3.5 Climate Change and Greenhouse Gases

This section of the Draft EIR (DEIR) provides a discussion of the proposed project's effect on greenhouse gas emissions and the associated effects of climate change. The California Environmental Quality Act (CEQA) requires that lead agencies consider the reasonably foreseeable adverse environmental effects of projects they are considering for approval. The reader is referred to Section 3.3, Air Quality, for a discussion of project impacts associated with air quality.

3.5.1 SETTING

EXISTING CLIMATE SETTING

Since the early 1990s, scientific consensus holds that the world's population is releasing greenhouse gases faster than the earth's natural systems can absorb them. These gases are released as byproducts of fossil fuel combustion, waste disposal, energy use, land-use changes, and other human activities. This release of gases, such as carbon dioxide (CO_2), methane (CH_4), and nitrous oxide (N_2O), creates a blanket around the earth that allows light to pass through but traps heat at the surface preventing its escape into space. While this is a naturally occurring process known as the greenhouse effect, human activities have accelerated the generation of greenhouse gases beyond natural levels. The overabundance of greenhouse gases in the atmosphere has led to an unexpected warming of the earth and has the potential to severely impact the earth's climate system.

While often used interchangeably, there is a difference between the terms "climate change" and "global warming." According to the National Academy of Sciences, climate change refers to any significant, measurable change of climate lasting for an extended period of time that can be caused by both natural factors and human activities. Global warming, on the other hand, is an average increase in the temperature of the atmosphere caused by increased greenhouse gas emissions. The use of the term climate change is becoming more prevalent because it encompasses all changes to the climate, not just temperature.

To fully understand global climate change, it is important to recognize the naturally occurring greenhouse effect and to define the greenhouse gases that contribute to this phenomenon. Various gases in the earth's atmosphere, classified as atmospheric greenhouse gases (GHGs), play a critical role in determining the earth's surface temperature. Solar radiation enters the earth's atmosphere from space and a portion of the radiation is absorbed by the earth's surface. The earth emits this radiation back toward space, but the properties of the radiation change from high-frequency solar radiation to lower-frequency infrared radiation. Greenhouse gases, which are transparent to solar radiation, are effective in absorbing infrared radiation. As a result, this radiation that otherwise would have escaped back into space is now retained, resulting in a warming of the atmosphere. This phenomenon is known as the greenhouse effect. Among the prominent GHGs contributing to the greenhouse effect are CO_2, CH_4, N_2O, hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfur hexafluoride (SF_6).

For most nonindustrial development projects, motor vehicles make up the bulk of GHG emissions. The primary greenhouse gases emitted by motor vehicles include carbon dioxide, methane, nitrous oxide, and hydrofluorocarbons (CARB 2004). Following are descriptions of the primary greenhouse gases attributed to global climate change, including a description of their physical properties, primary sources, and contribution to the greenhouse effect.

Carbon Dioxide

Carbon dioxide (CO_2) is a colorless, odorless gas. CO_2 is emitted in a number of ways, both naturally and through human activities. The largest source of CO_2 emissions globally is the combustion of fossil fuels such as coal, oil, and gas in power plants, automobiles, industrial facilities, and other sources. A number of specialized industrial production processes and product uses such as mineral production, metal production, and the use of petroleum-based products can also lead to CO_2 emissions. The atmospheric lifetime of CO_2 is variable because it is so readily exchanged in the atmosphere (USEPA 2011a).

Methane

Methane (CH_4) is a colorless, odorless gas that is not flammable under most circumstances. CH_4 is the major component of natural gas, about 87 percent by volume. It is also formed and released to the atmosphere by biological processes occurring in anaerobic environments. Methane is emitted from a variety of both human-related and natural sources. Human-related sources include fossil fuel production, animal husbandry (intestinal fermentation in livestock and manure management), rice cultivation, biomass burning, and waste management. These activities release significant quantities of methane to the atmosphere. Natural sources of methane include wetlands, gas hydrates, permafrost, termites, oceans, freshwater bodies, non-wetland soils, and other sources such as wildfires. Methane's atmospheric lifetime is about 12 years (USEPA 2011b).

Nitrous Oxide

Nitrous oxide (N_2O) is a clear, colorless gas with a slightly sweet odor. N_2O is produced by both natural and human-related sources. Primary human-related sources of N_2O are agricultural soil management, animal manure management, sewage treatment, mobile and stationary combustion of fossil fuels, adipic acid production, and nitric acid production. N_2O is also produced naturally from a wide variety of biological sources in soil and water, particularly microbial action in wet tropical forests. The atmospheric lifetime of N_2O is approximately 120 years (USEPA 2010a).

Hydrofluorocarbons

Hydrofluorocarbons (HFCs) are man-made chemicals, many of which have been developed as alternatives to ozone-depleting substances for industrial, commercial, and consumer products. The only significant emissions of HFCs before 1990 were of the chemical HFC-23, which is generated as a byproduct of the production of HCFC-22 (or Freon 22, used in air conditioning applications). The atmospheric lifetime for HFCs varies from just over a year for HFC-152a to 260 years for HFC-23. Most of the commercially used HFCs have atmospheric lifetimes less than 15 years (e.g., HFC-134a, which is used in automobile air conditioning and refrigeration, has an atmospheric life of 14 years) (USEPA 2010b).

Perfluorocarbons

Perfluorocarbons (PFCs) are colorless, highly dense, chemically inert, and nontoxic. There are seven PFC gases: perfluoromethane (CF_4), perfluoroethane (C_2F_6), perfluoropropane (C_3F_8), perfluorobutane (C_4F_{10}), perfluorocyclobutane (C_4F_8), perfluoropentane (C_5F_{12}), and perfluorohexane (C_6F1_4). Natural geological emissions have been responsible for the PFCs that have accumulated in the atmosphere in the past; however, the largest current source is

aluminum production, which releases CF_4 and C_2F_6 as byproducts. The estimated atmospheric lifetimes for CF_4 and C_2F_6 are 50,000 and 10,000 years, respectively (EFCTC 2003; USEPA 2010b).

Sulfur Hexafluoride

Sulfur hexafluoride (SF_6) is an inorganic compound that is colorless, odorless, nontoxic, and generally nonflammable. SF_6 is primarily used as an electrical insulator in high voltage equipment. The electric power industry uses roughly 80 percent of all SF_6 produced worldwide. Significant leaks occur from aging equipment and during equipment maintenance and servicing. SF_6 has an atmospheric life of 3,200 years (USEPA 2010b).

Each GHG differs in its ability to absorb heat in the atmosphere based on the lifetime, or persistence, of the gas molecule in the atmosphere. Gases with high global warming potential, such as HFCs, PFCs, and SF_6, are the most heat-absorbent. Methane traps over 21 times more heat per molecule than CO_2, and N_2O absorbs 310 times more heat per molecule than CO_2. Often, estimates of GHG emissions are presented in carbon dioxide equivalents (CO_2e), which weight each gas by its global warming potential. Expressing GHG emissions in carbon dioxide equivalents takes the contribution of all GHG emissions to the greenhouse effect and converts them to a single unit equivalent to the effect that would occur if only CO_2 were being emitted. **Table 3.5-1** shows the global warming potential for different greenhouse gases for a 100-year time horizon.

