CHAPTER 15 – GREENHOUSE GASES AND CLIMATE CHANGE

This chapter presents the potential effects of each alternative on global climate change and impacts of global climate change on the alternatives. General topics addressed include construction- and operational-related greenhouse gas (GHG) emissions. An explanation of what GHGs are, how they contribute to climate change, and how climate change affects the environment is provided in Section 15.1.2, Greenhouse Gas Emissions and Consequences of Climate Change in the Planning Area.

15.1 AFFECTED ENVIRONMENT/ENVIRONMENTAL SETTING

15.1.1 Regulatory Framework

The regulatory responsibilities for reducing emissions of GHGs and combatting the impacts of climate change include several federal, state, regional, and local agencies. This section summarizes the statutes, regulations, policies, and agency planning documents that are relevant to the approval, permitting, or implementation of the alternatives analyzed in this Environmental Impact Statement/Environmental Impact Report (EIS/EIR). This section also identifies any relevant federal permits or other entitlements that must be obtained prior to implementing the alternatives. To the extent possible, the analyses or studies required by these regulations and policies are integrated into the environmental effects analyses presented in Section 15.2, Environmental Consequences/Environmental Impacts (40 CFR 1502.25).

15.1.1.1 Federal

Supreme Court Ruling

The U.S. Environmental Protection Agency is the federal agency responsible for implementing the federal Clean Air Act and its amendments. The Supreme Court of the United States ruled on April 2, 2007, that carbon dioxide (CO_2), a GHG contributing to global climate change (see Section 15.1.2), is an air pollutant as defined under the Clean Air Act, and that the U.S. Environmental Protection Agency has the authority to regulate emissions of GHGs. The ruling in this case resulted in the U.S. Environmental Protection Agency taking steps to regulate GHG emissions and lent support for state and local agencies' efforts to reduce GHG emissions.

President's Council on Environmental Quality Guidance

On December 18, 2014, the President's Council on Environmental Quality released draft guidance for public comment that described how federal departments and agencies should consider the effects of climate change and GHG emissions as a result of proposed actions. The guidance explains that agencies should consider both the potential effects of a proposed action on climate change, as indicated by its estimated GHG emissions, and the implications of climate

change for the environmental effects of a proposed action. The draft guidance also provided a numeric emissions level for consideration, identifying that, if emissions from a federal action exceed 25,000 metric tons of carbon dioxide equivalent (MT CO_2e), a qualitative and quantitative assessment of a proposed action would be meaningful to decision makers and the public. For actions where emissions are below the 25,000 MT CO_2e/year reference point, quantitative analysis of GHG emissions is not recommended unless it is easily accomplished based on available tools and data.

The Council on Environmental Quality finalized its nonregulatory guidance on GHG emissions and the effects of climate change in the National Environmental Policy Act reviews in August 2016 (CEQ 2016). The final guidance no longer includes the 25,000 MT CO_2e emissions reference point. The final guidance removes identification of any quantitative emissions limit and instead advises federal agencies to consider the GHG emissions caused by federal actions, adapts the agency's actions to consider climate change effects throughout the process, and addresses these issues in the agency's procedures.

15.1.1.2 State

Executive Order S-3-05

Executive Order S-3-05, which was signed by Governor Schwarzenegger in 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[1] total 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.

As described below, legislation was passed in 2006 (Assembly Bill [AB] 32) to limit GHG emissions to 1990 levels by 2020 with continued "reductions in emissions" beyond 2020, but no specific additional reductions were enumerated in the legislation. Further, Senate Bill (SB) 375 (sustainable community strategies [SCS]/transportation) established goals for emissions from light-duty truck and automobiles for 2020 and 2035.

A recent California Appellate Court decision, *Cleveland National Forest Foundation v. San Diego Association of Governments* (November 24, 2014), further examined the executive order and whether it should be viewed as having the equivalent force of a legislative mandate for specific emissions reductions. The case has been accepted for review by the California Supreme Court and, therefore, is not currently considered a precedent.

[1] Note that in the context of this Plan, the word "establish" is synonymous with "create."

Assembly Bill 32: Global Warming Solutions Act of 2006

In September 2006, Governor Schwarzenegger signed the California Global Warming Solutions Act of 2006 (AB 32). 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. AB 32 also requires that these reductions (California Health and Safety Code, Section 38551):

> (a) . . . shall remain in effect unless otherwise amended or repealed.
>
> (b) It is the intent of the Legislature that the statewide GHG limit continue in existence and be used to maintain and continue reductions in emissions of GHGs beyond 2020.
>
> (c) The (Air Resources Board) shall make recommendations to the Governor and the Legislature on how to continue reductions of GHG emissions beyond 2020.

Climate Change Scoping Plan

In December 2008, the California Air Resources Board (CARB) adopted its Climate Change Scoping Plan, which contains the main strategies California will implement to achieve reduction of approximately 118 million metric tons (MMT) of CO_2e (further explained in Section 15.1.2) emissions, or approximately 21.7% from the state's projected 2020 emission level of 545 MMT CO_2e under a business-as-usual scenario (this is a reduction of 47 MMT CO_2e, or almost 10%, from 2008 emissions). CARB's original 2020 projection was 596 MMT CO_2e, but the current 545 MMT CO_2e 2020 projection takes into account the economic downturn that occurred in 2008 and associated reductions in statewide GHG emissions (CARB 2011). The Scoping Plan reapproved by CARB in August 2011 includes the Final Supplement to the Scoping Plan Functional Equivalent Document, which further examined various alternatives to Scoping Plan measures. The Scoping Plan also includes CARB-recommended GHG reductions for each emissions sector of the state's GHG inventory. CARB estimates the largest reductions in GHG emissions to be achieved by 2020 will be by implementing the following measures and standards (CARB 2011):

- Improved emissions standards for light-duty vehicles (estimated reductions of 26.1 MMT CO_2e)
- The Low-Carbon Fuel Standard (15.0 MMT CO_2e)
- Energy efficiency measures in buildings and appliances (11.9 MMT CO_2e)
- A renewable portfolio and electricity standards for electricity production (23.4 MMT CO_2e) and the Cap-and-Trade Regulation for certain types of stationary emission sources (e.g., power plants)

In May 2014, CARB released, and has since adopted, the *First Update to the Climate Change Scoping Plan* to identify the next steps in reaching AB 32 goals and evaluate the progress that has been made between 2000 and 2012 (CARB 2014a). According to the update, California is on track to meet the near-term 2020 GHG limit and is well positioned to maintain and continue reductions beyond 2020 (CARB 2014a). The update also reports the trends in GHG emissions from various emission sectors.

The update summarizes sector-specific actions needed to stay on the path toward the Executive Order S-3-05 2050 target. While the update acknowledges certain reduction targets by others (such as in the Copenhagen Accord), it stops short of recommending a specific target for California, instead acknowledging that mid-term targets need to be set "consistent with the level of reduction needed [by 2050] in the developed world to stabilize warming at 2 °C [degrees Celsius] (3.6 °F [degrees Fahrenheit]) [above pre-industrial levels]."

Actions are recommended for the energy sector, transportation (clean cars, expanded zero-emission vehicle program, fuels policies), land use (compliance with regional sustainability planning targets), agriculture, water use (more stringent efficiency and conservation standards, runoff capture), waste (elimination of organic material disposal, expanded recycling, use of Cap-and-Trade Program), green building (strengthening of Green Building Standards), and other sectors. Many of the actions that result in meeting targets will need to be driven by new or modified regulations.

Executive Order B-30-15

On April 20, 2015, Governor Edmund G. Brown Jr. signed Executive Order B-30-15 to establish a California GHG reduction target of 40% below 1990 levels by 2030. California is on track to meet or exceed the current target of reducing GHG emissions to 1990 levels by 2020, as established in the California Global Warming Solutions Act of 2006 (SB 32 discussed previously). California's new emission reduction target of 40% below 1990 levels by 2030 will make it possible to reach the ultimate goal of reducing emissions 80% below 1990 levels by 2050.

Senate Bill 32 of 2016

In August 2016, Governor Brown signed SB 32, which serves to extend California's GHG reduction programs beyond 2020. SB 32 amended the California Health and Safety Code to include Section 38566, which contains language to authorize CARB to achieve a statewide GHG emission reduction of at least 40% below 1990 levels by no later than December 31, 2030. SB 32 codified the targets established by the governor's Executive Order B-30-15 for 2030, which set the next interim step in the state's continuing efforts to pursue the long-term target expressed in Executive Orders S-3-05 and B-30-15 of 80% below 1990 emissions levels by 2050.

Senate Bill 375: Statutes of 2008

SB 375, signed into law by Governor Schwarzenegger in 2008, requires regional transportation plans, developed by metropolitan planning organizations, to incorporate an SCS that will achieve GHG emission reduction targets set by the CARB.

