4.11 Greenhouse Gas Emissions

Sections	Tables
4.11.1 Setting 4.11.2 Regulatory Framework 4.11.3 Impacts and Mitigation Measures	4.11-1 California GHG Emissions (million metric tons CO_2e) 4.11-2 Summary of Impacts – GHG Emissions 4.11-3 Total GHG Emissions from Project Construction 4.11-4 Total GHG Emissions from Project Operations 4.11-5 Total Amortized GHG Emissions

This section evaluates issues related to greenhouse gas (GHG) emissions resulting from implementation of the Monterey Peninsula Water Supply Project (MPWSP or proposed project). The section presents an overview of climate change; describes the various GHGs that have been identified as sources of climate change; discusses pertinent regulations, including those relevant at the federal and state levels; identifies the criteria used for determining the significance of environmental impacts; and describes the potential GHG impacts that would be associated with implementation of the MPWSP. Mitigation measures are prescribed to address significant impacts.

4.11.1 Setting

4.11.1.1 Climate Change

There is an overwhelming level of scientific consensus that climate change is occurring and that human activity contributes in some measure (perhaps substantially) to that change. Man-made emissions of GHGs, if not sufficiently curtailed, are likely to contribute further to increases in global temperatures. The potential effects of climate change in California include sea level rise and reductions in snowpack, as well as an increased number of extreme-heat days per year, high ozone days, large forest fires, and drought years (CARB, 2009). Globally, climate change could affect numerous environmental resources through potential, though uncertain, changes in future air temperatures and precipitation patterns. According to the International Panel on Climate Change (IPCC), the projected effects of climate change are likely to vary regionally, but are expected to include the following direct effects (IPCC, 2007):

- Higher maximum temperatures and more hot days over nearly all land areas;
- Higher minimum temperatures (fewer cold days and frost days over nearly all land areas);
- Reduced diurnal temperature range over most land areas;
- Increase in heat index over most land areas; and
- More intense precipitation events.

In addition, many secondary effects are projected to result from climate change, including a global rise in sea level, impacts on agriculture, changes in disease vectors, and changes in habitat and biodiversity. The possible outcomes and feedback mechanisms involved are not fully

understood, and much research remains to be done; however, over the long term, the potential exists for substantial environmental, social, and economic consequences.

4.11.1.2 Greenhouse Gas Emissions

GHG emissions that result from human activities primarily include carbon dioxide (CO_2), with much smaller amounts of nitrous oxide (N_2O), methane (CH_4, often from unburned natural gas), sulfur hexafluoride (SF_6) from high-voltage power equipment, and hydrofluorocarbons (HFCs) and perfluorocarbons (PFCs) from refrigeration/chiller equipment. Because these GHGs have different warming potentials (i.e., the amount of heat trapped in the atmosphere by a certain mass of the gas), and CO_2 is the most common reference gas for climate change, GHG emissions are often quantified and reported as CO_2-equivalent (CO_2e) emissions. For example, while SF_6 represents a small fraction of the total annual GHGs emitted worldwide, this gas is very potent, with 23,900 times the global warming potential of CO_2. Therefore, an emission of 1 metric ton of SF_6 would be reported as 23,900 metric tons CO_2e. The global warming potential of CH_4 and N_2O are 21 times and 310 times that of CO_2, respectively. The principal GHGs resulting from human activity that enter and accumulate in the atmosphere are described below.

Carbon Dioxide

CO_2 is a naturally occurring gas that enters the atmosphere through natural as well as anthropogenic (human) sources. Key anthropogenic sources include the burning of fossil fuels (e.g., oil, natural gas, and coal), solid waste, trees, wood products, and other biomass, as well as industrially relevant chemical reactions such as those associated with manufacturing cement. CO_2 is removed from the atmosphere when it is absorbed by plants as part of the biological carbon cycle.

Methane

Like CO_2, CH_4 is emitted from both natural and anthropogenic sources. Key anthropogenic sources of CH_4 include gaseous emissions from landfills, releases associated with mining and materials extraction industries (in particular coal mining), and fugitive releases associated with the extraction and transport of natural gas and crude oil. CH_4 emissions also result from livestock and agricultural practices. Small quantities of CH_4 are released during fossil fuel combustion.

Nitrous Oxide

N_2O is also emitted from both natural and anthropogenic sources. Important anthropogenic sources include industrial activities, agricultural activities (primarily the application of nitrogen fertilizer), the use of explosives, combustion of fossil fuels, and decay of solid waste.

Fluorinated Gases

HFCs, PFCs, and SF_6 are synthetic gases emitted from a variety of industrial processes, and they contribute substantially more to the greenhouse effect than the GHGs described previously. Fluorinated gases are often used as substitutes for ozone-depleting substances (i.e., chlorofluorocarbons, hydrochlorofluorocarbons, and halons). These gases are typically emitted in

small quantities, but because of their potency they are sometimes referred to as "high global warming potential gases." Fluorinated gases would not be emitted by any of the proposed construction or operational equipment that would be associated with the proposed project.

4.11.1.3 Greenhouse Gas Sources

Anthropogenic GHG emissions in the United States are derived mostly from the combustion of fossil fuels for transportation and power production. Energy-related CO_2 emissions resulting from fossil fuel exploration and use account for approximately three-quarters of the human-generated GHG emissions in the United States, primarily in the form of CO_2 emissions from burning fossil fuels. More than half of the energy-related emissions come from large stationary sources, such as power plants; approximately one-third derive from transportation; and a majority of the remaining sources include: industrial processes, agriculture, forestry, and waste management (USEPA, 2013a).