TABLE 3.5-1
GLOBAL WARMING POTENTIAL FOR GREENHOUSE GASES

Greenhouse Gas	Global Warming Potential
Carbon Dioxide (CO_2)	1
Methane (CH_4)	21
Nitrous Oxide (N_2O)	310
Hydrofluorocarbons (HFCs), Perfluorocarbons (PFCs)	6,500
Sulfur Hexafluoride (SF_6)	23,900

Source: California Climate Action Registry 2009

As the name implies, global 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, respectively. California is significant emitter of CO_2 in the world and produced 477 million gross metric tons of carbon dioxide equivalents in 2008 (CARB 2010). Consumption of fossil fuels in the transportation sector was the single largest source of California's GHG emissions in 2008, accounting for 36.4 percent of total GHG emissions in the state (CARB 2010). This category was followed by the electric power sector (including both in-state and out-of-state sources) (24.3 percent) and the industrial sector (19.3 percent) (CARB 2010).

EFFECTS OF GLOBAL CLIMATE CHANGE

With more than a decade of research, scientists have established that the early signs of climate change are already evident in the state — as shown, for example, in increased average temperatures, changes in temperature extremes, reduced snowpack in the Sierra Nevada, sea level rise, and ecological shifts.

Many of these changes are accelerating — locally, across the country, and around the globe. As a result of emissions already released into the atmosphere, California will face intensifying climate changes in coming decades (CNRA 2009). Generally, research indicates that California should expect overall hotter and drier conditions with a continued reduction in winter snow (with concurrent increases in winter rains), as well as increased average temperatures, and accelerating sea-level rise. In addition to changes in average temperatures, sea level, and precipitation patterns, the intensity of extreme weather events is also changing (CNRA 2009).

Climate change temperature projections identified in the 2009 California Climate Adaptation Strategy suggest the following (CNRA 2009):

- 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 and 9°F.

Precipitation levels are expected to change over the 21st century, though models differ in determining where and how much rain and snowfall patterns will change (CNRA 2009). Eleven out of 12 precipitation models run by the Scripps Institution of Oceanography suggest a small to significant (12–35 percent) overall decrease in precipitation levels by mid-century (CNRA 2009). In addition, higher temperatures increase evaporation and make for a generally drier climate, as higher temperatures hasten snowmelt. Moreover, the 2009 California Climate Adaptation Strategy concludes that more precipitation will fall as rain rather than as snow, with important implications for water management in the state. California communities have largely depended on runoff from yearly established snowpack to provide the water supplies during the warmer, drier months of late spring, summer, and early autumn. With rainfall and meltwater running off earlier in the year, the state will face increasing challenges of storing the water for the dry season while protecting Californians downstream from floodwaters during the wet season.

Changes in average temperature and precipitation are significant. Yet gradual changes in average conditions are not all for which California must prepare. In the next few decades, it is likely that the state will face a growing number of climate change-related extreme events such as heat waves, wildfires, droughts, and floods. Because communities, infrastructure, and other assets are at risk, such events can cause significant damages and are already responsible for a large fraction of near-term climate-related impacts every year (CNRA 2009).

Most climate projections developed to date, including those used in this section of the DEIR, produce gradual if sometimes substantial changes for a given climate variable. In the past, rapid climate changes have been observed, and scientists are increasingly concerned about additional abrupt changes that could push natural systems past thresholds beyond which they could not recover. Such events have been recorded in paleoclimatological records, but current

global climate models cannot predict when they may occur again (CNRA 2009). Such abrupt changes have been shown to occur over very short periods of time (a few years to decades) and thus represent the most challenging situations to which society and ecosystems would need to adapt (CNRA 2009). Short of being able to predict such abrupt changes, scientists are focusing their attention on aspects of the climate and earth system called "tipping elements" that can rapidly bring about abrupt changes. Tipping elements refer to thresholds where increases in temperature cause a chain reaction of mutually reinforcing physical processes in the earth's dynamic cycles. The most dangerous of these include the following (CNRA 2009):

- A reduction in Arctic sea ice, which allows the (darker) polar oceans to absorb more sunlight, thereby increasing regional warming, accelerating sea ice melting even further, and enhancing Arctic warming over neighboring (currently frozen) land areas.

- The release of methane (a potent GHG), which is currently trapped in frozen ground (permafrost) in the Arctic tundra, will increase with regional warming and melting of the ground, leading to further and more rapid warming and resulting in increased permafrost melting.

- Continued warming in the Amazon could cause significant rainfall loss and large scale dying of forest vegetation, which will further release CO_2.

- The accelerated melting of Greenland and West Antarctic Ice Sheets observed in recent times, together with regional warming over land and in the oceans, involves mechanisms that can reinforce the loss of ice and increase the rate of global sea-level rise.

According to the 2009 California Climate Adaptation Strategy, the impacts of global warming in California have the potential to include, but are not limited to, the areas discussed below.

Public Health

Climate change is expected to lead to an increase in ambient (i.e., outdoor) average air temperature, with greater increases expected in summer than in winter months. Larger temperature increases are anticipated in inland communities as compared to the California coast. The potential health impacts from sustained and significantly higher than average temperatures include heat stroke, heat exhaustion, and the exacerbation of existing medical conditions such as cardiovascular and respiratory diseases, diabetes, nervous system disorders, emphysema, and epilepsy. Numerous studies have indicated that there are generally more deaths during periods of sustained higher temperatures, and these are due to cardiovascular causes and other chronic diseases. The elderly, infants, and socially isolated people with pre-existing illnesses who lack access to air conditioning or cooling spaces are among the most at risk during heat waves (CNRA 2009).

Floods and Droughts

The impacts of flooding can be significant. Results may include population displacement, severe psychosocial stress with resulting mental health impacts, exacerbation of pre-existing chronic conditions, and infectious disease (CNRA 2009). Additionally, impacts can range from a loss of personal belongings, and the emotional ramifications from such loss, to direct injury and/or mortality.

Drinking water contamination outbreaks in the U.S. are associated with extreme precipitation events (CNRA 2009). Runoff from rainfall is also associated with coastal contamination that can

lead to contamination of shellfish and contribute to food-borne illness. Floodwaters may contain household, industrial, and agricultural chemicals as well as sewage and animal waste. Flooding and heavy rainfall events can wash pathogens and chemicals from contaminated soils, farms, and streets into drinking water supplies (CNRA 2009). Flooding may also overload storm and wastewater systems, or flood septic systems, also leading to possible contamination of drinking water systems (CNRA 2009).

Drought impacts develop more slowly over time. Risks to public health that Californians may face from drought include impacts on water supply and quality, food production (both agricultural and commercial fisheries), and risks of waterborne illness. As surface water supplies are reduced as a result of drought conditions, the amount of groundwater pumping is expected to increase to make up for the water shortfall. The increase in groundwater pumping has the potential to lower the water tables and cause land subsidence (CNRA 2009). Communities that utilize well water will be adversely affected by drops in water tables or through changes in water quality. Groundwater supplies have higher levels of total dissolved solids compared to surface waters. This introduces a set of effects for consumers, such as repair and maintenance costs associated with mineral deposits in water heaters and other plumbing fixtures, and on public water system infrastructure designed for lower salinity surface water supplies. Drought may also lead to increased concentration of contaminants in drinking water supplies (CNRA 2009).

