4.7 Greenhouse Gas Emissions

The purpose of this Section is to analyze potential greenhouse gas (GHG) emissions associated with the development of the proposed Project and identify mitigation measures that would avoid or reduce any significant impacts. Thresholds of significance for the impact analysis are derived from Appendix G of the 2011 *CEQA Guidelines*.

4.7.1 Environmental Setting

Greenhouse Gases Overview

Global warming is the name given to the increase in the average temperature of the Earth's near-surface air and oceans. The U.S. Environmental Protection Agency (EPA) reports that records from land stations and ships indicate that the global mean surface temperature warmed by about 0.9°F since 1880. These records indicate a near level trend in temperatures from 1880 to about 1910, a rise to 1945, a slight decline to about 1975, and a rise to present. The Intergovernmental Panel on Climate Change (IPCC) concluded in 2007 that warming of the climate system is now "unequivocal," based on observations of increases in global average air and ocean temperatures, widespread melting of snow and ice, and rising global average sea level.[1] Global warming is caused by natural processes and human actions. Specifically, the IPCC concludes that variations in natural phenomena such as solar radiation and volcanoes produced most of the warming from pre-industrial times to 1950 and had a small cooling effect afterward. [2] However, after 1950, increasing GHG concentrations resulting from human activity such as fossil fuel burning and deforestation have been responsible for most of the observed temperature increase. These basic conclusions have been endorsed by more than 45 scientific societies and academies of science, including all of the national academies of science of the major industrialized countries. Since 2007, no scientific body of national or international standing has maintained a dissenting opinion.

Increases in GHG concentrations in the Earth's atmosphere are thought to be the main cause of human-induced climate change. GHGs naturally trap heat by impeding solar radiation that has hit the Earth from being reflected back into space. Some GHGs occur naturally and are necessary for keeping the Earth's surface habitable. However, increases in the concentrations of these gases in the atmosphere during the last hundred years have decreased the amount of solar radiation that is reflected back into space, intensifying the natural greenhouse effect and resulting in the increase of global average temperature.

The principal GHGs of concern are carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), sulfur hexafluoride (SF_6), perfluorocarbons (PFC), and hydrofluorocarbons (HFC). In terms of Global Warming Potential (GWP), each of these gases varies substantially from one another. GWP is a measure of how much a given mass of GHG will contribute to global warming,

1 Intergovernmental Panel on Climate Change, *Intergovernmental Panel on Climate Change Fourth Assessment Report*, 2007.

2 Intergovernmental Panel on Climate Change, *Intergovernmental Panel on Climate Change Fourth Assessment Report*, 2007.

comparing one GHG to the same mass of CO_2 on a relative scale.[3] The GWP depends on the absorption of infrared radiation by a given species, the spectral location of its absorbing wavelengths, and the atmospheric lifetime of the species. GHG emissions are measured in units of pounds or tons of CO_2 equivalents (CO_2e). GWP values for key GHGs are summarized in the following **Table 4.7-1**. The following sections contain a general discussion of the natural and anthropogenic sources of each GHG.

TABLE 4.7-1
GLOBAL WARMING POTENTIAL FOR GREENHOUSE GASES
(100-year given time horizon)

Greenhouse Gas	Global Warming Potential
Carbon Dioxide (CO_2)	1
Methane (CH_4)	23
Nitrous Dioxide (N_2O)	310
Hydrofluorocarbons (HFCs)	11,700
Perfluorocarbons (PFCs)	6,500
Nitrogen Trifluouride (NF_3)	17,200
Sulfur Hexafluoride (SF_6)	23,900

SOURCES: U.S. Environmental Protection Agency, *PSD and Title V Permitting Guidance for Greenhouse Gases,* 2010; Intergovernmental Panel on Climate Change, *Intergovernmental Panel on Climate Change Fourth Assessment Report*, 2007, page 11; Intergovernmental Panel on Climate Change, *Summary for Policymakers, Climate Change 2007: The Physical Science Basis, Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change* , http://www.ipcc.ch/pdf/assessment-report/ar4/wg1/ar4-wg1-errata.pdf , accessed, October 2011, pages 3-5.

Carbon Dioxide (CO_2). In the atmosphere, carbon generally exists in its oxidized form as CO_2. Natural sources of CO_2 include animal and plant respiration, ocean-atmospheric exchange, and volcanic eruptions. Anthropogenic sources of CO_2 include the combustion of fossil fuels, such as coal, oil, and gas in power plants, automobiles, industrial facilities, and other sources and specialized industrial production processes and product uses (i.e., mineral production, metal production, and use of petroleum-based products). The largest source of CO_2 emissions globally is the combustion of fossil fuels. Sinks of CO_2 include forests, wetlands, and agriculture. When CO_2 sources exceed CO_2 sinks, the Earth's natural balance is no longer in equilibrium. Since the late 1800s, the concentration of CO_2 in the atmosphere has risen approximately 30 percent.[4]

Methane (CH_4). Methane in the atmosphere is eventually oxidized, yielding carbon dioxide and water. Natural sources of methane include, but are not limited to, anaerobic production, wetlands, termites, oceans, methane gas hydrates (clathrates), volcanoes and other geologic structures, wildfires, and animals. Anthropogenic sources of methane include, but are not limited to, landfills, natural gas systems, coal mining, manure management, forested lands, wastewater treatment, rice cultivation,

3 California Department of Resources Recycling and Recovery, *Statewide Anaerobic Digester Facilities for the Treatment of Municipal Organic Solid Waste Draft Program Environmental Impact Report*, February 2011.

4 Climate Action Team, *Climate Action Team Report to Governor Schwarzenegger and the Legislature*, March 2006, page 7.

composting, petrochemical production, and field burning of agricultural residues. In California, agricultural processes contribute significant sources of anthropogenic methane.[5]

Nitrous Oxide (N_2O). In the atmosphere, nitrous oxide reacts with ozone. Primary natural sources of nitrous oxide include bacterial breakdown of nitrogen in soils and oceans. Anthropogenic sources of nitrous oxide include fertilizer application, production of nitrogen fixing crops, nitric acid production, animal manure management, sewage treatment, combustion of fossil fuels, and nitric acid production.[6]

Hydrofluorocarbons (HFCs), Perfluorocarbons (PFCs), and Sulfur Hexafluoride (SF_6). HFCs are man-made chemicals containing the element fluorine. Developed as alternatives to ozone-depleting substances for industrial, commercial, and consumer products, they are used predominantly as refrigerants and aerosol propellants. PFCs are man-made as well, primarily used as replacements to ozone-damaging chlorofluorocarbons and hydrochlorofluorocarbons. Sources include aluminum production and semiconductor manufacturing. Man made, major releases of SF_6 come from leakage from electrical substations, magnesium smelters, and some consumer goods, such as tennis balls and training shoes. Each of these GHGs possesses a relatively high GWP and long atmospheric lifetimes.[7]

Intergovernmental Panel on Climate Change

The IPCC was established in 1988 by the World Meteorological Organization (WMO) and the United Nations Environment Program (UNEP) to assess "the scientific, technical and socioeconomic information relevant for the understanding of the risk of human-induced climate change." The IPCC issued Assessment Reports in 1990, 1995, 2001, and the latest in 2007 linking climate change to human activities. The 1st Assessment Report, released in 1990, played an important role in the discussions of the Intergovernmental Negotiating Committee for the United Nations Framework Convention on Climate Change (UNFCCC). The UNFCCC work was adopted in 1992 and went into effect in 1994; it provides the overall policy framework and legal basis for addressing the climate change issue. The 2nd Assessment Report was released in 1995. The most cited finding from that plenary, on attribution of climate change, has been consistently reaffirmed by subsequent research: "The balance of evidence suggests a discernible human influence on global climate." The 2nd Assessment report provided key input to the negotiations that led to the adoption in 1997 of the Kyoto Protocol by the UNFCCC. The 3rd Assessment Report was approved in January 2001. The predominant summary statements from the 3rd Assessment Report strengthened the 2nd Assessment Report's attribution statement: "An increasing body of observations gives a collective picture of a warming world and other changes in the climate system." The 3rd Report also states: "There is new and stronger evidence that most of the warming observed over the last 50 years is attributable to human activities."

