PUBLIC REVIEW DRAFT

Prepared for:

City of Angels
P.O. Box 667
Angels Camp, California 95222
Contact: Amy Augustine, AICP

Initial Study/Negative Declaration

Greenhouse Gas Reduction Plan

SCH No.:

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JUNE 2026

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Acronyms and Abbreviations

Acronym/Abbreviation	Definition
ABAU	Adjusted business-as-usual
amsl	Above meal sea level
AB	Assembly Bill
BAU	Business-as-usual
BMPs	Best Management Practices
CAAQS	California Ambient Air Quality Standards
CAL FIRE	California Department of Forestry and Fire Protection
CDFW	California Department of Fish and Wildlife
CCR	California Code of Regulations
CARB	California Air Resources Board
CBC	California Building Code
CCAPCD	Calaveras County Air Pollution Control District
CCOG	Calaveras County Council of Governments
CEQA	California Environmental Quality Act
CH_4	Methane
CO_2	Carbon Dioxide
DTSC	California Department of Toxic Substances Control
EHS	Environmental Health Services
EIR	Environmental Impact Report
EOP	Emergency Operations Plan
EV	Electric vehicles
EO	Executive Order
FEMA	Federal Emergency Management Agency
FHSZ	Fire Hazard Severity Zone
FMMP	Farmland Mapping and Monitoring Program
GHG	Greenhouse gas
GHGRP	Greenhouse Gas Reduction Plan
HCP	Habitat Conservation Plan
HFCs	Hydrofluorocarbons
IS	Initial Study
IS/ND	Initial Study/Negative Declaration
LRA	Local Responsibility Area
MJHMP	Multi-Jurisdictional Hazard Mitigation Plan
MND	Mitigated Negative Declaration
MRZs	Mineral Resource Zones
MT CO_2^e	Metric tons of carbon dioxide equivalent
N_2O	Nitrous oxide
NAAQS	National Ambient Air Quality Standards

NAHC	Native American Heritage Commission
NCCP	Natural Community Conservation Plan
ND	Negative Declaration
NPDES	National Pollutant Discharge Elimination System
PFCs	Perfluorocarbons
PG&E	Pacific Gas and Electric Company
PV	Photovoltaic
RTP	Regional Transportation Plan
SB	Senate Bill
SF_6	Sulfur hexafluoride
SGMA	Sustainable Groundwater Management Act
SIP	State Implementation Plan
SMARA	Surface Mining and Reclamation Act of 1975
SOI	Sphere of Influence
SRA	State Responsibility Area
TACs	Toxic air contaminants
USFWS	United States Fish and Wildlife Service
USEPA	United States Environmental Protection Agency
VMT	Vehicle miles traveled
WWTP	Wastewater Treatment Plant
ZEV	Zero emissions vehicles

1.0 Introduction and Purpose

1.1 Project Overview

The proposed project includes the City of Angels (Angels Camp) 2025 Greenhouse Gas Reduction Plan (GHGRP). The GHGRP includes measures to enable the City to meet its targets for GHG emissions consistent with current targets for the State to the year 2045. The GHGRP also includes forecasts of GHG emissions in Angels Camp through 2045, outlines updated State GHG reduction targets, and includes GHG Reduction Measures with quantified measures to reduce GHG emissions associated with energy, transportation, solid waste, and water and wastewater.

1.2 Statutory Authority Requirements

In accordance with the California Environmental Quality Act of 1970, as amended (California Public Resources Code, Section 21000-21177) and pursuant to the State CEQA Guidelines (Title 14, California Code of Regulations [CCR], Chapter 3, Section 15063), the City, acting in the capacity of the Lead Agency, is required to undertake the preparation of an Initial Study (IS) to determine if the project would have significant environmental impacts. The environmental document is intended as informational, undertaken to provide an environmental basis for subsequent discretionary actions on the project. The resulting documentation is not, however, a policy document, and its approval and/or certification neither presupposes nor mandates any actions on the part of those agencies from whom permits and other discretionary approval would be required.

The environmental documentation and supporting analysis will be subject to a public review period. During this review, public comments on the documentation should be addressed to the City. Following the review of any comments received pertaining to the CEQA review, the City will consider these comments as part of the project's environmental review and determination. The comments will be included in the IS document for consideration by the City of Angels' Planning Commission and City Council.

1.3 Purpose of the Initial Study

The purpose of the Initial Study is to: (1) identify environmental impacts; (2) provide the Lead Agency with information to use as the basis for deciding whether to prepare an Environmental Impact Report (EIR), Mitigated Negative Declaration (MND) or Negative Declaration (ND); (3) enable a Lead Agency or Applicant to modify a project, mitigating potential adverse impacts before an EIR is prepared; (4) facilitate an environmental assessment early in the design of a project; (5) provide documentation of the factual basis for the finding in an MND or ND that a project would not have a significant environmental effect; (6) eliminate needless EIRs; (7) determine whether a previously prepared EIR could be used for a project; and (8) assist in the preparation of an EIR, if required, by focusing the EIR on the effects determined to be significant, identifying the effects determined not to be significant, and explaining the reasons for determining that potentially significant effects would not be significant.

Section 15063 of the State CEQA Guidelines identifies specific disclosure requirements for inclusion in an IS. Pursuant to those requirements, an IS must include the following: (1) a description of the project, including the location of the project; (2) an identification of the environmental setting; (3) an identification of environmental effects by use of a checklist; (4) a discussion of ways to mitigate significant effects identified, if any; (5) an examination of a project's compatibility with existing zoning, plans, and other applicable land use controls; and (6) the name of the person or persons who prepared or participated in the preparation of the IS.

1.4 California Environmental Quality Act Compliance

In accordance with CEQA and the State CEQA Guidelines, this Initial Study has been prepared for the proposed project and its associated discretionary approvals. The Initial Study indicates that the project would result in less than significant impacts, and therefore, the project requires preparation of an Initial Study/Negative Declaration (IS/ND).

The IS/ND serves as the environmental document that presents the analysis of project impacts on each of the environmental topic areas in the CEQA Environmental Checklist provided in Section 3.0. This document will serve to inform City decision makers, representatives of affected trustee and responsible agencies, and other interested parties of the potential environmental effects that may occur with approval and implementation of the proposed project.

1.5 California Environmental Quality Act Review and Comment

This IS/ND has been submitted to potentially affected agencies and individuals. Notices of the availability of the IS/ND for review and comment, as well as the environmental documentation, are available on the City of Angels' website (https://angelscamp.gov/community-development/planning/) for review.

A 30-day public review period has been established for the IS/ND in accordance with Section 15073 of the State CEQA Guidelines. During review of the IS/ND, affected public agencies and the interested public should focus on the document's adequacy in identifying and analyzing the potential environmental impacts and the ways in which the potentially significant effects of the project can be avoided or mitigated. Comments on the IS/ND and the analysis contained herein must be received by 5:00 p.m. on July 6, 2026, and should be addressed to:

City of Angels
Amy Augustine, AICP, Project Planner
P.O. Box 667
200 Monte Verda Street, Suite B
Angels Camp, CA 95222
planning@angelscamp.gov
209.743.2323

Following receipt and evaluation of comments from agencies, organizations, and/or individuals, the City will determine whether any substantial new environmental issues have been raised. If so, further documentation – such as an EIR or an Initial Study/Mitigated Negative Declaration (IS/MND) – may be required. If not, the project and the environmental documentation are tentatively scheduled to be submitted to the Angels Camp Planning Commission and City Council for consideration.

1.6 Organization of the Initial Study

The IS/ND is organized into sections, as described below:

- **Section 1.0: Introduction and Purpose.** This section provides an introduction, project summary, and overview of the conclusions in the IS/ND.
- **Section 2.0**: **Project Description.** This section provides a brief description of the project location, relevant background information, and a description of the existing conditions of the project site and vicinity. This section provides a description of the proposed project and necessary discretionary approvals.
- **Section 3.0: Environmental Checklist.** The completed Environmental Checklist Form from the State CEQA Guidelines provides an overview of the potential impacts that may or may not result from project implementation. The Environmental Checklist Form also includes "mandatory findings of significance", as

required by CEQA. The analysis concludes the significance of impacts and standard conditions, regulatory requirements, and mitigation measures to reduce potentially significant impacts.

- **Section 4.0: List of Preparers.** This section lists the preparers of the document.

2.0 Project Description

2.1 Project Location

The proposed Draft Greenhouse Gas Reduction Plan (GHGRP) is for the entire City of Angels (Angels Camp, or City). Angels Camp is located at an elevation ranging between 1,500± and 1,580± feet above mean sea level (amsl) in the central Sierra Nevada foothills in Calaveras County, 77 miles southeast of Sacramento, 67 miles west of the California-Nevada border, and 40 miles east of the San Joaquin River. State Route 4 (SR 4) connects the City to the San Joaquin River Delta and San Francisco Bay to the west and the Sierra Nevada mountains to the east. State Route 49 (SR 49), also known as the Golden Chain Highway, traverses the northern and eastern portions of the City, and continues north toward Sacramento. Exhibits 1 and 2 show the regional vicinity and site vicinity, respectively.

The Planning Area is bordered to the north and east by unincorporated Calaveras County (including the community of Vallecito), to the west by unincorporated Calaveras County, and to the south by New Melones Lake. Based on the City's 2020 General Plan, Table 1-8, Summary of Land Uses, the primary land uses in the Planning Area include Residential, Public, Right of Way, Special Planning, Industrial, Business Attraction, and Commercial designations. According to the Angels Camp 2020 General Plan (General Plan), residential land uses are intended to provide a variety of housing options throughout the City. Additionally, Public and/or Right of Way land uses are intended to accommodate government buildings, schools, transportation facilities, and similar uses. Special Planning land uses are intended to provide uniform, unique, or flexible development with compatible mixed-uses and physical characteristics. Commercial land uses are intended to provide a broad range of commercial uses for residents and visitors, including grocery and specialty stores, hotels, restaurants, and similar uses.

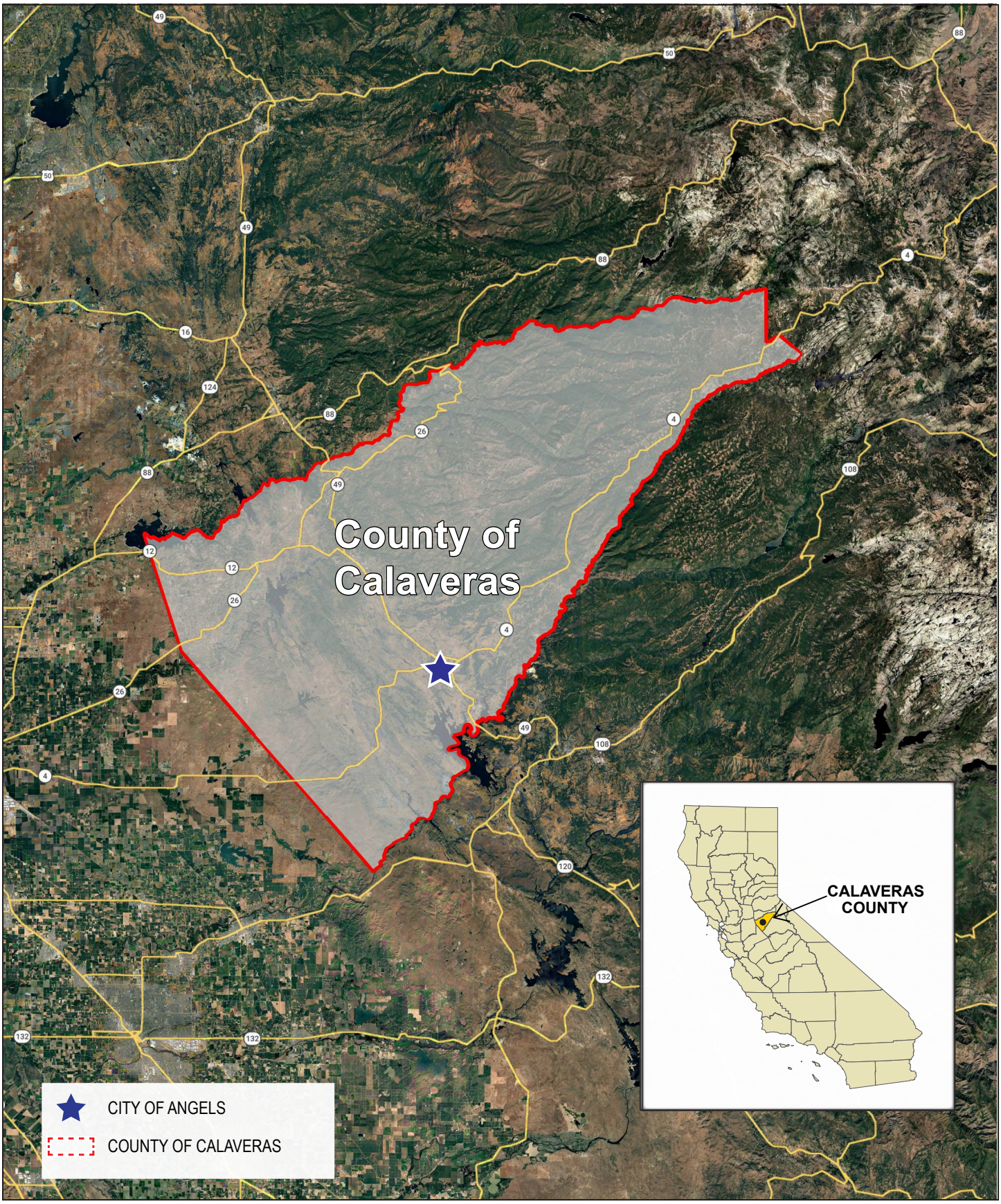
2.2 Environmental Setting

Due to the City's location in the Sierra Nevada foothills, the City anticipates that hazards related to climate change may increasingly impact the City. The following hazards associated with climate change have been identified as having the potential to impact the City: drought, increase in average temperature, increases in heat waves, decreases in winter chill hours, wildfires, tree mortality, reduction in spring runoff volumes, and extreme atmospheric river events. While these challenges are anticipated to occur throughout California, the impacts associated with them are often disproportionately borne by vulnerable and disadvantaged populations. Additionally, the City's economic vitality relies on tourism, recreation, agriculture, fishing, and other industries that depend on certain cultural, social, and economic resources within the area. These resources are affected by the health of the local ecosystem, which is likely to be impacted by climate change.

2.3 Project Background

The State of California has adopted a wide variety of regulations aimed at reducing the State's GHG emissions. In addition to the efforts at the State level, local governments have broad influence and, in some cases, exclusive jurisdiction over activities that contribute to significant GHG emissions through their planning and permitting processes, local ordinances, outreach and education efforts, and municipal operations. As a result, many communities throughout the State are taking responsibility for planning efforts to reduce energy usage and emissions. Through proactive measures in land use, transportation, energy efficiency, green building, waste diversion, water conservation, and more, local governments can help residents and businesses save money while improving quality of life and reducing emissions in their communities.

In a joint effort with the Calaveras Council of Governments (CCOG), the City of Angels and Calaveras County have drafted policy documents addressing greenhouse gases (GHG) in two phases to achieve compliance with State law. California State law requires local jurisdictions to address climate vulnerability and incorporate climate adaptation



Source: Google Earth Pro, April 2026.

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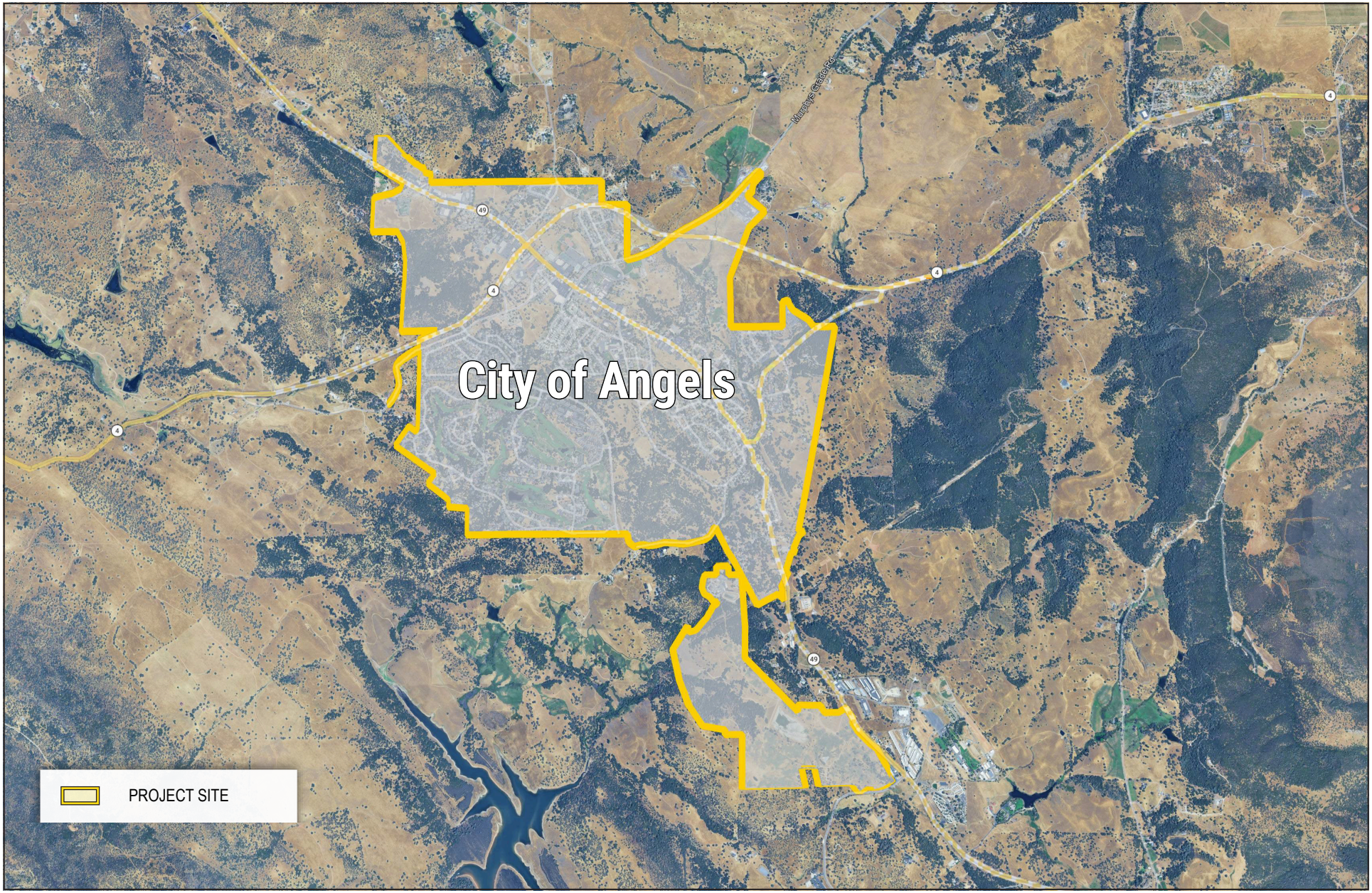
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GREENHOUSE GAS REDUCTION PLAN
INITIAL STUDY/NEGATIVE DECLARATION

Regional Vicinity

Exhibit 1

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Source: Google Earth Pro, April 2026

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GREENHOUSE GAS REDUCTION PLAN
INITIAL STUDY/NEGATIVE DECLARATION

Site Vicinity

Exhibit 2

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policies into their planning efforts. Jurisdictions must accomplish this effort through two phases. The first phase includes the completion of a Greenhouse Gas Inventory based on the best available data for the jurisdiction, accounting for greenhouse gas emissions generated by both municipal services (i.e., public facilities, employee operations, government buildings) and the community (residential uses, transportation, etc.). Based on the results of the Inventory, the second phase involves drafting a planning document, such as a Community Action Plan, Climate Action Plan, Climate Adaptation Plan, or Greenhouse Gas Reduction Plan, to identify measures to assist the jurisdiction in meeting Statewide requirements to reduce GHG emissions.

In 2020, the Calaveras Council of Governments (CCOG), in coordination with Calaveras County and the City, began drafting both the greenhouse gas inventories and a Greenhouse Gas Reduction Plan. The County's Greenhouse Gas Reduction Plan has not yet been adopted. In 2021, in coordination with the CCOG, the City completed updates to its 2018 Community-Wide and Government Operations Greenhouse Gas Emissions Inventory, to guide the future development of a Citywide GHGRP. The City released the City of Angels Draft Greenhouse Gas Reduction Plan in 2023.

By adopting policies to address climate change and reduce GHG emissions in accordance with State standards, the City would gain access to grant opportunities tied to GHG emission reductions. Additionally, the GHGRP would provide guidance for consultants and developers for streamlined mitigation measures pertaining to GHG emissions, including a screening tool tailored to the City in order to assist in determining whether a greenhouse gas study is required for a specific project. The GHGRP would provide measures that may be implemented to reduce any significant emissions generated by a particular project.

2.4 Project Characteristics

2.4.1 Proposed Project

The proposed project is the City of Angels 2023 Greenhouse Gas Reduction Plan (GHGRP). The GHGRP follows the development of the City's Community-Wide and Government Operations 2021 Greenhouse Gas Emissions Inventory, herein referenced as the 2021 Emissions Inventory, provided in Appendix A. The GHGRP is provided in Appendix B.

The State's climate objectives set an ambitious goal of carbon neutrality by 2045. The GHGRP includes measures to enable the City to meet its GHG emissions reduction targets by 2030, consistent with current State targets. However, additional measures will be required to meet targets through 2045. The GHGRP includes forecasts of GHG emissions in Angels Camp through 2045, outlines updated State GHG reduction targets, and includes GHG Reduction Measures, which are quantified measures to reduce GHG emissions associated with energy, transportation, solid waste, water, and wastewater. Implementation of the GHGRP's GHG Reduction Measures would assist the City to meet or exceed State requirements through 2030 with measures to assist in moving toward meeting 2045 requirements.

The GHGRP reflects the latest guidance from the California Air Resources Board (CARB) established in the 2022 Scoping Plan, which was designed to implement the State's GHG emission reduction targets set in Assembly Bill (AB) 32, Executive Order (EO) S-3-15, and Senate Bill (SB) 32. Although previous guidance (i.e., in the 2017 Scoping Plan, which is now superseded by the 2022 Scoping Plan) provided efficiency metrics for local governments to implement these targets, this is no longer the primary approach recommended by CARB; rather, local governments are encouraged to adopt emissions regulating documents and implement local actions that support State efforts to electrify transportation, decarbonize buildings, and reduce vehicle miles traveled (VMT), among other GHG-reducing measures. The GHG Reduction Measures outlined in the GHGRP align with this new approach. Nevertheless, quantified metrics, including the GHG emissions inventory and forecasts, remain essential to climate action planning.

Emissions Inventory, Baseline, and Projections

GHG emissions inventories are used to measure a community's progress toward reducing GHGs. AB 32 established a Statewide target of reducing GHG emissions to 1990 levels by 2020. California has exceeded this target and has

already established longer-term goals for 2030 (in SB 32) and 2045 (in AB 1279). The previous target for 2050 (80 percent below 1990 levels) is assumed to be in line with the State-adopted goal to achieve carbon neutrality (85 percent Statewide reductions below 1990 levels) by 2045.

The Angels Camp GHGRP includes emissions forecasts for 2030 and 2045. The 2030 and 2045 forecasts cover direct GHG emissions from sources within the boundaries of Angels Camp, including fuel combusted and solid waste generated within the City. Table 1, Forecasted Emissions by Sector, shows the 2030 and 2045 emissions forecasts, which reflect reasonably foreseeable future conditions and include the effect of State-level actions and efforts that would reduce GHG emissions in Angels Camp.

Table 1
Forecasted and Target Values (MT CO2e)[1]

Target Year	BAU2 Emissions	ABAU3 Forecast	Target Emissions
1990	26,458	-	-
2030	26,265	20,758	15,875
2045	28,039	17,674	0

Source: City of Angels Draft Greenhouse Gas Reduction Plan.

[1] Metric tons of carbon dioxide equivalent

[2] Business-as-Usual emissions.

[3] Adjusted scenario business-as-usual forecast (ABAU)

Table 2 below summarizes the total forecasted emissions under an Adjusted scenario business-as-usual forecast (ABAU) scenario, the reduced total emissions with the implementation of the GHG reduction measures, and the emissions gap between the reduced total emissions from the GHGRP and the emissions reduction goal for each target year. The emissions gap represents the difference between what GHG emissions are predicted to be with implementation of the GHGRP and what the GHG emissions should be based on the City's target levels.

Table 2
City Inventory, Forecast, and Reduction Targets (MT CO_2e)[1]

	1990	2018	2030	2045
Emissions Inventory and ABAU Forecast (MT CO_2e)	26,458	24,608	20,758	17,674
Target Percent Reduction below 1990 Levels	-	-	40%	100%
Target Emissions Level (MT CO_2e)	-	-	15,875	0
Reductions from ABAU Forecast Needed to Achieve Target (MT CO_2e)	-	-	4,883	17,674
Total Emissions Reductions from GHGRP[2]	**-**	**-**	**6,674**	**10,920**
Remaining Emissions Gap to Achieve Target (MT CO_2e)[1]	**-**	**-**	**(-1,790)[3]**	**6,754[4]**

Source: City of Angels Draft Greenhouse Gas Reduction Plan.

[1] Totals may not sum exactly due to independent rounding.

[2] Total emissions reductions would be cumulative targets achieved up to target years: 2030 and 2045.

[3] The negative emissions gap value in parentheses indicates the target would be achieved with a surplus of emissions reductions.

[4] Additional measure planning and discussion would be required to achieve the 2045 target.

Table 2 demonstrates that the City will need to take action to reduce GHG emissions, measured in metric tons of carbon dioxide equivalent (MTCO2e), to meet its GHG targets for 2030 and 2045. Implementation of the GHGRP would provide the opportunity for the City to achieve its adopted 2030 target. However, significant additional planning, discussion, and reductions would also be required to align with the State's carbon neutrality goal and meet the City's proposed emissions target for 2045. In order to reduce emissions in accordance with the targets, the GHGRP introduces measures and performance standards that would collectively lower emissions levels by the target

years. The GHGRP places the biggest emphasis on mitigation through on-site GHG-reducing design features, building decarbonization, VMT reduction, access to transit or shared mobility services, electric vehicle (EV) charging, organic waste diversion, and wastewater treatment plant energy efficiency.

GHG Emissions Reduction Measures

As shown in Table 2, the City will need to take action to reduce local GHG emissions beyond the legislatively adjusted business-as-usual (BAU) scenario to meet its emissions targets for 2030 and 2045 and to align with the State's neutrality goal. Table 3, GHG Reduction Summary, outlines the Reduction Measures included in the GHGRP to meet the City's GHG reduction targets. The Reduction Measures reflect input from City staff, stakeholders, and community members, and recognize significant contributors to local GHG emissions. Measures that can be quantified are summarized in Table 3; additional supportive measures that cannot be quantified due to lack of available data, established quantification methodology, or potential for double counting, are excluded from Table 3 but are described in the GHGRP. Table 3 identifies the estimated GHG reductions by sector that would result from implementation of the proposed measures.

Table 3
GHG Reduction Summary (MT CO2e)

Measure	Description	Emissions Reductions (MTCO2e)[1]	
Energy		**2030[2]**	**2045[2]**
RE-1	Increase Community Renewable Energy	451	-
EO-1	Conduct Energy Conservation Outreach and Education	394	67
EB-1	Facilitate Energy Efficiency Retrofits	380	138
EB-2	Establish a Green Business Program	3	0
EB-3	Implement an Electrification Time-of-Replacement Ordinance	919	2,560
NC-1	Implement Reach Codes[3]	62	92
NC-2	Incentive Zero Net Energy New Construction	2	12
Energy Sector Total		**2,211**	**2,869**
Transportation			
TR-2	Increase EV/ZEV Adoption	3,344	5,183
TR-2[4]	Decarbonize the City Municipal Fleet and Employee Commute	84	210
TR-3	Increase Active Transportation Mode Share	35	139
TR-4	Increase Public Transit Mode Share	403	1,612
TR-5	Decarbonize Off-Road Equipment and Vehicles	212	593
Transportation Sector Total		**3,993**	**7,527**
Solid Waste			
SW-1	Organic Waste Diversion	463	516
SW-2	Divert from Forward to Rock Creek Landfill	0.3	0.3
Solid Waste Sector Total		**464**	**517**

Measure	Description	Emissions Reductions (MTCO2e)[1]	
Water and Wastewater			
WW-1	Wastewater Treatment Plant Energy Efficiency	0.3	0.3
WW-2	Use of Reclaimed (Non-Potable) Water	0.02	0.02
WW-3	Use of Reclaimed (Non-Potable) Water	5	5
WW-4	Require Low-Flow Water Use Fixtures	0.3	0.4
Water and Wastewater Sector Total		**6**	**6**
Total GHG Emissions Reduction from GHGRP for All Sectors		***6,674***	***10,920***

Source: City of Angels Draft Greenhouse Gas Reduction Plan.

[1] Estimated emissions that would be reduced from the impacts of each GHG reduction measure by sector.

[2] Total emissions reductions would be cumulative targets achieved up to target years: 2030 and 2045.

[3] From October 1, 2025, through June 1, 2031, Assembly Bill 130 imposes a near-complete moratorium on local modifications to building standards affecting residential units, with certain exceptions. This includes the prohibition of new decarbonization ordinances and most reach codes that exceed State minimums. Therefore, the City will not implement reach codes exceeding State minimums until and unless alternative legislation is passed. The City will carry forward an amendment to this effect as part of the final adoption of the GHGRP—with an increase in efforts facilitating energy efficient retrofits to offset anticipated reductions from reach codes that may have exceeded State minimums, in combination with increased efforts at increased Active Transportation Mode sharing.

[4] Not included in sector total to avoid double counting.

GHGRP Implementation

In order to guarantee successful implementation of the GHGRP, the reduction measures must be regularly assessed and continuously monitored to ensure: 1) all measures clearly defined steps necessary for implementation; 2) individual measures are contributing to the overall GHG reduction target; 3) the GHGRP is on track to achieve its overall GHG reduction targets; and 4) beneficial community outcomes are attained. Accordingly, the GHGRP contains an Implementation and Monitoring section which assigns a City Department lead and support and an implementation timeline for a successful outcome for each measure. Regular monitoring is anticipated to occur so that the City can track the effectiveness of the reduction measures, update the emissions inventory, and update the GHGRP as needed to respond to changing technology, federal and State regulations, funding opportunities, demographics, and market conditions. The City's Community Development Department would be responsible for maintaining the GHGRP, including preparing an annual progress report for each measure and conducting comprehensive GHG emissions inventories at least every two years.

2.4.2 Project Objectives

Section 15183.5 of the California Environmental Quality Act (CEQA) Guidelines, Tiering and Streamlining the Analysis of Greenhouse Gas Emissions, defines a "qualified plan" as a plan for reducing GHG emissions that are determined adequate for CEQA tiering. A qualified plan allows a lead agency to analyze and mitigate potential environmental impacts related to GHG emissions at the programmatic level. Future projects can tier from the plan analysis, meaning the qualified plan can be incorporated by reference, or a proposed project may rely on the programmatic analysis in the qualified plan to evaluate project-specific impacts. A public or private project that demonstrates consistency with the qualified plan and incorporates applicable reduction measures would also be determined to have a less than significant cumulative impact related to GHG emissions. A qualified plan streamlines individual project analysis and allows for consistency across project analysis to achieve Citywide goals, rather than determining GHG emissions significance on a case-by-case basis. To be considered a qualified plan, the GHGRP must meet the following criteria outlined in CEQA Guidelines Section 15183.5(b)(1):

a) Quantify greenhouse gas emissions, both existing and projected over a specified time period, resulting from activities within a defined geographic area;

b) Establish a level, based on substantial evidence, below which the contribution to GHG emissions from activities covered by the plan would not be cumulatively considerable;

c) Identify and analyze the GHG emissions resulting from specific actions or categories of actions anticipated within the geographic area;

d) Specify measures or a group of measures, including performance standards, that substantial evidence demonstrates, if implemented on a project-by-project basis, would collectively achieve the specified emissions level;

e) Establish a mechanism to monitor the plan's progress toward achieving the level and to require amendment if the plan is not achieving specified levels;

f) Be adopted in a public process following environmental review.

The proposed project fulfills the requirements for a qualified plan that is compliant with CEQA and supports the State's GHG and VMT reduction goals. The following chapters of the GHGRP meet the criteria for a CEQA-qualified plan:

- Chapter 2 quantifies both existing and projected GHG emissions from community actions and government operations in the City. This chapter also identifies and analyzes the GHG emissions resulting from specific actions or categories of actions anticipated within the City of Angels.
- Chapter 3 establishes GHG reduction targets, based on State goals, substantial evidence, and City discussions.
- Chapter 5 outlines the suite of GHG reduction measures that would reduce community emissions to achieve the SB 32 Statewide emissions reduction goal of 40 percent below 1990 levels by 2030, and put the City on the path to achieving its fair share contribution to achieve carbon neutrality by 2045.
- Chapter 6 outlines how the City would monitor plan progress toward achieving the GHG emission reduction targets and describes how the GHGRP may be updated as necessary to ensure the efficacy of its reduction measures.

This IS/ND is being prepared in accordance with Criteria F. Additionally, the GHGRP commits the City to outlining a process for individual projects to determine consistency with the GHGRP through the development of a GHGRP Consistency Checklist. Therefore, the Draft GHGRP is consistent with Criteria A through F. Following adoption of the GHGRP and development of the GHGRP Consistency Checklist, future discretionary projects in the City that are subject to CEQA would be able use the GHGRP to streamline the CEQA review related to GHG emissions.

Additionally, implementation of the GHGRP would improve the ability of the City to pursue federal and State funding programs and grants related to climate change impact areas, including energy, transportation, solid waste, water, and wastewater.

2.5 Project Construction and Phasing

The proposed project includes a planning document that does not include any actual development of parcels. Therefore, construction or land use changes would not occur as a result of this project. Although separate plans or projects may be proposed in the future under the umbrella of the GHGRP, each plan or project, including any development that might occur as a result of the reduction measures contained within this project, would be subject to separate, project-specific environmental review under CEQA.

2.6 Project Approvals

The City of Angels is the Lead Agency for the proposed project and has discretionary authority over the project proposal. The actions and/or approvals the City needs to consider for the proposed project include, but are not limited to, the following:

- Adoption of the Draft GHGRP Initial Study/Negative Declaration for CEQA purposes to achieve a qualified plan; and
- Adoption of the Final Draft GHGRP.

3.0 Initial Study Checklist

1. **Project title:**
   Angels Camp Greenhouse Gas Reduction Plan

2. **Lead agency name and address:**
   City of Angels
   P.O. Box 667
   200 Monte Verda Street, Suite B
   Angels Camp, CA 95222

3. **Contact person and phone number:**
   Amy Augustine, AICP – City Planner
   Planning@AngelsCamp.gov
   (209) 736-1346

4. **Project location:**
   Citywide; Angels Camp is located in Calaveras County, in the Sierra Nevada foothills.

5. **Project sponsor's name and address:**
   City of Angels
   P.O. Box 667
   200 Monte Verda Street, Suite B
   Angels Camp, CA 95222

6. **General plan designation:**
   Citywide. Under the existing General Plan, the project area consists of a range of land use designations, including Residential Estate, Single Family Residential, Medium Density Residential, High Density Residential, Community Commercial, Shopping Commercial, Historic Commercial, Special Planning, Business Attraction and Expansion, Industrial, Public, Parks and Recreation, and Right of Way.

7. **Zoning:**
   Citywide. The project area consists of a range of zoning designations, including Residential Estate – One-Acre Minimum, Residential Estate – Five-Acre Minimum, Single-Family Residential, Single-Family Residential – Greenhorn Creek Combining District, Medium Density Residential, Multiple-Family Residential, Special Planning, Community Commercial, Shopping Center Commercial, Historical Commercial, Commercial: Greenhorn Creek District, Business Attraction and Expansion, Industrial, Greenhorn Creek Golf Course, Public and Quasi-Public, Open Space, Public Private Partnership Combining, Resources Management Combining, Special Planning Combining, Light Commercial, Visitor-Serving Commercial, and Recreation.

8. **Have California Native American tribes traditionally and culturally affiliated with the project area requested consultation pursuant to Public Resources Code section 21080.3.1? If so, is there a plan for consultation that includes, for example, the determination of significance of impacts to tribal cultural resources, procedures regarding confidentiality, etc.?**
   Consultation with California Native American tribes is addressed in Section 3.18, Tribal Cultural Resources.

Environmental Factors Potentially Affected

The environmental factors checked below would be potentially affected by this project, involving at least one impact that is a "Potentially Significant Impact," as indicated by the checklist on the following pages.

☐ Aesthetics	☐ Agriculture and Forestry Resources	☐ Air Quality
☐ Biological Resources	☐ Cultural Resources	☐ Energy
☐ Geology and Soils	☐ Greenhouse Gas Emissions	☐ Hazards and Hazardous Materials
☐ Hydrology and Water Quality	☐ Land Use and Planning	☐ Mineral Resources
☐ Noise	☐ Population and Housing	☐ Public Services
☐ Recreation	☐ Transportation	☐ Tribal Cultural Resources
☐ Utilities and Service Systems	☐ Wildfire	☐ Mandatory Findings of Significance

Determination (To be completed by the Lead Agency)

On the basis of this initial evaluation:

☒ I find that the proposed project COULD NOT have a significant effect on the environment, and a NEGATIVE DECLARATION will be prepared.

☐ I find that although the proposed project could have a significant effect on the environment, there will not be a significant effect in this case because revisions in the project have been made by or agreed to by the project proponent. A MITIGATED NEGATIVE DECLARATION will be prepared.

☐ I find that the proposed project MAY have a significant effect on the environment, and an ENVIRONMENTAL IMPACT REPORT is required.

☐ I find that the proposed project MAY have a "potentially significant impact" or "potentially significant unless mitigated" impact on the environment, but at least one effect (1) has been adequately analyzed in an earlier document pursuant to applicable legal standards, and (2) has been addressed by mitigation measures based on the earlier analysis as described on attached sheets. An ENVIRONMENTAL IMPACT REPORT is required, but it must analyze only the effects that remain to be addressed.

☐ I find that although the proposed project could have a significant effect on the environment, because all potentially significant effects (a) have been analyzed adequately in an earlier ENVIRONMENTAL IMPACT REPORT or NEGATIVE DECLARATION pursuant to applicable standards, and (b) have been avoided or mitigated pursuant to that earlier ENVIRONMENTAL IMPACT REPORT or NEGATIVE DECLARATION, including revisions or mitigation measures that are imposed upon the proposed project, nothing further is required.