Water Resources

The state's water supply system already faces challenges in providing sufficient water for California's growing population. Climate change is expected to exacerbate these challenges through increased temperatures and possible changes in precipitation patterns. The trends of the last century — especially increases in hydrologic variability — will likely intensify in this century. We can expect to experience more frequent and larger floods and deeper droughts (CNRA 2009). Rising sea level will threaten the Delta water conveyance system and increase salinity in near-coastal groundwater supplies (CNRA 2009). Planning for and adapting to these simultaneous changes, particularly their impacts on public safety and long-term water supply reliability, will be among the most significant challenges facing water and flood managers this century.

Forests and Landscapes

Global climate change has the potential to intensify the current threat to forests and landscapes by increasing the risk of wildfire and altering the distribution and character of natural vegetation. If temperatures rise into the medium warming range, wildfire occurrence statewide could increase from 57 percent to 169 percent by 2085 (CNRA 2009). However, since wildfire risk is determined by a combination of factors, including precipitation, winds, temperature, and landscape and vegetation conditions, future risks will not be uniform throughout the state.

3.5.2 REGULATORY FRAMEWORK

FEDERAL

Federal Regulation and the Clean Air Act

In the past, the USEPA has not regulated GHGs under the Clean Air Act (CAA) because it asserted that the act did not authorize the USEPA 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 the USEPA 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 USEPA 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 that the USEPA did not have a valid rationale for not regulating GHGs. In response to this ruling, the USEPA has recently made an endangerment finding that greenhouse gases pose a threat to the public health and welfare. This is the first step necessary for the establishment of federal GHG regulations under the Clean Air Act.

In April 2010, the USEPA issued the final rule on new standards for GHG emissions and fuel economy for light-duty vehicles in model years 2017–2025. In November 2010, the USEPA 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 to address GHG emissions regulated under the Clean Air Act. In that document, the USEPA described the "Tailoring Rule" in the regulation of GHG emissions. With the Tailoring Rule, the USEPA 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. In step two, which began 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 the USEPA's commitment to future rulemaking that will describe subsequent steps of the Tailoring Rule for GHG permitting (USEPA 2010d).

Federal Heavy-Duty National Program

In August 2011, the USEPA and the Department of Transportation's National Highway Traffic Safety Administration (NHTSA) announced the first-ever program to reduce greenhouse gas (GHG) emissions and improve fuel efficiency of heavy-duty trucks and buses. The USEPA and the NHTSA have each adopted complementary standards under their respective authorities covering model years 2014–2018, which together form a comprehensive Heavy-Duty National Program. The goal of the joint rulemakings is to present coordinated federal standards that help manufacturers to build a single fleet of vehicles and engines that are able to comply with both. The USEPA and NHTSA have adopted standards for CO_2 emissions and fuel consumption, respectively, tailored to each of three main regulatory categories: (1) combination tractors; (2) heavy-duty pickup trucks and vans; and (3) vocational vehicles. The USEPA has additionally adopted standards to control HFC leakage from air conditioning systems in pickups and vans and combination tractors. Also exclusive to the USEPA program are the USEPA's N_2O and CH_4 standards that will apply to all heavy-duty engines, pickups, and vans. For purposes of this program, the heavy-duty fleet incorporates all on-road vehicles rated at a gross vehicle weight at or above 8,500 pounds, and the engines that power them, except those covered by the current GHG emissions and Corporate Average Fuel Economy standards for model year 2012–2016 passenger vehicles.

The Heavy-Duty National Program is projected to reduce fuel use and GHG emissions from medium- and heavy-duty vehicles, from semi trucks to the largest pickup trucks and vans, as well as all types and sizes of work trucks and buses in between. Vehicles covered by this program make up the transportation segment's second largest contributor to oil consumption and GHG emissions. This comprehensive program is designed to address the urgent and closely intertwined challenges of dependence on oil, energy security, and global climate change. The USEPA and the NHTSA estimate that the combined standards will reduce CO_2 emissions by about 270 million metric tons and save about 530 million barrels of oil over the life of vehicles built for the 2014 to

2018 model years, providing $49 billion in net program benefits. A second phase of regulations is planned for model years beyond 2018. The goals would include spurring innovation as well as updating the assessment of actual emissions and fuel use from this sector. Such future regulation would also be designed to align with similar programs developed outside the U.S.

STATE

Assembly Bill 1493

Assembly Bill (AB) 1493 (Pavley) of 2002 (Health and Safety Code Sections 42823 and 43018.5) requires the California Air Resources Board (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 declared 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, the USEPA denied California's waiver request and declined to promulgate adequate federal regulations limiting GHG emissions. In early 2008, the State brought suit against the USEPA related to this denial.

In January 2009, President Obama instructed the USEPA 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, the USEPA 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 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 from the 2020 model year vehicles.

Executive Order S-3-05

Executive Order S-3-05 (State of California) proclaims that California is vulnerable to the impacts of climate change. It declares that increased temperatures could reduce the Sierra's snowpack, further exacerbate California's air quality problems, and potentially cause a rise in sea levels. To combat 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 made up of members from various state agencies and commissions. The Climate Action Team released its first report in March 2006 and continues to release periodic reports on progress. The report proposed to achieve the targets by building on voluntary actions of California businesses, local government and community actions, as well as through state incentive and regulatory programs.

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

Assembly Bill 32 (Health and Safety Code Sections 38500, 38501, 28510, 38530, 38550, 38560, 38561–38565, 38570, 38571, 38574, 38580, 38590, 38592–38599) requires that statewide GHG emissions be reduced to 1990 levels by the year 2020. The gases that are regulated by AB 32 include carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), hydrofluorocarbons, perfluorocarbons, nitrogen trifluoride, and sulfur hexafluoride. The reduction to 1990 levels will be accomplished through an enforceable statewide cap on GHG emissions that will be phased in starting in 2012. To effectively implement the cap, AB 32 directs CARB to develop and implement regulations to reduce statewide GHG emissions from stationary sources. AB 32 specifies that regulations adopted in response to AB 1493 should be used to address GHG emissions from vehicles. However, AB 32 also includes language stating that if the AB 1493 regulations cannot be implemented, then CARB should develop new regulations to control vehicle GHG emissions under the authorization of AB 32.

AB 32 requires that CARB adopt a quantified cap on GHG emissions representing 1990 emissions levels and disclose how it arrives at the cap, institute a schedule to meet the emissions cap, and develop tracking, reporting, and enforcement mechanisms to ensure that the state achieves reductions in GHG emissions necessary to meet the cap. CARB is implementing this program. The CARB Board adopted a draft resolution for formal cap-and-trade rulemaking on December 16, 2010, and is developing offset protocols and compliance requirements. AB 32 also includes guidance to institute emissions reductions in an economically efficient manner and conditions to ensure that businesses and consumers are not unfairly affected by the reductions.

