3.17 Greenhouse Gas Emissions

This section of the Environmental Impact Report (EIR) describes the existing greenhouse gas (GHG) emissions within the project area for Eden Landing Phase 2 of the South Bay Salt Pond (SBSP) Restoration Project. It then analyzes whether the project implementation would cause a substantial adverse effect on GHG emissions. The information presented is based on a review of existing GHG emissions and climate change within the area and other pertinent federal, state and local regulations. The analysis of the project's GHG-related environmental impacts is presented for each alternative. The program-level mitigation measures described in Chapter 2, Alternatives, would be implemented with the project. Therefore, this section only includes additional, project-level mitigation measures as needed.

3.17.1 Physical Setting

Methodology

This Eden Landing Phase 2 document generally tiers off the 2007 SBSP Restoration Project Final Environmental Impact Statement/Report (2007 Final EIS/R), which did not evaluate GHG emissions. California Senate Bill (SB) 97, enacted in 2007, addressed the need to analyze GHG emissions as a part of the California Environmental Quality Act (CEQA) process. As directed by SB 97, the Office of Planning and Research (OPR) prepared and developed amendments to the CEQA Guidelines for GHG emissions. These amendments were subsequently adopted by the California Natural Resources Agency on December 30, 2009. The amendments became effective on March 18, 2010. In the CEQA Guidelines Amendments, thresholds of significance for GHG emissions were not specified; nor were assessment methodologies or specific mitigation measures prescribed. Instead, the amendments encourage lead agencies to consider many factors in performing a CEQA analysis, but rely on the lead agencies to make their own determinations based on substantial evidence. The CEQA amendments also encourage public agencies to make use of programmatic mitigation plans and programs from which to tier when they perform individual project analyses. This section supplements the 2007 Final EIS/R. This section provides a brief summary of the basis for climate change and impacts based on scientific studies published by various federal, state, and international agencies and organizations. The methods of analysis and thresholds of significance are based on the Bay Area Air Quality Management District's (BAAQMD's) 2011 Air Quality Guidelines (BAAQMD 2010a, 2011).

This section describes the climate change impacts associated with project GHG emissions. Because no single project is large enough to result in a measurable increase in global concentrations of GHG emissions, the global warming impacts of a project are considered on a cumulative basis. Because climate change issues are global in nature, this section will provide a discussion of national, statewide, and global GHG emission sources and inventories to provide context on a larger scale.

Regional Setting

Climate Change and Global Warming

Radiation from the sun is the primary source of energy keeping the earth warm enough for life. As solar radiation enters the earth's atmosphere, a portion of the radiation passes through the atmosphere and is absorbed by the earth's surface (this is primarily radiation in the visible portion of the electromagnetic spectrum), a portion is reflected back toward space, and a portion is absorbed by the upper atmosphere. The radiation absorbed by the earth heats the earth's surface, which then emits infrared radiation. Because

the earth has a much lower temperature than the sun, it emits longer-wavelength radiation.[1] Certain gases in the earth's atmosphere, classified as GHGs, play a critical role in determining the earth's surface temperature. GHGs have strong absorption properties at wavelengths that are emitted by the earth. As a result, radiation that otherwise would have escaped back into space is instead "trapped," resulting in a warming of the atmosphere. This phenomenon, known as the "greenhouse effect," is responsible for maintaining a habitable climate on Earth.

Anthropogenic emissions of GHGs are widely accepted in the scientific community as contributing to global climate change. The Intergovernmental Panel on Climate Change (IPCC) was commissioned by the World Meteorological Organization and United Nations Environment Program to assess scientific, technical, and socioeconomic information relevant to the understanding of climate change, its potential impacts, and options for adaptation and mitigation. According to *Climate Change, 2007: The Physical Science Basis, Summary for Policymakers* (IPCC 2007), there is no doubt that the climate is warming. Global average air and ocean temperatures and global average sea level are rising. The period from 1995 through 2006 ranked as among the warmest on record since 1850. Although some of the increase is explained by natural occurrences, IPCC 2007 asserts that the increase in temperature is very likely (greater than a 90 percent probability) caused by human activity, most notably from the burning of fossil fuels.

Climate change is a global problem, and GHGs are global pollutants, unlike criteria air pollutants (such as ozone precursors) and toxic air contaminants, which are pollutants of regional and local concern. GHGs include carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), and other pollutants. Emissions of CO_2 and N_2O are byproducts of fossil fuel combustion, among other sources. Methane, a highly potent GHG, results from off-gassing associated with agricultural practices and landfills, among other sources. The impacts from each of these other GHGs besides CO_2 are often converted to carbon dioxide equivalent (CO_2e) by multiplying the mass of a GHG by its Global Warming Potential (GWP) to measure how much global warming a given type and mass of a particular GHG may cause using the equivalent mass of CO_2.[2] Global sinks of CO_2 include uptake by vegetation and dissolution into the ocean (IPCC 2007).

For California, projected effects from climate change are described in *Our Changing Climate: Vulnerability and Adaptation to the Increasing Risks from Climate Change* (California Climate Change Center 2012). Projections using climate modeling indicate that temperatures in California are expected to rise between 4.1 and 8.6 degrees Fahrenheit by the end of the century, depending on how much California and the rest of the globe's emitters are able to reduce GHG emissions. These temperature increases will negatively affect public health, water supply, agriculture, plant and animal species, and the coastline (California Climate Change Center 2012).

[1] The wavelength at which a body emits radiation is proportional to the temperature of the body.

[2] CO_2e is a measurement used to account for the fact that different GHGs have different potential to retain infrared radiation in the atmosphere and contribute to the greenhouse effect. This potential, known as the GWP of a GHG, is dependent on the lifetime, or persistence, of the gas molecule in the atmosphere. For example, as described in the General Reporting Protocol 2.0 of The Climate Registry (TCR 2014), 1 metric ton of methane has the same contribution to the greenhouse effect as approximately 25 metric tons of carbon dioxide, so its GWP is 25. Therefore, methane is a much more potent GHG than carbon dioxide. Expressing emissions in CO_2e takes the contributions of all GHG emissions to the greenhouse effect and converts them to a single unit equivalent to the effect that would occur if only carbon dioxide were being emitted. The GWP for nitrous oxide is 298, making it an even more potent GHG than methane.