Signature Date

3.1 Aesthetics

	Potentially Significant Impact	Less Than Significant Impact With Mitigation Incorporated	Less Than Significant Impact	No Impact
I. AESTHETICS – Except as provided in Public Resources Code Section 21099, would the project:				
a) Have a substantial adverse effect on a scenic vista?	☐	☐	☐	☒
b) Substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a state scenic highway?	☐	☐	☐	☒
c) In non-urbanized areas, substantially degrade the existing visual character or quality of public views of the site and its surroundings? (Public views are those that are experienced from publicly accessible vantage point). If the project is in an urbanized area, would the project conflict with applicable zoning and other regulations governing scenic quality?	☐	☐	☐	☒
d) Create a new source of substantial light or glare which would adversely affect day or nighttime views in the area?	☐	☐	☐	☒

3.1.1 Regulatory Setting

Regulations at the State and local levels applicable to the proposed project related to aesthetics include:

- California State Scenic Highway Program
- Angels Camp 2020 General Plan Environmental Impact Report (General Plan EIR)
- Angels Camp 2020 General Plan (General Plan)
- Angels Camp Municipal Code (Municipal Code)

3.1.2 Environmental Setting

According to the General Plan, Angels Camp's natural and cultural scenic resources include heritage trees, hillsides, hilltops, scenic corridors, creeks, cultural resources, recreational resources, and similar resources. According to the California Department of Transportation (Caltrans) State Scenic Highway System Map, segments of State Route 4 and State Route 49 within the City are Eligible State Scenic Highways[1]. Based on the Summary of Land Uses table in the City's General Plan, the leading land use in the Planning Area is residential, followed by Public, Right of Way, Special Planning, and Commercial. According to the General Plan, residential land uses are intended to provide a variety of housing options throughout the City. Additionally, Public and Right of Way land uses are intended to accommodate government buildings, schools, transportation facilities, and other similar uses. Special Planning land uses are intended to provide uniform, unique, or flexible development with compatible mixed uses and physical

[1] California Department of Transportation. California State Scenic Highway System Map. https://www.arcgis.com/apps/webappviewer/index.html?id=465dfd3d807c46cc8e8057116f1aacaa. Accessed February 18, 2026.

characteristics. Commercial land uses are intended to provide a broad range of commercial uses for residents and visitors, including grocery and specialty stores, hotels, restaurants, and others similar uses[2].

3.1.3 Impact Analysis

a) Would the project have a substantial adverse effect on a scenic vista?

No Impact: Scenic vistas in the Planning Area consist of scenic corridors and views to and from open spaces, hillsides, groves, and the Sierra Nevada Mountains. Scenic views are also provided in urban areas of the City, including along scenic and historic drives. The Draft GHGRP proposes measures that would aid in reducing the City's GHG emissions, and would not directly lead to development that would affect scenic vistas. However, the proposed measures encourage the installation of renewable and carbon-free energy generation, including solar photovoltaic (PV) systems, both through new private installs on residences and businesses, or on municipal facilities, to provide alternative sources of energy. Both private and municipal PV systems would most likely be placed on rooftops, which could alter scenic views.

However, photovoltaic systems on commercial or civic structures would likely not be significant enough to block or greatly alter viewsheds, and would be subject to Planning and Building & Safety division review and approval. The City's General Plan and development review process regulate development and enforce policies to ensure that opportunities to enjoy scenic views are either preserved or enhanced. In addition, future projects that would potentially alter or affect scenic vistas, including interior/exterior retrofits and electric vehicle charging stations, would be subject to Municipal Code Chapter 17.26, Historical Commercial District. Specifically, future projects would be required to demonstrate compliance with Municipal Code Sections 17.26.070, Demolition or removal of buildings, and 17.26.080, Construction or alteration of buildings structures, which adopts the Secretary of the Interior Standards regarding the treatment of historic properties. Therefore, potential future commercial or civic development associated with the GHGRP measures is not anticipated to be of a significant size that would result in impacts on scenic vistas, and would be subject to separate, project-specific environmental review which would be completed prior to project implementation.

Assembly Bill 2188, which took effect on January 1, 2015, requires local governments to adopt a streamlined and expedited permit approval process for small residential rooftop solar energy panels. The City of Angels Municipal Code, Chapter 15.28, complies with AB 2188 regulations; the Municipal Code stipulates that once the application process is complete, a permit shall be issued. Therefore, small residential rooftop systems consistent with the size and placement requirements set forth in the Municipal Code are not subject to design review or other approvals related to visual quality. Nevertheless, similar to potential future PV systems for commercial or civic structures, any potential future residential rooftop solar systems are anticipated to be insignificant in size and are therefore not expected to substantially alter views of scenic vistas.

The GHGRP is a planning document and does not include any changes to land use designations, building heights and intensities, or residential densities. Potential aesthetic-related impacts are unique to a project's location and design and cannot be meaningfully determined until a project site has been defined. All future development would be subject to the City's zoning requirements. Therefore, the project would result in no impacts to scenic vistas. No mitigation measures are required.

[2] City of Angels. City of Angels 2020 Camp General Plan. https://angelscamp.gov/community-development/planning/. Accessed February 18, 2026.

b) Would the project substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a state scenic highway?

No Impact: State Route 49 and part of State Route 4 within Angels Camp are included on the Caltrans list of eligible scenic highways. State Route 49 and State Route 4 feature views of grasslands and lightly forested areas[3]. However, the City has not yet proceeded with maintaining official scenic highway designation for either SR 49 or SR 4. Therefore, there are no designated State scenic highways in Angels Camp.

As discussed under Threshold a) above, solar PV systems on commercial or civic structures would likely not be significant enough in size to block or greatly alter viewsheds and would require Planning and Building & Safety division review and approval. Any potential future development of civic or commercial PV systems associated with the GHGRP measures would be required to undergo separate, project-specific environmental review.

Though potential future residential rooftop solar energy systems would not be required to undergo environmental or design review, pursuant to AB 2188, these systems are expected to be small in size and would not substantially alter scenic resources.

The GHGRP is a planning document and does not include any changes to land use designations, building heights and intensities, or residential densities. Potential aesthetic-related impacts are unique to a project's location and design and cannot be meaningfully determined until a project site has been defined. All future development would be subject to the City's zoning requirements. Therefore, the project would result in no impacts to scenic highways. No mitigation measures are required.

c) In non-urbanized areas, would the project substantially degrade the existing visual character or quality of public views of the site and its surroundings? (Public views are those that are experienced from publicly accessible vantage point). If the project is in an urbanized area, would the project conflict with applicable zoning and other regulations governing scenic quality?

No Impact: The Draft GHGRP does not include any land use changes or other direct development that would affect visual character. Rather, the GHGRP proposes a variety of energy efficient retrofit programs for existing private and municipal buildings. The Draft GHGRP also includes several measures to improve the bicycle and pedestrian network. The result would be a more unified and streetscape with an emphasis on well-designed sidewalks, with associated landscaping and street trees. Additionally, as discussed above, the installation of commercial or civic solar PV systems and EV charging stations could result in slight changes to existing visual character but would be subject to Planning and Building department approval to determine appropriate sizing and placement prior to installation. The development of commercial and civic PV systems would also be subject to separate, project-specific environmental review prior to project implementation, and any potentially significant impacts would be addressed through mitigation measures specific to the project and impact.

Though future small residential solar energy systems would not be subject to local visual character policies so long as they meet the size and placement requirements in the Municipal Code pursuant to AB 2188, this type of development is anticipated to be small in size and would not significantly alter the visual character of the City.

The proposed project includes a planning document and does not include any changes to land use designations, building heights and intensities, or residential densities. No development is proposed. Therefore, the project would result in no impacts to the visual character of the City or the quality of public views, or conflict with applicable zoning and other regulations governing scenic quality. No mitigation measures are required.

[3] California Department of Transportation. California State Scenic Highway System Map. https://www.arcgis.com/apps/webappviewer/index.html?id=465dfd3d807c46cc8e8057116f1aacaa. February 18, 2026.

d) Would the project create a new source of substantial light or glare which would adversely affect day or nighttime views in the area?

No Impact: The Draft GHGRP includes measures related to the installation of solar PV systems on homes, businesses, and municipal facilities. However, solar PV systems are specifically designed to absorb sunlight, not reflect it. Thus, their placement and orientation on private or municipal structures would not adversely affect day or nighttime views in the area. Additionally, the development of commercial and civic PV systems would be subject to separate, project-specific environmental review prior to project implementation, and any potentially significant impacts would be addressed through mitigation measures specific to the project and impact.

The GHGRP is a planning document and does not include any changes to land use designations, building heights and intensities, or residential densities. Potential aesthetic-related impacts are unique to a project's location and design and cannot be meaningfully determined until a project site has been defined. All future development would be subject to the City's zoning requirements. No development is proposed. Therefore, the project would result in no impacts on light and glare. No mitigation measures are required.

MITIGATION MEASURES

Project implementation would not result in any significant impacts related to aesthetics; therefore, no mitigation measures are required.

3.2 Agriculture and Forestry Resources

	Potentially Significant Impact	Less Than Significant Impact With Mitigation Incorporated	Less Than Significant Impact	No Impact
II. AGRICULTURE AND FORESTRY RESOURCES – In determining whether impacts to agricultural resources are significant environmental effects, lead agencies may refer to the California Agricultural Land Evaluation and Site Assessment Model (1997) prepared by the California Dept. Conservation as an optional model to use in assessing impacts on agriculture and farmland. In determining whether impacts to forest resources, including timberland, are significant environmental effects, lead agencies may refer to information compiled by the California Department of Forestry and Fire Protection regarding the state's inventory of forest land, including the Forest and Range Assessment Project and the Forest Legacy Assessment project; and forest carbon measurement methodology provided in Forest Protocols adopted by the California Air Resources Board. Would the project:				
a) Convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Farmland), as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency, to non-agricultural use?	☐	☐	☐	☒
b) Conflict with existing zoning for agricultural use, or a Williamson Act contract?	☐	☐	☐	☒
c) Conflict with existing zoning for, or cause rezoning of, forest land (as defined in Public Resources Code Section 12220(g)), timberland (as defined by Public Resources Code Section 4526), or timberland zoned Timberland Production (as defined by Government Code Section 51104(g))?	☐	☐	☐	☒
d) Result in the loss of forest land or conversion of forest land to non-forest use?	☐	☐	☐	☒
e) Involve other changes in the existing environment which, due to their location or nature, could result in conversion of Farmland, to non-agricultural use or conversion of forest land to non-forest use?	☐	☐	☐	☒

3.2.1 Regulatory Setting

Regulations at the State and local levels applicable to the proposed project related to agriculture and forestry resources include:

- California Department of Conservation Farmland Mapping and Monitoring Program (FMMP)
- Williamson Act/California Land Conservation Act
- California Public Resources Code Sections 12220(g) and 4526
- California Government Code Section 51104(g)
- Angels Camp 2020 General Plan Environmental Impact Report (General Plan EIR)
- Angels Camp 2020 General Plan (General Plan)

3.2.2 Environmental Setting

The City of Angels is surrounded by mountain ranges and open space, including protected acres of Calaveras County. According to the General Plan EIR, agricultural uses are minimal within the City and the Sphere of Influence (SOI). Agricultural uses border the City to the east and west. According to the California Department of Conservation (DOC), the City is designated as Urban and Built-Up Land, Vacant or Disturbed Land, and Grazing Land[4]. The DOC identifies no Prime Farmland, Farmland of Statewide Importance, or Unique Farmland within the City. The City's Zoning Code designates areas in the south and eastern portions of the City as residential agricultural. However, the project area primarily contains zoning for residential, commercial, industrial, and other uses. The project area is not covered under a Williamson Act contract[5]. There is no land within the City designated as forest land or timberland zoned Timber Production.

3.2.3 Impact Analysis

a) Would the project convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Farmland), as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency, to non-agricultural use?

No Impact: Agricultural land use within the City is minimal. There is no Prime and Unique Farmland or Farmland of Statewide Importance within the City[6]. The City is predominantly comprised of Urban and Built-Up Land, as well as Grazing Land along the periphery of the City where development is less dense. Urban and Built-Up Land occupies the center of the City, along approximately 3 miles of SR 49. Development along SR 49 is comprised of commercial and residential uses. Grazing Land is located in the northern and southern portions of the City, including areas designated by the Zoning Code as residential agricultural. The proposed GHGRP does not include any land use changes or other strategies that would result in the conversion of Prime Farmland or farmland of unique or Statewide importance to non-agricultural use. No development is proposed on forest land or timberland zoned Timber Production. Any future development projects in the City would not result in the conversion of Prime Farmland, Unique Farmland, or Farmland of Statewide Importance to non-agricultural use. Any future development on properties zoned Residential or Residential Estate would be subject to project-specific environmental review. Therefore, the proposed project would have no impact on agricultural resources. No mitigation measures are required.

b) Would the project conflict with existing zoning for agricultural use, or a Williamson Act contract?

No Impact: Agricultural land use within the City is minimal. There are no Williamson Act contracts within the city limits[7]. Outside the city limits, there are several enrolled Williamson Act contracts for unincorporated regions of Calaveras County. However, the proposed GHGRP does not include any land use changes or other strategies that would conflict with an existing Williamson Act contract. No development is proposed. Therefore, no impact would occur. No mitigation measures are required.

[4] California Department of Conservation. 2022. California Important Farmland Finder, https://maps.conservation.ca.gov/DLRP/CIFF/. Accessed February 11, 2026.

[5] California Department of Conservation. 2023. California Williamson Act Enrollment Finder, https://gis.conservation.ca.gov/portal/home/webmap/viewer.html?webmap=18f7488c0a9d4d299f5e9c33b312f312. Accessed February 11, 2026.

[6] California Department of Conservation. 2022. California Important Farmland Finder. https://maps.conservation.ca.gov/dlrp/ciff/, accessed February 11, 2026.

[7] California Department of Conservation. 2023. California Williamson Act Enrollment Finder, https://gis.conservation.ca.gov/portal/home/webmap/viewer.html?webmap=18f7488c0a9d4d299f5e9c33b312f312. Accessed February 11, 2026.

c) Would the project conflict with existing zoning for, or cause rezoning of, forest land (as defined in Public Resources Code Section 12220(g)), timberland (as defined by Public Resources Code Section 4526), or timberland zoned Timberland Production (as defined by Government Code Section 51104(g))?

No Impact: The Planning Area does not contain forest resources or land zoned for forest use. The proposed GHGRP does not include any land use or zoning changes or other strategies that would result in the conversion of forest land or timberland. No development is proposed on forest land or timberland zoned Timber Production. Any future development projects in the City would not result in the conversion of forest land or timberland to non-forest use. Therefore, no impact related to forest land or timberland would occur. No mitigation measures are required.

d) Would the project result in the loss of forest land or conversion of forest land to non-forest use?

No Impact: The Planning Area does not contain forest resources or land zoned for forest use. The proposed GHGRP does not include any land use or zoning changes or other strategies that would result in the conversion of forest land or timberland. No development is proposed on forest land or timberland zoned Timber Production. Any future development projects in the City would not result in the conversion of forest land or timberland to non-forest use. Therefore, no impact related to forest land or timberland would occur. No mitigation measures are required.

e) Would the project involve other changes in the existing environment which, due to their location or nature, could result in conversion of Farmland, to non-agricultural use or conversion of forest land to non-forest use?

No Impact: The City does not have land that is designated or zoned for forest land or Farmland of unique or Statewide importance. Additionally, the proposed GHGRP does not include any land uses changes or other strategies that would result in the conversion of Farmland to non-agricultural use or forest land to non-forest use. No development is proposed. Any future development on properties zoned Residential Agricultural would be subject to project-specific environmental review. Therefore, the proposed project would have no impact on agricultural or forestry resources. No mitigation measures are required.

MITIGATION MEASURES

Project implementation would not result in any significant impacts related to agriculture and forestry resources; therefore, no mitigation measures are required.

3.3 Air Quality

	Potentially Significant Impact	Less Than Significant Impact With Mitigation Incorporated	Less Than Significant Impact	No Impact
III. AIR QUALITY – Where available, the significance criteria established by the applicable air quality management district or air pollution control district may be relied upon to make the following determinations. Would the project:				
a) Conflict with or obstruct implementation of the applicable air quality plan?	☐	☐	☐	☒
b) Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable federal or state ambient air quality standard?	☐	☐	☐	☒
c) Expose sensitive receptors to substantial pollutant concentrations?	☐	☐	☐	☒
d) Result in other emissions (such as those leading to odors) adversely affecting a substantial number of people?	☐	☐	☐	☒

3.3.1 Regulatory Setting

Regulations at the federal and local levels applicable to the proposed project related to air quality include:

- United States Environmental Protection Agency (US EPA) national ambient air quality standards (NAAQS)
- California Air Resources Board (CARB) statewide ambient air quality standards (CAAQS)
- Calaveras County General Plan Environmental Impact Report
- Angels Camp 2020 General Plan Environmental Impact Report (General Plan EIR)
- Angels Camp 2020 General Plan (General Plan) Air Quality Element
- Angels Camp Municipal Code (Municipal Code)

3.3.2 Environmental Setting

Criteria air pollutants are defined as those pollutants for which the federal and State governments have established air quality standards for outdoor or ambient concentrations to protect public health with a determined margin of safety.[8] In addition to the criteria pollutants, toxic air contaminants (TACs) are another group of pollutants of concern. TACs are considered either carcinogenic or noncarcinogenic based on the nature of the health effects associated with exposure to the pollutant. The City is located in Calaveras County, which has a State designation of Attainment or Unclassified for all criteria pollutants except for ozone and PM_{10}. Calaveras County has a national designation of either Unclassified or Attainment for all criteria pollutants except for ozone. Angels Camp is located within the Mountain Counties Air Basin. Naturally occurring asbestos is present within the western portion of Calaveras County and generally extends north to southwest following the Bear Mountain and Melones Fault Zones[9]. Sensitive receptors are considered land uses or other types of population groups that are more sensitive to air pollution than others due

[8] California Air Resources Board. Criteria Pollutants Emission Inventory. https://ww2.arb.ca.gov/criteria-pollutant-ei/about. Accessed February 27, 2026.

[9] Calaveras County. 2018. Calaveras County General Plan Environmental Impact Report. https://planning.calaverasgov.us/Portals/Planning/Documents/Draft%20General%20Plan%20Update/CEQA/GP%20Draft%20EIR.pdf. Accessed February 25, 2026.

to their exposure, including children, elderly individuals, those at heightened risk of negative health outcomes due to exposure to air pollution, residential uses, schools, and other uses that house sensitive groups.

3.3.3 Impact Analysis

a) Would the project conflict with or obstruct implementation of the applicable air quality plan?

No Impact: Air quality plans describe air pollution control strategies and measures to be implemented by a city, county, region, and/or air district. Angels Camp is located in the Mountain Counties Air Basin and local air quality is monitored by the Calaveras County Air Pollution Control District (CCAPCD). The CCAPCD does not have an adopted air quality plan; regional air quality is managed at the State level through a State Implementation Plan (SIP).[10] According to the General Plan, pollutants transported into the City from the San Joaquin Valley and Bay Area are the primary contributors to degraded air quality in the City. The purpose of the Draft GHGRP is to reduce GHG emissions within the City to help contribute to global efforts to reduce the effects of climate change. Recommended measures within the Draft GHGRP include implementing energy efficient retrofits, developing EV infrastructure, reducing emissions from off-road sources, and improving pedestrian, bicycle, and transit connectivity. In addition to reducing GHG emissions, each of these elements would help to reduce criteria air pollutants. Short-term criteria pollutant emissions would be generated during construction activities associated with implementation of some of the recommended measures, from the use of construction equipment and worker vehicle trips. However, construction impacts would be temporary in nature and are not anticipated to be significant, based on the relatively low intensity of the potential retrofit projects encouraged by the GHGRP. Once operational, air quality emissions associated with these potential future projects would be reduced compared to existing conditions, or would be negligible.

Additionally, the proposed GHGRP measures would support several policies and programs within the General Plan Air Quality Element. Any renewable energy, energy efficient, or infrastructure improvements installation projects that may occur as result of the proposed GHGRP would be subject to the development review and permitting process, State and federal laws, General Plan policies that protect air quality, and separate, project-specific environmental review to determine impacts and mitigation measures, if necessary.

Therefore, the Draft GHGRP would not conflict with the implementation of an applicable air quality plan and would have no impact in this regard. Implementation of the GHGRP would serve to meet or exceed State emissions targets. No mitigation measures are required.

b) Would the project result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable federal or state ambient air quality standard?

No Impact: The proposed GHGRP provides measures to reduce greenhouse gas emissions and energy use from future development. No development is proposed as part of the proposed project. Any renewable energy, energy-efficient, or infrastructure improvements installation projects that may occur as result of the proposed GHGRP would be subject to the development review and permitting process, State and federal laws, General Plan policies that protect air quality, and separate, project-specific environmental review to determine impacts and mitigation measures, if necessary. Additionally, short-term criteria pollutant emissions would be generated during construction activities associated with implementation of some of the recommended measures, from the use of construction equipment and worker vehicle trips. However, construction impacts would be temporary in nature and are not anticipated to be significant, based on the relatively low intensity of the potential retrofit projects encouraged by the GHGRP. Once operational, air quality emissions associated with these potential future projects would be reduced compared to

[10] United States Environmental Protection Agency. 2022. EPA Approved and Compiled Rules and Regulations: Calaveras County APCD. https://www.epa.gov/system/files/documents/2022-08/calaveras-county-apcd-epa-compiled-rules-and-regulations.pdf. Accessed February 27, 2026.

existing conditions, or would be negligible. Therefore, no impact would occur, and no mitigation measures are required.

c) Would the project expose sensitive receptors to substantial pollutant concentrations?

No Impact: Some members of the population are especially sensitive to air pollutant emissions and should be given special consideration when evaluating air quality impacts from projects. These include children, older adults, persons with pre-existing respiratory or cardiovascular illness, and athletes and others who engage in frequent exercise. Sensitive receptors include residences, schools, playgrounds, childcare centers, athletic facilities, long-term health care facilities, rehabilitation centers, convalescent centers, and retirement homes.

The greatest potential for toxic air contaminant (TAC) emissions would originate from diesel particulate matter emissions associated with off-road equipment operations. The Draft GHGRP does not propose any development; however, the GHGRP includes recommended measures to reduce emissions that encourage various retrofit and infrastructure improvement projects. None of these projects would require substantial development activity. Nevertheless, construction of these projects would generate short-term pollutant concentrations that could be located in the proximity of sensitive receptors. All future development associated with the measures encouraged in the GHGRP would be subject to separate, project-specific environmental review to determine impacts related to air quality and identify mitigation measures, if necessary. All future development would also be subject to the development review and permitting process, State and federal laws, and General Plan policies that protect air quality.

Therefore, implementation of the measures in the GHGRP is not anticipated to expose sensitive receptors to substantial TAC concentrations. GHGRP measures NC-2 andTR-5 would reduce emissions from new construction and associated off-road sources. The GHGRP is intended to lower emissions generation in the City compared to existing conditions. No impact would occur, and no mitigation measures are required.

d) Would the project result in other emissions (such as those leading to odors) adversely affecting a substantial number of people?

No Impact: The Draft GHGRP does not propose any development. However, the recommended measures in the GHGRP encourage retrofit and infrastructure improvement projects that could potentially emit odors during construction activities, including exhaust from diesel construction equipment, which could be considered offensive to some individuals. Odors from these sources would be localized and generally confined to the immediate area surrounding the construction site, and would be temporary. Potential future development associated with the Draft GHGRP measures would utilize typical construction techniques, and the odors from off-road equipment and on-road vehicles would be typical of most construction sites and temporary in nature. Therefore, construction-related odor impacts related to potential future projects is anticipated to be less than significant. Nonetheless, any renewable energy, energy efficient, or infrastructure improvements installation projects that may occur as result of the proposed GHGRP would be subject to the development review and permitting process, State and federal laws, General Plan policies that protect air quality, and separate, project-specific environmental review to determine impacts and mitigation measures, if necessary.

The Draft GHGRP also includes food waste reduction measures that would support organic waste diversion. The processing of organic waste could result in objectionable odors. However, organic waste would go to dedicated operations facilities which would comply with applicable CCAPCD regulations.

The proposed project would not directly involve construction or development activities upon implementation. The proposed project would therefore not result in impacts related to odors adversely affecting a substantial number of people. No mitigation measures are required.

MITIGATION MEASURES

Project implementation would not result in any significant impacts related to air quality; therefore, no mitigation measures are required.

3.4 Biological Resources

	Potentially Significant Impact	Less Than Significant Impact With Mitigation Incorporated	Less Than Significant Impact	No Impact
IV. BIOLOGICAL RESOURCES – Would the project:				
a) Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Wildlife or U.S. Fish and Wildlife Service?	☐	☐	☐	☒
b) Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations, or by the California Department of Fish and Wildlife or U.S. Fish and Wildlife Service?	☐	☐	☐	☒
c) Have a substantial adverse effect on state or federally protected wetlands (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means?	☐	☐	☐	☒
d) Interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites?	☐	☐	☐	☒
e) Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance?	☐	☐	☐	☒
f) Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan?	☐	☐	☐	☒

3.4.1 Regulatory Setting

Regulations at the federal and local levels applicable to the proposed project related to biological resources include:

- Angels Camp 2020 General Plan Environmental Impact Report (General Plan EIR)
- Angels Camp 2020 General Plan (General Plan)
- Angels Camp Municipal Code (Municipal Code)

3.4.2 Environmental Setting

According to the U.S. Fish and Wildlife Service (USFWS) National Wetlands Inventory, freshwater wetlands, ponds, and riverine environments exist within the City, which could function as wildlife corridors or nursery sites for native

and migratory species.[11] According to the California Department of Fish and Wildlife (CDFW), the City is not located within an adopted Natural Community Conservation Plan (NCCP).[12] The City does not have a Habitat Conservation Plan (HCP). According to the CDFW, the California Natural Diversity Database designates the City of Angels as suitable for habitats of several species, including the pallid bat and Townsend big-eared bat.[13]

3.4.3 Impact Analysis

a) Would the project have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Wildlife or U.S. Fish and Wildlife Service?

No Impact: The Draft GHGRP is a policy document that would not directly lead to development that would conflict with local, State, or federal policies protecting listed species. The GHGRP would not modify, either directly or indirectly, habitats of any species identified as a candidate, sensitive, or special status species. The GHGRP measures do recommend development, including 62 new EV charging ports (Measure TR-1), bikeway and pedestrian system connections (Measure TR-3), "Park and Ride" facilities (Measure TR-4), and biofuel infrastructure (Measure TR-8). Such potential future development would occur in already urbanized areas where listed species are not expected to occur. However, any future potential development, including that associated with the GHGRP measures, would be required to undergo separate, project-specific environmental review in order to determine impacts and identify mitigation measures, if necessary. In addition, future projects that would modify, either directly or indirectly, habitats of any species identified as a candidate, sensitive, or special status species, including interior retrofits, would be required to complete project-specific preconstruction surveys for special-status species, including bats. All potential future development would also be required to comply with the General Plan and regulatory permitting required by existing federal and State laws relative to listed species.

The GHGRP is a policy document and does not directly include any development, construction, or land use changes. Potential future projects would be evaluated by the City for their compliance with goals, policies, and measures contained in the City's General Plan intended to mitigate potential impacts to natural and biological resources. Therefore, the proposed project would have no impact on candidate, sensitive, or special status species. No mitigation measures are required.

b) Would the project have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations, or by the California Department of Fish and Wildlife or U.S. Fish and Wildlife Service?

No Impact: According to the General Plan Land Use Map, most riparian areas within Angels Camp are designated as Parks and Recreation or Public uses and would be protected from direct impacts from development[14]. Potential future development pursuant to the measures of the GHGRP could have the potential to impact riparian habitat or other sensitive natural communities. However, all potential future development projects associated with the measures in the GHGRP would be required to undergo separate, project-specific environmental review to determine potential impacts and identify mitigation measures, if necessary. In addition, any potential future project that would affect riparian habitats would be required to obtain a CDFW Section 1600 Permit when modifying any river, stream,

[11] U.S. Fish and Wildlife Service, National Wetlands Inventory, https://fwsprimary.wim.usgs.gov/wetlands/apps/wetlands-mapper/, accessed February 23, 2026.

[12] California Department of Fish and Wildlife, August 2023, California Natural Community Conservation Plans, https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=68626&inline, accessed February 23, 2026.

[13] California Department of Fish and Wildlife. California Natural Diversity Database QuickView. https://apps.wildlife.ca.gov/bios6/?tool=cnddbqv. Accessed April 6, 2026.

[14] City of Angels. General Plan Land Use Map. https://angelscamp.gov/wp-content/uploads/2016/08/Map-LanduseMap2012.pdf. Accessed February 23, 2026.

or lake.[15] Furthermore, potential future projects that would affect riparian habitats would be required to obtain a Section 404 Permit issued by the U.S. Army Corps of Engineers (USACE) under the Clean Water Act when discharging dredged or fill material into waters of the United States.[16]

The GHGRP Measure TR-3, Increase Active Transportation Mode Share, would potentially be addressed by the proposed Angels Creek and Transit Hub project, which proposes the first phase of a 5.1-mile pathway network along Angels Creek. The City has prepared a separate Initial Study/Mitigated Negative Declaration (IS/MND) for the Angels Creek and Transit Hub project. Due to the proximity of the project to Angels Creek, the Angels Creek and Transit Hub project would be subject to CDFW permitting under Section 1602, Streambed Alteration Agreement. Through compliance with existing regulations and project-specific mitigation measures, the Angels Creek and Transit Hub Project IS/MND determined that the project would have less than significant impacts with mitigation incorporated on biological resources.

The GHGRP is a policy document and would not directly involve construction or development activity. Potential impacts related to sensitive natural communities, such as riparian or wetland habitats, are unique to a project's location and characteristics and cannot be meaningfully determined until a project has been defined. Therefore, the project would have no impacts on riparian habitat or other sensitive natural communities. No mitigation measures are required.

c) Would the project have a substantial adverse effect on state or federally protected wetlands (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means?

No Impact: According to the United States Fish and Wildlife Service National Wetlands Inventory, there are approximately three freshwater emergent wetlands, one freshwater pond, and one forested wetland within the City. Potential future development pursuant to the measures of the GHGRP could have the potential to impact State or federally protected wetlands. However, all potential future development projects associated with the measures in the GHGRP would be required to undergo separate, project-specific environmental review to determine potential impacts and identify mitigation measures, if necessary.

The GHGRP is a policy document and would not directly involve construction or development activity. Potential impacts related to wetland habitats are unique to a project's location and characteristics and cannot be meaningfully determined until a project has been defined. Therefore, the project would have no impacts on wetlands. No mitigation measures are required.

d) Would the project interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites?

No Impact: Within undeveloped areas of the City, the potential exists for nesting birds and other species to occur, as well as for those areas to be wildlife nursery sites. However, the GHGRP is a planning document consistent with the City's General Plan and does not propose any land use changes. Potential future development that may occur as a result of the recommended measures in the GHGRP would occur within developed areas of the City, including retrofits to existing structures and infrastructure. Further, future development in the City would be subject to all applicable State, regional, and local regulations and standards regarding biological resources. In addition, any future potential project that could interfere with the movement of native or migratory species would be required to prepare

[15] California Department of Fish and Wildlife. Lake and Streambed Alteration Program. https://wildlife.ca.gov/Conservation/Environmental-Review/LSA. Accessed April 7, 2026.

[16] United States Environmental Protection Agency. Permit Program under CWA Section 404. February 17, 2026. https://www.epa.gov/cwa-404/permit-program-under-cwa-section-404. Accessed April 7, 2026.

a project-specific preconstruction survey, including for bat species. Therefore, the project would have no impact on the movement of native resident or migratory fish or wildlife species, corridors, or nursery sites. No mitigation measures are required.

e) Would the project conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance?

No Impact: The Draft GHGRP is a planning document that would not directly lead to development that would conflict with local policies protecting biological resources, such as a tree preservation policy. However, the Draft GHGRP recommends measures to improve pedestrian, bicycle, and transit connectivity, which could result in the development of expanded alternative transportation facilities. Should sidewalks and bike paths be expanded as part of the proposed project, any removal of trees and vegetation along City streets would be required to comply with Chapter 17.64 of the City's Municipal Code[17]. The Oak Tree and Heritage Tree Preservation Ordinance requires a permit relating to the maintenance, removal, and mitigation of Oak and Heritage trees. Where it may be necessary to remove a tree(s), the City would require that such trees be replanted or replaced.

Additionally, all potential future development associated with the measures in the GHGRP would be required to undergo separate, project-specific environmental review to determine impacts on biological resources. The GHGRP does not directly propose development or any land use changes. Future development in the City would be subject to all applicable State, regional, and local regulations and standards regarding biological resources. Therefore, the proposed project would have no impact on policies protecting biological resources or any local, regional, or State habitat conservation plan. No mitigation measures are required.

f) Would the project conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan?

No Impact: The City does not participate in an adopted Habitat Conservation Plan. The proposed GHGRP does not include any development, land use changes, or other strategies that would conflict with the provisions of any adopted habitat conservation plan. Therefore, no impact would occur, and no mitigation measures are required.

MITIGATION MEASURES

Project implementation would not result in any significant impacts related to biological resources; therefore, no mitigation measures are required.

[17] City of Angels. Angels Camp Municipal Code. Chapter 17.64. https://www.codepublishing.com/CA/Angels/. Accessed February 23, 2026

3.5 Cultural Resources

	Potentially Significant Impact	Less Than Significant Impact With Mitigation Incorporated	Less Than Significant Impact	No Impact
V. CULTURAL RESOURCES – Would the project:				
a) Cause a substantial adverse change in the significance of a historical resource pursuant to Section 15064.5?	☐	☐	☐	☒
b) Cause a substantial adverse change in the significance of an archaeological resource pursuant to Section 15064.5?	☐	☐	☐	☒
c) Disturb any human remains, including those interred outside of formal cemeteries?	☐	☐	☐	☒

3.5.1 Regulatory Setting

Regulations at the State and local levels applicable to the proposed project related to cultural resources include:

- California Public Resources Health and Safety Code Sections 7050.5 through 7055
- California Public Resources Code Section 5097.98
- Angels Camp 2020 General Plan (General Plan)
- Angels Camp Municipal Code (Municipal Code)

3.5.2 Environmental Setting

The City has multiple historic properties that are protected by the General Plan and Municipal Code.

3.5.3 Impact Analysis

a) Would the project cause a substantial adverse change in the significance of a historical resource pursuant to Section 15064.5?

No Impact: The proposed GHGRP does not include any land use changes or other strategies that would result in adverse effects on historical resources. No development is proposed. Further, at the time that any project pursuant to the GHGRP's recommended measures is proposed, a separate, project-level environmental review would be required to identify potential impacts on known or potential historic sites and structures. The CEQA Guidelines require a project that will have potentially adverse impacts on historical resources to conform to the Secretary of the Interior's Standards for the Treatment of Historic Properties. Municipal Code Chapter 17.26, Historical Commercial District Ordinance, offers additional protections to historic areas by giving the City the authority to make recommendations, decisions, and determinations regarding the designation, preservation, protection, and enhancement of the district, including the authority to deny demolition, except in cases of damage or dilapidation[18]. Future projects that would potentially alter or affect a historical resource, including through interior/exterior retrofits to existing buildings that may alter the character-defining features of a historic building(s), would be required to demonstrate compliance with the Secretary of the Interior's Standards as adopted by reference in Municipal Code Sections 17.26.070, Demolition or removal of buildings, and 17.26.080, Construction or alteration of buildings structures. Additionally, the General Plan

[18] City of Angels. Angels Camp Municipal Code. Chapter 17.26. https://www.codepublishing.com/CA/Angels/. Accessed February 18, 2026

includes goals and policies that would minimize or avoid impacts on historical resources by requiring the preservation of such resources[19].

The GHGRP is a planning document and does not include any development. Therefore, no impact would occur, and no mitigation measures are required.

b) Would the project cause a substantial adverse change in the significance of an archaeological resource pursuant to Section 15064.5?

No Impact: The Draft GHGRP is a planning document and does not include any development. The GHGRP includes measures that recommend retrofits and infrastructure improvements that would occur in developed areas of the City. Potential future construction associated with the GHGRP measures, including expanded pedestrian, bicycle, and transit facilities, would likely take place within existing rights-of-way. Should construction associated with implementation of the proposed measures take place outside the existing rights-of-way, new ground disturbance has the potential to uncover unknown resources. All potential future development associated with the measures in the GHGRP would be required to undergo separate, project-specific environmental review to determine impacts on cultural resources and to develop appropriate mitigation and monitoring procedures for projects on sensitive sites.

The GHGRP is a planning document and does not include any development or land use changes. Therefore, no impact would occur, and no mitigation measures are required.

c) Would the project disturb any human remains, including those interred outside of formal cemeteries?

No Impact: The Draft GHGRP is a planning document and does not include any development. The GHGRP includes measures that recommend retrofits and infrastructure improvements that would occur in developed areas of the City. Potential future ground-disturbing activities associated with the GHGRP measures could potentially uncover previously unknown human remains. In the unlikely event that this occurs, compliance with State regulations pertaining to the discovery of human remains would be required.

The proposed project does not include development or land use changes. Therefore, no impact would occur, and no mitigation measures are required.

MITIGATION MEASURES

Project implementation would not result in any significant impacts related to cultural resources; therefore, no mitigation measures are required.

[19] City of Angels. City of Angels 2020 Camp General Plan. https://angelscamp.gov/community-development/planning/. Accessed February 18, 2026.

3.6 Energy

	Potentially Significant Impact	Less Than Significant Impact With Mitigation Incorporated	Less Than Significant Impact	No Impact
VI. Energy – Would the project:				
a) Result in potentially significant environmental impact due to wasteful, inefficient, or unnecessary consumption of energy resources, during project construction or operation?	☐	☐	☐	☒
b) Conflict with or obstruct a state or local plan for renewable energy or energy efficiency?	☐	☐	☐	☒

3.6.1 Regulatory Setting

Regulations at the State and local levels applicable to the proposed project related to energy include:

- California Code of Regulations (CCR) Title 24, Part 6

3.6.2 Environmental Setting

Pacific Gas and Electric Company (PG&E) provides electricity to the City of Angels.

3.6.3 Impact Analysis

a) Would the project result in potentially significant environmental impact due to wasteful, inefficient, or unnecessary consumption of energy resources, during project construction or operation?

No Impact: Implementation of the proposed GHGRP would not result in construction or operational impacts related to wasteful consumption of energy resources. The Draft GHGRP is a planning document containing climate action measures to reduce Angels Camp GHG emissions. The Draft GHGRP would not involve land use or zoning changes but would encourage infrastructure development and redevelopment, including energy efficiency retrofits. Furthermore, the purpose and intended effect of the GHGRP is to reduce GHG emissions generated within the City, including those emissions generated by energy demand and supply. The Draft GHGRP encourages electrification, use of renewable energy, and energy efficiency in existing and new residential and commercial buildings.

Measures EB-4 and NC-2 propose the expansion of decarbonization and electrification efforts for municipal buildings and construction. Measure TR-5 focuses on electrifying landscaping equipment and upgrading off-road equipment to use cleaner fuels. As such, the Draft GHGRP does not directly propose development and would not result in the use of non-renewable resources in a wasteful or inefficient manner. Implementation of the Draft GHGRP would assist in reducing the use of non-renewable energy resources within the City, and would improve local energy efficiency. Therefore, the proposed GHGRP would not result in impacts related to energy, and no mitigation measures are required.

b) Would the project conflict with or obstruct a state or local plan for renewable energy or energy efficiency?