5 Climate Action Team, *Climate Action Team Report to Governor Schwarzenegger and the Legislature*, March 2006, page 11.
6 Environmental Protection Agency, *Nitrous Oxide, Sources and Emissions,* http://www.epa.gov/nitrousoxide/sources.html, accessed September 2011.
7 Climate Action Team, *Climate Action Team Report to Governor Schwarzenegger and the Legislature*, March 2006, page 12.

The IPCC completed its 4th Assessment Report in 2007. The IPCC's 4th Assessment Report Working Group I concluded with more certainty than in its previous reports that "warming of the climate system is unequivocal." The group's conclusions are based on a variety of evidence including historical, global average air, and ocean temperatures, widespread observations of melting snow and ice, and rising global average sea level. Global concentrations of three key GHGs—CO_2, CH_4 and N_2O—have increased "markedly" and "as a result of human activities" since the Industrial Revolution of the 18th century. Ice core data on historical levels of GHGs was used by IPCC scientists to conclude that modern concentrations of these three GHGs "now far exceed pre-industrial values." The report also states that fossil fuel use and changes in land use are the primary contributors to increased CO_2 concentrations globally, while agriculture is the primary source of increased CH_4 and N_2O.

Previously, the IPCC's 3rd Assessment Report stated that the average global temperature is likely to increase by between 3.6 and 8.1°F by 2100; it also found larger temperature increases to be possible, but unlikely. Temperature increases are expected to vary widely in specific locations, depending on many factors. The increase in temperature is expected to lead to higher temperature extremes, precipitation extremes leading to increased flooding and droughts, ocean acidification from increased carbon content, and rising sea levels.

Global Climate Trends and Associated Impacts

The rate of increase in global average surface temperature over the last hundred years has not been consistent; the last three decades have warmed at a much faster rate – on average 0.32 °F per decade. Eleven of the twelve years from 1995 to 2006 rank among the twelve warmest years in the instrumental record of global average surface temperature (going back to 1850).[8]

During the same period over which this increased global warming has occurred, many other changes have occurred in other natural systems. Sea levels have risen on average 1.8 millimeters per year (mm/yr); precipitation patterns throughout the world have shifted, with some areas becoming wetter and others drier; tropical cyclone activity in the North Atlantic has increased; peak runoff timing of many glacial and snow-fed rivers has shifted to earlier in the season; as well as numerous other observed conditions. Though it is difficult to prove a definitive cause and effect relationship between global warming and other observed changes to natural systems, there is high confidence in the scientific community that these changes are a direct result of increased global temperatures.[9]

Regional Setting

Almost all climate scenarios include a continuing trend of warming through the end of the century, given the vast amounts of GHGs already released and the difficulties associated with reducing emissions to a level that would stabilize the climate. Total GHG emissions in California have been approximated by the California Energy Commission (CEC), which found that 492

8 Intergovernmental Panel on Climate Change, *Intergovernmental Panel on Climate Change Fourth Assessment Report*, 2007, page 30.
9 Intergovernmental Panel on Climate Change, *Intergovernmental Panel on Climate Change Fourth Assessment Report*, 2007, page 30.

million metric tons of CO_2e ($MTCO_2e$) GHG emissions were produced in California in 2004.[10] The CEC study also found transportation to be the source of 41 percent of the State's GHG emissions; followed by electricity generation at 22 percent and industrial sources at 21 percent.

Potential impacts in California associated with global climate change may include less snow pack, sea level rise, more extreme heat days, more high ozone days, more large forest fires, and more drought years.

Climate change temperature projections identified in the 2009 California Climate Adaptation Strategy suggest the following[11]:

- Average temperature increase is expected to be more pronounced in the summer than in the winter season.
- Inland areas are likely to experience more pronounced warming than coastal regions.
- Heat waves are expected to increase in frequency, with individual heat waves also showing a tendency toward becoming longer and extending over a larger area, thus more likely to encompass multiple population centers in California at the same time.
- As GHGs remain in the atmosphere for decades, temperature changes over the next 30 to 40 years are already largely determined by past emissions. By 2050, temperatures are projected to increase by an additional 1.8 to 5.4 °F; (an increase one to three times as large as that which occurred over the entire 20th century).
- By 2100, the models project temperature increases between 3.6 to 9 °F.

The 2009 CNRA also states that 2.5 trillion dollars' worth of infrastructure in California is at risk from the various projected climate-related changes in our environment. The estimated cost of addressing the impacts on that infrastructure is about $3.9 billion, annually. The report identifies a number of steps to be taken in the near term to appropriately plan for and address this threat. Highlights of the actions include: the formation of a Climate Adaptation Advisory Panel; new approaches to water management; revised land-use planning to avoid construction in highly vulnerable areas; evaluation of all state infrastructure projects to avoid exacerbating threats to infrastructure; and, more specific planning by emergency response agencies, public health agencies, and others to fortify existing communities and resources, and prepare for future stressors.

There are also many secondary effects that are projected to result from global warming, including global rise in sea level, impacts to agriculture, changes in disease vectors, and changes in habitat and biodiversity. While the possible outcomes and the feedback mechanisms involved are not fully understood, and much research remains to be done, the potential for substantial environmental, social, and economic consequences over the long-term may be significant.

[10] California Energy Commission, *Inventory of California Greenhouse Gas Emissions and Sinks: 1990 to 2004,* December 2006.

[11] California Natural Resources Agency, *2009 California Climate Adaption Strategy Discussion Draft*, 2009.

Regional Water Resources

Depending on the climate model, precipitation is predicted to increase or decrease slightly. However, the form in which precipitation occurs could change substantially. Warmer winters would lead to less snow and more rain. As a result, the Sierra snowpack would be reduced and would melt earlier. This change could lead to increased flood risks as more water flows into reservoirs and rivers during the winter rainy period. Furthermore, late spring and summer flows to reservoirs would be reduced due to reduced snow packs, thereby reducing the chance of unrestricted water supplies for cities, agriculture, and rivers. Increased temperatures would also lead to a rise in the sea level, from both thermal expansion and melting land-based glaciers. The State Department of Water Resources (DWR) notes that "adapting to the current and future effects of climate change is essential for DWR and California's water managers. DWR addresses climate change in its California Water Plan, which is updated every five years. The California Water Plan provides a framework for water managers, legislators, and the public to consider options and make decisions regarding California's water future. DWR continues to improve and expand the analysis of climate change in the California Water Plan. The 2009 California Water Plan Update includes multiple scenarios of future climate conditions and stresses the consideration of uncertainty, risk, and sustainability.[12]

During the past century, sea levels along the California coast have risen by approximately seven inches. Climate forecasts indicate the sea level would rise by seven to 23 inches over the next 100 years depending on the climate model. Substantial melting of either the Greenland or Antarctic ice sheets would lead to an even greater increase in sea levels; however, the IPCC models do not indicate that this would occur within the next 100 years, which is the boundary of most climate models. Longer forecast periods are inherently less reliable as they require more assumptions and tend to compound the effects of assumptions that may be incorrect. Increases in sea level could lead to increased coastal flooding, salt water intrusion into aquifers, and disrupt wetlands and estuaries.

Effects of Climate Change on Precipitation and Recharge

The effects of climate change on precipitation and recharge in the Bristol, Cadiz, Fenner, and Orange Blossom Wash Watersheds are uncertain. While global climate change has been modeled often, it is much more difficult to model and understand climate change impacts on a regional or local level. There is a general consensus that climate change will cause general warming, sea level rise, a shift in precipitation and runoff patterns (i.e. more winter precipitation falling as rain rather than snow), and increased flooding across the globe.[13] At a smaller scale, the ability to predict the impacts of climate change becomes more difficult. In particular, aquifer recharge can be difficult to quantify because it can be affected by many climatic and human factors, including the amount of precipitation; the density of streams that lose water to the aquifer; the ambient temperature, wind speed, and amount of solar radiation (potential evaporation); the type and amount of vegetative cover; the surface soil type and sub-surface geology; and depth to water.