The Sacramento Area Council of Governments (SACOG) serves as the metropolitan planning organization for Sacramento, Placer, El Dorado, Yuba, Sutter, and Yolo Counties, excluding those lands located in the Lake Tahoe Basin. The Planning Area is located within Sacramento County and includes Galt and Rancho Cordova. SACOG adopted its Metropolitan Transportation Plan (MTP)/SCS 2035 in 2016. SACOG was tasked by CARB to achieve a 9% per capita reduction compared to 2012 emissions by 2020 and a 16% per capita reduction by 2035, which CARB confirmed the region would achieve by implementing its SCS (CARB 2013). The 2016 MTP/SCS forecasts land use development by community types: Center and Corridor Communities, Established Communities, Developing Communities, Rural Residential Communities, and Lands Not Identified for Development in the 2016 MTP/SCS study period (SACOG 2016a). CARB is currently in the process of updating the GHG reduction targets pursuant to the provisions of SB 375.

The Planning Area includes Sacramento County, Galt, and Rancho Cordova, which are jurisdictions with areas slated for development in the SCS growth projections.

15.1.1.3 Local

Sacramento Metropolitan Air Quality Management District

The Planning Area is entirely within the jurisdiction of the Sacramento Metropolitan Air Quality Management District (SMAQMD). The SMAQMD's *Guide to Air Quality Assessment in Sacramento County* establishes analysis expectations with regard to GHG emissions in California Environmental Quality Act (CEQA) documents, such as EIRs, for projects in the SMAQMD's jurisdiction (SMAQMD 2016). SMAQMD recommends that an analysis of potential impacts of project-generated GHG emissions should include a description of GHGs, summary of existing regulations, and discussion of GHG emissions sources in the Planning Area. The guidelines further state that the analysis should quantify the mass emissions associated with project construction and operation. SMAQMD has adopted thresholds of significance, which are further described in Section 15.2.1, Methodology for Assessing Impacts of Each Alternative on Greenhouse Gases and Climate Change.

Sacramento County

Sacramento County Climate Action Plan

In 2009, Sacramento County began a multiphase Climate Action Plan to meet the state's targets for GHG reductions. The Climate Action Plan Strategy and Framework Document was adopted

on November 9, 2011, by the Sacramento County Board of Supervisors, and the Government Operations Climate Action Plan was adopted on September 11, 2012. The plan includes a GHG inventory for the entire Sacramento County (discussed further below), a GHG emission reduction target, and goals and implementation measures developed to help Sacramento County reach these targets. Reduction strategies address GHG emissions associated with transportation and land use, energy, water, waste management and recycling, and agriculture and open space. Although parts of the plan encompass countywide emissions issues, the focus of the currently adopted plan is on Sacramento County facilities and operations. Sacramento County is currently working to update and expand the Climate Action Plan to address countywide emissions sources.

Sacramento County 2030 General Plan

The *Sacramento County General Plan of 2005–2030* (Sacramento County General Plan) (Sacramento County 2011) includes the following policy in the Land Use Element related to reducing GHG emissions in Sacramento County:

> **Policy LU-115:** It is the goal of the County to reduce GHG emissions to 1990 levels by the year 2020. This shall be achieved through a mix of State and local action.

2030 Galt General Plan

The *2030 Galt General Plan: Policy Document* (Galt General Plan) (Galt 2009a) contains numerous policies related to GHG emission reduction. However, only the following three are applicable to the analysis in this EIS/EIR:

> **Policy COS-7.1:** Greenhouse Gas Emission Reduction: The City shall reduce GHG emissions from City operations as well as from private development in compliance with the California Global Warming Act of 2006 and any applicable State regulations. To accomplish this, the City will coordinate with SMAQMD and [C]ARB in developing a GHG Emissions Reduction Plan that identifies GHG emissions within the City as well as ways to reduce those emissions. The plan will parallel the requirements adopted by [C]ARB specific to this issue. Specifically, the City will work with the SMAQMD to include the following key items in the plan:
>
> - Inventory all known, or reasonably discoverable, sources (both public and private) of GHG in the City;
> - Inventory estimated 1990 GHG emissions based on available data, the current level, those projected for the 2020 milestone year (consistent with AB 32), and that projected for the year 2030;

- Set a target for the reduction of emissions attributable to the City's discretionary land use decisions and its own internal government operations, and;
- Identify specific actions that will be undertaken by the City to meet the emission reduction targets set by the City.

Policy COS-7.2: Statewide Global Warming Solutions Support: The City should monitor and support the efforts of [C]ARB, under AB 32, to formulate mitigation strategies, if any that may be implemented by local government. If and when any such strategies become available, the City should consider whether to implement them in some form, such as, for example, by imposing new mitigation measures on new development. If the City Council, after seeking public input on the subject, chooses to implement any such measures it considers to be feasible and desirable, the City's commitment may take the form of a new ordinance, resolution, or other type of policy document.

Policy COS-7.3: Motor Vehicle Trip Reduction: The City shall encourage strategic land use patterns for businesses that reduce the number and length of motor vehicle trips and/or encourage alternative modes of travel.

Rancho Cordova General Plan

The *City of Rancho Cordova General Plan* (Rancho Cordova General Plan) (Rancho Cordova 2006a) does not have any policies related to GHG emissions or global climate change; however, the Rancho Cordova General Plan does include the following policies within the Air Quality Element that would result in reductions in GHG emissions:

Policy AQ.4.1: Promote improved air quality benefits through energy conservation measures for new and existing development.

Policy AQ.4.2: Support vehicle improvements and the use of clean vehicles that reduce emissions and improve air quality.

15.1.2 Greenhouse Gas Emissions and Consequences of Climate Change in the Planning Area

This section provides information on GHGs and their effect on climate change.

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. This absorbed radiation is then emitted from the Earth as low-frequency infrared radiation. The Earth has a much lower temperature than the Sun;

therefore, the Earth emits lower frequency radiation. Most solar radiation passes through GHGs; however, infrared radiation is absorbed by these gases. As a result, radiation 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 greenhouse effect, Earth would not be able to support life as we know it.

Prominent GHGs contributing to the greenhouse effect are CO_2, methane (CH_4), nitrous oxide (N_2O), hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride (SF_6). Different gases have varying global warming potential and therefore are commonly normalized based on each gasses' global warming potential and expressed as CO_2e (i.e., the global warming potential of each gas is converted to the equivalent global warming potential for CO_2). Human-caused emissions of these GHGs in excess of natural ambient concentrations are widely regarded as being responsible for intensifying the greenhouse effect, which has led to a trend of unnatural warming of the Earth's climate, known as global climate change or global warming. It is *extremely unlikely* that global climate change of the past 50 years can be explained without the contribution from human activities (IPCC 2007).

Climate change is a global problem. GHGs are global pollutants, unlike criteria air pollutants and toxic air contaminants, which are pollutants of regional and local concern. Whereas pollutants with localized air quality effects have relatively short atmospheric lifetimes (approximately 1 day), GHGs have long atmospheric lifetimes (1 year to several thousand years). GHGs persist in the atmosphere for long enough time periods to be dispersed around the globe. Although the exact lifetime of any particular GHG molecule is dependent on multiple variables and cannot be pinpointed, it is understood that more CO_2 is emitted into the atmosphere than is sequestered (i.e., taken out of gaseous form in the atmosphere and bound into a solid or liquid) by ocean uptake, vegetation, and other forms of sequestration. Of the total annual human-caused CO_2 emissions, approximately 54% is sequestered through ocean uptake, uptake by northern hemisphere forest regrowth, and other terrestrial sinks within a year, whereas the remaining 46% of human-caused CO_2 emissions remains stored in the atmosphere (IPCC 2013).

Similarly, impacts of GHGs are realized globally as opposed to localized air quality effects of criteria air pollutants and toxic air contaminants. The quantity of GHGs that it takes to ultimately result in climate change is not precisely known. However, the quantity is enormous, and no single project alone would measurably contribute to a noticeable change in the global average temperature or to global, local, or micro climates. From the standpoint of a National Environmental Policy Act and CEQA impact analysis, GHG impacts to global climate change are inherently cumulative, and the key question is whether a project's contribution to the impact is "cumulatively considerable" in combination with other sources.

15.1.3 Attributing Climate Change—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 (CARB 2014b). In California, the transportation sector is the largest emitter of GHGs followed by electricity generation (CARB 2014b). Emissions of CO_2 are byproducts of fossil fuel combustion. CH_4, a highly potent GHG, results from off-gassing (the release of chemicals from nonmetallic substances under ambient or greater pressure conditions) and is largely associated with agricultural practices, landfills, and wastewater treatment plants. N_2O, an even more potent GHG, is also largely attributable to agricultural practices and soil management. Carbon sinks, or reservoirs, include vegetation and the ocean, which absorb CO_2 through sequestration and dissolution (absorption of the molecules into the liquid medium), respectively, which are two of the most common processes for removing CO_2 from the atmosphere.

