR. Sectors of the 2005 emissions inventory that were refined included on-road and off-road mobile-related emissions, wastewater treatment, and high GWP GHGs. Each is discussed in greater detail below and summarized in Table 4.14-3 and Exhibit 4.14-4.

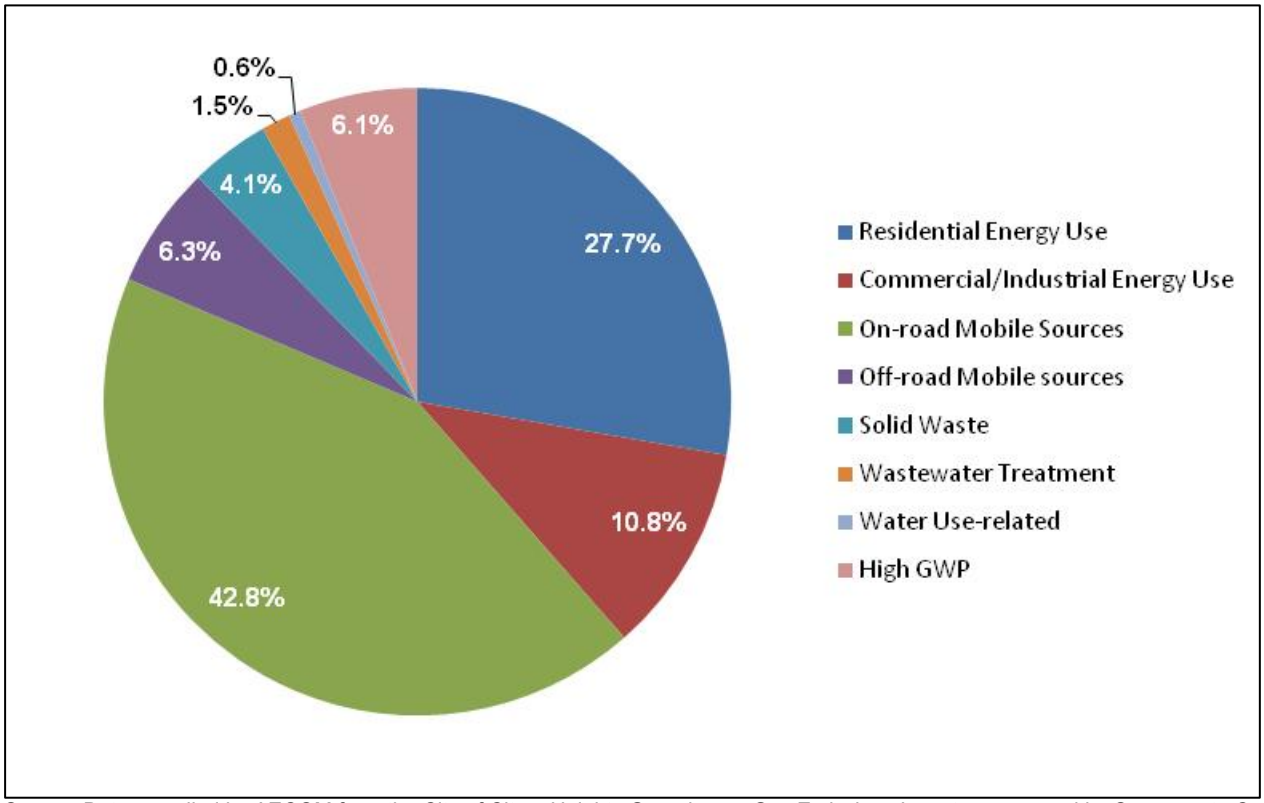
On-road mobile-source GHG emissions were calculated using a bottom-up method based on VMT data obtained from Fehr & Peers Transportation Consultants, which used select zone assignment of SACOG's current SACMET regional travel demand forecasting (TDF) model to calculate VMT for the City of Citrus Heights under existing conditions. Vehicle trips and associated VMT were categorized according to three types of trips:

- Internal–Internal (I-I) trips, which begin and end in Citrus Heights;
- Internal–External (I-X) trips, which begin in Citrus Heights and end outside Citrus Heights; and
- External–Internal (X-I) trips, which begin outside Citrus Heights and end inside Citrus Heights.

The methodology used to calculate VMT assigns 100% responsibility for all I-I trips and 50% responsibility for all I-X and X-I trips to the City. This methodology is consistent with the recommendations of the Regional Targets Advisory Committee, which is the body charged with making recommendations to ARB on implementation of SB 375. On-road mobile-source GHG emissions were estimated using emission factors from the ARB's Mobile Source Emission Factor Model (EMFAC 2007) using VMT by speed bin.

Table 4.14-1 2005 Community-wide Greenhouse Gas Emissions		
Community Sector	Inventory Emissions	
	MT CO_2e	Percent
Residential Energy Use	160,429	27.7%
Commercial/Industrial Energy Use	62,553	10.8%
On-road Mobile sources	247,463	42.8%
Off-road Mobile sources	36,627	6.3%
Solid Waste	23,679	4.1%
Wastewater Treatment	8,425	1.5%
Water Use-related	3,525	0.6%
High GWP	35,433	6.1%
Total	**578,134**	**100%**

Notes: CO_2e = carbon dioxide equivalent; DMV = Department of Motor Vehicles; GHG = Greenhouse Gas; GWP = global warming potential; MT= metric tons.
Source: Data compiled by AECOM from the City of Citrus Heights' Greenhouse Gas Emissions Inventory prepared by Sacramento County 2009.

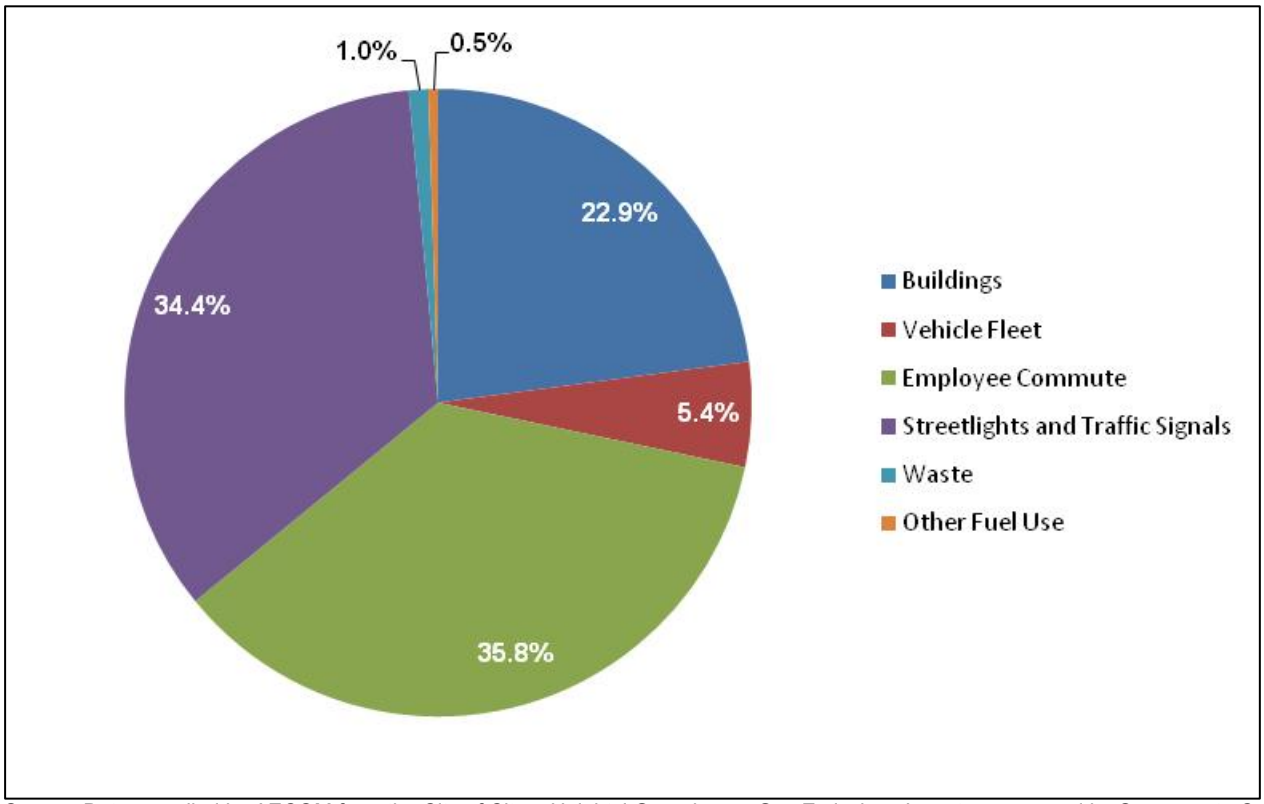


Source: Data compiled by AECOM from the City of Citrus Heights Greenhouse Gas Emissions Inventory prepared by Sacramento County 2009.