To determine the projected changes in California, well-established climate models were used to project the future climate. The changes in the future climate were found to affect the natural environment in California in the following general ways (California Climate Change Center 2012):

- More frequent, hotter, and longer heat waves, with fewer extremely cold nights;
- Greater numbers of large wildfires burning larger areas;
- Reduced snow pack and stream flow from the Sierra Nevada, affecting winter recreation and water supply;
- Public health impacts from heat waves, including higher temperatures, which will increase ground-level ozone levels;
- Increased electricity demand for cooling in the summer and reduced energy supply from hydropower;
- Accelerated sea-level rise threatening coastal infrastructure and increasing the risk of coastal flooding to vulnerable populations;
- Changes in growing season conditions that may affect agriculture, causing variations in crop quality and yield; and/or
- Changes in distribution of plant and wildlife species because of changes in temperature, competition from colonizing species, changes in hydrologic cycles, changes in sea levels, and other climate-related effects.

These changes in California's climate and ecosystems are occurring at a time when California's population is expected to increase from 37 million to 50 million by 2050 (California Department of Finance 2013). Therefore, the number of people potentially affected by climate change—and the amount of anthropogenic GHG emissions anticipated under a "business as usual" scenario—is expected to increase. Similar changes as those noted above for California are also expected occur in other parts of the world, with regional variations in resources affected and vulnerability to adverse effects.

Anticipated impacts from climate change affecting the San Francisco Bay Area include sea-level rise (threatening coastal areas, San Francisco Bay [Bay] and its associated shoreline habitats, and the Sacramento–San Joaquin River Delta as well as key infrastructure), reduced Sierra snowpack (a main component of the Bay Area's water supply), an increased number of high-heat days and wildfires, and higher levels of air pollution (BAAQMD 2010b). These changes could result in diminished water supply availability and quality, reduced agricultural production, risks to coastal wetland ecosystems, and public health impacts (CEC 2012).

One of the major goals of the Eden Landing Phase 2 Project is to maintain or improve current levels of flood risk management. To that end, the project designs include a number of features intended to address flood risk management. Most of these issues are addressed in Section 3.2, Hydrology, but it is worth noting here that protection from flooding associated with future sea-level rise (and thus with GHG emissions and climate change) is added by the establishment of tidal marshes and habitat transition zones, both of which are central features of the project. Thus, the Eden Landing Phase 2 Project is expected to be part of the long-term adaptation to climate change-related issues in the South Bay.

Greenhouse Gas Emissions

Whereas the effects of traditional air quality pollutants and toxic air contaminants are local, the impacts of GHGs are largely global. The quantity of GHGs that it takes to cause a change in climate is not precisely known; however, the quantity is enormous, and no single project alone would be expected to measurably contribute to a noticeable incremental change in the global average temperature or to global, local, or microclimate changes. The estimated global annual emission of anthropogenic GHGs was 49 billion metric tons in 2004. Of this, agriculture was estimated to contribute 13.5 percent (IPCC 2007). This compares with the estimated emissions from California of 0.484 billion metric tons in 2004 or 0.99 percent of the global emissions.

Emissions of GHGs contributing to global climate change are attributable in large part to human activities associated with the burning of fossil fuels in the industrial/manufacturing, utility, transportation, residential, and agricultural sectors (CEC 2006). Emissions of carbon dioxide are predominantly byproducts of fossil fuel combustion. Methane is a highly potent GHG that results from off-gassing (the release of chemicals from nonmetallic substances under ambient or greater pressure conditions) largely associated with agricultural practices and landfills. Carbon dioxide sinks, or reservoirs, include vegetative growth (which converts carbon dioxide to biomass) and the ocean, which absorbs carbon dioxide through photosynthesis by phytoplankton and dissolution, respectively, two of the most common processes of carbon dioxide sequestration (IPCC 2007).

California produced 441.5 million metric tons of CO_2e in 2014 (CARB 2016). Combustion of fossil fuel in the transportation sector was the single largest source of California's GHG emissions, accounting for 37 percent of total GHG emissions in the state.

Project Setting

This section focuses on GHG emissions from the Eden Landing Phase 2 activities.

Existing Conditions

The existing project area consists of salt ponds and adjacent habitats. There have been many studies on the GHG impacts of wetlands and tidal salt marshes, particularly regarding their potential to produce methane and their ability to sequester carbon (Trulio et al. 2007). GHG emissions and sequestration associated with these land use changes are difficult to quantify, because these effects are somewhat speculative for wetland areas and can vary greatly, depending on the specific time frame of interest, the characteristics of the wetland, geology, climate, and other factors. The emissions and sequestration are typically addressed in a qualitative manner, discussing some of the anticipated outcomes based on evolving scientific studies.

Later in this section, however, the GHG emissions from Eden Landing Phase 2 project implementation are estimated and related to larger regional emissions, and the carbon sequestration potential of the tidal marsh wetlands that would be added under different Eden Landing Phase 2 actions is also estimated. The potential for methane emissions are not quantified.

The Eden Landing Phase 2 project area is comprised of 11 individual ponds and encompasses roughly 2,300 acres of former salt ponds within the southern area of the Eden Landing Ecological Reserve. The Eden Landing Phase 2 project area is generally bounded by San Francisco Bay on the west, Old Alameda Creek (OAC) on the north, the federal Alameda Creek Flood Control Channel (ACFCC) on the south, and

to the east – a mix of suburban/urban communities, the Union Sanitary District Treatment Plant, a county-owned landfill, a Cargill-owned pond (CP3C), and miscellaneous detention basins and drainage channels. The project areas are indirect sources of mobile GHG emissions from recreational users accessing the site. Mobile emissions may also be generated by California Department of Fish and Wildlife (CDFW) staff and others (e.g., contractors) accessing the project areas to perform Adaptive Management Plan (AMP) monitoring, research, and operations and maintenance (O&M) activities of facilities within and near the pond clusters. These O&M activities typically involve the replacement and/or repairs of water control structures, limited levee maintenance and inspection, and trail maintenance.