Climate Change Scoping Plan

In October of 2008, CARB published its Climate Change Proposed Scoping Plan, which is the State's plan to achieve GHG reductions in California required by AB 32. The scoping plan contains the main strategies California will implement to achieve reduction of 169 million metric tons (MMT) of CO_2e, or approximately 30 percent from the state's projected 2020 emission level of 596 MMT of CO_2e under a business-as-usual scenario (this is a reduction of 42 MMT CO_2e, or almost 10 percent, from 2002–2004 average emissions). The scoping plan also includes CARB-recommended GHG reductions for each emissions sector of the state's GHG inventory. The largest proposed GHG reduction recommendations are from improving emission standards for light-duty vehicles (estimated reductions of 31.7 MMT CO_2e), implementation of the Low-Carbon Fuel Standard (15.0 MMT CO_2e), energy efficiency measures in buildings and appliances and the widespread development of combined heat and power systems (26.3 MMT CO_2e), and a renewable portfolio standard for electricity production (21.3 MMT CO_2e). The scoping plan identifies the local equivalent of AB 32 targets as a 15 percent reduction below baseline greenhouse gas emissions level, with baseline interpreted as greenhouse gas emissions levels between 2003 and 2008. The scoping plan states that land use planning and urban growth decisions will play an important role in the state's GHG reductions because local governments have primary authority to plan, zone, approve, and permit how land is developed to accommodate population growth and the changing needs of their jurisdictions. (Meanwhile,

CARB is also developing an additional protocol for community emissions.) CARB further acknowledges that decisions on how land is used will have large impacts on the GHG emissions that will result from the transportation, housing, industry, forestry, water, agriculture, electricity, and natural gas emission sectors. The proposed scoping plan states that the ultimate GHG reduction assignment to local government operations is to be determined. With regard to land use planning, the scoping plan expects approximately 5.0 MMT CO_2e will be achieved associated with implementation of Senate Bill 375, which is discussed further below. The Climate Change Proposed Scoping Plan was approved by CARB on December 11, 2008.

The status of the Climate Change Scoping Plan had been uncertain as a result of a court decision in the case of *Association of Irritated Residents v. California Air Resources Board* (San Francisco Superior Court Case No. CPF-09-509562). The court found that CARB, in its CEQA review, had not adequately explained why it selected a scoping plan that included a cap-and-trade program rather than an alternative plan. While CARB disagrees with the trial court finding and has appealed the decision, in order to remove any doubt about the matter and in keeping with CARB's interest in public participation and informed decision-making, CARB revisited the alternatives. The revised analysis includes the five alternatives included in the original environmental analysis: a "no project" alternative (that is, taking no action at all); a plan relying on a cap-and-trade program for the sectors included in a cap; a plan relying more on source-specific regulatory requirements with no cap-and-trade component; a plan relying on a carbon fee or tax; and, a plan relying on a variety of proposed strategies and measures. The revised analysis relies on emissions projections updated in light of current economic forecasts, accounting for the economic downturn since 2008 and reduction measures already approved and put in place. At the time of production of this environmental impact report, the 45-day public review and comment period of the CARB revised analysis of alternatives had just been completed. The public hearing to consider approval of the AB 32 Scoping Plan Functional Equivalent Document (including the Supplement) and the AB 32 Scoping Plan was held on August 24, 2011.

Senate Bill 1368

Senate Bill (SB) 1368 (codified at Public Utilities Code Chapter 3) is the companion bill of AB 32. SB 1368 required 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 required the California Energy Commission (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 1078, Governor's Order S-14-08, and Senate Bill 2X (California Renewables Portfolio Standards)

Senate Bill 1078 (Public Utilities Code Sections 387, 390.1, 399.25 and Article 16) addresses electricity supply and requires that retail sellers of electricity, including investor-owned utilities and community choice aggregators, provide a minimum 20 percent of their supply from renewable sources by 2017. The proposed project would receive energy service from the investor-owned Pacific Gas and Electric Company. This Senate Bill will affect statewide GHG emissions associated with electricity generation. In 2008, Governor Schwarzenegger signed Executive Order S-14-08, which set the Renewable Portfolio Standard target to 33 percent by 2020. It directed state government agencies and retail sellers of electricity to take all appropriate actions to implement this target.

Prior to the Executive Order the California Public Utilities Commission and the California Energy Commission were responsible for implementing and overseeing the Renewables Portfolio Standards. The Executive Order shifted that responsibility to the California Air Resources Board (CARB), requiring them to adopt regulations by July 31, 2010. CARB is required by current law, AB 32 of 2006, to regulate sources of greenhouse gases to meet a state goal of reducing greenhouse gas emissions to 1990 levels by 2020 and an 80 percent reduction of 1990 levels by 2050.

In March 2011, Senate Bill 2X established S-14-08 as law passed the state's legislature. While Senate Bill 2X contains the same targets as Governor's Order S-14-08 (33 percent of their supply from renewable sources by 2020), as an executive order it did not have the force of law (Governor's Order can be reversed by future governors).

Senate Bill 375

Senate Bill 375 (codified at Government Code and Public Resources Code[1]), signed in September 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, which 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. These reduction targets will be updated every eight years, but can be updated every four years if advancements in emissions technologies affect the reduction strategies to achieve the targets. CARB is also charged with reviewing each MPO's Sustainable Communities Strategy or Alternative Planning Strategy for consistency with its assigned targets. If MPOs do not meet the GHG reduction targets, transportation projects would not be eligible for funding programmed after January 1, 2012.

California Building Energy Efficiency Standards

Title 24, Part 6 of the California Code of Regulations, known as the Building Energy Efficiency Standards, was established in 1978 in response to a legislative mandate to reduce California's energy consumption. The standards are updated periodically to allow consideration and possible incorporation of new energy efficiency technologies and methods. On January 1, 2010, the California Building Standards Commission adopted CALGreen and became the first state in the United States to adopt a statewide green building standards code. CALGreen requires new buildings to reduce water consumption by 20 percent, divert 50 percent of construction waste from landfills, and install low pollutant-emitting materials.

LOCAL

Nevada County General Plan

The Nevada County General Plan serves as the overall guiding policy document for the unincorporated areas of Nevada County. A summary of the project's consistency with applicable General Plan greenhouse gas-related policies is contained in **Appendix 3.0-A**. While this Draft EIR analyzes the project's consistency with the General Plan pursuant to California Environmental Quality Act (CEQA) Section 15125(d), the Nevada County Board of Supervisors makes the ultimate determination of consistency with the General Plan.

[1] Senate Bill 375 is codified at Government Code Sections 65080, 65400, 65583, 65584.01, 65584.02, 65584.04, 65587, 65588, 14522.1, 14522.2, and 65080.01 as well as Public Resources Code Sections 21061.3, 21159.28, and Chapter 4.2.

Northern Sierra Air Quality Management District

The project is under jurisdiction of the Northern Sierra Air Quality Management District (NSAQMD), which regulates air quality according to the standards established in the Clean Air Acts and amendments to those acts. The NSAQMD comprises three contiguous, mountainous, rural counties in northeastern California (Nevada, Sierra, and Plumas counties) and regulates air quality through its permitting authority and through air quality related planning and review activities over most types of stationary emission sources.

The NSAQMD has not yet established significance thresholds for greenhouse gas emissions from project operations.

3.5.3 IMPACTS AND MITIGATION MEASURES

STANDARDS OF SIGNIFICANCE

Per Appendix G of the State CEQA Guidelines, the County considers impacts related to climate change significant if implementation of the proposed project would result in any of the following:

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

2) Conflict with any applicable plan, policy, or regulation of an agency adopted for the purpose of reducing the emissions of greenhouse gases.

To meet GHG emission targets of AB 32, California would need to generate less GHG emissions in the future than current levels. It is recognized, however, that for most projects there is no simple metric available to determine if a single project would substantially increase or decrease overall GHG emission levels or conflict with the goals of AB 32. Moreover, emitting CO_2 into the atmosphere is not itself an adverse environmental effect. It is the increased concentration of GHG emissions in the atmosphere resulting in global climate change and the associated consequences of climate change that results in adverse environmental effects (e.g., sea level rise, loss of snowpack, severe weather events). Although it is possible to generally estimate a project's incremental contribution of GHGs into the atmosphere, it is typically not possible to determine whether or how an individual project's relatively small incremental contribution might translate into physical effects on the environment. Given the complex interactions between various global and regional-scale physical, chemical, atmospheric, terrestrial, and aquatic systems that result in the physical expressions of global climate change, it is impossible to discern whether the presence or absence of GHGs emitted by the project would result in any altered conditions.