Citrus Heights Community-wide Greenhouse Gas Emissions Inventory (2005) **Exhibit 4.14-2**

Table 4.14-2 2005 Government-Related Greenhouse Gas Emissions		
Government Sector	MT CO_2e	Percent
Buildings	603	22.9%
Vehicle Fleet	143	5.4%
Employee Commute	945	35.8%
Streetlights and Traffic Signals	908	34.4%
Waste	25	1.0%
Other Fuel Use	14	0.5%
Total	**2,638**	**100%**

Notes: CO_2e = carbon dioxide equivalent; MT= metric tons.
Source Data compiled by AECOM from the City of Citrus Heights' Greenhouse Gas Emissions Inventory prepared by Sacramento County 2009.



Source: Data compiled by AECOM from the City of Citrus Heights' Greenhouse Gas Emissions Inventory prepared by Sacramento County 2009.

Citrus Heights Municipal Greenhouse Gas Emissions Inventory (2005) **Exhibit 4.14-3**

On-Road Mobile Sources

The revised on-road mobile-source GHG emissions estimates account for locally (City)-generated VMT on state highways (e.g., I-80) and do not include emissions associated with trips that originate and terminate outside of Citrus Heights. The original GHG emissions inventory did not distinguish between locally-generated or pass-through VMT. In addition, the original inventory did not calculate emissions according to speed bin. Thus, this refined calculation enables the City to more accurately identify the subset of mobile-source emissions that General Plan polices can influence.

Off-road Mobile Sources

Off-road mobile-source GHG emissions were calculated using a top-down method. ARB's OFFROAD emissions model contains factors for types of off-road motor vehicles such as boats, agricultural equipment, off-highway vehicles, lawn and garden equipment, and rail. The OFFROAD model aggregates off-road emissions for all of Sacramento County. Under the current inventory calculation, the total off-road GHG emissions for all of Sacramento County were apportioned using the population of each jurisdiction (incorporated cities and unincorporated areas). This approach to allocating off-road mobile-source GHG emissions is not necessarily representative of the jurisdictions in which off-road emissions sources would exist. For example, under this method, some portion of agricultural equipment-related GHG emissions would be allocated to Citrus Heights, when most of this type of equipment would be located in the unincorporated area of the County. However, this approach may be appropriate for lawn and garden equipment emissions.

The revised off-road mobile-source GHG estimates removed emissions that are not applicable to Citrus Heights (e.g., use of agricultural equipment, boats, off-highway vehicles) from the countywide OFFROAD model, but retained emissions associated with equipment that is likely used within the City (e.g., landscape and construction equipment, air compressors, generators). These emissions were then apportioned by population to Citrus Heights.

Wastewater Emissions

Domestic wastewater treatment emissions were calculated using a bottom-up calculation method for GHG emissions generated by the Sacramento Regional Wastewater Treatment Plant (WWTP). The Sacramento Regional WWTP service area includes the cities of Citrus Heights, Elk Grove, Folsom Rancho Cordova, Sacramento, West Sacramento, and a portion of unincorporated Sacramento County. Wastewater is treated at the plant using secondary treatment processes, which results in methane formation. Emission factors for methane published by the IPCC for wastewater treatment and discharge were used, along with facility-specific information on average annual flow and influent biological oxygen demand (BOD). The GHG emissions from the Sacramento Regional WWTP were distributed on a per-capita basis for the entire Sacramento Regional County Sanitation District service area, and then allocated to Citrus Heights based on the City's population. This method more accurately estimates GHG emissions from the wastewater treatment process specific to Citrus Heights.

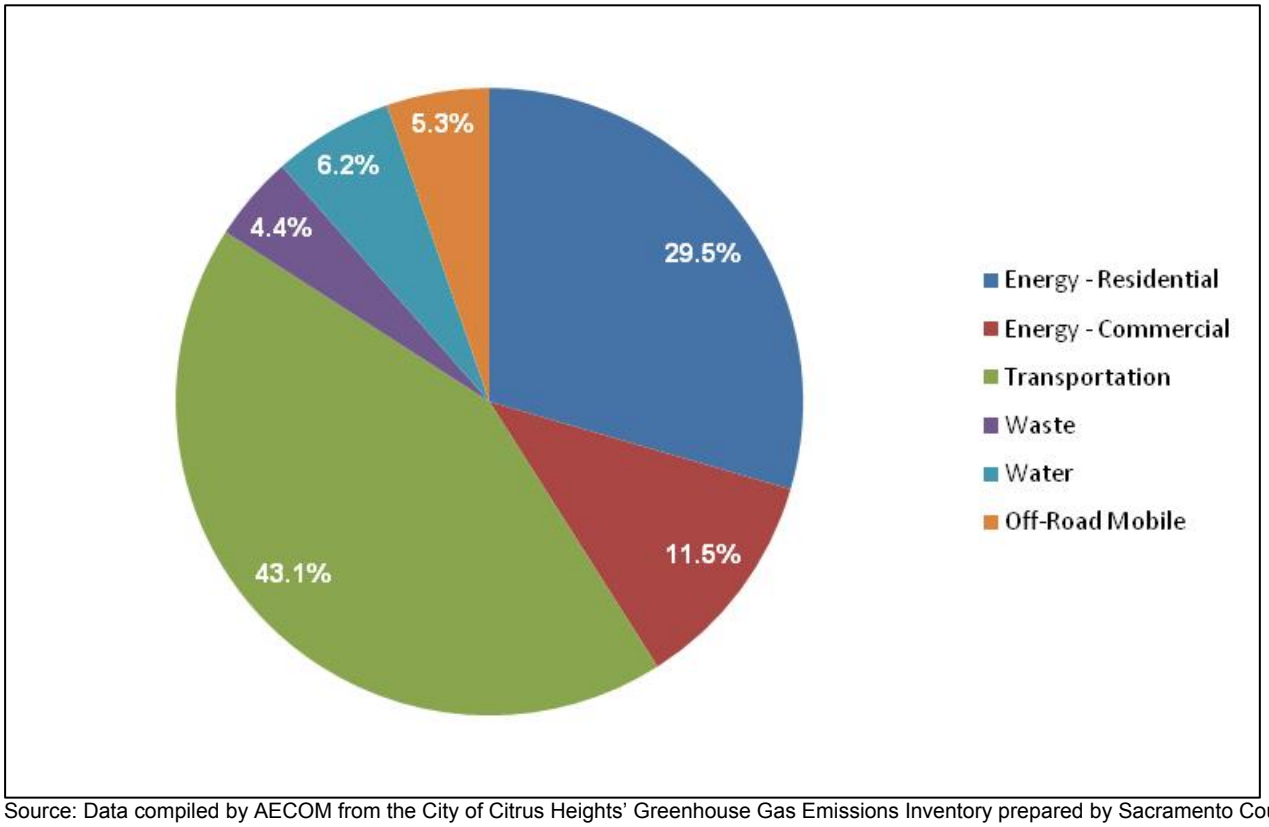
High Global Warming Potential Greenhouse Gases

High GWP GHGs are associated with industrial processes, refrigerants, semi-conductor manufacturing, and electrical transmission. According to the City's inventory, there are no industrial-specific GHG emissions in Citrus Heights, which would indicate that there are likely few, if any, high GWP GHG emissions in the City. Thus, high GWP emissions were removed from the GGRP emissions baseline in Citrus Heights.

Table 4.14-3
2005 Community-wide Greenhouse Gas Emissions – GGRP Baseline

Community Sector	GGRP Baseline Emissions	
	MT CO_2e	Percent
Residential Energy Use	160,429	29.5%
Commercial/Industrial Energy Use	62,553	11.5%
On-road Mobile sources	234,231	43.1%
Off-road Mobile sources	28,877	5.3%
Solid Waste	23,679	4.4%
Wastewater Treatment	30,433	5.6%
Water Use-related	3,525	0.6%
Total	**543,727**	**100%**

Notes: CO2e = carbon dioxide equivalent; MT= metric tons.
Off-road mobile-source emissions are related to emissions from off-road motor vehicles such as boats, agricultural equipment, off-highway vehicles, lawn and garden equipment, and rail.
Source: Data compiled by AECOM from the City of Citrus Heights' Greenhouse Gas Emissions Inventory prepared by Sacramento County 2009.



Source: Data compiled by AECOM from the City of Citrus Heights' Greenhouse Gas Emissions Inventory prepared by Sacramento County 2009.

Citrus Heights Community-wide Greenhouse Gas Emissions Baseline (2005) **Exhibit 4.14-4**

4.14.6 ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

THRESHOLDS OF SIGNIFICANCE

According to the *CEQA Guidelines* (Appendix G), an impact related to GHG emissions is considered significant if the proposed project would:

- Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment; or
- Conflict with any applicable plan, policy or regulation of an agency adopted for the purpose of reducing the emissions of greenhouse gases.

Neither ARB nor SMAQMD has developed a quantitative significance threshold to evaluate construction-related GHG emissions. However, some California air districts, including SMAQMD, recommend that the Lead Agency quantify and disclose the total GHG emissions that would occur during construction, and make a significance determination on construction-generated GHG emission impacts in relation to meeting AB 32 GHG reduction goals. The SMAQMD does not have a quantitative threshold of significance for construction-related GHG emissions; therefore, the threshold is based on a qualitative evaluation of whether the project implements applicable Best Management Practices for reducing GHG emissions related to construction activities.