[12] California Department of Water Resources, *California Water Plan Update 2009*, December 2009, page 6-20.
[13] The Public Policy Institute of California, *Adapting California's Water Management to Climate Change*, November 2008, page 6.

Additionally, relatively little has been written about the impacts of climate change on groundwater recharge.

Current geological assessments of the aquifer system at the Project area suggest that the Project's annual recharge rate is unlikely to be materially affected by climate change. Located in a non-urban, remote area, the basin's groundwater supply is mainly generated by precipitation (both rain and snow) that occurs in the upper elevations of two nearby mountain ranges. Once it has infiltrated and becomes groundwater, precipitation moves very slowly down gradient toward the Project area at the base of the Watershed. Groundwater beneath the Project area has been found to be hundreds, and in some cases thousands, of years old. Although climate change is expected to shift precipitation and snow melt patterns, which will cause significant impacts in areas that rely on surface runoff from snowmelt, any decline in the amount of precipitation falling on the mountains surrounding the Watershed tributary to the Project area is unlikely to significantly affect the natural recharge in the groundwater basin since it is reliant on seepage from the hard rock formations underlying the mountain ranges rather than surface runoff or alluvial recharge.[14]The total amount of natural recharge that occurs each year in the basin should be relatively unchanged over the long-term.

The basin in which the Project lies will be shielded from some of the other effects of climate change as well, given its location and characteristics, i.e. it will not be affected by sea level rise—seawater intrusion—given its inland, desert location.

DWR has made the following recommendations regarding how the state and local water agencies should address climate change: (a) provide sustainable funding for statewide and integrated regional water management; (b) fully develop the potential for integrated regional water management; (c) aggressively increase water use efficiency; (d) practice and promote integrated flood management; (e) enhance and sustain ecosystems; (f) expand water storage and conjunctive management of surface and groundwater resources; (g) fix Delta water supply, quality, and ecosystem conditions; (h) preserve, upgrade, and increase monitoring, data analysis and management; (i) plan for and adapt to potential sea level rise; and (j) identify and fund focused climate change impacts and adaptation research and analysis.[15]

Colorado River

Climate change impacts to the Colorado River are similar to those expected globally. DWR indicates that water supplies from the Colorado River may decrease in the future.[16] The report notes that a recent comprehensive modeling study projected an 8 to 11 percent decrease in runoff by the year 2100 for the Colorado River basin, depending on the emissions scenario. This study also found that water shortages for the basin may become more frequent.

14 California Department of Water Resources, *Managing an Uncertain Future: Climate Change Adaptation Strategies for California's Water*, October 2008.
15 California Department of Water Resources, *Managing an Uncertain Future: Climate Change Adaptation Strategies for California's Water*, October 2008.
16 California Department of Water Resources, *California Water Plan Update 2009*, December 2009.

Another report notes that climate model projections show longer and more intense future droughts in the Colorado River basin.[17] If these climate scenarios materialize, the Southwest will have to prepare for deeper and historically more unusual water shortages, and the sustainability of current water deliveries from the Colorado River will become less predictable.

The Bureau of Reclamation recently released a report on its climate change modeling efforts. The report concludes that annual variability in precipitation is expected to persist within the Colorado River Basin, and the basin likely will continue to experience both wet and dry periods throughout the 21st century.[18] Results of Reclamation's climate change modeling suggest that annual runoff will vary by location. Southern subbasins are expected to experience increased warming and precipitation as compared to more northern subbasins like the Green River basin. Warming is expected to lead to more rainfall-runoff during the cool season rather than snowpack accumulation. Generally speaking, streamflow variability over the Upper Colorado River Basin is expected to continue and increase under changing climate conditions. While annual maximum week runoff is predicted to remain stable throughout the Basin, annual minimum week runoff is expected to decrease.

Given that the Colorado River Basin is expected to experience both wet and dry periods throughout the 21st century, storage of excess River flows during wet years will be necessary to compensate for the low flows in dry years. The predicted shift in runoff patterns, combined with predicted periods of increased precipitation, will result in time periods during which Colorado River flows are likely to exceed storage capacity for those flows. In these years, these excess flows are available to be diverted to alternative storage sites. If they are not diverted to storage, the flows will flow outside the United States, and the local region will be deprived of an important water supply. At the opposite end of the spectrum, if the longer and more intense future droughts projected by Cayan et al. materialize, the ability to store excess Colorado River flows and other supplies, such as State Water Project water from the Bay-Delta, in wet years will become even more important. Storing surplus water in wet years will enable water providers to provide a more reliable water supply during periods of drought.

Regional Wildfires

Increased temperatures would lead to increases in evapotranspiration. The summers would likely be drier, and vegetation would also be more likely to dry out, resulting in increasingly larger areas of flammable forests and wild lands. In addition, warmer temperatures could lead to the expansion of pests that kill and weaken trees, leading to increases in the amount of highly flammable dead trees, also increasing the risk of large forest fires. Local wildfire hazards are addressed in Section 4.8 Hazards and Hazardous Materials.

[17] Cayan, Daniel R., et al., *Future Dryness in the Southwest U.S. and the Hydrology of the Early 21st Century*, Proceedings of the National Academies of Science Vol. 107, No. 50, December 2010, pages 21271-21276.

[18] U.S. Department of the Interior, Bureau of Reclamation, *SECURE Water Act Section 9503(c) – Reclamation Climate Change and Water 2011*, April 2011.

Regional Weather Extremes

The temperature increases presented in climate change models are yearly averages. Within those averages is the potential for substantially hotter summers and/or colder winters. As a result of global climate change, the weather is expected to become more variable, with larger extremes. An increase in the number of days with extreme heat has implications for public health as Californians would face greater risk of death or disability from dehydration, heat stroke/exhaustion, heart attack, stroke, and respiratory distress caused by extreme heat. In addition, increased temperatures have implications for agricultural crops, particularly long-term crops such as grapes and fruit trees that are planted in particular locations to take advantage of micro-climates. The crops grown on the Cadiz Property use water-saving drip irrigation and are not dependent on rain; rather groundwater from the aquifer system is used to irrigate all crops in production. The Cadiz agricultural operations currently exist in extremely hot conditions for long periods of the year.

Regional Air Quality

As indicated in the discussion of weather extremes, increased temperatures can increase air quality problems. Increased temperatures create the conditions in which ozone formation can increase. In addition, hotter temperatures would likely result in increased electricity use to power air conditioners and refrigerators. Increased power usage has the potential to result in increased air pollutant emissions as more electrical generation is needed to meet the demand. Climate change has been factored into local and regional air quality planning, as noted by the California Air Resources Board (CARB), through implementation of Assembly Bill 32 and related programs.

4.7.2 Regulatory Framework

Federal

In the past, the EPA has not regulated GHGs under the Clean Air Act because it asserted that the act did not authorize EPA to issue mandatory regulations to address global climate change and that such regulation would be unwise without an unequivocally established causal link between GHGs and the increase in global surface air temperatures. However, the U.S. Supreme Court held that EPA must consider regulation of motor vehicle GHG emissions. In *Massachusetts v. Environmental Protection Agency* et al., twelve states and cities, including California, together with several environmental organizations, sued to require the EPA to regulate GHGs as pollutants under the Clean Air Act (127 S. Ct. 1438 (2007)). The Court ruled that GHGs fit within the Clean Air Act's definition of a pollutant and EPA did not have a valid rationale for not regulating GHGs. In 2009 EPA responded to this ruling and made an endangerment finding that GHGs pose a threat to the public health and welfare. That was the first step necessary for the establishment of federal GHG regulations under the Clean Air Act.