Statewide emissions of GHG from relevant source categories for 2006 through 2012 are summarized in **Table 4.11-1**. Specific contributions from individual air basins, such as the North Central Coast Air Basin, which encompasses the project area, are included in the emissions inventory but are not itemized by air basin. In 2012, California produced 458.7 million gross metric tons of CO_2e emissions. Transportation was the source of 36 percent of the state's GHG emissions, followed by electricity generation at 21 percent, industrial sources at 19 percent, commercial and residential sources at 9 percent, and other sources comprising the remaining 14 percent (CARB, 2014a). Although not included as an emission inventory category, water use requires significant amounts of energy. Approximately one-fifth of the electricity and one-third of the non-power plant natural gas consumed in the state are associated with water delivery, treatment, and use.

TABLE 4.11-1
CALIFORNIA GHG EMISSIONS (million metric tons CO_2e)

Emission Inventory Category	2006	2007	2008	2009	2010	2011	2012	
Transportation	189.18	189.27	178.02	171.47	170.46	168.13	167.38	36%
Electric Power	104.54	113.94	120.15	101.32	90.3	88.04	95.09	21%
Commercial and Residential	41.89	42.11	42.44	42.65	43.82	44.32	42.28	9%
Industrial	90.28	87.1	87.54	84.95	88.51	88.34	89.16	19%
Recycling and Waste	7.8	7.93	8.09	8.23	8.34	8.42	8.49	14%
High Global Warming Potential	11.08	11.78	12.87	13.99	15.89	17.35	18.41	
Agriculture	37.75	37.03	37.99	35.84	35.73	36.34	37.86	
Total Gross Emissions	**482.52**	**489.16**	**487.1**	**458.45**	**453.05**	**450.94**	**458.67**	**100%**

NOTE: The GHG percentages of the total gross emissions for year 2012 were rounded to the nearest whole number.

SOURCE: CARB, 2014a.

4.11.2 Regulatory Framework

4.11.2.1 Federal Regulations

U.S. Environmental Protection Agency (USEPA)

On April 2, 2007, in *Massachusetts v. USEPA* (549 US 497), the Supreme Court found that GHGs are air pollutants covered by the Clean Air Act. The Court held that the USEPA must determine whether emissions of GHGs from new motor vehicles cause or contribute to air pollution that may reasonably be anticipated to endanger public health or welfare, or whether the science is too uncertain to make a reasoned decision. In making such decisions, the USEPA is required to follow the language of Section 202(a) of the Clean Air Act, which obligates it to prescribe (and from time to time revise) standards applicable to the emission of any air pollutant from any class or classes of new motor vehicles or new motor vehicle engines. The Supreme Court decision resulted from a petition for rulemaking under Section 202(a) filed by more than a dozen environmental, renewable energy and other organizations.

On April 17, 2009, the USEPA Administrator signed proposed "endangerment" and "cause or contribute" findings for GHGs under Section 202(a) of the Clean Air Act. The USEPA held a 60-day public comment period, considered public comments, and issued final findings. The USEPA found that six GHGs, taken in combination, endanger both the public health and the public welfare of current and future generations. The USEPA also found that the combined emissions of these GHGs from new motor vehicles and new motor vehicle engines contribute to the greenhouse effect as air pollution that endangers public health and welfare under Clean Air Act Section 202(a) (USEPA, 2013b). Specific GHG regulations that the USEPA has adopted to date are as follows:

> ***40 CFR Part 98. Mandatory Reporting of Greenhouse Gases Rule.*** This rule requires mandatory reporting of GHG emissions for facilities that emit more than 25,000 metric tons of CO_2e emissions per year (USEPA, 2013c). The proposed project would not trigger GHG reporting as required by this regulation because it would generate less than 25,000 metric tons of CO_2e emissions per year.
>
> ***40 CFR Part 52. Proposed Prevention of Significant Deterioration and Title V Greenhouse Gas Tailoring Rule.*** USEPA has mandated that Prevention of Significant Deterioration and Title V requirements apply to facilities whose stationary source CO_2e emissions exceed 100,000 tons per year (USEPA, 2013b). The proposed project would not trigger Prevention of Significant Deterioration or Title V permitting under this regulation because it would generate less than 100,000 tons of CO_2e emissions per year.

4.11.2.2 State Regulations

A variety of statewide rules and regulations mandate the quantification and, if emissions exceed established thresholds, the reduction of GHGs. CEQA requires lead agencies to evaluate project-related GHG emissions and the potential for the project to contribute to climate change and to provide appropriate mitigation in cases where the lead agency determines that a project would result in a significant addition of GHGs to the atmosphere.

Executive Order S-3-05

In June 2006, Governor Arnold Schwarzenegger signed Executive Order S-3-05, which established the following statewide emission-reduction targets through the year 2050:

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

This executive order does not contain any requirements that directly pertain to the proposed project; however, future actions taken by the State of California to implement these goals may affect the proposed project, depending on the specific implementation measures that are developed.

Assembly Bill 32

California Assembly Bill (AB) 32, *the Global Warming Solutions Act of 2006*, required the California Air Resources Board (CARB) to establish a statewide GHG emissions cap for 2020 based on 1990 emission levels. AB 32 required CARB to adopt regulations that identify and require selected sectors or categories of emitters of GHGs to report and verify their statewide GHG emissions, and CARB is authorized to enforce compliance with the program. Under AB 32, CARB also was required to adopt a statewide GHG emissions limit equivalent to the statewide GHG emissions levels in 1990, which must be achieved by 2020. CARB established this limit in December 2007 at 427 million metric tons of CO_2e. This is approximately 30 percent below forecasted "business-as-usual" emissions of 596 million metric tons of CO_2e in 2020, and about 10 percent below average annual GHG emissions during the period of 2002 through 2004 (CARB, 2009).