SMAQMD recommends that thresholds of significance for long-term GHG emissions should be related to AB 32's GHG reduction goals. Under both the CEQA Guidelines and SMAQMD guidance, a general plan would be assumed to have a less-than-significant impact for GHG emissions if the lead agency has prepared and adopted a greenhouse gas reduction plan that has been evaluated pursuant to CEQA and has a certified or approved environmental document. If a general plan is adopted pursuant to a certified EIR that considers GHG emissions, and if the plan and its EIR incorporate development policies, standards, and mitigation measures achieving GHG reductions that result in a less-than-significant impact with respect to GHG emissions, this could alleviate the need to evaluate and mitigate GHG's at the project-level for projects that are found to be consistent with the general or area plan.

Efficiency-Based Threshold

SMAQMD recommends that thresholds of significance for GHG emissions should be related AB 32 reduction goals. In a statewide context, GHG efficiency can be considered independently from the jurisdiction in which the plan is located. Mass emissions from land use-related sectors can be normalized using population and/or employment to allow assessment of GHG efficiency. Limiting the analysis to land use-related sectors maintains focus on long-range physical development within the community. This threshold is employed in Impacts 4.14-1 and 4.14-2.

The sum of the number of jobs and number of residents at a point in time is termed the "service population" (SP). Dividing mass (i.e., total) land use emissions by the associated population and/or employment allows an assessment of GHG efficiency. Statewide per-capita and per-SP metrics have been established that would accommodate estimated statewide population and employment growth, and the statewide emission rates needed to accommodate growth while also achieving AB 32 goals (i.e., 1990 GHG emissions levels by 2020).[2] These emission rates identify how GHG-efficient new and existing land uses must be in order to achieve AB 32 targets in the emissions sectors that are related to land use (e.g., on-road passenger and heavy-duty motor vehicles, commercial and residential area sources [i.e., natural gas], electricity generation/consumption, waste water

[2] The planning horizon (2035) exceeds the 2020 timeframe for implementation of AB 32. Executive Order S-3-05 establishes a 2050 statewide emissions reduction goal of 80% below 1990 emissions levels. The 2020 timeframe is analyzed because analyzing the 2050 timeframe would be speculative.

treatment, and water consumption). Table 4.14-4 summarizes statewide 1990, current (2002–2004 average baseline), and projected 2020 GHG emissions from these sectors.

Table 4.14-4
California Statewide Greenhouse Gas Emissions Inventory, 1990 Emissions Limit, Base Year, and 2020 Projections from Land Use-Related Sectors

Sector	1990 Emissions (MMT CO_2e/yr)	2002-2004 Average (MMT CO_2e /yr)	2020 Emissions Projections (MMT CO_2e/yr)
Transportation	**137.992**	**168.657**	**209.101**
On-Road Passenger Vehicles	108.945	133.947	160.783
On-Road Heavy Duty	29.047	34.710	48.318
Electric Power	**95.385**	**88.970**	**107.401**
In-State Generation	33.808	32.152	55.039
Imported Electricity	61.577	56.818	52.362
Commercial and Residential	**44.220**	**41.579**	**47.970**
Residential Fuel Use	29.657	28.515	32.100
Commercial Fuel Use	13.462	11.704	13.755
Commercial Combined Heat and Power	1.101	1.360	2.115
Recycling and Waste[1]	**2.833**	**3.390**	**4.190**
Domestic Waste Water Treatment	2.833	3.390	4.190
Total Gross Emissions	**280.430**	**302.596**	**368.662**

Notes: MMT CO_2e /yr = million metric tons of carbon dioxide equivalent emissions per year.
[1] Landfills not included.
Please refer to Appendix B for detailed calculations.
Sources: Data compiled by AECOM 2009, ARB 2008, ARB 2009

AB 32 has established the 1990 emissions limit as the legislative context for assessing future emissions. The 1990 emissions limit from these sectors is 280 MMT CO_2e. ARB has developed 2020 statewide GHG emissions estimates based on population increases, demographic changes, economic development, and a wide variety of other factors, classified as the "business as usual" (BAU) scenario. The BAU estimate for land use-related GHG emissions sectors (i.e., transportation, electricity, natural gas, and wastewater) in California is approximately 370 MMT CO_2e in 2020.

Table 4.14-5 summarizes projected population and employment estimates for the state, and allocates the GHG emissions limit (i.e., 280 MMT CO_2e) from Table 4.14-4 to the projected 2020 statewide population and SP. The resulting per-capita metric is 6.35 MT CO_2e/person/yr and the per-SP metric is 4.36 MT CO_2e/SP/yr. By meeting these AB 32-derived GHG efficiency targets, the City can demonstrate that the increment of new growth anticipated in the Draft General Plan in 2035 would occur in a manner that would not hinder statewide achievement of fair share GHG reductions and would not conflict with the Scoping Plan, and could therefore be considered less than significant.

Greenhouse Gas Reduction Plan-Based Threshold

SMAQMD states that lead agencies may choose to analyze and mitigate GHG emissions in a GHG reduction plan or similar document. SMAQMD supports preparation of a GHG reduction plan or climate action plan detailing the jurisdiction's approach to reducing GHGs as a companion document implementing general plans. Furthermore, SMAQMD recommends that GHG reduction plans or climate action plans:

Table 4.14-5
California Statewide Greenhouse Gas Emissions, Population Projections, and Greenhouse Gas Efficiency Thresholds

	1990	2002–2004 Average	2020
Statewide Population	29,758,213	36,199,342	44,135,923
Statewide Employment	14,294,100	16,413,400	20,194,661
Statewide Service Population (Population + Employment)	44,052,313	52,612,742	64,330,584
Projected Statewide GHG emissions(MT CO_2e)/capita[1]	9.42	8.36	8.35
Projected Statewide GHG emissions (MT CO_2e)/SP[1]	6.37	5.75	5.73
AB 32 Goal for GHG emissions (MT CO_2e)/capita[1]	9.42	7.75	**6.35**
AB 32 Goal for GHG emissions (MT CO_2e)/ SP[1]	6.37	5.33	**4.36**

Notes: AB = Assembly Bill; MT CO_2e = metric tons carbon dioxide equivalent; GHG = greenhouse gas; SP = service population.
[1] Greenhouse gas efficiency levels were calculated using only the land use-related sectors of ARB's emissions inventory. See Table 4.14-4. Please refer to Appendix B for detailed calculations.
Sources: Data compiled by EDAW 2009, ARB 2008, ARB 2009, DOF 2009, EDD 2009

- Address the entirety of the general or area plan project area;
- Include a base year GHG emissions inventory and GHG emissions projections for 2020;
- Identify a range of binding and enforceable GHG emission reduction measures, and demonstrate that these measures, if implemented, would achieve established reduction targets;
- Demonstrate consistency with all AB 32 Climate Change Scoping Plan measures; and
- Be adopted by resolution of the city council or board of supervisors.

A general plan would be assumed to have a less-than-significant impact for GHG emissions if the lead agency has prepared and adopted a plan that meets the above criteria and that has been evaluated pursuant to CEQA. This threshold is employed in Impact 4.14-3.

APPROACH

Pursuant to the guidance provided in the State CEQA Guidelines and *SMAQMD Guide to Air Quality Assessment in Sacramento County*, this section addresses four potential impacts of the Draft General Plan and GGRP related to GHG emissions:

1. The potential for implementation of the Draft General Plan and GGRP to result in construction-related GHG emissions;
2. The potential for the increment of new growth anticipated within the Draft General Plan (i.e., approximately 3,577 net new dwelling units and approximately 2.9 million net new non-residential square feet) to generate GHG emissions that may have a significant impact on the environment;
3. The potential for the community-wide GHG targets and reduction plan identified in the Draft General Plan and GGRP to conflict with the ARB *Climate Change Scoping Plan*; and

4. The potential impacts of anticipated climate change effects (i.e., reduced hydroelectric energy production, increased energy demand, and decreased water supply) on the planning area.

Methods used to evaluate each impact are presented in the impact discussions.

IMPACT ANALYSIS

IMPACT 4.14-1 **Generation of Construction-Related Greenhouse Gas Emissions.** *Future construction activities related to land uses consistent with the Draft General Plan and GGRP would result in increased generation of GHG emissions. However, the Draft General Plan and GGRP include policies, measures, and actions applicable to large construction projects designed to reduce construction-related GHG emissions. Furthermore, anticipated future construction-related emissions would be below AB 32 efficiency standards. Therefore, this impact would be considered* ***less than significant****.*

This impact considers the potential for implementation of the Draft General Plan and GGRP to result in construction-related GHG emissions. Heavy-duty off-road equipment, materials transport, and worker commutes associated with future land uses consistent with the Draft General Plan would result in exhaust emissions of GHGs. GHG emissions generated by construction would be primarily in the form of CO_2. Although emissions of other GHGs, such as CH_4 and N_2O, also occur from on- and off-road vehicles used during construction, they are relatively small compared with CO_2 emissions, even when factoring in the relatively larger global warming potential of CH_4 and N_2O.