In April 2010, EPA issued the final rule on new standards for GHG emissions and fuel economy for light-duty vehicles in model years (MY) 2017-2025. In November 2010, EPA published the "Prevention of Significant Deterioration (PSD) and Title V Permitting Guidance for Greenhouse

Gases," which provides the basic information that permit writers and applicants need in order to address GHG emissions regulated under the Clean Air Act. In that document, EPA described the "Tailoring Rule" in the regulation of GHG emissions. With the Tailoring Rule, EPA established a phased schedule in the regulation of stationary sources. The first phase of the "Tailoring Rule" began January 2, 2011 and focuses the GHG permitting programs on the largest sources with the most Clean Air Act permitting experience. Then, in step two beginning June 1, 2011, the rule expands to cover large sources of GHGs that may not have been previously covered by the Clean Air Act for other pollutants. The rule also describes EPA's commitment to future rulemaking that will describe subsequent steps of the "Tailoring Rule" for GHG permitting.[19]

EPA annually publishes the Inventory of U.S. Greenhouse Gas Emissions and Sinks for estimating sources of GHGs that is generally consistent with the IPCC methodology developed in its Guidelines for National Greenhouse Gas Inventories. The inventory identifies and quantifies a country's primary anthropogenic sources and sinks of greenhouse gases is essential for addressing climate change. [20]

State

Assembly Bill (AB) 1493 (Pavley) of 2002, (Health and Safety Code Sections 42823 and 43018.5). AB 1493 requires CARB to develop and adopt the nation's first GHG emission standards for automobiles. These standards are also known as "Pavley I." The California Legislature provided in AB 1493 that global warming is a matter of increasing concern for public health and the environment. It cites several risks that California faces from climate change, including a reduction in the State's water supply, an increase in air pollution caused by higher temperatures, harm to agriculture, an increase in wildfires, damage to the coastline, and economic losses caused by higher food, water, energy, and insurance prices. The bill also states that technological solutions to reduce GHG emissions would stimulate California's economy and provide jobs. In 2004, the State of California submitted a request for a waiver from federal clean air regulations, as the State is authorized to do under the CAA, to allow the State to require reduced tailpipe emissions of CO_2. In late 2007, EPA denied California's waiver request and declined to promulgate adequate federal regulations limiting GHG emissions. In early 2008, California brought suit against the USEPA related to this denial.

In January 2009, President Obama instructed EPA to reconsider the Bush Administration's denial of California's and 13 other states' requests to implement global warming pollution standards for cars and trucks. In June 2009, EPA granted California's waiver request, enabling the State to enforce its GHG emissions standards for new motor vehicles beginning with the current model year.

Also in 2009, President Obama announced a national policy aimed at both increasing fuel economy and reducing GHG pollution for all new cars and trucks sold in the United States. The

19 U.S. Environmental Protection Agency, *PSD and Title V Permitting Guidance for Greenhouse Gases,* 2010.
20 Environmental Protection Agency, *U.S. Greenhouse Gas Emissions and Sinks,* April 2011. http://epa.gov/climatechange/emissions/downloads11/US-GHG-Inventory-2011-Executive-Summary.pdf, accessed October 2011.

new standards would cover model years 2012 to 2016 and would raise passenger vehicle fuel economy to a fleet average of 35.5 miles per gallon (mpg) by 2016. When the national program takes effect, California has committed to allowing automakers who show compliance with the national program to also be deemed in compliance with State requirements. California is committed to further strengthening these standards beginning in 2017 to obtain a 45 percent GHG reduction in the 2020 model year vehicles.

Executive Order S-3-05. Executive Order S-3-05 (State of California) states that California is vulnerable to the impacts of climate change. It states that increased temperatures could reduce the snowpack in the Sierra Nevada Mountains, further exacerbate California's air quality problems, and potentially cause a rise in sea levels. To address those concerns, the Executive Order established total greenhouse gas emission targets. Specifically, emissions are to be reduced to the 2000 level by 2010, to the 1990 level by 2020, and to 80 percent below the 1990 level by 2050.

The Executive Order directed the Secretary of the California Environmental Protection Agency (CalEPA) to coordinate a multi-agency effort to reduce greenhouse gas emissions to the target levels. The Secretary will also submit biannual reports to the Governor and State Legislature describing (1) progress made toward reaching the emission targets, (2) impacts of global warming on California's resources, and (3) mitigation and adaptation plans to combat these impacts. To comply with the Executive Order, the Secretary of CalEPA created a Climate Action Team (CAT) made up of members from various State agencies and commissions. CAT 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 (AB 32). The California Global Warming Solutions Act of 2006 (AB 32) requires CARB to design and implement emission limits, regulations, and other measures, such that statewide GHG emissions will be reduced to 1990 levels by 2020. In 2009 CARB mandatory reporting and verification regulations went into effect. Regulations require reporting for major facilities, those that generate more than 25,000 $MTCO_2e$ /year such as cement plants, oil refineries, power plants (electricity), cogeneration facilities, and hydrogen plants. These sources make up approximately 94 percent of the point source CO_2e emissions in California.[21]

Pursuant to AB 32, CARB adopted a Scoping Plan in December 2008, which was re-approved by CARB on August 24, 2011,[22] outlining measures to meet the 2020 GHG reduction limits. In order to meet these goals, California must reduce its GHG emissions by 30 percent below projected 2020 business as usual emissions levels, or about 15 percent from current levels. The Scoping Plan estimates a reduction of 174 million $MTCO_2e$ (about 191 million U.S. tons) from transportation, energy, agriculture, forestry, and other sources, with measures summarized in **Table 4.7-2**. CARB has identified an implementation timeline for the GHG reduction strategies in the Scoping Plan. Some measures may require new legislation to implement, some will require

[21] California Air Resources Board, *Mandatory Reporting of California Greenhouse Gas Emissions*, Presentation at Cal/EPA Headquarters, August 2007.

[22] California Air Resources Board, *Final Supplement to the AB 32 Scoping Plan Functional Equivalent Document,* August 2011.

subsidies, some have already been developed, and some will require additional effort to evaluate and quantify. Additionally, some emissions reductions strategies may require their own environmental review under CEQA or the National Environmental Policy Act (NEPA).

TABLE 4.7-2
LIST OF RECOMMENDED ACTIONS BY SECTOR

Measure No.	Measure Description	GHG Reductions (Annual Million $MTCO_2e$)
Transportation		
T-1	Pavley I and II – Light Duty Vehicle Greenhouse Gas Standards	31.7
T-2	Low Carbon Fuel Standard (Discrete Early Action)	15
T-3[1]	Regional Transportation-Related Greenhouse Gas Targets	5
T-4	Vehicle Efficiency Measures	4.5
T-5	Ship Electrification at Ports (Discrete Early Action)	0.2
T-6	Goods Movement Efficiency Measures • Ship Electrification at Ports • System-Wide Efficiency Improvements	3.5
T-7	Heavy-Duty Vehicle Greenhouse Gas Emission Reduction Measure – Aerodynamic Efficiency (Discrete Early Action)	0.93
T-8	Medium- and Heavy-Duty Vehicle Hybridization	0.5
T-9	High Speed Rail	1
Electricity and Natural Gas		
E-1	Energy Efficiency (32,000 GWh of Reduced Demand) • Increased Utility Energy Efficiency Programs • More Stringent Building & Appliance Standards Additional Efficiency and Conservation Programs	15.2
E-2	Increase Combined Heat and Power Use by 30,000 GWh (Net reductions include avoided transmission line loss)	6.7
E-3	Renewables Portfolio Standard (33% by 2020)	21.3
E-4	Million Solar Roofs (including California Solar Initiative, New Solar Homes Partnership and solar programs of publicly owned utilities) • Target of 3000 MW Total Installation by 2020	2.1
CR-1	Energy Efficiency (800 Million Therms Reduced Consumptions) • Utility Energy Efficiency Programs • Building and Appliance Standards • Additional Efficiency and Conservation Programs	4.3
CR-2	Solar Water Heating (AB 1470 goal)	0.1
Green Buildings		
GB-1	Green Buildings	26
Water		
W-1	Water Use Efficiency	1.4†
W-2	Water Recycling	0.3†
W-3	Water System Energy Efficiency	2.0†
W-4	Reuse Urban Runoff	0.2†
W-5	Increase Renewable Energy Production	0.9†
W-6	Public Goods Charge (Water)	TBD†