3.17.2 Regulatory Setting

GHG emissions and sources in the San Francisco Bay Area are regulated by the United States Environmental Protection Agency (USEPA), the California Air Resources Board (CARB), and BAAQMD. Each of these agencies develops rules, regulations, policies, and/or goals to attain the directives imposed through legislation. Although USEPA regulations may not be superseded, both state and local regulations may be more stringent.

Federal Laws and Regulations

At the federal level, USEPA implements national programs related to GHG emissions and climate change under the federal Clean Air Act (CAA) and Clean Air Act Amendments.

Federal Clean Air Act

In 2007, in *Massachusetts v. The Environmental Protection Agency*, the United States Supreme Court ruled that GHGs are air pollutants that are covered under the CAA. The court found that USEPA has a mandatory duty to enact rules regulating mobile GHG emissions pursuant to the federal CAA. The court held that GHGs fit the definition of an air pollutant that causes and contributes to air pollution and may reasonably be anticipated to endanger public health or welfare. In 2009, the USEPA Administrator found that the current and projected concentrations of GHGs threaten public health and welfare of current and future generations and that combined emissions from new motor vehicles contribute to GHG pollution. USEPA's endangerment finding covers emissions of six key GHGs: CO_2, CH_4, N_2O, hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride.

Mobile Source Regulations

On August 9, 2011, USEPA and the National Highway Traffic Safety Administration (NHTSA) announced standards to reduce GHG emissions and improve fuel efficiency for heavy-duty trucks and buses. On October 15, 2012, USEPA and NHTSA established a program to reduce GHG emissions and improve fuel economy standards for new cars and light trucks through 2025 (USEPA 2012a).

Stationary Source Regulations

On May 13, 2010, Clean Air Act permitting programs were tailored to cover the nation's largest GHG emitters: power plants, refineries, and cement production facilities. On March 27, 2012, the USEPA proposed a Carbon Pollution Standard for new power plants that would, for the first time, set limits on the amount of carbon pollution emitted by power plants (USEPA 2012b). On September 20, 2013, this proposal was withdrawn, and a new proposal was issued with a revised approach that would set separate standards for natural-gas-fired turbines and coal-fired units.

Council on Environmental Quality Guidance

In response to President Trump's Executive Order (EO) 13783, the Council on Environmental Quality (CEQ) withdrew its "Final Guidance for Federal Departments and Agencies on Consideration of GHG emissions and Effects of Climate Change in NEPA Reviews" on April 5, 2017. Withdrawing this guidance did not change any previously established law, regulation, or legally binding requirements.

The prior guidance (released in 2016) superseded the draft GHG and climate change guidance released by CEQ in 2010 and 2014. The previous guidance applied to all proposed federal agency actions, including land and resource management actions, and instructed agencies to consider both the potential effects of a proposed action on climate change, as indicated by its estimated GHG emissions, and the implications of climate change for the environmental effects of a proposed action. The prior guidance recommended that agencies quantify a proposed agency action's projected direct and indirect GHG emissions, taking into account available data and GHG quantification tools that are suitable for the proposed agency action (CEQ 2016).

On June 4, 2012, CEQ finalized an Update to the 2010 Guidance on Federal GHG Accounting and Reporting (CEQ 2012). The guidance establishes requirements for federal agencies in calculating and reporting GHG emissions associated with agency operations under Executive Order 13514, Federal Leadership in Environmental, Energy, and Economic Performance. Under the authority of Executive Order 13514, the United States Fish and Wildlife Service (USFWS) has developed a climate change strategy and included sustainability practices within the USFWS Service Manual to reduce and offset GHG emissions and move toward carbon-neutral practices. The USFWS Climate Change Strategic Plan includes Mitigation Goal 5, which aims to change business practices to achieve carbon neutrality by the year 2020. The plan lists objectives to assess and reduce the carbon footprint of the USFWS's facilities, vehicles, workforce, and operations; assess and reduce the USFWS's land management carbon footprint, and offset the remaining carbon balance (USFWS 2010).

State Laws and Regulations

California Air Resources Board

CARB is the agency responsible for coordination and oversight of state and local GHG programs in California. The legal framework for GHG emission reductions in California has come about through Executive Orders, legislation, regulations, and court decisions. Some of the major components of these programs and legislation are highlighted below.

California Global Warming Solutions Act (AB 32)

CARB is the lead agency for implementing Assembly Bill (AB) 32, the California Global Warming Solutions Act, adopted by the California Legislature in 2006. AB 32 set statewide targets to reduce GHG emissions to 1990 levels by 2020. AB 32 also requires CARB to prepare a scoping plan containing the main strategies that will be used to achieve reductions in GHG emissions in California.

CARB recommends for each emissions sector of the State's GHG inventory, but does not directly discuss GHG emissions generated by construction activities. Key elements of the Scoping Plan include the following recommendations:

1. Expanding and strengthening existing energy-efficiency programs and building and appliance standards;

2. Achieving a statewide renewables energy mix of 33 percent;
3. Developing a California cap-and-trade program that links with other Western Climate Initiative partner programs to create a regional market system;
4. Establishing targets for transportation-related GHG emissions for regions throughout California and pursuing policies and incentives to achieve those targets;
5. Adopting and implementing measures pursuant to existing state laws and policies, including California's clean car standards, goods movement measures, and the Low Carbon Fuel Standard; and
6. Creating targeted fees, including a public goods charge on water use, fees on high-GWP gases, and a fee to fund the administrative costs of the state's long-term commitment to AB 32 implementation.

CARB has not yet determined what amount of GHG reductions it recommends from local government operations; however, the Scoping Plan does state 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. 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 emissions sectors. However, in general, this acknowledgement is more relevant to development projects that would change a land use and thus alter emissions from the listed economic sectors than to a restoration project within an area already set aside as a wildlife refuge.