15.1.3.1 Existing Emissions Inventory

A GHG emissions inventory was conducted in 2009 for Sacramento County, including Galt and Rancho Cordova (Sacramento County 2009). The inventory was developed based on 2005 data and quantified baseline emissions by sector for the included jurisdictions. Total emissions for each jurisdiction within the Planning Area are shown in Table 15-1.

Table 15-1. 2005 Community GHG Emissions Inventory

Jurisdiction	CO2e (MT)
Sacramento County	13,938,537
Galt	172,428
Rancho Cordova	557,943

Source: Sacramento County 2009.
Notes: CO2e = carbon dioxide equivalent; MT = metric tons

15.1.4 Effects of Climate Change on the Environment

According to the IPCC, global average temperature is expected to increase by 3°F to 7°F by the end of the century, depending on future GHG emission scenarios (IPCC 2007). According to the California Natural Resources Agency, temperatures in California are projected to increase 2°F to 5°F by 2050 and by 4°F to 9°F by 2100 (CNRA 2012).

Other environmental resources could be indirectly affected by the accumulation of GHG emissions and resulting rise in global average temperature. 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. According to

the California Energy Commission (2012), the snowpack portion of the state's water supply could potentially decline 30% to 90% by the end of the twenty-first century. 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 snowpack of the Sierra Nevada until spring would flow into the Central Valley concurrently with winter storm events. This scenario would place more pressure on California's levee/flood control system.

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 could become extinct or be extirpated from the state if suitable conditions are no longer available (CNRA 2012).

Changes in precipitation patterns and increased temperatures could also alter the distribution and character of natural vegetation and associated moisture content of plants and soils. An increase in frequency of extreme heat events and drought are also expected. These changes are expected to lead to increased frequency and intensity of wildfires (CNRA 2012).

However, attempting to predict the response of any one particular species, habitat, or ecosystem to climate change, particularly when considering a specific geographic area, would require significant speculation. Assumptions would need to be made regarding the type and extent of changes in climatic conditions in the area of interest (e.g., average maximum temperature, average minimum temperature, volume and timing of precipitation, changes in wind patterns), as well as the response of the organism or ecosystem to these changes. For example, while the Mediterranean climate of mild wet winters and hot dry summers is conducive to the formation of vernal pools, climate may not be integral to vernal pool formation. As defined by Keeley and Zelder (1998), vernal pool habitat is defined by the source of water, duration of inundation, and the timing of these phases. According to Keeley and Zelder (1998), as long as conditions support (1) inundation during periods wherein temperature is sufficient for plant growth, followed by (2) a brief, water-logged terrestrial stage that proceeds (3) extreme, extended soil desiccation, climate type is not integral to the formation of vernal pools. It is unknown to what extent these parameters would need to change to substantially affect the long-term viability of vernal pools in the Planning Area.

The potential effects from climate change on vernal pools in the Planning Area may ultimately prove to be important. However, California has experienced climatic variation throughout geologic time and vernal pool species survived and evolved under these changing conditions. Various paleontological records, including evaluation of tree rings, pollen deposits, and salinity records support these findings. For example, California experienced a dry period between 10,000 and 5,000 years ago that is associated with deglaciation combined with influences from the Milankovitch solar maximum (i.e., a period of intense solar activity when increased solar

energy reached the earth) (Minnich 2007, p. 59; Malamud-Roam et. al. 2006, p. 1,576). Limited growth of bristlecone pine trees (*Pinus longaeva*) during this period, as observed through the study of tree rings, supports the conclusion that water was scarce. Additionally, pollen deposits sampled at an assortment of high elevation meadows indicate a more open forest containing a greater number of shrubs than the current forests of the Sierra Nevada. Records of high salinity within the San Francisco Estuary at this time also correspond with dryer conditions in the watershed because less runoff would allow more salt water intrusion into the estuary.

Following this dry period, California experienced an extended wet period. From 5,000 years ago to 3,500 years ago, paleontological evidence suggests an increase in precipitation coinciding with a reduction in the strength of wind-driven upwelling off the coast of California. During this period, the salinity of the San Francisco Estuary was relatively low, and tree rings within these dates are thicker, which is indicative of higher precipitation rates. Glaciers also began forming in the Sierra Nevada where they had previously been absent during the early Holocene; therefore, temperatures are thought to be cooler (Minnich 2007, p. 61).

A shift back to a drier climate then occurred, extending from approximately 2,050 to 650 years ago (i.e., approximately 1,350 AD), culminating in an additional period of global cooling known as the Little Ice Age from 1,250 to 1,750 AD (Malamud-Roam et. al. 2006, p. 1,584). Tree ring chronologies indicate a moderately cool period extending from the seventeenth century to the early nineteenth century, followed by relatively stable climatic conditions during the twentieth century.

Therefore, while current climate change projections trend towards a generally hotter, drier climate, there is evidence that the state has experienced these conditions before, with vernal pools persisting through these periods. However, other variables, such as stresses from degradation of water quality or human disturbance, could alter how vernal pools respond to future hotter and drier conditions relative to similar past climatic conditions. Given the amount of uncertainty and number of variables involved, it would be speculative to attempt to predict the future effects of climate change on any particular species or ecosystem in the Planning Area.

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 to 22 inches by 2100, depending on the future levels of GHG emissions (IPCC 2007). The California Natural Resources Agency projects that sea levels along California will rise 5 to 24 inches by 2050 and 17 to 66 inches by 2100 (CNRA 2012). However, the Planning Area is approximately 90 miles inland, and although some of the southwestern portions of the Planning Area are near sea-level, they are protected by levees and other flood control features.

15.2 ENVIRONMENTAL CONSEQUENCES/ ENVIRONMENTAL IMPACTS

15.2.1 Methodology for Assessing Impacts of Each Alternative on Greenhouse Gases and Climate Change

GHG emissions are typically categorized by direct (e.g., emissions directly emitted from a source, such as vehicle tailpipe emissions) and indirect (e.g., emissions that occur off site, such as energy consumption from a local utility). The alternatives were evaluated in the context of the planned urban development, land use patterns within the Planning Area, and emissions sources associated with them (e.g., stationary, mobile). Impacts were identified where the actions or projects associated with the alternative would result in new or additional GHG emissions.

There are multiple ways that alternatives could increase GHG emissions, such as by increasing regional vehicle miles traveled (VMT) and, thus, mobile-source CO_2; increasing other fossil fuel consumption, such as for energy production; and decreasing the amount of CO_2 sequestered in vegetation. GHG emissions would occur during both construction and operations. Construction and operations could also result in the use of heavy duty equipment, which would be a source of exhaust. The projects and activities expected under each alternative, including expected or conceptual preserves, are described in Chapter 2, Alternatives, Including the Proposed Action/Proposed Project. Potential impacts of the alternatives were analyzed using a 50-year study period, as discussed in Section 3.6.3, EIS/EIR Study Period.

Potential impacts from GHG emissions from each alternative were analyzed based on the anticipated development projects and preserve establishment, management, and maintenance over the 50-year study period, as described in Section 3.6.3.

Specific to emissions from preserve establishment, emissions from construction- and operational-related activities were quantified using the California Emissions Estimate Model. Modeling was for an estimated high activity day implementing habitat establishment/re-establishment and used conservative assumptions (i.e., assumptions that would lead to higher emissions) so as not to underestimate emissions from this activity. For example, the modeling assumed that approximately 385 acres of habitat establishment/re-establishment would be completed in a single year, which is roughly 20% of the total habitat establishment/re-establishment required for each alternative over the entire 50-year study period. The parameters of the model represent what would be expected to occur as each alternative is implemented over time. The modeling included the use of heavy-duty equipment for earth movement and grading, as well as operational-related vehicle use. Model assumptions and parameters are included in Appendix H, Modeling Data and Assumptions for Air Quality and Greenhouse Gas Analyses.

As described previously, GHG emissions are global pollutants and, therefore, contribute to a global, not local or regional, problem; however, the regulatory framework in California is such

that SMAQMD regulates local emissions and sources within the Sacramento Valley Air Basin with the intent to achieve the region's fair share of GHG emission reduction such that state GHG reduction targets (i.e., goals set by the Scoping Plan) are met. As such, significance thresholds determined by SMAQMD and other local agencies (e.g., Sacramento County) are designed to ensure compliance with state GHG reduction planning efforts. The emissions attributable to each alternative result from activities that occur in the Planning Area. Therefore, the lead agencies determined that the appropriate geographic scale for evaluating GHG emissions is the Planning Area.

Based on the global nature of GHG emissions, the global climate change analysis is inherently cumulative. No single action or project would emit sufficient GHGs to result in a change in Earth's climate. Therefore, GHG emissions identified for a single action or project are inherently an expression of that action's or project's contribution to the cumulative effect of global climate change. Direct and indirect emissions as a result of any alternative evaluated in this EIS/EIR would be a cumulative contribution to a global issue. For these reasons, the description of direct and indirect effects for each alternative reflects the alternative's contribution to cumulative impacts. A separate cumulative impact discussion is not needed for any alternative in this chapter.