No Impact: Any potential future development associated with the Draft GHGRP measures would be required to comply with the latest California Energy Commission (CEC) requirements, including CEC Building Energy Efficiency Standards, as well as all federal, State, and local rules and regulations pertaining to energy consumption and

conservation[20]. Potential future development would also be required to undergo separate, project-specific environmental review to determine energy impacts.

The proposed GHGRP includes an inventory of citywide GHG emissions; forecasts of future citywide GHG emissions; monitoring and reporting processes to ensure State GHG targets are met; and measures for reducing GHG emissions to meet State requirements. The GHGRP is written for intended implementation through the year 2045. The GHGRP would also support the CARB passenger vehicle GHG emissions reduction targets through measures that would increase active and public transportation and provision of EV infrastructure throughout the city. Therefore, the GHGRP would not conflict with or obstruct a plan for renewable energy or energy efficiency, and no mitigation measures are required.

MITIGATION MEASURES

Project implementation would not result in any significant impacts related to energy; therefore, no mitigation measures are required.

[20] California Energy Commission. 2025. Restructured 2025 Energy Code Title 24, Part 6. https://www.energy.ca.gov/media/12153. Accessed February 27, 2026.

3.7 Geology and Soils

	Potentially Significant Impact	Less Than Significant Impact With Mitigation Incorporated	Less Than Significant Impact	No Impact
VII. GEOLOGY AND SOILS – Would the project:				
a) Directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury, or death involving:				
i) Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault? Refer to Division of Mines and Geology Special Publication 42.	☐	☐	☐	☒
ii) Strong seismic ground shaking?	☐	☐	☐	☒
iii) Seismic-related ground failure, including liquefaction?	☐	☐	☐	☒
iv) Landslides?	☐	☐	☐	☒
b) Result in substantial soil erosion or the loss of topsoil?	☐	☐	☐	☒
c) Be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction or collapse?	☐	☐	☐	☒
d) Be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (1994), creating substantial direct or indirect risks to life or property?	☐	☐	☐	☒
e) Have soils incapable of adequately supporting the use of septic tanks or alternative wastewater disposal systems where sewers are not available for the disposal of wastewater?	☐	☐	☐	☒
f) Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?	☐	☐	☐	☒

3.7.1 Regulatory Setting

Regulations at the federal, State, and local levels applicable to the proposed project related to geology and soils include:

- Paleontological Resources Preservation Act
- California Alquist-Priolo Earthquake Fault Zoning Act
- California Building Standards Code

- California Seismic Hazards Mapping Act
- Angels Camp Municipal Code (Municipal Code)

3.7.2 Environmental Setting

The Planning Area is located within a seismically active region, within one mile of the Foothills Fault System, which includes the Melones Fault and Bear Mountains Fault.[21]

3.7.3 Impact Analysis

a) Would the project directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury, or death involving:

i) Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault? Refer to Division of Mines and Geology Special Publication 42.

ii) Strong seismic ground shaking?

iii) Seismic-related ground failure, including liquefaction?

iv) Landslides?

No Impact: The Planning Area is located within a seismically active area where several faults and fault zones are considered active by the California Department of Conservation, Division of Mines and Geology[22]. As such, earthquakes in and near the Planning Area have the potential to cause ground shaking of significant magnitude as well as liquefaction and seismically-induced landslides in parts of the City.

However, the proposed project is a planning document and does not include any land use changes or development. Any potential future development projects associated with the measures in the GHGRP would be required to undergo separate, project-specific environmental review to determine potential impacts related to geology and soils. Any future development would also be subject to federal, State, and local regulatory requirements related to building design and construction, including the most recent version of the California Building Code. Therefore, the proposed project would have no impacts related to the cause of potential substantial adverse effects involving earthquake faults, seismic ground shaking, or seismic-related ground failure. No mitigation measures are required.

b) Would the project result in substantial soil erosion or the loss of topsoil?

No Impact: The GHGRP is a planning document and would not directly involve construction or development activities. Any future development in the City would be subject to State, regional, and local requirements related to the prevention of erosion of on-site soils and the discharge of construction-related pollutants. Future projects would also be evaluated by the City for their compliance with the goals, policies, and measures contained in the General Plan intended to protect lives and property. In the event that new development or construction of expanded bike paths and pedestrian amenities associated with the GHGRP measures would require construction activities that may result in substantial soil erosion or loss of topsoil, such activities would be subject to the latest version of the California Building Code (CBC), the National Pollutant Discharge Elimination System (NPDES), and Municipal Code Chapter 15.20, Flood Damage Prevention, to reduce erosion impacts.

[21] California Department of Conservation. Fault Activity Map of California. https://maps.conservation.ca.gov/cgs/fam/. Accessed on February 19, 2026.
[22] Ibid.

Therefore, the proposed project would have no impact on soil erosion or the loss of topsoil. No mitigation measures are required.

c) Would the project be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction or collapse?

d) Would the project be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (1994), creating substantial direct or indirect risks to life or property?

No Impact: The GHGRP is a planning document and would not directly involve construction or development activities. All potential future projects associated with the measures in the GHGRP would be required to undergo separate, project-specific environmental review to determine impacts related to unstable and expansive soils. The potential hazards of unstable soil or geologic units, or expansive soil, would be addressed largely through the integration of geotechnical information in the planning and design process for future projects to determine the local soil suitability for specific sites in accordance with standard industry practices and state-provided requirements. To account for any potential instability, all future development projects in the City would be subject to federal, State, and local regulatory requirements related to building design and construction. Pursuant to the CBC, project-specific geotechnical investigations would be required, subject to review by the City's Public Works Department, and any recommendations contained within would be required to be implemented.

The proposed GHGRP is a planning document and does not include any land use changes or other measures that would affect soil stability. Therefore, the proposed project would have no impacts related to unstable soil or geologic hazards, including landslides, lateral spreading, subsidence, or liquefaction, or expansive soil. No mitigation measures are required.

e) Would the project have soils incapable of adequately supporting the use of septic tanks or alternative wastewater disposal systems where sewers are not available for the disposal of wastewater?

No Impact: The GHGRP is a planning document and does not include any land use changes or other measures that would require the use of a septic tank or alternative wastewater disposal system. The proposed project would not directly involve any development. All future development in the City would be subject to federal, State, and local regulatory requirements related to building design and construction. Pursuant to the CBC, project-specific geotechnical investigations would be required, subject to review by the City's Public Works Department, and any recommendations contained within would be required to be implemented. Therefore, the proposed project would have no impact related to soils incapable of adequately supporting the use of septic tanks or alternative waste disposal systems. No mitigation measures are required.

f) Would the project directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?

No Impact: The proposed project includes a planning document and does not directly involve any development. Potential impacts related to paleontological and geologic resources are unique to a project and site and cannot be meaningfully determined until a project has been defined. In the event that paleontological resources are discovered during the implementation of future development projects, applicants will be required to comply with regulatory standards enumerated in Public Resources Code Section 5097.574, which identifies the protocol for proper handling. Therefore, the proposed project would have no impacts related to paleontological resources or unique geologic features. No mitigation measures are required.

MITIGATION MEASURES

Project implementation would not result in any significant impacts related to geology and soils; therefore, no mitigation measures are required.

3.8 Greenhouse Gas Emissions

	Potentially Significant Impact	Less Than Significant Impact With Mitigation Incorporated	Less Than Significant Impact	No Impact
VIII. GREENHOUSE GAS EMISSIONS – Would the project:				
a) Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment?	☐	☐	☐	☒
b) Conflict with an applicable plan, policy or regulation adopted for the purpose of reducing the emissions of greenhouse gases?	☐	☐	☐	☒

3.8.1 Regulatory Setting

Regulations at the federal, State, and local levels applicable to the proposed project related to geology and soils include:

- Assembly Bill (AB) 32
- Executive Order (EO) S-3-15
- Senate Bill (SB) 32
- Calaveras County Council of Governments Regional Transportation Plan (RTP)
- Angels Camp 2020 General Plan Draft Environmental Impact Report (General Plan EIR)

3.8.2 Environmental Setting

Greenhouse gases, gases that trap heat in the atmosphere, regulate the earth's temperature. This phenomenon, known as the greenhouse effect, is responsible for maintaining a habitable climate. The most common GHGs are carbon dioxide (CO_2) and water vapor, but there are also several others, most importantly methane (CH_4), nitrous oxide (N_2O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfur hexafluoride (SF_6). These are released into the earth's atmosphere through a variety of natural processes and human activities. An expanding body of scientific research supports the theory that global climate change is currently affecting changes in weather patterns, average sea level, ocean acidification, chemical reaction rates, and precipitation rates, and that it will increasingly do so in the future. The climate and several naturally occurring resources within California are adversely affected by this global warming trend.

3.8.3 Impact Analysis

a) Would the project generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment?

No Impact: The GHGRP is a planning document intended to help the City reduce local GHG emissions to meet or exceed State targets for 2030 and 2045. No development is directly proposed by the GHGRP; however, the GHGRP contains recommended measures to reduce GHG emissions, which include retrofits and infrastructure improvement projects. Potential future projects associated with the measures in the GHGRP are not anticipated to generate substantial emissions, because those projects would result in only minor upgrades to existing uses. In addition, any construction-related GHG emissions would be anticipated to be more than offset by the operational benefits of the

projects recommended in the GHGRP. Implementation of the strategies and measures proposed within the Draft GHGRP would result in annual community-wide GHG emission reductions. As shown in Table 3, the GHGRP measures would result in total MTCO2e reductions of approximately 6,674 MTCO2e by 2030 and 10,920 MTCO2e by 2045. As proposed, the GHGRP would meet all State-mandated emissions targets through 2030 and would require further discussions and measures to meet 2045 targets. Therefore, the GHGRP is anticipated to have a net positive effect with regard to GHG emissions. No impact would occur, and no mitigation measures are required.

b) Would the project generate conflict with an applicable plan, policy or regulation adopted for the purpose of reducing the emissions of greenhouse gases?

No Impact: The GHGRP reflects the latest guidance from the CARB established in the 2022 Scoping Plan, which is designed to implement the State's GHG emission reduction targets set in AB 32 and SB 32. Assembly Bill 32 established a statewide target of reducing GHG emissions to 1990 levels by 2020. California has exceeded this now-past target and has already established longer-term goals for 2030 (in SB 32) and 2045 (in AB 1279). The proposed GHGRP that would serve as the implementation tool for GHG monitoring and reporting and would serve to implement a number of measures aimed at reducing local GHG emissions to meet State targets.

Additionally, the Calaveras Council of Governments (CCOG) Regional Transportation Plan (RTP) includes a set of policy objectives related to safety and quality of life, climate and environment, equity and accessibility, economy, and infrastructure[23]. California Government Code Section 65080 (Gov. Code Section 65080) requires that CCOG prepare and adopt an RTP which sets forth a description of transportation issues in the region, identifies and quantifies regional needs expressed within both short-range and long-range planning horizons, and maintains internal consistency with fund estimates. With implementation of the proposed GHGRP's measures related to sustainable and multi-modal transportation, the proposed GHGRP would complement the goals and policies of the RTP and would continue to carry out the goals of AB 32 and Government Code Section 65080. The GHGRP would, by nature, result in reduced transportation-related GHG emissions and achieve the overarching goals of local, regional, and State plans to reduce GHG emissions. As such, the proposed project would not conflict with any applicable plan, policy, or regulation adopted for the purpose of reducing the emissions of GHGs. Therefore, no impact would occur, and no mitigation measures are required.

MITIGATION MEASURES

Project implementation would not result in any significant impacts related to greenhouse gas emissions; therefore, no mitigation measures are required.

[23] Calaveras Council of Governments. 2021. 2021 Regional Transportation Plan.12 October. https://calacog.org/wp-content/uploads/2021/10/2021-Calaveras-RTP-Final1013.pdf. Accessed February 25, 2026.

3.9 Hazards and Hazardous Materials

	Potentially Significant Impact	Less Than Significant Impact With Mitigation Incorporated	Less Than Significant Impact	No Impact
IX. HAZARDS AND HAZARDOUS MATERIALS – Would the project:				
a) Create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials?	☐	☐	☐	☒
b) Create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment?	☐	☐	☐	☒
c) Emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school?	☐	☐	☐	☒
d) Be located on a site that is included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5 and, as a result, would it create a significant hazard to the public or the environment?	☐	☐	☐	☒
e) For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project result in a safety hazard or excessive noise for people residing or working in the project area?	☐	☐	☐	☒
f) Impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan?	☐	☐	☐	☒
g) Expose people or structures, either directly or indirectly, to a significant risk of loss, injury or death involving wildland fires?	☐	☐	☐	☒

3.9.1 Regulatory Setting

Regulations at the State and local levels applicable to the proposed project related to hazards and hazardous materials include:

- California Government Code Section 65962.5
- Calaveras County Emergency Operations Plan (Solano County EOP)
- City of Angels 2021 Emergency Operations Plan Evacuation Annex (City's EOP)
- Angels Camp 2020 General Plan Environmental Impact Report (General Plan EIR)
- Angels Camp 2020 General Plan (General Plan)

3.9.2 Environmental Setting

The Planning Area consists of the entire City of Angels. Within the City, there are two public schools, including Mark Twain Elementary and Bret Harte High School. [24,25] The Planning Area contains two sites listed on the California Department of Toxic Substances Control (DTSC) EnviroStor database, which include the Angels Camp Towne Center (voluntary cleanup) and the Brown Mine (needs evaluation). No other sites within the City are listed pursuant to Government Code Section 65962.5.[26] The City of Angels is located more than five miles from the nearest public use airport and is not located within an airport land use plan. The City of Angels 2021 Emergency Operations Plan and the Calaveras County Emergency Operations Plan provide for the integration and coordination of planning efforts against potential threats, including earthquakes, flooding and dam failure, wildfires, extreme weather, landslides, hazardous materials, terrorism, and cybersecurity.[27,28]

3.9.3 Impact Analysis

a) Would the project create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials?

No Impact: Implementation of the Draft GHGRP, including the recommended measures, would not result in the routine transport, use, or disposal of hazardous materials. No development is directly proposed by the GHGRP. The GHGRP includes measures encouraging future projects related to retrofits and infrastructure improvements. It is possible that construction activities associated with these potential future projects would require the use of materials that include on-site fueling/servicing of construction equipment, and the transport of fuels, lubricating fluids, and solvents. These types of materials are not acutely hazardous, and all storage, handling, and disposal of these materials is regulated by the California Department of Toxic Substances Control (DTSC), United States Environmental Protection Agency, California Environmental Protection Agency, the Occupational Safety & Health Administration, and the Calaveras County Environmental Health Services (EHS). The transport, use, and disposal of construction-related hazardous materials would be required to comply with applicable federal, State, and local regulations.

The GHGRP is a planning document and does not directly propose any development or land use changes. Therefore, no impact would occur, and no mitigation measures are required.

b) Would the project create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment?

No Impact: Implementation of the recommended measures in the Draft GHGRP could result in the rehabilitation and renovation of older residential, commercial, and municipal structures to support energy and water retrofits and the installation of private and municipal solar PV systems. Structures built prior to 1978 may contain asbestos-containing building materials and lead paint. If not properly handled and released into the environment in large enough quantities, these materials could pose a threat to construction workers and residents. However, these retrofits would primarily be small-scale, and no single renovation would likely result in releases large enough to pose a health hazard

[24] Mark Twain Union Elementary School District. About Us. https://www.mtwain.k12.ca.us/page/about-us. Accessed February 23, 2026.

[25] Bret Hart Union High School District. Schools. https://www.brethartebullfrogs.org/. Accessed February 23, 2026

[26] California Environmental Protection Agency, Cortese List Data Resources, https://calepa.ca.gov/sitecleanup/corteselist/, accessed February 23, 2026.

[27] City of Angels. 2021 Emergency Operations Plan. https://angelscamp.gov/wp-content/uploads/EOP_floodwaterplan_Final-2.pdf . Accessed February 23, 2026.

[28] Calaveras County. 2024 Emergency Operations Plan. https://oes.calaverasgov.us/Portals/OES/Documents/Calaveras%20County%20EOP%20and%20Annexes.pdf?ver=g_DqXy8Oj19r5UjMnRsBjA%3D%3D . Accessed February 23, 2026.

to the public. In addition, demolition and construction activities involving hazardous materials removal are heavily regulated, and construction would be required to comply with applicable federal and State safety regulations.

The GHGRP is a planning document and does not directly propose any development or land use changes. Therefore, no impact would occur, and no mitigation measures are required.

c) Would the project emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school?

No Impact: The proposed project includes a planning document and does not directly propose any development of land use changes. Additionally, the Draft GHGRP does not recommend projects that would involve the handling of hazardous or acutely hazardous materials. Potential hazardous material-related impacts are location-specific and cannot be assessed in a meaningful way until the location of a project site is known. At such time that a development proposal is considered that project will be subject to the development review process. Any potential future projects associated with the measures in the GHGRP would be required to comply with all applicable regulatory requirements related to hazardous materials. The proposed project evaluated herein includes a planning document and does not directly propose physical changes in the environment. Therefore, the proposed project would have no impacts related to the emission or handling of hazardous materials within 0.25-mile of a school. No mitigation measures are required.

d) Would the project be located on a site that is included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5 and, as a result, would it create a significant hazard to the public or the environment?

No Impact: According to the DTSC, two hazardous materials sites are located within the City, which could be encountered during implementation of measures in the Draft GHGRP.[29] The Draft GHGRP is a planning document that, in itself, would not create a significant hazard. No development is directly proposed. Implementation of the measures recommended in the Draft GHGRP, such as measures related to pedestrian, bike, and transit connectivity, could result in the construction of bicycle paths or expanded pedestrian and transit amenities, which could require disturbance of a site located on or near a known hazardous materials site. However, demolition and construction activities involving hazardous materials sites are heavily regulated, and construction of potential future projects would be required to comply with applicable federal and State safety regulations.

The proposed project includes a planning document, and no development or land use changes are proposed. Therefore, no impact would occur, and no mitigation measures are required.

e) For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project result in a safety hazard or excessive noise for people residing or working in the project area?

No Impact: The City of Angels is located more than five miles from the Calaveras County airport and is not located within an airport land use plan.[30] The GHGRP is a planning document and no development is proposed. Therefore, no impact would occur in this regard, and no mitigation measures are required.

[29] California Department of Toxic Substances Control. EnviroStor Database. https://www.envirostor.dtsc.ca.gov/public/map/?global_id=60003489. Accessed February 23, 2026.

[30] Calaveras County. Calaveras County Airport Plan 2010. https://planning.calaverasgov.us/Portals/Planning/Documents/Current Community Plans/Special Plans/Airport Plan 2010/Airport Plan 2010.pdf?ver=8tZJA-9DqcUESR17wCfHUg%3d%3d. Accessed February 23, 2026.

f) Would the project impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan?

No Impact: Relevant emergency response or emergency evacuation plans include the Calaveras County Emergency Operations Plan and the Calaveras County Multi-Jurisdictional Hazard Mitigation Plan (MJHMP). The Draft GHGRP is a planning document and does not propose any development; the recommendations and measures in the Draft GHGRP would not interfere with an adopted emergency response plan or emergency evacuation plan. Further, the Draft GHGRP recommends measures that would increase safety for drivers, pedestrians, and bicyclists, and seeks to reduce the number of automobiles on City streets, which may make evacuation and emergency response safer and more efficient. Therefore, no impact would occur, and no mitigation measures are required.

g) Would the project expose people or structures, either directly or indirectly, to a significant risk of loss, injury or death involving wildland fires?

No Impact: According to CAL FIRE, the City is predominantly classified as being located within a High Fire Hazard Severity Zone (FHSZ) in a Local Responsibility Area (LRA), with Very High FHSZ (VHFHSZ) regions within the City, including to the north near Brunner Hill Road, east along Vallecito Road, and south below Centennial Lane. The central areas of the City are designated as Moderate FHSZs[31]. Areas of high fire threat are characterized by natural vegetation that can serve as fuel for wildland fires, impede emergency access, and facilitate the rapid spread of potential fire.

However, the GHGRP is a planning document that does not include any development or land use changes. Implementation of the measures in the GHGRP would not include any land use changes or measures that would affect exposure to wildland fire risk. No impact would occur, and no mitigation measures are required.

MITIGATION MEASURES

Project implementation would not result in any significant impacts related to hazards and hazardous materials; therefore, no mitigation measures are required.

[31] California Department of Forestry and Fire Protection, Local Responsibility Area Fire Hazard Severity Zones, City of Angels Camp – Calaveras County LRA, March 10, 2025, https://calfire.app.box.com/s/wahuw9ny7cgn89xpxh7092ur50r1pwvj/file/1798585647873, accessed February 11, 2026.

3.10 Hydrology and Water Quality

	Potentially Significant Impact	Less Than Significant Impact With Mitigation Incorporated	Less Than Significant Impact	No Impact
X. HYDROLOGY AND WATER QUALITY – Would the project:				
a) Violate any water quality standards or waste discharge requirements or otherwise substantially degrade surface or ground water quality?	☐	☐	☐	☒
b) Substantially decrease groundwater supplies or interfere substantially with groundwater recharge such that the project may impede sustainable groundwater management of the basin?	☐	☐	☐	☒
c) Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river or through the addition of impervious surfaces, in a manner which would:				
i) result in substantial erosion or siltation on- or off-site;	☐	☐	☐	☒
ii) substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or offsite;	☐	☐	☐	☒
iii) create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff; or	☐	☐	☐	☒
iv) impede or redirect flood flows?	☐	☐	☐	☒
d) In flood hazard, tsunami, or seiche zones, risk release of pollutants due to project inundation?	☐	☐	☐	☒
e) Conflict with or obstruct implementation of a water quality control plan or sustainable groundwater management plan?	☐	☐	☐	☒

3.10.1 Regulatory Setting

Regulations at the federal, State, and local levels applicable to the proposed project related to hydrology and water quality include:

- Federal Emergency Management Agency's (FEMA) National Flood Insurance Program
- 2014 Sustainable Groundwater Management Act (SGMA)
- Angels Camp Emergency Operations Plan 2021
- Angels Camp 2020 General Plan Environmental Impact Report (General Plan EIR)
- Angels Camp 2020 General Plan (General Plan)

- Angels Camp Municipal Code (Municipal Code)

3.10.2 Environmental Setting

The proposed project encompasses the incorporated City of Angels. According to FEMA's National Flood Hazard Layer Viewer, the Planning Area contains regions within a regulatory floodway and 100-year flood zone, generally in the vicinity of Angels Creek and Cherokee Creek. Portions of the southwestern portion of the City contain regions with a 0.2-percent annual chance of flood.

3.10.3 Impact Analysis

a) Would the project violate any water quality standards or waste discharge requirements or otherwise substantially degrade surface or ground water quality?

No Impact: The GHGRP is a planning document; no development or land use changes are proposed. However, the GHGRP recommends measures that encourage potential future projects related to retrofits and infrastructure improvements. Potential future projects related to the GHGRP measures could result in construction-related water discharge. Depending on the project size, potential future projects could be required to comply with the NPDES permit to control stormwater discharges. All potential future projects would be required to comply with federal, State, and local regulations regarding onsite stormwater retention, to prevent contamination of surface waters and local groundwater. Potential future projects may also be required to prepare a Stormwater Pollution Prevention Plan (SWPPP) and/or incorporate BMPs during construction to reduce potential impacts.

The Draft GHRP includes measures to implement Wastewater Treatment Plant (WWTP) Energy Efficiency, an ordinance for the use of reclaimed water to irrigate the WWTP, and an ordinance for the requirement of low-flow water use fixtures which would minimize waste as a result of new construction. Therefore, no impact would occur, and no mitigation measures are required.

b) Would the project substantially decrease groundwater supplies or interfere substantially with groundwater recharge such that the project may impede sustainable groundwater management of the basin?

No Impact: The Draft GHGRP is a planning document and does not directly propose any development or land use changes. The Draft GHGRP intends to promote water conservation through implementation of the Wastewater Treatment Plant (WWTP) Energy Efficiency, an ordinance for the use of reclaimed water to irrigate the WWTP, and an ordinance for the requirement of low-flow water use fixtures which would minimize waste as a result of new construction. Additional measures included in the GHGRP include water efficiency requirements for new and renovated buildings, increased enforcement of water use restrictions, and promotion of water-efficient products and practices.

The recommended measures in the GHGRP encourage potential future projects related to infrastructure improvements and retrofits. Potential future projects related to pedestrian, bicycle, and transit connectivity could increase the amount of landscaping within the City, which could increase the need for water for irrigation purposes. However, any landscaping would be required to comply with applicable water-efficient landscape standards in the Municipal Code. Any future development would also be subject to all applicable State, regional, and local regulatory requirements concerning the efficient use and conservation of water resources and preservation of groundwater resources and quality. The proposed project includes a planning documents and does not directly involve any development. Therefore, the proposed project would have no impact on groundwater supplies or recharge. No mitigation measures are required.

c) Would the project substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river or through the addition of impervious surfaces, in a manner which would:

i) Result in substantial erosion or siltation on- or off-site?

ii) Substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or offsite?

iii) Create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff?

iv) Impede or redirect flood flows?

No Impact: The proposed project includes a planning document that does not directly propose physical changes to the environment. The GHGRP contains measures intended to increase efficiency and reduce GHG emissions in the City. Some measures, such as improving the bike and pedestrian network, could result in future projects that slightly increase the amount of surface runoff due to new pedestrian and bicycle paths, and therefore impervious surface area, within the City. However, any potential future projects would be subject to existing federal and State regulations, as well as the City's Flood Damage Prevention ordinance that helps prevent and minimize flood damage resulting from hydrodynamic and hydrostatic loads, including limiting surface runoff from development and reducing erosion. Additionally, the MJHMP's goals and policies are intended to preserve natural water courses or naturalized drainage channels, and to ensure future development incorporates BMPs to reduce runoff from a site.[32]

Potential impacts related to drainage are unique to a project and cannot be meaningfully determined until a project and project site have been defined. Future development in the City would be required to follow State, regional, and local regulations regarding drainage, erosion, and runoff. The City would require BMPs for construction in order to avoid erosion, pollution, sedimentation, and runoff that would degrade water quality. Therefore, the proposed project would have no impact related to drainage patterns or the course of a stream or river. No mitigation measures are required.

d) In flood hazard, tsunami, or seiche zones, would the project risk release of pollutants due to project inundation?

No Impact: The City is located approximately 109 miles from the ocean and is not at risk from tsunamis. There are no bodies of water in the City that could put the City at risk from a seiche. According to the FEMA Flood Insurance Rate Map, a regulatory floodway is located in the central portion of the City, oriented in a northeast-southwest direction, generally in the vicinity of Angels Creek.[33] This area is located within a 100-year flood zone. A 100-year flood zone has a 1 percent chance of experiencing a major flood in any given year. Portions of the City in the vicinity of Cherokee Creek are also located within a 100-year flood zone. Areas with no flooding (A zones) are mapped along the western portion of the Planning Area near Greenhorn Creek.[34] There are no other federally mapped flood hazard zones in Angels Camp; however, areas are prone to flooding in the eastern portions of the Planning Area.

Future development would be subject to all applicable federal, State, and local regulatory requirements concerning flood hazards, including measures identified in the City's General Plan. The proposed project includes a planning

[32] Calaveras County. 2021. Multi-Jurisdictional Hazard Mitigation Plan. https://angelscamp.gov/wp-content/uploads/Final-Draft-2021-Calaveras-County-MJHMP-042021.pdf. Accessed February 17, 2026.

[33] Federal Emergency Management Agency. 2009. *FEMA Flood Map Service Center – City of Angels*. Website: https://msc.fema.gov/portal/search?AddressQuery=angels%20camp%2C%20ca. Accessed March 17, 2026.

[34] Federal Emergency Management Agency, National Flood Hazard Layer Viewer, https://www.fema.gov/flood-maps/national-flood-hazard-layer, accessed February 17, 2026

document and does not directly propose any development. Therefore, the proposed project would have no impact on the release of pollutants in a flood hazard, tsunami, or seiche zone. No mitigation measures are required.

e) Would the project conflict with or obstruct implementation of a water quality control plan or sustainable groundwater management plan?

No Impact: The GHGRP is a planning document and does not directly propose any development. The GHGRP includes measures that encourage future projects related to retrofits and infrastructure improvements. Construction and operation associated with these potential future projects would be required to comply with local, State, and federal regulations, including the NPDES Construction General Permit, Calaveras County MS4 Permit, and the City's Code. Commonly practiced BMPs, as required by these regulations, would be implemented to control construction site runoff and reduce the discharge of pollutants to storm drain systems from stormwater and other nonpoint-source runoff. Construction runoff would also have to be in compliance with the water quality objectives for the region. The NPDES Construction General Permit requires stormwater discharges not to contain pollutants that cause or contribute to an exceedance of any applicable water quality objectives or water quality standards, including designated beneficial uses.

No development or land use changes are proposed. Therefore, the proposed project would not obstruct implementation of a water quality control plan, and no impact would occur. No mitigation measures are required.

MITIGATION MEASURES

Project implementation would not result in any significant impacts related to hydrology and water quality; therefore, no mitigation measures are required.

3.11 Land Use and Planning

	Potentially Significant Impact	Less Than Significant Impact With Mitigation Incorporated	Less Than Significant Impact	No Impact
XI. LAND USE AND PLANNING – Would the project:				
a) Physically divide an established community?	☐	☐	☐	☒
b) Cause a significant environmental impact due to a conflict with any land use plan, policy, or regulation adopted for the purpose of avoiding or mitigating an environmental effect?	☐	☐	☐	☒

3.11.1 Regulatory Setting

Regulations at the local level applicable to the proposed project related to land use and planning include:

- Angels Camp 2020 General Plan Environmental Impact Report (General Plan EIR)
- Angels Camp 2020 General Plan (General Plan)
- Angels Camp Main Street Plan
- Angels Camp Municipal Code (Municipal Code)
- Municipal Code Title 17, Zoning (Zoning Code)

3.11.2 Environmental Setting

The GHGRP would be applicable to the entire City of Angels. Based on the City's 2020 General Plan, Table 1-8, Summary of Land Uses, the primary land uses in the Planning Area include Residential, Public, Right of Way, Special Planning, and Commercial designations. According to the General Plan, residential land uses are intended to provide a variety of housing options throughout the City. Additionally, Public and Right of Way land uses are intended to accommodate government buildings, schools, transportation facilities, and similar uses. Special Planning land uses are intended to provide uniform, unique, or flexible development with compatible mixed-uses and physical characteristics. Commercial land uses are intended to provide a broad range of commercial uses for residents and visitors, including grocery and specialty stores, hotels, restaurants, and similar uses.

3.11.3 Impact Analysis

a) Would the project physically divide an established community?

No Impact: The Draft GHGRP is a planning document that does not directly involve development and does not propose land use changes. Implementation of the Draft GHGRP measures would enhance pedestrian, bicycle, and transit connectivity and encourage the development of new residential and nonresidential buildings to be built all-electric, which could result in the development of structures or improvements that could divide an established community, including renewable energy generation and energy storage systems. However, all potential future projects would be required to undergo separate, project-specific environmental review in order to determine impacts related to land use and planning. Any subsequent discretionary actions or development that occur(s) pursuant to the GHGRP measures would be reviewed and processed in accordance with City planning policies.

The Draft GHGRP intends to increase connectivity throughout the City by implementing programs for bike, pedestrian, and transit connectivity, and Electric Vehicle (EV) rideshare, which would connect residential development within the

City to existing commercial and public uses. The GHGRP has been prepared in compliance with State law, and no actual development is proposed at this time. No potential adverse impacts related to land use would occur as a result of the proposed project. No mitigation measures are required.

b) Would the project cause a significant environmental impact due to a conflict with any land use plan, policy, or regulation adopted for the purpose of avoiding or mitigating an environmental effect?

No Impact: Implementation of the Draft GHGRP would require modification of some existing City policies, including changes to the Municipal Code and Zoning Code. The GHGRP proposes the adoption of ordinances that have more stringent requirements related to emissions, including the electrification of existing residential and commercial buildings, net zero emissions for new construction, decarbonization of off-road equipment and vehicles, diversion of organic waste, increased adoption of EV and Zero Emissions Vehicles (ZEV), determination of appropriate utilization of reclaimed (non-potable) water, and adoption of water-conserving appliances in new residential and non-residential buildings. While the proposed measures could conflict with some existing policies, the GHGRP is designed to mitigate adverse environmental impacts associated with global climate change. Where conflicts do occur, the GHGRP measures would generally result in greater avoidance or mitigation of environmental effects related to GHG emissions. Therefore, no impact would occur, and no mitigation measures are required.

MITIGATION MEASURES

Project implementation would not result in any significant impacts related to land use and planning; therefore, no mitigation measures are required.

3.12 Mineral Resources

	Potentially Significant Impact	Less Than Significant Impact With Mitigation Incorporated	Less Than Significant Impact	No Impact
XII. MINERAL RESOURCES – Would the project:				
a) Result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the state?	☐	☐	☐	☒
b) Result in the loss of availability of a locally important mineral resource recovery site delineated on a local general plan, specific plan or other land use plan?	☐	☐	☐	☒

3.12.1 Regulatory Setting

Regulations at the State and local levels applicable to the proposed project related to mineral resources include:

- Surface Mining and Reclamation Act of 1975 (SMARA)
- City of Angels 2020 General Plan Environmental Impact Report (General Plan EIR)

3.12.2 Environmental Setting

SMARA regulates surface mining operations and encourages the production, conservation, and protection of the State's mineral resources, and limits new development in areas with significant deposits of minerals. SMARA also classifies areas into Mineral Resource Zones (MRZs), which identify whether known or inferred significant mineral resources are present in an area. According to the California Department of Conservation Special Report 169, the City is designated MRZ-2b.[35] MRZ-2 is defined as areas containing significant inferred precious and base metal resources of hydrothermal origin. Furthermore, according to the General Plan, the City's Sphere of Influence contains several designated mineral resource areas and mines; however, there are no designated mineral resources within City limits.

3.12.3 Impact Analysis

a) Would the project result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the state?

b) Would the project result in the loss of availability of a locally important mineral resource recovery site delineated on a local general plan, specific plan or other land use plan?

No Impact: The project area is designated MRZ-2b. However, the GHGRP does not include any land uses changes or development. Potential future projects that may occur in relation to the recommended measures in the GHGRP would be located primarily in developed areas and are not anticipated to be located in areas with designated mineral resources. Nevertheless, all future projects would be required to undergo separate, project-specific environmental review to determine impacts on mineral resources.

No development is proposed. Therefore, no impact would occur, and no mitigation measures are required.

[35] California Department of Conservation, Special Report 169, Mineral Land Classification of the San Andreas 15-Minute Quadrangle Calaveras County, California, 1993.

MITIGATION MEASURES

Project implementation would not result in any significant impacts related to mineral resources; therefore, no mitigation measures are required.

3.13 Noise

	Potentially Significant Impact	Less Than Significant Impact With Mitigation Incorporated	Less Than Significant Impact	No Impact
XIII. NOISE – Would the project result in:				
a) Generation of a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?	☐	☐	☐	☒
b) Generation of excessive groundborne vibration or groundborne noise levels?	☐	☐	☐	☒
c) For a project located within the vicinity of a private airstrip or an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project expose people residing or working in the project area to excessive noise levels?	☐	☐	☐	☒

3.13.1 Regulatory Setting

Regulations at the State and local levels applicable to the proposed project related to noise include:

- Angels Camp Municipal Code (Municipal Code)
- Angels Camp 2020 General Plan Noise Element

3.13.2 Environmental Setting

The City of Angels is located more than five miles from the nearest public use airport and is not located within an airport land use plan.

3.13.3 Impact Analysis

a) Would the project result in generation of a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?

No Impact: The Draft GHGRP is a planning document and does not directly recommend any measures that would generate excessive amounts of noise. No development is directly proposed. However, the GHGRP recommends measures that encourage potential future projects related to retrofits and infrastructure improvements. Construction activities associated with implementation of the Draft GHGRP measures could possibly result in temporary increases in noise levels. The City regulates noise associated with construction equipment and activities through its Noise Enforcement Ordinance in the Municipal Code and the General Plan Noise Element Guidelines. Compliance with the City's Noise Enforcement Ordinance in Municipal Code Section 1.17.080 and the General Plan Noise Element Guidelines would be required for any future project. Regarding operational noise, the GHGRP does not include any

land use changes or other measures that would result in noise increases. Therefore, no impact would occur, and no mitigation measures are required.

b) Would the project result in generation of excessive groundborne vibration or groundborne noise levels?

No Impact: Similar to Threshold a) above, temporary construction activities as a result of potential future implementation of the Draft GHGRP measures could result in excessive groundborne vibration or groundborne noise.

The Draft GHGRP is a planning document and does not directly recommend any measures or land use development that would generate excessive amounts of vibration. A majority of the recommended measures would involve small-scale construction projects, including energy and water efficient retrofits. The exact nature of future construction that could occur is not known at this time; thus, construction noise levels cannot be estimated. However, all future development would be required to undergo separate, project-specific environmental review to determine potential impacts to noise. Additionally, all construction activities would be required to comply with the City's Noise Enforcement Ordinance and the Noise Element Guidelines.

No development or land use changes are proposed. Therefore, no impact would occur, and no mitigation measures are required.

c) For a project located within the vicinity of a private airstrip or an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project expose people residing or working in the project area to excessive noise levels?

No Impact: The City of Angels is located more than five miles from the Calaveras County airport and is not located within an airport land use plan.[36] The Draft GHGRP is a planning document, and no development is proposed. Future development that may occur in relation to the measures recommended in the GHGRP would be required to adhere to the policies of the City's General Plan Noise Element and the Municipal Code. Therefore, the proposed project would have no impact related to excessive noise levels within the vicinity of a public use airport or airport land use plan. No mitigation measures are required.

MITIGATION MEASURES

Project implementation would not result in any significant impacts related to noise; therefore, no mitigation measures are required.

[36] Calaveras County. Calaveras County Airport Plan 2010. https://planning.calaverasgov.us/Portals/Planning/Documents/Current Community Plans/Special Plans/Airport Plan 2010/Airport Plan 2010.pdf?ver=8tZJA-9DqcUESR17wCfHUg%3d%3d. Accessed February 23, 2026.

3.14 Population and Housing

	Potentially Significant Impact	Less Than Significant Impact With Mitigation Incorporated	Less Than Significant Impact	No Impact
XIV. POPULATION AND HOUSING – Would the project:				
a) Induce substantial unplanned population growth in an area, either directly (for example, by proposing new homes and businesses) or indirectly (for example, through extension of roads or other infrastructure)?	☐	☐	☐	☒
b) Displace substantial numbers of existing people or housing, necessitating the construction of replacement housing elsewhere?	☐	☐	☐	☒

3.14.1 Regulatory Setting

There are no regulations at the federal, State, or local levels applicable to the proposed project related to population and housing.

3.14.2 Environmental Setting

The City of Angels has a population of approximately 3,716 people.[37]

3.14.3 Impact Analysis

a) Would the project induce substantial unplanned population growth in an area, either directly (for example, by proposing new homes and businesses) or indirectly (for example, through extension of roads or other infrastructure)?

No Impact: The GHGRP is a planning document; no development is proposed. However, the GHGRP includes recommended measures to improve the pedestrian, bicycle, and transit network, which would involve the development of bike lanes and transit-supportive roadway treatments. These improvements would serve to improve transit times and reliability as well as walking and biking safety. None of the measures recommended in the GHGRP would induce substantial unplanned population growth in the area. The GHGRP is intended to reduce local GHG emissions through retrofits and infrastructure improvements, as well as revised City policies.