However, the State of California has established GHG reduction targets and has determined that GHG emissions as they relate to global climate change are a source of adverse environmental impacts in California that should be addressed under CEQA. Although AB 32 did not amend CEQA, it identifies the myriad environmental problems in California caused by global warming (Health and Safety Code, Section 38501[a]). In response to the relative lack of guidance on addressing GHGs and Climate Change, SB 97 was passed in order to amend CEQA by directing the Office of Planning and Research to prepare revisions to the State CEQA Guidelines addressing the mitigation of GHGs or their consequences. These revisions to the State CEQA Guidelines went into effect in January 2010.

Thresholds of significance illustrate the extent of an impact and are a basis from which to apply mitigation measures. Significance thresholds for greenhouse gas emissions resulting from land use development projects have not been established in Nevada County (as previously mentioned, the NSAQMD has not yet established significance thresholds for greenhouse gas emissions from project operations). In June 2010, the Bay Area Air Quality Management District (BAAQMD) published its greenhouse gas threshold. Utilization of BAAQMD's GHG threshold was considered reasonable and appropriate by NSAQMD staff (Longmire 2011). If the proposed project would generate GHG emissions above the threshold level, it would be considered to contribute substantially to a cumulative impact and the impact would be considered significant. If mitigation can be applied to lessen the emissions such that the project meets its share of emission reductions needed to address the cumulative impact, the project would be considered less than significant.

The BAAQMD does not have an adopted threshold of significance for construction-related GHG emissions. However, quantification and disclosure of construction-generated GHG emissions that would occur during construction is recommended.

The BAAQMD's emission threshold for operations is 4.6 metric tons of CO_2e per service population (residents plus employees) per year (BAAQMD 2011). The BAAQMD thresholds were chosen based on the substantial evidence that such thresholds represent quantitative and/or qualitative levels of GHG emissions, compliance with which means that the environmental impact of the GHG emissions will normally not be cumulatively considerable under CEQA (BAAQMD 2011). Compliance with such thresholds will be part of the solution to the cumulative GHG emissions problem, rather than hinder the State's ability to meet its goals of reduced statewide GHG emissions under AB 32.

METHODOLOGY

GHG emissions-related impacts were assessed in accordance with methodologies recommended by the BAAQMD and in comparison to the recommended BAAQMD significance thresholds.

GHG emissions associated with the proposed project were estimated for the GHGs that the California Air Resources Board finds are generated from indirect sources like the proposed project, including carbon dioxide (CO_2), nitrous oxide (N_2O), and methane (CH_4). Calculations of GHG emissions typically focus on CO_2 because it is the most commonly produced GHG in terms of number of sources and volume generated, and because it is among the easiest GHGs to measure. This analysis assesses N_2O and CH_4 emissions for other primary source categories of emissions (e.g., motor vehicles and energy use associated with long-term operation of the project). It is important to note that while other GHGs, such as hydrofluorocarbons (HFCs), have a higher global warming potential than CO_2, emissions from land use developments like the proposed project are negligible under typical operations.

URBEMIS 2007 was utilized to estimate the proposed project's CO_2 emissions from construction. URBEMIS is software that uses the URBEMIS land use emissions inventory model to estimate greenhouse gas and criteria pollutant emissions under particular scenarios involving construction, area, and other sources. It has been designed specifically for California, though a 49-state version is in development, and uses California-specific road and construction emissions factors. The URBEMIS 2007 model uses the California Air Resources Board's EMFAC2007 model for on-road vehicle emissions and the OFFROAD2007 model for off-road vehicle emissions. N_2O and CH_4 emissions resulting from project construction were analyzed using the California Climate Action Registry General Reporting Protocol Version 3.1 (January 2009). The General Reporting

Protocol, produced by the California Registry and developed with the recommendations and technical and policy guidance from the California Energy Commission, is a document designed to support the accurate reporting of GHG emissions in a quantifiable manner.

URBEMIS 2007 was used to estimate the proposed project's GHG emissions from area and mobile sources, as well as emissions resulting from the project's projected energy demand (electricity and natural gas) were analyzed using the Energy Information Administration's Residential Energy Consumption Survey (EIA 2005). GHG emissions generated from the conveyance of water and wastewater were projected with the use of ratios authored in the BAAQMD's Greenhouse Gas Model in conjunction with the California Energy Commission's Redefining Estimates for Water-Related Energy Use (CEC 2006). Finally, GHG emissions resulting from solid waste hauling and decomposition were projected with the use of ratios authored in the BAAQMD's Greenhouse Gas Model. For the purposes of this analysis, it was assumed that solid waste hauling trucks would travel 2,053 miles per year in service to the project. This number was determined by the distance between the project site and the McCourtney Road Transfer Station near Grass Valley, in addition to the distance between the McCourtney Road Transfer Station and the Ostrom Landfill in Wheatland, which would be the final destination for solid waste generated at the project site.

IMPACTS AND MITIGATION MEASURES

AB 32 Compliance and GHG Emissions (Standards of Significance 1 & 2)

Impact 3.5.1 Implementation of the proposed project would result in a net increase in greenhouse gas emissions that would conflict with the goals of AB 32 or result in a significant impact on the environment. This impact is **cumulatively considerable.**

Proposed CCRC Development

GHG emissions contribute, on a cumulative basis, to the significant adverse environmental impacts of global climate change. No single land use project could generate enough GHG emissions to noticeably change the global average temperature (BAAQMD 2010a, p. 2-1; SMAQMD 2011, p. 6-1). The combination of GHG emissions from past, present, and future projects contributes substantially to the phenomenon of global climate change and its associated environmental impacts and as such is addressed only as a cumulative impact.

Construction GHG Emissions

The proposed project would result in direct emissions of GHGs from construction. The approximate quantity of daily GHG emissions generated by construction equipment utilized to build each phase of the project is depicted in **Table 3.5-2**. The table indicates that CO_2 would be the primary GHG emitted. Methane (CH_4) and nitrous oxide (N_2O) would also be emitted, but these emissions would be substantially less in volume based on their emissions profile.

TABLE 3.5-2
CONSTRUCTION-RELATED GREENHOUSE EMISSIONS (POUNDS PER DAY)

Project Phase	Carbon Dioxide (CO_2)	Nitrous Oxide (N_2O)	Methane (CH_4)	Hydro-fluorocarbons (HFCs)	Perfluorocarbons (PFCs)	Sulfur Hexafluoride (SF_6)	CO_2e
Phases 1 and 2 (one year)	5,751	0.147	0.329	Negl.	Negl.	Negl.	5,804
Phase 3 (6 months)	2,349	0.06	0.134	Negl.	Negl.	Negl.	2,370
Phase 4 (6 months)	2,349	0.06	0.134	Negl.	Negl.	Negl.	2,370
Phase 5 (6 months)	2,349	0.06	0.134	Negl.	Negl.	Negl.	2,370
Phase 6 (6 months)	2,349	0.06	0.134	Negl.	Negl.	Negl.	2,370
Phase 7 (6 months)	2,349	0.06	0.134	Negl.	Negl.	Negl.	2,370
Phase 8 (6 months)	3,952	0.101	0.226	Negl.	Negl.	Negl.	3,988
Phase 9 (6 months)	2,349	0.06	0.134	Negl.	Negl.	Negl.	2,370
Phase 10 (6 months)	2,349	0.06	0.134	Negl.	Negl.	Negl.	2,370
Trail System Development Phase	6,428	0.165	0.367	Negl.	Negl.	Negl.	6,487

Note: Negl. = Emissions of this GHG would be negligible from this source category
Source: URBEMIS 2007v.9.2.4; California Climate Action Registry General Reporting Protocol Version 3.1 (2009)

Table 3.5-2 illustrates the construction-related GHG emissions that will result from each construction phase of the proposed project. **Table 3.5-3** depicts the annual GHG emission contribution of each of these construction phases in metric tons based upon the projected number of days estimated to construct each phase.