As discussed in Section 3.4, Previous Planning Area Environmental Reviews, the EIR documents previously prepared for the General Plans of Sacramento County, Galt, and Rancho Cordova (Sacramento County 2010; Galt 2009b; Rancho Cordova 2006b) analyzed direct and cumulative impacts of urban growth planned within the respective jurisdictions. The Sacramento County and Galt General Plan EIRs identified effects related to GHG emissions, while the Rancho Cordova General Plan EIR did not. When the impact analysis or conclusions provided in the General Plan EIR documents were determined by the lead agencies to be appropriate for use in the analysis of the EIS/EIR Alternatives, a brief summary or description of the incorporated information or analysis is provided in Sections 15.2.2, No Action/No Project Alternative; 15.2.3, Proposed Action/Proposed Project Alternative; and 15.2.4, Reduced Permit Term Alternative.

15.2.1.1 Determination of Impact Significance

Significance Criteria

As discussed in Section 3.8.1, Significance Thresholds, the criteria used to evaluate the significance of each alternative's GHG and climate change impacts are based on Appendix G of the CEQA Guidelines (14 CCR 15000 et seq.) and on typical thresholds used to evaluate effects on global climate change in recent EIRs prepared by Sacramento County. Based on these sources, a significant adverse impact would occur if the alternative would:

1. Generate GHG emissions, either directly or indirectly, that may have a significant effect on the environment.

2. Conflict with an applicable plan, policy, or regulation adopted for the purpose of reducing the emissions of GHGs.

SMAQMD currently recommends that lead agencies use mass emission thresholds of significance for evaluating construction- and operational-related GHG emissions and stationary sources. Projects with GHG emissions that are below the thresholds are considered to be consistent with AB 32 and CARB's Climate Change Scoping Plan goal to reduce GHG emissions. Thus, compliance with these thresholds would ensure compliance with CEQA, Appendix G, thresholds as described previously and will be applied to the South Sacramento Habitat Conservation Plan (SSHCP). These thresholds are the following:

- Construction phase of projects: 1,100 MT CO_2e/year
- Operational phase of projects: 1,100 MT CO_2e/year
- Stationary source projects: 10,000 MT CO_2e/year

Appendix G of the CEQA Guidelines does not provide suggested criteria for evaluating a beneficial effect. The following criteria were developed by the lead agencies. A beneficial impact could occur if the alternative would:

1. Result in a net reduction in GHG emissions compared to a baseline environmental condition.

The impact analysis for the three EIS/EIR Alternatives considers the context, intensity, and severity of potential impacts to each of these GHG and climate change impact criteria and presents a determination of significance applicable to each of these criteria.

15.2.2 No Action/No Project Alternative

The No Action/No Project Alternative is described in Section 2.2, No Action/No Project Alternative, of Chapter 2.

15.2.2.1 Direct and Indirect Effects of the Alternative

Construction Emissions

Much of the future urban development included in the No Action/No Project Alternative is described in the General Plans of Sacramento County, Galt, and Rancho Cordova (see Section 3.4).

Construction associated with future development could result in GHG emissions from the use of heavy-duty construction equipment and from construction vehicle (i.e., worker commute vehicles and haul truck trips) exhaust.

The impact analysis presented in the *Final Environmental Impact Report: Sacramento County General Plan Update* (Sacramento County General Plan EIR) (Sacramento County 2010, pp., 12-1 to 12-42) determined the following within Sacramento County:

- Construction-related GHG emissions would be considered significant and unavoidable.[2]

The impact analysis presented in the *City of Galt General Plan Update: 2030 Final EIR* (Galt General Plan EIR) (Galt 2009b) determined the following within Galt:

- Construction-related GHG emissions would be considered significant and unavoidable.

The *City of Rancho Cordova General Plan Final Environmental Impact Report* (Rancho Cordova General Plan EIR) (Rancho Cordova 2006b) did not explicitly evaluate impacts associated with GHG emissions; however, type and character of urban development within Rancho Cordova would be similar to that described for Sacramento County and Galt (e.g., residential, commercial). As such, it is expected that impacts associated with GHG emissions and global climate change in Rancho Cordova would be similar to those described for Sacramento County and Galt.

As discussed in Section 3.4, the three General Plan EIRs used different study periods—ending in 2030 (Galt 2009b), 2030 (Rancho Cordova 2006b), and 2050 (Sacramento County 2010). However, the 50-year study period for this EIS/EIR ends in 2065 (Section 3.6.3). Therefore, additional urban development can be expected to occur within Galt, Rancho Cordova, and Sacramento County in the years after each General Plan EIR study period ends but before this EIS/EIR's study period ends in 2065. Therefore, the impact analyses and conclusions incorporated from the three General Plan EIRs may not have considered all of the future urban development that is included in the project description of each EIS/EIR Alternative. Consequently, when determining the significance of each impact described in the EIS/EIR, the lead agencies considered the impact analysis and the conclusions incorporated by reference from the General Plan EIRs, along with the effects of all urban development activities and projects that are included in the description of each EIS/EIR Alternative.

As explained in Section 2.2.2, Expected Regulatory Environment Under the No Action/No Project Alternative, the regulatory environment of the No Action/No Project Alternative is expected to restrict the ability of local agencies to permit approximately 1,900 acres of future urban development in the Mather Core Recovery Area (MCRA), and this future urban development would be shifted or displaced to one or more of the areas of undeveloped land

[2] As described further in Section 3.4.1, the proposed project analyzed within the Sacramento County General Plan EIR assumed development within a designated "Jackson Highway Corridor New Growth Area" that was not a part of the alternative ultimately selected by Sacramento County. However, Sacramento County is currently processing land use entitlements in the Jackson Highway Corridor; therefore, the referenced conclusions from the proposed project analysis are relevant to the No Action/No Project Alternative.

outside the Urban Service Boundary (USB) discussed in Section 2.2.3, Loss of Natural Lands Under the No Action/No Project Alternative.

Urban development shifted or displaced outside of the USB could result in construction worker commute and vendor haul trips being longer in distance, resulting in higher VMT (and associated GHG mobile-source emissions) relative to what would be expected if urban development was confined to the USB. An increase in regional VMT associated with construction trips would result in increased emissions of GHGs. Construction-related GHG emissions as a result of increased vehicle trips and VMT would contribute further to the already significant unavoidable impacts to global climate change described in the EIRs referenced previously.

Under the No Action/No Project Alternative, new urban development would continue to include mitigation actions to offset impacts to listed species, wetlands, and other regulated natural resources, including off-site or on-site mitigation preserves (See Section 2.2.2). Mitigation for unavoidable impacts could also continue to occur through purchasing credits at a mitigation or conservation bank approved by the applicable resource agencies (e.g., U.S. Fish and Wildlife Service or U.S. Army Corps of Engineers), by payment into an in-lieu fee program, on-site project developer–responsible mitigation, or off-site project developer–responsible mitigation.

Under the No Action/No Project Alternative, mitigation preserves would frequently be established (constructed) in an uncoordinated manner by multiple entities. This would often result in smaller, more isolated preserves mostly located within the MCRA and elsewhere in the USB since some projects would establish on-site mitigation preserves for resource impacts that could not be avoided. Emissions associated with establishment/construction of mitigation preserves would be evaluated on a project-by-project basis and, therefore, have not been described within the referenced General Plan EIRs.

Establishment of mitigation preserves would include minor construction activities, such as earth movement and grading, fence installation, and other minor work. The use of heavy equipment for grading and earth moving could result in exhaust GHG emissions. Although specific details regarding the size of mitigation preserves and types of construction activities are not known, an estimate of GHG emissions was conducted based on conservative assumptions of preserve numbers, size, and likely construction equipment that would be used (e.g., trucks, loaders, backhoes). Refer to Appendix H for detailed assumptions. Based on the modeling conducted, preserve establishment and/or re-establishment could result in up to 397 MT CO_2 per year from the use of heavy-duty equipment, worker commute, and vendor haul trips. This level of emissions would not exceed applicable SMAQMD thresholds of significance of 1,100 MT CO_2 per year and, therefore, would not further contribute to already existing significant and unavoidable cumulative GHG impacts.

Operational Emissions

Operational-related GHG emissions associated with future development would originate from mobile and stationary sources (e.g., electricity). To characterize impacts on global climate change resulting from operation of urban development, the same documents described in Section 3.4 are referenced here. Impacts are summarized below.

The impact analysis presented in the Sacramento County General Plan EIR (Sacramento County 2010, pp., 12-1 to 12-42) determined the following within Sacramento County:

- Operational-related GHG emissions would be considered significant and unavoidable.
- Impacts on urban development from climate change would also be significant and unavoidable.

The impact analysis presented in the Galt General Plan EIR (Galt 2009b) determined the following within Galt:

- Operational-related GHG emissions would be considered significant and unavoidable.

The Galt General Plan EIR (Galt 2009b) did not evaluate impacts from climate change on urban development. However, because Galt is located within Sacramento County, the same climate changes and associated effects (e.g., precipitation pattern changes, increases fire, decreases snow pack, sea-level rise) that would occur within Sacramento County would also occur in Galt. As such, impacts to these areas would be the same as those described for Sacramento County.