Methodology

Total construction emissions for the 25-year buildout period associated with implementation of the Draft General Plan were estimated using URBEMIS 2007 Version 9.2.4. URBEMIS is designed to model construction emissions for land use development projects based on building size, land use and type, and disturbed acreage and allows for the input of project-specific information. Construction emissions associated with future land uses consistent with the Draft General Plan are estimated to generate a total of 15,268 MT CO_2 between 2010 and 2035.[3] Construction emissions related to implementation of the plan also account for exhaust emissions of GHGs that would be generated by heavy-duty equipment, haul trucks, and vehicle trips.[4]

It is possible to amortize total construction emissions over the planning horizon of the Draft General Plan (e.g., 2010 to 2035). As discussed below in Impact 4.14-2, the annual anticipated land use emissions for the increment of new growth anticipated within the Draft General Plan are 95,267 MT CO_2e/yr, which meets AB 32 GHG efficiency goals given the population and employees such uses would be anticipated to accommodate. If anticipated construction emissions were distributed evenly over this 25-year period, they would contribute an additional 611 MT CO_2/yr to these emissions.[5] With construction emissions included, the GHG emissions of additional growth anticipated in the Draft General Plan would increase to 95,878 MT CO_2e/yr by 2035. This would result in efficiency metrics of 4.65 MT CO_2e/person/yr and 3.52 MT CO_2e/SP/yr, which also are less than AB 32 GHG efficiency goals. If total construction emissions over 25 years were added to a single year of construction, the GHG efficiency of the increment of new growth anticipated in the Draft General Plan would remain less than AB 32 GHG efficiency goals (i.e., 6.35 MT CO_2e/person/yr and 4.36 MT CO_2e/SP/year).

Neither ARB nor SMAQMD has proposed any GHG emissions mitigation measures directly related to construction activity. However, SMAQMD has adopted protocols for mitigation if a proposed project's construction emissions exceed the threshold of significance for NO_x emissions, and has developed recommended

[3] URBEMIS outputs of tons were converted to metric tons by a factor of 0.91.

[4] The URBEMIS model does not account for reductions in CO_2 emission rates that would affect future construction activity due to the regulatory environment that is expected to evolve under AB 32.

[5] Construction of future land uses consistent with the Draft General Plan would likely span a period longer than 25 years. However, to support a conservative analysis, the 25-year period from the time of writing this analysis was used to amortize emissions.

measures for reducing GHG emissions from construction activities. In most cases, reducing NO_x emissions and controlling emissions from off-road construction equipment will also reduce GHG emissions related to construction.

Draft General Plan Policies and Actions

The Draft General Plan includes the following policies and actions designed to reduce construction-related criteria pollutant and GHG emissions.

Policies

- **53.1:** Promote measures that improve air quality and help meet air quality attainment standards.
- **53.3:** Promote use of clean alternative fuel vehicles and construction equipment.

Actions

53.1.B. Support SMAQMD in its development of improved ambient air quality monitoring capabilities and establishment of standards, thresholds and rules to address and, where necessary, mitigate the air quality impacts of new development.

53.1.C. Enforce air pollution control measures during construction.

53.3.B. Adopt a "proactive contracting" policy that gives preference to contractors using reduced emission equipment for City construction projects as well as for City contracts for services (e.g., garbage collection).

Greenhouse Gas Reduction Plan Measure and Actions

SMAQMD has developed recommended measures for reducing GHG emissions from construction activities. These measures are best management practices (BMPs) and many are not easy to quantify for GHG emission reductions. The GGRP includes the following measure and actions related to the SMAQMD BMPs:

Measure

- **4-1.A.** Implement Construction Air Quality Mitigation Plan protocols and BMPs set forth by SMAQMD.

Actions

4-1.A.A. Require submission of a Construction Air Quality Mitigation Plan (CAQMP) for future projects exceeding the SMAQMD NO_x threshold of significance (85 pounds/day).

4-1.A.B. In CAQMPs prepared for future projects, require incorporation of applicable SMAQMD-recommended BMPs for reducing construction-related GHGs.

4-1.A.C. Offer selection preference for contractors who use low-emission equipment and low-carbon fuels in their equipment when bidding on City contracts.

Conclusion

Draft General Plan and GGRP policies, measures, and actions would require preparation of CAQMPs for future projects exceeding SMAQMD's NO_x threshold of 85 pounds per day. Implementation of GGRP Action 1-1E.B would require that applicable SMAQMD-recommended BMPs be included in CAQMPs meeting the NOx threshold. Furthermore, when amortized over the 25-year planning horizon (or even within a single year of

construction), construction-related GHG emissions would not cause GHG emissions for the increment of new growth anticipated within the Draft General Plan to exceed AB 32 GHG efficiency goals. Therefore, with implementation of the Draft General Plan and GGRP and SMAQMD-recommended construction BMPs, anticipated construction emissions would be consistent with the goals of AB 32. Therefore, construction-related GHG emissions are considered **less than significant**. No mitigation beyond implementation of GGRP measures and actions is required.

IMPACT 4.14-2 Increases in Greenhouse Gas Emissions From New Development. *Future land uses consistent with the Draft General Plan would allow for up to 3,577 net new dwelling units and up to 2.9 million net new non-residential square feet. These uses would result in increased generation of GHGs, which would contribute considerably to cumulative GHG emissions. However, anticipated future land use emissions would be below AB 32 efficiency standards. Furthermore, the Draft General Plan and GGRP include policies, measures and actions designed to reduce GHG emissions associated with new development. This impact would be less than significant.*

This impact considers the potential for the increment of new growth anticipated within the Draft General Plan and GGRP to generate GHG emissions that may have a significant impact on the environment. Analysis of this impact uses statewide efficiency-based metrics derived from the Scoping Plan to compare emissions resulting from the increment of new growth anticipated by the Draft General Plan in 2035 to statewide emissions efficiencies required to achieve AB 32 objectives.

Land use-related emissions may be both direct and indirect emissions, and would be generated by area-, mobile-, and stationary-sources. Area-source emissions would be associated with activities, such as combustion of natural gas for hearth furnaces and maintenance of landscaping and grounds. Natural gas combustion for space and water heating is also a direct area source of GHG emissions, but is considered separately from other area-sources. Mobile-source emissions of GHGs would include vehicle trips associated with employee commutes, errands, recreation, and other trips in passenger vehicles of future residents of and visitors.[6] Indirect emissions sources include stationary-source emissions from electricity generation at off-site utility providers. Consumption of water would also result in indirect GHG emissions because of the electricity consumption associated with the off-site conveyance, distribution, and treatment of that water. Solid waste and wastewater generated by activities within the City of Citrus Heights would result in direct, off-site emissions of GHGs.

Analysis

This analysis employs both a per-capita emissions metric and a per-SP emissions metric that combines per-capita and per-job emissions. Table 4.14-6 shows that the net increase in future mass emissions in 2035 compared to existing (2005 on-the-ground) conditions associated with new land uses anticipated within the Draft General Plan and GGRP would be 95,267 MT CO_2e/yr. Because the Draft General Plan and GGRP address primarily land use and mobility characteristics, mobile sources (i.e., vehicle trips) are the primary source of GHG emissions associated with the increment of new growth anticipated within the Draft General Plan and GGRP. Energy use (both electricity generation and natural gas consumption) is the next largest category at approximately 17% of the total CO_2e emissions.

Additional dwelling units and non-residential square feet anticipated within the Draft General Plan would accommodate approximately 15,880 new residents and 6,580 new jobs. If the land use emissions identified in Table 4.14-2 were distributed evenly on a per-capita basis, the increment of new growth anticipated within the

[6] ARB estimates that implementation of GHG emission reduction standards for new passenger cars, pickup trucks and sport utility vehicles as described in AB 1493 will achieve a 15.76% increase in vehicle performance and therefore reduce the overall GHG emissions from on-road mobile sources by 2020 (ARB 2008). Based on current available data, implementation of the Low Carbon Fuel Standard (LCFS) is projected to reduce overall statewide GHG emissions attributable to vehicle fuels by about 10%. Statewide reductions associated with AB 1493 and the LCFS are incorporated into the GHG emission estimates for new land uses within the planning area in 2035.

Table 4.14-6 Net Increase in GHG Emissions 2005-2035 with Implementation of the Draft General Plan[1]	
Source	Annual Mass CO_2e Emissions (metric tons)
Land Use Emissions	
Mobile-Source	53,570
Electricity Generation	20,202
Natural Gas Consumption	10,721
Area-Source	3,310
Water Consumption	949
Solid Waste	6,514
Total Land Use Emissions (Direct and Indirect)	**95,267**
GHG Efficiency Metrics	
Projected Increase in Residential Population (2005 to 2035)[2]	**15,880**
Projected Increase in Employment (jobs)[2]	**6,580**
Projected Increase in Service Population	**22,460**
CO_2e/person/year	6.00 metric tons/person/year
CO_2e/SP/year	4.24 metric tons/SP/year

Notes:
AB = Assembly bill; CO_2e/SP/year = carbon dioxide equivalent per service population per year; GHG = greenhouse gases; SP = service population.