No development or land use changes are proposed. As such, no impact would occur, and no mitigation measures are required.

b) Would the project displace substantial numbers of existing people or housing, necessitating the construction of replacement housing elsewhere?

No Impact: The GHGRP is a planning document; no development is proposed. However, the GHGRP includes recommended measures to improve the pedestrian, bicycle, and transit network, which would involve the development of bike lanes and transit-supportive roadway treatments, as well as measures to retrofit existing

[37] Census Reporter. Angels, CA. 2024. Website: https://censusreporter.org/profiles/16000US0602112-angels-ca/. Accessed March 17, 2026.

buildings to be more energy efficient. These improvements would serve to improve transit times and reliability as well as walking and biking safety. Projects involving retrofits to existing residential structures would be small in nature and would not require replacement housing. None of the measures recommended in the GHGRP would induce displace existing people or housing in the area. The GHGRP is intended to reduce local GHG emissions through retrofits and infrastructure improvements, as well as revised City policies.

Therefore, no impact would occur, and no mitigation measures are required.

MITIGATION MEASURES

Project implementation would not result in any significant impacts related to population and housing; therefore, no mitigation measures are required.

3.15 Public Services

	Potentially Significant Impact	Less Than Significant Impact With Mitigation Incorporated	Less Than Significant Impact	No Impact
XV. PUBLIC SERVICES – Would the project:				
a) Result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times, or other performance objectives for any of the public services:				
Fire protection?	☐	☐	☐	☒
Police protection?	☐	☐	☐	☒
Schools?	☐	☐	☐	☒
Parks?	☐	☐	☐	☒
Other public facilities?	☐	☐	☐	☒

3.15.1 Regulatory Setting

Regulations at the State and local levels applicable to the proposed project related to public services include:

- Government Code Section 65996
- California Mitigation Fee Act (AB 1600)
- California Fire Code
- Angels Camp 2020 General Plan Environmental Impact Report (General Plan EIR)
- Angels Camp 2020 General Plan (General Plan)
- Angels Camp Municipal Code (Municipal Code)
- Angels Camp Emergency Operations Plan 2021

3.15.2 Environmental Setting

Fire protection services in the City are provided by the Angels Camp Fire Department (Fire Department), which provides fire and rescue operations, educational and volunteer programs, and medical and health services. The Fire Department consists of multiple stations within the City, located in the northwest along SR 49 and southeast along SR 4. Police protection services in the City are provided by the Angels Camp Police Department (Police Department), which provides law enforcement services, patrol operations, traffic operations, investigations, and support services. The Police Department is located generally south of the intersection of SR 4 and SR 49. The City is served by Mark Twain Union Elementary School District and Bret Harte Union High School District, which provides educational services for students at the elementary and secondary levels. Specifically, Mark Twain Union Elementary School District operates Mark Twain Elementary and Bret Harte Union High School District operates Bret Harte Union High School.[38] .[39] The City maintains three public parks: Utica Park along SR 49, Gateway Park in the western portion of the City, and Tryon Park along SR 4.[40] Library services in the City are provided by the Calaveras County Library System.

[38] Mark Twain Union Elementary School District. About Us. https://www.mtwain.k12.ca.us/page/about-us. Accessed February 18, 2026.

[39] Bret Harte Union High School District. Schools. https://www.brethartebullfrogs.org/. Accessed February 18, 2026.

[40] City of Angels Camp. Parks. https://angelscamp.gov/living-in-angels/parks/. Accessed February 18, 2026.

Specifically, the Calaveras County Library System branch serving the City is the Angels Camp Branch Library, which is located in the northwestern portion of the City along SR 49. In addition to book circulation, the Angels Camp Branch Library offers programming for both children and adults.[41]

3.15.3 Impact Analysis

a) Would the project result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times, or other performance objectives for any of the public services:

Fire protection?

No Impact:

The GHGRP is a planning document, and does not directly involve any development. All future development would be subject to review and approval by the Fire Department. Additionally, all future development would be required to adhere to all State and local regulations regarding fire protection and building standards, as well as policies and implementation standards outlined in other sections of the General Plan. Therefore, the project would have no impact on fire protection services, and no mitigation measures are required.

Police protection?

No Impact:

The proposed project includes a planning document and does not directly propose any development. The GHGRP includes recommended measures to improve physical infrastructure, including expanded sidewalks and bike paths. Future development would be required to adhere to State and local regulations, including any relevant policies in the General Plan, intended to maintain adequate police protection services. Therefore, the proposed project would have no impact on police protection services, and no mitigation measures are required.

Schools?

No Impact: School-related impacts depend on the location, type, and size of a project, including students generated per household, and the capacity of facilities in a given attendance area. Impacts to schools cannot be meaningfully determined until a project is defined. The GHGRP is a policy document and does not directly involve any future development. Future development would be required to pay development impact fees, pursuant to the City's General Plan and Municipal Code, to offset potential development impacts. Therefore, the project would have no impact on schools, and no mitigation measures are required.

Parks?

No Impact: Park-related impacts depend on the location, type, and size of a project. The City of Angels has numerous parks and open space areas. However, the GHGRP is a planning document and does not directly involve any future development. The GHGRP includes recommended measures encouraging the development of enhanced bike, pedestrian, and transit connectivity which would provide additional passive recreation areas within the City. All future development would be required to adhere to State and local regulations, including policies and measures outlined in the General Plan to preserve park and recreation facilities. Future development would also be required to undergo

[41] Calaveras County. Couty Library. https://library.calaverasgov.us/. Accessed February 18, 2026.

separate, project-specific environmental review. Therefore, the proposed project would have no impact on parks, and no mitigation measures are required.

Other public facilities?

No Impact: The GHGRP is a policy document and does not directly involve any development. All future development would be required to adhere to all applicable State and local regulations. Therefore, the proposed project would have no impact on other public facilities, and no mitigation measures are required.

MITIGATION MEASURES

Project implementation would not result in any significant impacts related to public services; therefore, no mitigation measures are required.

3.16 Recreation

	Potentially Significant Impact	Less Than Significant Impact With Mitigation Incorporated	Less Than Significant Impact	No Impact
XVI. RECREATION				
a) Would the project increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated?	☐	☐	☐	☒
b) Does the project include recreational facilities or require the construction or expansion of recreational facilities which might have an adverse physical effect on the environment?	☐	☐	☐	☒

3.16.1 Regulatory Setting

Regulations at the local level applicable to the proposed project related to recreation include the Angels Camp 2020 General Plan (General Plan).

3.16.2 Environmental Setting

The City maintains three public parks: Utica Park along SR 49, Gateway Park on the western side of the City, and Tryon Park along SR 4.

3.16.3 Impact Analysis

a) Would the project increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated?

No Impact: Impacts to recreational facilities depend upon the location, type, and size of a project. The City has numerous public parks and open space areas. Impacts to recreational facilities cannot be meaningfully determined until a project is defined. The GHGRP is a planning document and does not directly involve any development. Future development would be required to adhere to all applicable State and local regulations, including policies and measures outlined in other sections of the General Plan intended to preserve the City's recreational facilities. Therefore, the proposed project would have no impact on recreational facilities, and no mitigation measures are required.

b) Does the project include recreational facilities or require the construction or expansion of recreational facilities, which might have an adverse physical effect on the environment?

No Impact: The proposed project includes a planning document and does not directly involve any development or construction. The project would not construct any recreational facilities or require the expansion of recreational facilities. Therefore, the proposed project would have no impact on new or expanded recreational facilities. No mitigation measures are required.

MITIGATION MEASURES

Project implementation would not result in any significant impacts related to recreation; therefore, no mitigation measures are required.

3.17 Transportation

	Potentially Significant Impact	Less Than Significant Impact With Mitigation Incorporated	Less Than Significant Impact	No Impact
XVII. TRANSPORTATION – Would the project:				
a) Conflict with a program, plan, ordinance, or policy addressing the circulation system, including transit, roadway, bicycle, and pedestrian facilities?	☐	☐	☐	☒
b) Conflict or be inconsistent with CEQA Guidelines Section 15064.3, subdivision (b)?	☐	☐	☐	☒
c) Substantially increase hazards due to a geometric design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment)?	☐	☐	☐	☒
d) Result in inadequate emergency access?	☐	☐	☐	☒

3.17.1 Regulatory Setting

Regulations at the State and local levels applicable to the proposed project related to transportation include:

- California Fire Code
- California Department of Transportation, District 10 (Stockton)
- Calaveras County Council of Governments (CCOG) Regional Transportation Plan (RTP)
- Angels Camp 2020 General Plan (General Plan)

3.17.2 Environmental Setting

According to the General Plan, circulation patterns were established during the days of the Gold Rush and generally routed from mine to mine. Primary transportation routes through the City include SR 49 and SR 4.

3.17.3 Impact Analysis

a) Would the project conflict with a program, plan, ordinance, or policy addressing the circulation system, including transit, roadway, bicycle and pedestrian facilities?

b) Would the project conflict or be inconsistent with CEQA Guidelines Section 15064.3, subdivision (b)?

No Impact: The Draft GHGRP is a planning document; no development is proposed. Potential future implementation of the recommended measures included in the Draft GHGRP would result in the development of bike, pedestrian, and transit connectivity improvements. The GHGRP measures also include transportation demand strategies to reduce commute trips to work, school, and other frequent destinations. As such, these measures and actions support decreasing vehicle miles traveled by encouraging alternative forms of transportation and the development of related infrastructure, reducing total GHG emissions from transportation throughout the City. Such measures would not conflict with the City's Municipal Code and would further support goals, policies, and actions identified in the City's General Plan, as well as CCOG's RTP. All modifications to the transportation network would be subject to review by the City for compliance with the General Plan and would be required to comply with applicable local, State, and

federal regulations. Additionally, all potential future projects would be required to undergo separate, project-specific environmental review to determine impacts related to transportation. Therefore, implementation of the GHGRP would not result in impacts related to a program, plan, ordinance, or policy addressing the circulation system, or VMT. No mitigation measures are required.

c) Would the project substantially increase hazards due to a geometric design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment)?

No Impact: The GHGRP is a planning document; no development or land use changes are proposed. Several of the recommended measures included in the GHGRP are aimed at providing alternative modes of transportation and reducing the amount of VMT throughout the City. The Draft GHGRP promotes safety improvements regarding pedestrian, bike, and transit use through enhancing connectivity and implementing supportive roadway treatments. The Draft GHGRP does not include measures that would substantially increase hazards due to a design feature or incompatible uses. Therefore, no impact would occur, and no mitigation measures are required.

d) Would the project result in inadequate emergency access?

No Impact: The GHGRP is a planning document; no development or land use changes are proposed. Several of the recommended measures included in the GHGRP are aimed at providing alternative modes of transportation and reducing the amount of VMT throughout the City. The Draft GHGRP does not include measures that would result in inadequate emergency access. Therefore, no impact would occur, and no mitigation measures are required.

MITIGATION MEASURES

Project implementation would not result in any significant impacts related to transportation; therefore, no mitigation measures are required.

3.18 Tribal Cultural Resources

	Potentially Significant Impact	Less Than Significant Impact With Mitigation Incorporated	Less Than Significant Impact	No Impact
XVIII. TRIBAL CULTURAL RESOURCES				
Would the project cause a substantial adverse change in the significance of a tribal cultural resource, defined in Public Resources Code Section 21074 as either a site, feature, place, cultural landscape that is geographically defined in terms of the size and scope of the landscape, sacred place, or object with cultural value to a California Native American tribe, and that is:				
a) Listed or eligible for listing in the California Register of Historical Resources, or in a local register of historical resources as defined in Public Resources Code Section 5020.1(k), or	☐	☐	☐	☒
b) A resource determined by the lead agency, in its discretion and supported by substantial evidence, to be significant pursuant to criteria set forth in subdivision (c) of Public Resources Code Section 5024.1? In applying the criteria set forth in subdivision (c) of Public Resources Code Section 5024.1, the lead agency shall consider the significance of the resource to a California Native American tribe.	☐	☐	☐	☒

3.18.1 Regulatory Setting

Regulations at the State and local levels applicable to the proposed project related to tribal cultural resources include:

- Assembly Bill 52 (AB 52)
- Angels Camp 2020 General Plan (General Plan)

3.18.2 Environmental Setting

According to California Public Resources Code Section 21084, a project may have a significant effect on the environment if the project "may cause a substantial adverse change in the significance of an historical resource". AB 52 specifies that a project with the potential for adverse effects on tribal cultural resources may be considered a significant effect on the environment. The GHGRP classifies as a "project" under CEQA; accordingly, the City conducted tribal consultation pursuant to AB 52.

3.18.3 Impact Analysis

Would the project cause a substantial adverse change in the significance of a tribal cultural resource, defined in Public Resources Code Section 21074 as either a site, feature, place, cultural landscape that is geographically defined in terms of the size and scope of the landscape, sacred place, or object with cultural value to a California Native American tribe, and that is:

a) Listed or eligible for listing in the California Register of Historical Resources, or in a local register of historical resources as defined in Public Resources Code Section 5020.1(k)?

b) A resource determined by the lead agency, in its discretion and supported by substantial evidence, to be significant pursuant to criteria set forth in subdivision (c) of Public Resources Code Section 5024.1? In applying the criteria set forth in subdivision (c) of Public Resource Code Section 5024.1, the lead agency shall consider the significance of the resource to a California Native American tribe.

No Impact: The City, as the Lead Agency pursuant to CEQA and as required by AB 52, initiated consultation on April 9, 2026, through mailing, via certified mail, and emailing AB 52 consultation letters for the proposed project, including project information and contact information to nine Native American tribes. The tribal governments provided with an AB 52 consultation letter include the following list of recipients:

- Buena Vista Rancheria of Me-Wuk Indians[42]
- Calaveras Band of Mi-Wuk Indians[43]
- California Valley Miwok Tribe[44]
- Chicken Ranch Rancheria of Me-Wuk Indians[45]
- Ione Band of Miwok Indians[46]
- Jackson Rancheria Band of Miwuk Indians[47]
- Nashville Enterprise Miwok-Maidu-Nishinam Tribe[48]
- Pakan'yani Maidu of Strawberry Valley Rancheria[49]
- Tule River Indian Tribe[50]

Under AB 52, Native American tribes have 30 days to respond and request further project information and/or formal consultation. The City did not receive any responses during the consultation period.

The GHGRP is a planning document that would not directly result in development or construction. The proposed project would not cause a substantial adverse change in the significance of a tribal cultural resource listed or eligible for listing in the California Register of Historical Resources or in the local register of historical resources as defined in Public Resources Code Section 5020.1(k).

[42] AB 52 letters were sent to two contacts at the Buena Vista Rancheria of Me-Wuk Indians.

[43] AB 52 letters were sent to three contacts at the Calaveras Band of Mi-Wuk Indians.

[44] AB 52 letters were sent to three contacts at the California Valley Miwok Tribe.

[45] AB 52 letters were sent to five contacts at the Chicken Ranch Rancheria of Me-Wuk Indians.

[46] AB 52 letters were sent to two contacts at the Ione Band of Miwok Indians.

[47] AB 52 letters were sent to two contacts at the Jackson Rancheria Band of Miwuk Indians. One contact was notified only by certified mail, as no email address was provided.

[48] AB 52 letters were sent to two contacts at the Nashville Enterprise Miwok-Maidu-Nishinam Tribe. One contact only provided a phone number; the City called and left a voicemail for this contact.

[49] AB 52 letters were sent to two contacts at the Pakan'yani Maidu of Strawberry Valley Rancheria.

[50] AB 52 letters were sent to two contacts at the Tule River Indian Tribe.

All future potential projects associated with the measures recommended in the GHGRP would be subject to separate, project-specific environmental review and any related tribal consultation to ensure that impacts related to tribal cultural resources would be less than significant. Future development projects would also be subject to State and federal laws regarding the protection of tribal cultural resources. Therefore, no impact would occur, and no mitigation measures are required.

MITIGATION MEASURES

Project implementation would not result in any significant impacts related to tribal cultural resources; therefore, no mitigation measures are required.

3.19 Utilities and Service Systems

	Potentially Significant Impact	Less Than Significant Impact With Mitigation Incorporated	Less Than Significant Impact	No Impact
XIX. UTILITIES AND SERVICE SYSTEMS – Would the project:				
a) Require or result in the relocation or construction of new or expanded water, wastewater treatment or storm water drainage, electric power, natural gas, or telecommunications facilities, the construction or relocation of which could cause significant environmental effects?	☐	☐	☐	☒
b) Have sufficient water supplies available to serve the project and reasonably foreseeable future development during normal, dry, and multiple dry years?	☐	☐	☐	☒
c) Result in a determination by the wastewater treatment provider which serves or may serve the project that it has adequate capacity to serve the project's projected demand in addition to the provider's existing commitments?	☐	☐	☐	☒
d) Generate solid waste in excess of state or local standards, or in excess of the capacity of local infrastructure, or otherwise impair the attainment of solid waste reduction goals?	☐	☐	☐	☒
e) Comply with federal, state, and local management and reduction statutes and regulations related to solid waste?	☐	☐	☐	☒

3.19.1 Regulatory Setting

Regulations at the State and local levels applicable to the proposed project related to utilities and service systems include:

- California Integrated Waste Management Act of 1989
- 2022 California Building Energy Efficiency Standards
- 2022 Green Building Code
- City of Angels Water Department 2013 Water Master Plan
- Angels Camp Municipal Code (Municipal Code)
- Municipal Code Title 17, Zoning (Zoning Code)

3.19.2 Environmental Setting

The City of Angels provides and maintains water and wastewater services to the Planning Area.[51] The City contracts with Cal-Waste for refuse and recycling.[52] Pacific Gas and Electric Company (PG&E) and the Calaveras Public Power Agency provide electricity services to the City.[53] The Utica Water and Power Authority manages a hydroelectric facility, known as Angels Powerhouse, located on Angels Creek along the eastern boundary of the City. Angels Powerhouse provides an annual power output of 120-6,400 megawatt hours. AT&T, Comcast, and T-Mobile provide telecommunication services to the City.[54]

3.19.3 Impact Analysis

a) Would the project require or result in the relocation or construction of new or expanded water, wastewater treatment or storm water drainage, electric power, natural gas, or telecommunications facilities, the construction or relocation of which could cause significant environmental effects?

No Impact: The proposed project includes a planning document and does not directly involve any development. However, the GHGRP includes recommended measures that encourage the development of retrofits and infrastructure improvements All future development in the City would be subject to all applicable State, regional, local, and utility provider regulations and requirements concerning the installation of utilities. Utility services impacts depend on the project type and location and cannot be meaningfully determined until a project has been defined. Therefore, the proposed project would have no impacts related to the construction or expansion of new or expanded water, wastewater treatment, stormwater drainage, electric power, or telecommunication facilities.

Further, the GHGRP proposes water efficiency retrofits for new development, renovated buildings, and the Wastewater Treatment Plant. Such measures would involve retrofits to existing development that would reduce the use of utility service systems and would not create the need for new or expanded utility facilities. Therefore, the proposed project would have no impact on water supplies, and no mitigation measures are required.

b) Would the project have sufficient water supplies available to serve the project and reasonably foreseeable future development during normal, dry and multiple dry years?

No Impact: The proposed GHGRP is a planning document and does not include any development, land use changes, or other measures that would affect water supply. Any potential future development associated with the recommended measures in the GHGRP would be required to comply with all applicable State, regional, and local regulatory requirements concerning efficient use and conservation of water resources. Future development projects would also be required to undergo separate, project-specific environmental review. Additionally, the Draft GHGRP recommends water efficiency measures (measures WW-1a through WW-4), which would reduce the City's water demand. Therefore, no impact would occur, and no mitigation measures are required.

c) Would the project result in a determination by the wastewater treatment provider which serves or may serve the project that it has adequate capacity to serve the project's projected demand in addition to the provider's existing commitments?

No Impact: The proposed GHGRP is a planning document and does not include any development, land use changes, or other measures that would affect wastewater treatment. All future development would be subject to all applicable

[51] City of Angels. Water and Wastewater. https://angelscamp.gov/water/. Accessed February 18, 2026.

[52] City of Angels. Integrated Waste and Garbage Services. https://angelscamp.gov/city-hall/integrated-waste-and-garbage-services/. Accessed February 18, 2026.

[53] Pacific Gas and Electric Company. 2014. Service Area Map. https://www.pge.com/tariffs/assets/pdf/tariffbook/ELEC_MAPS_Service%20Area%20Map.pdf. Accessed February 18, 2026.

[54] CalTel. https://caltel.com/. Accessed February 18, 2026.

State, regional, and local regulatory requirements concerning the efficient use and conservation of water resources, including measures identified in the City's General Plan. In addition, the Draft GHGRP recommends measure WW-1, Wastewater Treatment Plan energy efficiency, which would reduce the City's energy demand per gallon treated. Therefore, the no impact would occur, and no mitigation measures are required.

d) Would the project generate solid waste in excess of state or local standards, or in excess of the capacity of local infrastructure, or otherwise impair the attainment of solid waste reduction goals?

No Impact: The proposed GHGRP is a planning document and does not include any development, land use changes, or other measures that would affect solid waste. Future development would be required to comply with all applicable federal, State, regional, and local standards, management and reduction statutes, and regulations related to solid waste.

Moreover, the Draft GHGRP intends to reduce emissions associated with solid waste generation through implementation of solid waste diversion measures to achieve a solid waste disposal rate of 75 percent diversion of food and green yard waste. Specific measures include providing green waste collection programs, utilizing public/private partnerships to utilize green waste in alternative uses and waste-to-energy facilities, reviewing zoning ordinance and Air Pollution Control District regulations and amendments as necessary to facilitate the development of green waste-to-energy projects and other projects that convert green waste to products, and investigating and incentivizing community composting. Such measures would result in an increased diversion of waste from landfills and reduce emissions associated with solid waste. Therefore, no impact would occur, and no mitigation measures are required.

e) Would the project comply with federal, state, and local management and reduction statutes and regulations related to solid waste?

No Impact: The proposed GHGRP is a planning document and does not include any development, land use changes, or other measures that would affect solid waste regulation compliance. Moreover, the Draft GHGRP does not recommend any measure that does not comply with applicable solid waste regulations. The Draft GHGRP proposes a measure that would reduce the amount of waste sent to landfills and would comply with SB 1383, by locally diverting 75 percent of organic waste from landfills to match the statewide goal. Therefore, no impact would occur, and no mitigation measures are required.

MITIGATION MEASURES

Project implementation would not result in any significant impacts related to utilities and service systems; therefore, no mitigation measures are required.

3.20 Wildfire

	Potentially Significant Impact	Less Than Significant Impact With Mitigation Incorporated	Less Than Significant Impact	No Impact
XX. WILDFIRE – If located in or near state responsibility areas or lands classified as very high fire hazard severity zones, would the project:				
a) Substantially impair an adopted emergency response plan or emergency evacuation plan?	☐	☐	☐	☒
b) Due to slope, prevailing winds, and other factors, exacerbate wildfire risks, and thereby expose project occupants to pollutant concentrations from a wildfire or the uncontrolled spread of a wildfire?	☐	☐	☐	☒
c) Require the installation or maintenance of associated infrastructure (such as roads, fuel breaks, emergency water sources, power lines or other utilities) that may exacerbate fire risk or that may result in temporary or ongoing impacts to the environment?	☐	☐	☐	☒
d) Expose people or structures to significant risks, including downslope or downstream flooding or landslides, as a result of runoff, post-fire slope instability, or drainage changes?	☐	☐	☐	☒

3.20.1 Regulatory Setting

Regulations at the local level applicable to the proposed project related to wildfire include:

- Angels Camp 2020 General Plan Environmental Impact Report (General Plan EIR)
- 2021 Calaveras County Multi-Jurisdictional Hazard Mitigation Plan (MJHMP)

3.20.2 Environmental Setting

According to the California Department of Forestry and Fire Protection (CAL FIRE), the entire City is classified as a Local Responsibility Area (LRA); no State Responsibility Areas (SRAs) are located within the City.[55] Within LRAs, fire protection services are generally provided by cities and other local fire districts. The Angels Camp Fire Department provides fire protection services within the City and the surrounding unincorporated areas, with assistance from CAL FIRE during summer months. According to CAL FIRE, the City is predominantly classified as being located within a High Fire Hazard Severity Zone (FHSZ), with Very High FHSZ areas located within the northern, eastern, and southern portions of the City, and Moderate FHSZ areas located throughout the central areas of the City.[56]

[55] California Department of Forestry and Fire Protection, State Responsibility Area Fire Hazard Severity Zones, Calaveras County, April 1, 2024, https://calfire.app.box.com/s/viyymvmweaaciuhwfb2bdxqdok3zo0ke/file/1483757830866, accessed February 11, 2026.

[56] California Department of Forestry and Fire Protection, Local Responsibility Area Fire Hazard Severity Zones, City of Angels Camp – Calaveras County LRA, March 10, 2025, https://calfire.app.box.com/s/wahuw9ny7cgn89xpxh7092ur50r1pwvj/file/1798585647873, accessed February 11, 2026.

3.20.3 Impact Analysis

a) Would the project substantially impair an adopted emergency response plan or emergency evacuation plan?

No Impact: The Draft GHGRP is a planning document. No development or land use changes are proposed. The recommended measures within the Draft GHGRP would not interfere with an adopted emergency response plan or emergency evacuation plan. State Routes 4 and 49 would be the primary evacuation routes for any emergency in the City.

Potential impacts related to emergency response and evacuation are unique to a project and cannot be meaningfully determined until a project has been defined. To ensure adequate emergency access, future development in the City would be required to undergo review by the Fire Department and to comply with the provisions of the Municipal Code during construction and operation. Future development would also be required to adhere to all applicable local regulations and policies, including those of a potential future evacuation plan.

Further, the Draft GHGRP recommends measures that would increase safety for drivers, pedestrians, and bicyclists, and seeks to reduce the number of automobiles on City streets, which may improve evacuation and emergency response conditions compared to existing conditions. In addition, Draft GHGRP Measure TR-8, Develop a Biofuel Industry, would utilize organic waste from active forest management for bioenergy, which would potentially decrease wildfire risk in the area. Therefore, no impact would occur, and no mitigation measures are required.

b) Due to slope, prevailing winds, and other factors, would the project exacerbate wildfire risks, and thereby expose project occupants to pollutant concentrations from a wildfire or the uncontrolled spread of a wildfire?

No Impact: The majority of Angels Camp is characterized by CAL FIRE as having a Moderate fire threat level, with areas of High and Very High Fire Hazard Severity Zones located on the periphery of the City. Areas of Little or No Threat are located along SR 49. Areas of High fire threat are characterized by natural vegetation that can serve as fuel for wildland fires, and topographies that can impede emergency access and facilitate the rapid spread of potential fire.

However, potential impacts related to fire exacerbation are unique to a project and cannot be meaningfully determined until a project has been defined. The proposed project includes a planning document and does not directly involve any development. Future development in the City would require project-specific review on behalf of the Fire Department. Future development would also be required to comply with the provisions of the City's General Plan, MJHMP, and all other local regulations pertaining to wildfire risks during construction and operation. Therefore, the proposed project would have no impact related to exacerbated wildfire risks, pollutant concentrations from wildfire, or uncontrolled spread of wildfire. No mitigation measures are required.

c) Would the project require the installation or maintenance of associated infrastructure (such as roads, fuel breaks, emergency water sources, power lines, or other utilities) that may exacerbate fire risk or that may result in temporary or ongoing impacts to the environment?

No Impact: The proposed project includes a planning document, and no development or land use changes are proposed. However, implementation of the Draft GHGRP recommended measures related to pedestrian and bicycle networks would involve physical infrastructure improvements such as expanded sidewalks and bike paths. Draft GHGRP measures also encourage other infrastructure improvements, such as the installation of EV chargers, development of a biofuel industry, and solar energy generation conversion. All such infrastructure improvements associated with the Draft GHGRP measures would occur in already developed areas served by existing roadway and utility infrastructure and generally removed from areas of elevated wildfire risk. Even so, additional utility infrastructure or roads needed for potential future projects would be required to comply with existing State

regulations, including Title 14 of the California Code of Regulations and the California Fire and Building Codes. Additional MJHMP policies to help reduce infrastructure-related wildfire risk include policies related to retrofitting structures, education programs, fuel management, and supporting critical power supply with generators. Compliance with existing regulations and policies would be required for all potential future projects to ensure that installation or maintenance of infrastructure would not exacerbate fire risk. Therefore, no impact would occur, and no mitigation measures are required.

d) Would the project expose people or structures to significant risks, including downslope or downstream flooding or landslides, as a result of runoff, post-fire slope instability, or drainage changes?

No Impact: Potential impacts related to post-fire instability and drainage changes are unique to a project type and location and cannot be meaningfully determined until a project has been defined. Future development in the City would require review by the Fire Department. Future development would also be required to comply with all applicable State, regional, and local regulations regarding wildfire hazards, water quality standards, and drainage. The proposed project includes a planning document and does not directly involve any development. Therefore, the proposed project would have no impacts related to downslope or downstream flooding or landslides. No mitigation measures are required.

MITIGATION MEASURES

Project implementation would not result in any significant impacts related to wildfire; therefore, no mitigation measures are required.

3.21 Mandatory Findings of Significance

	Potentially Significant Impact	Less Than Significant Impact With Mitigation Incorporated	Less Than Significant Impact	No Impact
XXI. MANDATORY FINDINGS OF SIGNIFICANCE				
a) Does the project have the potential to substantially degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, substantially reduce the number or restrict the range of a rare or endangered plant or animal, or eliminate important examples of the major periods of California history or prehistory?	☐	☐	☐	☒
b) Does the project have impacts that are individually limited, but cumulatively considerable? ("Cumulatively considerable" means that the incremental effects of a project are considerable when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects.)	☐	☐	☐	☒
c) Does the project have environmental effects which will cause substantial adverse effects on human beings, either directly or indirectly?	☐	☐	☐	☒

3.21.1 Impact Analysis

a) Does the project have the potential to substantially degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, substantially reduce the number or restrict the range of a rare or endangered plant or animal, or eliminate important examples of the major periods of California history or prehistory?

No Impact: The purpose of the Draft GHGRP is to reduce community-wide GHG emissions in the City of Angels to reduce environmental impacts associated with global climate change. The Draft GHGRP proposes measures to lessen numerous environmental impacts and does not contain any strategy or measure that would either directly substantially reduce habitat, reduce wildlife populations, threaten animal or plant communities, restrict the range of species, or eliminate examples of history or prehistory. In addition, future projects that would modify, either directly or indirectly, habitats of any species identified as a candidate, sensitive, or special status species, including interior retrofits, would be required to complete project-specific preconstruction surveys for special-status species, including bats. Any potential future project that would affect riparian habitats would be required to obtain a CDFW Section

1600 Permit when modifying any river, stream, or lake.[57] Furthermore, potential future projects that would affect riparian habitats would be required to obtain a Section 404 Permit issued by the U.S. Army Corps of Engineers (USACE) under the Clean Water Act when discharging dredged or fill material into waters of the United States. No impact would occur.

The Draft GHGRP would not directly result in the destruction of, or damage to, historical resources. Potential future construction associated with Draft GHGRP measures, such as expanding pedestrian, bicycle, and public transit facilities, would most likely take place within existing rights-of-way. Should construction associated with the implementation of the proposed measures take place outside the existing rights-of-way, such as renewable energy and biofuel generation infrastructure, new ground disturbance would have the potential to uncover previously undiscovered resources. In the event that this occurs, compliance with State regulations pertaining to the discovery of cultural resources would be required. Additionally, future projects that would potentially alter or affect a historical resource, including through interior/exterior retrofits to existing buildings that may alter the character-defining features of a historic building(s), would be required to demonstrate compliance with the Secretary of the Interior's Standards For the Treatment of Historic Properties, as adopted by reference in Municipal Code Sections 17.26.070, Demolition or removal of buildings, and 17.26.080, Construction or alteration of buildings structures. The GHGRP is a planning document, and no development or land use changes are proposed. Therefore, no impact would occur.

b) Does the project have impacts that are individually limited, but cumulatively considerable? ("Cumulatively considerable" means that the incremental effects of a project are considerable when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects.)

No Impact: The Draft GHGRP would not result in any adverse environmental impacts that are cumulatively considerable. The project is intended to contribute to a cumulative reduction in GHG emissions and to reduce adaptation impacts associated with global climate change, both of which would have beneficial cumulative environmental effects. Potential future development projects encouraged by the measures within the Draft GHGRP that may result in indirect adverse environmental impacts would be required to undergo separate, project-specific environmental review to determine impacts and identify mitigation measures, as necessary. The GHGRP is a planning document and does not directly propose any development or land use changes. Therefore, no impact would occur.

c) Does the project have environmental effects which will cause substantial adverse effects on human beings, either directly or indirectly?

No Impact: The Draft GHGRP is a planning document intended to reduce the City's community-wide GHG emissions to help cumulatively address the adverse environmental impacts associated with global climate change, while also protecting and enhancing the quality of life within the City. The Draft GHGRP recommended measures to strive to protect the environment, enhance human health and safety, and conserve natural resources, both within and beyond Angels Camp. Adoption and implementation of the Draft GHGRP would result in beneficial environmental effects and would not cause substantial adverse direct or indirect effects on human beings resulting from a change in the physical environment.

As demonstrated throughout this document, the proposed project would have no impacts on Aesthetics, Agricultural and Forestry Resources, Air Quality, Biological Resources, Cultural Resources, Energy, Geology and Soils, Greenhouse Gas Emissions, Hazards and Hazardous Materials, Hydrology and Water Quality, Land Use and Planning, Mineral Resources, Noise, Population and Housing, Public Services, Recreation, Transportation, Tribal Cultural Resources, Utilities and Service Systems, or Wildfires. The proposed project involves adoption of a planning document and does

[57] California Department of Fish and Wildlife. Lake and Streambed Alteration Program. https://wildlife.ca.gov/Conservation/Environmental-Review/LSA. Accessed April 7, 2026.

not include any changes to land use designations, building heights and intensities, or residential densities. Therefore, the proposed project would have no impacts on the environment.

MITIGATION MEASURES

Project implementation would not result in any significant impacts related to the topical sections listed above; therefore, no mitigation measures are required.

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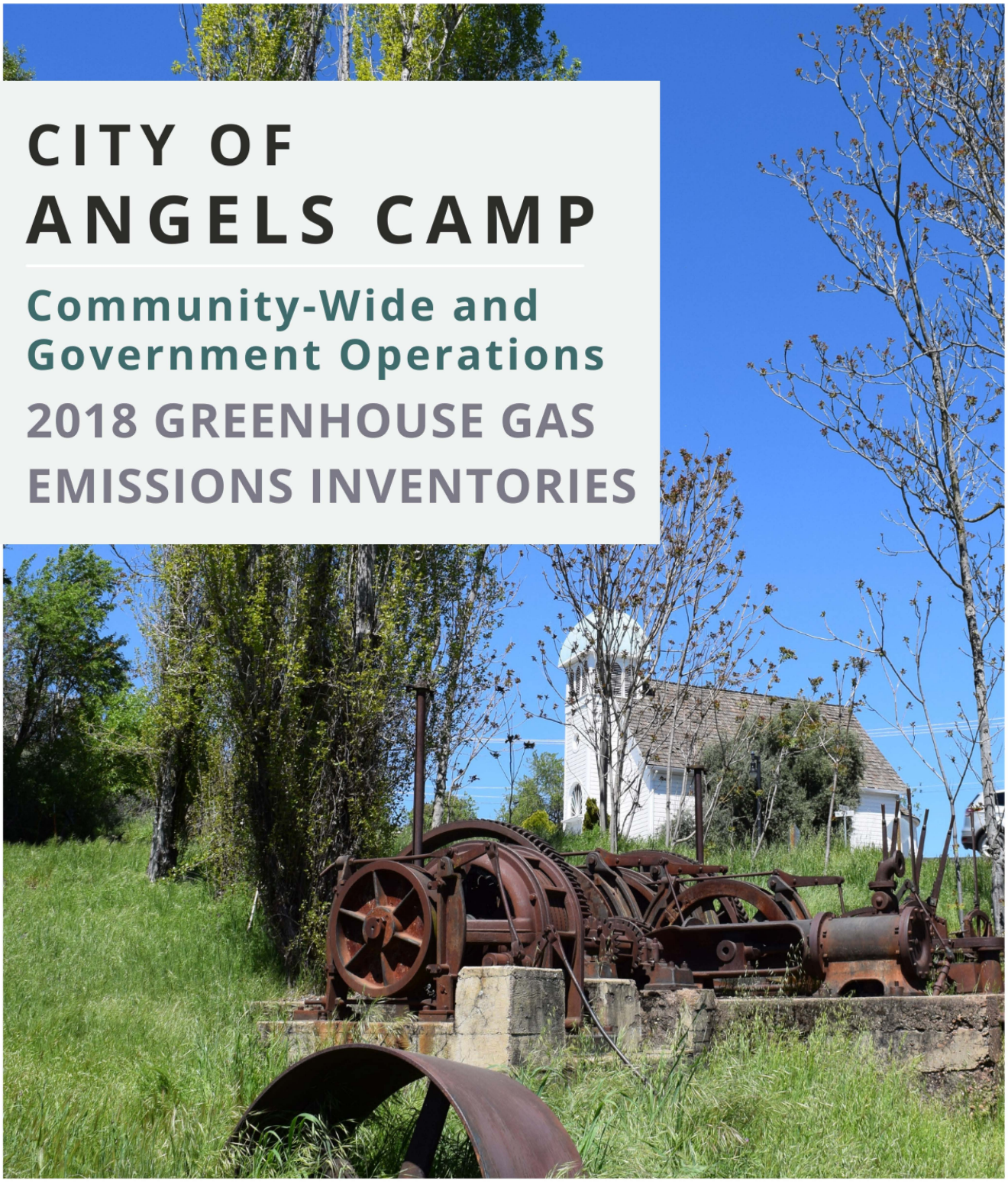
Appendix A

2021 Emissions Inventories

CITY OF ANGELS CAMP

Community-Wide and Government Operations

2018 GREENHOUSE GAS EMISSIONS INVENTORIES



September 2021

SIERRA BUSINESS COUNCIL

Harris

rincon

CALAVERAS COUNCIL of GOVERNMENTS

ANGELS CAMP CALIFORNIA

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Executive Summary

The City of Angels Camp (City) is addressing reducing greenhouse gas (GHG) emissions by taking climate planning action. This report serves as a guidepost to local GHG emissions reduction efforts, including future development of the City's GHG Reduction Plan that will address emissions resulting from energy use[1], transportation, solid waste disposal, treatment and transport of potable water and wastewater. Through these planning efforts, the City can achieve benefits beyond reducing emissions, including saving money – both community members' and the City's, improving economic vitality, public health, and the quality of life for residents and other community members.

This project has been split into two phases. Phase I establishes a replicable methodology for analyzing current and projected GHG emissions, develops a baseline measurement to benchmark progress over time, and proposes initial reduction targets. Phase II of this project includes developing emissions reduction plans outlining strategies, goals, and priority actions to reduce emissions consistent with state requirements, as well as communicating progress to the public, stakeholders, and policymakers. These actions will help to implement the City's General Plan goals, air quality goals, facilitate new development, and other compliance issues related to GHG emissions reductions.