In the interest of achieving the maximum technologically feasible and cost-effective GHG emission reductions, AB 32 permits the use of market-based compliance mechanisms and requires CARB to monitor compliance with and enforce any rule, regulation, order, emission limitation, emissions reduction measure, or market-based compliance mechanism that it adopts.

Climate Change Scoping Plan (AB 32 Scoping Plan)

In December 2008, CARB approved the AB 32 Scoping Plan outlining the State's strategy to achieve the 2020 GHG emissions limit. The Scoping Plan estimates a reduction of 174 million metric tons CO_2e (about 191 million tons) from the transportation, energy, agriculture, forestry, and high climate-change-potential sectors, and proposes a comprehensive set of actions designed to reduce overall GHG emissions in California, improve the environment, reduce dependence on oil, diversify California's energy sources, save energy, create new jobs, and enhance public health. The Scoping Plan must be updated every five years to evaluate the mix of AB 32 policies to ensure that California is on track to achieve the 2020 GHG reduction goal. Appendices C and E of the adopted 2008 AB 32 Scoping Plan include a list of 39 recommended action measures to reduce GHG emissions (CARB, 2009). Of the action measures, *W-3: Water System Energy Efficiency*, is the only measure that is directly applicable to the proposed project. The purpose of this measure is to reduce the magnitude and intensity of energy use in California's water systems through

implementation of energy-efficient production, treatment, and conveyance infrastructure. CARB has set a 20 percent electricity use reduction target from 2006 levels for this measure.

The AB 32 Scoping Plan must be updated every five years to evaluate the adopted mix of AB 32 policies to ensure that California is on track to achieve the 2020 GHG reduction goal. CARB released its first Scoping Plan Update in May 2014 (CARB, 2014b). There are no recommended actions identified in the Scoping Plan Update that are directly applicable to the proposed project.

Mandatory Reporting Requirements

Pursuant to California Code of Regulations Title 17, Sections 95100 through 95158, operations of large industrial stationary combustion and process emissions sources that emit 10,000 metric tons CO_2e or more per calendar year are required to report and verify their GHG emissions to CARB. As indicated in **Table 4.11-5** under Impact 4.11-1, below, the total amortized GHG emissions for the proposed project would be 6,181 metric tons per year, which is below the AB 32 reporting threshold of 10,000 metric tons per year; therefore, the proposed project would not be subject to the AB 32 mandatory reporting requirements.

Market-Based "Cap-and-Trade" Compliance Mechanism

AB 32 allows the use of market-based compliance mechanisms to achieve the maximum technologically feasible and cost-effective GHG emission reductions. AB 32 also requires CARB to monitor compliance with and enforce any rule, regulation, order, emission limitation, emissions reduction measure, or market-based compliance mechanism that it adopts. In response, CARB adopted a cap-and-trade program that covers major sources of GHG emissions such as refineries and power plants. The program includes an annual emissions cap that declines over time. CARB's cap-and-trade program applies to facilities that would emit 25,000 metric tons or more of CO_2e per year. Since the total amortized GHG emissions for the proposed project are estimated at 6,181 metric tons per year, the cap-and-trade program would not apply to the proposed project (see Section 4.11.3.4 for a discussion and breakdown of the construction-related and operational GHG emissions associated with the proposed project).

4.11.2.3 Applicable State, Regional, and Local Land Use Plans and Policies Relevant to Greenhouse Gas Emissions

As described above, the AB 32 Scoping Plan outlines the State's overall strategy to achieve the 2020 GHG emissions limit. Although state, regional, and local land use plans, policies, and regulations generally do not address GHG emissions at the project level, a number of state, regional, and local agencies with jurisdiction over the proposed project have adopted plans, policies, and regulations related to air quality and energy consumption that also have the effect of reducing GHG emissions. Analyses of project consistency with such plans, policies, and regulations are provided in Sections 4.10, Air Quality, and 4.18, Energy Conservation, of this EIR.

4.11.3 Impacts and Mitigation Measures

4.11.3.1 Significance Criteria

Appendix G of the CEQA Guidelines recommends the following significance criteria for the evaluation of GHG emissions impacts. Implementation of the proposed project would have a significant impact related to GHG emissions if it would:

- Generate GHG emissions, either directly or indirectly, that could have a significant impact on the environment; or
- Conflict with an applicable plan, policy, or regulation adopted for the purpose of reducing GHG emissions.

4.11.3.2 Approach to Analysis

The following discussions provide specific information as to how the significance levels of impacts related to GHG emissions were determined.

Generation of GHG Emissions

CEQA allows for significance criteria established by the applicable air pollution control district to be used to assess the impact of a project related to GHG emissions, at the discretion of the CEQA Lead Agency. In February 2014, the Monterey Bay Unified Air Pollution Control District (MBUAPCD) staff recommended that its Board of Directors approve an operational significance threshold of 10,000 metric tons CO_2e per year for stationary source projects that rely on operational processes and equipment that are subject to MBUAPCD permitting requirements. For land use projects, the MBUAPCD staff recommended to its board in February 2014 that it adopt a "bright line" significance threshold of 2,000 metric tons CO_2e per year, require that all project GHG emissions be mitigated by 16 percent compared to unmitigated emissions for the impact to be considered less than significant, or demonstrate compliance with an applicable adopted GHG reduction plan/climate action plan for the impact to be considered less than significant (MBUAPCD, 2014). As of March 2015, the MBUAPCD Board of Directors has not adopted any of the thresholds recommended by its staff (MBUAPCD, 2015). However, for the reasons set forth below, this EIR nonetheless uses the significance threshold of 2,000 metric tons CO_2e per year to evaluate whether the project's emissions could have a significant impact on the environment.