TABLE 3.5-3
CONSTRUCTION-RELATED GREENHOUSE GAS EMISSIONS
(METRIC TONS PER YEAR)

Project Phase	Carbon Dioxide Equivalent (CO_2e)
Phase 1 and Phase 2 (2012)	332
Phase 3 and Phase 4 (2013)	144
Phase 5 and Phase 6 (2014)	114
Phase 7 and Phase 8 (2015)	156
Phase 9 and Phase 10 (2016)	122
Trail System Development Phase (2017)	84

Source: URBEMIS 2007v.9.2.4; California Climate Action Registry General Reporting Protocol Version 3.1 (2009)

Tables 3.5-2 and **3.5-3** above illustrate the construction-related GHG emissions that would result from each construction phase of the proposed project.

While the BAAQMD does not have an adopted significance threshold for construction-related GHG emissions, estimated GHG emissions that would occur during construction are disclosed in order to assist in the determination of significance for GHG emission impacts in relation to meeting AB 32 GHG reduction goals. In addition, the BAAQMD recommends that all construction projects incorporate best management practices.

As stipulated by mitigation measure **MM 3.3.1a** in Section 3.3, Air Quality, of this DEIR, the project applicant will be required to submit an Off-Road Construction Equipment Emission Reduction Plan to the NSAQMD for approval prior to groundbreaking. The plan is required to include the horsepower rating, engine production year, and projected hours of use or fuel throughput for each piece of equipment and be updated and submitted monthly throughout the duration of the project. Mitigation measure **MM 3.3.1a** also mandates that the primary construction contractor shall be responsible to ensure that all construction equipment is properly tuned and maintained, that idling times shall be minimized either by shutting equipment off when not in use or reducing the maximum idling time to 5 minutes when not in use (as required by California airborne toxics control measure Title 13, Section 2485 of California Code of Regulations), and that all construction equipment shall be maintained and properly tuned in accordance with manufacturers' specifications. In addition, the primary construction contractor is required to ensure that all equipment be checked by a certified mechanic and determined to be running in proper condition prior to operation and that utilization of existing power sources (e.g., power poles) or clean fuel generators rather than temporary power generators are employed. It is anticipated that these best management practices (BMPs) will substantially reduce construction-based impacts associated with the generation of GHG emissions.

In addition, mitigation measure **MM 3.5.1a** shall be required.

Mitigation Measures

MM 3.5.1a The project applicant shall be required submit a Construction Recycling Plan (CRP) with the requirement of recycling at least 50 percent of construction waste or demolition materials. The CRP shall be prepared to the satisfaction of Nevada County and require the following of the project applicant:

1. Prepare a monthly summary of how many tons of material overall is being diverted through the CRP throughout construction. The applicant shall report to the County, in an approved format, on the amount of materials collected, disposed, and diverted, the facilities to which those materials were taken, and the types of materials which were recycled.

2. Reuse, recycle, or compost all construction debris to the maximum extent possible. To the fullest extent possible, all construction waste collected over the course of construction activities shall be processed to recover all reusable, recyclable, and compostable materials.

3. Set a requirement of achieving a 50 percent diversion for all construction waste resulting from project construction.

Timing/Implementation: During construction

Enforcement/Monitoring: Nevada County Community Development Agency

The BMPs stipulated under mitigation measure **MM 3.3.1a** in conjunction with mitigation measure **MM 3.5.1a** will reduce construction-based impacts to a **less than cumulatively considerable** impact.

Operational GHG Emissions

As shown in **Table 3.5-4**, below, the long-term operations of the proposed project would produce 4,694 metric tons of CO_2e annually, primarily from motor vehicles that travel to and from the site.

TABLE 3.5-4
ESTIMATED GREENHOUSE GAS EMISSIONS – PROJECT OPERATION (BUILDOUT) (METRIC TONS PER YEAR)

Emission Source		Carbon Dioxide (CO_2)	Methane (CH_4)	Nitrous Oxide (N_2O)	Hydro-fluorocarbons (HFCs)	Per-fluorocarbons (PFCs)	Sulfur Hexafluoride (SF_6)	CO_2e
Mobile Source[1,2] (vehicle)		1,658	N/A	N/A	N/A	N/A	N/A	1,658
Area Source (landscaping, hearth)[3]		1,526	Negl.	Negl.	Negl.	Negl.	Negl.	1,526
Stationary Source[4]	Electricity	705	Negl.	Negl.	Negl.	Negl.	Negl.	705
	Natural Gas	853	Negl.	Negl.	Negl.	Negl.	Negl.	853
Water and Wastewater Conveyance		69	Negl.	Negl.	Negl.	Negl.	Negl.	69
Solid Waste		492	Negl.	N/A	Negl.	Negl.	Negl.	492
Total CO_2e Emissions		**5,303 CO_2e Emissions**						

*Source: URBEMIS ver. 9.2.4; BAAQMD BGM Model; EIA 2005; CEC 2006 (see **Appendix 3.5-A**)*
Negl - Emissions of this GHG would be negligible from this source category.
N/A – Not available
[1] Emissions presented are not adjusted for future improved CAFÉ standards (Pavley I) and Low Carbon Fuel Standards.
[2] Source: Vehicle miles traveled from KD Anderson 2011.
[3] Area source emissions account for mitigation measure MM 3.3.3 in Section 3.3, Air Quality. Accounts for individual propane use.
[4] Stationary source emissions account for indirect emissions from energy generation facility.

Changes to regulations will take effect in the near future (year 2020 and beyond) that will substantially reduce GHG emissions. For instance, implementation of AB 1493 (Pavley), described in the Regulatory Framework subsection above, will significantly reduce the amount of GHGs emitted from passenger vehicles. According to the URBEMIS model prepared for the proposed project, 87.4 percent of vehicle trips related to the project are from passenger cars, light-duty trucks, and medium-duty trucks, all of which are subject to Pavley. CARB's Post-Processor tool estimates an 18 percent reduction in GHGs in these vehicle classes by 2020. As passenger vehicles represent the single largest source of GHGs associated with the proposed project, the anticipated reduction represents 263 fewer metric tons per year of GHGs attributed to the project.

In terms of energy, the project will at minimum meet the California Building Energy Efficiency Standards, which went into effect January 1, 2010. These standards reduce electricity by 4.9 percent below baseline emissions and reduce natural gas by 9.4 percent below baseline

emissions. In March 2011, Senate Bill 2X established the Renewable Portfolio Standard as law (33 percent of energy supply from renewable sources by 2020). Senate Bill 2X would reduce project emissions by 149 metric tons annually by 2020. These regulations and others will further reduce GHGs as shown in **Table 3.5-5**.