[1] Direct land use emissions were modeled using the URBEMIS 2007 and Bay Area Air Quality Management District Greenhouse Gas Model (BGM), based on trip generation rates and VMT obtained from the traffic analysis.

[2] Net change in employment estimates for 2035 were based on 2005 and 2035 data from the SACOG SACMET travel demand model. Population was derived using SACOG household forecasts and a population/household ratio of 2.36 for 2005 and 2.55 for 2035 according to US Census and DOF data.

Source: Modeling conducted by AECOM in 2010

Draft General Plan would generate GHG emissions at an average rate of approximately 6.00 MT CO2e/person/yr. If new jobs and population are considered together, this rate would be approximately 4.24 MT CO2e/SP/yr. These rates are both less than the significance thresholds defined for purposes of this analysis in Table 4-14.5 (i.e., 6.35 MT CO2e/person/yr and 4.36 MT CO2e/SP/yr).

Draft General Plan Policies and Actions

The Draft General Plan includes the following policies and actions to reduce GHG emissions associated with new development.

Policies

- **31.4:** Require new development to provide transit enhancements, where appropriate, that decrease transit travel times, improve access to transit stops, or improve the amenities, security, or travel information at transit stops.

- **40.1:** Encourage new buildings to maximize solar access to promote passive solar energy use, natural ventilation, effective use of daylight, and on-site solar generation.

- **40.2:** Promote a climate-appropriate tree planting and maintenance program in order to reduce ambient air temperature on hot sunny days, and require that all tree plantings and outdoor lighting be integrated.

- **41.1:** Require energy-efficient site and building designs in new construction.

- **53.1:** Promote measures that improve air quality and help meet air quality attainment standards.

- **54.1:** Encourage alternative modes of transportation and trip-reducing strategies such as telecommuting and mixed-use development.

- **55.1:** Implement a comprehensive greenhouse gas reduction plan to reduce communitywide greenhouse gasses through community engagement and leadership; land use, community design, and transportation choices; energy and water conservation techniques; solid waste reduction and building green infrastructure.

- **60.1:** Mitigate the urban heat island effect and sequester carbon.

Actions

40.1.A. Amend the Zoning Code to include standards for building construction and siting that promote energy conservation.

41.1.A. Explore use of grant funds and programs with SMUD and non-profit agencies to establish programs for energy conservation (such as home weatherization, Energy Star appliances) and transition to the use of clean and renewable energy (such as photovoltaic retrofit, solar hot water heating and pumps).

41.1B. Consider ordinances that would require energy audits, solar access, insulation, solar retrofit, and solar water heating.

53.1.B. Support SMAQMD in its development of improved ambient air quality monitoring capabilities and establishment of standards, thresholds and rules to address and, where necessary, mitigate the air quality impacts of new development.

Greenhouse Gas Reduction Plan Measures and Actions

The GGRP includes the following measures and actions to reduce GHG emissions associated with new development.

Measures

- **3-2.A:** Develop rideshare infrastructure to facilitate participation by those travelling from Citrus Heights to major employment centers such as Downtown Sacramento or Roseville.

- **3-4.A:** Create infrastructure to promote use of low-carbon and alternative fuel vehicles.

- **4-3.E:** Collaborate with local utility companies and adjacent cities to accelerate smartgrid integration in the community.

Actions

3-2.A.B. Amend the Zoning Code to require preferential parking spaces within new or substantially improved commercial, employment and civic projects designated for carpool and/or vanpool use.

3-4.A.A. Amend the Zoning Code to require new or substantially improved multi-family residential, commercial and office projects to provide infrastructure to accommodate alternative fuel vehicles.

4-3.E.C. Adopt an ordinance to require smart grid energy management systems and compatible heating, ventilation, air conditioning and lighting in new construction.

Conclusion

The increment of new growth anticipated within the Draft General Plan would generate GHG emissions at an average rate of approximately 6.00 MT CO2e/person/yr. If new jobs and population are considered together, this rate would be approximately 4.24 MT CO2e/SP/yr. These values are below efficiency levels identified in Table 4.14-5 which are required statewide to achieve California's 2020 GHG target established under AB 32 (i.e., 6.35 MT CO2e/person/yr and 4.36 MT CO_2e/SP/yr). As noted previously, achieving 1990 emissions by 2020, as mandated under AB 32, is a goal tied to global GHG concentrations needed to stabilize GHG concentrations in the atmosphere at a level that would prevent dangerous human interference with the global climate. Furthermore, the Draft General Plan and GGRP include policies, measures, and actions designed to reduce GHG emissions associated with new development. Therefore, with implementation of the Draft General Plan and GGRP, this impact is considered **less than significant**. No mitigation beyond Draft General Plan and GGRP policies, measures, and actions is required.

IMPACT 4.14-3 Consistency with Plans, Policies and Regulations Related to Greenhouse Gases. *The Draft General Plan and GGRP include policies and measures that would reduce community-wide GHG emissions by 13.7% below 2005 levels. The City's actions, together with the effects of AB 1493 and Low Carbon Fuel Standards (LCFS) in Citrus Heights would enable a combined reduction of about 24.5% below 2005 levels by 2020. Therefore, the Draft General Plan and GGRP would not conflict with any plans, policies or regulations related to GHG emissions and the impact would be* ***less than significant****.*

This impact considers the potential for the community-wide GHG targets and reduction plan identified in the Draft General Plan and GGRP to conflict with the ARB *Climate Change Scoping Plan* (Scoping Plan). The adopted Scoping Plan includes proposed GHG reductions from direct regulations, alternative compliance mechanisms, monetary and non-monetary incentives, voluntary actions, and market-based mechanisms such as cap-and-trade systems. The Scoping Plan did not directly create any regulatory requirements for the City or for future land uses consistent with the Draft General Plan. However, regulatory changes would affect GHG emission rates from vehicles uses by residents and business in Citrus Heights. Regulatory changes could affect GHG emissions rates associated with electricity demand created by future land uses, which will be required to comply with future regulatory changes, as appropriate.

Analysis

This analysis compares the community-wide GHG reduction potential of implementation of the GGRP's primary measures to reductions needed on a statewide basis to enable implementation of the Scoping Plan. The Scoping Plan calls for reducing greenhouse gas emissions on a statewide level to 1990 levels, which equates to cutting approximately 28% from emission levels projected for 2020, or about 15% from current levels. ARB encourages local governments to adopt a reduction goal for municipal operations emissions and move toward establishing similar goals for community-wide emissions that parallel the State commitment to reduce greenhouse gas emissions by approximately 15% from current levels by 2020 (ARB 2008). SMAQMD also recommends that a numeric GHG reduction target representative of 1990 levels despite planned population and employment growth (e.g., 15% below current levels) should be adopted as a policy within a lead agency's general plan (SMAQMD 2009).

Adopting an emission reduction target is an important step in assessing the effectiveness of the Draft General Plan and GGRP. In comparison to many other California jurisdictions, Citrus Heights is nearly built out, and a significant number of residents work in adjacent cities. However, approximately 60% of Citrus Heights'

residential units and much of its commercial building stock were built prior to implementation of California's Title 24 Energy Efficiency Standards. Understanding this context, the City's baseline inventory and projections led to establishment of a reduction target. On February 17, 2010, the Citrus Heights City Council recommended a communitywide reduction target of 10 to 15% below 2005 baseline emission levels by 2020, consistent with AB 32 goals for local governments in 2020. This target has been incorporated in the Draft General Plan as Goal 55, and is the reduction target described in the GGRP.

As described in the Environmental Setting, a GHG emissions inventory was conducted for the City of Citrus Heights for the year 2005. As shown in Table 4.14-7, the GGRP baseline inventory for the year 2005 identified a

Table 4.14-7
City of Citrus Heights Communitywide Greenhouse Gas Emissions: 2005 and 2020

Communitywide Emissions Sector	2005 Baseline Emissions	2020 Projections	GGRP Emission Reduction Measures (without Statewide Reductions)	GGRP Emission Reduction Measures (with Statewide Reductions)[2]
	MT CO_2e	MT CO_2e	MT CO_2e	MT CO_2e
Building Energy Use (Commercial and Residential)	222,982	212,374	43,857	43,857
On-road Mobile sources (Transportation)	234,231	248,963	19,760	17,960
Off-road Mobile sources[1]	28,877	30,693		
Solid Waste	23,679	25,168	18,880	18,880
Wastewater and Water Use	33,958	39,198	4,030	4,030
Green Infrastructure			740	740
Statewide Reductions				
AB 1493 (15.76%)				39,240
Low Carbon Fuel Standard (10%)				20,970
Total	**543,727 (A)**	**556,396 (B)**	**87,267 (C)**	**145,677 (D)**
2020 Incorporating GGRP Emission Reduction Measures (without Statewide Reductions) [Formula = B - C]			**469,129 (E)**	
2020 Incorporating GGRP Emission Reduction Measures (with Statewide Reductions) [Formula = B - D]				**410,719 (F)**
% Change from 2005		**+2.3%**	**-13.7%[3]**	**-24.5%[4]**

Notes: CO_2e = carbon dioxide equivalent; MT= metric tons; AB = Assembly Bill. Totals may not appear to add due to rounding.