The proposed project would include three emergency backup generators that would be operated intermittently. With the exception of these backup generators that would emit well under one percent of the total annual project-related GHG emissions (see Table 4.11-4), the proposed project would include no other stationary sources of emissions that would require a MBUAPCD permit. Although the proposed project would be a heavy industrial land use type, it would primarily result in indirect emissions associated with use of electricity from Pacific Gas and Electric Company (PG&E)'s electrical grid by stationary sources at power plants. These sources are regulated and permitted by local air districts throughout California; however, they are outside

of the control of CalAm and are not under the jurisdiction of the California Public Utilities Commission (CPUC). Because the sources of the indirect emissions are already regulated and permitted by the local air districts where the power plants reside, no permit or other MBUAPCD approval would be required for the proposed project's use of the associated electricity. Therefore, as described by MBUAPCD, the stationary source threshold of 10,000 metric tons CO_2e per year may not be the most appropriate threshold to gauge impact significance for the proposed project.

As noted earlier, MBUAPCD staff has recommended that its Board of Directors approve an operational significance threshold of 10,000 metric tons CO_2e per year for stationary source projects that rely on operational processes and equipment that are subject to MBUAPCD permitting requirements. Because the project would include stationary sources (i.e., three emergency backup generators) that would be subject to MBUAPCD permitting requirements, this threshold could be interpreted as applicable to this analysis; however, given that the majority of GHG emissions that would be generated by the project would be indirect emissions not subject to MBUAPCD permitting requirements, the 10,000 metric tons CO_2e per year threshold may be less appropriate for this analysis than a threshold developed for land use projects, which typically do not require MBUAPCD permits for stationary sources.

For land use projects, the MBUAPCD staff-recommended bright line significance threshold is 2,000 metric tons CO_2e per year, which is based on a similar threshold that has been developed for Ventura County and represents an "emissions capture rate" of 75 percent of all commercial and residential land use development projects in Ventura County. [1] This threshold is based on emissions data suggesting that commercial and residential projects that emit greater than 2,000 metric tons CO_2e per year are responsible for 75 percent of GHG emissions associated with those land uses. Therefore, use of this threshold effectively requires mitigation for the top 75 percent of emissions generated by new land use projects. If all land use-project emissions are mitigated to below this threshold, it would represent an overall reduction in new land use project-related emissions of up to 75 percent. Since the AB 32 and Executive Order S-3-05 GHG emissions reductions goal of lowering GHG emissions to 1990 levels by 2020 is roughly equivalent to reducing emissions by 15 percent below current levels, this threshold can be used to determine if the project would generally be consistent with this goal.

It is acknowledged that the bright line 2,000 metric ton significance threshold focuses on new commercial and residential development type projects that are not industrial in nature; however, similar to the emissions that would be associated with the proposed project, GHG emissions associated with commercial and residential projects tend to be indirect in nature, primarily as a result of automobile and electricity use. The MBUAPCD staff recommendation includes the following two options to the 2,000 metric tons threshold to demonstrate less-than-significant impacts for land use projects: 1) mitigating project emissions by 16 percent (which would be consistent with CARB's projected reduction in GHG emissions needed to achieve the statewide

[1] A "75 percent emissions capture rate" means that 75 percent of the total emissions from all new projects would be subject to analysis in an environmental impact report prepared pursuant to CEQA, including analysis of feasible alternatives and imposition of feasible mitigation measures.

2020 target as identified in Executive Order S-3-05 and AB 32 (CARB, 2014b)); or 2) demonstrating compliance with an applicable adopted GHG reduction plan/climate action plan.

As mentioned above and elaborated in the discussion of Impact 4.11-1 below, the vast majority of GHG emissions that would be associated with the proposed project would be indirect emissions related to the project's use of electricity from PG&E's electrical power grid. CalAm has provided a rough annual energy use estimate for the proposed project based on simple energy use factors for slant well pumping and on volume of product water produced, but the energy use estimate does not appear to take into account the specific pumps and equipment systems that would require electricity or the energy recovery and energy efficiency features proposed for the project. Given the lack of specific information currently available relative to the energy usage of the proposed project, it is currently not possible for the CPUC to substantiate whether or not the proposed project emissions can be mitigated by 16 percent. In addition, there is no GHG reduction plan/climate action plan that would be applicable to the proposed project. Therefore, neither of the two options to the 2,000 metric tons threshold for assessment of land use projects is considered practicable for evaluation of the proposed project.