Measure No.	Measure Description	GHG Reductions (Annual Million $MTCO_2e$)
Industry		
I-1	Energy Efficiency and Co-Benefits Audits for Large Industrial Sources	TBD
I-2	Oil and Gas Extraction GHG Emission Reduction	0.2
I-3	GHG Leak Reduction from Oil and Gas Transmission	0.9
I-4	Refinery Flare Recovery Process Improvements	0.3
I-5	Removal of Methane Exemption from Existing Refinery Regulations	0.01
Recycling and Waste Management		
RW-1	Landfill Methane Control (Discrete Early Action)	1
RW-2	Additional Reductions in Landfill Methane • Increase the Efficiency of Landfill Methane Capture	TBD†
RW-3	High Recycling/Zero Waste • Commercial Recycling • Increase Production and Markets for Compost • Anaerobic Digestion • Extended Producer Responsibility • Environmentally Preferable Purchasing	9†
Forests		
F-1	Sustainable Forest Target	5
High Global Warming Potential (GWP) Gases		
H-1	Motor Vehicle Air Conditioning Systems: Reduction of Refrigerant Emissions from Non-Professional Services (Discrete Early Action)	0.26
H-2	SF_6 Limits in Non-Utility and Non-Semiconductor Applications (Discrete Early Action)	0.3
H-3	Reduction of Perfluorocarbons in Semiconductor Manufacturing (Discrete Early Action)	0.15
H-4	Limit High GWP Use in Consumer Products Discrete Early Action (Adopted June 2008)	0.25
H-5	High GWP Reductions from Mobile Sources • Low GWP Refrigerants for New Motor Vehicle Air Conditioning Systems • Air Conditioner Refrigerant Leak Test During Vehicle Smog Check • Refrigerant Recovery from Decommissioned Refrigerated Shipping Containers • Enforcement of Federal Ban on Refrigerant Release during Servicing or Dismantling of Motor Vehicle Air Conditioning Systems	3.3
H-6	High GWP Reductions from Stationary Sources • High GWP Stationary Equipment Refrigerant Management Program: - Refrigerant Tracking/Reporting/Repair Deposit Program - Specifications for Commercial and Industrial Refrigeration Systems • Foam Recovery and Destruction Program • SF Leak Reduction and Recycling in Electrical Applications • Alternative Suppressants in Fire Protection Systems • Residential Refrigeration Early Retirement Program	10.9
H-7	Mitigation Fee on High GWP Gases	5
Agriculture		
A-1	Methane Capture at Large Dairies	1.0†

[1] This is not the SB 375 regional target. ARB will establish regional targets for each Metropolitan Planning Organization (MPO) region following the input of the regional targets advisory committee and a consultation process with MPO's and other stakeholders per SB 375.

† GHG emission reduction estimates are not included in calculating the total reductions needed to meet the 2020 target.

SOURCE: California Air Resources Board, *Final Supplement to the AB 32 Scoping Plan Functional Equivalent Document*, August 2011.

Senate Bill 1368 (SB 1368). (codified at Public Utilities Code Chapter 3) SB 1368 is the companion bill of AB 32. SB 1368 requires the California Public Utilities Commission (CPUC) to establish a greenhouse gas emission performance standard for baseload generation from investor-owned utilities by February 1, 2007. The bill also requires the CEC to establish a similar standard for local publicly owned utilities by June 30, 2007. These standards cannot exceed the greenhouse gas emission rate from a baseload combined-cycle natural-gas-fired plant. The legislation further requires that all electricity provided to California, including imported electricity, must be generated from plants that meet the standards set by the CPUC and CEC.

Senate Bill 104 (Updating the list of GHGs regulated under AB 32). Senate Bill 104 (SB 104), adopted in October 2009, authorizes CARB to regulate nitrogen trifluoride as a GHG. Nitrogen trifluoride is a gas emitted during the etching process during the manufacturing of various electronic products including televisions, computer monitors, solar panels, and microprocessors. SB 104 adds nitrogen trifluoride to the list of GHGs regulated by CARB under AB 32. CARB has developed and adopted a variety of rules to reduce fluorinated gas emissions (HFC, PFC, and SF6) in semiconductor and related electronic device manufacturing. Passage of this bill adds nitrogen trifluoride to the list of fluorinated gases regulated under the CARB rules for semiconductor and related electronic manufacturing.[23]

Senate Bill 97 SB 97 acknowledges that climate change is a prominent environmental issue that requires analysis under CEQA. As of March 18, 2010, CARB had established guidelines for the feasible mitigation or effects of GHG emissions.

Senate Bill 375. SB 375, signed in September 2008 (Chapter 728, Statutes of 2008), aligns regional transportation planning efforts, regional GHG reduction targets, and land use and housing allocation. SB 375 requires Metropolitan Planning Organizations (MPOs) to adopt a sustainable communities strategy or alternative planning strategy (APS) that will prescribe land use allocation in that MPO's regional transportation plan. CARB, in consultation with MPOs, will provide each affected region with reduction targets for GHGs emitted by passenger cars and light trucks in the region for the years 2020 and 2035. If MPOs do not meet the GHG reduction targets, transportation projects may not be eligible for funding programmed after January 1, 2012.

On August 9, 2010 CARB proposed regional GHG Emission reduction targets pursuant to SB 375. CARB developed proposed regional targets through an extensive public process, with significant contributions from the affected MPOs. Substantial data and analysis, developed by the regions, served as the basis for predicting the amount of change that can reasonably be expected in coming decades and demonstrated significant regional differences which are reflected in the targets.

Executive Order S-13-08: The Climate Adaptation and Sea Level Rise Planning Directive. On November 14, 2008, Governor Schwarzenegger issued Executive Order S-13-08 in order to reduce and assess California's vulnerability to climate change and sea level rise. The Executive Order initiated four major actions:

23 California Air Resources Board, *Senate Bill No. 104*, October 2009.

- Initiate California's first statewide climate change adaptation strategy that will assess the State's expected climate change impacts, identify where California is most vulnerable and recommend climate adaptation policies by early 2009;
- Request the National Academy of Science establish an expert panel to report on sea level rise impacts in California to inform state planning and development efforts;
- Issue interim guidance to state agencies for how to plan for sea level rise in designated coastal and floodplain areas for new projects; and
- Initiate a report on critical existing and planned infrastructure projects vulnerable to sea level rise. This report was released in 2009 as the California Adaptation Strategy (CNRA, 2009).

The Executive Order provides consistency and clarifies to state agencies how to address sea level rise and other climate change related impacts in current planning efforts.

California Cap and Trade Program. The AB 32 Scoping Plan identifies a cap-and-trade program as one of the strategies California will employ to reduce the GHG emissions that cause climate change. This program will help put California on the path to meet its goal of reducing GHG emissions to 1990 levels by the year 2020, and ultimately achieving an 80% reduction from 1990 levels by 2050. Under cap-and-trade, an overall limit on GHG emissions from capped sectors will be established by the program, and facilities subject to the cap will be able to trade permits (allowances) to emit GHGs.

CARB is working with stakeholders to design a California cap-and-trade program that is enforceable and meets the requirements of AB 32, including the need to consider any potential impacts on disproportionately impacted communities. Consistent with AB 32, CARB must finalize the cap-and-trade regulation, which must begin in 2012.