[1] Off-road mobile-source emissions are related to emissions from off-road motor vehicles such as boats, agricultural equipment, off-highway vehicles, lawn and garden equipment, and rail.

[2] Statewide reductions refer to Citrus Heights' share of statewide emission reductions for AB 1493 and LCFS.

[3] The percent change below 2005 emission levels is calculated based on the following formula (A-E)/A

[4] The percent change below 2005 emission levels is calculated based on the following formula (A-F)/A

Source: Data compiled by AECOM from the City of Citrus Heights Greenhouse Gas Emissions Inventory 2009 and modeled by AECOM 2010

communitywide emissions total of 543,727 MT CO_2e. In addition, a 2020 emissions projection was also prepared. As shown in Table 4.14-7, the 2020 emissions projection identified a communitywide emissions total of 556,396 MT CO_2e in 2020. As shown in the table, the GGRP recommends communitywide measures and actions that can collectively reduce GHG emissions by approximately 87,267 MT CO_2e/yr, equivalent to a 13.7% reduction below 2005 levels. Reductions that would occur within Citrus Heights by virtue of statewide reductions from implementation of AB 1493 and the LCFS were also considered during development of the GHG reduction target and GGRP measures. Together with the effects of AB 1493 and LCFS in Citrus Heights, the GGRP measures would enable a combined reduction of 145,677 MT CO_2e/yr, or about 24.5% below 2005 levels. This reduction encompasses both the increment of new growth anticipated within the Draft General Plan and existing development within the planning area.

Draft General Plan Policies

The Draft General Plan includes the following policies that are designed to reduce communitywide GHG emissions. Measures to implement each of these policies are provided in the GGRP. These policies address each of the categories identified within CAPCOA's *Model Policies for Greenhouse Gasses in General Plans* (CAPCOA 2009), providing a Citrus Heights-specific context and approach to reducing GHG emissions within the sectors most applicable to the City.

- **7.3:** Require new development to preserve and enhance significant natural features (such as creeks, wetlands and trees) and retain the existing topography. In some cases, consideration of these factors will reduce the density of a project to a level below the densities permitted by the General Plan and Zoning Code.

- **9.1:** Where appropriate, provide opportunities for a mix of low-intensity nonresidential land uses in residential sections of major corridors that will support attractive and healthy work and living environments.

- **13.1:** Improve mobility in the Sunrise MarketPlace area to provide adequate access for vehicles, transit, bicycles and pedestrians.

- **13.4:** Facilitate the development of new buildings in areas currently devoted to parking to shorten distances between buildings and foster better pedestrian connections between shopping centers.

- **17.1:** Use a flexible planning approach for Stock Ranch to allow for a variety of uses and to respond to evolving market conditions and community needs.

- **25.1:** Promote development of a variety of housing types in terms of location, cost, design, style, type, and tenure, while ensuring compatibility with adjacent uses of land.

- **25.4:** Support a variety of housing opportunities on vacant or under-utilized lands.

- **29.1:** When constructing or modifying transportation facilities, strive to provide for the movement of vehicles, commercial trucks, alternative and low energy vehicles, transit, bicyclists and pedestrians appropriate for the road classification and adjacent land use.

- **29.2:** Measure customer satisfaction related to vehicle travel using LOS according to procedures in the latest version of the Highway Capacity Manual published by the Transportation Research Board. The City will strive to achieve LOS E or better conditions for City roadways and intersections during peak hours (these may include weekday AM, Mid-Day, and PM hours as well as Saturday Mid-Day or PM peak hours). The intent of the policy is to effectively utilize the roadway network capacity while balancing the desire to minimize potential adverse effects of vehicle travel on the environment and other modes.

  Exceptions to LOS E are allowed for both roadway segments and intersections along the following streets:

- Sunrise Boulevard – south City limits to north City limits
- Greenback Lane – west City limits to east City limits
- Old Auburn Road – Sylvan Road to Fair Oaks Boulevard
- Antelope Road – I-80 to Auburn Boulevard
- Auburn Boulevard – Old Auburn Road to north City limits

No road widening to provide additional vehicle capacity of the above listed streets will be permitted. Development projects that impact these locations according to the City's transportation impact study guidelines would require mitigation, including, but not limited to, the following items:

- actions that reduce vehicle trips or provide non-auto improvements to the transportation network or services
- lengthening of turn pockets
- signal timing modifications

Additional exceptions may be allowed by the City Council at both exempt and non-exempt locations where mitigation is infeasible or would conflict with other community values such as those listed below:

- impacts on general safety, particularly pedestrian, bicycle, and transit safety
- the right-of-way needs and the physical impacts on surrounding private or public properties
- the visual aesthetics of the required improvement and its impact on community identity and character
- environmental impacts including air quality and noise impacts
- impacts on quality of life as perceived by residents

- **29.4:** Support safe, complete and well-connected neighborhood street, bicycle, and pedestrian access and connections that balance circulation needs with the neighborhood context.

- **29.6:** Collaborate with neighboring jurisdictions when updating the General Plan and preparing the Capital Improvement Plan to work toward providing a regional Complete Streets transportation network for all modes.

- **30.1:** Improve aesthetic features along the City's roadways and maintain landscaping in an efficient and timely manner especially when it enhances the walking and biking environment.

- **30.2:** Require public street right-of-way dedications and improvements as development occurs. Ultimate right-of-way and improvements should be installed at the time of development, except when a lesser right-of-way will avoid significant social, neighborhood or environmental impacts and perform the same traffic movement function.

- **30.3:** Discourage the construction of private streets to ensure full public access to the City circulation system.

- **30.4:** Maintain street and sidewalks in rural residential areas that balance circulation needs and compatibility within the surrounding neighborhoods.

- **31.1:** Strive to increase fixed-route and demand responsive (i.e., paratransit) transit service coverage and frequency to Citrus Heights residents and employees.

- **31.2:** Strive to provide public transit that is an attractive, convenient, dependable and safe alternative to the automobile.

- **31.3:** Consider express commuter bus service between Citrus Heights and major employment and transit centers.

- **31.4:** Require new development to provide transit enhancements, where appropriate, that decrease transit travel times, improve access to transit stops, or improve the amenities, security, or travel information at transit stops.

- **32.1:** Evaluate and utilize technologies that can improve the performance, reliability, and safety of the transportation system (such as signal coordination, centralized traffic control, red-light cameras, and real-time travel information).

- **34.1:** Preserve continuous riparian corridors and adjacent habitat along the City's creeks and waterways.

- **34.2:** Achieve and maintain a balance between conservation, development and utilization of open space to enhance air and water quality.

- **36.1:** Incorporate existing trees into development projects. Avoid adverse effects on health and longevity of native oaks or other significant trees through appropriate design measures and construction practices. When tree preservation is not possible, require appropriate tree replacement.

- **37.1:** Implement low impact development strategies to create water-conserving landscapes.

- **37.3:** Implement water sensitive urban design techniques to promote water efficiency and protect water quality.

- **40.1:** Encourage new buildings to maximize solar access to promote passive solar energy use, natural ventilation, effective use of daylight, and on-site solar generation.

- **40.2:** Promote a climate-appropriate tree planting and maintenance program in order to reduce ambient air temperature on hot sunny days, and require that all tree plantings and outdoor lighting be integrated.

- **41.1:** Require energy-efficient site and building designs in new construction.

- **41.2:** Provide financial incentives to maximize energy conservation and the use of clean and renewable energy.

- **41.3:** Retrofit existing buildings using low maintenance, durable building materials and high- efficiency energy systems and appliances.

- **41.4:** Reduce energy consumption supporting municipal operations.

- **49.1:** Promote drainage improvements through natural means and practices that minimize flooding.

- **53.1:** Promote measures that improve air quality and help meet air quality attainment standards.

- **53.2:** Minimize the impacts of vehicle emissions on air quality.

- **53.3:** Promote use of clean alternative fuel vehicles and construction equipment.

- **54.1:** Encourage alternative modes of transportation and trip-reducing strategies such as telecommuting and mixed-use development.

- **55.1:** Implement a comprehensive greenhouse gas reduction plan to reduce communitywide greenhouse gasses through community engagement and leadership; land use, community design, and transportation choices; energy and water conservation techniques; solid waste reduction and building green infrastructure.