Although the 2,000 metric tons CO_2e per year threshold is based on commercial and residential land use development projects, which appears to be a conservative threshold for a large industrial project such as the MPWSP, the CPUC has determined that the 2,000 metric tons CO_2e per year threshold is based on substantial evidence and is the most appropriate bright line significance threshold available to evaluate the proposed project. Therefore, in absence of an adopted or recommended threshold for industrial projects that do not require MBUAPCD permits, the CPUC has determined that use of the 2,000 metric tons CO_2e per year threshold is suitable for use in this analysis. Although this significance threshold falls short of meeting the Executive Order S-3-05 emissions reduction goal of lowering emissions to 80 percent below 1990 levels by 2050, which is equivalent to lowering emissions to 90 percent below current levels, the MBUAPCD staff has not yet provided guidance or recommendations for significance thresholds to evaluate consistency with the 2050 emissions reduction goal.[2]

MBUAPCD staff has not identified a specific significance threshold for short-term construction-related GHG emissions. Because emissions from construction activities occur over a relatively short-term period of time, they contribute a relatively small portion of the overall lifetime project GHG emissions. Therefore, the CPUC has elected to evaluate GHG construction emissions based on guidance developed by the South Coast Air Quality Management District (SCAQMD). For construction-related GHGs, SCAQMD recommends that total emissions from construction be amortized over a period equal to the estimated life of the project (in this case 40 years) and added to operational emissions, and then compared to the operational significance threshold (SCAQMD, 2008). Consistent with the SCAQMD's recommended approach for construction emissions, this

[2] The CPUC is aware not only of the Court of Appeals decision in Cleveland National Forest Foundation v. SANDAG, which would require an EIR for a regional transportation plan to include an analysis of the plan's consistency with the GHG emission reduction goal for 2050 as reflected in Executive Order No. S-3-05, but also that the California Supreme Court has granted a petition for review of this question. While the Supreme Court is considering the issue, the effect of the Appellate Court decision is stayed and does not govern the preparation of this EIR or whether it complies with the requirements of CEQA.

analysis amortizes the proposed project's construction emissions over a 40-year project lifetime, adds them to the proposed project's estimated annual operational emissions, and then compares the total combined emissions to the 2,000 metric tons CO_2e per year significance threshold.

Below is a summary of the methods used to estimate project-related short-term construction and long-term operational GHG emissions. For each of the fuel consumption factors and emission factors, as well as all other assumptions used to estimate construction and operational GHG emissions, refer to **Appendix G**.

Construction Emissions

Construction equipment inventories, equipment horsepower (hp) ratings, and construction activity scheduling assumptions were used by the CPUC's consultant (Environmental Science Associates [ESA]) for the off-road equipment GHG emissions modeling. Fuel consumption factors for off-road equipment were derived from equipment inventory data using CARB's off-road emissions inventory database. GHG emissions resulting from the operation of off-road construction equipment were estimated by multiplying the total diesel fuel consumed by each piece of equipment (derived from fuel use factors based on CARB's Off-road 2011 emissions database model) by CO_2, N_2O, and CH_4 emission factors obtained from The Climate Registry (TCR) (TCR, 2014). N_2O and CH_4 emissions were multiplied by their respective global warming potentials and added to the CO_2 emissions to obtain CO_2e emissions.

GHG emissions from project-related on-road construction vehicles were estimated using CARB's most recent version of its motor vehicle emissions burden model (EMFAC2014). Since the EMFAC2014 model provides GHG emissions factors for CO_2 and CH_4 only, N_2O emission factors for gasoline and diesel combustion were obtained from TCR (2014). GHG emissions in the form of CO_2e were calculated by multiplying the estimated total miles that would be traveled by construction worker vehicles and haul trucks by the GHG emission factors, multiplying the N_2O and CH_4 emissions by their respective global warming potential, and adding the CO_2, N_2O, and CH_4 emissions.

Operational Emissions

The indirect emissions that would be associated with the proposed project's use of electricity were estimated using PG&E's estimate of its power grid emission factor for year 2020 [i.e., 290 pounds CO_2 per megawatt hours (MWh); PG&E, 2013], which would be the first full year the project would be operational. N_2O and CH_4 emission factors for electricity use were obtained from TCR (2014). CalAm estimates that the proposed project's annual electricity demand would be approximately 48,200 MWh per year. Current demand for electricity associated with CalAm's existing production system (i.e., Carmel River surface water wells and Seaside Groundwater Basin groundwater production wells) is approximately 7,700 MWh per year, which represents the baseline electrical demand for the proposed project. Therefore, the net increase in electrical power demand as of 2020 would be approximately 40,500 MWh per year (CalAm, 2014). Once the GHG emissions were estimated for CO_2, N_2O, and CH_4, the total CO_2e associated with project power demand was calculated by multiplying the N_2O and CH_4 emissions by their respective global warming potential, and then adding those values to the CO_2 emissions.

GHG emissions would also be generated from project-related vehicle travel during project operations and from emergency generator testing at the MPWSP Desalination Plant, ASR Pump Station, and Valley Greens Pump Station. GHG emissions from vehicles that would be used during project operations were estimated using the same methodology described above for construction-related vehicle emissions. Emissions associated with up to 30 commuting workers each day and up to 3 material deliveries per day were calculated using EMFAC2014 emissions factors for light-duty trucks and heavy-duty diesel trucks, and multiplied by the respective estimated long-term vehicle miles per year for each vehicle type. Routine operation of the emergency generators would be limited to 50 hours per year per generator for testing and maintenance. Fuel consumption factors for the emergency generators were obtained from manufacturer specifications of standby diesel generator sets similar to the size of the proposed emergency generators. GHG emissions associated with emergency generator testing were estimated by multiplying the total diesel fuel estimated to be consumed by CO_2, N_2O, and CH_4 emission factors obtained from TCR (TCR, 2014). N_2O and CH_4 emission values were multiplied by their respective global warming potentials and added to the CO_2 emissions to obtain CO_2e emissions.