On October 20, 2011, CARB adopted the final cap-and-trade regulation and Resolution 11-32. The Final Rulemaking Package was filed with the Office of Administrative Law (OAL) on October 27, 2011. OAL has until December 13, 2011 to make a determination. The cap-and-trade regulation, Title 17 California Coded of Regulations §§ 95800 through 96023, will become effective January 1, 2012. In August and November 2012, the first auction of "compliance instruments" (i.e. GHG emissions allowances) will be held and on January 1, 2013 the compliance obligation for Covered Entities begins. Covered Entities are entities within California that have one or more of the processes or operations listed in the regulation under § 95811 and that have annual emissions greater than the 25,000 $MTCO_2E$ threshold (§ 95812). The cap-and-trade program allows for non-Covered Entities, including Voluntarily Associated Entities, to register with the program and purchase and hold GHG emission allowances (§ 95814). California is working closely with six other western states and four Canadian provinces through the Western Climate Initiative (WCI), described below, to design a regional program that can deliver GHG emission reductions within the region at costs lower than could be realized through a California-only program.

Western Climate Initiative. California is working closely with six other states and four Canadian provinces in the - WCI to design a regional GHG emissions reduction program that includes a cap-and-trade approach. California's participation in WCI creates an opportunity to provide substantially greater reductions in GHG emissions throughout the region than could be achieved by California alone. The larger scope of the program also expands the market for clean technologies and helps avoid leakage; that is, the shifting of emissions from sources within California to sources outside the State. The WCI partners released the recommended design for a regional cap-and-trade program in September 2008. The creation of a robust regional trading system can complement the other policies and measures included in this plan, and it provides the means to achieve the reduction of GHG emissions needed from a wide range of sectors, as cost-effectively as possible.

California Air Pollution Control Officers Association. In January 2008, the California Air Pollution Control Officers Association (CAPCOA) addressed a range of GHG emission thresholds that can be used. The range includes a GHG threshold of zero and several non-zero thresholds. Non-zero thresholds include percentage reductions for new projects that would allow the State to meet its goals for GHG emissions reductions by 2020 and perhaps 2050. These would be determined by a comparison of new emissions versus business as usual emissions, and the reductions of approximately 30 percent would be required in order to achieve 2020 goals; reductions of 90 percent (effective immediately) would be required in order to achieve the more aggressive 2050 goals. These goals could be varied to apply differently to new projects by economic sector or by State region.

Other non-zero thresholds discussed in the CAPCOA paper include:

- 900 $MTCO_2e$ /year (a market capture approach that would capture 90 percent or more of likely future discretionary developments);
- 10,000 $MTCO_2e$ /year (potential CARB mandatory reporting level with cap and trade);
- 25,000 $MTCO_2e$ /year (the CARB mandatory reporting level for the statewide emissions inventory);
- 40,000 to 50,000 $MTCO_2e$ /year (regulated emissions inventory capture – using percentages equivalent to those used in air districts for criteria air pollutants);
- Projects of statewide importance (9,000 $MTCO_2e$ /year for residential, 13,000 metric tons/year CO_2e for office project, and 41,000 $MTCO_2e$ /year for retail projects); and
- Unit-based thresholds and efficiency-based thresholds that were not quantified in the report.

Local

Mojave Desert Air Quality Management District

MDAQMD has jurisdiction over the desert portion of San Bernardino County and the far eastern end of Riverside County, and thus it has jurisdiction over the Project area. The MDAQMD has not established thresholds of significance for GHG emissions.

San Bernardino County GHG Emissions Reduction Plan

The County of San Bernardino has prepared a GHG Emissions Reduction Plan that aims to reduce current GHG emissions by at least 15 percent by 2020. The proposed Project is exempt from the County's zoning and development pursuant to Government Code section 53091. Therefore, the County GHG Plan is not applicable to the proposed Project but the measures are included to establish consistency between the Project and the proposed plan's emission reduction measures. The goals are consistent with AB 32 Scoping Plan and CARB's recommended greenhouse gas reduction goals for local governments by 2020. The plan aims to reduce emissions through improvements and modifications to internal and external County operations. External activities will be reduced by approximately 2,272,000 $MTCO_2e$ (compared to 2020 unmitigated levels) to a level of approximately 5,315,000 $MTCO_2e$, which constitutes a reduction of approximately 30 percent. External emissions include GHG emissions produced by private industry and development that is located within the area subject to the County's discretionary land use authority and its ministerial building permit authority (the "External Emissions Inventory"). Internal activities will be reduced by approximately 229,000 $MTCO_2e$ (compared to 2020 unmitigated levels) to a level of 289,000 $MTCO_2e$, which constitutes a total of approximately 42 percent. Internal emissions include GHG emissions associated with the County's services and internal operations (the "Internal Inventory"). Internal reductions include those from the following sectors: Stationary Sources (46 percent); Transportation and Land Use (23 percent); Building energy (22 percent); Solid Waste Landfills (9 percent); Water conservation (0.4 percent); and Agriculture and Resource Conservation (0.1 percent).

4.7.3 Impact and Mitigation Analysis

Significance Criteria

Based on the *CEQA Guidelines,* Appendix G, a project may be deemed to have a significant effect on the environment with respect to greenhouse gas emissions if it would:

- Generate GHG 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 GHG (including AB 32, the California Global Warming Solutions Act of 2006, and the AB 32 Scoping Plan).

Methodology

At this time, there is no agreed consensus in the State of California among CEQA lead agencies regarding the analysis of global climate change and the selection of significance criteria. In fact, numerous organizations, both public and private, have released advisories and guidance with recommendations designed to assist decision-makers in the evaluation of GHG emissions given the current uncertainty regarding when emissions reach the point of significance. Several options are available to lead agencies.

First, lead agencies may elect to rely on thresholds of significance recommended or adopted by State or regional agencies with expertise in the field of global climate change (see *CEQA Guidelines* §15064.7(c)). To date, neither CARB nor MDAQMD have adopted significance thresholds for GHG emissions for residential or commercial development under CEQA. Other agencies have adopted thresholds as guidance including the San Joaquin Air Pollution Control District and the Bay Area Air Quality Management District. However, at this time there is no industry standard that has received wide application or general acceptance. Therefore, as the lead agency for the Proposed Project, SMWD has elected to determine as a benchmark for this Project only the significance of GHG emissions utilizing the GHG significance threshold adopted by the South Coast Air Quality Management District (SCAQMD) for certain industrial uses. The SCAQMD has adopted an interim operational significance threshold of 10,000 $MTCO_2e$ per year for stationary sources where SCAQMD is the lead agency.[24] Given the proposed Project's proximity to the SCAQMD, SMWD believes that the SCAQMD's significance threshold is the most relevant air district-adopted GHG significance threshold to use as a benchmark for the Project.

As noted above, the SCAQMD's adopted GHG significance threshold is intended for long-term operational GHG emissions. However, the SCAQMD has developed guidance for the determination of the significance of GHG construction emissions that recommends that total emissions from construction be amortized over 30 years and added to operational emissions and then compared to the threshold.[25] This analysis of the proposed Project applies SCAQMD's guidance with regard to the assessment of construction-related GHG emissions.

OPR recommends the following approach for analyzing GHG emissions:

1. Identify and quantify the project's GHG emissions;
2. Assess the significance of the impact on climate change; and
3. If the impact is found to be significant, identify alternatives and/or mitigation measures that would reduce the impact to less-than-significant levels.

This analysis incorporates an approach that is a combination of qualitative and quantitative considerations. The considerations are as follows:

A. Analyze potential conflicts with the CARB's 39 recommended actions in California's AB 32 Climate Change Scoping Plan.

B. Analyze the relative size of a project. The project's GHG emissions will be compared to SCAQMD's adopted threshold for industrial stationary sources of 10,000 $MTCO_2e$/year for which it is the lead agency. As discussed above, MDAQMD currently does not have adopted GHG thresholds of significance for CEQA review projects. SMWD's purpose in utilizing this threshold as a benchmark is to provide a context for the Project's GHG emissions.