CARB published the First Update to the AB 32 Scoping Plan on May 16, 2014. The update identifies opportunities to leverage existing and new funds to further drive GHG emissions reductions through strategic planning and targeted low-carbon investments. CARB released the proposed 2017 Scoping Plan update for public review on January 21, 2017. The updates define CARB's climate change priorities for the next 5 years and sets the groundwork to reach long-term goals set forth in California Executive Orders S-03-05 and B-16-2012. CARB identified six key focus areas in the update: energy, transportation, agriculture, water, waste management, and natural and working lands. In the natural and working lands focus area, the following actions were identified as important to reducing future GHG emissions through wetland restoration:

- Develop funding mechanisms to support efforts to restore, conserve, and protect wetlands.
- Restore, conserve, and maintain existing wetlands in addition to creating new areas that were not previously sequestering carbon.
- Avoid wetland degradation and conversion that could potentially reduce sequestration benefits and increase emissions.
- Develop actionable policies and measures that conserve wetland resources that provide high sequestration benefit.
- Pursue research related to measuring carbon sequestration potential that will inform and support management actions that maximize sequestration longevity.

Senate Bill 97

In August 2007, the California Legislature adopted SB 97, requiring OPR to prepare and transmit new CEQA guidelines for the mitigation of GHG emissions or the effects of GHG emissions to the Resources Agency by July 1, 2009. OPR submitted its proposed guidelines to the Secretary for Natural Resources on April 13, 2009. The Natural Resources Agency undertook the formal rulemaking process to certify and adopt the amendments as part of the state regulations implementing CEQA and adopted the CEQA Guidelines Amendments on December 30, 2009. The amendments became effective on March 18, 2010. In the CEQA Guidelines Amendments, thresholds of significance for GHG emissions was not specified; nor are assessment methodologies or specific mitigation measures prescribed. Instead, the amendments encourage lead agencies to consider many factors in performing a CEQA analysis, but rely on the lead agencies to make their own determinations based on substantial evidence. The CEQA amendments also encourage public agencies to make use of programmatic mitigation plans and programs from which to tier when they perform individual project analyses.

Executive Orders S-03-05 and B-16-2012

In 2005, Governor Schwarzenegger issued Executive Order S-03-05, calling for statewide GHG reductions to 2000 levels by 2010, to 1990 levels by 2020, and to 80 percent below 1990 levels by 2050. Executive Order S-03-05 also called for a coordinated interagency effort to report on progress made toward meeting the GHG emissions targets and on the impacts of global warming on California. These reports are required biannually,[3] with the latest summary report published in July 2012 (CEC 2012). In March 2012, Governor Brown signed Executive Order B-16-2012, which affirmed the long-range climate goal for California to reduce GHG emissions to 80 percent below 1990 levels by 2050.

Senate Bill 375

SB 375, the Sustainable Communities and Climate Protection Act of 2008 enhances California's ability to reach its AB 32 goals by promoting good land use and transportation planning, with the goal of more sustainable communities. Sustainable communities require CARB to develop regional GHG emissions reduction targets for 2020 and 2035 for each region covered by one of the state's 18 metropolitan planning organizations. The adopted targets for the San Francisco Bay Area metropolitan planning organization, the Metropolitan Transportation Commission (MTC), are 7 percent below 2005 per capita levels by 2020 and 15 percent below 2005 per capita levels by 2035, as set by Executive Order G-11-024.

Assembly Bill 1493

With the passage of AB 1493 in 2002, California launched an innovative and proactive approach for dealing with GHG emissions and climate change at the state level. AB 1493 requires CARB to develop and implement regulations to reduce automobile and light truck GHG emissions. These stricter emissions standards apply to automobiles and light trucks beginning with the 2009 model year. Although litigation was filed challenging these regulations and USEPA initially denied California's related request for a waiver, a waiver has since been granted (CARB 2013).

[3] Although the language in the EO requiring these reports states that they should be issued "biannually," the language in these reports refers to "biennial" reports, and the reports have been issued as such (every 2 years) (http://resources.ca.gov/climate/fourth/).

Low Carbon Fuel Standard

Executive Order S-01-07, the Low Carbon Fuel Standard, was issued in January 2007. The order calls for a reduction of at least 10 percent in the carbon intensity of California's transportation fuels by 2020. The Low Carbon Fuel Standard was approved by CARB in 2009 and became effective on April 15, 2010. The regulation establishes annual performance standards for fuel producers and importers and applies to all fuels used for transportation in California (CARB 2011).

2009 California Climate Adaptation Strategy

The State of California published the 2009 California Climate Adaptation Strategy, which summarizes climate change impacts and provides recommendations on strategies to adapt to its effects. The strategies cover seven sectors, which include public health, biodiversity and habitat, oceans and coastal resources, water, agriculture, forestry, and transportation and energy. In 2014, the California Natural Resources Agency published an update to this plan called Safeguarding California: Reducing Climate Risk. This document provides policy guidance on the preparation, prevention, and response to the effects of climate change within the state of California.

Senate Bill 350

The 2015 Clean Energy and Pollution Reduction Act (SB 350) was signed into law on October 10, 2015, and requires that the amount of electricity generated and sold to retail customers from renewable energy resources be increased to 50 percent by December 31, 2030. A doubling of statewide energy efficiency savings in electricity and natural gas by retail customers must also be achieved by January 1, 2030.

Executive Order B-30-15

In April 2015, Governor Brown signed Executive Order B-30-2015, which established a new interim statewide GHG emission reduction target to reduce GHG emissions to 40 percent below 1990 levels by 2030 in order to ensure California meets its target of reducing GHG emissions to 80 percent below 1990 levels by 2050. It additionally directed all state agencies with jurisdiction over sources of GHG emissions to implement measures, pursuant to statutory authority, to achieve GHG emissions reductions to meet the 2030 and 2050 targets.

Senate Bill 32 and Assembly Bill 197

In September 2016, California Governor Brown signed SB 32 (Chapter 249, Statutes of 2016) and AB 197 (Chapter 250, Statutes of 2016), which require the state to reduce GHG emissions to at least 40 percent below 1990 levels by 2030 and invest in communities most impacted by climate change. SB 32 codifies the 2030 GHG emissions reduction goal established by Executive Order B-30-15, issued by Governor Brown in 2015. AB 197 establishes a legislative committee on climate change policies to help continue the state's activities to reduce greenhouse gas emissions.

Local Laws and Regulations

Bay Area Air Quality Management District

In 1999, BAAQMD released the BAAQMD CEQA Guidelines (BAAQMD 1999). This advisory document provided thresholds for air quality emissions, but did not provide thresholds for GHG emissions. In 2010, BAAQMD adopted air quality guidance that included quantitative thresholds of

significance and recommended Best Management Practices (BMPs) and mitigation measures for GHG emissions, among other pollutants (BAAQMD 2010a).