Conflicts with Applicable Plans, Policies, or Regulations

The impact analysis considers the project's potential to conflict with the GHG reduction goals set forth in Executive Order S-3-05 and AB 32, including the applicable recommended action measures identified by CARB in its Climate Change Scoping Plan (see Section 4.11.2.2).

4.11.3.3 Summary of Impacts

Table 4.11-2 summarizes the proposed project's GHG-related impacts and significance determinations.

TABLE 4.11-2
SUMMARY OF IMPACTS – GHG EMISSIONS

Impacts	Significance Determinations
Impact 4.11-1: Incremental contribution to climate change from GHG emissions associated with the proposed project.	SUM
Impact 4.11-2: Conflict with Executive Order S-3-05 and AB 32 Emissions Reduction Goals.	SUM
Impact 4.11-3: Conflict with AB 32 Climate Change Scoping Plan.	SUM

SUM = Significant and Unavoidable, even with implementation of mitigation

4.11.3.4 Impacts and Mitigation Measures

Impact 4.11-1: Incremental contribution to climate change from GHG emissions associated with the proposed project. (*Significant and Unavoidable, even with implementation of Mitigation*)

Implementation of the proposed project would result in short-term construction and long-term operational emissions. Construction and operation emissions that would be associated with the

proposed project are discussed separately below; however, the impact conclusion is based on the sum of amortized construction emissions and the operational emissions (see Section 4.11.3.2, Approach to Analysis, for additional information regarding the methods used to estimate the proposed project's short-term construction and long-term operation emissions).

Construction Emissions

As shown in **Table 4.11-3**, it is estimated that GHG emissions generated by construction of the proposed project would total approximately 21,637 metric tons CO_2e over the 30-month construction period, which equates to a 40-year amortized annual average value of approximately 541 metric tons CO_2e (refer to **Appendix G** for all assumptions associated with the GHG construction emissions).

TABLE 4.11-3
TOTAL GHG EMISSIONS FROM PROJECT CONSTRUCTION

Construction Emissions Source	Construction Emissions (metric tons)			
	CO_2	N_2O	CH_4	CO_2e
MPWSP Desalination Plant	7,354.05	0.11	0.21	7,391.41
Subsurface Slant Wells, Electrical Conduit, Electrical Control Panel, and Electrical Control Building	2,164.34	0.03	0.07	2,176.17
Source Water Pipeline	551.67	0.01	0.02	554.87
Salinas Valley Return and Brine Discharge Pipelines	286.68	0.01	0.01	288.81
Desalinated Water Pipeline	544.43	0.01	0.02	547.57
Transmission Main	5,145.02	0.06	0.10	5,164.59
Monterey Pipeline	1,117.82	0.02	0.04	1,124.35
Transfer Pipeline	551.67	0.01	0.02	554.87
ASR Conveyance Pipelines and ASR Pump-to-Waste Pipeline	372.86	0.01	0.01	375.34
Terminal Reservoir and ASR Pump Station	2,161.39	0.03	0.05	2,171.40
ASR-5 and ASR-6 Wells and ASR Settling Basin	1,082.39	0.02	0.04	1,089.31
Ryan Ranch-Bishop Interconnection Improvements	62.04	0.00	0.00	62.45
Main System-Hidden Hills Interconnection Improvements	62.04	0.00	0.00	62.45
Valley Greens Pump Station	73.21	0.00	0.00	73.63
Total Emissions	**21,529.61**	**0.31**	**0.60**	**21,637.21**
40-Year Amortized Annual Average	**-**	**-**	**-**	**540.93**

SOURCE: ESA, 2015. See **Appendix G.**

Operational Emissions

The proposed project would generate long-term GHG emissions associated with electrical power consumption, vehicle travel, and operation of diesel-fueled emergency generators. Indirect emissions would result from a total project-related net increase in electricity demand of

approximately 40,500 MWh per year. Other emission sources that would occur during operations of the proposed project would include up to 66 one-way vehicle trips per day associated with commuting workers and material deliveries and up to 50 hours per year of routine testing and maintenance of each of the three emergency generators at the MPWSP Desalination Plant site (1,000 hp), at the ASR Pump Station (335 hp), and at the Valley Greens Pump Station (68 hp). The estimated annual emissions that would be associated with each of these operational sources are presented in **Table 4.11-4**. As indicated in the table, total net CO_2e emissions that would be associated with operation of the proposed project would be approximately 5,640 metric tons per year.

TABLE 4.11-4
TOTAL GHG EMISSIONS FROM PROJECT OPERATIONS

Operation Emissions Source	Operational Emissions (total metric tons)			
	CO_2	N_2O	CH_4	CO_2e
Baseline Electricity Consumption	1,012.11	0.02	0.10	1,021.05
Electricity Consumption with Project	6,341.57	0.13	0.63	6,397.60
Net Increase in Electricity Consumption	5,329.46	0.11	0.53	5,376.55
Vehicle Trips	224.87	0.02	<0.01	230.80
Emergency Generator Testing	32.77	<0.01	<0.01	33.07
Total	**5,587**	**0.13**	**0.54**	**5,640.42**

SOURCE: ESA, 2015. See **Appendix G**.