The Rancho Cordova General Plan EIR (Rancho Cordova 2006b) did not evaluate operational-related impacts from GHG emissions or impacts from climate change on urban development. However, urban development within Rancho Cordova would be similar to that described for Sacramento County and Galt (e.g., residential, commercial). As such, it is expected that impacts associated with to GHG emissions and global climate change in Rancho Cordova would be similar to those described for Sacramento County and Galt. Further, because Rancho Cordova is located within Sacramento County, the same climate changes and associated effects (e.g., precipitation pattern changes, increases fire, decreases snow pack, sea-level rise) that would occur within Sacramento County would also occur in Rancho Cordova. As such, impacts to these areas would be the same as those described for Sacramento County.

The impact analysis presented in the 2016 MTP/SCS Final EIR (SACOG 2016b) determined the following within the SACOG Planning Area:

- The GHG impacts resulting from land use changes and transportation improvements identified in the 2016 MTP/SCS that are associated with achieving the SB 375 GHG emissions reduction targets are considered less than significant.

Implementation of the No Action/No Project Alternative would result in operational-related mobile-source emissions associated with vehicular exhaust as a function of VMT traveled within the Planning Area (e.g., as a result of urban development). As stated previously, the previously referenced EIRs analyzed the effects of urban development through a period between 2030 and 2050; however, the lead agencies anticipate that urban development projects would continue through the end of the EIS/EIR 50-year study period (2065). Therefore, the lead agencies extrapolated that the significant and unavoidable GHG impacts identified in the EIRs would continue to be significant and unavoidable as additional urban development is implemented.

Similar to what was described previously for construction emissions, urban development shifted or displaced outside of the USB could result in resident and employee commute trips being longer in distance, resulting in higher VMT (and associated GHG mobile-source emissions) relative to what would be expected if urban development was confined to the USB. An increase in regional VMT associated with operational trips would result in increased emissions of GHGs. Operation-related GHG emissions as a result of increased vehicle trips and VMT would contribute further to the already significant unavoidable impacts to global climate change described in the EIRs referenced previously.

In addition to mobile-source GHG emissions, urban development would result in the conversion of undeveloped carbon-sequestering terrestrial land covers (e.g., agriculture/cropland land, oak woodlands, grasslands) to developed land, decreasing the total sequestering capacity of land within the Planning Area. This would result in a net increase in GHG emissions. Based on Table 8-4, Acres of Direct Impacts to Each Natural Land Cover Under the No Action/No Project Alternative, in Chapter 8, Natural Land Cover Habitat Types and Associated Plant and Animal Communities, and as shown in Appendix H, expected urban development could result in a loss of 34,352 acres of vegetated carbon-sequestering land. It is estimated that this would amount to approximately 772 MT/year of CO_2e that would have otherwise continued to be sequestered by the undeveloped land. The loss of carbon sequestering land, resulting primarily from urban development, would be part of the already significant and unavoidable impacts in the referenced EIRs. See Appendix H for land coverage and carbon sequestration calculations.

Operational emissions associated with mitigation preserve management include mobile-source exhaust emissions associated with transportation of livestock for grazing management specific to preserve management activities and visits by Preserve Managers/crews for maintenance and monitoring. Additionally, depending on the specifics of the habitat re-establishment or establishment activity, several pieces of heavy equipment and the associated crews may use local roadways, resulting in on- and off-site exhaust emissions. Most days, vehicle trips and heavy equipment use on mitigation preserves under the No Action/No Project Alternative would not be substantially different from the daily vehicle trips and heavy equipment activities associated with typical existing rangeland and farmland uses. The types of activities are similar (e.g., fence installation or repair, access road maintenance, drainage repairs) between the No Action/No Project Alternative and existing conditions on the mitigation preserve lands and rangeland or farmland. However, for extra activities specific to the use of the land as a mitigation preserve, these activities could result in additional GHG emissions throughout the Planning Area.

Although specific details regarding the specific mitigation preserve activities or operational/maintenance trip number are not known, an estimate of emissions was conducted based on conservative assumptions of preserve numbers, size, activities that would take place and equipment that would be used for those activities (e.g., trucks, loaders, backhoes). Refer to Appendix H for detailed assumptions. The emissions modeling represents a maximum day of preserve operation and maintenance, assuming both vehicle maintenance trips and operation of heavy-duty equipment, such as a day when heavy maintenance or repairs (e.g., landscape contouring, drainage infrastructure repairs, alteration of graded access roads) are needed along with regular operations. During the majority of days over the 50-year EIS/EIR study period, the amount of mitigation preserve management activity and attendant vehicle trips and heavy-duty equipment operations would be much less and not substantially different from activities associated with agricultural and rangeland operations undertaken on lands prior to being established as a mitigation preserve. The maximum activity estimate is intended to be conservative to avoid the risk of understating the impacts of the alternative. Based on the modeling conducted, preserve maintenance and operational activities could result in up to 180 MT CO_2 per year. This level of emissions would not exceed applicable SMAQMD thresholds of significance of 1,100 MT CO_2 per year. Operational activities associated with mitigation preserve management would not result in substantial GHG emissions.

15.2.2.2 Cumulative Effects of the Alternative

As described in Section 15.2.1, the GHG emission impacts analyzed in this EIS/EIR are, by definition, cumulative. Therefore, cumulative GHG emission impacts of the No Action/No Project Alternative are identical to the direct and indirect impacts described in Section 15.2.2.1, Direct and Indirect Effects of the Alternative.

15.2.3 Proposed Action/Proposed Project Alternative

The Proposed Action/Proposed Project Alternative is described in Section 2.3.

15.2.3.1 Direct and Indirect Effects of the Alternative

Construction Emissions

As described in Section 2.3.3, the Proposed Action/Proposed Project Alternative Covered Activities include types of urban development similar to those anticipated under the No Action/No Project Alternative; however, under the Proposed Action/Proposed Project Alternative, urban development would not be shifted or displaced outside of the USB.

Construction associated with future development could result in GHG emissions from the use of heavy-duty construction equipment and from construction vehicle (i.e., worker commute vehicles and haul truck trips) exhaust. Because the Proposed Action/Proposed Project Alternative includes types of urban development consistent with those anticipated under the No Action/No Project Alternative, the sources and types of GHG emissions associated with construction of development, such as the operation of heavy-duty construction equipment, would be the same as those described for the No Action/No Project Alternative; however, the Proposed Action/Proposed Project Alternative does not include the MCRA regulatory requirements of the No Action/No Project Alternative (refer to Section 2.2.2). This provides the opportunity for urban development Covered Activities within the MCRA to be implemented consistent with the Sacramento County and Rancho Cordova General Plans without the 1,900 acres of shifted or displaced urban development occurring outside the USB under the No Action/No Project Alternative. As a result, a portion of construction worker commute and vendor haul trips between future construction sites for development could be shorter in distance compared to the No Action/No Project Alternative. This would result in lower VMT and, therefore, reduced exhaust emissions of GHGs under the Proposed Action/Proposed Project Alternative compared to the No Action/No Project Alternative.

The potential adverse effects from construction emissions identified above for the No Action/No Project Alternative future conditions within the Planning Area would still occur under the Proposed Action/Proposed Project Alternative but to a lesser extend under the Proposed Action/Proposed Project Alternative because of the reduced vehicle trip lengths resulting from not having urban development shifted or displaced outside the MCRA. This would result in a ***Minor Beneficial*** effect when comparing the Proposed Action/Proposed Project Alternative to the No Action/No Project Alternative baseline condition.

As discussed in Section 2.3.5, Conservation Strategy Under the Proposed Action/Proposed Project Alternative, the Proposed Action/Proposed Project Alternative would include the

establishment of an interconnected Preserve System in the Planning Area and a comprehensive preserve management program that would be implemented in perpetuity. The Preserve System under the Proposed Action/Proposed Project Alternative would be more contiguous and connected than the mitigation preserves that would be established under the No Action/No Project Alternative. Preserve establishment and management could include a variety of activities during construction that would result in emissions.

Activities that would generate GHG emissions associated with the construction/establishment of individual preserves under the Proposed Action/Proposed Project Alternative would be the same as those described for the No Action/No Project Alternative, such as vehicle trips and operation of heavy equipment for grading. However, under the Proposed Action/Proposed Project Alternatives, overall preserves would be larger and better linked and established/constructed by the SSHCP Implementing Entity rather than by different entities.

In addition to on-site emission associated with heavy equipment at preserve sites, construction and worker vehicle trips would also result in mobile-source emissions associated with the establishment of preserves. As a result of a more contiguous and connected Preserve System, construction-related vehicular trips associated with vendor and worker trips for preserve establishment/construction could be fewer because of a smaller number of "job sites" and coordinated preserve activities directed by the SSHCP Implementing Entity. This would result in fewer mobile-source GHG emissions. Construction-related mobile-source emissions as identified above for the No Action/No Project Alternative future condition associated with mitigation preserve activities would still occur but potentially to a lesser extent under the Proposed Action/Proposed Project Alternative. This would be a ***Minor Beneficial*** effect when comparing the Proposed Action/Proposed Project Alternative to the No Action/No Project Alternative baseline condition.