The thresholds were developed using a "gap-based" threshold, to cover the perceived shortfall between the GHG reductions achieved with the AB 32 Scoping Plan measures and the AB 32 GHG emissions targets. The thresholds were developed based on BAAQMD's expertise and the best-available GHG emissions data and incorporated conservative assumptions for the amount of emissions reductions from legislation to cover the gap (BAAQMD 2009).

The BAAQMD CEQA guidelines did not adopt any significance thresholds for construction-related GHG emissions. Rather, BAAQMD recommended lead agencies to quantify and disclose GHG emissions that would occur during construction and to make a determination on the significance of those emission impacts in relation to meeting the AB 32 GHG reduction goals. BAAQMD also encouraged lead agencies to incorporate BMPs to reduce GHG emissions during construction, as applicable. The BAAQMD CEQA Guidelines included operations-related thresholds of significance for two types of projects: land use development and stationary source projects. For land use development projects, including residential, commercial, industrial, and public land uses and facilities, the threshold was compliance with a qualified GHG reduction strategy or annual emissions of less than 1,100 metric tons of CO_2e or efficiency performance criteria based on service population. For stationary source projects, such as land uses with equipment that emits GHG emissions and would require a BAAQMD permit to operate, the threshold was 10,000 metric tons per year of CO_2e (BAAQMD 2010a).

As discussed for air pollutant thresholds of significance developed by the BAAQMD in Section 3.13, Air Quality, BAAQMD's adoption of the 2010 Thresholds was challenged in court. A court-ordered ruling in the case (*California Building Industry Association v. BAAQMD*, Alameda County Superior Court Case No. RGI0548693) required the BAAQMD thresholds to be subject to further environmental review under CEQA. As a result, the BAAQMD released updated CEQA Guidelines in 2012 (BAAQMD 2012) that removed references to CEQA thresholds. BAAQMD appealed the ruling, and the judgment was reversed on August 13, 2013, by the Court of Appeals of the State of California, First Appellate District. The Court of Appeals' decision was appealed to the California Supreme Court, which granted limited review and held that the Guidelines were valid in part, and remanded the case to the Court of Appeals. In August 2016, the Court of Appeals issued an opinion limited to the challenged receptor-based thresholds, and found that the thresholds may not be used for the primary purpose envisioned by BAAQMD. The case was then remanded to the Alameda County Superior Court, where the matter is currently pending.

The claims made in the case concerned the CEQA impacts of adopting the thresholds, and the court ruling did not specifically address whether the thresholds were supported by "substantial evidence." At this time, the BAAQMD is no longer recommending the use of the 2010 GHG thresholds and instead recommends that lead agencies determine appropriate GHG thresholds of significance based on substantial evidence in the record.

For this GHG analysis and in the absence of other thresholds adopted by the BAAQMD, the 2010 thresholds were used because they were established based on substantial evidence. The BAAQMD released the "Proposed Thresholds of Significance" in 2009, which "provides the *substantial evidence* in support of the thresholds of significance…" (emphasis added) (BAAQMD 2009). Those thresholds for GHG emissions were developed by relying on reasonable, environmentally conservative assumptions on growth in the land use sector, predicted emissions reductions from statewide regulatory measures and the resulting emissions inventories, and the efficacy of GHG mitigation measures.

The issues identified in the BAAQMD CEQA Air Quality Guidelines' court case are not considered relevant to the scientific soundness of the BAAQMD's analysis of the level at which GHG emissions would potentially have a significant impact. Therefore, the usage of these 2010 thresholds is consistent with the BAAQMD's direction that thresholds should be based on substantial evidence.

2017 Bay Area Clean Air Plan

The latest Clean Air Plan was adopted in April 2017 (BAAQMD 2017). The 2017 Clean Air Plan includes a comprehensive strategy designed to reduce ozone, particulate matter, air toxics, and GHGs from stationary, mobile, and transportation sources. Consistent with the CARB GHG reduction goals, the Clean Air Plan's performance objectives are to reduce GHG emissions to 40 percent below 1990 levels by 2035 and 80 percent below 1990 levels by 2050. The plan includes control measures that will directly reduce GHG emissions and many other measures that will reduce GHGs as a co-benefit. Applicable measures include offering retrofit incentives (MSM-B2) for medium- and heavy-duty on-road vehicles, encouraging alternative fuel use for both light- and medium-duty vehicles (MSM-A1) and off-road equipment (MSM-B1 and MSM C-1).

Plan Bay Area

On July 18, 2013, MTC and the Association of Bay Area Governments (ABAG) approved the Plan Bay Area. The plan includes the Sustainable Communities Strategy for the Bay Area, in accordance with SB 375 and the 2040 Regional Transportation Plan. The plan includes integrated land use and transportation strategies for the region. The plan was developed through OneBayArea, a joint initiative between ABAG, BAAQMD, MTC, and the Bay Conservation and Development Commission. The plan's transportation policies focus on maintaining the extensive existing transportation network and utilizing these systems more efficiently to handle density in Bay Area transportation cores (ABAG and MTC 2013).

Many nearby Bay Area counties and cities have adopted GHG policies and climate action plans that contain strategies to reduce GHG emissions. Applicable items from these plans include the following:

- *City of Hayward Climate Action Plan (CAP).* Hayward's original CAP was adopted by the City Council on July 28, 2009, and then incorporated into the City's General Plan in 2014. Hayward's GHG reduction goals include:
    - 20 percent below 2005 baseline emissions levels by 2020
    - 62.7 percent below 2005 baseline emissions levels by 2040
    - 82.5 percent below 2005 baseline emissions levels by 2050
- *Union City CAP.* Union City's CAP was adopted by City Council in October 2010. This plan was developed using a baseline GHG inventory from 2005. The CAP presents a strategy to achieve the City Council's goal of reducing GHG emissions 20 percent below 2005 baseline emissions levels by 2020.
- *County of Alameda Community CAP.* The County Board of Supervisors adopted a comprehensive community CAP for the unincorporated areas within Alameda County on February 4, 2014. This plan includes a series of 37 local programs and policy measures related to transportation, land use, building energy, water, waste, and green infrastructure. This plan, if implemented, could reduce community-wide emissions by more than 15 percent by the year 2020.