- **55.2:** Emphasize Citrus Heights' role as an environmental steward by conducting City business in a manner that increases community understanding of the healthy and balanced relationships between developed and natural environments.
- **60.1:** Mitigate the urban heat island effect and sequester carbon.
- **60.2:** Expand urban agriculture and recreation within the City.
- **62.4:** Continue working with regional water suppliers to identify and implement water conservation practices to meet a 20% reduction in per capita use by 2020.
- **62.6:** Ensure adequate sewer collection, treatment and disposal services for all community residents.
- **62.7:** Support efforts of the Sacramento County Regional Sanitation District in wastewater reclamation.
- **63.1:** Continue to reduce solid waste through source reduction, curbside recycling, green waste collection, and recovery. Progress toward becoming a low-waste generating community.
- **63.2:** Continue public education programs in recycling and reuse techniques.
- **63.4:** Enable source reduction, recycling, composting and yard waste programs for homes and businesses.
- **63.5:** Develop effective and efficient recycling programs for multi-family developments and businesses.
- **63.6:** Encourage businesses and consumers to buy and use recycled products.
- **63.7:** Encourage contractors hired by the City to use recycled materials.
- **63.8:** Use recyclable material in City facilities, projects and programs to the maximum extent feasible.

Greenhouse Gas Reduction Plan Measures

The GGRP recommends communitywide strategies and measures aimed at collectively reducing GHG emissions by approximately 13.7% below 2005 levels to achieve the City's adopted emission reduction target (10 to 15% below 2005 baseline emission levels by 2020). Specific GHG reduction measures in the GGRP are grouped within seven strategy areas – community leadership and engagement, land use and community design, transportation and connectivity, energy efficiency and conservation, water efficiency and conservation, waste reduction, green infrastructure, and public health and safety. The GHG reduction measures were developed by (a) evaluating existing community conditions, (b) identifying emissions reduction opportunities within the City, (c) reviewing best practices from other jurisdictions and organizations, and (d) incorporating state and regional laws, guidelines, and recommendations.

The GGRP includes two types of measures: *primary* and *supporting* measures. *Primary* measures generate directly attributable GHG reductions based on current technology, empirical studies and available data. The GGRP recommends the following primary measures (listed below, with their anticipated level of GHG reductions in 2020[7]) that collectively meet the City's target of 10 to 15% below 2005 levels. Together with the effects of AB 1493 and LCFS in Citrus Heights, the GGRP measures would enable a combined reduction of about 24.5% below 2005 levels.

[7] Appendix B of the GGRP provides substantiation for the reduction potential of each GGRP measure.

Primary Measures

- **3-2.A:** Develop rideshare infrastructure to facilitate participation by those traveling from Citrus Heights to major employment centers such as Downtown Sacramento or Roseville. [1,230 MT CO2e/yr]
- **3-4.A:** Create infrastructure to promote use of low-carbon and alternative fuel vehicles. [12,210 MT CO2e/yr]
- **3-5.A:** Maximize pedestrian and bicycle use through high-quality design, enhanced infrastructure, and enforcing bike and pedestrian travel rights. [3,730 MT CO2e/yr]
- **3-6.A:** Conduct a public transit gap study analyzing strategies to increase transit use and funding sources for transit improvements. Work with regional transit agencies to provide bus route coverage to underserved areas. [2,490 MT CO2e/yr]
- **3-7.A:** Improve fuel-efficiency of the City fleet by purchasing low or zero-emission vehicles when vehicles are retired from service. (Public safety vehicles are exempted from this requirement.) [40 MT CO2e/yr]
- **3-7.B:** Provide financial incentives to encourage ridesharing and/or public transit use among City employees. [60 MT CO2e/yr]
- **4-2.B:** Collaborate with utility companies to provide financial incentives/rebates for residential and commercial buildings to upgrade from inefficient water heaters to solar water heaters. [8,670 MT CO2e/yr]
- **4-2.C:** Create a community-wide Solar Power program and remove physical and code barriers to support installation of solar panels in commercial and residential districts. [11,700 MT CO2e/yr]
- **4-3.A:** Develop a Residential Energy Benchmark program to assist homeowners to identify voluntary retrofit opportunities and funding options to increase building energy performance by 30% from baseline. [5,730 MT CO2e/yr]
- **4-3.B:** Develop a Commercial Energy Benchmark program to assist business owners to identify voluntary retrofit opportunities and funding options to increase building energy performance by 30% from baseline. [1,490 MT CO2e/yr]
- **4-3.D:** Develop an Energy Efficient Upgrade program for residents and business owners to promote upgrades from inefficient appliances, lighting and roofing to Energy Star certified systems. [12,338 MT CO2e/yr]
- **4-3.E:** Collaborate with local utility companies and adjacent cities to accelerate smartgrid integration in the community. [3,160 MT CO2e/yr]
- **4-5.A:** Collaborate with SMUD to increase the use of green energy within City facilities. [10 MT CO2e/yr]
- **4-5.B:** Reduce energy consumption in City buildings by 40% from baseline. [215 MT CO2e/yr]
- **4-5.C:** Improve lighting efficiency and decrease energy consumption in public spaces. [544 MT CO2e/yr]
- **5-1.A:** Work with the water agencies to develop plans to implement SB 7 to achieve a 20% reduction in urban water demand by 2020. [4,030 MT CO2e/yr]
- **6-1.A:** Establish a 2020 waste reduction target of 75% below 2005 levels and work with the County, neighboring cities and other organizations to create a low-waste plan and provide public education regarding low-waste strategies and implementation. [18,880 MT CO2e/yr]

- **7-1.A:** Enhance the City's urban forest and other green infrastructure to reduce building energy use, improve comfort, augment neighborhood aesthetics, improve stormwater quality, and maximize carbon capture and storage. [740 MT CO2e/yr]

The recommended GGRP measures are grounded in actions directly influenced by the City and rely on community participation. A number of *supporting* measures were also included. These measures are not quantifiable at this time, but they facilitate and support the reduction potential of the *primary* measures.

Conclusion

The GGRP recommends communitywide strategies and measures that can collectively reduce GHG emissions approximately 87,267 MT CO_2e emissions per year (equivalent to a 13.7% reduction below 2005 levels) by 2020 and achieve the City's emission reduction target. Statewide reductions from implementation of AB 1493 and the LCFS were also considered during development of the GHG reduction target and GGRP measures. Together with the effects of AB 1493 and LCFS in Citrus Heights, the GGRP measures would enable a combined reduction of 145,677 MT CO_2e/yr, or about 24.5% below 2005 levels. This value exceeds the 15% below 2005 levels target recommended within the Scoping Plan and SMAQMD guidance that would achieve consistency with AB 32 reduction levels.

After taking into account GHG emissions from all applicable sectors, the General Plan and GGRP would generate GHG emissions at a rate that is consistent with that needed statewide to achieve the AB 32 legislative mandate. Emissions associated with development of individual projects within the planning area are minimized due to the policies contained in the Draft General Plan, as well as the GHG reduction measures in the GGRP. The Draft General Plan and GGRP would not conflict with the Scoping Plan, or any other plans, policies or regulations for the purpose of reducing GHG emissions. The impact is **less than significant**.

IMPACT 4.14-4 Impacts of Anticipated Climate Change Effects on the Planning Area. *GHG emissions are expected to result in a variety of effects on the planning area, including reduced hydroelectric energy production, increased energy demand, and decreased water supply. Uncertainty associated with these impacts, as well as implementation of Draft General Plan policies would make this impact* ***less than significant****.*

This impact considers the potential impacts of anticipated climate change effects on the planning area. As discussed previously in this section, human-induced increases in GHG concentrations in the atmosphere have led to increased global average temperatures (global warming) through the intensification of the greenhouse effect and resulted in associated changes in local, regional, and global average climatic conditions. Although there is a strong scientific consensus that global climate change is occurring and is influenced by human activity, there is less certainty as to the timing, severity, and potential consequences of the climate phenomena. Scientists have identified several ways in which global climate change could alter the physical environment in California (IPCC 2007, CEC 2006a, DWR 2006).

Although uncertainty exists as to the precise levels of these impacts, there is consensus regarding the range that can be expected. This analysis focuses on the effects of global climate change that might have a direct, reasonably foreseeable effect on physical conditions in the planning area. Therefore, this analysis gives greatest consideration to climate-change data with more consistency in projections of future conditions, and thus a probability for a greater likelihood of occurring within a reasonable time frame (i.e., approximately 100 years).

Temperature

An increase in average annual temperatures, by itself, would have little effect on the planning area, other than adjustments in project operations in response to warmer temperatures, such as increased evapotranspiration rates affecting both detention basin areas and landscaped areas, resulting in an increased irrigation demand, and potentially greater overall energy consumption to meet air conditioning needs.

Temperature change could result in increased energy demand within the planning area, which could increase GHG emissions and other air pollutant emissions associated with energy generation. Since both municipal and agricultural users rely on groundwater in the Citrus Heights area, increased demand for irrigation could deplete groundwater supplies and require the construction of additional water storage or other types of infrastructure to serve water demands of future land uses consistent with the Draft General Plan.

Precipitation

Although global climate change models generally predict an increase in overall precipitation on a worldwide scale, there is no such consistency among the results of regional models applied to California. Given the uncertainty associated with projecting the amount of annual precipitation, any conclusion regarding significance of potential effects of climate change on precipitation volumes as they relate to reasonably foreseeable direct effects on physical conditions in the planning area would be speculative.