Operational Emissions

As described previously for the No Action/No Project Alternative, potential significant adverse effects from operational GHG emissions from stationary and mobile sources are anticipated for urban development under the No Action/No Project Alternative future condition. These conclusions would still be the case under the Proposed Action/Proposed Project Alternative. However, under the Proposed Action/Proposed Project Alternative, 1,900 acres of urban development would not be shifted or displaced outside of the USB. Therefore, operational related vehicular trips associated with development would be shorter, resulting in fewer mobile-source GHG emissions. Therefore, potential significant adverse effects from operation of development identified previously for the No Action/No Project Alternative future condition would also occur but to a lesser extent under the Proposed Action/Proposed Project Alternative. This would be a ***Minor Beneficial*** effect when comparing the Proposed Action/Proposed Project Alternative to the No Action/No Project Alternative baseline condition.

In addition to mobile-source GHG emissions, urban development would result in the conversion of undeveloped carbon-sequestering terrestrial land covers (e.g., agriculture/cropland land, oak woodlands, grasslands) to developed land, decreasing the total sequestering capacity of land within the Planning Area. This would result in a net increase in GHG emissions. Based on Table 8-8, Expected Direct Impacts to Natural Land Covers – Proposed Action/Proposed Project Alternative, and as shown in Appendix H, expected urban development could result in a loss of 32,348 acres of vegetated carbon-sequestering land under the Proposed Action/Proposed Project Alternative. This would amount to approximately 745 MT/year of CO_2 that would have otherwise continued to be sequestered by the undeveloped land. Compared to the No Action/No Project Alternative, the Proposed Action/Proposed Project Alternative would result in approximately 2,004 fewer acres of vegetated land converted to non-carbon sequestering land. Compared to the No Action/No Project Alternative, the Proposed Action/Proposed Project Alternative would result in approximately 27 MT/year of CO_2 less emissions from changes in carbon-sequestrating land coverage. The total loss in carbon sequestration (i.e., 745 MT/year of CO_2) would be substantially below applicable GHG thresholds of 1,100 MT CO_2/year. Because net annual GHG emissions associated with the loss of carbon-sequestering land would be slighter lower under the Proposed Action/Proposed Project Alternative relative to the No Action/No Project Alternative, this would be a ***Minor Beneficial*** effect when comparing the Proposed Action/Proposed Project Alternative to the No Action/No Project Alternative baseline condition.

Activities associated with the operation and maintenance of preserves under the Proposed Action/Proposed Project Alternative, such as monitoring and maintenance, would be similar to those described for the No Action/No Project Alternative; however, under the Proposed Action/Proposed Project Alternative, overall, preserves would be larger and better linked, and managed by the SSHCP Implementing Entity rather than by different entities. As a result of a more contiguous and connected Preserve System with larger preserves overall, operational-related vehicular trips associated with maintenance and work trips for preserve maintenance could be fewer because of a smaller overall number of individual preserves to be visited. Trips to multiple preserves could also be consolidated as personnel directed by the SSHCP Implementing Entity would have activities to perform at multiple preserves and could drive to multiple preserves in a single vehicle “trip.” However, preserve management under the Proposed Action/Proposed Project Alternative would be more intensive than under the No Action/No Project Alternative, with more management and monitoring activities implemented on an annual basis. This would result in an increase in trips as compared to the No Action/No Project Alternative to implement the more active management strategy. Therefore, overall operational-related mobile-source emissions associated with preserve activities for the Proposed Action/Proposed Project Alternative would be similar to those identified above for the No Action/No Project Alternative future condition without the SSHCP. This would be a ***Less***

Than Significant Adverse effect when comparing the Proposed Action/Proposed Project Alternative to the No Action/No Project Alternative baseline condition.

As discussed previously in Section 15.1.4, Effects of Climate Change on the Environment, climate change may result in various effects to precipitation amounts and patterns, temperature, snow pack, and sea-level rise. These changes may result in effects to Preserve Systems. However, as described previously, given the amount of uncertainty and number of variables involved, it would be speculative to attempt to predict the future effects of climate change on any particular species or ecosystem in the Planning Area. Although, if adverse effects from climate change were to occur in preserves, the typically larger and more interconnected preserves associated with the Proposed Action/Proposed Project Alternative would be more resilient to changing climatic conditions than the often smaller and more isolated mitigation preserves associated with the No Action/No Project Alternative. This would result in ***Minor Beneficial*** effect when comparing the Proposed Action/Proposed Project Alternative to the No Action/No Project Alternative baseline condition.

15.2.3.2 Significance of Direct and Indirect Effects

In summary, compared to the No Action/No Project Alternative baseline condition, the Proposed Action/Proposed Project Alternative would result in the following:

- A net reduction in GHG emissions resulting from construction of urban development
- Net reduction in GHG emissions resulting from Preserve System construction/establishment
- A net reduction in GHG emissions resulting from operations of urban development
- A net reduction in GHG emissions resulting from the loss of carbon-sequestering terrestrial land covers
- Little difference in GHG emissions resulting from Preserve System management
- A Preserve System that is more resilient to climate change

Therefore, after considering the significance of impacts from the Proposed Action/Proposed Alternative related to the GHG and climate change impact criteria, the Proposed Action/Proposed Project Alternative would result in ***Minor Beneficial*** effects to GHG emissions and climate change compared to the impacts that would occur under the No Action/No Project Alternative baseline condition.

15.2.3.3 Cumulative Effects of the Alternative

As described in Section 15.2.1, the GHG emission impacts analyzed in this EIS/EIR are, by definition, cumulative. Therefore, cumulative GHG emission impacts of the Proposed

Action/Proposed Project Alternative are identical to the direct and indirect impacts described in Section 15.2.3.1, Direct and Indirect Effects of the Alternative. Therefore, after considering the significance of impacts from the Proposed Action/Proposed Alternative on GHG emissions and climate change, the Proposed Action/Proposed Project Alternative would result in ***Minor Beneficial*** effects compared to the impacts that would occur under the No Action/No Project Alternative baseline condition.

15.2.4 Reduced Permit Term Alternative

As described in Section 2.3.3, the Reduced Permit Term Alternative includes the same types of new urban development and infrastructure as those anticipated under the No Action/No Project Alternative.

Under the Reduced Permit Term Alternative, the core of the Preserve System established inside the UDA would be associated with the development of five large land use entitlements, as discussed in Section 2.3.4, Covered Species Under the Proposed Action/Proposed Project Alternative, for the Reduced Permit Term Alternative and in Section 2.3.3 for the Proposed Action/Proposed Project Alternative. Because the core of the Preserve System inside the UDA under both EIS/EIR action alternatives is associated with the same five large land use entitlements, approximately 70% of the UDA preserves established under the Reduced Permit Term Alternative would have similar sizes, boundaries, and locations as the UDA preserves established under the Proposed Action/Proposed Project Alternative. However, the shorter duration of the Reduced Permit Term Alternative—and the smaller amount of urban development and associated development fees collected by the Reduced Permit Term Alternative—would not allow the SSHCP Implementing Entity to establish as many acres of new preserves in the Planning Area as would occur under the Proposed Action/Proposed Project Alternative's 50-year permit term. Therefore, fewer new preserves would be established under the Conservation Strategy of the Reduced Permit Term Alternative. This difference would be especially pronounced outside the UDA.

As described in Section 2.4, Reduced Permit Term Alternative, the ESA and CESA Incidental Take Permits and the CWA permit strategy for HCP Covered Activities would be valid only during the 30-year permit term of the Reduced Permit Term Alternative, and the Reduced Permit Term Alternative's Conservation Strategy would be implemented only during this 30-year term. The urban development Covered Activities and Conservation Strategies associated with the five land use entitlements would be implemented inside the UDA during this 30-year period. However, the EIS/EIR uses a 50-year analysis study period to evaluate all alternatives (see Section 3.6.3); therefore, the EIS/EIR study period extends beyond the end of the 30-year permit term for the Reduced Permit Term Alternative. Therefore, as described in Section 3.6.7.2, Analysis of the Reduced Permit Term Alternative, After the End of the Permit Term

(Years 31–50), the EIS/EIR analysis of the Reduced Permit Term Alternative also considers future urban development that is not part of the project description of the Reduced Permit Term Alternative but is still expected to occur within the Planning Area after the end of the permit term (i.e., in Years 31–50 of the EIS/EIR study period).