3.17.3 Environmental Impacts and Mitigation Measures

Approach to Analysis

The assumptions presented in Sections 3.13, Air Quality, and 3.12, Noise, regarding the types and durations of use of construction equipment and equipment used following construction also apply to this GHG and climate change impact analysis.

Significance Criteria

For the purpose of this analysis, the project would have a significant GHG or climate change impact if it were to:

- Generate GHG emissions, either directly or indirectly, that may have a significant impact on the environment; or
- Conflict with an agency's applicable plan, policy, or regulation designed to reduce GHG emissions.

As stated in Appendix G of the CEQA Guidelines (AEP 2016), the significance standards established by the applicable air quality management or air pollution control district may be used to evaluate impacts.

According to the BAAQMD CEQA guidelines (BAAQMD 2010a), there are thresholds for evaluating GHG emissions from projects and plans and developed guidelines for assessing these impacts for direct and indirect operational emissions. These thresholds include:

1. A bright line emissions threshold of 1,100 metric tons of CO_2e per year;
2. An emissions efficiency metric of 4.6 tons of CO_2e per year per service population; [4] or
3. Consistency with a qualified GHG Reduction Strategy.

The BAAQMD has not adopted any thresholds for evaluating GHG emissions from construction activities. However, other districts, including the South Coast Air Quality Management District and the San Luis Obispo County Air Pollution Control District, have recommended that GHG emissions from construction and short-term sources be amortized over the lifetime of the project for comparison with significance thresholds (SCAQMD 2008; SLOAPCD 2012). For the analysis in this EIR, the construction GHG emissions will be amortized over the lifetime of the project (assuming a 50-year project life) and compared to the bright line emissions threshold of 1,100 metric tons of CO_2e per year, in addition to construction-related BMPs, to evaluate the significance of these emissions. Impact evaluations for the Action Alternatives are assessed based on the existing conditions described in Section 3.17.2, Regulatory Setting, above, and not the conditions that would occur under the No Action Alternative. This approach mimics the evaluation contained in the 2007 Final EIS/R. In this case, the No Action Alternative represents no change from current management direction or level of management intensity provided in the AMP.

As explained in Section 3.1.2, Environmental Setting and Impact Analysis, although both the CEQ Regulations for Implementing NEPA and the CEQA Guidelines were considered during the impact

[4] Service population is the sum of new residents and full time workers.

analysis, impacts identified in this EIR are characterized using CEQA terminology. Please refer to Section 3.1.2 for a description of the terminology used to explain the severity of the impacts.

Program-Level Evaluation Summary

The 2007 Final EIS/R evaluated the program-level impacts of the project. Following the analytical standards of the time (2007), impacts related to climate change and GHG emissions were not evaluated.

Project-Level Evaluation

Overview

GHG emissions from construction and operational activities were evaluated for all alternatives. As described in Chapter 2, Alternatives, each Action Alternative includes dredged material placement and import from a project-constructed offloading facility. The offloading facility and booster pumps may be powered by diesel fuel or electricity. If diesel fuel were to power the construction equipment during dredge material placement, a large diesel generator barge would be moored near the offloading facility in the deep-water channel. Booster pumps and onshore equipment would have individual diesel generators that would be maintained by land- and water-based crews. If electricity were to power construction equipment during dredge material placement, the electrical infrastructure necessary to bring power to the offloading facility and booster pumps would include a substation, overhead transmission line, and submarine power cables. Because GHG emissions would differ if the dredged material placement equipment was primarily powered by diesel fuel or electricity, the Action Alternatives were further subdivided and labeled Alternative Eden B1, C1, and D1 for diesel and Eden B2, C2, and D2 for electric.

Construction

Construction GHG emissions were calculated using the methodologies and assumptions described in Section 3.13, Air Quality. The project may use a diesel or electric engine; therefore, GHG emissions associated with each engine type are evaluated. Electricity-related emissions were estimated using PG&E emission factors for 2015. Detailed modeling input assumptions and output results are provided in Appendix I. Construction GHG emissions for each of the Eden Landing Phase 2 alternatives, including options 1 (diesel pumps) and 2 (electric pumps), are shown in Table 3.17-1.

Table 3.17-1 Eden Landing Pond Complex Construction Emissions Summary

Alternative	CO_2e Emissions (Metric Tons)
Alternative A (No Action)	
Construction emissions	—
Amortized construction emissions (metric tons/year)	—
Alternative B1	
Dredge material placement (diesel pump)	22,677
Construction emissions (other)	666
Total construction emissions	23,343
Amortized construction emissions (metric tons/year)	467
Alternative B2	
Dredge material placement (electric pump)	11,485
Construction emissions (other)	666
Total construction emissions	12,151
Amortized construction emissions (metric tons/year)	243

Table 3.17-1 Eden Landing Pond Complex Construction Emissions Summary

Alternative	CO_2e Emissions (Metric Tons)
Alternative C1	
Dredge material placement (diesel pump)	17,960
Construction emissions (other)	635
Total construction emissions (metric tons)	18,595
Amortized construction emissions (metric tons/year)	372
Alternative C2	
Dredge material placement (electric pump)	9,179
Construction emissions (other)	635
Total construction emissions	9,814
Amortized construction emissions (metric tons/year)	196
Alternative D1	
Dredge material placement (diesel pump)	22,211
Construction emissions (other)	694
Total construction emissions	22,905
Amortized construction emissions (metric tons/year)	458
Alternative D2	
Dredge material placement (electric pump)	10,992
Construction emissions (other)	635
Total construction emissions	11,627
Amortized construction emissions (metric tons/year)	233
Note: Amortized emissions assume a 50-year project lifetime.	

Operations

As discussed in Section 3.13, Air Quality, operations at the project area under the No Action Alternative and the three Action Alternatives would involve off-road equipment usage and on-road vehicle activity during O&M and adaptive management activities. These activities would generate GHG emissions; however, neither the No Action Alternatives nor the Action Alternatives are expected to substantially increase the level of operational activity at southern Eden Landing because the overall approach to O&M would remain unchanged and would largely consist of passenger vehicle use and manual operation of water control structures. Therefore, operational activities and operational GHG emissions at the project area would be similar to existing conditions under the No Action and the Action Alternatives.