This report documents the results of community-wide and government operations GHG emissions inventories from sources within the City in 2018. Community-wide activities resulted in the emissions of 25,193 metric tons of carbon dioxide equivalent (MT CO_2e), which equates to a per capita emissions value of 6.46 MT CO_2e per year. City government operations generated 511 MT CO_2e. Key findings from each inventory are listed below. More detailed discussion of each inventory is provided in the **Community-Wide Inventory Results** and the **Government Operations Inventory Results** sections.

In addition, the inventory projects the City's GHG emissions from 2018 out to 2045, based on a business-as-usual (BAU) forecast and an adjusted scenario forecast (ABAU) of community-wide GHG emissions[2]. The 2045 forecasts project an increase for the BAU scenario and a decrease for the ABAU scenario from the 2018 baseline. Under the BAU scenario, emissions are projected to increase by 12.7%, equating to 28,378 MT CO_2e projected to be emitted in 2045. Under the ABAU scenario, emissions are projected to

[1] As of the published date of this report, the specific impacts of Public Safety Power Shutoff (PSPS) events on GHG emissions in Calaveras County are unknown. The first PSPS event took place in 2019, which is after the baseline year of 2018 used for this report. As energy sector data from 2019 and on becomes available, this can be used for future inventories and re-inventories of community-wide and government operations GHG emissions.

[2] Note: this does not include forecasting projections for wildfire.

decrease by 28.0%, equating to 18,133 MT CO_2e projected to be emitted in 2045. The report also includes emissions reduction target recommendations for the City to consider. More detailed information is provided in the **Emissions Forecasting** and **GHG Reduction Targets** sections.

The Calaveras County and Angels Camp GHG inventories and reduction plans project also includes a wildfire report, a separate assessment that analyzes the carbon storage inventories for the County's and City's natural and working lands, potential GHG emissions impact from wildfires, climate change vulnerability assessment related to wildfire, and wildfire impact reduction best practices. The 2020 Calaveras County natural and working lands total carbon stock inventories was calculated to be 74 million MT CO_2e. In the unlikely scenario that the majority of the deciduous and mixed forests in Calaveras County were to burn over multiple future wildfire events, the forested land has an emissions potential of over 8 million MT CO_2 from the conversion of carbon stocks to atmospheric carbon. Forest management can reduce the intensity and severity of wildfires in Calaveras County, reducing the GHG emissions potential per acre of forested land from 21.7 MT CO_2/acre burned down to 9.3 MT CO_2/acre burned. The full wildfire report can be viewed in **Appendix O**, Wildfire-related Greenhouse Gas Emissions from Natural Lands Carbon Stock Loss and Climate Change Vulnerability Assessment.

With support from the Calaveras Council of Governments (CCOG) and guidance from City staff, Sierra Business Council (SBC), along with subconsultant team of Rincon Consultants and Harris & Associates, completed all emissions estimates in accordance with the United States Community Protocol[3] (USCP) and the Local Government Operations Protocol[4] (LGOP). Details on the inventory boundaries and the protocols can be found in the **Inventory Methodologies** section of this report.

Key Findings of the Community-Wide GHG Emissions Inventory

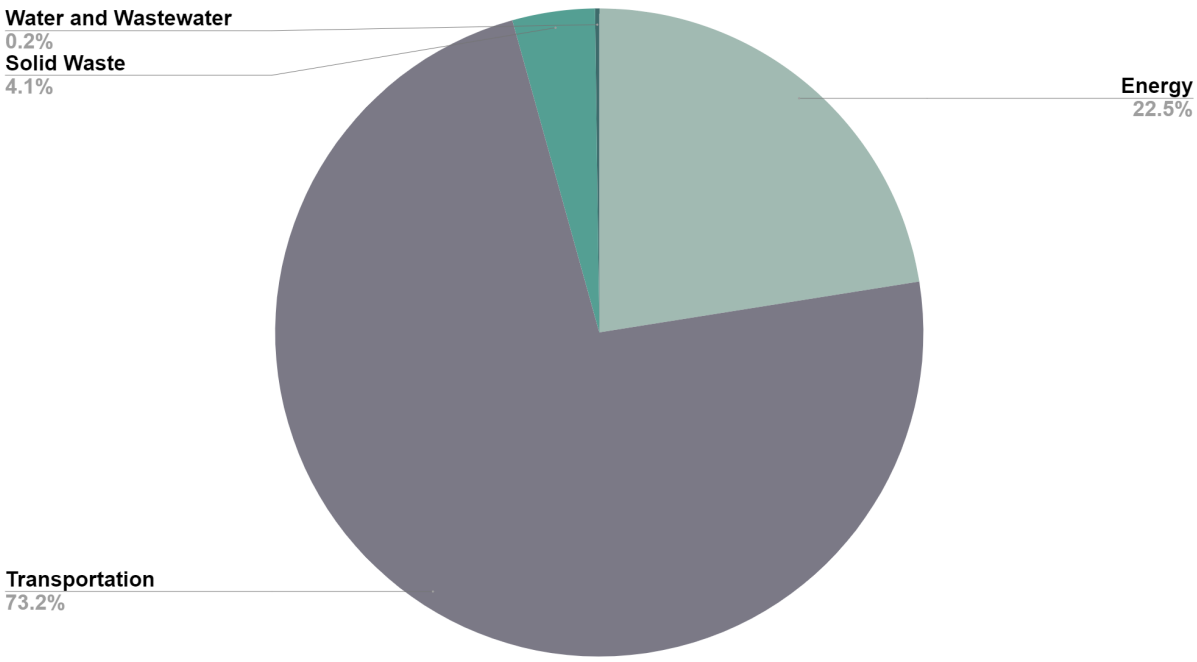
In 2018, sources within the City, and activities of the City's residents, businesses, and visitors emitted 25,193 MT CO_2e. These emissions are attributed to four different sectors: energy use, transportation, solid waste, and water and wastewater. The transportation sector was the most significant contributor of emissions. In summary:

- Transportation accounted for 73.2%

[3] U.S. Community Protocol for Accounting and Reporting of Greenhouse Gas Emissions (2021). ICLEI - Local Governments for Sustainability USA.
[4] Local Government Operations Protocol (2021). The Climate Registry.

- Energy use accounted for 22.5%
- Emissions from solid waste accounted for 4.1%
- Water and wastewater accounted for 0.2%

Figure ES-1: 2018 Emissions Summary

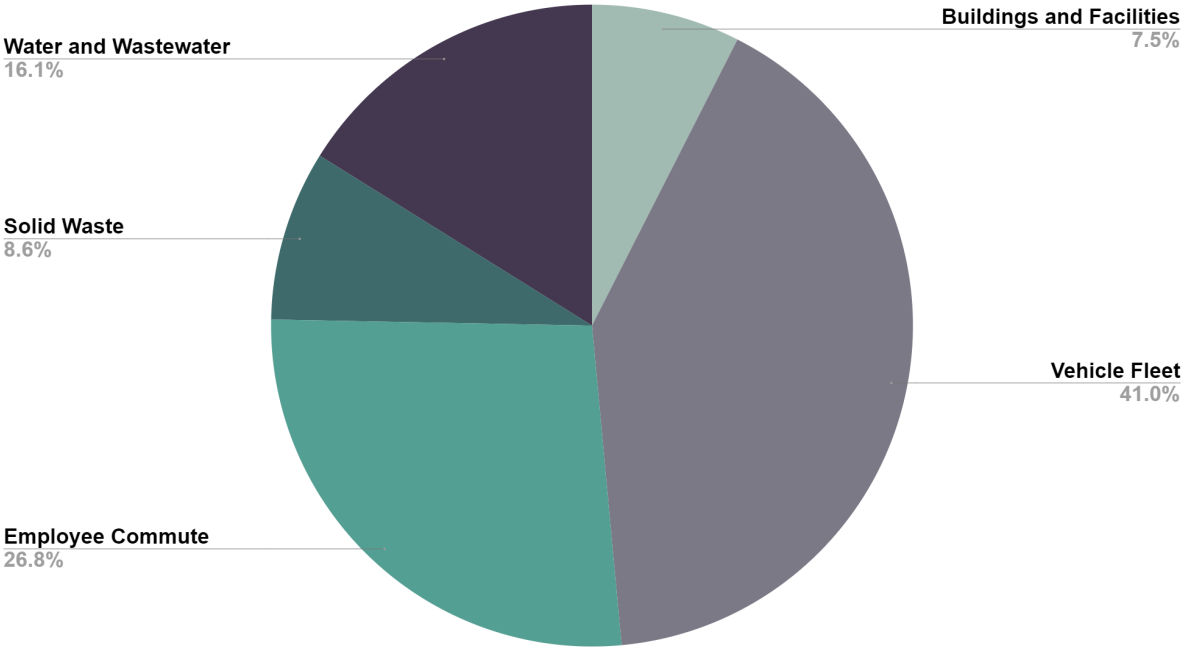


Key Findings of the Government Operations GHG Emissions Inventory

In 2018, City government operations generated 511 MT CO_2e for the sectors reported in this inventory. The vehicle fleet sector was the most significant contributor of emissions.

- Emissions from the City's vehicle fleet accounted for 41.0%
- Emissions from City employee commutes accounted for 26.8%
- City-owned and operated water and wastewater facilities accounted for 16.1%
- Emissions from City facility-generated solid waste accounted for 8.6%
- Energy from the City's buildings and facilities accounted for 7.5%

Figure ES-2: 2018 Emissions Summary



Introduction

California's legislature and regulatory agencies have established policies relating to grerenhouse gas (GHG) emissions reductions, including the California Global Warming Solutions Act (AB 32, 2006) and others discussed in more detail in the **California Climate & Policy Goals** section of the report. Due to these drivers and other motivations, many of California's local governments and communities are quantifying and reducing their GHG emissions. The City of Angels Camp (City) has responded to California's climate action planning process by developing goals and policies for GHG emissions reductions in it's 2020 General Plan Update and subsequently developing community-wide and government operations inventories for the year 2018 to implement those policies. This report documents the findings and methodologies of those inventories. With support from Calaveras Council of Governments (CCOG) and guidance from City staff, Sierra Business Council (SBC), along with the subconsultant team of Rincon Consultants and Harris & Associates, completed emissions estimates in accordance with the United States Community Protocol (USCP) and the Local Government Operations Protocol (LGOP). These protocols outline widely adopted and accepted methods for performing GHG inventories and are recommended by state agencies for local governments. More information on the inventory boundaries and the protocols used to develop the inventories is provided in the **Inventory Methodologies** section of the report.

GHG emissions are air pollutants as defined by the U.S. Supreme Court and subject to regulation by the U.S. Environmental Protection Agency under the federal Clean Air Act and the State of California under the Global Warming Solutions Act of 2006 (AB 32). These gases include carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), sulfur hexafluoride (SF_6), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and nitrogen trifluoride (NF_3). It is important to note that each of these gases has different potency, or ability to contribute to global warming. For the purposes of this inventory and in accordance with USCP and LGOP, all gases have been converted to their equivalent in carbon dioxide or CO_2e.

The City's inventory report presents a detailed accounting of GHGs emitted by source. In addition, the inventory projects the City's community-wide GHG emissions from 2018 to 2030, 2035, and 2045 based on business-as-usual (BAU) and adjusted scenario (ABAU) forecasts of changes in energy use, transportation, solid waste management, and wastewater treatment. These factors are influenced over time by changes in climate, population demographics, land-use and transportation patterns, the adoption of new technologies, and measures adopted to reduce GHG emissions.

This report is the first step toward measuring emissions reduction progress, planning future climate action, and developing strategies for reducing GHG emissions over time. The purpose of this report is to establish a baseline measurement or foundation to benchmark progress over time and guide City-wide climate planning and action. The second step of this process includes developing and prioritizing strategies to reduce GHG emissions consistent with state mandates, and involve and communicate progress to the public, stakeholders, and policymakers.

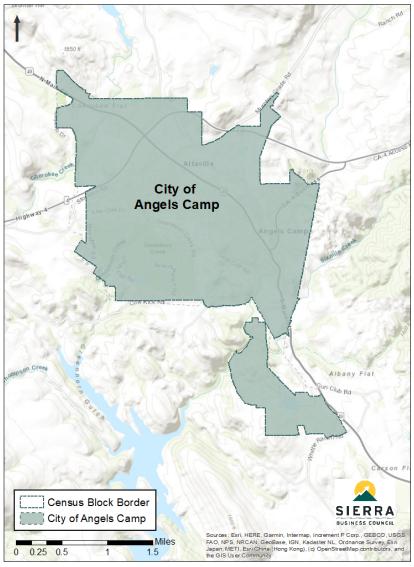
The first phase of the Calaveras County and Angels Camp GHG inventory and reduction plan project also included a comprehensive wildfire GHG analysis, designed to be consistent with the California Air Resources Board's "Report on Greenhouse Gas Emissions of Contemporary Wildfire, Prescribed Fire, and Forest Management Activities".

Rincon Consultants developed an in-depth analysis of the carbon sequestration value of wildlands and the fire emissions potential from these lands. The report includes an inventory of all the carbon sequestered in both the soils and vegetation of the County, including the City, to understand areas that have high carbon sequestration value, consistent with California's Natural and Working Lands Inventory. This will provide the City an understanding of the specific regions that would generate more GHG emissions and loss of vegetation carbon storage in a wildfire event. Furthermore, the wildfire assessment included an evaluation of areas that are likely to have a high fire return interval and overlap with these high carbon storage areas, and what the potential reduction in GHG emissions could be from forest management practices. The results of the report can be used to better understand the potential shifts in carbon stocks during wildfire events, and how forest management activities can reduce the loss of valuable carbon sequestration in the City's natural lands. The full report has been attached under **Appendix O**, Wildfire-related Greenhouse Gas Emissions from Natural Lands Carbon Stock Loss and Climate Change Vulnerability Assessment.

Community Profile

Located at 1,378 feet in elevation and home to approximately 4,000 residents, the City of Angels Camp is an iconic Gold Country town nestled in the Sierra Nevada foothills. It is well known as the place Samuel Clemens first heard the story and wrote "The Celebrated Jumping Frog of Calaveras County" giving rise to his fame as Mark Twain. Today, it is well loved for the Jumping Frog Jubilee and Calaveras County Fair, its gold rush history, high country recreation, local wineries, golf courses, and notable small town charm.

Originally inhabited by Indigenous Miwok people, Angels Camp was one of the earliest important mining communities along the Mother Lode region of California. Situated in southwestern County of Calaveras (County), on State Routes 49 and 4, it is traversed by Angels Creek, China Gulch, Greenhorn Creek, Cherokee Creek, Indian Creek, Six-Mile Creek, and several Gold-Rush era miner's ditches. Nearby is the New Melones Reservoir, which was created by the construction of the New Melones Dam in 1979 by the U.S. Army Corps of Engineers, replacing the original 1926 dam.



California Climate Policy & Goals

Since 2005, the State of California has responded to growing concerns over the effects of climate change by addressing emissions in the public and private sectors through legislative action. California mandates and guidance on measuring and reducing GHG emissions include:

- executive order on California global warming impacts and targets (EO S-3-05, 2005)[5],
- the California Global Warming Solutions Act (AB 32, 2006)[6] and its successor bill (SB 32, 2016)[7],
- the Sustainable Communities and Climate Protection Act (SB 375, 2008)[8],
- the California Clean Energy and Pollution Reduction Act (SB 350, 2015)[9],
- local government requirements for climate adaptation and resilience strategies (SB 379, 2015)[10],
- the California Air Resources Board (CARB) 2017 Climate Change Scoping Plan[11],
- the 100 Percent Clean Energy Act of 2018 (SB 100, 2018)[12], and
- executive order to achieve carbon neutrality (EO B-55-18, 2018).[13]

[5] http://static1.squarespace.com/static/549885d4e4b0ba0bff5dc695/t/54d7f1e0e4b0f0798cee3010/1423438304744/California+Executive+Order+S-3-05+(June+2005).pdf
[6] Global Warming Solutions Act of 2006 (AB 32). California Air Resources Board.
[7] Global Warming Solutions Act of 2006: Emissions Limit (SB 32). (2016). California Legislative Information.
[8] Transportation Planning: Travel Demand Models: Sustainable Communities Strategy: Environmental Review (SB 375). (2008). Institute for Local Government.
[9] Clean Energy and Pollution Reduction Act (SB 350). (2015). California Energy Commission.
[10] SB 379, Jackson. Land use: general plan: safety element (2015). California Legislative Information.
[11] https://ww2.arb.ca.gov/sites/default/files/classic//cc/scopingplan/scoping_plan_2017.pdf
[12] https://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=201720180SB100
[13] https://www.ca.gov/archive/gov39/wp-content/uploads/2018/09/9.10.18-Executive-Order.pdf

All of the above legislation provides guidance and protocols for local governments to participate in the State's GHG reduction efforts.

In response, many communities in the United States are addressing emissions at the local level. California state climate policies and mandates both encourage and require local governments and public agencies to develop solutions at the local level. As many of the major sources of GHG emissions can be directly or indirectly controlled through local policies and actions, local governments have an opportunity to play a key role in reducing GHG emissions within their boundaries. Through proactive measures related to land use, transportation demand management, energy efficiency, green building, waste diversion, and more, local governments can contribute to emissions reductions in their communities. This GHG inventory will build capacity for the City to better understand and address local climate impacts, allowing them to set goals that will increase their resilience and comply with California's greater climate strategy and mandates.

Climate Change in the Sierra Nevada

The California Assembly Bill 32[14] defines climate change impacts under the following language: Global warming poses a serious threat to the economic well-being, public health, natural resources, and the environment of California. The potential adverse impacts of global warming include the exacerbation of air quality problems, a reduction in the quality and supply of water to the state from the Sierra snowpack, a rise in sea levels resulting in the displacement of thousands of coastal businesses and residences, damage to marine ecosystems and the natural environment, and an increase in the incidences of infectious diseases, asthma, and other human health-related problems. Global warming will have detrimental effects on some of California's largest industries, including agriculture, wine, tourism, winter sports, recreational and commercial fishing, and forestry. It will also increase the strain on electricity supplies necessary to meet the demand for summer air-conditioning in the hottest parts of the state.

The CARB 2017 Climate Change Scoping Plan[15] provides additional details on the specific threats of climate change, particularly relevant for rural, forested regions like the City. The CARB scoping plan states: In California, as in the rest of the world, climate change is contributing to an escalation of serious problems, including raging wildfires, coastal erosion, disruption of water supply, threats to agriculture, spread of insect-borne diseases, and continuing health threats from air pollution.

[14] https://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=200520060AB32
[15] https://ww2.arb.ca.gov/sites/default/files/classic//cc/scopingplan/scoping_plan_2017.pdf

- The drought that plagued California for years devastated the state's agricultural and rural communities, leaving some of them with no drinking water. In 2015 alone, the drought cost agriculture in the Central Valley an estimated $2.7 billion, and more than 20,000 jobs.
- Changes include: A recorded increase in annual average temperatures, as well as increases in daily minimum and maximum temperatures. An increase in the occurrence of extreme events, including heat waves. A decrease in winter chill hours, necessary for the production of high-value fruit and nut crops.
- In recent years, California has experienced the deadliest wildfires in its history.
- Extensive tree mortality is already prevalent in California. The western pine beetle and other bark beetles have killed a majority of the ponderosa pine in the foothills of the central and southern Sierra Nevada Mountains.
- California will experience a reduction in spring runoff volumes, as a result of declining snowpack.
- While more intense dry periods are anticipated under warmer conditions, extremes on the wet end of the spectrum are also expected to increase due to more frequent warm, wet atmospheric river events and a higher proportion of precipitation falling as rain instead of snow.
- In recent years, atmospheric rivers have also been recognized as the cause of the large majority of major floods.
- Climate change is making events, like these listed above, more frequent, more catastrophic and more costly. Climate change impacts all Californians, and the impacts are often disproportionately borne by the state's most vulnerable and disadvantaged populations.

These are the many challenges associated with climate change that face the City, along with communities in the Sierra Nevada. To learn more about how climate change might impact the City, state agencies in California created a new public tool, Cal-Adapt, which provides relevant data, resources, and future projections.[16] A healthy ecosystem provides cultural, social, and economic benefits that local communities rely on for agriculture, tourism, recreation, fishing, and other industries that are important to the City and its economic vitality.[17,18]

[16] Cal-Adapt. California Energy Commission. (2021).
[17] Core Writing Team, Pachauri, R.K., Meyer, L.A.. (2014). Climate Change 2014: Synthesis Report. Fifth Assessment Report of the Intergovernmental Panel on Climate Change.
[18] Dettinger, M., Alpert, H., Battles, J., Kusel, J., Safford, H., Fougeres, D., Knight, C., Miller, L., Sawyer, S. (2018). Sierra Nevada Region Report. California's Fourth Climate Change Assessment.

Inventory Development

Aligning with established methodology and protocols, the inventory development process involved a number of key steps and decision-making points:

- **Identify Emissions Sources and Activities**: In consultation with CCOG and City staff, the team assessed 2018 GHG emissions from four different sectors: energy (energy use in buildings), transportation, solid waste, and water and wastewater. Within each sector, activities that occur in the City that release emissions outside of the City, as well as sources that generate emissions directly within the City, were accounted for. Emissions associated with government operations were also identified and included.
- **Inventory Boundaries**: The geographic scope of the inventory is referred to as "the City of Angels Camp" and is defined by the City's jurisdictional boundaries.
- **Data Collection and Inventory Years**: This inventory used data collected from the year 2018. This allows the inventory to be comparable to other nationwide inventories which typically include assessments from 2018 data, while also providing the best data available from the City, CCOG, and relevant special districts. The team worked closely with City staff and CCOG to identify and review available data for the baseline inventory and forecast of GHG emissions for the City. Data sets used for the findings in this report are highlighted throughout, as well as detailed in the appendices.
- **Inventory Tools**: For the community-wide and government operations inventories, ClearPath[19] was used. ClearPath, available through ICLEI, calculates, monitors, and forecasts GHG emissions based on reported activity data and demographic information. ClearPath was developed to assist in the preparation of USCP and LGOP-compliant GHG inventories.

More details about specific tools and methodologies are highlighted in their respective sections throughout this report.

[19] ClearPath. (2021). ICLEI - Local Governments for Sustainability USA.

GHG Emissions Inventory

Inventory Methodologies

Understanding a GHG Emissions Inventory

Achieving tangible greenhouse gas (GHG) emissions reductions in order to impact climate change requires identifying baseline emissions levels, sources, and activities that generate emissions in the community. Warming trends across the region have increased the frequency and severity of catastrophic wildfire, diminished snowpack, rain-on-snow and flooding events, low reservoirs and water supply, and decreased biodiversity. These effects are beginning to take hold locally, threatening not only the environment but also the City of Angels Camp's (City's) way of life.

This report presents emissions from the City as a whole, where the government operations emissions are a subset of community-wide emissions and should not be added to community emissions totals since they are already included in the community-wide data. The inventory uses the latest methodology and modeling to develop a 2018 inventory, looking at GHG emissions generated by energy, transportation, solid waste, and water and wastewater. Emissions from carbon dioxide (CO_2), methane (CH_4), and nitrous oxide (N_2O) are accounted for and calculated as the carbon dioxide equivalent (CO_2e). The government operations inventory only includes emissions from sources and activities over which the City has influence.

As local governments and public agencies have continued to join the greater climate action movement, the need for standardized approaches to quantifying GHG emissions has proven essential. The inventory utilizes the approach and methods provided by the U.S. Community Greenhouse Gas Emissions Protocol, in addition to the Local Government Operations Protocol.

Emissions Protocols

U.S. Community Protocol[20]

The City's community-wide GHG inventory was conducted in accordance with the U.S. Community Protocol (USCP) released by the organization ICLEI in October 2012 (updated in 2019) and represents the current national standard in guidance for community-wide GHG emissions inventories. The USCP improved on earlier protocols by establishing additional

[20] U.S. Community Protocol for Accounting and Reporting of Greenhouse Gas Emissions (2021). ICLEI - Local Governments for Sustainability USA.

reporting requirements for community-wide inventories and providing improved accounting guidance for quantifying emissions. The improvements include the addition of electricity transmission and distribution losses, the delineation of community wastewater and potable water energy use emissions, improved methods to estimate residential non-utility fuel use emissions, and improved methods to estimate wastewater process emissions. The State of California Governor's Office of Planning and Research recommends that California local governments follow the USCP when undertaking their GHG emissions inventories.

Local Government Operations Protocol[21]

The Local Government Operations Protocol (LGOP) was released in 2008 (updated in 2010), by ICLEI, the California Air Resources Board (CARB), and the California Climate Action Registry (CCAR) to serve as the national standard for quantifying and reporting GHG emissions from local government operations. The purpose of the LGOP is to provide the principles, approach, methodology, and procedures needed to develop a government operations GHG emissions inventory. The LGOP was used to guide the government operations inventory.

Greenhouse Gas Global Warming Potential

GHG emissions are commonly aggregated and reported in terms of equivalent-carbon-dioxide-units, or CO_2e. This carbon dioxide equivalent combines the three different gaseous emissions types into one single unit based on the Global Warming Potential (GWP) of each gas, which is a measure of the amount of warming a GHG may cause over the span of 100 years, measured against the amount of warming caused by carbon dioxide. Converting all emissions to equivalent-carbon-dioxide-units allows for the comparison of different GHGs in similar terms. For example, methane is 28 times more powerful than carbon dioxide in its warming effect over 100 years, so one metric ton (MT) of methane emissions is equal to 28 MT of carbon dioxide equivalents. **Table 1** presents the GWPs of the commonly occurring GHGs according to the Intergovernmental Panel on Climate Change's 5th Assessment Report, reflecting the most recent scientific consensus. Of those seven, this inventory focused on three main GHGs: carbon dioxide (CO_2), methane (CH_4), and nitrous oxide (N_2O).

[21] Local Government Operations Protocol (2021). The Climate Registry.

Table 1. Greenhouse Gas Global Warming Potentials

Greenhouse Gas	Chemical Formula	IPCC 5th Assessment Global Warming Potential[22]
Carbon Dioxide	CO_2	1
Methane	CH_4	28
Nitrous Oxide	N_2O	265
Hydrofluorocarbons	Various	4 - 12,400
Perfluorocarbons	Various	6,630 - 11,100
Sulfur Hexafluoride	SH_6	23,500
Nitrogen Trifluoride	NF_3	16,100

Quantifying Greenhouse Gas Emissions

Sources and Activities

Communities contribute to GHG emissions in a number of ways: 1) GHG emissions that are produced by sources located within the defined boundary, and 2) GHG emissions produced as a consequence of community activities. All of the emissions in this report have been quantified using calculation-based methodologies. Calculation-based methodologies look at GHG-emitting activities and determine how much of each activity occurred in the City. Then an emissions factor is developed or cited from literature for each specific activity and the two figures are multiplied together to arrive at the total emissions produced by each activity within the City:

Activity or Source Data x Emissions Factor = Emissions Produced by Activity.

Activity or source data refers to the relevant measurement of energy use or other GHG-generating processes such as fuel consumption by fuel type, metered annual electricity consumption, or annual vehicle miles traveled (VMT). Standard emissions factors are applied to activity or source data to determine the associated emissions. Emissions factors are typically expressed as emissions per unit of activity or source data (e.g. lbs CO_2/kWh of electricity). ICLEI's ClearPath toolkit was used to complete these quantifications.

The report for community-wide emissions measures GHG emissions in four primary areas: energy use, including propane and electricity used to heat and cool buildings; transportation, including emissions from vehicle operations; solid waste, including materials deposited in landfills that will later decompose; and wastewater treatment. The

[22] Global Warming Potential Values. (2013). Greenhouse Gas Protocol. IPCC.

report measures both emissions occurring within the City and emissions originating outside the City for use inside the City, in order to create a measure of total emissions.

The second part of this report, focused on emissions from government operations, measures emissions in five primary areas: energy use from buildings and facilities, vehicle fleet, employee commutes, solid waste generation, and water and wastewater.

The basic process followed for the inventory is to measure sources of emissions (such as power generation) and activities that create emissions (such as vehicle operations), and convert those sources and activities into equivalent GHG emissions. The observed emissions allow for measurement over time of progress toward meeting climate policy goals. The report also uses assumptions in City-wide growth to create a forecast of changes to occur in GHG emissions, which can aid in decision making.

Information only items are GHG emissions that are not included in the GHG emissions totals, though are reported to provide context. Information items are reported separately from the totals either to avoid overlap with other reported emissions or because they are excluded from GHG inventories by protocol guidance. Information items can include emissions such as:

- Emissions associated with electric vehicles. The emissions are included in residential and non-residential electricity emissions totals, and reported as an information item in the transportation sector.
- Emissions associated with energy used to distribute water and collect wastewater, as they are included in commercial community-wide electricity usage totals.

Forecast Methodology

After the completion of the emissions inventories, forecasts of emissions were developed under business-as-usual (BAU) and adjusted business-as-usual scenarios (ABAU). A BAU scenario does not account for any local, state, or federal policy that would impact future GHG emissions. The BAU forecasts estimate future community-wide GHG emissions in the years 2030, 2035, and 2045. BAU forecasts are based on two inputs — current emissions data and growth rates. Baseline emissions data came from the 2018 inventory. Growth rates were calculated based on projected growth of relevant indicator variables.

BAU projections are intended to demonstrate the expected growth in GHG emissions if no reduction measures are taken. The BAU forecast is beneficial in that it allows for comparison between forecasted and actual observed emissions to determine what

emissions reduction progress has been made to date. BAU forecasts also can help assess whether the City can achieve its emissions reduction targets through current efforts.

An adjusted scenario forecast, or adjusted BAU (ABAU), accounts for legislative adjustments and projected emissions reductions resulting from legislative action. This includes future updates to statewide vehicle fleet standards and renewable portfolio standards. ABAU forecasts are developed using two inputs - current emissions data and either BAU projections or adjusted rates of growth or decay.

Community-Wide Inventory Results

The community-wide inventory is an assessment of the City of Angels Camp's (City) greenhouse gas (GHG) emissions resulting from activities by City residents, businesses and visitors for the year 2018. The community-wide inventory includes:

1. Use of electricity
2. Use of fuel in buildings or other stationary use
3. Use of fuel for on-road transportation by passenger and freight vehicles
4. Use of energy for potable water and wastewater distribution and treatment processes
5. Generation of solid waste by the community

Based on the methodologies outlined above, inventory results provide information on the sources of GHG emissions, the relative magnitude of those emissions by source, and emissions trends in the City over time.

Community-Wide GHG Emissions Summary

Key Findings

- In 2018, the community, including residents and businesses, of Angels Camp emitted an estimated 25,193 metric tons (MT) CO_2e.
- The largest contributor to community emissions in the inventory is community-wide transportation (73%), which includes on-road and off-road vehicle emissions.
- In combination, the transportation and energy sectors produce roughly 96% of the community-wide emissions in the City, and therefore have the most potential for emissions reductions.
- By conducting periodic GHG emissions inventories as data becomes more robust and methodologies improve, the City can get an even clearer picture of the GHG emissions in the community, and monitor and evaluate any reduction efforts taken.

Overview of 2018 Community-Wide Inventory

In 2018, the City emitted 25,193 MT CO_2e.[23] The transportation sector was the largest source of emissions, followed by energy, solid waste, and water and wastewater, as shown in **Figure 1**. On a per capita basis, emissions were 6.46 MT CO_2e per City resident annually. Note that per capita emissions, however, may not be directly comparable to inventories from other jurisdictions, as overall inventory methodologies can differ.

Figure 1. 2018 Emissions Summary

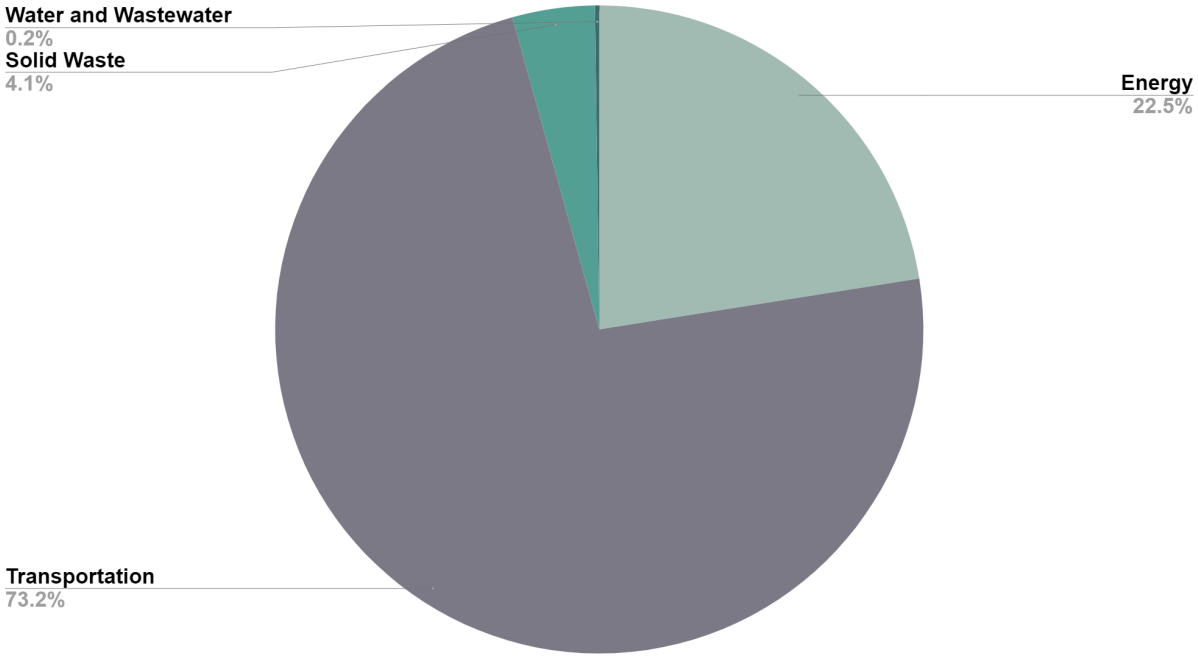


Table 2. 2018 Emissions Summary

Sector	MT CO_2e	% of Total Emissions
Energy	5,667	22.49%
Transportation	18,437	73.18%
Solid Waste	1,037	4.12%
Water and Wastewater	52.78	0.21%
Total	**25,193**	**100%**

[23] Community-Master-Data-Workbook. (2021). Sierra Business Council.

Energy

The energy sector consists of building electricity and other fuel use (propane and wood), as noted below **Table 3.** Aggregated electricity use data was provided by Pacific Gas & Electric Company (PG&E) and Calaveras Public Power Agency (CPPA)[24] and is shown in **Figure 2** below. **Figure 2** below shows emissions by energy type, and it is important to note that there are very little emissions coming from electricity provided by CPPA, as CPPA electricity is generated through various hydroelectric projects.

While there is no natural gas usage in the City, propane significantly contributed to emissions for the energy sector. Propane and wood usage estimates for 2018 were taken from the U.S. Energy Information Administration (EIA) and scaled using household energy use estimates from the U.S. Census American Community Survey.[25] These estimates are shown in **Figure 2**.

The electricity use and emissions metrics include transmission and distribution (T&D) losses for 2018. T&D losses are slight losses in electrical energy as a result of transmission across power lines. T&D losses were measured at 4.8% of end use consumption in 2018 according to the eGRID gross loss rates for the Western Region.[26]

Refer to the **Appendices A and B** for data on 2018 emissions factors.

[24] Electricity data provided by PG&E and CPPA. Located in the Community-Master-Data-Workbook.
[25] Propane and wood data estimated using data from the U.S. Energy Information Administration and U.S. Census Bureau American Community Survey.
[26] Transmission and distribution loss rates were provided by the U.S. Environmental Protection Agency eGRID Data Explorer.

Figure 2. Emissions by Energy Type

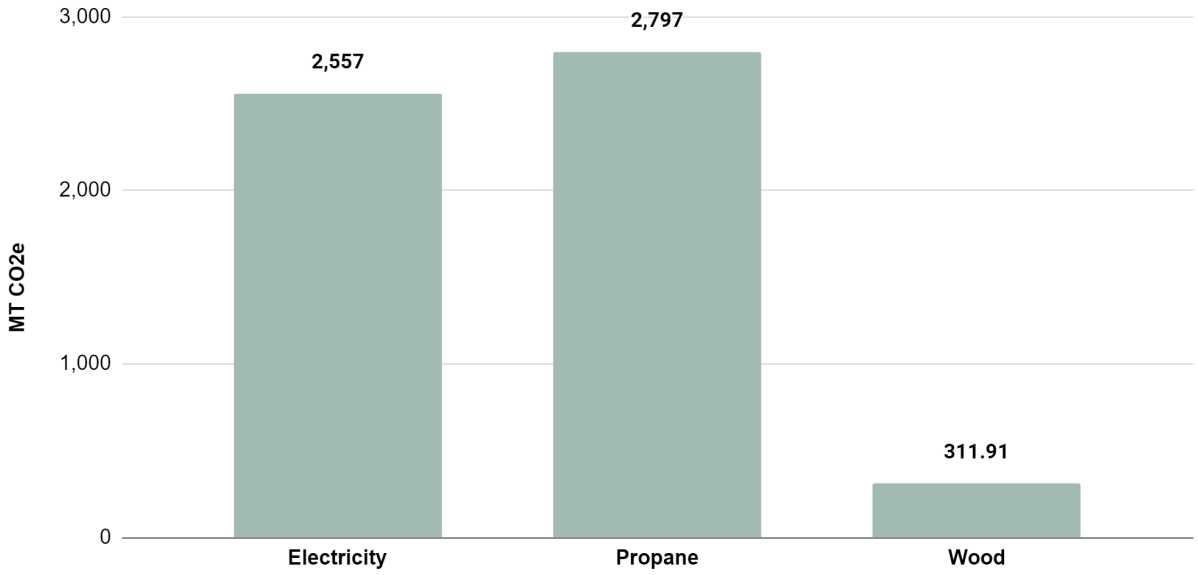


Table 3. Energy Activity Data and Emissions

Energy Type	Amount	Unit	Emissions (MT CO_2e)	Data Source
Residential Electricity (PG&E)	13,351,915	kWh	1,260	PG&E
Residential T&D Loss Rate	4.80	%	144.93	eGRID
Residential Propane	485,623	gallons	2,743	EIA / ACS
Residential Wood	31,313	MMBtu	311.91	EIA / ACS
Commercial Electricity (PG&E)	10,691,523	kWh	1,009	PG&E
Commercial Electricity (CPPA)	1,399,724	kWh	25.90	CPPA
Commercial Electricity T&D Loss Rate	4.80	%	117.29	eGRID
Commercial Propane	9,735.85	gallons	54.98	EIA / ACS
Total Emissions			**5,667**	

Transportation

In 2018, on-road vehicle miles traveled (VMT) data was provided for the Calaveras Council of Governments' (CCOG) travel demand model and scaled to the City from aggregated

County data using population.[27] The breakdown of VMT and emissions by trip type is noted in **Table 4** below. Off-road fuel usage data was provided by the California Air Resources Board's OFFROAD2017 model, including fuel usage data from off-road activity relating to construction and other industrial and light commercial activities. The off-road vehicle data was originally calculated for the County and was scaled down to City usage using population. On- and off-road activity and emissions data are shown in **Figure 3** and **Table 4** below.