TABLE 3.5-5
GHG REDUCTIONS FROM APPLICATION OF NEW REGULATIONS

California Legislation	CO_2e Emissions Reductions (metric tons/year)
AB 1493 (Pavley)	263
California Building Energy Efficiency Standards	115
Senate Bill 2X – Renewable Portfolio Standard	149
Total	**527**

*Source: See **Appendix 3.5-A***

When the reductions from applicable new regulations are accounted (a reduction of 527 metric tons of CO_2e per year), the amount of GHG emissions is 4,776 metric tons per year, which would result in a CO_2e per service population (residents plus employees) per year of 10.4 metric tons of CO_2e. This is over the significance threshold for operations of 4.6 metric tons of CO_2e per service population per year. Therefore, the following mitigation shall be required.

General Plan and Zoning Ordinance Text Amendments

As discussed in further detail in Section 4.0, Cumulative Impacts Summary, the proposed General Plan and Zoning Ordinance text amendments are policy actions that would not directly result in a net increase in greenhouse gas emissions that would conflict with the goals of AB 32. Although CCRCs would be permitted in either a PD (Planned Development) or SDA (Special Development Area) land use designation with approval of a zone change after implementation of the proposed project, such rezoning applications would be subject to further CEQA analysis of project-specific impacts (proposed Zoning Ordinance amendment Section L.II 2.7.11(C)(4)), including climate change impacts. It is reasonable to assume that future site-specific CEQA analysis would result in project-specific mitigation to address climate change impacts. While future projects may result in similar impacts to those of the proposed project, it is reasonable to assume that advances in technology (solar, wind, etc.) as well as future project design features or participation in regional or national GHG mitigation could occur, resulting in less GHG impact than the proposed project. For future projects resulting from the General Plan and Zoning Ordinance text amendments, either impacts must be less than significant or a project-specific environmental impact report must be prepared with impact discussion and appropriate mitigation.

Mitigation Measures

MM 3.5.1b The project applicant shall include the following energy-efficient building measures to be applied site development for each structure.

- Meet CALGreen Building Code Tier 1 standards (Title 24, Part 11) at the time of building permit issuance.

CalGreen Tier 1 Standards for energy efficiency include a pre-requisite:

- A4.203.1 Exceed Tier 1 California Energy Code based on the 2008 energy standard requirements by 15 percent.

Implement elective measures (of which the project applicant can choose which four to implement):

- A4.205.1 Radiant Barrier*
- A4.205.2 Exterior Shading on South & West Windows
- A4.206.1 Blower Door Testing
- A4.207.1 Innovative Radiant, Hydronic, or Ground Source Heating & Cooling System
- A4.207.2 HVAC Commissioning
- A4.207.4 Furnace AFUE .90 or higher
- A4.207.5 Electric Heat Pump HSPF 8.0 or higher*
- A4.207.6 Cooling Equipment SEER higher than 13.0 and EER 11.5 or higher
- A4.207.7 Interior and/or Insulated Ductwork
- A4.207.8 Duct Leakage Testing Shows <6% Leakage*
- A4.207.9 Whole House Fan
- A4.207.10 Energy STAR Ceiling Fans
- A4.208.1 Gas Water Heater EF higher than .6
- A4.208.2 Gas Water Heater EF higher than .8
- A4.208.3 Minimize Hot Water Wait Time
- A4.209.1 Hard-wired Lighting Fixtures at least 90% Energy STAR
- A4.210.1 All Applicable Appliances Energy STAR
- A4.211.1 Solar PV System meeting CEC NSHP program
- A4.211.2 Solar Water Heating System with Solar Fraction > 0.5.
- A4.211.3 Roof Space for Future Solar Installation - 300 sq ft. min.
- A4.211.4 Conduit for Future Solar Installation - 1" min.

Additionally, requiring the project applicant to meet Tier 1 Standards for all categories will result in the following pre-requisites needing to be met:

- A4.106.4 - Not less than 20% of the total parking, walking, or patio surfaces shall be permeable (excluding primary driveway, walkway and porch areas).
- A4.106.5 - Roofing materials shall have a minimum 3- year aged solar reflectance and thermal emittance or a minimum Reflectance Index (SRI) equal to or greater than the values specified in Tables A4.106.5(1) and A4.106.5(2). Steep slope >64, low slope >10 or 16 (depending on climate zone)
- A4.303.1 – Kitchen Faucet has a Maximum flow rate of 1.5 gpm.
- A4.303.4 - When landscaping is provided by the builder, a water efficient landscape irrigation system shall be installed that reduces potable water use.
- Tier 1: Reduce the use of potable water to a quantity that does not exceed 65% of evapotranspiration (ETo) times landscape area.
- 4.408.1 - Recycle and/or salvage for reuse a minimum of 65% of the nonhazardous construction and demolition debris, or meet a local construction and demolition waste management ordinance, whichever is more stringent. (Excavated soil and land-clearing debris excluded).
- A4.403.2 - As allowed by the enforcing agency, reduce cement used in foundation mix design. Products commonly used to replace cement in concrete mix designs include, but are not limited to fly ash, slag, silica fume, rice hull ash. Tier 1: Not less than a 20% reduction in cement use.
- A4.405.3 - Use materials, equivalent in performance to virgin materials, with post-consumer or pre-consumer recycled content value (RCV) for a percent of the total materials cost. (RCV equals percent postconsumer + 1/2 percent pre-consumer times material cost.) Tier 1: minimum 10%.
- A4.504.2 - Tier 1: At least 80% of resilient flooring installed shall comply with the criteria listed above.
- A4.504.3 - Tier 1: Install thermal insulation in compliance with the VOC emissions limits defined in Collaborative for High Performance Schools (CHPS) Low-emitting Materials List.

Timing/Implementation: *Prior to the issuance of building permits*

Enforcement/Monitoring: *Nevada County Community Development Agency*

According to the California Air Pollution Control Officers Association's (CAPCOA) Quantifying Greenhouse Gas Mitigation Measures (2010), the project will achieve a 0.05 percent reduction in electricity and a 0.77 percent reduction in natural gas (indirect use from power plant) for each percentage above the California Building Energy Efficiency Standard. Mitigation measure **MM**

3.5.1b would result in the further reduction of 103 metric tons of CO_2e per year [670 x (0.0005 x 15) + 772 x (0.0077 x 15) = 103]. Therefore, implementation of mitigation measure **MM 3.5.1b** would reduce annual GHG emissions to 4,673 metric tons per year. In addition, mitigation measure **MM 3.3.3** in Section 3.3, Air Quality, would further reduce emissions requiring the prohibition of wood-burning stoves or fireplaces as well as the provision of a green-waste drop-off site for residents.

The BAAQMD's emission threshold is 4.6 metric tons of CO_2e per service population (residents plus employees) per year (BAAQMD 2011). The BAAQMD thresholds were chosen based on the substantial evidence that such thresholds represent quantitative and/or qualitative levels of GHG emissions, compliance with which means that the environmental impact of the GHG emissions will normally not be cumulatively considerable under CEQA (BAAQMD 2011). Compliance with such thresholds will be part of the solution to the cumulative GHG emissions problem. Utilization of the BAAQMD's GHG threshold was considered reasonable and appropriate by NSAQMD staff (Longmire 2011).