As described in **Table 4.11-4**, the vast majority of GHG emissions that would be associated with long-term operation of the proposed project would be indirect emissions from the project's use of electricity, which would be provided by the local PG&E electrical power grid. Due to California's Renewables Portfolio Standard (RPS) program that requires investor-owned utilities to increase procurement from eligible renewable energy sources to 33 percent of total procurement by 2020, PG&E has steadily increased the amount of renewables in its energy production portfolio, which lowers the overall indirect emissions associated with use of its electricity. In fact, indirect emissions associated with use of PG&E's electricity will continue to drop as more and more electricity from renewable power generators is brought onto the grid. PG&E estimates that its emissions rate for its current (i.e., year 2015) energy production portfolio is 391 pounds of CO_2 per MWh generated, and that its emissions rate estimate for year 2020 is 290 pounds of CO_2 per MWh generated (PG&E, 2013). This will equal a reduction in indirect GHG emissions associated with electricity use in the PG&E service area of approximately 26 percent over the next five years. In addition, in January 2015, Governor Brown proposed an expansion of the RPS program goal to 50 percent by 2030. As of March 2015, state policymakers have not legislated this RPS program expansion into law. However, if the expansion is approved, PG&E's electricity emissions rate (and the carbon footprint of the proposed project) would continue to fall throughout the life of the proposed project.

It should be noted that CO_2 degassing from groundwater to the atmosphere has been identified by a member of the public as a potential GHG emissions issue associated with the proposed project. Groundwater CO_2 partial pressures are typically 10 to 100 times higher than atmospheric CO_2 partial pressures. Therefore, when groundwater is extracted and brought to the surface, CO_2 degassing from the groundwater to the atmosphere occurs. To determine the amount of CO_2 degassing from subsurface water extraction that occurs when the groundwater equilibrates with the atmosphere, geochemical speciation modeling of the water would be required (Macpherson, 2009). Although geochemical speciation modeling has not been conducted for this analysis, it can be concluded that the groundwater currently being extracted from wells along the Carmel River and the Seaside Groundwater Basin that would be replaced with product water from the proposed project emit approximately the same amount of CO_2 from degassing as would occur due to implementation of the proposed project. Therefore, the net change in CO_2 degassing that would be associated with the proposed project compared to baseline conditions would be negligible.

Impact Conclusion

As shown in **Table 4.11-5**, the sum of the 40-year amortized construction GHG emissions and the total net operation emissions that would be associated with the proposed project is approximately 6,181 metric tons CO_2e per year. These emissions would exceed the 2,000 metric tons per year significance threshold; therefore, a significant impact would occur.

TABLE 4.11-5
TOTAL AMORTIZED GHG EMISSIONS

Emissions Source	CO_2e (metric tons per year)
40-Year Amortized Construction Emissions	541
Total Net Operational Emissions	5,640
Total Project Emissions	**6,181**

SOURCE: ESA, 2015. See **Appendix G**.

Implementation of **Mitigation Measure 4.18-1 (Construction Equipment Efficiency Plan)** would ensure that construction activities are conducted in a fuel-efficient manner (see Section 4.18, Energy Conservation, Impact 4.18-1 discussion), which would also limit the generation of GHG construction-related emissions.

With regard to operation-related GHG emissions, the vast majority of emissions would be a result of increased electricity consumption. The MPWSP Desalination Plant designs already include state of the art energy recovery and energy efficient features in place of standard energy saving systems (see Chapter 3, Project Description); however, there may be additional energy reducing features available to further reduce the electrical consumption associated with the proposed project. In addition, it may be feasible for CalAm to obtain “clean” renewable energy for operations of the proposed project, which would reduce the overall carbon footprint of the project. Therefore, implementation of **Mitigation Measure 4.11-1 (GHG Emissions Reduction)** is required to reduce the overall carbon footprint of the proposed project.

Although implementation of **Mitigation Measures 4.11-1** and **4.18-1** would ensure that the proposed project is constructed and operated in an energy-efficient manner that would reduce the overall carbon footprint of the proposed project as much as feasible, the CPUC cannot substantiate numerically that the mitigated GHG emissions would be reduced to a less-than-significant level. Therefore, this impact is considered to be significant and unavoidable, even with implementation of mitigation.

Mitigation Measures

Mitigation Measure 4.11-1 applies to the project as a whole.

Mitigation Measure 4.11-1: GHG Emissions Reductions.

(a) ***Energy Conservation Technologies.*** CalAm shall prepare and submit a GHG Emissions Reduction Plan to the CPUC for approval prior to the start of project construction activities. Once approved, the Plan shall be implemented. The Plan shall include a detailed description of the carbon footprint for all operational components of the approved project (e.g., the MPWSP Desalination Plant, transmission of source and product water, ASR system pumping) based on manufacturer energy usage specification data for all equipment and the most current PG&E power system emissions factor for GHG emissions.

The Plan shall include a summary of state-of-the-art energy recovery and conservation technologies available for utility scale desalination facilities and shall include a commitment by CalAm to incorporate all available feasible energy recovery and conservation technologies; or, if CalAm finds that any of the technologies will not be feasible for the project, the Plan shall include a detailed description as to why such technology is considered to be infeasible. The carbon footprint estimate for the approved project shall include consideration of all proposed energy recovery and conservation technologies that will be employed by the project, and shall describe the approximate GHG emissions reductions that will be associated with each technology.

(b) ***Renewable Energy.*** CalAm shall make good faith efforts to obtain "clean" renewable energy for operations of the project, including but not necessarily limited to: the use of methane gas from the existing Monterey Regional Waste Management District (MRWMD) landfill-gas-to-energy (LFGTE) facility located adjacent to the MPWSP Desalination Plant site; and installation of solar photovoltaic (PV) panels at or adjacent to the desalination plant. The carbon footprint estimate for the approved project shall include consideration of all renewable energy that would directly be used by the project in the form of kilowatt hours per year, and shall describe the approximate GHG emissions reductions that will be associated with the use of the renewable energy.