Figure 3. On-Road and Off-Road Emissions

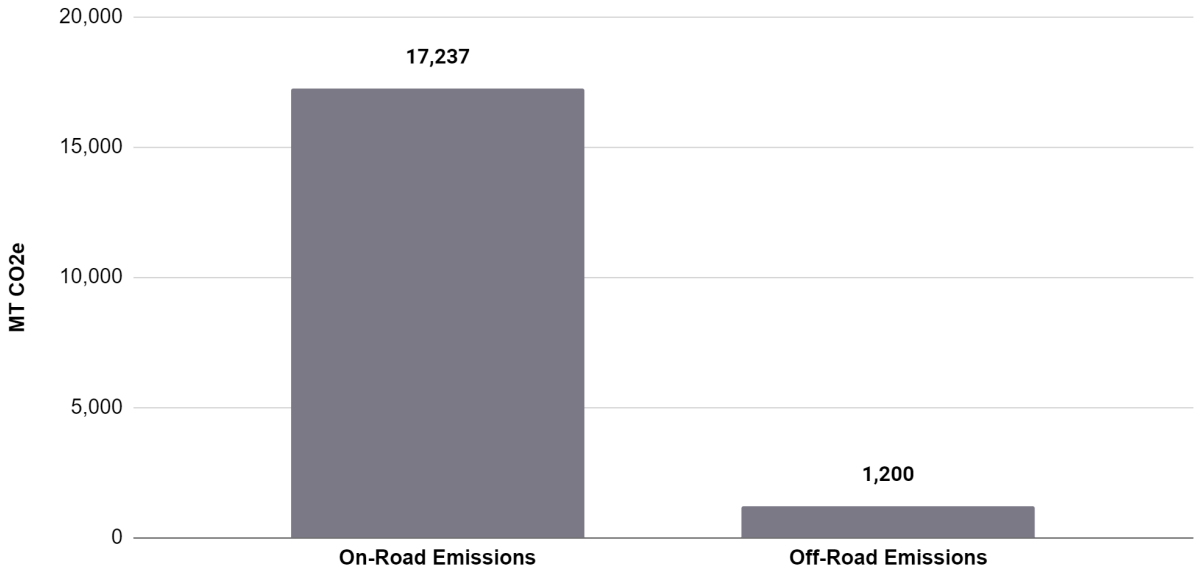


Table 4. Vehicle Miles Traveled and Emissions from Transportation

Activity / Source	Miles Traveled (Miles)	Gasoline Use (Gallons)	Diesel Use (Gallons)	Liquid Propane Gas Use (Gallons)	Emissions (MT CO_2e)
On-Road Vehicles	34,937,859				**17,237**
Trip Starts and Ends In Boundary	15,370,293				7,583
Trip Starts In and Ends Out of Boundary	9,783,783				4,827
Trip Starts Out and Ends In Boundary	9,783,783				4,827
Off-Road Vehicles		14,087	102,319	3,003	**1,200**
Total Emissions					**18,437**

[27] On-Road data provided by CCOG. Off-Road data provided by CARB OFFROAD2017 Model, EPA Emissions Factors, and 5th Assessment Global Warming Potentials.

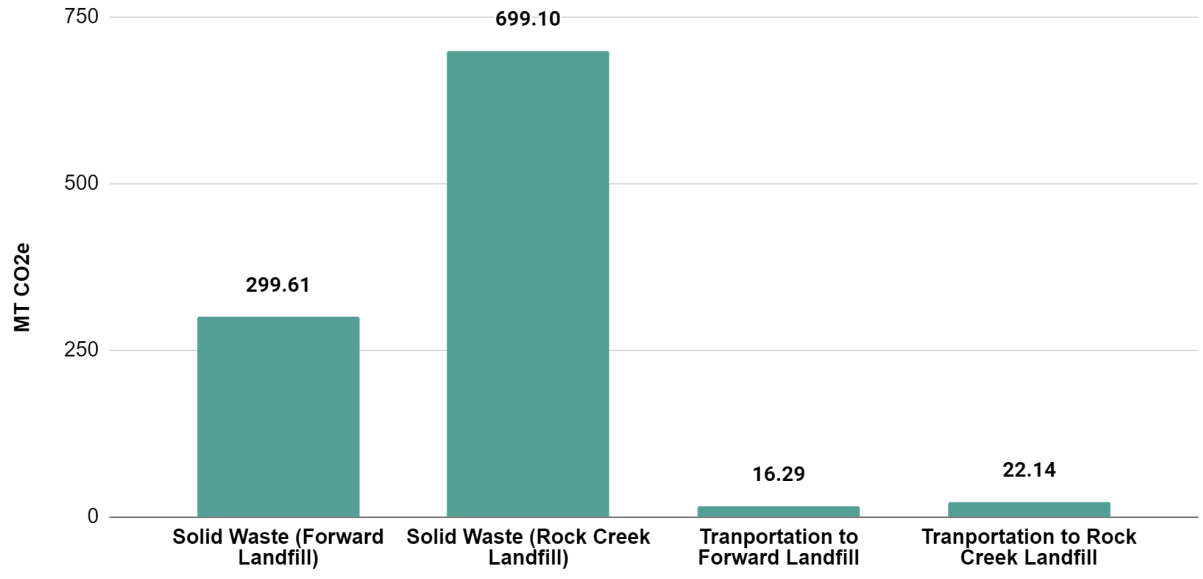
Solid Waste

In 2018, total City-wide solid waste sent to the landfill was approximately 3,519 tons.[28] Solid waste generated in the City is primarily sent to Forward Landfill in Manteca and Rock Creek Landfill in Farmington. The figure below lists the total solid waste tonnage sent to both Forward and Rock Creek Landfills. Both landfills have methane collection systems in place. Solid waste tonnage data was provided by Calaveras County Integrated Waste Management and scaled down to City usage. Emissions from transportation of solid waste were also calculated using the annual tonnage and the distance to and from each landfill.

Table 5. Solid Waste Generation Data and Emissions

Landfill	Solid Waste (Tons)	Emissions (MT CO_2e)	Distance to Landfill (Miles)	Emissions (MT CO_2e)	Data Source
Forward Landfill	1,056	299.61	55.10	16.29	Calaveras County Integrated Waste Management, CalRecycle, and Google Maps
Rock Creek Landfill	2,463	699.10	32.10	22.14	
Total	**3,519**	**998.71**		**38.43**	

Figure 4. Solid Waste Emissions



[28] Solid waste data provided by Calaveras County Integrated Waste Management. Located in Community-Master-Data-Workbook.

Water and Wastewater

Emissions from water and wastewater for the year 2018 were 52.78 MT CO_2e.[29] Electricity emissions from water distribution and wastewater collection and treatment were accounted for in the City-wide calculations for the energy sector and were considered "information only" items in this section to avoid double counting. Wastewater emissions are primarily associated with the City's treatment processes.

Table 6. Electricity Use for Potable Water Supply - Information Item

Energy Type	Electricity Use (kWh)	Water Treated (Gallons)	Data Source
Electricity (CPPA)	197,600	321,800,000	CPPA, USCP, City of Angels Camp

Table 7. Electricity Use for Wastewater Treatment - Information Item

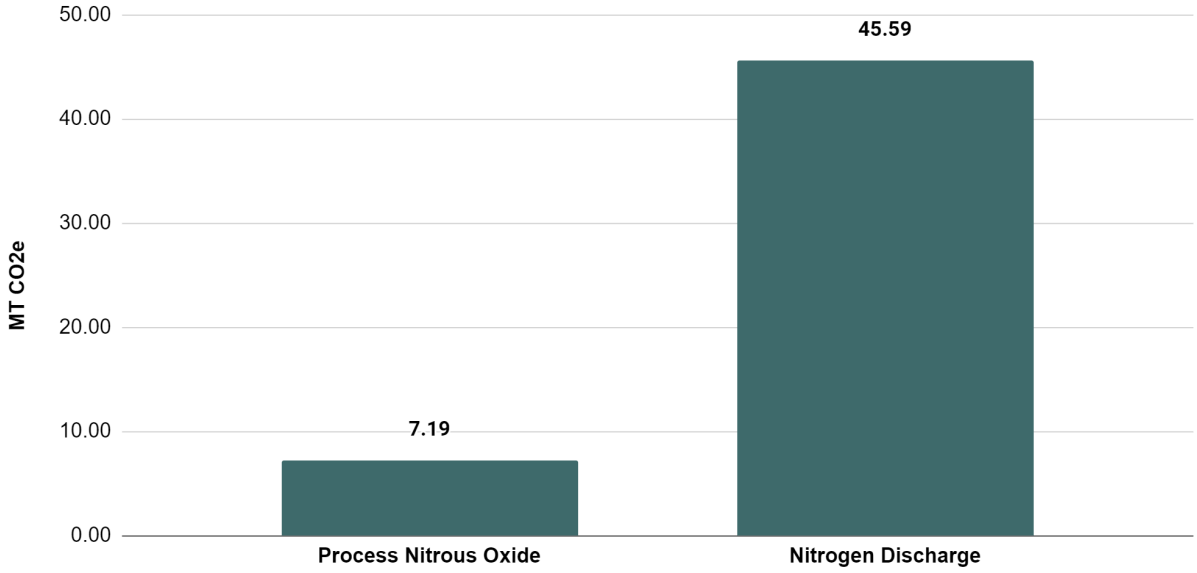
Energy Type	Electricity Use (kWh)	Water Treated (Gallons)	Data Source
Electricity (CPPA)	1,400,000	168,000,000	CPPA, USCP, City of Angels Camp

Table 8. Wastewater Treatment Process Data

Treatment Process	Emissions (MT CO_2e)
Nitrogen Discharge	45.59
Process N_2O	7.19
Total Emissions	**52.78**

[29] Water and wastewater data provided by the City of Angels Camp. Located in Community-Master-Data-Workbook.

Figure 5. Water and Wastewater Emissions



Government Operations Inventory Results

This section presents a detailed analysis of greenhouse gas (GHG) emissions resulting from the City of Angel's Camp's (City) government operations. The government operations emissions are a subset of community-wide emissions and should not be added to community emissions totals since they are already included in the community-wide data. The emissions included in this inventory were determined using the operational control framework. Included are emissions from buildings, facilities and lighting energy use, water distribution and wastewater treatment emissions, and vehicle fleet fuel use emissions. These are emissions sources and activities for which the City has the full authority to introduce and implement operating policies. The government operations inventory also includes two additional emissions sectors for which the City has limited control: emissions from employee-generated solid waste and emissions from employees' personal commutes to work. Including these optional sources is recommended strongly by the Local Government Operations Protocol (LGOP) even though the City does not have full operational control.

Based on the methodologies previously outlined, inventory results provide information on the sources of GHG emissions and the relative magnitude of those emissions by source for the City operations.

Government Operations GHG Emissions Summary

Key Findings

- In 2018, the City's government operations emitted an estimated 511 metric tons (MT) CO_2e, which includes emissions sources and activities for which the City has the authority to introduce and implement operational policies.
- The largest contributor to government operations emissions in the inventory is the vehicle fleet (41%), which includes on-road and off-road vehicle emissions.
- In combination, the vehicle fleet and employee commute sectors produce more than 67% of the government operations emissions in the City, and therefore have the most potential for emissions reductions.
- Emissions from government operations account for 2.0% of total community-wide emissions.
- By conducting periodic GHG emissions inventories as data becomes more robust and methodologies improve, the City can get an even clearer picture of the government operations GHG emissions, and monitor and evaluate any reduction efforts taken.

Overview of 2018 Government Operations Inventory

In 2018, City facilities and operations emitted 511 MT CO_2e.[30] The vehicle fleet sector was the largest source of emissions, followed by employee commute, water and wastewater, solid waste, and buildings and facilities.

[30] LGO-Master-Data-Workbook. (2021). Sierra Business Council.

Figure 6. 2018 Emissions Summary

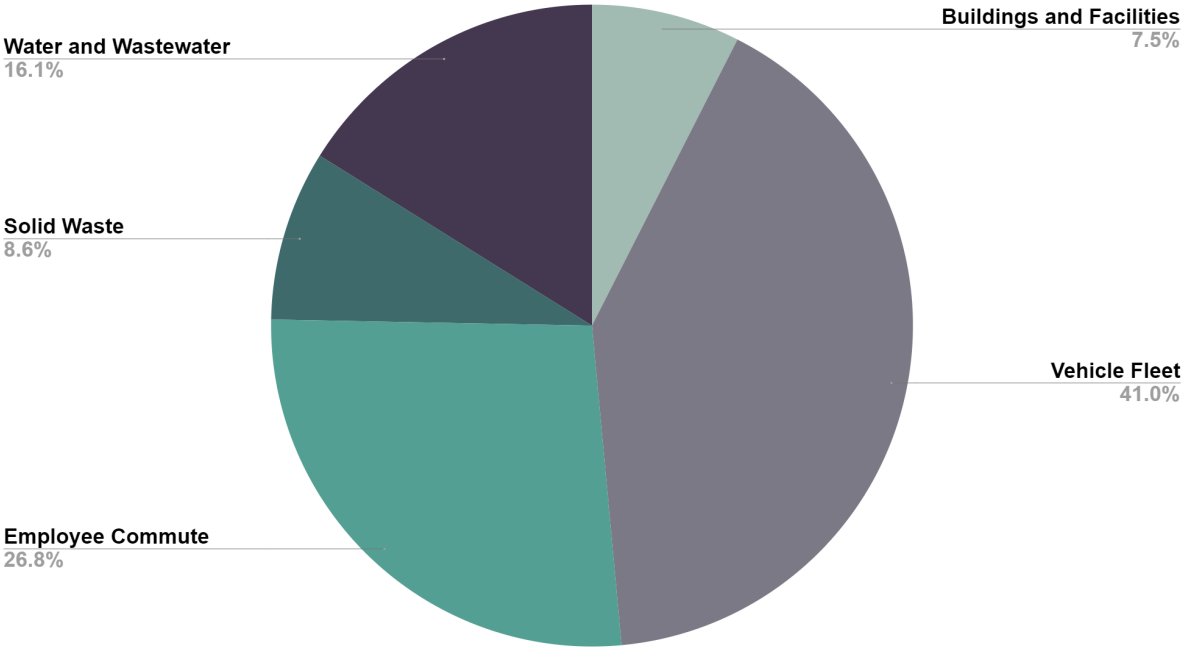


Table 9. 2018 Emissions Summary

Sector	MT CO_2e	% of Total Emissions
Buildings and Facilities	38	7.49%
Vehicle Fleet	210	41.04%
Employee Commute	137	26.77%
Solid Waste	44	8.58%
Water and Wastewater	82	16.12%
Total	**511**	**100%**

Buildings and Facilities

The buildings and facilities sector consists of building electricity and propane in City buildings and facilities, as noted below **Table 10**. Aggregated electricity use data was provided by Pacific Gas & Electric Company (PG&E) and Calaveras Public Power Agency (CPPA)[31] and is shown in **Figure 7** below. There are very little emissions coming from

[31] Electricity data provided by PG&E and CPPA. Located in the LGO-Master-Data-Workbook.

electricity provided by CPPA, as CPPA electricity is generated through various hydroelectric projects. There is no natural gas used within City operations.

Figure 7. Emissions from Buildings and Facilities Energy Use

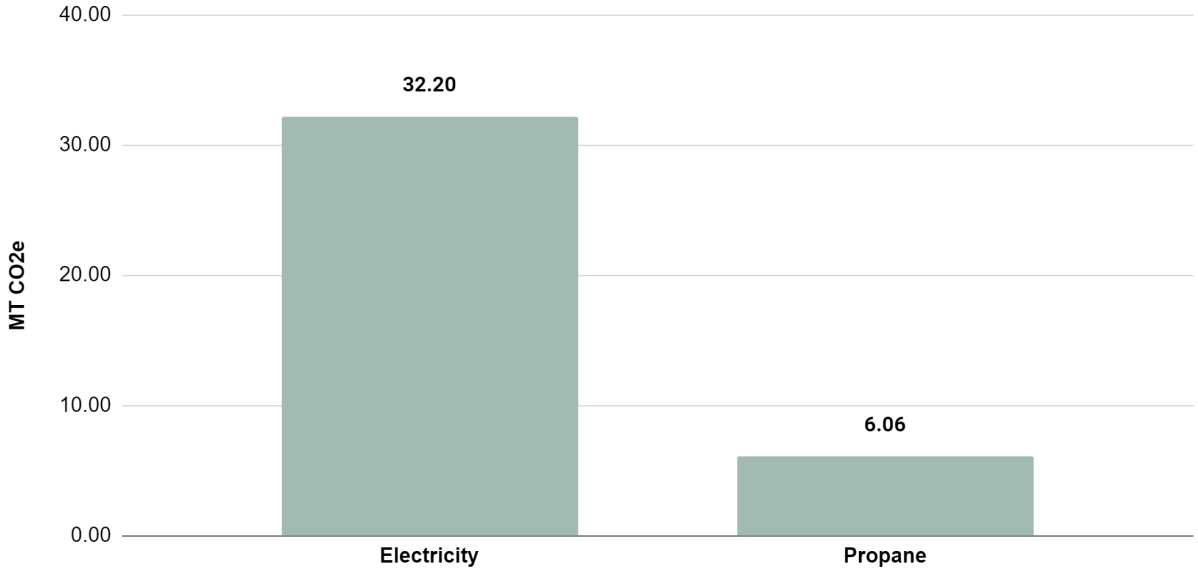


Table 10. Energy Use and Emissions from City Buildings and Facilities

Energy Type	Amount	Unit	Emissions (MT CO_2e)	Data Source
Electricity (PG&E)	66,725	kWh	6.30	PG&E
Electricity (CPPA)	1,399,724	kWh	25.90	CPPA
Propane	1,073	gallons	6.06	EIA / ACS
Total Emissions			**38.26**	

Vehicle Fleet

Vehicle fleet data for 2018 was provided by the City's Public Works, Police, and Fire Departments.[32] This data set included vehicle type, fuel type, total annual miles traveled, and gallons of fuel or hours used. All off-road vehicles were categorized as small utility vehicles in ClearPath. **Table 11** below shows breakdown of passenger, light duty, and heavy duty vehicles, in addition to fuel usage by type.

[32] Vehicle fleet data provided by the City of Angels Camp. Located in LGO-Master-Data-Workbook.

Figure 8. Vehicle Fleet Emissions

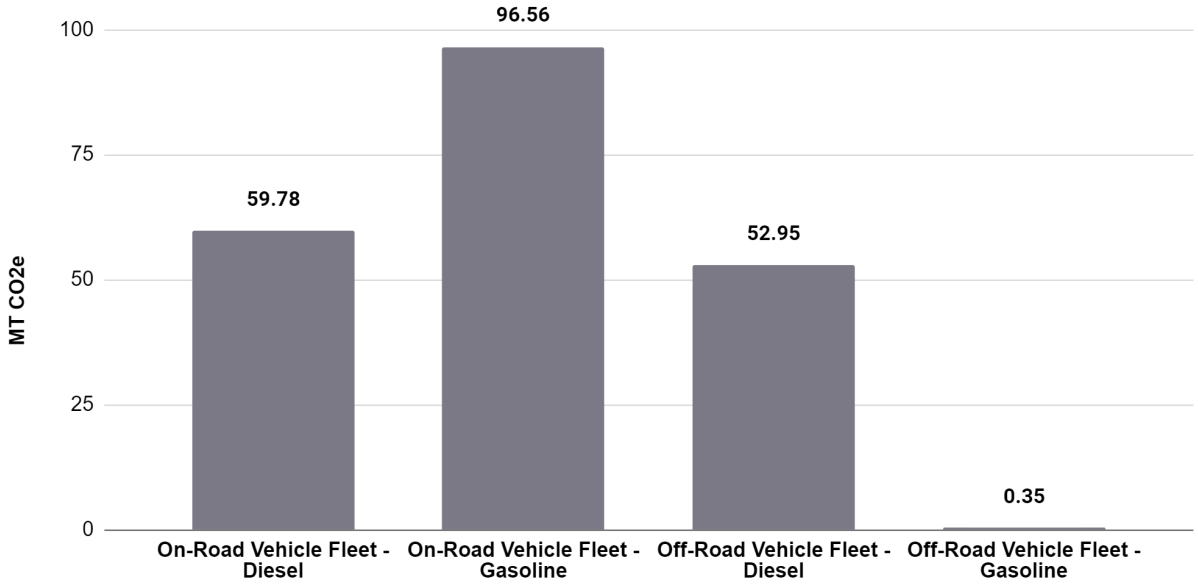


Table 11. Vehicle Fleet Breakdown and Emissions

Activity / Source	Annual VMT	Fuel Used (Gallons)	Emissions (MT CO_2e)
On-Road Vehicle Fleet - Diesel	49,144	5,849	59.78
On-Road Vehicle Fleet - Gasoline	185,102	10,905	96.56
Off-Road Vehicle Fleet - Diesel	N/A	5,186	52.95
Off-Road Vehicle Fleet - Gasoline	N/A	39	0.35
Total Emissions			**209.64**

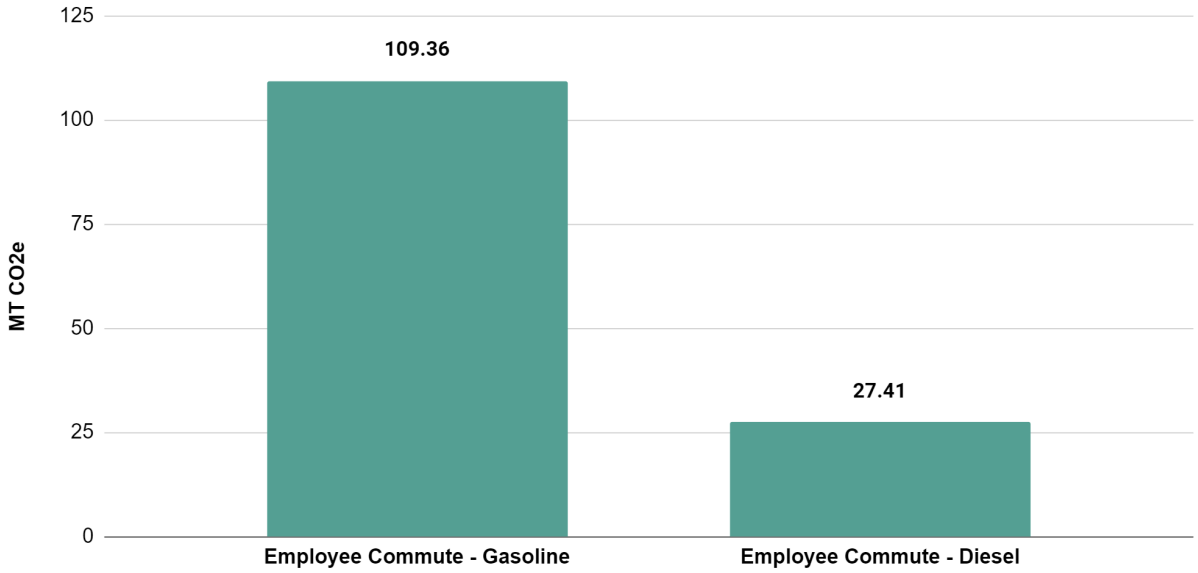
Employee Commute

In order to compile an employee commute data set, a survey was distributed both electronically and by hard copy to all City employees. The survey included questions regarding mileage to and from work, how many days per week were spent driving to work, vehicle type, and fuel type. It was asked that employees fill out this survey for their "pre-COVID-19" commutes. There were 36 employees and 4 contractors in 2018. In total, there were 40 responses, and it was shown that all employees drive alone to work. Total vehicle miles traveled are categorized by gasoline and diesel, as well as by passenger vehicle or light duty truck. The City Employee Commute survey is included in **Appendix I.**

Table 12. Employee Commute VMT Breakdown and Emissions

Activity / Source	Annual VMT	Emissions (MT CO_2e)
Employee Commute - Gasoline	254,250	109.36
Employee Commute - Diesel	49,271	27.41
Total Emissions		**136.77**

Figure 9. Employee Commute Emissions



Solid Waste

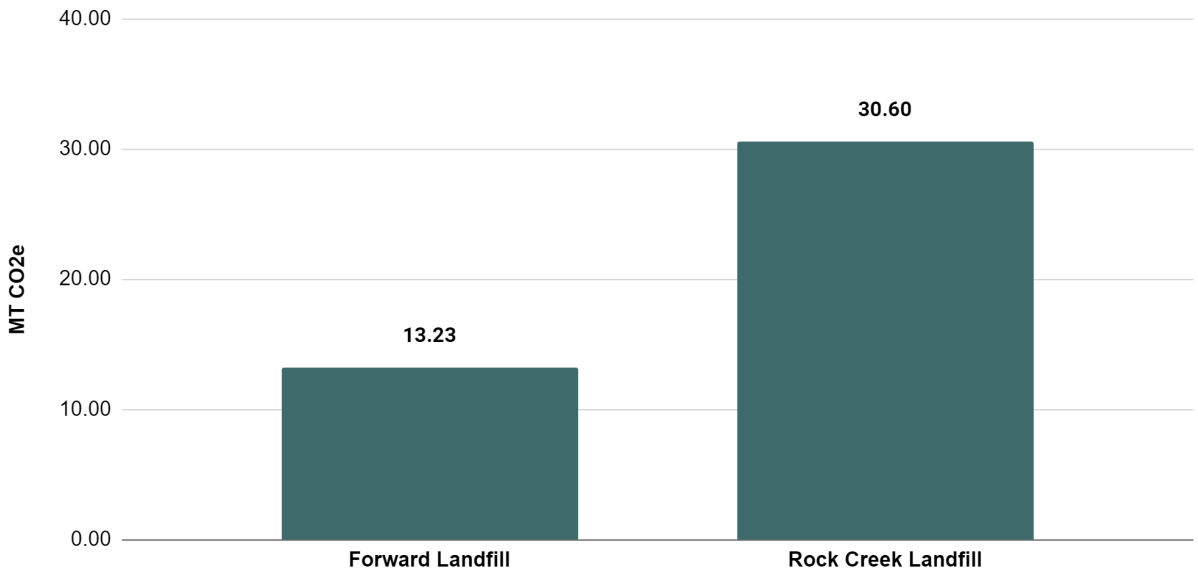
In 2018, solid waste generated by City government operations was approximately 73 tons.[33] Solid waste generated by City facilities is sent to Forward Landfill in Manteca and Rock Creek Landfill in Farmington. In **Figure 10** below, you can see total solid waste tonnage sent to both Forward and Rock Creek Landfills. Both landfills have methane collection systems in place. Solid waste tonnage data was provided by the City. Emissions from transportation of solid waste were also calculated using the annual tonnage and the distance to and from each landfill.

[33] Solid waste data provided by the City of Angels Camp. Located in LGO-Master-Data-Workbook.

Table 13. City Facility-Generated Solid Waste

Landfill	Solid Waste (Tons)	Emissions (MT CO_2e)	Distance to Landfill (Miles)	Emissions (MT CO_2e)	Data Source
Forward Landfill	22.00	12.92	55.10	0.31	Calaveras County Integrated Waste Management, CalRecycle, and Google Maps
Rock Creek Landfill	51.34	30.14	32.10	0.46	
Total	**73.34**	**43.06**		**0.77**	

Figure 10. Emissions from City Facility-Generated Solid Waste



Water and Wastewater

Emissions from City-operated water and wastewater facilities for the year 2018 totaled 82.3 MT CO_2e.[34] Water and wastewater emissions are primarily associated with energy used to distribute water, collect wastewater, and the City's treatment processes. Data was provided by the City and is outlined below in **Table 14, Table 15** and **Table 16**. Under the LGOP, these emissions are included in the government operations inventory because they are owned and operated by the City.

[34] Water and wastewater data provided by the City of Angels Camp. Located in LGO-Master-Data-Workbook.

Table 14. City-Operated Potable Water Supply Electricity

Energy Type	Electricity Use (kWh)	Water Treated (Gallons)	Emissions (MT CO_2e)	Data Source
Electricity (CPPA)	197,600	321,800,000	3.66	CPPA, USCP, City of Angels Camp
Total Emissions			**3.66**	

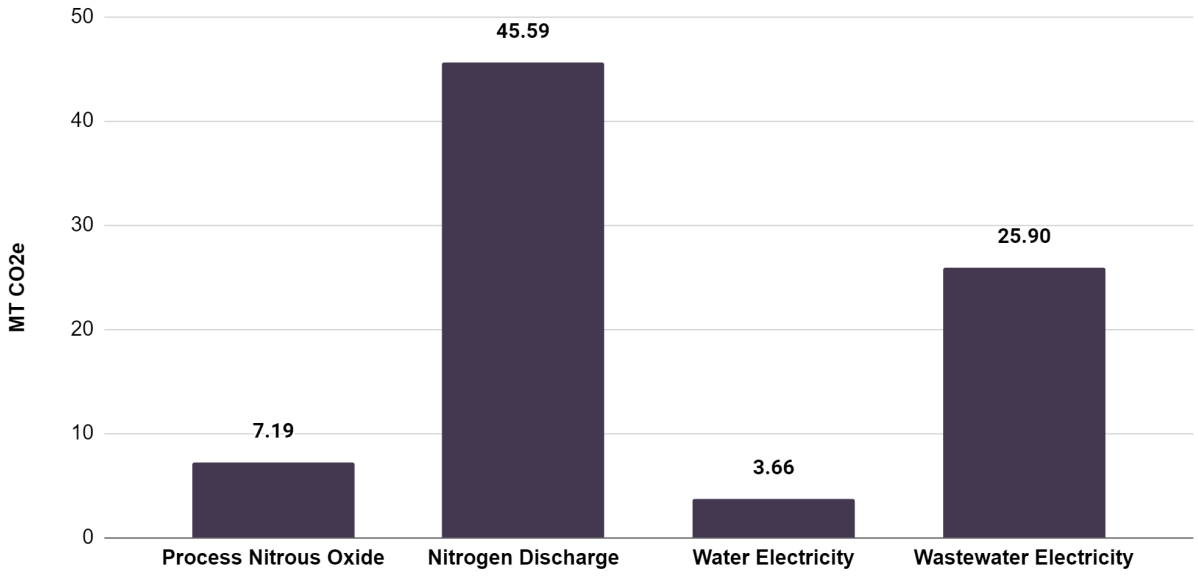
Table 15. City-Operated Wastewater Treatment Electricity

Energy Type	Electricity Use (kWh)	Wastewater Treated (Gallons)	Emissions (MT CO_2e)	Data Source
Electricity (CPPA)	1,400,000	168,000,000	25.90	CPPA, USCP, City of Angels Camp
Total Emissions			**25.90**	

Table 16. Wastewater Treatment Process Data

Treatment Process	Emissions (MT CO_2e)
Nitrogen Discharge	45.59
Process N_2O	7.19
Total Emissions	**52.78**

Figure 11. Water and Wastewater Emissions



Emissions Forecasting

Business-as-Usual Forecasts

Business-as-usual (BAU) forecasts were conducted for the City of Angels Camp (City) after the completion of the emissions inventory to provide an estimate of future emissions in each sector.[35] The BAU scenarios take the emissions from a snapshot in time and project them out over time, assuming no other changes or variables that might otherwise affect emissions. In general, BAU emissions forecasting does not account for any local, state, or federal policy that would impact future GHG emissions, nor does it account for potential changes in technology or individual consumption behavior. The BAU forecasts estimate how annual emissions would change from 2018 to 2030, to 2035, and to 2045. These years align with existing regional, local, and statewide emissions reduction goals.

The BAU forecast is based on two inputs, baseline emissions data and growth rates, both of which are presented in **Appendix M** and **Appendix N**. Growth rates were calculated using projections of population, employment rates, and several other indicator variables. For the City forecasts, two forecast scenarios were calculated due to differences in population growth rates from differing years (one references an increasing population growth rate from 2018 data and the other a declining population growth rate from 2021 data). Both of these forecasts and more detailed information on the reasoning behind including two BAU forecasts are provided in **Appendix M**. Only the forecasts using 2018 DOF data are included in this section of the report.

Calculating the emissions forecast is achieved by isolating an indicator variable for the various sectors and sub-sectors that were evaluated in the inventory, then assessing how that indicator variable is projected to increase or decrease into the future, and applying that rate of change to the emissions from that sector or sub-sector.

For example, to forecast residential energy, the team looked at the different projected rates of change for Calaveras County population out to 2045 (from 2021 and 2018 Department of Finance population projection data), then applied those rates of change to the emissions coming from the City's residential energy sector to arrive at our BAU forecasts. This process was applied to each sector and sub-sector using associated growth indicators.

Table 17 below displays the various indicator variables and their data sources for each sector. Forecasts are based on projections provided by commonly-used sources, however

[35] Data located in the City of Angels Camp Forecasts spreadsheet.

like other predictive modeling, there is inherent uncertainty in these predictions. Likewise, significant events, like the 2020-2021 COVID pandemic, can disrupt a projection in unexpected ways. As this inventory was based on data from before the pandemic, resulting impacts are not accounted for as they are as of yet unknown. Additionally, data that is specific and robust for small rural regions, like Calaveras County, can be difficult to obtain. Regardless, forecasting can be a useful tool to help understand the actions needed to reach emissions reduction targets.

Table 17. Business-as-Usual Emissions Forecast Variables & Data Sources

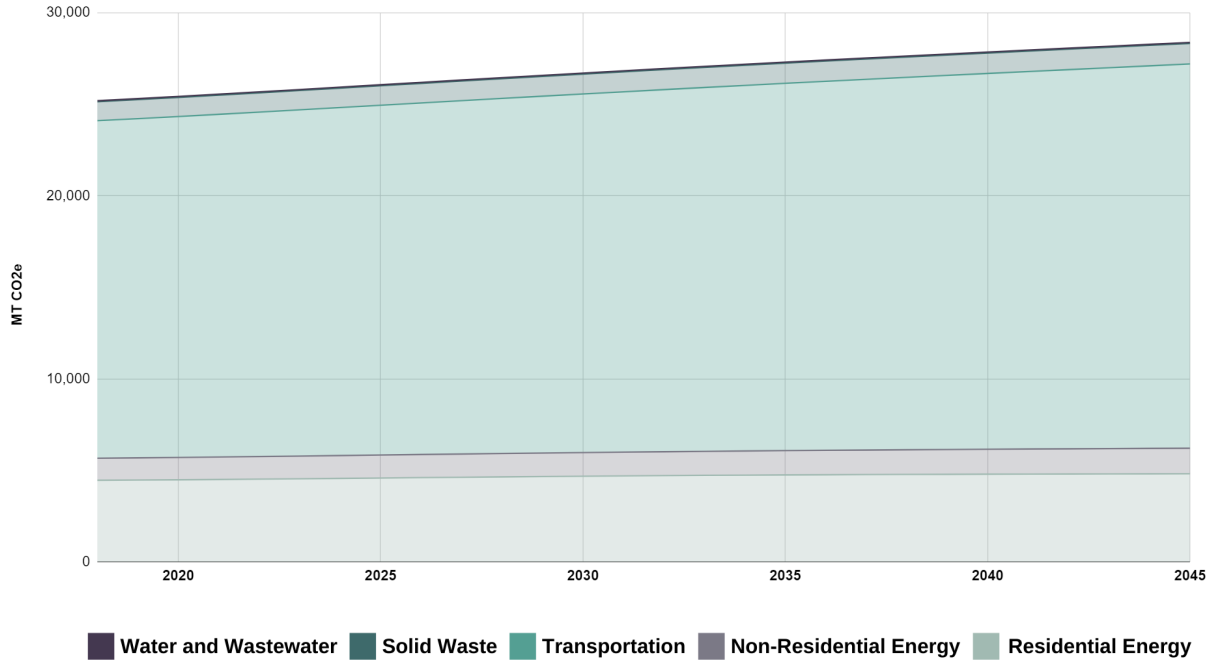
Sector	Sub-sector	Indicator Variable	Data Source
Energy	Residential Energy	Population (2018 Projections)	California Department of Finance
	Non-Residential Energy	Employment	California Employment Development Department
Transportation	On-Road Transportation	VMT Projections	Calaveras Council of Governments
	Off-Road Emissions	Population (2018 Projections)	U.S. Census, American Community Survey
Solid Waste	Solid Waste	Population (2018 Projections)	California Department of Finance
Water and Wastewater	Water and Wastewater	Population (2018 Projections)	California Department of Finance

The BAU forecast showed an overall increase in emissions. Under the BAU scenario, emissions are forecast to increase by 6.0% from 2018 to 2030, by 8.4%, from 2018 to 2035, and by 12.7% from 2018 to 2045, for a total increase in emissions from 2018 to 2045 of 12.7%. This equates to 28,378 MT CO_2e projected to be emitted in 2045. **Table 18** and **Figure 12** display the forecast trends.

Table 18. Business-as-Usual Forecasted Emissions by Sector (MT CO_2e) (2018 California Department of Finance Population Projections)

Year	Residential Energy	Non-Residential Energy	Transportation	Solid Waste	Water and Wastewater	Total Emissions and %
2018	4,459	1,207	18,437	1,037	52.78	25,193
2030	4,681	1,291	19,589	1,089	55.41	26,706 **+6.01%**
2035	4,753	1,326	20,064	1,106	56.26	27,305 **+8.39%**
2045	4,815	1,396	20,991	1,120	56.99	28,378 **+12.65%**
Net % Change	**+7.97%**	**+15.66%**	**+13.85%**	**+7.97%**	**+7.97%**	**+12.65%**

Figure 12. City-Wide Business-as-Usual Greenhouse Gas Emissions Forecast (2018 California Department of Finance Population Projections)



Adjusted Business-as-Usual Forecasts

The adjusted scenario forecast, or adjusted BAU (ABAU), projects emissions out to 2045 and accounts for adjustments and projected emissions reductions resulting from legislative

action. This includes projections that include statewide vehicle fleet standards and renewable portfolio standards. ABAU forecasts are developed using two inputs - current emissions data and either BAU projections or adjusted rates of growth or decay. The ABAU forecast illustrates the difference between and forecasted emissions reductions as a result of state policies' emissions reductions targets. This difference represents the reductions that must be made by the jurisdiction in order to reach reduction targets. These factors are influenced over time by changes in climate, population demographics, land-use and transportation patterns, the adoption of new technologies, and measures adopted to reduce greenhouse gas emissions.

As with the BAU forecasts, two forecast scenarios were calculated due to differences in population growth rates from differing years (one references an increasing population growth rate from 2018 data and the other a declining population growth rate from 2021 data). Both of these forecasts and more detailed information on the reasoning behind including two ABAU forecasts is provided in **Appendix M**. Only the forecasts using 2018 DOF data are included in this section of the report.

The below table displays the legislative adjustments that are applied to each emissions sector to calculate the ABAU forecasts.