It should be noted that there are several project features that will assist in the reduction of GHG emissions resulting from the project that are unable to be quantified as due to their nature it would be overly speculative to do so. These project features include:

- The provision of a minimum of two paratransit vehicles for the purposes of transporting residents within the facility to various business appointments, grocery and service needs, recreation, and special events. Comprehensive and personalized transportation services would be provided by staff at the Village Center to coordinate all resident transportation needs. Residents can arrange for carpooling, a community vehicle, a private driver, or an "errand runner" who would pick up and deliver twice daily.

- The use of native and adaptive plant materials in new landscaping. The proposed planting palette would stress indigenous and drought-tolerant plant materials wherever possible. These species would minimize the use of extensive water, fertilizers, herbicides, and other intervention.

- The use of water-efficient irrigation technologies. All irrigation systems would be designed to minimize the amount of water used for irrigation purposes. Automatic systems would include drip systems, low application rate spray heads, water sensors, and check valves to prevent low point drainage. Design of irrigation systems would preclude overspray onto paved areas.

- The placement of deciduous trees for passive cooling of buildings and paved areas. Deciduous canopy shade trees would be located within the landscaping for coverage of parking areas and other paved surfaces subject to the "heat island effect." Shading of parking areas would achieve 50 percent in 15 years. Deciduous trees would be positioned on south- and west-facing exposures to limit heat gain during summer months.

- The proposed lighting fixtures would be approved by the IDA (International Dark-Sky Association) and would utilize low energy, compact fluorescent, or LED bulb options.

- The project proposes a variety of recreational amenities on the project site which would limit the need for residents to drive elsewhere. These include improved walking trails and soft surface trails throughout the project site, a group barbecue area, pondside fishing area, gazebo site, general picnic areas and social gathering areas along the Bear River,

raised bed community gardens, pool and pool house, event lawn, horseshoe pits, outdoor kitchen, and courts for tennis, pickleball, volleyball, and bocce ball.

- The project proposes a mix of uses including a variety of independent and supportive living arrangements including independent living, assisted living, nursing care, physical rehabilitation, and memory impairment housing in a campus-like setting featuring commercial and recreational uses and transportation and a variety of other services. These other services include a café, post office, recycling center, bakery, theater, ice cream parlor, pub, pharmacy, market/deli, beauty shop, bank, and dry cleaning.

These project features would assist in the reduction of GHG emissions resulting from the project. For example, many different uses are to be located on-site, which would reduce the demand to travel elsewhere as many services would exist to accommodate future residents. When off-site travel is necessary, the two paratransit vehicles available would reduce the use of single-occupancy vehicles and increase carpooling. As stated previously, the emissions reductions from these design features are unable to be quantified as, due to their nature, it would be overly speculative to do so. For instance, while the two available paratransit vehicles would increase carpooling and thus reduce single-occupancy vehicle trips and emissions, it cannot be accurately estimated how often this service will be employed by future residents of the project.

Table 3.5-6 depicts the projected GHG emissions per service population for the project under unmitigated conditions, unmitigated with state regulations applied, and mitigated conditions. As can be seen, mitigation measure **MM 3.5.1b** in conjunction with state regulations would reduce emissions by 630 metric tons of GHG per year. Furthermore, the project proposes several design features that would further reduce GHG emissions though are too speculative to be quantified. Thus, the emissions identified in **Table 3.5-6** are considered very conservative and likely overstate the extent of GHG emissions that would occur.

TABLE 3.5-6
PROJECT GREENHOUSE GAS EMISSIONS
PER SERVICE POPULATION

	Emissions	Emission Reductions from Unmitigated Buildout	Jobs	Population	Service Population (SP)	$MTCO_2e$/SP/Year
Unmitigated Project Buildout	5,303	–	43	415	458	11.5
Unmitigated Project Buildout with State Regulations Applied	4,776	527	43	415	458	10.4
Mitigated Project Buildout	**4,673**	**630**	**43**	**415**	**458**	**10.2**

Based on the population and employment figures listed in **Table 3.5-6** above, the projected buildout service population would be 458 under the proposed project. Dividing the GHG emissions for buildout yields a metric ton per service population ratio of 10.2for buildout conditions. As this exceeds the BAAQMD threshold of 4.6, the proposed project would result in a net increase in cumulative GHG emissions. The proposed project's contribution to GHGs is thus considered **cumulatively considerable** and is a **significant and unavoidable** impact.

REFERENCES

BAAQMD (Bay Area Air Quality Management District). 2010a. *California Environmental Quality Act Guidelines.*

———. 2010b. *Source Inventory of Bay Area Greenhouse Gas Emissions.* http://www.baaqmd.gov/Divisions/Planning-and-Research/Emission-Inventory-and-Air-Quality-Related/Emission-Inventory/Greenhouse-Gases.aspx.

———. 2011. *California Environmental Quality Act Guidelines.*

California Climate Action Registry. 2009. *California Climate Action Registry General Reporting Protocol Version 3.1.*

CAPCOA (California Air Pollution Control Officers Association). 2010. *Quantifying Greenhouse Gas Mitigation Measures.*

CARB (California Air Resources Board). 2004. *Climate Change Emissions Control Regulations*.

———. 2010. *California Greenhouse Gas Inventory for 2000–2008.* http://www.arb.ca.gov/cc/inventory/data/data.htm.

CEC (California Energy Commission). 2006. *Redefining Estimates for Water-Related Energy Use* http://www.energy.ca.gov/2006publications/CEC-500-2006-118/CEC-500-2006-118.PDF.

CNRA (California Natural Resources Agency). 2009. *2009 California Climate Adaptation Strategy*.

EFCTC (European Fluorocarbons Technical Committee). 2003. *Fluorocarbons and Sulphur Hexafluoride: Perfluorocarbons (PFCs) Fact Sheet*. http://www.fluorocarbons.org/en/info/brochures/ fact_10.html.

EIA (Energy Information Administration). 2005. *Residential Energy Consumption Survey.* http://www.eia.doe.gov/emeu/recs/recs2005/c&e/summary/pdf/tableus8.pdf and http://www.eia.doe.gov/emeu/recs/recs2005/c&e/summary/pdf/tableus9.pdf

KD Anderson and Associates. 2011. *Traffic Impact Analysis for Rincon Del Rio Continuing Care Retirement Community, Nevada County, CA*.

Longmire, Sam. 2011. Northern Sierra Air Management District. E-mail communications with PMC staff.

SMAQMD (Sacramento Metropolitan Air Quality Management District). 2011. *CEQA Guide to Air Quality Assessment*. Revised 2011.

USEPA (United States Environmental Protection Agency). 2008. "SF6 Emission Reduction Partnership for Electric Power Systems: Basic Information." http://www.epa.gov/electricpower-sf6/basic.html.

———. 2010a. "Nitrous Oxide." http://www.epa.gov/nitrousoxide/scientific.html.

———. 2010b. "High Global Warming Potential Gases." http://epa.gov/highgwp/.

———. 2010c. *Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990–2008.*

———. 2010d. *PSD and Title V Permitting Guidance for Greenhouse Gases*.

———. 2011a. "Climate Change – Greenhouse Gas Emissions: Carbon Dioxide." http://www.epa.gov/climatechange/emissions/co2.html.

———. 2011b. "Methane." http://www.epa.gov/methane/scientific.html.

———. 2011c. "Regulatory Announcement USEPA-420-F-11-031." http://www.epa.gov/oms /climate /documents/420f11031.pdf.