Mitigation Measure 4.18-1 applies to all project components.

Mitigation Measure 4.18-1: Construction Equipment Efficiency Plan.

(See Impact 4.18-1 in Section 4.18, Energy Conservation, for description.)

Impact 4.11-2: Conflict with Executive Order S-3-05 and AB 32 Emissions Reduction Goals. (*Significant and Unavoidable, even with implementation of Mitigation*)

As discussed under Impact 4.11-1, above, GHG emissions associated with the proposed project would exceed the emissions significance threshold, which indicates that implementation of the project would not be consistent with the GHG emission reduction goals for year 2020 identified in Executive Order S-3-05 and AB 32. Therefore, it can be concluded that the proposed project would conflict with Executive Order S-3-05 and AB 32, and would result in a potentially significant impact.

Impact Conclusion

Implementation of **Mitigation Measure 4.11-1 (GHG Emissions Reduction Plan)** described under Impact 4.11-1, above, and **Mitigation Measure 4.18-1 (Construction Equipment Efficiency Plan)** described under Impact 4.18-1 (see Section 4.18, Energy Conservation), respectively, would require CalAm to develop and implement a GHG Emissions Reduction Plan and a Construction Equipment Efficiency Plan, which would reduce project-related GHG emissions to the extent feasible. However, the CPUC cannot substantiate that the mitigated GHG emissions would be reduced to a less-than-significant level. Therefore, this impact is considered to be significant and unavoidable, even with implementation of mitigation.

Mitigation Measures

Mitigation Measure 4.11-1 applies to the project as a whole.

> **Mitigation Measure 4.11-1: GHG Emissions Reduction.**
>
> (See Impact 4.11-1, above, for description.)

Mitigation Measure 4.18-1 applies to all project components.

> **Mitigation Measure 4.18-1: Construction Equipment Efficiency Plan.**
>
> (See Impact 4.18-1 in Section 4.18, Energy Conservation, for description.)

Impact 4.11-3: Conflict with AB 32 Climate Change Scoping Plan. *(Significant and Unavoidable, even with implementation of Mitigation)*

As identified in Section 4.11.2, Regulatory Framework, the only other plan, policy, or regulation that would be directly applicable to the proposed project would be AB 32 Scoping Plan Measure W-3, Water System Energy Efficiency. The intent of Measure W-3 is to compel water purveyors to: incorporate advanced technologies in the design and construction of water supply systems to lower energy consumption; examine opportunities to use energy sources that have lower GHG emissions; and identify new and innovative technologies and measures for mutually achieving energy and water efficiency savings. As described in Chapter 3, Project Description, Section 3.4.2.2, Reverse Osmosis System, CalAm proposes to incorporate process and energy

recovery systems that would utilize pressure-exchange technologies to transfer energy from the high-pressure brine stream to the source water stream to reduce energy demand as well as source water pumping requirements. The use of modern reverse osmosis technology would also ensure that the energy would be used efficiently. These recent technological advancements include less energy intensive membrane materials and more efficient pumps (Pacific Institute, 2013). In addition, the design and construction of the MPWSP Desalination Plant would incorporate various energy efficient design elements into building support systems, electrical and treatment equipment, and process design that would reduce operational energy demand (see Project Description Section 3.6.5, Power Demand). These project elements would increase energy efficiency and reduce energy demand, thereby reducing indirect emissions of GHGs.

In addition to the proposed energy recovery system and use of energy efficient design elements, variable-frequency drives would be used where appropriate to reduce the operating speed of pumps to closely match the pump discharge pressure requirements, which would reduce energy usage (CDM Smith, 2014). Variable-frequency drives, which are electronic controllers that adjust the speed of an electric motor by modulating the power being delivered, provide continuous control, matching motor speed to the specific demands of the work being performed (CPUC, 2013). In addition, energy-efficient motors, also called premium or high-efficiency motors, would be used for project motors ranging in size from 5 to 800 hp. These motors are up to 8 percent more efficient than standard motors. Energy-efficient motors contain design improvements including, for example, lengthening the core and using lower-electrical-loss steel, thinner stator laminations, more copper in the windings to reduce electrical losses, improved bearings, and smaller, more aerodynamic cooling fans (CPUC, 2013). Also, the pipeline system materials and sizing that would be used for the proposed project would be designed to limit pressure losses and reduce pumping and energy demand requirements (CDM Smith, 2014).

Impact Conclusion

CARB has set a 20 percent electricity use reduction target for Measure W-3; therefore, a 20 percent reduction in electricity use associated with the proposed project's energy recovery and energy saving features would indicate a less-than-significant impact associated with the proposed project's consistency with this measure. As described above, the MPWSP Desalination Plant designs already include state of the art energy recovery and energy efficient features in place of standard energy saving systems; although there may be additional feasible energy reducing features available to further reduce the electrical consumption associated with the project. Therefore, implementation of **Mitigation Measure 4.11-1 (GHG Emissions Reduction)** is required to ensure that the proposed project is operated in an energy-efficient manner to the extent feasible. However, the CPUC cannot substantiate that the proposed project's electricity use would be reduced to a less-than-significant level. Therefore, this impact is considered to be significant and unavoidable, even with implementation of mitigation.

Mitigation Measure

Mitigation Measure 4.11-1 applies to the project as a whole.

Mitigation Measure 4.11-1: GHG Emissions Reduction Plan.

(See Impact 4.11-1, above, for description.)

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