As described in Section 3.6.7.2, mitigation preserves established after the end of the 30-year Reduced Permit Term Alternative would be established under a project-by-project process for obtaining individual authorizations under CWA, ESA, CESA, and Section 1600 of the California Fish and Game Code. Consequently, mitigation preserves established in Years 31–50 of the EIS/EIR study period would not be established using a regional, landscape-based approach that balances new urban development with the need for conservation, as would be provided by an HCP. Therefore, much of the Preserve System inside the UDA would be very similar under the two action alternatives, but the Preserve System outside the UDA would be substantially different between the Reduced Permit Term Alternative and the Proposed Action/Proposed Project Alternative. Under the Reduced Permit Term Alternative, it is unlikely that mitigation preserves established outside the UDA would be contiguous or interconnected, and it is unlikely that a large, contiguous, 10,500-acre, landscape-size Vernal Pool Preserve would be established in the southwestern portion of the Planning Area. Likewise, the No Action/No Project Alterative would not result in contiguous, interconnected preserves outside the UDA and would not establish a 10,500-acre Vernal Pool Preserve in the Planning Area. In these ways, the new mitigation preserves established outside the UDA under the Reduced Permit Term Alternative and the No Action/No Project Alternative would be similar.

15.2.4.1 Direct and Indirect Effects of the Alternative

Construction Emissions

As described in Section 2.4.3, Covered Activities/Projects Under the Reduced Permit Term Alternative, the Reduced Permit Term Alternative Covered Activities include types of urban development similar to those anticipated under the No Action/No Project Alternative; however, under the Reduced Permit Term Alternative, urban development would not be shifted or displaced outside of the USB.

Construction associated with future development could result in GHG emissions from the use of heavy-duty construction equipment and construction-vehicle (i.e., worker commute vehicles and haul truck trips) exhaust. Because the Reduced Permit Term Alternative includes types of urban development consistent with those anticipated under the No Action/No Project Alternative, the sources and types of GHG emissions associated with construction of development, such as the operation of heavy-duty construction equipment, would be the same as described for the No Action/No Project Alternative; however, the Reduced Permit Term

Alternative does not include the MCRA regulatory requirements of the No Action/No Project Alternative (refer to Section 2.2.2). This provides the opportunity for urban development Covered Activities within the MCRA to be implemented consistent with the Sacramento County and Rancho Cordova General Plans without the 1,900 acres of shifted or displaced urban development occurring outside the USB under the No Action/No Project Alternative. As a result, a portion of construction worker commute and vendor haul trips between future construction sites for development could be shorter in distance compared to the No Action/No Project Alternative. This would result in lower VMT and, therefore, reduced exhaust emissions of GHGs under the Reduced Permit Term Alternative compared to the No Action/No Project Alternative.

The potential adverse effects from construction emissions identified above for the No Action/No Project Alternative future conditions within the Planning Area would still occur under the Reduced Permit Term Alternative but to a lesser extent under the Reduced Permit Term Alternative because of the reduced vehicle trip lengths resulting from not having urban development shifted or displaced outside the MCRA. This would result in a ***Minor Beneficial*** effect when comparing the Reduced Permit Term Alternative to the No Action/No Project Alternative baseline condition.

As discussed in Section 2.4.5, Conservation Strategy Under the Reduced Permit Term Alternative, the Reduced Permit Term Alternative includes a Preserve System established during the 30-year permit term and a comprehensive preserve management program implemented in perpetuity for those preserves. The Preserve System established during the 30-year permit term under the Reduced Permit Term Alternative would be more consolidated and linked than for the No Action/No Project Alternative. As outlined in Section 2.4.5 in Chapter 2, further establishment of a coordinated preserve management and monitoring program would cease after the end of the 30-year permit term; however, the preserves established in a consolidated manner during the permit term would remain intact, whereas future (i.e., beyond the 30-year permit term) mitigation preserves would not be established in such a manner. The mitigation preserves under the Reduced Permit Term Alternative established during Years 31–50 of the 50-year EIS/EIR study period would resemble preserve establishment patterns under the No Action/No Project Alternative.

As described previously for the Proposed Action/Proposed Project Alternative, overall GHG emissions associated with preserve establishment are considered similar for the Proposed Action/Proposed Project Alternative and the No Action/No Project Alternative. Because the Reduced Permit Term Alternative implements aspects of both alternatives in the same manner as described previously for each alternative, overall GHG emissions associated with preserve establishment under the Reduced Permit Term Alternative would be similar to emissions from the other two alternatives. Because GHG emissions from preserve establishment under the Reduced Permit Term Alternative would, overall, be similar to those describe for the No

Action/No Project Alternative, a ***Less Than Significant Adverse*** effect to climate change would occur when comparing the Reduced Permit Term Alternative to the No Action/No Project Alternative baseline condition.

Operational Emissions

As described previously for the No Action/No Project Alternative, potential significant adverse effects from operational GHG emissions from stationary and mobile sources are anticipated for urban development under the No Action/No Project Alternative future condition. These conclusions would still be the case under the Reduced Permit Term Alternative. However, under the Reduced Permit Term Alternative, 1,900 acres of urban development would not be shifted or displaced outside of the USB. Therefore, operational related vehicular trips associated with development would be shorter, resulting in fewer mobile-source GHG emissions; that is, potential significant adverse effects from operation of development identified above for the No Action/No Project Alternative future condition would also occur but to a lesser extent under the Reduced Permit Term Alternative. This would be a ***Minor Beneficial*** effect when comparing the Reduced Permit Term Alternative to the No Action/No Project Alternative baseline condition.

Urban development under the Reduce Permit Term Alternative would also result in the conversion of undeveloped terrestrial carbon-sequestering terrestrial land covers (e.g., agriculture/cropland land, oak woodlands, grasslands) to developed land, decreasing the total sequestering capacity of land within the Planning Area. This would result in a net increase in GHG emissions. Based on Table 8-12, Expected Direct Impacts to Natural Land Covers – Reduced Permit Term Alternative, and as shown in Appendix H, expected urban development could result in a loss of approximately 34,113 acres of vegetated carbon-sequestering land under the Reduced Permit Term Alternative. This would amount to approximately 771 MT/year of CO_2 that would have otherwise continued to be sequestered by the undeveloped land. Compared to the No Action/No Project Alternative, the Reduced Permit Term Alternative would result in 239 fewer acres of vegetated land converted to non-carbon sequestering land. Compared to the No Action/No Project Alternative, the Reduced Permit Term Alternative would result in approximately 1 MT/year of CO_2 fewer emissions from changes in carbon-sequestrating land coverage.

This small difference in emissions resulting from 239 fewer acres of terrestrial carbon-sequestering land being converted is because some land cover types sequester more carbon than others. As shown in Appendix H, riparian woodland habitats are estimated to result in approximately 0.74 MT of carbon sequestered in the woody vegetation per acre per year. However, other land covers, such as annual grasslands, quickly reach an equilibrium between carbon sequestered in the growing vegetation and carbon released back into the atmosphere through decomposition of dead vegetation. Therefore, grassland land covers were assumed to

result in no net increases in carbon sequestration over time. That is, for this analysis, grasslands were assumed to sequester 0 MT of carbon per acre per year. The calculations of carbon sequestration potential reflect these conditions, as shown in Appendix H.

The total loss in carbon sequestration for the Reduced Permit Term Alternative (i.e., 771 MT/year of CO_2) would be below the applicable GHG thresholds of 1,100 MT CO_2/year. Because net annual GHG emissions associated with the loss of carbon-sequestering land would be negligibly lower under the Reduced Permit Term Alternative relative to the No Action/No Project Alternative, there would be ***No Impact*** when comparing the Reduced Permit Term Alternative to the No Action/No Project Alternative baseline condition.

As described previously for the Proposed Action/Proposed Project Alternative, overall GHG emissions associated with preserve operations are considered similar for the Proposed Action/Proposed Project Alternative and the No Action/No Project Alternative. Because the Reduced Permit Term Alternative implements aspects of both alternatives in the same manner as described previously for each alternative, overall GHG emissions associated with preserve operations under the Reduced Permit Term Alternative would be similar to emissions from the other two alternatives. Because GHG emissions from preserve operations under the Reduced Permit Term Alternative would, overall, be similar to those describe for the No Action/No Project Alternative, a ***Less Than Significant Adverse*** effect on climate change would occur when comparing the Reduced Permit Term Alternative to the No Action/No Project Alternative baseline condition.

As discussed previously in Section 15.1.4, climate change may result in various effects to precipitation amounts and patterns, temperature, snow pack, and sea-level rise. These changes may result in effects to Preserve Systems. However as described previously, given the amount of uncertainty and number of variables involved, it would be speculative to attempt to predict the future effects of climate change on any particular species or ecosystem in the Planning Area. If adverse effects from climate change were to occur in preserves, the typically larger and more interconnected preserves established during the 30-year permit term under the Reduced Permit Term Alternative would be more resilient to changing climatic conditions than the smaller and more isolated mitigation preserves associated with the No Action/No Project Alternative. This would result in ***Minor Beneficial*** effect compared to the No Action/No Project Alternative baseline condition.