As discussed in the project settings section above, the existing project area consists of former salt ponds and adjacent habitats that have the potential to produce methane and to sequester carbon if they are restored to tidal marsh. Quantification of methane emissions would be largely speculative and were therefore not included. However, the potential for restored tidal marshes to sequester carbon was estimated; the results are presented in Impact 3.17-2.

Phase 2 Impact 3.17-1: Construction-Generated GHG Emissions

Alternative Eden A (No Action). Under this alternative, no construction activities would occur within the southern Eden Landing ponds. Although limited O&M activities would be ongoing, they are considered part of baseline operations and not construction. As such, no construction-generated GHG emissions would occur. Long-term operational GHG emissions for this alternative are evaluated in Phase 2 Impact 3.17-2, below.

Alternative Eden A Level of Significance: No Impact

Alternative Eden B1 and B2. Implementation of this alternative would involve excavation of pilot channels, creation of habitat islands and habitat transition zones, trail construction, and levee modifications including raising, breaching, and lowering. Earthmoving activity would occur under this alternative. Material from cut activities would be used reused on-site, and some off-site hauling trips for imported material would be required. Dredged material movement and placement would occur under this alternative using a diesel- or electric-powered offloading facility and pumps. Construction activities would result in the generation of GHG emissions from exhaust from off-road equipment and vehicle activity.

The total construction-related GHG emissions under Alternatives Eden B1 and B2 were calculated and amortized over the lifetime of the project (assumed to be 50 years). Construction emissions using diesel pumps for Alternative Eden B1 would total 23,343 metric tons of CO_2e over the entire construction period, and the amortized emissions were estimated to be 467 metric tons of CO_2e per year. With electric pumps, construction emissions for Alternative Eden B2 would total 12,151 metric tons of CO_2e over the construction period, and the amortized emissions were estimated to be 196 metric tons of CO_2e per year.

As shown in Table 3.17-1, and discussed above, amortized construction GHG emissions would not exceed the bright line emissions threshold of 1,100 metric tons of CO_2e per year. Furthermore, the project would implement several BMPs, developed by the State Coastal Conservancy (SCC), a key project partner, which would be implemented as feasible, that would reduce GHG emissions during construction. These BMPs include incorporation of low-carbon fuels and alternative fuels in construction equipment and vehicles, use of newer engines in off-road equipment, enforcement of equipment idling limits, electrification of equipment, and reduction of vehicle miles traveled (VMT) for worker trips and hauling trips through implementation of VMT reduction plans (SCC 2011). For these reasons, this impact would be less than significant.

Alternatives Eden B1 and B2 Level of Significance: Less than Significant

Alternative Eden C1 and C2. Implementation of this alternative would involve excavation of pilot channels, creation of habitat islands and habitat transition zones, trail construction, and levee modifications including raising, breaching, and lowering. Earthmoving activity would occur under this alternative. Material from cut activities would be reused on-site, and some off-site hauling trips for imported material would be required. Dredged material movement and placement would occur under this alternative using a diesel- or electric-powered offloading facility and pumps. Construction activities would result in the generation of GHG emissions from exhaust from off-road equipment and vehicle activity.

The total construction-related GHG emissions under Alternatives Eden C1 and C2 were calculated and amortized over the lifetime of the project (assumed to be 50 years). Construction emissions using diesel pumps for Alternative Eden C1 would total 22,905 metric tons of CO_2e over the entire construction period, and the amortized emissions were estimated to be 485 metric tons of CO_2e per year. With electric pumps, construction emissions for Alternative Eden C2 would total 11,627 metric tons of CO_2e over the construction period, and the amortized emissions were estimated to be 233 metric tons of CO_2e per year.

As shown in Table 3.17-1, and discussed above, amortized construction GHG emissions would not exceed the bright line emissions threshold of 1,100 metric tons of CO_2e per year. As discussed for Alternative Eden B, the project would also implement SCC-developed BMPs to the extent they are

feasible that would further reduce construction GHG emissions. For these reasons, this impact would be less than significant.

Alternatives Eden C1 and C2 Level of Significance: Less than Significant

Alternative Eden D1 and D2. Implementation of this alternative would involve excavation of pilot channels, creation of habitat islands and habitat transition zones, trail construction, and raising, breaching, and lowering of levees. Earthmoving activity would occur under this alternative. Materials would be used on-site, and some off-site hauling trips for imported material would be required. Dredged material movement and placement would occur under this alternative using a diesel- or electric-powered offloading facility and pumps. Construction activities would result in the generation of GHG emissions from exhaust from off-road equipment and vehicle activity.

The total construction-related GHG emissions under Alternative Eden D1 were calculated and amortized over the lifetime of the project (assumed to be 50 years). Construction emissions using diesel pumps for Alternative Eden D1 would total 23,343 metric tons of CO_2e over the entire construction period, and the amortized emissions were estimated to be 467 metric tons of CO_2e per year. With electric pumps, construction emissions for Alternative Eden D2 would total 12,151 metric tons of CO_2e over the construction period, and the amortized emissions were estimated to be 243 metric tons of CO_2e per year.

As shown in Table 3.17-1, and discussed above, amortized construction GHG emissions would not exceed the bright line emissions threshold of 1,100 metric tons of CO_2e per year. As discussed for Alternative Eden B1, the project would also implement SCC-developed BMPs to the extent they are feasible that would further reduce construction GHG emissions. For these reasons, this impact would be less than significant.

Alternatives Eden D1 and D2 Level of Significance: Less than Significant

Phase 2 Impact 3.17-2: Operational GHG Emissions

Alternative Eden A (No Action). Operations under Alternative Eden A (No Action) would involve limited O&M activities, such as levee repair, trail maintenance, and biological surveys. These activities would occur intermittently over the lifetime of the project. O&M activities would generate GHG emissions associated with the use of vehicles and other equipment. However, the level of activity would be similar to the O&M activities occurring under existing conditions and would not result in a substantial increase in GHG emissions compared to existing operational activities. Therefore, potential impacts from long-term operational GHG emissions would be less than significant.

