

3.7 Climate Change and Greenhouse Gases

3.7.1 Introduction

This section analyzes the proposed project's potential impacts related to climate change and greenhouse gases (GHGs). It describes existing conditions in the project area and summarizes the overall Federal, state, and local regulatory framework for climate change and greenhouse gases, and it analyzes the potential for the proposed project to affect these resources.

3.7.2 Existing Conditions

This section discusses the existing conditions related to climate change and GHGs in the project area.

Principal Greenhouse Gas Emissions

The primary GHGs generated by the proposed project would be CO₂, CH₄, and N₂O. Each of these gases is discussed in detail below. Note that perfluorocarbons are not discussed because these gases are primarily generated by industrial and manufacturing processes that will not be undertaken for the proposed project.

To simplify reporting and analysis, emissions of GHGs are described in terms of a single gas: CO₂. The most commonly accepted method to compare GHG emissions is the global warming potential (GWP) methodology defined in the collective documents published by Intergovernmental Panel on Climate Change (IPCC). The IPCC defines the GWP of various GHG emissions on a normalized scale that recasts all GHG emissions in terms of CO₂ equivalent (CO₂e), which compares the gas in question to that of the same mass of CO₂ (CO₂ has a GWP of 1 by definition). The GWP values used in this report are based on the IPCC Fourth Assessment Report (AR4) and United Nations Framework Convention on Climate Change reporting guidelines and are defined in Table 3.7-1 (Intergovernmental Panel on Climate Change 2007a). The AR4 GWP values are used in the California Air Resources Board's (ARB) California inventory and Assembly Bill (AB) 32 Scoping Plan estimate update (California Air Resources Board 2014).

Table 3.7-1 lists the global warming potential of CO₂, CH₄, and N₂O; their lifetimes; and abundances in the atmosphere.

Table 3.7-1. Lifetimes and Global Warming Potentials of Several Greenhouse Gases

Greenhouse Gases	Global Warming Potential (100 years)	Lifetime (years)	2014 Atmospheric Abundance
CO ₂ (ppm)	1	50–200	394
CH ₄ (ppb)	25	9–15	1,893
N ₂ O (ppb)	298	121	326

Sources: Intergovernmental Panel on Climate Change 2007a; Blasing 2014; National Oceanic and Atmospheric Administration 2015.

ppm = parts per million by volume.

ppb = parts per billion by volume.

Carbon Dioxide

CO₂ is the most important anthropogenic GHG and accounts for more than 75% of all GHG emissions caused by humans. Atmospheric CO₂ has increased from a pre-industrial concentration of 280 parts per million (ppm) to 400 ppm in 2015 (Intergovernmental Panel on Climate Change 2007a; National Oceanic and Atmospheric Administration 2015). Its atmospheric lifetime of 50–200 years ensures that atmospheric concentrations of CO₂ will remain elevated for decades even after mitigation efforts to reduce GHG concentrations are promulgated (Intergovernmental Panel on Climate Change 2007b). The primary sources of anthropogenic CO₂ in the atmosphere include the burning of fossil fuels (including motor vehicles), gas flaring, cement production, and land use changes (e.g., deforestation, oxidation of elemental carbon). CO₂ can be removed from the atmosphere by photosynthetic organisms.

Methane

CH₄, the main component of natural gas, is the second most abundant GHG and has a GWP of 25 (Intergovernmental Panel on Climate Change 2007a). Atmospheric CH₄ has increased from a pre-industrial concentration of 715 parts per billion (ppb) to 1,893 ppb in 2014 (Intergovernmental Panel on Climate Change 2007a; Blasing 2014). Sources of anthropogenic emissions of CH₄ include rice fields, cattle, natural gas use, landfill outgassing, and coal mining (National Oceanic and Atmospheric Administration 2005). Certain land uses also function as both CH₄ sources and sinks. For example, wetlands are terrestrial sources of CH₄, and undisturbed, aerobic soils act as a CH₄ sink (i.e., they remove CH₄ from the atmosphere).

Nitrous Oxide

N₂O is a powerful GHG with a GWP of 298 (IPCC 2007b). N₂O concentrations in the atmosphere have increased 18% from pre-industrial levels of 270 ppb to 326 ppb in 2014 (Intergovernmental Panel on Climate Change 2007a; Blasing 2014). Anthropogenic sources of N₂O include agricultural processes (e.g., fertilizer application), nylon production, fuel-fired power plants, nitric acid production, and vehicle emissions. N₂O is also used in rocket engines, racecars, and aerosol spray containers. Additionally, natural processes such as nitrification and denitrification can produce N₂O that diffuses into atmosphere. In the United States more than 70% of N₂O emissions are related to agricultural soil management practices, particularly fertilizer application.