Table 19. Adjusted Business-as-Usual Emissions Forecast Variables & Data Sources

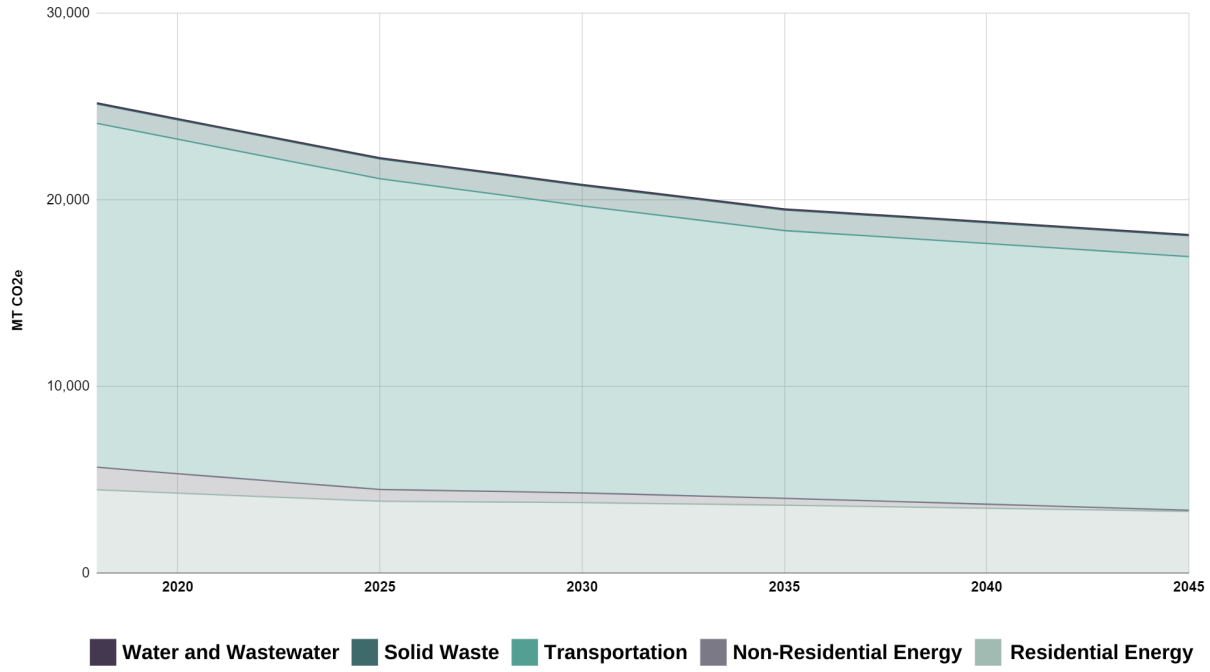
Sector	Sub-sector	Indicator Variable	Data Source
Energy	Residential Energy	Electricity - Renewable Portfolio Standard Other Fuels - Population (2018 Projections)	SB 100 California Department of Finance
	Non-Residential Energy	Electricity - Renewable Portfolio Standard Other Fuels - Employment	SB 100 California Employment Development Department
Transportation	On-Road Transportation	Emissions Rates (EMFAC 2021)	California Air Resources Board
	Off-Road Emissions	Emissions Rates (OFFROAD 2017)	California Air Resources Board
Solid Waste	Solid Waste	Population (2018 Projections)	California Department of Finance
Water and Wastewater	Water and Wastewater	Population (2018 Projections)	California Department of Finance

Under the ABAU scenario, emissions are forecast to decrease by 17.4% from 2018 to 2030, by 22.6% from 2018 to 2035, and by 28.0% from 2018 to 2045, for a total decrease in emissions from 2018 to 2045 of 28.0%. This equates to 18,133 MT CO_2e projected to be emitted in 2045. **Table 20** and **Figure 13** display the forecast trends.

Table 20. Adjusted Business-as-Usual Forecasted Emissions by Sector (MT CO_2e) (2018 California Department of Finance Population Projections)

Year	Residential Energy	Non-Residential Energy	Transportation	Solid Waste	Water and Wastewater	Total Emissions and %
2018	4,460	1,207	18,436	1,037	52.78	25,193
2030	3,769	520	15,386	1,089	55.41	20,819 **-17.36%**
2035	3,631	368	14,352	1,106	56.26	19,513 **-22.55%**
2045	3,299	64	13,594	1,120	56.99	18,133 **-28.02%**
Net % Change	**-26.04%**	**-94.73%**	**-26.26%**	**+7.97%**	**+7.97%**	**-28.02%**

Figure 13. City-Wide Adjusted Business-as-Usual Greenhouse Gas Emissions Forecast (2018 California Department of Finance Population Projections)



GHG Reduction Targets

An important part of the climate action planning process is setting greenhouse gas (GHG) emissions reduction targets. These targets help guide local governments in developing and adopting appropriate energy action policies and programs. Emissions reduction targets also provide a performance metric by which jurisdictions can evaluate progress.

Targets can be set using different methods. Many cities and counties have chosen to follow California state-wide GHG reduction targets codified in Senate Bill 32, to reduce emissions to 40% below 1990 levels by 2030, or the Executive Order S-3-05, to reduce emissions to 80% below 1990 levels by 2050. More recently, others may choose to adopt Executive Order B-55-18, with the goal of reaching carbon neutrality by 2045. ICLEI recommends adopting an 80% below 1990 levels by 2050 target for both community-wide and government operations, or to consider leading by example and setting a more aggressive goal.[36]

Another target setting method applied by local governments is to align their reduction targets with those of nearby jurisdictions. This tactic can provide jurisdictions an opportunity to leverage regional influence and achieve economies of scale when pursuing GHG reduction projects that are cross-jurisdictional.[37]

The City of Angels Camp (City) may also want to take into consideration target setting compliance in regards to the California Environmental Quality Act (CEQA). CEQA section 15183.5 provides guidance on how a GHG plan can be designed to be consistent and comply with criteria for CEQA requirements. Qualified plans that meet CEQA requirements include ones that meet or exceed SB 32, to reduce emissions to 40% below 1990 levels by 2030.

The following table lays out examples of emissions reduction targets adopted by neighboring rural jurisdictions to Calaveras County. The City can reference these targets to help guide their decision on selecting appropriate emissions reduction goals for their community.

[36] ICLEI Guide for Setting a Greenhouse Gas Reduction Target, 2010.

[37] ICLEI Guide for Setting a Greenhouse Gas Reduction Target, 2010.

Table 21. GHG Emissions Reduction Targets

Jurisdiction	Reduction Target
City of Merced	GHG reductions to 1990 levels by 2020
Placer County	GHG reductions of 15% below 2005 levels by 2020, 39% below 2005 levels by 2030, and 69% below 2005 levels by 2050
San Joaquin Valley	GHG reductions of 8% of 2005 levels in 2020, 15.7% in 2035, and 21.2% in 2042
City of South Lake Tahoe	GHG reductions of 50% below 2015 levels by 2030 and 80% below 2015 levels by 2040
Town of Truckee	GHG reductions of 80% below 2008 levels by 2040
Tuolumne County	GHG reductions of 40% below 1990 levels by 2030 and 80% below 1990 levels by 2050

Conclusion

This report provides an accounting of the City of Angels Camp's (City) community-wide and government operations greenhouse gas (GHG) emissions by source and activity. Business-as-usual (BAU) and adjusted business-as-usual (ABAU) forecasts are also provided to demonstrate the expected growth in GHG emissions, aid in assessing progress, and support GHG emissions reduction target development. These inventories set the stage for ongoing monitoring of the City's progress in achieving national, statewide, regional, and local GHG emissions reduction and other goals. It also provides analysis to inform future planning, policy development, and climate-related actions in the City. And finally, it provides practical information – including key findings, graphs, charts, and maps – that can be used by the City and other agencies to communicate needs and progress to the public, stakeholders, and policymakers.

This analysis found that in 2018, the community as a whole emitted 25,193 metric tons (MT) of CO_2e, which equates to a per capita emissions value of 6.46 MT CO_2e per year. The City's government operations emitted 511 MT of CO_2e in 2018. These are emissions sources and activities for which the City has authority to introduce and implement reduction policies. **Figures 14** and **15** below summarize the City's 2018 GHG emissions.

The City should continue to update these inventories every five years to monitor and assess progress. By conducting periodic GHG emissions inventories as data becomes more robust and methodologies improve, the City can create a clear picture of the GHG emissions in the community, and monitor and evaluate any reduction efforts taken.

Additional key findings from this analysis include:

- The largest contributor to community emissions in the inventory is community-wide transportation, which includes on-road and off-road vehicle emissions. In combination, the transportation (73.2%) and energy (22.5%) sectors produce roughly 96% of the community-wide emissions in the City, and therefore have the most potential for emissions reductions.
- The largest contributor to government operations emissions in the inventory is the vehicle fleet, which includes on-road and off-road vehicle emissions. In combination, the vehicle fleet and employee commute sectors produce more than 67% of the government operations emissions in the City, and therefore have the most potential for emissions reductions.

- The 2045 forecasts project an increase for the BAU scenario and a decrease for the ABAU scenario from the 2018 baseline. Under the BAU scenario, from 2018 to 2045 emissions are projected to increase by 12.7%. This equates to 28,378 MT CO_2e projected to be emitted in 2045. Under the ABAU scenario, emissions are projected to decrease by 28.0%, equating to 18,133 MT CO_2e projected to be emitted in 2045.
- Many cities and counties have chosen to follow California state-wide GHG reduction targets codified in Senate Bill 32, to reduce emissions to 40% below 1990 levels by 2030, or the Executive Order S-3-05, to reduce emissions to 80% below 1990 levels by 2050.

Figure 14. 2018 Community-Wide GHG Emissions

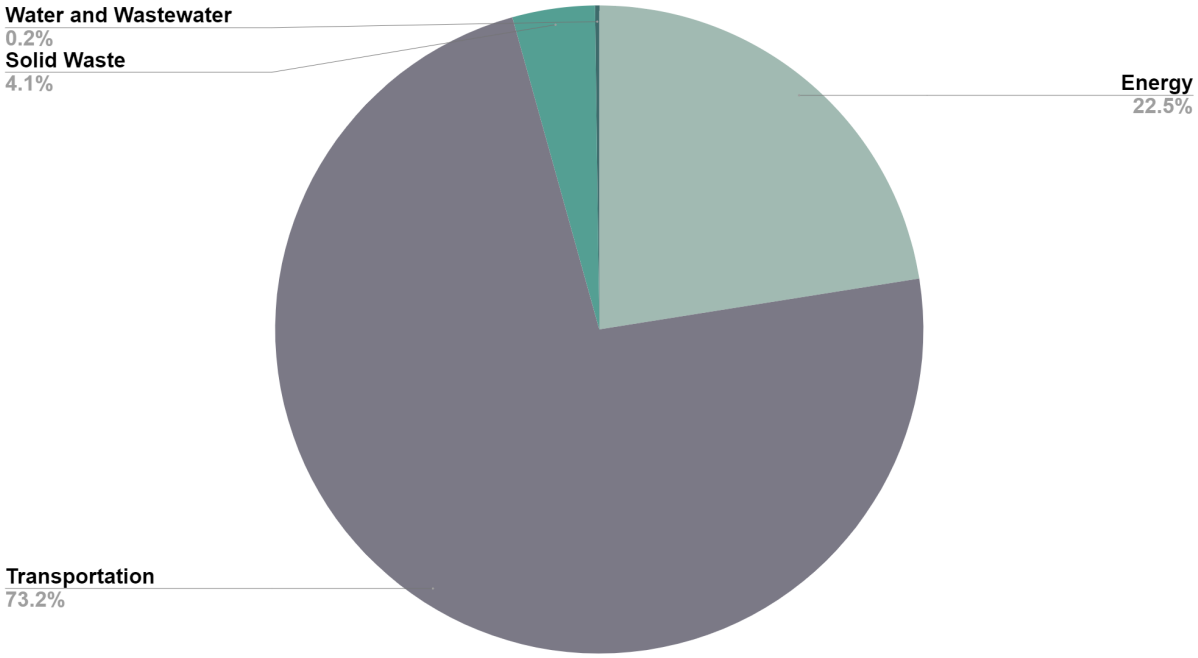
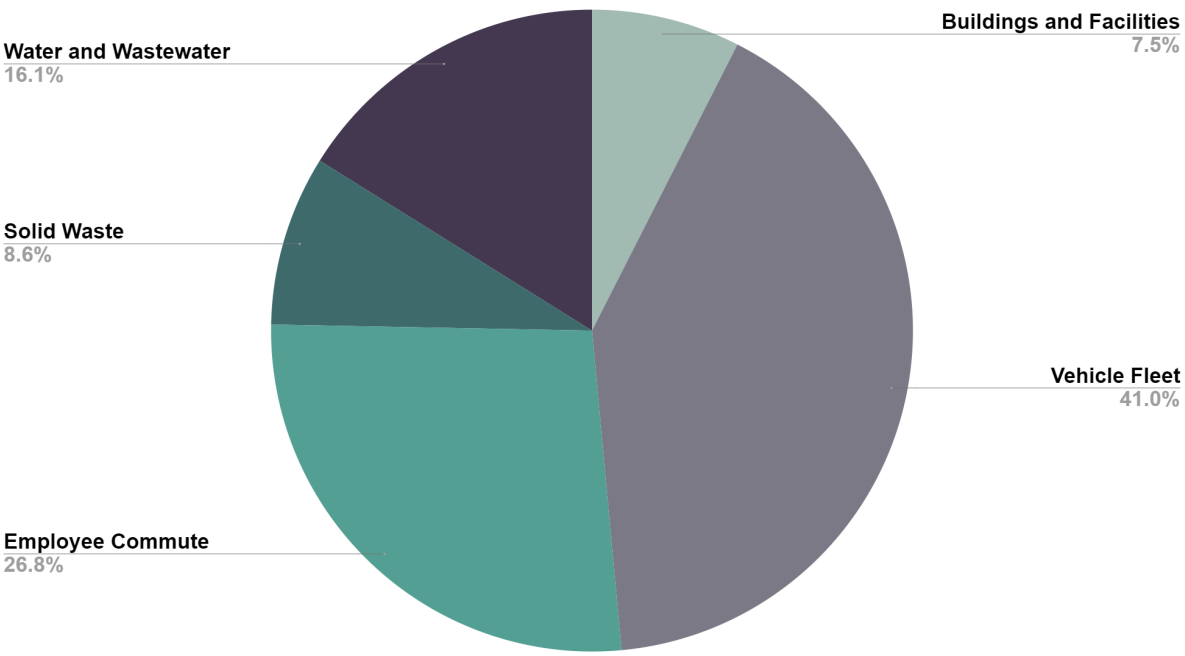


Figure 15. 2018 Government Operations GHG Emissions



Wildfire Assessment Findings

The Calaveras County and Angels Camp GHG inventories and reduction plans project also included a separate wildfire assessment report, which has been appended to this GHG inventory report. The wildfire report evaluated the challenges specific to the County, which includes the City, demonstrating how wildfires can impact the carbon cycle and GHG emissions, as well as how the wildland urban interface can both be put at risk by wildfires and increase opportunity for wildfire ignition. To understand the potential GHG emissions impact related to wildfire in the County and the City a Natural and Working Lands Carbon Inventory for the years 2010 and 2020 was developed, which demonstrates the total carbon storage in vegetation and soils. The analysis calculated the current available carbon storage (sequestration) in the County region, how carbon storage has changed over time, and highlighted regions and landcover where carbon storage value is high. Additionally, a case study was developed for the 2015 Butte Fire to analyze both the local risks for wildfire and the potential magnitude of GHG emissions and carbon storage loss from a single wildfire event. The wildfire analysis also encompassed an assessment of how forest management practices, such as thinning and prescribed burns, can significantly reduce wildfire GHG emissions and preserve long term carbon stocks that may be destroyed by high-intensity fires caused by overgrown forests.

Key findings from the wildfire assessment include:

- The 2020 Calaveras County natural and working lands total carbon stock inventories was calculated to be 74 million MT CO_2e.
- In the unlikely scenario that the majority of the deciduous and mixed forests in Calaveras County were to burn over multiple future wildfire events, the forested land has an emissions potential of over 8 million MT CO_2 from the conversion of carbon stocks to atmospheric carbon.
- Forest management can reduce the intensity and severity of wildfires in Calaveras County, reducing the GHG emissions potential per acre of forested land from 21.7 MT CO_2/acre burned down to 9.3 MT CO_2/acre burned.

The full wildfire report can be viewed in **Appendix O**, Wildfire-related Greenhouse Gas Emissions from Natural Lands Carbon Stock Loss and Climate Change Vulnerability Assessment.

GHG emissions reduction efforts require the creation of clear, actionable, and feasible implementation plans informed by local context, robust data, and proven solutions. To build upon the findings of these GHG inventories, a secondary project phase will include the development of a comprehensive GHG reduction plan for the City. This plan will develop measures to reduce emissions resulting from energy use, transportation, solid waste disposal, and treatment and transport of water and wastewater.

As the City moves forward with emissions reduction strategies and uses this data to inform planning efforts, the City should identify the benefits from strategies including: energy efficiency and conservation, renewable energy, vehicle fuel type and efficiency improvements, alternative transportation, vehicle trip reduction, land use and transit planning, waste reduction, and others. The City can achieve benefits beyond reducing emissions, including saving money, improving economic vitality, and ultimately increasing the quality of life for its residents, businesses, and visitors.

The consultant team of Sierra Business Council, Rincon Consultants, and Harris & Associates wishes to thank the project staff at the City of Angels Camp and the Calaveras Council of Governments who lent their knowledge to this project.

Appendices

Community-Wide Inventory Appendices

Appendix A. Residential Energy

Table A-1. Residential Activity Data

Activity / Source	2018	Units	Data Source
Electricity (PG&E)	13,351,915	kWh	Pacific Gas & Electric Company (PG&E)
PG&E Transmission & Distribution (T&D) Losses	640,891.92	kWh	U.S. Environmental Protection Agency eGRID (Western, CAMX, 2018)
T&D Grid Loss Factor	4.80	%	U.S. Environmental Protection Agency eGRID (Western, CAMX, 2018)
Total Electricity	**13,956,807**	**kWh**	**Data Source**
Natural Gas (PG&E)	0	Therms	Pacific Gas & Electric Company
Propane (LPG)	485,623	Gallons	U.S. Environmental Protection Agency, U.S. Energy Information Administration, and U.S. Census Bureau American Community Survey
Fuel Oil / Kerosene	0	Gallons	
Wood	31,313	MMBtu	

Methods

Utility-Derived Data

Utility-provided activity data is shown in **Table A-1**. Electricity and other stationary fuel consumption data were collected from Pacific Gas and Electric Company (PG&E), Calaveras Public Power Agency (CPPA), U.S Energy Information Administration (EIA), U.S. Census American Community Survey (ACS), and the U.S. Environmental Protection Agency eGRID (EPA eGRID) for all residences within City limits. The data was categorized as residential or non-residential and entered into ClearPath, where the GHG emissions were calculated using utility-reported and calculated grid emissions factors for electricity. The calculation methods and emissions factors are shown in **Table A-2**.

Table A-2. Residential GHG Calculation Methods & Emissions Factors

Activity / Source	Method	CO_2 lbs/MWh	CH_4 lbs/GWh	N_2O lbs/GWh	Source
2018 Electricity – PG&E	BE.2.2	206	34	4	2018 PG&E (CO_2) & 2018 U.S. EPA eGRID CAMX (CH_4 and N_2O)
2018 Electricity – CPPA	BE.2.2	40.79	0	0	2018 CPPA (Hydroelectric Project), International Hydropower Association
2018 Electricity – PG&E T&D Losses	BE.4.1	496.54	34	4	2018 U.S. EPA eGRID CAMX (CO_2, CH_4, and N_2O)
2018 Electricity – CPPA T&D Losses	BE.4.1	40.79	0	0	2018 CPPA (Hydroelectric Project), International Hydropower Association
Activity / Source	**Method**	**CO_2 lbs/MWh**	**CH_4 lbs/GWh**	**N_2O lbs/GWh**	**Source**
Natural Gas	BE.1.1	53.02 kg/MMBtu	0.005 kg/MMBtu	0.0001 kg/MMBtu	USCP Appendix C - Table B.1 and Table B.3
Propane (LPG)	BE.1.2	5.79 kg/Gallon	0.001 kg/Gallon	0.0001 kg/Gallon	USCP Appendix C - Table B.1 LPG and Table B.4 Residential LPG
Fuel Oil/Kerosene	BE.1.2	10.15 kg/Gallon	0.0015 kg/Gallon	0.0001 kg/Gallon	USCP Appendix C - Table B.1 Kerosene and Table B.4 Residential Kerosene
Wood	BE.1.2	93.80 kg/MMBtu	0.316 kg/MMBtu	0.0042 kg/MMBtu	USCP Appendix C - Table B.2 Wood and Wood Residuals and Table B.3 Biomass Fuels Solid Residential

Table A-3. 2018 Residential Non-Utility Home Heating Fuel Use Calculations (EIA/ACS)

Fuel Type	Propane	Fuel Oil / Kerosene	Wood	Data Source
California Fuel Use in 2018	263,298,000	55,44,000	21,900,000	Energy Information Administration (EIA) State Energy Data System (SEDS) 2018 California Residential Energy Use Estimates
Units	Gallons	Gallons	MMBtu	
# of 2018 California Households	419,110	31,744	205,621	U.S. Census Bureau, 2018 American Community Survey

Per Household Fuel Use	628.23	174.65	106.51	(ACS) 1-year estimates. California Households using Non-Utility Fuels for Home Heating
Units	Gallons	Gallons	MMBtu	
# of 2018 City of Angels Camp Households using Non-Utility Heating Fuels	773	0	294	U.S. Census Bureau, 2018 American Community Survey (ACS) 1-year estimates.

Non-Utility Derived Data

Non-utility activity data is shown in Table A-1. Propane and wood used in the City for home heating were estimated using EIA and ACS data. The EIA State Energy Data System California residential energy use estimates and the ACS 2018 1-year estimates of California households using non-utility fuels for home heating were used to calculate California per household fuel use. This per household fuel use factor was applied to the number of households using non-utility fuels for home heating in the City.

Table A-1 shows the activity data for home heating use. **Table A-3** above shows the EIA/ACS propane and wood for 2018. Activity data was then entered into ClearPath using the calculation methods and emissions factors shown in **Table A-2**.

Electricity Transmission and Distribution (T&D) Losses Data

Electricity transmission and distribution (T&D) losses activity data is shown in **Table A-1**. T&D losses were calculated for residential electricity following EPA guidance, using EPA eGRID region grid gross loss (ggl) factors shown in **Table A-2**. EPA recommends multiplying electricity consumption by ggl/(1-ggl). The calculated T&D losses were entered into ClearPath, where the GHG emissions were calculated using the EPA eGRID Western CAMX sub-region grid-average emissions factors.

Appendix B. Non-Residential (Commercial) Energy Use Sector Notes

Table B-1. Non-Residential Activity Data

Activity / Source	2018	Units	Data Source
Electricity (PG&E)	10,691,523	kWh	Pacific Gas & Electric Company (PG&E)
Electricity (CPPA)	1,399,724	kWh	Calaveras Public Power Agency (Hydroelectric Project)

PG&E T&D Losses	513,193	kWh	U.S. Environmental Protection Agency eGRID (Western, CAMX, 2018)
CPPA T&D Losses	67,187	kWh	U.S. Environmental Protection Agency eGRID (Western, CAMX, 2018)
T&D Grid Loss Factor	4.80	%	U.S. Environmental Protection Agency eGRID (Western, CAMX, 2018)
Total Electricity		**kWh**	**Data Source**
Natural Gas (PG&E)	0	Therms	Pacific Gas & Electric Company
Propane (LPG)	9,736	Gallons	U.S. Environmental Protection Agency, U.S. Energy Information Administration, and U.S. Census Bureau American Community Survey

Methods

Utility-Derived Data

Utility-provided activity data is shown in **Table B-1**. Electricity, natural gas and other stationary fuel consumption data were collected from Pacific Gas and Electric Company (PG&E), Calaveras Public Power Agency (CPPA), and the U.S. Environmental Protection Agency eGRID (EPA eGRID) for all commercial facilities within City limits. The activity data was entered into ClearPath, where the GHG emissions were calculated using utility and EPA reported grid emissions factors. The calculation methods and emissions factors are shown in **Table B-2**.

Table B-2. Non-Residential GHG Calculation Methods & Emissions Factors

Activity / Source	Method	CO_2 lbs/MWh	CH_4 lbs/GWh	N_2O lbs/GWh	Source
2018 Electricity – PG&E	BE.2.2	206	34	4	2018 PG&E (CO_2) & 2018 U.S. EPA eGRID CAMX (CH_4 and N_2O)
2018 Electricity – CPPA	BE.2.2	40.79	0	0	2018 CPPA (Hydroelectric Project), International Hydropower Association
2018 Electricity – PG&E T&D Losses	BE.4.1	496.54	34	4	2018 U.S. EPA eGRID CAMX (CO_2, CH_4, and N_2O)
2018 Electricity – CPPA T&D Losses	BE.4.1	40.79	0	0	2018 CPPA (Hydroelectric Project), International Hydropower Association

Activity / Source	Method	CO_2 lbs/MWh	CH_4 lbs/GWh	N_2O lbs/GWh	Source
Natural Gas	BE.1.1	53.02 kg/MMBtu	0.005 kg/MMBtu	0.0001 kg/MMBtu	USCP Appendix C - Table B.1 and Table B.3
Propane (LPG)	BE.1.2	5.79 kg/Gallon	0.001 kg/Gallon	0.0001 kg/Gallon	USCP Appendix C - Table B.1 LPG and Table B.4 Residential LPG

Table B-3. 2018 Non-Residential Non-Utility Heating Fuel Use Calculations (EIA)

Activity / Source	Propane Data	Data Source
U.S. Propane Use	1,923,497,268	Energy Information Administration (EIA) 2018 U.S. Commercial Energy Use Estimates (SEDS)
Units	Gallons	
2018 U.S. Commercial Square Footage	97,000,000,000	Energy Information Administration (EIA) 2018 Commercial Square Footage Estimates (CBECS)
Per Square Foot Use	0.0198	
Units	Gallons	
2018 City of Angels Camp Commercial Square Footage	490,969	City of Angels Camp

Non-Utility Derived Data

Propane is widely used throughout the City for heating purposes. Propane data was estimated using commercial propane usage data and commercial square footage data from the EIA. This data was then scaled using commercial square footage within the City and is shown in **Table B-3**.

Electricity Transmission and Distribution (T&D) Losses Data

Electricity transmission and distribution (T&D) losses activity data is shown in **Table B-1**. T&D losses were calculated for commercial electricity following EPA guidance, using EPA eGRID region grid gross loss (ggl) factors shown in **Table B-2**. EPA recommends multiplying electricity consumption by ggl/(1-ggl). The calculated T&D losses were entered into ClearPath, where the GHG emissions were calculated using the EPA eGRID Western CAMX sub-region grid-average emissions factors.

Appendix C. Community Transportation Sector Notes

Table C-1. Community Transportation Activity Data

On-Road Activity / Source (Scaled)	Vehicle Miles Traveled (VMT)	Data Source
Gasoline Vehicles	29,915,729	Calaveras Council of Governments (CCOG) U.S. Census Bureau Population Data (for Population Scaling) California Air Resources Board (CARB) EMFAC 2017
Diesel Vehicles	4,825,165	
Electric Vehicles	41,507	
Natural Gas Vehicles	7,092	
Plug-In Hybrid Vehicles	148,365	
Total City of Angels Camp Annual VMT	34,937,859	
EMFAC City of Angels Camp VMT	109,494	

Off-Road Vehicles (Scaled) Direct ClearPath Input	Unit	Data Source
1,182	CO_2 (Metric Tons)	CARB OFFROAD 2017, U.S EPA Emissions Factors, and IPCC 5th Assessment Global Warming Potential
0.13	CH_4 (Metric Tons)	
0.053	N_2O (Metric Tons)	

Table C-2. Community Transportation GHG Calculation Methods & Emissions Factors

Activity / Source	Method	CO_2	CH_4	N_2O	Emissions Factor Source
Gasoline Vehicles (g/mile)	TR.1.B	420.20	0.0164	0.0184	CARB EMFAC 2017
Diesel Vehicles (g/mile)	TR.1.B	889.75	0.0130	0.14	
Electric Vehicles (g/mile)	TR.1.B	0	0	0	
Natural Gas Vehicles (g/mile)	TR.1.B	990.45	0.5803	0.2019	
Plug-In Hybrid Vehicles (g/mile)	TR.1.B	165.04	0.0006	0.00075	

Methods

On-Road Vehicles

On-road transportation emissions for the City were calculated using vehicle miles traveled (VMT) estimated by Calaveras Council of Governments' Travel Demand Model and EMFAC2017 data for the County, which was scaled to the City using population data. The CCOG analysis included all miles traveled within the County in 2018, as well as trips that started in boundary and ended out of boundary and trips that started out of boundary and ended in boundary. On-road transportation activity data is shown in **Table C-1**. Activity data was entered into ClearPath, where City-level fuel and vehicle-specific emissions factors, shown in **Table C-2**, were applied to calculate the GHG emissions associated with community on-road transportation. The methodology for collecting and conditioning this data is as follows:

Fuel / Vehicle Type Breakdown and Emissions Calculations

VMT and emissions percentages by fuel type are estimated for the County using the CARB's EMFAC 2017 model, run for 2018 and scaled to the City using population. Data from this model was used to derive county-specific per-mile emissions factors and vehicle fuel efficiencies for gas, diesel, natural gas, hybrid, and electric fuels for passenger cars, light-duty trucks and heavy-duty trucks. These were applied to the City's VMT estimates to derive emissions by fuel type.

EMFAC 2017 reports CO_2, CH_4, and N_2O emissions factors for different vehicle type and fuel combinations for every county in California, informed by California Department of Motor Vehicles registrations, the Smog Check program and other data sources. Average CO_2, CH_4, and N_2O emissions factors were calculated for passenger vehicles, light trucks, and heavy trucks.

Off-Road Emissions

Off-road emissions for the City were obtained from the California Air Resources Board's (CARB) OFFROAD 2017 model. Included were emissions attributed to off-road, fuel-consuming equipment categories including Industrial, Light Commercial, and Construction vehicles. These are equipment types that are thought to have significant operation within the County and were scaled to the City using population. Emissions data, shown in **Table C-1**, was entered into ClearPath.

Appendix D. Community Solid Waste Sector Notes

Table D-1. Community Solid Waste Activity Data

Landfill	2018 Waste Generation (Tons)	Landfill Gas Capture?	2018 Distance to Facility (Miles)	Data Source
Forward Landfill	1,056	Yes	55.10	Calaveras County Integrated Waste Management, CalRecycle, and Google Maps
Rock Creek Landfill	2,463	Yes	32.10	

Table D-2. Community Solid Waste GHG Calculation Methods & Emissions Factors

Activity / Source	Method	Type	Emissions Factor	Emissions Factor Source
Transportation of Solid Waste	SW.6	Solid Waste Transportation	0.00014 Metric Tons CO_2e / Wet Short Ton / Mile	USCP Appendix E

Activity / Source	Method	Type	%	Metric Tons CH_4 / Wet Short Ton	Emissions Factor Source
Community-Generated Solid Waste Characterization	12.2.2	Newspaper	1.20	0.043	CalRecycle Calaveras County Waste Characterization Study for 2018 USCP Appendix E
		Office Paper	1.80	0.203	
		Corrugated Cardboard	5.20	0.120	
		Magazines/Third Class Mail	8.40	0.049	
		Food Scraps	18.20	0.078	
		Grass	1.15	0.038	
		Leaves	2.70	0.013	
		Branches	3.05	0.062	
		Dimensional Lumber	23.70	0.062	
		All Other (Non-Organic)	34.60	0	

Methods

Community-Generated Solid Waste

Solid waste generated in the City of Angels Camp and disposed of in landfills emits GHGs. Emissions reported for 2018 occur at the landfills over the entire period that waste decomposes, estimated to be 100 years. The tonnage of landfilled waste generated by City residents, businesses, and visitors was collected from the Calaveras County Integrated Waste Management and scaled to the City using population.

Waste characterization percentages from CalRecycle, shown in **Table D-2**, were applied to the tonnage of community-generated waste that was landfilled. The waste tonnage and characterization data were entered into ClearPath, where GHG emissions were calculated based on standard factors for organic content and methane-generating potential for each waste type. Emissions were adjusted based on the presence of landfill gas capture systems.

Solid Waste Transportation

Solid waste transportation emissions include emissions from the trucks used to transport the waste to the regional landfills. The tonnage of waste collected and the distance to the landfills were entered into ClearPath to calculate GHG emissions using default per-ton-mile CO_2e emissions (the GHGs emitted to transport one ton of waste one mile).

It is important to acknowledge the benefits of recycling and composting that lower waste volumes and emissions. When waste volumes are reduced, transportation emissions are likewise reduced, and when incoming organic waste is diverted, landfill emissions are also reduced. Finally, upstream emissions from materials manufacturing are reduced when recycled materials displace virgin materials.

Appendix E. Community Potable Water Use Sector Notes

Table E-1. Community Potable Water Electricity Use Activity Data - Information Item

Year	Service	Electricity Use (kWh)	Potable Water Provided (Gallons)	Energy Intensity (kWh / Million Gallons)	Population Served	Data Source
2020	CPPA	197,600	321,800,000	614.05	3,875	USCP, City of Angels Camp

Table E-2. Community Potable Water GHG Calculation Methods & Emissions Factors

Activity / Source	Method	CO_2 lbs/MWh	CH_4 lbs/GWh	N_2O lbs/GWh	Emissions Factor Source
2018 Electricity - CPPA	BE.2.2	40.79	0	0	2018 CPPA (Hydroelectric Project), International Hydropower Association

Methods

Community Potable Water Electricity Use

The City's potable water use activity data is shown in **Table E-1**. Data was collected from the City of Angels Camp. Even though the wastewater treatment plant is located outside of City limits, it is included in this analysis because it is owned and operated by the City. The electricity use was marked as an "information only" item to prevent double counting. The electricity use was entered into ClearPath, where the GHG emissions were calculated using relevant emissions factors for electricity shown in **Table E-2**. T&D losses were calculated by applying the EPA eGRID grid loss factors to the electricity used and then entering the loss into ClearPath, where the GHG emissions were calculated using the relevant emissions factors. All of this data was marked as "information only" to prevent double counting.

Appendix F. Community Wastewater Treatment Sector Notes

Table F-1. Community Wastewater Treatment Electricity Use Activity Data - Information Item

Year	Service	Electricity Use (kWh)	Water Treated (Gallons)	Energy Intensity (kWh / Million Gallons)	Population Served	Data Source
2020	CPPA	1,400,000	168,000,000	8,333	3,875	USCP, City of Angels Camp

Table F-2. Community Wastewater Treatment GHG Calculation Methods & Emissions Factors

Activity / Source	Method	CO_2 lbs/MWh	CH_4 lbs/GWh	N_2O lbs/GWh	Emissions Factor Source
2018 Electricity – CPPA	BE.2.2	40.79	0	0	2018 CPPA (Hydroelectric Project), International Hydropower Association
Activity / Source	**Method**	**CO_2**	**CH_4**	**N_2O**	**Emissions Factor Source**
Central Plants - with Nitrification / Denitrification (Population-Based)	WW.7	N/A	N/A	7 g N_2O / person / year	USCP Appendix F
Central Plants - without Nitrification / Denitrification (Population-Based)	WW.8	N/A	N/A	3.2 g N_2O / person / year	USCP Appendix F
Effluent (Population-Based)	WW.12	N/A	N/A	0.005 kg N_2O-N/kg sewage-N discharged	USCP Appendix F
Lagoons - No Primary Treatment (Population-Based)	WW.6	N/A	0.6 kg CH_4 / kg BOD_5	N/A	USCP Appendix F
Septic Systems (Population-Based)	WW.11	N/A	0.6 kg CH_4 / kg BOD_5	N/A	USCP Appendix F

Methods

Community Wastewater Treatment Electricity Use

Community-generated wastewater treatment activity data for 2018 is shown in **Table F-1**. Data on electricity use, wastewater treated, and population served by the plants and systems were collected from City staff and Calaveras County Public Power Agency (CPPA). Because the wastewater treatment infrastructure lies within the City, the electricity use is marked as "information only" to prevent double counting. The electricity use was entered into ClearPath, where the GHG emissions were calculated using utility-reported grid emissions factors for electricity shown in **Table F-2.** T&D losses were calculated by applying the EPA eGRID regional grid loss factors to the total electricity use and then entered into

ClearPath, where the GHG emissions were calculated using the EPA eGRID Western CAMX sub-region grid average emissions factors. All of this data was marked as "information only" to prevent double counting.

Table F-3. Community Wastewater Treatment Operations Activity Data

2018 Facility	Wastewater Treated (MG)	Population Served	Commercial / Industrial Factor	Nitrification / Denitrification?	Aerobic?	Data Source
City of Angels Camp	168	3,875	1	Yes	Yes	City of Angels Camp

Community Wastewater Treatment Facility Process and Fugitive Emissions

There are two emissions associated with wastewater treatment processes: methane (CH_4) and nitrous oxide (N_2O), which together account for a small part of total community-based GHG emissions. Calculating the makeup and amount of emissions depends on the processes involved and the management practices employed.

City wastewater treatment is operated by one central treatment facility. Operational parameters of the wastewater treatment systems are delineated in **Table F-3**. The plant is aerobic with nitrification / denitrification nutrient-removal systems. The wastewater treatment activity data were entered into ClearPath, where GHG emissions were calculated using the standard methods and emissions factors from the United States Community Protocol (USCP) and Local Government Operations Protocol (LGOP) that are shown in **Table F-2**.

Uncertainties

According to the EPA national inventory of greenhouse gas emissions, considerable uncertainty exists within any of the EPA/IPCC-based methodologies used to estimate wastewater process and fugitive emissions. EPA states that population-based methane emissions could be underestimated by 37% or overestimated by 47% while nitrous oxide emissions could be underestimated by 76% or overestimated by 93%. Emissions estimates based on direct source measurements can possibly have higher accuracy and less uncertainty. This extreme degree of uncertainty exists because these methodologies were originally developed for international countrywide inventories that were mainly population-based. By necessity, these methodologies were generalized "top-down"

approaches that sought to provide emissions estimates for countries where detailed information would be impractical to obtain. Although these methodologies had the advantage of being relatively simple to calculate, the trade-off was a compromised level of accuracy. Nevertheless, the methodologies in this Appendix reflect the evolution of knowledge since the development of the LGOP and rely upon direct measurement where possible.

Methods are evolving but especially where the emissions are based on population and default inputs, communities should exercise caution in drawing conclusions or establishing policies based on these calculations.