Based on the results of a variety of regional climate models and literature, it is reasonably foreseeable that snowpack will be reduced and/or will melt earlier or more rapidly in watersheds. Given that the magnitude and timing of the increase in winter runoff and the associated changes in reservoir use that may occur, the exact impact on the planning area would be speculative.

Although various climate change models predict some increase in variability of weather patterns and an increasing incidence of extreme weather events, there is no consistency among the model results, with some predicting increased incidents of droughts and others predicting increased frequency of severe storm events.

Runoff

Runoff is directly affected by changes in precipitation and snowpack (see discussions above). Changes in both the amount of runoff and in seasonality of the hydrologic cycle have the potential to greatly affect the heavily managed water systems of the western United States. As described in the previous discussion of snowpack, data indicate that although overall precipitation volumes (represented by runoff amounts) showed no change, more runoff occurred as a result of rain during the winter months, and less runoff could be attributed to the melting of accumulated snowpack during the spring and early summer (DWR 2006).

Detailed estimates of changes in runoff as a result of climate change have been produced for California using regional hydrologic models. Model results indicate that as temperatures rise, a declining proportion of total precipitation falls as snow, more winter runoff occurs, and remaining snow melts sooner and faster in spring. In some basins, spring peak runoff may increase; in others, runoff volumes may shift to earlier in the spring and winter months (Kiparsky and Gleick 2005, DWR 2006). If snowpack declines, it is also possible that the incidence or severity of flood events resulting from “rain on snow” conditions could also decline.

Potential changes made to the amount of reservoir space retained for flood storage, retained annual carryover volumes, and other reservoir management factors in response to altered Sierra Nevada runoff patterns could substantially alter how those runoff patterns are experienced in downstream in the vicinity of the planning area.

Sea Level

A consistent rise in sea level has been recorded worldwide over the last 100 years. Recorded rises in sea level along the California coast correlate well with the worldwide data. Based on the results of various global climate change models, sea level rise is expected to continue. Based on the consistency in past trends, the consistency of future projections, and the correlation between data collected globally and data specific to California, it is reasonably foreseeable that some amount of sea level rise will occur along the California coast over the next 100 years. While sea level rise induced by climate change is reasonably certain, the planning area is not located in an area that would be affected by sea level rise.

Water Supply

Several recent studies have shown that existing water supply systems are sensitive to climate change. Potential impacts of climate change on water supply and availability could directly and indirectly affect a wide range of institutional, economic, and societal factors. Residential, industrial, and agricultural land uses all are affected by the cost and security of water supply. Much uncertainty remains, however, with respect to the overall impact of global climate change on future water supplies.

Little work has been performed on the effects of climate change on specific groundwater basins or groundwater recharge characteristics (Kiparsky and Gleick 2005). Changes in rainfall and changes in the timing of the groundwater recharge season would result in changes in recharge. Warmer temperatures could increase the period where water is on the ground by reducing soil freeze. Conversely, warmer temperatures could lead to higher evaporation or shorter rainfall seasons, which could mean that soil deficits would persist for longer time periods, shortening recharge seasons. The specific extent to which various meteorological conditions will change and the impact of that change on groundwater are both unknown. A reduced snowpack, coupled with increased rainfall, could require a change in the operating procedures for California's existing dams and conveyance facilities (Kiparsky and Gleick 2005).

In 2003, CEC's Public Interest Energy Research (PIER) program established the California Climate Change Center (CCCC) to conduct climate change research relevant to the state. Executive Order S-3-05 called for the California Environmental Protection Agency (CalEPA) to prepare biennial science reports on the potential impact of continued climate change on certain sectors of California's economy. CalEPA entrusted PIER and its CCCC to lead this effort. The climate change analysis contained in its first biennial science report concluded that major changes in water management and allocation systems could be required in order to adapt to the change. As less winter precipitation falls as snow, and more as rain, water managers would have to balance the need to construct reservoirs for water supply with the need to maintain reservoir storage for winter flood control. Additional storage could be developed, but at high environmental and economic costs.

Climate change is expected to have a greater effect in Southern California and on agricultural users than urban users in the Central Valley, which includes both the San Joaquin and Sacramento Valleys. Based on the conclusions of current literature regarding California's ability to adapt to global climate change, it is reasonably expected that over time, the state's water system will be modified to be able to address the projected climate changes, e.g., under dry and/or warm climate scenarios (DWR 2006).

Although coping with climate change effects on California's water supply could come at a considerable cost, based on a thorough investigation of the issue, it is reasonably expected that statewide implementation of adaptation measures will likely enable California's water system to reliably meet future water demands. Given known projections, it is not useful to scale regional and state trends down to predict specific impacts in the planning area.

Water Quality

Although there are various ways in which climate change could affect water quality, effects could be positive or negative depending on a variety of conditions. In addition, current water quality conditions in regional surface waters depend in large part on human activities, and this would continue into the future. The effects of climate change on water quality could be alleviated by, exacerbated by, or overwhelmed by effects directly related to localized human actions.

Draft General Plan Policies and Actions

The Draft General Plan contains the following policies and actions which can aid the City's adaptation to climate change effects.

Policies

- **49.1:** Promote drainage improvements that minimize flooding.
- **49.3:** Require evaluation of potential flood hazards prior to approval of development projects.
- **49.4:** Maintain local storm drain systems to ensure capacity for maximum runoff flows.
- **49.6:** Improve notification and evacuation procedures to be used during flood events.
- **49.7:** Protect buildings and property from flooding.
- **55.3:** Consult and coordinate with State resource and emergency management agencies regarding updates to climate change science and development of adaptation priorities.
- **62.1:** Ensure that adequate water supply and distribution facilities are available to serve the community.
- **62.3:** Pursue development of emergency water supplies to anticipate a major drought or disaster.
- **62.4:** Continue working with regional water suppliers to implement water conservation practices.
- **62.5:** Promote development of additional water storage facilities to meet future peak hour and fire flow demands.

Actions

49.1.A. Work with Sacramento County and other local, regional, state and federal agencies to develop flood-control measures, and to finance, construct and plan improvements to minimize flooding in and around the City of Citrus Heights.

49.1.B. Continue working on solutions to localized flooding problems in the vicinity of Cripple and Arcade Creeks.

49.1.C. Modify the storm drainage program to provide for City collection and allocation of all storm drainage fees.

49.1.D. Develop a capital improvement program for storm drainage projects.

49.3.A. Require major proposed development projects to submit accurate topographic and flow characteristic information, including depiction of 100-year floodplain boundaries under fully-developed, pre- and post-project runoff conditions.

49.4.A. Continue annual maintenance of the channels, pipes and inlets of the storm drain system.

49.4.B. Discourage construction activities, including grading, building, and fill within natural swale areas.

49.4.C. Support any private organization or other group efforts to clean up creeks and streams.

49.6.A. Develop an Emergency Preparedness and Response Plan that includes flood notification and evacuation procedures.

49.6.B. Distribute materials that describe appropriate procedures to follow during and after a flood event, and incorporate educational efforts into the Emergency Preparedness and Response Plan.

49.6.C. Provide for notification of City residents and workers, especially those with mobility limitations, during flood events.

49.7.A. Use storm drainage fees and/or other funding sources to assist in the raising of existing residences above the 100-year base flood elevation.

49.7.B. Ensure that new construction conforms to all applicable provisions of the National Flood Insurance Program.

49.7.C. Within floodplain overlay zones, require the lowest floor level for residential structures to be above the crown of the street frontage or the base flood level as prescribed by the National Flood Insurance Program.

62.1.A. Approve new development only if water purveyors can demonstrate an adequate water supply and delivery system.

62.4.A. Require water-conserving building design and equipment in new construction.

62.4.B. Encourage water-conserving landscaping and other conservation measures.

62.4.C. Encourage retrofitting of existing development with water-conserving devices.

62.4.D. Promote water conservation education programs.

62.4.E. Prepare and adopt a water conservation program.

Conclusion

Although climate change is an issue of global scale and the impacts described above are likely to occur whether or not the Draft General Plan and GGRP are adopted, implementation of the Draft General Plan and GGRP would influence the degree to which climate change affects Citrus Heights residents, ecosystems, and the local economy. Future land uses consistent with the Draft General Plan could subject an increased number of persons and structures to potential hazards, such as water supply issues. Additionally, environmental impacts resulting from implementation of the Draft General Plan could combine with climate change–associated impacts to intensify such impacts and exacerbate hardships for the City. Although the Draft General Plan may increase Citrus Heights' exposure to such risks and hardships, it also includes policies and actions that would assist the City in avoiding, adapting to, and being resilient in the face of climate change effects.

This analysis concludes that (1) the climate change effect would not have the potential to substantially affect the planning area, and (2) due to significant uncertainty in projecting future conditions related to the climate change effect, it would be too speculative to reach a meaningful conclusion regarding the significance of any reasonably foreseeable direct impact on physical conditions in the project vicinity. Implementation of Draft General Plan goals, policies, and actions would reduce the extent and severity of climate change–associated impacts in Citrus Heights by proactively planning for changes in climate and conditions, creating a policy framework to coordinate with State agencies planning for climate change, and providing methods to adapt to anticipated changes. This impact is considered **less than significant**.

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