3.7.3 Regulatory Setting

This section summarizes key Federal, state, and local regulatory information that applies to climate change and GHGs.

3.7.3.1 Federal

Although there is currently no Federal overarching law or policy related to climate change or the regulation of GHGs, recent activity suggests that regulation may be forthcoming. Foremost among recent developments has been the U.S. Supreme Court's decision in *Massachusetts et al. v. U.S. Environmental Protection Agency (EPA)*, the Endangerment Finding, and Cause or Contribute Finding. Despite these findings, the future of GHG regulations at the Federal level is still uncertain. EPA regulation may be preempted by congressional action, should a cap-and-trade bill be passed prior to adoption of EPA regulation.

3.7.3.2 State

The State of California has adopted legislation, and regulatory agencies have enacted policies, addressing various aspects of climate change and GHG emissions mitigation. Much of this legislation and policy activity is not directed at citizens or jurisdictions but rather establishes a broad framework for the state's long-term GHG mitigation and climate change adaptation program.

Assembly Bill 32—The California Global Warming Solutions Act (2006)

AB 32 codified the state's GHG emissions target by requiring that the state's GHG emissions be reduced to 1990 levels by 2020. Since AB 32 was adopted, ARB, California Energy Commission, California Public Utilities Commission, and Building Standards Commission have been developing regulations that will help meet the goals of AB 32 and EO S-03-05. The Scoping Plan for AB 32, developed by ARB as part of the requirements of AB 32, identifies specific measures and actions to reduce GHG emissions to 1990 levels by 2020 and requires ARB and other state agencies to develop and enforce regulations and other initiatives for reducing GHGs.

Climate Change Scoping Plan

On December 11, 2008, pursuant to AB 32, ARB adopted the Climate Change Scoping Plan. This plan outlines how emissions reductions from significant sources of GHGs will be achieved via regulations, market mechanisms, and other actions. Six key elements, outlined in the scoping plan, are identified to achieve emissions reduction targets.

- Expanding and strengthening existing energy efficiency programs and building and appliance standards.
- Achieving a statewide renewable energy mix of 33%.
- Developing a California cap-and-trade program that links with other Western Climate Initiative partner programs to create a regional market system.
- Establishing targets for transportation-related GHG emissions for regions throughout California and pursuing policies and incentives to achieve those targets.
- 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.
- 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.

The Climate Change Scoping Plan also described recommended measures that were developed to reduce GHG emissions from key sources and activities while improving public health, promoting a cleaner environment, preserving our natural resources, and ensuring that the effects of the reductions are equitable and do not disproportionately affect low-income and minority communities. These measures put the state on a path to meet the long-term 2050 goal of reducing California's GHG emissions to 80% below 1990 levels.

Executive Order B-30-15 (2015)

California EO B-30-15 established a medium-term goal of reducing GHG emissions by 40% compared to 1990 levels by 2030, and requires California Air Resources Board (ARB) to update its

current AB 32 Scoping Plan to identify the measures to meet the 2030 target. The executive order is only currently binding on state agencies. However, at the time of preparation of this analysis, there is proposed state legislation that would establish this target in statute and to give ARB the authority to adopt interim binding GHG targets (Senate Bill [SB] 32 [Pavley]).

3.7.3.3 Local

The local air quality district is Butte County Air Quality Management District (BCAQMD). The BCAQMD does not regulate GHG emissions, nor has the BCAQMD established GHG thresholds to measure the significance of GHG emissions from land use conversion or construction projects.

Butte County

Butte County Climate Action Plan

Although Butte County's California Environmental Quality Act (CEQA) guidance does not specify GHG thresholds, the County adopted its Climate Action Plan (CAP) on February 25, 2014 (County of Butte 2014). The plan, which has undergone subsequent updates, is an implementation mechanism of the County's General Plan that was adopted in 2010 and amended in 2012. The Butte County CAP provides goals, policies, and programs to reduce GHG emissions, address climate change adaptation, and improve quality of life in the county. The Butte County CAP also supports statewide GHG emissions-reduction goals identified in AB 32 and SB 375. Programs and actions in the Butte County CAP will help the County sustain its natural resources, grow efficiently, ensure long-term resiliency to a changing environmental and economic climate, and improve transportation. The Butte County CAP also serves as a Qualified GHG Reduction Strategy under CEQA, simplifying development review for new projects that are consistent with the CAP. Section 15183.5 of the State CEQA Guidelines establishes opportunities for CEQA tiering for qualified GHG reduction plans, in which the impacts of projects that are consistent with the adopted GHG reduction plans can be considered less than significant and their contributions to cumulative emissions are not considered cumulatively considerable; however, the GHG reduction plan must meet Section 15183.5 criteria. The Butte County CAP is not appropriate for tiering the proposed project because it is a construction-only project; however, the CAP can be used for tiering other types of projects.