15.2.4.2 Significance of Direct and Indirect Effects

In summary, compared to the No Action/No Project Alternative baseline condition, the Proposed Action/Proposed Project Alternative would result in the following:

- A net reduction in GHG emissions resulting from construction of urban development
- A net reduction in GHG emissions resulting from operations of urban development

- A negligible difference in GHG emissions resulting from the loss of carbon-sequestering terrestrial land covers
- Little difference in GHG emissions resulting from Preserve System construction/establishment
- Little difference in GHG emissions resulting from Preserve System management
- A Preserve System that is more resilient to climate change

Therefore, after considering the significance of impacts from the Reduced Permit Term Alternative related to the GHG and climate change impact criteria, the Reduced Permit Term Alternative would result in ***Minor Beneficial*** effects to GHG emissions and climate change compared to the impacts that would occur under the No Action/No Project Alternative baseline condition.

15.2.4.3 Cumulative Effects of the Alternative

As described in Section 15.2.1, the GHG emission impacts analyzed in this EIS/EIR are, by definition, cumulative. Therefore, cumulative GHG emission impacts of the Reduced Permit Term Alternative are identical to the direct and indirect impacts described in Section 15.2.4.1. Therefore, after considering the significance of impacts from the Reduced Permit Term Alternative on GHG emissions and climate change, the Reduced Permit Term Alternative would result in ***Minor Beneficial*** effects compared to the impacts that would occur under the No Action/No Project Alternative baseline condition.

15.3 REFERENCES CITED

14 CCR 15000–15387 and Appendices A–L. Guidelines for Implementation of the California Environmental Quality Act, as amended.

40 CFR 1502.1–1502.25. Environmental Impact Statement.

California Health and Safety Code, Sections 38550–38551. Division 25.5: California Global Warming Solutions Act of 2006; Part 3: Statewide Greenhouse Gas Emissions Limit.

CARB (California Air Resources Board). 2011. *Status of Scoping Plan Recommended Measures*. Accessed December 2017. http://www.arb.ca.gov/cc/scopingplan/status_of_scoping_plan_measures.pdf.

CARB. 2013. *Facts About California's Sustainable Communities Plans*. Last revised October 2, 2013. Accessed December 2017. https://www.arb.ca.gov/cc/sb375/scag_fact_sheet.pdf.

CARB. 2014a. *First Update to the Climate Change Scoping Plan: Building on the Framework Pursuant to AB 32, the California Global Warming Solutions Act of 2006*. May 2014. Accessed December 2017. https://www.arb.ca.gov/cc/scopingplan/2013_update/first_update_climate_change_scoping_plan.pdf.

CARB. 2014b. *California Greenhouse Gas Inventory for 2000–2012—by Category as Defined in the 2008 Scoping Plan*. Last Updated March 24, 2014. Accessed December 2017. https://www.arb.ca.gov/cc/inventory/pubs/reports/2000_2012/ghg_inventory_scopingplan_00-12_2014-03-24.pdf.

CEC (California Energy Commission). 2012. *Our Changing Climate: Vulnerability & Adaptation to the Increasing Risks from Climate Change in California*. Publication CEC-500-2012-007. Last updated July 31, 2012.

CEQ (President's Council on Environmental Quality). 2016. *Final Guidance for Federal Departments and Agencies on Consideration of Greenhouse Gas Emissions and the Effects of Climate Change in National Environmental Policy Act Review*. August 1, 2016. Accessed December 2017. https://ceq.doe.gov/docs/ceq-regulations-and-guidance/nepa_final_ghg_guidance.pdf.

CNRA (California Natural Resources Agency). 2012. *Our Changing Climate 2012: Vulnerability & Adaptation to the Increasing Risks of Climate Change in California: A Summary on the Third Assessment from the California Climate Change Center*. CEC-500-2012-007. July 2012. Accessed December 2017. http://www.water.ca.gov/waterplan/docs/cwpu2013/Final/vol4/climate_change/05Climate_Action_Team_3_Assesment.pdf.

Galt. 2009a. *2030 Galt General Plan: Policy Document*. Final. Prepared by Mintier Harnish, in association with Environmental Science Associates, Applied Development Economics, and Omni Means. Sacramento, California: Mintier Harnish. April 2009. Accessed December 2017. http://www.ci.galt.ca.us/Modules/ShowDocument.aspx?documentid=9877.

Galt. 2009b. *City of Galt General Plan Update: 2030 Final EIR*. Final. SCH No. 2007082092. Prepared by Environmental Science Associates, in association with Mintier Harnish, Applied Development Economics, and Omni Means. Sacramento, California: Environmental Science Associates. March 2009. Accessed December 2017. http://www.saclafco.org/SphereofInfluenceInformation/Documents/galtsoi/sac_024063.pdf.

IPCC (Intergovernmental Panel on Climate Change). 2007. *Climate Change 2007: The Physical Science Basis*. Contribution of Working Group I to the Fourth Assessment Report of the IPCC. Geneva, Switzerland: IPCC. February 2007.

IPCC. 2013. "Carbon and Other Biogeochemical Cycles." In *Climate Change 2013: The Physical Science Basis*. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change. Geneva, Switzerland: IPCC. Accessed December 2017. http://www.climatechange2013.org/images/report/WG1AR5_ALL_FINAL.pdf.

Keeley, J.E., and H. Zedler. 1998. "Characterization and Global Distribution of Vernal Pools." In *Ecology, Conservation, and Management of Vernal Pool Ecosystems: Proceedings from a 1996 Conference*, edited by C.W. Witham, E.T. Bauder, D. Belk, W.R. Ferren Jr., and R. Ornduff, 1–14. 0-943460-37-9. Based on a conference held at the Hilton Hotel, Sacramento, California, June 19–21, 1996. Sacramento, California: California Native Plant Society.

Malamud-Roam, F.P., B. Lynn Ingram, M. Hughes, and J.L. Florsheim. 2006. "Holocene Paleoclimate Records from a Large California Estuarine System and its Watershed Region: Linking Watershed Climate and Bay Conditions." *Quaternary Science Reviews* 25:1570–1598. Accessed December 2017. http://www.waterboards.ca.gov/waterrights/water_issues/programs/bay_delta/deltaflow/docs/exhibits/ccwd/spprt_docs/ccwd_malamud_roam_etal_2006.pdf.

Minnich, R.A. 2007. "Climate, Paleoclimate, and Paleovegetation." In *Terrestrial Vegetation of California*, 3rd ed., edited by M.G. Barbour, T. Keeler-Wolf, and A.S. Schoenherr, 43–70. Oakland, California: University of California Press. Accessed December 2017. http://earthsciences.ucr.edu/docs/chapter2.pdf.

Rancho Cordova. 2006a. *City of Rancho Cordova General Plan*. Rancho Cordova, California: City of Rancho Cordova, Public Works Department. Adopted June 26, 2006. Accessed December 2017. http://www.cityofranchocordova.org/home/showdocument?id=11075.

Rancho Cordova. 2006b. *City of Rancho Cordova General Plan Final Environmental Impact Report*. SCH No. 2005022137. Rancho Cordova, California: City of Rancho Cordova. June 2006. Accessed December 2017. http://www.cityofranchocordova.org/Index.aspx?page=104#a3.

SACOG (Sacramento Area Council of Governments). 2016a. *Metropolitan Transportation Plan/Sustainable Communities Strategy: Building a Sustainable System*. Sacramento, California: SACOG. Adopted February 18, 2016. Accessed December 2017. http://www.sacog.org/sites/main/files/file-attachments/mtpscs_complete.pdf.

SACOG. 2016b. *Final Environmental Impact Report for the 2016 Metropolitan Transportation Plan/Sustainable Communities Strategy*. SCH No. 2014062060. Sacramento, California: SACOG. January 2016. Accessed December 2017. http://www.sacog.org/general-information/final-2016-mtpscs-environmental-impact-report.

Sacramento County. 2009. *Greenhouse Gas Emissions Inventory for Sacramento County*. Prepared by ICF Jones & Stokes. Sacramento, California: ICF Jones & Stokes.

Sacramento County. 2010. *Final Environmental Impact Report: Sacramento County General Plan Update*. Control Number 2002-GPB-0105. SCH No. 2007082086. Sacramento, California: Sacramento County, Department of Environmental Review and Assessment. April 2010. Accessed December 2017. http://www.per.saccounty.net/EnvironmentalDocuments/Pages/SearchDocuments.aspx.

Sacramento County. 2011. *Sacramento County General Plan of 2005–2030.* Sacramento, California: Sacramento County, Community Planning and Development Department. Amended November 9, 2011. Accessed December 2017. http://www.per.saccounty.net/PlansandProjectsIn-Progress/Pages/GeneralPlan.aspx.

SMAQMD (Sacramento Metropolitan Air Quality Management District). 2016. *Guide to Air Quality Assessment in Sacramento County*. Adopted December 2009. Last Revised September 2016. Accessed December 2017. http://www.airquality.org/Residents/CEQA-Land-Use-Planning/CEQA-Guidance-Tools.