[24] South Coast Air Quality Management District, Board Meeting, Agenda No. 31 – *Interim CEQA GHG Significance Threshold for Stationary Sources, Rules and Plans,* December 2008.
[25] South Coast Air Quality Management District, Board Meeting, Agenda No. 31 – *Interim CEQA GHG Significance Threshold for Stationary Sources, Rules and Plans,* December 2008.

C. Analyze the basic energy efficiency parameters of a project to determine whether its design is inherently energy efficient.

D. Analyze potential conflicts with any applicable plan, policy, or regulation of an agency adopted for the purpose of reducing the emissions of GHGs.

The CARB-approved URBEMIS 2007 emissions model was utilized to determine emissions from construction equipment and haul trucks. EMFAC 2007 was utilized to determine emissions associated with worker and employee trips during construction and operations. In addition, GHG emissions from operations were obtained by calculating emissions from the provided amount of kilowatt-hour (kWh) needed for project operations. Output sheets are provided in Appendix E1.

Groundwater Conservation and Recovery Component

Greenhouse Gas Emissions

Significance Threshold

Would the proposed Project generate GHG emissions, either directly or indirectly, that may have a significant impact on the environment?

Would the proposed Project conflict with any applicable plan, policy, or regulation of an agency adopted for the purpose of reducing the emissions of GHG (including AB 32, the California Global Warming Solutions Act of 2006, and the AB 32 Scoping Plan)?

Impact Analysis

GHG emissions are considered to be exclusively cumulative impacts; there are no non-cumulative GHG emission impacts from a climate change perspective.[26] Direct (i.e., on-road vehicles, off-road equipment, and Project turbine natural gas combustion) and indirect (i.e., usage of electricity that is generated in other regions) GHG emissions of the Project and whether these emissions conflict with plans or policies are assessed below, per the analysis criteria described in this section. The final determination regarding impact significance is based on the overall consideration of all these analysis criteria factors.

Criterion A Analysis: Conflict with CARB's Recommendations. With regard to Item A, the Project does not pose any apparent conflict with the CARB recommended actions listed in Table 4.7-2, in particular, water associated measures W-1 through W-5.

W-1: Water Use Efficiency

The proposed Project would utilize a minimal amount of water during construction for dust suppression during construction. The Water Providers' Urban Water Management Plans provide for conservation measures to reduce water demand and to more efficiently utilize water. Programs include increased use of recycled water (See Chapter 7 Alternatives for more information on Water Provider conservation efforts). In addition, the California Green Building Code includes

[26] California Air Pollution Control Officers Association, *CEQA and Climate Change: Evaluating and Addressing Greenhouse Gas Emissions from Projects Subject to the California Environmental Quality Act*, January 2008, page 35.

building standards that require water efficient fixtures and/or a reduced number of fixtures for new development. The proposed Project would not conflict with this measure.

W-2: Water Recycling

The Project is sustainable as it would conserve groundwater that would otherwise be lost due to migration to a brine sink and evapotranspiration. The Project would not conflict with this measure. The Project would not impede implementation of recycled water projects currently planned or in operation within each of the Water Provider service areas.

W-3: Water System Energy Efficiency

The Project would require less energy per gallon delivered than would the SWP.[27] As a result, the Project provides a more energy efficient alternative to the SWP. Furthermore, the Project would utilize excess capacity in the CRA when available. The CRA pump stations currently operate with multiple single-speed pumps (each pump having a 220 cfs rating). The water pumped into the CRA by the Project would be accommodated with the existing pump capacity, without increasing energy requirements at the lift stations. The proposed Project would be consistent with this measure.

W-4: Reuse Urban Runoff

There would be no urban runoff from the proposed Project. However, the Project does utilize recharge water from precipitation within the Watershed. The proposed Project would be consistent with this measure.

W-5: Increase Renewable Energy Production

The proposed Project as designed would not produce energy. However, in the future, the conveyance pipelines could be utilized to generate hydroelectric energy to help offset the energy needed to run the water pumps. The proposed Project would not be inconsistent with this measure.

Criterion B Analysis: Relative Size of the Project. With regard to Criterion B, direct GHG emissions associated with off-road equipment and on-road vehicles for construction of the Groundwater Conservation and Recovery Component were estimated to be approximately 106,470 lbs/day (409 $MTCO_2e$ /year). Total construction emissions would be 12,280 $MTCO_2e$/yr amortized over 30 years. This includes construction of the wellfield, pipeline, and intermediate pump station. **Table 4.7-3** summarizes construction related GHG emissions.

[27] California Energy Commission, *California's Water – Energy Relationship*, November 2005, Figure 2-2 and page 23.

TABLE 4.7-3
CONSTRUCTION EMISSIONS FROM GROUNDWATER CONSERVATION AND RECOVERY COMPONENT (lbs per day)[a]

Project Component	CO_2
Wellfield Construction (including mobilization, site clearing and grading, drilling, site access, and demobilization)	31,108
Conveyance Pipeline / CRA Tie-in (including mobilization, site clearing and grading, excavation, backfilling, site access, and demobilization)	50,265
Storage Reservoir/ Pump Station (including mobilization, site clearing and grading, excavation, backfilling, site access, and demobilization)	14,813
Construction Employee Trips	14,675
Unmitigated Total	110,861
Mitigated Total	106,470

a Project construction emissions estimates were made using URBEMIS2007, version 9.2. 4. See Appendix E1 for more information.

SOURCE: ESA, 2011.

In regards to operations, there are two options for supplying power to the wellfield pumps – either by natural gas or electrical power. First, if the wellfield and intermediate pump station are powered with natural gas, direct operational GHG emissions would be approximately 27,731 $MTCO_2e$/year from natural gas combustion. The wellfield may be equipped with solar bolt-ons to reduce natural gas consumption. Additionally, emissions from employee on-road vehicle trips would be 13 $MTCO_2e$/year. Therefore, total annual GHG emissions would be 28,153 $MTCO_2e$/year for the Project,[28] including amortized construction emissions and operational mobile source emissions. Direct emissions from the Project would exceed the 10,000 $MTCO_2e$/year benchmark. **Table 4.7-4** summarizes estimated operational GHG emissions.

Alternatively, if electricity from the grid is used to power the Project, indirect off-site emissions from power plants would be approximately 15,388 $MTCO_2e$/year, totaling 15,810 $MTCO_2e$/year when summed with on-road emissions and amortized construction emissions. These operational emissions would exceed the 10,000 $MTCO_2e$/year benchmark. Since the Project exceeds the benchmark, the Project's impact would be potentially significant. However, SMWD does not intend to adopt this as a threshold of significance. It is used as a benchmark to provide context for the Project's emissions.

It should be noted that SB 1078 requires retail sellers of electricity to provide at least 20 percent of their supply from renewable sources by 2017. This legislation also requires that each retail seller increase its total procurement of eligible renewable energy resources by at least an additional 1 percent of retail sales per year so that 20 percent of its retail sales are procured from eligible renewable energy resources. CARB also adopted the "Renewable Electricity Standard" on September 23, 2010, which requires 33 percent renewable energy by 2020 for most publicly owned electricity retailers. As a result, emissions from electricity consumption in the County would decrease, and at the time of the Project buildout, emissions would likely be less than current projections.

28 URBEMIS 2007 Version 9.2.4, February 2008; Appendix E1.

TABLE 4.7-4
ANNUAL GHG EMISSIONS

Activity	GHG Emissions (Metric tons CO_2e/year)
Construction	12,280
Amortized over 30 years	409
Operations	
Vehicle Trips	13
Natural Gas	27,731[a]
Electricity	15,388[a]
Total (with natural gas)	**28,153**
Total (with electricity)	**15,810**

[a] Electricity and natural gas emissions are based on the extraction value of 50,000 AFY. Natural gas consumption rates were obtained by using a 40% conversion efficiency for natural gas generators (thermal energy to electrical energy) and a 30% conversion efficiency for natural gas engines (thermal energy to mechanical energy). The natural gas engines that are used for the Project would be reciprocating (or internal combustion) natural gas engines, which typically offers energy efficiencies ranging from 25 to 45 percent (California Energy Commission, *California Distributed Energy Resource Guide,* http://www.energy.ca.gov/distgen/equipment/reciprocating_engines/-reciprocating_engines.html, accessed November 2011). Data shown are for 50,000 AFY. Emissions for the 75,000 AFY extraction value would be 37,330 MT/year and 21,610 MT/year for natural gas and electricity use, respectively.