2014 BCAQMD CEQA Handbook

BCAQMD's 2008 *CEQA Air Quality Handbook* did not provide specific guidance for evaluating GHG impacts. The updated handbook was released in 2014 and was used to prepare this document (Butte County Air Quality Management District 2014). The 2014 handbook recommends that CEQA analyses addressing the potential impacts of project-generated GHG emissions include the following.

- An inventory of the project's construction and operational sources of GHGs and the time periods when emissions are expected, distinguishing BCAQMD-permitted stationary sources from mobile and other non-permitted sources.
- The current state of the science with respect to GHGs and climate change and the existing regulatory environment.
- The non-project GHG setting representing the baseline for determining the project's impact.
- Identification of the thresholds of significance applicable to the proposed project. The lead agency may consider thresholds of significance adopted or recommended by other lead

agencies, or adopt its own thresholds, provided the decision is supported by substantial evidence. Alternatively the lead agency may consider thresholds based on the goals of AB Bill 32.

Sacramento Metropolitan Air Quality Management District GHG Thresholds of Significance

As previously mentioned, the BCAQMD has not established GHG thresholds to measure the significance of GHG emissions from land use or construction projects. Sacramento Metropolitan Air Quality Management District (SMAQMD) adopted GHG thresholds in October 2014 to evaluate and disclose the significance of GHG emissions from land use and construction projects in compliance with CEQA and the AB 32 Scoping Plan. SMAQMD's GHG thresholds, which have been designated *Sacramento Area Regional GHG Thresholds*, were established using guidance from the California Air Pollution Control Officers Association (CAPCOA) on how to develop the threshold concepts for evaluating project-level GHG emissions (Huss pers. comm.). The thresholds also incorporated input from a committee of regional air districts.

Although the Sacramento Area Regional GHG Thresholds were not formally adopted by the BCAQMD, the BCAQMD and other districts in the region (e.g., Yolo Solano Air Management District, Placer County Air Pollution Control District, El Dorado County Air Quality Management District) use them for GHG analyses. Therefore, Sutter Butte Flood Control Agency (SBFCA) will apply these thresholds to determine the significance of GHG emissions from the proposed modifications because these thresholds were developed with a regional perspective and are in compliance with expert advice from CAPCOA. More detailed discussion of the Sacramento Area Regional GHG thresholds is provided below in Section 3.7.4.2, *Determination of Effects*.

3.7.4 Environmental Effects

This section describes the assessment methods and environmental effects determination for the potential impacts of the proposed project on climate change and GHGs.

3.7.4.1 Assessment Methods

The assessment methods related to climate change and GHGs for the proposed project are described below.

Quantitative estimates of GHG emissions for the proposed modifications were forecast using construction activity data provided by HDR, SBFCA's professional engineering firm, and using default emission factors from CalEEMod (Version 2013.2.2). CalEEMod is currently the accepted model used in the industry. Detailed information on the emission calculation methods is provided in Appendix 3.6-A. The following types of project-specific information were used.

- Duration of each type of construction activity at the proposed project site. This information was provided by HDR (see Chapter 2, *Project Description*).
- Type of each construction equipment, number of pieces of each type, and the duration of each type of construction activity. This information was provided by HDR for the combined Hydraulic Improvements and Recreation Features components (see Chapter 2, *Project Description*) and for the Vegetation Management component (see Appendix 3.6-A). As previously mentioned, the project area is within the jurisdiction of BCAQMD.

- Equipment usage at the proposed project site was assumed to be a maximum of 10 hours per day (see Chapter 2, *Project Description*). Equipment usage as a percentage of maximum hours of daily usage is presented in Table 2-2 of Chapter 2.
- Quantities of borrow material, spoil material, and supplies to be delivered to the proposed project site. This information was provided by HDR (see Chapter 2, *Project Description*).
- Number of employees for the Vegetation Management component was based on data provided by HDR, see Appendix 3.6-A.
- Default operating parameters for each type of construction equipment (horsepower and load factor) were set by CalEEMod.
- Default number of employees per phase of Hydraulic Improvements/Recreation Features components were set by CalEEMod.
- Default emission factors for fuel consumption and GHG emission rates (CO₂ and CH₄) for non-road construction equipment, on-road delivery trucks, and on-road commute vehicles were set by CalEEMod.