Alternative Eden A Level of Significance: Less than Significant

Alternatives Eden B1/B2, Eden C1/C2, and Eden D1/D2. The following discussion addresses the three Action Alternatives (Alternatives Eden B, Eden C, and Eden D). In terms of GHG emissions, the operations under the Action Alternatives would be quite similar to the current operations and those that would take place over time under Alternative Eden A. The opening and closing of water control structures is done by hand, and those structures would continue to be reached by regular passenger vehicles (primarily a pick-up truck). All three Action Alternatives include removing the existing pump between the OAC and Pond E1, which could reduce emissions somewhat. All three also feature addition of recreational trails. Although these new recreational trails may generate emissions as a result of vehicle trips, this activity is not anticipated to result in a substantial increase in GHG emissions compared to the

environmental baseline. While there would be some ongoing maintenance of levees and the additional need to maintain trails in all Action Alternatives, there would also be breaching and removal of large areas of levee that would no longer need to be maintained.

Similarly, the habitat transition zones, islands, and other habitat features would need to be maintained and there would be ongoing mosquito abatement, biological monitoring and research, but this would largely be limited to occasional visits in passenger vehicles to remove weeds, perform abatement, or conduct surveys. These activities would have a negligible increase in GHG emissions. Overall, the level of operational activity would not be anticipated to be substantially different compared to existing conditions, and would not result in a substantial increase in GHG emissions compared to existing operational activities.

The project would be expected to increase carbon sequestration in southern Eden Landing over the lifetime of the project. Using natural wetlands' carbon sequestration rates (Callaway et al. 2012) and Verified Carbon Standard's Methodology for Tidal Wetland and Seagrass Restoration (Silverstrum and Crooks 2013), successful tidal marsh establishment under Alternative B would result in 2,270 acres of vegetation that could sequester approximately 800 tons of carbon per year. Tidal marsh establishment in the Bay Ponds under Alternative Eden C would result in 1,375 acres of vegetation that could sequester approximately 485 tons of carbon per year. Under Alternative Eden D, tidal marsh would be established in the Bay Ponds, with the potential to also restore marsh in the remaining ponds later in the project. Tidal marsh establishment in the Bay Ponds under Alternative Eden D would result in 1,375 acres of vegetation that could sequester approximately 485 tons of carbon per year. If the tidal marsh is also established in the remaining ponds, tidal marsh establishment under Alternative Eden D would result in 2,270 acres of vegetation that could sequester approximately 800 tons of carbon per year.

Based on the above discussion, potential impacts from long-term operational emissions would be less than significant.

Alternatives Eden B, Eden C and Eden D Level of Significance: Less than Significant

Phase 2 Impact 3.17-3: Conflicts with Applicable GHG Emissions Reduction Plan, Policy, or Regulation *California Climate Change Center*

Alternative Eden A (No Action). As discussed in Impacts 3.17-1 and 3.17-2, Alternative Eden A (No Action) would not generate construction GHG emissions and would not result in a substantial net increase in operational GHG emissions. The alternative would not conflict with regulations or applicable CAP policies designed to reduce GHG emissions. Impacts would be less than significant.

Alternative Eden A Level of Significance: Less than Significant

Alternatives Eden B1/B2, Eden C1/C2, and Eden D1/D2. As discussed in Impacts 3.17-1 and 3.17-2, the Action Alternatives would generate construction GHG emissions that are less than significant and would not result in substantial net increases in operational GHG emissions.

As discussed in Section 3.17.2, Regulatory Setting, AB 32 set a statewide target to reduce GHG emissions to 1990 levels by 2020, and the AB 32 Scoping Plan outlines the main strategies that will be used to achieve reductions in GHG emissions in California. These reduction strategies focus on building energy-efficiency programs, expanding California's renewable energy portfolio, implementing the California cap-and-trade program for facilities, establishing targets for transportation-related GHG

emissions for California regions, and implementing measures pursuant to existing state laws and policies (including California's clean car standards, goods movement measures, and the Low Carbon Fuel Standard). These measures are not directly applicable to the project, and as such, the project does not conflict with the AB 32 Scoping Plan.

As discussed in Section 3.17.2, Regulatory Setting, Hayward and Union City have adopted or drafted CAPs containing GHG emission-reduction policies. Applicable policies from these CAPs include reduction of vehicle and equipment idling, use of low-carbon fuels, use of cleaner engines and technology, and reduction or diversion of waste during construction. These are generally similar to and included in the SCC-developed BMPs discussed under Impact 3.17-1, above. The Phase 2 project at southern Eden Landing would implement these BMPs to the extent they are feasible to reduce GHG emissions during construction. The SCC BMPs require the incorporation of low-carbon fuels and alternative fuels in construction equipment and vehicles, use of newer engines in off-road equipment, enforcement of equipment idling limits, electrification of equipment, and reduction of VMT for worker trips and hauling trips through implementation of VMT reduction plans (SCC 2011). These BMPs would be consistent with applicable CAP policies, and the project would therefore not conflict with the CAPs and applicable CAP policies.

None of the three Action Alternatives would conflict with regulations or applicable CAP policies designed to reduce GHG emissions. Impacts would be less than significant.

Alternatives Eden B1/B2, Eden C1/C2, and Eden D1/D2 Level of Significance: Less than Significant

Impact Summary

Phase 2 impacts and levels of significance are summarized in Table 3.17-2. The levels of significance are those remaining after implementation of program-level mitigation measures, project-level design features, the AMP and other CDFW management practices and documents. The GHG analysis required no project-level mitigation measures to reduce the impacts to a level that is less than significant.

Table 3.17-2 Phase 2 Summary of Impacts – GHG Emissions

IMPACT	Alternative Eden A	Alternative Eden B1/B2	Alternative Eden C1/C2	Alternative Eden D1/D2
Phase 2 Impact 3.17-1: Construction- generated GHG emissions.	NI	LTS	LTS	LTS
Phase 2 Impact 3.17-2: Operational GHG emissions.	LTS	LTS	LTS	LTS
Phase 2 Impact 3.17-3: Conflicts with applicable GHG emissions reduction plan, policy, or regulation.	LTS	LTS	LTS	LTS

Note:

Alternative Eden A is the No Action Alternative (No Project Alternative under CEQA).

LTS = Less than Significant
NI = No Impact