NOTE: See Appendix E for detailed calculations

SOURCE: ESA, 2011.

Criterion C Analysis: Energy Efficiency. With regard to Item C, the Project would provide the ability to increase water supplies to urban uses in Southern California. As discussed in Section 4.13, the Project would require less energy per gallon delivered than used by the SWP. The CEC estimates that delivery of water via the SWP West Branch to northern Los Angeles County requires approximately 7,672 kWh/MG. The proposed Project would require the consumption of approximately 3,112 kWh/MG, which is less than half the energy required to convey the same amount of water through the SWP.[29] As a result, the Project provides a more energy efficient alternative to the SWP. Furthermore, the Project would utilize excess capacity in the CRA when available. The CRA pump stations currently operate with multiple single-speed pumps (each pump having a 220 cfs rating). The water pumped into the CRA by the Project would be accommodated with the existing pump capacity, without increasing energy requirements at the lift stations. As such, the proposed Project provides an efficient alternative to other imported water sources and would emit fewer GHG emissions.

Criterion D Analysis: Consistency with Applicable GHG Reduction Plan, Policy, or Regulation. With regard to Item D, MDAQMD currently does not have any GHG plan, policy or regulation and therefore, the proposed Project would not result in a conflict. Despite this, it would be consistent with DWP recommendations to fully develop the potential for integrated regional

[29] California Energy Commission, *California's Water – Energy Relationship*, November 2005, Figure 2-2 and page 23.

water management. However, the County of San Bernardino recently prepared a draft GHG Emissions Reduction Plan which identifies three external GHG emission water supply reduction measures. The three external GHG emission reductions are as follows:

R1. Existing and proposed State and regional water supply measures that do not require County action (Renewable Portfolio Standard (33 percent by 2020);

R2. Existing and new water supply measures that require County action. Reductions assume measure will affect water importation from the SWP only. The County's mandatory influence is for new development; impact on existing development must come through voluntary measures in cooperation with water providers; and

R3. Existing and new water supply measures—reductions not quantified or relied upon to achieve reduction goal (storm water runoff, conservations areas, financing mechanism, and opportunities.)

Goal R1 applies to GHG reduction goals identified by State and regional water supply entities. As discussed above, the Project would be consistent with AB32 goals. The proposed Project is consistent with the goals of R2, in that it is reducing reliance on SWP supplies. The Project is also consistent with R3 since it would reduce reliance on imported water from the SWP with a less energy intensive alternative. Therefore the proposed Project is consistent with the County's draft GHG reduction plan and policies.

In summary, based upon the analysis of Criteria A, B, C, and D presented above, the Project could result in a cumulatively considerable increase in GHG emissions such that the Project could indirectly and remotely impair the State's ability to implement AB 32. The impact would be potentially significant for both scenarios, regardless of whether the wellfield and intermediate pump station are powered with natural gas or electricity. The impact would be reduced to less than significant with mitigation through the purchase of carbon offset credits consistent with the policies and guidelines of AB 32.

Mitigation Measures

GHG-1: Within 90 days of completion of construction of the Groundwater Conservation and Recovery Component of the Project, carbon offset credits shall be purchased from the Climate Registry, or other source that is approved by CARB as being consistent with the policies and guidelines of the California Global Warming Solution Act of 2006 (AB 32), or that is approved by a local or regional agency with jurisdiction over or within San Bernardino County as local emissions credits under a GHG reduction plan or similar program, in sufficient quantity to reduce the Project's first year total (direct plus indirect) GHG emissions below 10,000 $MTCO_2e$ per year. The first year offsets identified in the binding agreement shall be purchased and retired no later than 12 calendar months from completion of the first full year of operation. The estimated amount of offsets required is 18,153 $MTCO_2e$ per year (i.e., 28,153 – 10,000 $MTCO_2e$ per year) if the wellfield and intermediate pump station are powered by natural gas. This volume may be reduced if less power is needed, solar power is provided, or diesel powered wells are retired at the Cadiz Ranch that would count as an offset.

If electricity from the grid is used, the required offsets are estimated to be 5,810 $MTCO_2e$ per year (i.e., 15,810 – 10,000 $MTCO_2e$ per year). Since offsets for off-site electricity generation is the responsibility of the energy generators, the Project may obtain verification of these offsets or purchase additional offsets as needed.

A GHG inventory shall be completed which will be verified by an accredited third-party verification body and reported to the Climate Registry. The Applicant shall purchase and retire such additional carbon offset credits (due to a net increase in emissions from the first full year of operations) as may be needed each year to ensure that the Project's total (direct plus indirect) GHG emissions are offset below the benchmark of 10,000 $MTCO_2e$ above existing 2011 conditions.

Significance Conclusion

Less than Significant with Mitigation.

Imported Water Storage Component

This component is analyzed on a programmatic basis.

Greenhouse Gas Emissions

Significance Threshold

Would the proposed Project generate GHG emissions, either directly or indirectly, that may have a significant impact on the environment?

Would the proposed Project conflict with any applicable plan, policy or regulation of an agency adopted for the purpose of reducing the emissions of GHG (including AB 32, the California Global Warming Solutions Act of 2006, and the AB 32 Scoping Plan)?

Impact Analysis

See Impact Analysis for the Groundwater Conservation and Recovery Component. The Imported Water Storage Component would increase energy usage and GHG emissions due to the conveyance of water from the CRA to the Fenner Valley and back to the CRA. The Imported Water Storage Component could require twice the power requirements of Phase I in a given year. However, in actuality based on water availability and in lieu storage opportunities, the energy use would not likely reach this amount. However, total new emissions associated with this operation may be greater than the 10,000 $MTCO_2e$ /year benchmark. Although these Project emissions may exceed this limit, the Project would not conflict with the AB 32 recommended actions listed in Table 4.7-2.

The additional storage provided by the Project would make up for the lack of water supplies during drought periods when other water supplies are unavailable. Therefore, it is consistent with DWR recommendations. The energy used to convey water in these years would be in place of SWP energy use since SWP deliveries would be reduced in these drought years. The Project would also provide underground storage that would reduce demands for additional above ground dry-year storage in Southern California, which would avoid the emissions required to construct this above ground storage. With mitigation measure GHG-2, impacts to Climate Change would be reduced to a less than significant level.

Mitigation Measures

GHG-2: Imported Water Storage Component. Within 90 days of completion of Project construction, carbon offset credits shall be purchased from The Climate Registry, or other source that is approved by CARB as being consistent with the policies and guidelines of the California Global Warming Solution Act of 2006 (AB 32), or that is approved by a local or regional agency with jurisdiction over or within San Bernardino County as local emission credits under a GHG Reduction Plan or similar program, in sufficient quantity to reduce the Project's total (direct plus indirect) GHG emissions below 10,000 $MTCO_2e$ per year, and each year purchase additional carbon offset credits (due to a net increase in emissions from first year operations) as may be needed to reduce emissions below 10,000 $MTCO_2e$.

Significance Conclusion

Less than significant with mitigation.

Mitigation Measure Summary Table

Table 4.7-5 presents the impacts and mitigation summary for Greenhouse Gas Emissions.

TABLE 4.7-5
IMPACTS AND MITIGATION SUMMARY

Proposed Project Impact	Mitigation Measure	Significance Conclusion
Groundwater Conservation and Recovery Component		
Greenhouse Gas Emissions	**GHG-1**	Less than significant with mitigation
Imported Water Storage Component		
Greenhouse Gas Emissions	**GHG-2**	Less than significant with mitigation