3.7.4.2 Determination of Effects

Although not formally adopted by BCAQMD, SMAQMD's Sacramento Area Regional GHG Thresholds were used to evaluate the forecast emissions for the proposed project for multiple reasons. The thresholds, which are based on AB 32's requirement to reduce statewide GHG emissions from both existing and new development to 1990 levels by 2020, rely upon a capture rate and a gap analysis, which is tied back to AB 32 reduction targets (i.e., 1990 levels by 2020). The Sacramento Area Regional GHG Thresholds reflect regional land use conditions, including density and access to transit. Because these thresholds are specific to the project region, mirror CAPCOA's expert guidance, and are consistent with the objectives of AB 32, they were determined to be an effective benchmark for evaluating the significance of GHG emissions for the proposed project (see Citizens for Responsible Equitable Environmental Development [CREED] versus City of Chula Vista [July 2011, 197 Cal.App.4th 327]). Additionally, although Butte County adopted CAPs or similar program-level GHG reduction documents, the guidance provided in these documents is not appropriate for evaluating or tiering effects related to construction-only projects such as the proposed project. A CAP is intended to present a strategy to reduce long-term emissions most commonly associated with development projects or related actions that have a long-term operational component.

The Sacramento Area Regional GHG Thresholds include the following project categories and emission levels.

- **Stationary source projects:** 10,000 direct metric tons of CO₂e per year.
- **Operation of a land development project:** 1,100 metric tons CO₂e per year.
- **Construction of a project:** 1,100 metric tons CO₂e per year.

Because the proposed project is a construction project, Sacramento Area Regional GHG Threshold for project construction of 1,100 metric tons CO₂e was used as the criterion to determine whether construction-source emissions would be significant under CEQA. Construction-related annual emissions below 1,100 metric tons of CO₂e would result in a less-than-significant impact on global climate change. Emission levels that exceed this threshold are considered significant and must be mitigated below 1,100 metric tons of CO₂e.

3.7.4.3 CEQA Checklist

Potential impacts of the proposed project on climate change and greenhouse gases are discussed in the context of State CEQA Guidelines Appendix G checklist items.

a. Generate a significant amount of GHG emissions, either directly or indirectly?

Impact GHG-1: Increase in GHG Emissions during Construction Exceeding Threshold (less than significant for all components)

BCAQMD has not formally adopted GHG thresholds for general construction projects. Therefore, a threshold of 1,100 metric tons (MT) CO₂e per year, consistent with the Sacramento Area Regional GHG Thresholds, was used to evaluate CO₂e emissions from proposed construction activities associated with the proposed project. As noted in Table 3.7-2, the CO₂e emissions associated with the Vegetation Management component without mitigation would be 60.5 MT in both 2017 and 2018, as the construction equipment and activities for 2018 was conservatively assumed to be equal to construction equipment and activities for 2017. The CO₂e emissions associated with the combined Hydraulic Improvements and Recreation Features components in 2017 are estimated at about 588 MT. Since construction activities associated with all three project components will occur in the year 2017, total CO₂e emissions for that year are added together, with total GHG emission in 2017 estimated at approximately 648 MT CO₂e. For the year 2018, only construction activities related to Vegetation Management will occur.

As indicated in Table 3.7-2, total CO₂e emissions for both 2017 and 2018 would be below the 1,100 MT threshold used to evaluate the proposed project. Therefore, this impact would be less than significant.

Table 3.7-2. Forecast Greenhouse Gas Emissions During Construction

Emission Category	GHG Metric Tons			
	CO ₂	CH ₄	N ₂ O	CO ₂ e
2017				
Vegetation Management	60.3	<0.01	0	60.6
Hydraulic Improvements/Recreation Features	586.2	0.07	0	587.9
2017 Total CO ₂ e Emissions				648.4
2018				
Vegetation Management	60.3	<0.01	0	60.6
2018 Total CO ₂ e Emissions				60.6

^a Global warming potentials of CO₂ = 1, CH₄ = 25, N₂O = 298 (Intergovernmental Panel on Climate Change 2007a).

Note: Values may not add due to rounding.
 GHG = greenhouse gas.
 CO₂e = carbon dioxide equivalent.
 CO₂ = carbon dioxide.
 CH₄ = methane.
 N₂O = nitrous oxide.

b. Conflict with an applicable plan, policy, or regulation adopted for the purpose of reducing the emissions of greenhouse gases?

Impact GHG-2: Conflict with an Applicable Plan, Policy, or Regulation Adopted for the Purpose of Reducing the Emissions of GHGs (less than significant for all components)

At the time of preparation of this document, no Federal, state, or local agency with jurisdiction over the Oroville Wildlife Area had adopted plans or regulations that set specific goals for emission limits or emission reductions applicable to the proposed project. As described in Effect CC-1, the average forecast emissions from the implementation of the proposed project were compared to presumptive significance thresholds that were derived from the Sacramento Area Regional GHG Thresholds that are conservatively low. The forecast emission rates for the proposed project are below the presumptive significance thresholds. Therefore, implementation of the proposed project would not conflict with, or obstruct, the implementation of GHG emission reduction plans. This impact would be less than significant.