Government Operations Inventory Appendices

Appendix G. Buildings and Facilities Sector Notes

Table G-1. Buildings and Facilities Electricity and Natural Gas Activity Data

Building / Facility	Activity / Source	kWh	Unit	Source
City of Angels Camp Facilities	Electricity (PG&E)	66,725	kWh	Pacific Gas & Electric Company (PG&E)
City of Angels Camp Facilities	Electricity (CPPA)	1,399,724	kWh	Calaveras Public Power Agency (CPPA)
City of Angels Camp Facilities	Propane	1,073	gallons	EIA

Table G-2. Buildings and Facilities GHG Calculation Methods & Emissions Factors

Activity / Source	Method	CO_2 lbs/MWh	CH_4 lbs/GWh	N_2O lbs/GWh	Source
2018 Electricity – PG&E	6.2	206	34	4	2018 PG&E (CO_2) & 2018 U.S. EPA eGRID CAMX (CH_4 and N_2O)
2018 Electricity – CPPA	6.2	40.79	0	0	2018 CPPA (Hydroelectric Project), International Hydropower Association

Activity / Source	Method	CO_2 lbs/MWh	CH_4 lbs/GWh	N_2O lbs/GWh	Source
Natural Gas	BE.1.1	53.02 kg/MMBtu	0.005 kg/MMBtu	0.0001 kg/MMBtu	USCP Appendix C - Table B.1 and Table B.3
Propane (LPG)	BE.1.2	5.79 kg/Gallon	0.001 kg/Gallon	0.0001 kg/Gallon	USCP Appendix C - Table B.1 LPG and Table B.4 Residential LPG

Methods

Buildings and facilities electricity and propane data, shown in **Table G-1**, was collected from Pacific Gas & Electric Company, Calaveras Public Power Agency, and the U.S. Energy Information Administration. The propane data was scaled to City facility square footage using estimates from national commercial energy use and national commercial square footage data. The activity data was entered into ClearPath, where GHG emissions were calculated using the calculation methods and emissions factors shown in **Table G-2**.

Appendix H. Vehicle Fleet Sector Notes

Table H-1. Vehicle Fleet Activity Data

Activity / Source On-Road Unless Noted Off-Road	Total Fuel Use (Gallons)	Annual Miles Traveled (VMT)	VMT % Passenger Vehicles	VMT % Light Trucks	VMT % Heavy Trucks	Data Source
Gasoline Vehicles	10,905	185,102	48.62	48.85	2.53	City of Angels Camp (Public Works, Police, and Fire Departments)
Diesel Vehicles	5,849	49,144	0	13.86	86.14	
Off Road Gasoline	39.00	N/A	N/A	N/A	N/A	
Off Road Diesel	5,186	N/A	N/A	N/A	N/A	

Table H-2. Vehicle Fleet GHG Calculation Methods & Emissions Factors

Activity / Source	Method	CO_2 kg / gallon	CH_4 grams / mile	N_2O grams / mile	Emissions Factor Source
On-Road Passenger Gasoline	7.1.1.1 and 7.1.3.3	8.78	0.0186	0.0093	LGOP Appendix G - Table G.11 (CO_2) and U.S. National Transportation Defaults (CH_4 and N_2O)
On-Road Light Trucks Gasoline	7.1.1.1 and 7.1.3.3	8.78	0.0201	0.0167	

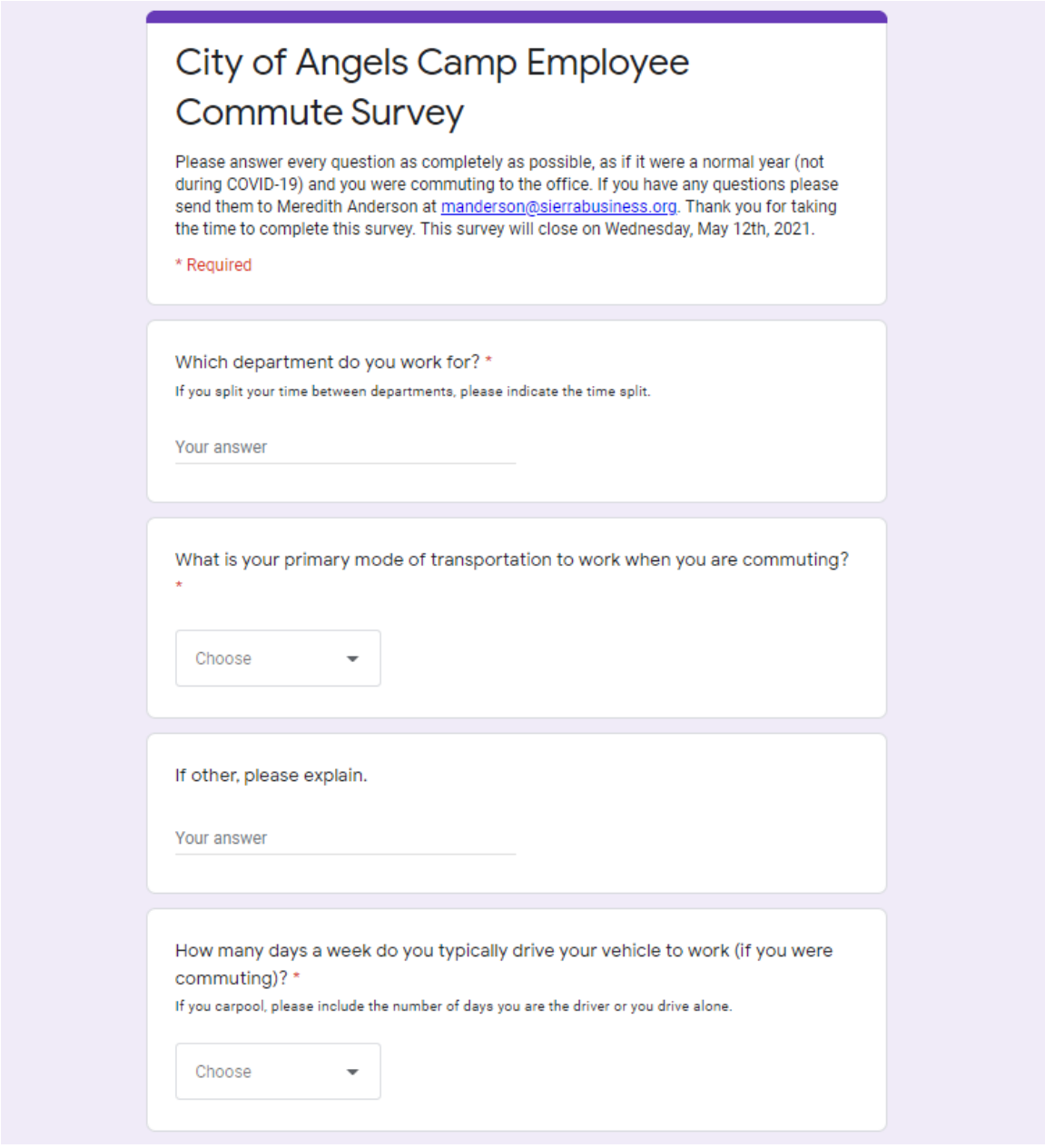
On-Road Heavy Trucks Gasoline	7.1.1.1 and 7.1.3.3	8.78	0.086	0.0664	
On-Road Passenger Diesel	7.1.1.1 and 7.1.3.3	10.21	0.0005	0.001	
On-Road Light Trucks Diesel	7.1.1.1 and 7.1.3.3	10.21	0.001	0.0015	
On-Road Heavy Trucks Diesel	7.1.1.1 and 7.1.3.3	10.21	0.0051	0.0048	
Off-Road Large Utility Diesel	7.1.1.1 and 7.2	10.21	0.58 grams / gallon		LGOP Appendix G - Table G.11 (CO_2) & G.14 (CH_4 and N_2O)

Methods

The 2018 vehicle fleet information, including vehicles miles traveled (VMT) and fuel use (by type and department) was collected from City staff. Vehicle fleet-specific 2018 miles per gallon (MPG) data was used to calculate annual mileage and fuel use for each vehicle. Vehicle breakdown and fuel use were entered into ClearPath.

Appendix I. Employee Commute Sector Notes

Figure I-1. Employee Commute Survey



City of Angels Camp Employee Commute Survey

Please answer every question as completely as possible, as if it were a normal year (not during COVID-19) and you were commuting to the office. If you have any questions please send them to Meredith Anderson at manderson@sierrabusiness.org. Thank you for taking the time to complete this survey. This survey will close on Wednesday, May 12th, 2021.

* Required

Which department do you work for? *

If you split your time between departments, please indicate the time split.

Your answer

What is your primary mode of transportation to work when you are commuting? *

Choose

If other, please explain.

Your answer

How many days a week do you typically drive your vehicle to work (if you were commuting)? *

If you carpool, please include the number of days you are the driver or you drive alone.

Choose

How many days a week do you typically work? *

Choose

What is the average number of vacation days, sick days, holidays and office closures (combined) you observe in a typical YEAR? *

Please enter the number not including weekends.

Your answer

When you drive your own vehicle to work, What is the one-way distance on your commute? *

Please enter a whole number. Enter mileage for one direction only.

Your answer

If you drive to work, what type of vehicle do you drive?

Choose

What is the make and model of your vehicle?

Your answer

What is the model year of your vehicle?

Your answer

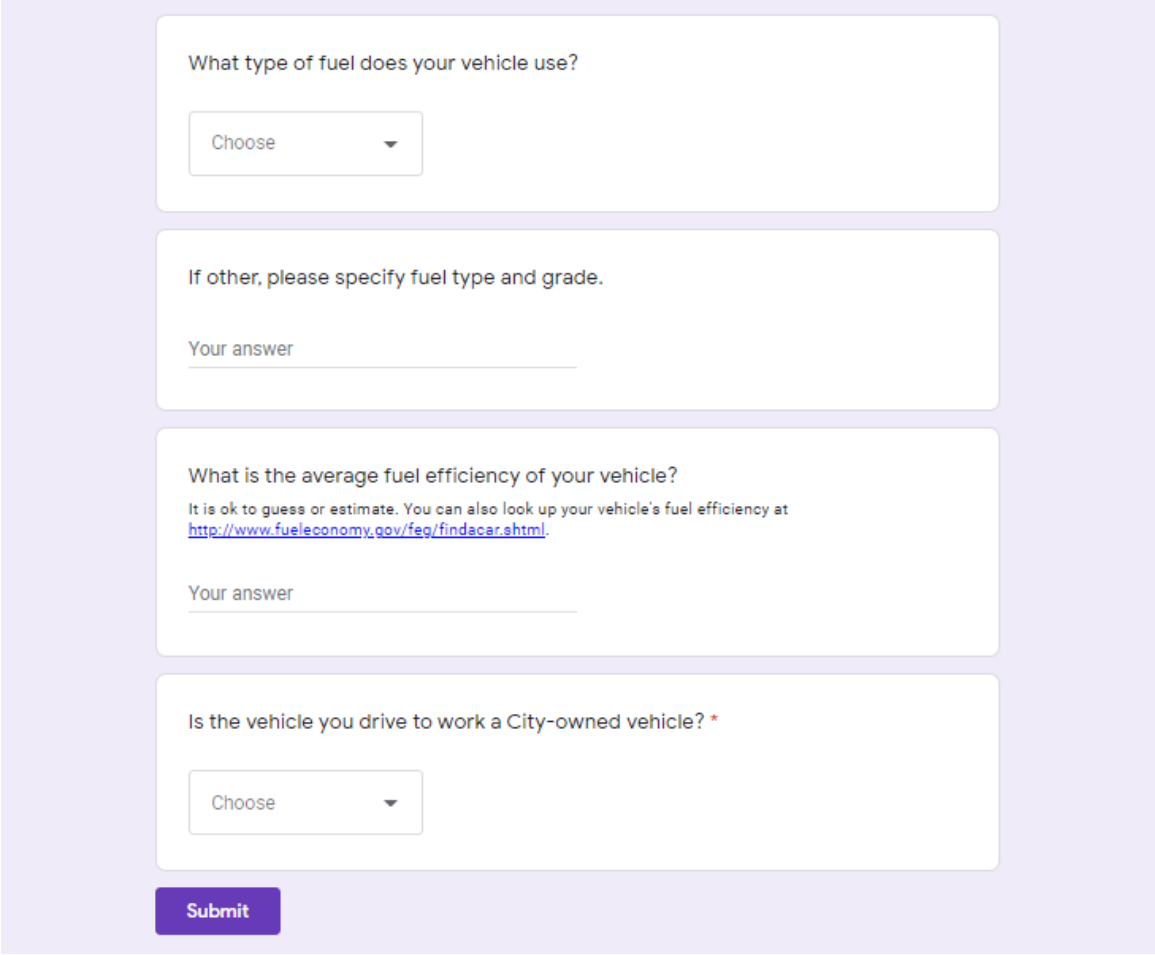


Table I-1. Employee Commute Activity Data

Fuel	Vehicle Type	2018 Vehicle Miles Traveled	%	Data Source
Number of Employees	N/A	40	N/A	City of Angels Camp
Gasoline	Passenger Cars	254,250	49.73	City of Angels Camp, 2021 Employee Commute Surveys
	Light Trucks		50.27	
	Heavy Trucks		0	
Diesel	Passenger Cars	49,271	10.23	
	Light Trucks		89.77	
	Heavy Trucks		0	
Total	**All Types**	**303,521**	**N/A**	

Table I-2: Employee Commute GHG Calculation Methods & Emissions Factors

Activity / Source	Method	CO_2 kg / gallon	CH_4 grams / mile	N_2O grams / mile	Emissions Factor Source
Passenger Vehicles - Gasoline	7.1.1.1 and 7.1.3.3	8.78	0.0186	0.0093	LGOP Appendix G - Table G.11 (CO_2) and U.S. National Transportation Defaults (CH_4 and N_2O)
Light Trucks - Gasoline		8.78	0.0201	0.0167	
Heavy Trucks - Gasoline		8.78	0.086	0.0664	
Passenger Vehicles - Diesel		10.21	0.0005	0.001	
Light Trucks - Diesel		10.21	0.001	0.0015	
Heavy Trucks - Diesel		10.21	0.0051	0.0048	

Methods

Employee commute emissions were calculated using employee surveys conducted in 2021 to use as a proxy for the year 2018. There were 40 respondents out of the 40 total employees. The survey collected information regarding travel distances, modes, and frequency. Business travel is not delineated in the surveys, but emissions from business travel in City vehicles is captured in the Vehicle Fleet sector. The VMT activity data, shown in **Table I-1**, was then entered into ClearPath, where GHG emissions were calculated using the methods and emissions factors shown in **Table I-2**. The fuel efficiencies were used to convert VMT to fuel use for the emissions calculations.

Appendix J. Solid Waste Sector Notes

Table J-1. Government Operations Solid Waste Activity Data

Landfill Name	2018 Wet Tons	Density (lbs / Cubic Yard)	Data Source
Forward Landfill	22	194.5	City of Angels Camp
Rock Creek Landfill	51.34	194.5	
Total Government Operations Waste	**73.34**		

Table J-2. Solid Waste Calculation Methods & Emissions Factors

Activity / Source	Method	Type	Emissions Factor	Emissions Factor Source
Transportation of Solid Waste	SW.6	Solid Waste Transportation	0.00014 Metric Tons CO_2e / wet short ton / mile	USCP Appendix E

Activity / Source	Method	Type	%	Metric Tons CH_4 / Wet Short Ton	Percentages and Emissions Factor Source
Government Operations Solid Waste Characterization	12.2.2	Newspaper	2.59	0.043	CalRecycle Calaveras County Public Administration 2018 Waste Characterization Study
		Office Paper	27.80	0.203	
		Corrugated Cardboard	4.70	0.120	
		Magazines / Third Class Mail	5.47	0.049	
		Food Scraps	14.60	0.078	
		Grass	1.35	0.038	
		Leaves	1.35	0.013	LGOP Chapter 12
		Branches	0.04	0.062	
		Dimensional Lumber	14.12	0.062	USCP Appendix E
		All Other (Non-Organic)	27.98	0	

Methods

The City facility-generated solid waste data was collected from City staff in the form of cubic yards. The tonnage of solid waste, shown in **Table J-1**, was calculated using a density of 89 lbs per cubic yard, provided by the California Integrated Waste Management Board (CalRecycle) specifically tailored to public administration waste, and 300 lbs per cubic yard for community-generated waste. The average of these two values was used (194.5 lbs per cubic yard), as some of the waste was generated from community facilities where the City pays for the solid waste disposal. The solid waste was transferred to managed landfills for disposal, which have landfill-gas capture systems in place. The emissions associated with this waste occur at the landfill sites over the entire period of decomposition (estimated to be about 100 years).

The solid waste tonnage activity data was entered into ClearPath, where GHG emissions were calculated using CalRecycle's public administration and City-wide percentages, coupled with standard emissions factors adopted by the California Air Resources Board, the California Climate Action Registry, ICLEI - Local Governments for Sustainability and The Climate Registry and shown in **Table J-2**.

Appendix K. City Operations Potable Water Electricity Use

Table K-1. City Operations Potable Water Electricity Use Activity Data

Year	Service	Electricity Use (kWh)	Potable Water Provided (Gallons)	Energy Intensity (kWh / Million Gallons)	Population Served	Data Source
2020	CPPA	197,600	321,800,000	614.05	3,875	USCP, City of Angels Camp

Table K-2. City Operations Potable Water GHG Calculation Methods & Emissions Factors

Activity / Source	Method	CO_2 lbs/MWh	CH_4 lbs/GWh	N_2O lbs/GWh	Emissions Factor Source
2018 Electricity - CPPA	BE.2.2	40.79	0	0	2018 CPPA (Hydroelectric Project), International Hydropower Association

Methods

City Operations Potable Water Electricity Use

The City's potable water use activity data is shown in **Table K-1**. Data was collected from the City of Angels Camp. Even though the treatment plant is located outside of City limits, it is included in this analysis because it is owned and operated by the City. The electricity use was entered into ClearPath, where the GHG emissions were calculated using relevant emissions factors for electricity shown in **Table K-2**.

Appendix L. City Operations Wastewater Treatment Sector Notes

Table L-1. City Operations Wastewater (WW) Electricity Use Activity Data

Year	Service	Electricity Use (kWh)	Water Treated (Gallons)	Energy Intensity (kWh / Million Gallons)	Population Served	Data Source
2020	CPPA	1,400,000	168,000,000	8,333	3,875	USCP, City of Angels Camp

Table L-2. Energy Use GHG Calculation Methods & Emissions Factors

Activity / Source	Method	CO_2 lbs/MWh	CH_4 lbs/GWh	N_2O lbs/GWh	Emissions Factor Source
2018 Electricity – CPPA	BE.2.2	40.79	0	0	2018 CPPA (Hydroelectric Project), International Hydropower Association

Activity / Source	Method	CO_2	CH_4	N_2O	Emissions Factor Source
Central Plants - with Nitrification / Denitrification (Population-Based)	WW.7	N/A	N/A	7 g N_2O / person / year	USCP Appendix F
Central Plants - without Nitrification / Denitrification (Population-Based)	WW.8	N/A	N/A	3.2 g N_2O / person / year	USCP Appendix F
Effluent (Population-Based)	WW.12	N/A	N/A	0.005 kg N_2O-N/kg sewage-N discharged	USCP Appendix F
Lagoons - No Primary Treatment (Population-Based)	WW.6	N/A	0.6 kg CH_4 / kg BOD_5	N/A	USCP Appendix F
Septic Systems (Population-Based)	WW.11	N/A	0.6 kg CH_4 / kg BOD_5	N/A	USCP Appendix F

Table L-3. City Operations Wastewater Treatment Facility Data

2018 Facility	Wastewater Treated (MG)	Population Served	Commercial / Industrial Factor	Nitrification / Denitrification?	Aerobic?	Data Source
City of Angels Camp	168	3,875	1	Yes	Yes	City of Angels Camp

Methods

Wastewater Treatment Energy Use

Wastewater treatment activity data for 2018 is shown in **Table L-1**. Data on electricity use and water volumes were collected from City staff. Transmission and distribution losses were calculated by applying the EPA eGRID regional grid loss factors to the total electricity use and then entered into ClearPath, where the GHG emissions were calculated using the EPA eGRID Western CAMX sub-region grid average emissions factors. This data was marked as "information only" to prevent double counting.

Wastewater Treatment Facility Process and Fugitive Emissions

City wastewater treatment is operated by one central treatment facility. Operational parameters of the wastewater treatment systems are delineated in **Table L-3**. The plant is aerobic with nitrification / denitrification nutrient-removal systems. The wastewater treatment activity data were entered into ClearPath, where GHG emissions were calculated using the standard methods and emissions factors from the United States Community Protocol (USCP) and Local Government Operations Protocol (LGOP) that are shown in **Table L-2**.

Forecast Data & Growth Rate Appendices

Appendix M. Forecast

Methods

BAU projections are intended to demonstrate the expected growth in GHG emissions if no reduction measures are taken. The BAU forecast is beneficial in that it allows for comparison between forecasted and actual observed emissions to determine what emissions reduction progress has been made to date, as well as to assess whether or not

future reduction goals could be met by the reduction efforts made to date. BAU forecast estimates future community-wide GHG emissions in the years 2030, 2035, and 2045. A BAU forecast is based on two inputs — current emissions data and growth rates. Baseline emissions data came from the 2018 inventory. Growth rates were calculated based on projected growth of relevant indicator variables.

An adjusted scenario forecast, or adjusted BAU (ABAU), accounts for legislative adjustments and projected emissions reductions resulting from legislative action. This includes future updates to statewide vehicle fleet standards and renewable portfolio standards. ABAU forecasts are developed using two inputs — current emissions data and either BAU projections or adjusted rates of growth or decay.

Calculating the emissions forecast is achieved by isolating an indicator variable for the various sectors and sub-sectors that were evaluated in the inventory and then assess how that indicator variable is projected to increase or decrease into the future and apply that rate of change to the emissions from that sector or sub-sector.

For example, agricultural emissions forecasts are based on projecting forward current trends in agricultural activities. This includes the number of livestock and crop production acreage as provided in recent Calaveras County Agriculture Production Reports. The previous ten years of reported data were used to develop growth factors for the emissions forecast. A slight growth in acres of farmland was shown and a growth rate was calculated. Additionally, livestock numbers show no evidence of trend over the 10 year period between 2010 and 2019. Accordingly, livestock population was assumed to remain constant through the emissions forecast period. The forecast was developed out to 2045 using a number of indicator variables for different sectors and subsectors to arrive at our BAU forecast. This process was applied to each sector and sub-sector.

For the City forecasts, two different scenarios were included for both BAU and ABAU forecasts in order to paint a more holistic picture of what might happen in the County in the future. For both BAU and ABAU forecasts, there are two different scenarios: a growth scenario that is aligned with the 2019 Calaveras County General Plan (General Plan)[38], using 2018 California Department of Finance (DOF) data[39], and a declining growth scenario that uses current 2021 DOF population projections (as of this report, pulled in June 2021). The 2018 projection data with a population growth resulted in increasing emissions for BAU forecast and decreasing emissions for the ABAU forecast. The 2021 projection data with a

[38] Calaveras County General Plan. (2019). Calaveras County.
[39] Projections. (2021). California Department of Finance.

population decline resulted in decreasing emissions for BAU forecast and decreasing emissions for the ABAU forecast.

Sierra Business Council (SBC) also investigated the Regional Housing Needs Allocation[40], through California's Department of Housing and Community Development (HCD). HCD is based off of DOF population projection data, where the values from the 2018 Housing Element were most likely pulled from 2017 DOF population projection data and HCD applied an adjusted DOF population value. SBC also discovered and resolved discrepancies among DOF projections across different data sets, resulting in the DOF instructing us to use P2A population projections.

The project clients (CCOG and Calaveras County) and the consultants determined using the 2018 DOF population projection data may likely yield the most representative forecast scenario. It is the closest data set that aligns to the General Plan.

The rate of change for the Calaveras County VMT projections was applied to the on-road transportation sector. We did not use DOF household data for any of the sectors in the forecast scenarios. As the household projection rate is similar to the population projection rate, we felt comfortable applying the population projection rate in lieu of the household projection rate. The sources for all of the growth rate indicators are located in **Tables N-1** and **N-2**.

Table M-1. Greenhouse Gas Emissions Forecast Data for Business-as-Usual Forecast (2021 California Department of Finance Population Projections)

Year	Residential Energy	Non-Residential Energy	Transportation	Solid Waste	Water and Wastewater	Total Emissions
2018	4,459	1,207	18,437	1,037	52.78	25,193
2019	4,442	1,214	18,523	1,033	52.58	25,265
2020	4,431	1,221	18,611	1,030	52.44	25,346
2021	4,417	1,228	18,699	1,027	52.28	25,423
2022	4,417	1,235	18,790	1,027	52.28	25,521
2023	4,424	1,242	18,883	1,029	52.37	25,630
2024	4,434	1,249	18,976	1,031	52.49	25,744
2025	4,446	1,256	19,071	1,034	52.63	25,860
2026	4,457	1,263	19,165	1,037	52.76	25,974

[40] Calaveras Final Regional Housing Need Determination. (2018). California Department of Housing and Community Development.

2027	4,470	1,270	19,259	1,040	52.90	26,091
2028	4,484	1,277	19,354	1,043	53.08	26,211
2029	4,490	1,284	19,446	1,044	53.14	26,318
2030	4,494	1,291	19,539	1,045	53.19	26,422
2031	4,505	1,298	19,633	1,048	53.32	26,537
2032	4,510	1,305	19,725	1,049	53.39	26,643
2033	4,512	1,312	19,817	1,049	53.41	26,744
2034	4,513	1,319	19,908	1,050	53.41	26,842
2035	4,511	1,326	19,998	1,049	53.39	26,938
2036	4,512	1,333	20,090	1,049	53.41	27,038
2037	4,508	1,340	20,180	1,048	53.35	27,129
2038	4,503	1,347	20,270	1,047	53.30	27,220
2039	4,492	1,354	20,358	1,045	53.16	27,301
2040	4,488	1,361	20,448	1,044	53.12	27,394
2041	4,473	1,368	20,535	1,040	52.94	27,469
2042	4,465	1,375	20,624	1,038	52.85	27,555
2043	4,454	1,382	20,712	1,036	52.72	27,636
2044	4,448	1,389	20,801	1,034	52.64	27,725
2045	4,439	1,396	20,890	1,032	52.54	27,809

Table M-2. Greenhouse Gas Emissions Forecast Data for Business-as-Usual Forecast (2018 California Department of Finance Population Projections)

Year	Residential Energy	Non-Residential Energy	Transportation	Solid Waste	Water and Wastewater	Total Emissions
2018	4,459	1,207	18,437	1,037	52.78	25,193
2019	4,471	1,214	18,531	1,040	52.92	25,308
2020	4,485	1,221	18,626	1,043	53.09	25,428
2021	4,502	1,228	18,721	1,047	53.29	25,552
2022	4,521	1,235	18,817	1,051	53.51	25,678
2023	4,540	1,242	18,914	1,056	53.74	25,806
2024	4,562	1,249	19,011	1,061	54.00	25,936
2025	4,583	1,256	19,107	1,066	54.25	26,067

2026	4,604	1,263	19,204	1,071	54.49	26,196
2027	4,624	1,270	19,301	1,076	54.74	26,325
2028	4,645	1,277	19,397	1,080	54.98	26,455
2029	4,664	1,284	19,493	1,085	55.20	26,581
2030	4,681	1,291	19,589	1,089	55.41	26,706
2031	4,698	1,298	19,685	1,093	55.61	26,830
2032	4,714	1,305	19,780	1,096	55.80	26,951
2033	4,729	1,312	19,875	1,100	55.97	27,071
2034	4,742	1,319	19,970	1,103	56.12	27,189
2035	4,753	1,326	20,064	1,106	56.26	27,305
2036	4,762	1,333	20,157	1,108	56.36	27,416
2037	4,771	1,340	20,251	1,110	56.47	27,528
2038	4,779	1,347	20,344	1,111	56.56	27,638
2039	4,786	1,354	20,437	1,113	56.65	27,747
2040	4,792	1,361	20,530	1,115	56.73	27,855
2041	4,798	1,368	20,622	1,116	56.80	27,962
2042	4,803	1,375	20,714	1,117	56.85	28,066
2043	4,807	1,382	20,807	1,118	56.90	28,170
2044	4,811	1,389	20,899	1,119	56.94	28,274
2045	4,815	1,396	20,991	1,120	56.99	28,378

Table M-3. Greenhouse Gas Emissions Forecast Data for Adjusted Business-as-Usual Forecast (2021 California Department of Finance Population Projections)

Year	Residential Energy	Non-Residential Energy	Transportation	Solid Waste	Water and Wastewater	Total Emissions
2018	4,460	1,207	18,436	1,037	52.78	25,193
2019	4,348	1,125	18,182	1,033	52.58	24,741
2020	4,240	1,043	17,928	1,030	52.44	24,294
2021	4,130	961	17,674	1,027	52.28	23,845
2022	4,030	879	17,420	1,027	52.28	23,408
2023	3,934	797	17,165	1,029	52.37	22,978
2024	3,841	715	16,911	1,031	52.49	22,551

2025	3,749	633	16,657	1,034	52.63	22,126
2026	3,728	611	16,403	1,037	52.76	21,831
2027	3,708	588	16,149	1,040	52.90	21,537
2028	3,690	565	15,894	1,043	53.08	21,246
2029	3,666	542	15,640	1,044	53.14	20,946
2030	3,641	520	15,386	1,045	53.19	20,645
2031	3,611	489	15,179	1,048	53.32	20,380
2032	3,577	459	14,972	1,049	53.39	20,111
2033	3,541	428	14,765	1,049	53.41	19,838
2034	3,504	398	14,559	1,050	53.41	19,563
2035	3,465	368	14,352	1,049	53.39	19,287
2036	3,428	337	14,276	1,049	53.41	19,144
2037	3,388	307	14,200	1,048	53.35	18,997
2038	3,347	276	14,125	1,047	53.30	18,849
2039	3,302	246	14,049	1,045	53.16	18,695
2040	3,262	216	13,973	1,044	53.12	18,548
2041	3,214	185	13,897	1,040	52.94	18,390
2042	3,171	155	13,821	1,038	52.85	18,239
2043	3,126	124	13,746	1,036	52.72	18,085
2044	3,084	94	13,670	1,034	52.64	17,935
2045	3,041	64	13,594	1,032	52.54	17,784

Table M-4. Greenhouse Gas Emissions Forecast Data for Adjusted Business-as-Usual Forecast (2018 California Department of Finance Population Projections)

Year	Residential Energy	Non-Residential Energy	Transportation	Solid Waste	Water and Wastewater	Total Emissions
2018	4,460	1,207	18,436	1,037	52.78	25,193
2019	4,367	1,125	18,182	1,040	52.92	24,767
2020	4,277	1,043	17,928	1,043	53.09	24,344
2021	4,188	961	17,674	1,047	53.29	23,924
2022	4,101	879	17,420	1,051	53.51	23,504
2023	4,014	797	17,165	1,056	53.74	23,086

2024	3,928	715	16,911	1,061	54.00	22,669
2025	3,842	633	16,657	1,066	54.25	22,253
2026	3,828	611	16,403	1,071	54.49	21,967
2027	3,814	588	16,149	1,076	54.74	21,681
2028	3,801	565	15,894	1,080	54.98	21,395
2029	3,785	542	15,640	1,085	55.20	21,107
2030	3,769	520	15,386	1,089	55.41	20,819
2031	3,743	489	15,179	1,093	55.61	20,560
2032	3,717	459	14,972	1,096	55.80	20,300
2033	3,689	428	14,765	1,100	55.97	20,039
2034	3,661	398	14,559	1,103	56.12	19,776
2035	3,631	368	14,352	1,106	56.26	19,513
2036	3,599	337	14,276	1,108	56.36	19,377
2037	3,568	307	14,200	1,110	56.47	19,241
2038	3,536	276	14,125	1,111	56.56	19,105
2039	3,504	246	14,049	1,113	56.65	18,968
2040	3,471	216	13,973	1,115	56.73	18,831
2041	3,437	185	13,897	1,116	56.80	18,693
2042	3,403	155	13,821	1,117	56.85	18,553
2043	3,368	124	13,746	1,118	56.90	18,413
2044	3,333	94	13,670	1,119	56.94	18,273
2045	3,299	64	13,594	1,120	56.99	18,133

Appendix N. Growth Rates

Table N-1. Growth Rate Indicators & Sources for Business-as-Usual Forecast

Sector	Indicator	Source
Residential Energy	Population (2018 & 2021 Projections)	California Department of Finance
Non-Residential Energy	Employment	California Employment Development Department
On-Road Transportation	VMT Projections	Calaveras Council of Governments

Off-Road Transportation	Population (2018 & 2021 Projections)	U.S. Census Bureau, American Community Survey
Solid Waste	Population (2018 & 2021 Projections)	California Department of Finance
Water and Wastewater	Population (2018 & 2021 Projections)	California Department of Finance

Table N-2. Growth Rate Indicators & Sources for Adjusted Business-as-Usual Forecast

Sector	Indicator	Source
Residential Energy	Electricity - Renewable Portfolio Standard Other Fuels - Population (2018 & 2021 Projections)	SB 100 California Department of Finance
Non-Residential Energy	Electricity - Renewable Portfolio Standard Other Fuels - Employment	SB 100 California Department of Finance
On-Road Transportation	Emissions Rates (EMFAC 2021)	California Air Resources Board
Off-Road Transportation	Emissions Rates (OFFROAD 2017)	California Air Resources Board
Solid Waste	Population (2018 & 2021 Projections)	California Department of Finance
Water and Wastewater	Population (2018 & 2021 Projections)	California Department of Finance

Table N-3. Population, Employment, and VMT Projections (County Data*)

Year	Population (DOF, 2018)	Population (DOF, 2021)	Employment (CEDD)	VMT Projections (CCOG)
2018	44,692	44,572	57,414	316,278,459
2019	44,808	44,403		
2020	44,953	44,286		
2021	45,126	44,153		
2022	45,308	44,150		
2023	45,507	44,222		
2024	45,721	44,325		
2025	45,934	44,443		
2026	46,142	44,551		
2027	46,349	44,677		
2028	46,557	44,824	60,982	
2029	46,741	44,877		

2030	46,920	44,919	
2031	47,091	45,031	
2032	47,246	45,085	
2033	47,393	45,102	
2034	47,523	45,106	
2035	47,642	45,087	608,147,022
2036	47,725	45,100	
2037	47,816	45,057	
2038	47,896	45,011	
2039	47,969	44,896	
2040	48,033	44,860	
2041	48,093	44,711	
2042	48,135	44,628	
2043	48,177	44,520	
2044	48,215	44,456	
2045	48,256	44,368	

**The above data represents the Calaveras County projections. There was no data available for the City of Angels Camp specifically, so the above data was used to represent the rate of change for the City through 2045.*

Appendix O. Wildfire-related Greenhouse Gas Emissions from Natural Lands Carbon Stock Loss and Climate Change Vulnerability Assessment

Attached as a separate document.

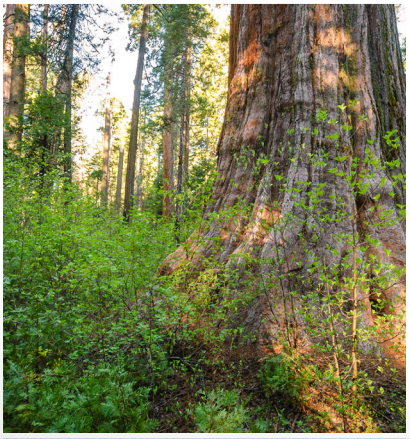
Calaveras County

Greenhouse Gas Emissions Reduction Plan

Wildfire-related Greenhouse Gas Emissions from Natural Lands Carbon Stock Loss and Climate Change Vulnerability Assessment











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1 Introduction

California has experienced record-breaking wildfires in recent years, with 2020 setting the all-time record for acres burned of over 4 million acres in the State, more than double the previous state record set in 2018.[1] This significant increase in the severity and extent of wildfires, highlights the importance of understanding the full extent of these impacts in order to guide policy development. In 2018 pursuant to Executive Order (EO) B-52-18, the State established the California Fuel Management Task Force , which was in charge of developing a holistic integrated approach toward forest management. In January 2021, this effort culminated in the development and adoption of California's Wildfire and Forest Resilience Action Plan, which integrates key findings and recommendations from various plans, studies, and assessments into a single coordinated and comprehensive strategy for forest management and wildfire resilience.[2] In parallel with this effort, the California Air Resources Board (CARB) has developed methodology regarding quantification of the carbon cycle and greenhouse gas (GHG) emission impacts of wildfire and forest management strategies in order to better understand wildfire implications in terms of the State's contribution to climate change.[3] This report intends to provide detail relative to these State level efforts in the context of Calaveras County, including the City of Angels Camp, by assessing the changes in carbon stocks from land use and fire related activities, the GHG emissions impact of wildfire in the County, and the wildfire-related climate change vulnerabilities, while presenting relevant best practices in wildfire impact reduction related to Calaveras County specific to climate change vulnerabilities.

A combination of a changing climate and hundreds of years of unnatural fire suppression has led to increases in fuels that contribute to catastrophic fires. Wildfires are not only an effect of a changing climate that influences drought and the disease that turns living vegetation into dry fuel, but they are also a major contributor to GHG emissions by converting natural land carbon stocks into atmospheric carbon.[4] This feedback cycle is a symptom of unhealthy forests and wildlands that result from fire suppression, insufficient investment in wildland fire risk management and misguided land use planning.[5] Regular wildfires are part of the natural cycle of forests, grasslands, and shrublands, in which old decaying vegetation is cleared out by low-intensity fires so that mature trees can continue to thrive and provide valuable habitat and ecosystem services. Such regular wildfires are typically lower-intensity, preserving the primary carbon stocks that are already in place, allowing for continued carbon sequestration associated with living vegetation and minimal release of these carbon stocks as GHG emissions during wildfires.[6] However, land use planning has included

[1] Roman et al. 2020. Greetings from the 2020 Wildfire Season. National Fire Protection Association Journal. Available: <https://www.nfpa.org/News-and-Research/Publications-and-media/NFPA-Journal/2020/November-December-2020/Features/Wildfire>. Accessed June 7, 2021.

[2] California Governor's Forest Management Task Force (CGFMTF). 2021. California Wildfire & Forest Resilience Action Plan. Available: <https://www.fire.ca.gov/media/ps4p2vck/californiawildfireandforestresilienceactionplan.pdf>. Accessed May 27, 2021.

[3] CARB. 2020. Public Comment Draft: Greenhouse Gas Emissions of Contemporary Wildfire, Prescribed Fire, and Forest Management Activities. Available: <https://ww3.arb.ca.gov/cc/inventory/pubs/ca_ghg_wildfire_forestmanagement.pdf>. Accessed June 7, 2021.

[4] California Natural Resources Agency (CNRA). 2018. California Forest Carbon Plan: Managing Our Forest Landscapes in a Changing Climate. Available: <https://resources.ca.gov/CNRALegacyFiles/wp-content/uploads/2018/05/Forest-Carbon-Plan-One-Pager-May-2018.pdf>. Accessed June 7, 2021.

[5] Bustic, et. al. 2015. Land Use and Wildfire: A Review of Local Interactions and Teleconnections. Land volume 4. Available: <https://www.researchgate.net/publication/272790284_Land_Use_and_Wildfire_A_Review_of_Local_Interactions_and_Teleconnections>. Accessed June 7, 2021.

[6] CGFMTF. 2021. California Wildfire & Forest Resilience Action Plan. Available: <https://www.fire.ca.gov/media/ps4p2vck/californiawildfireandforestresilienceactionplan.pdf>. Accessed May 27, 2021.

development in areas that would naturally have recurring fires, leading to an increased population in the wildland urban interface (WUI), and an increased need to suppress fire in these areas.[7] Now California faces the challenge of managing natural lands and land use patterns to reduce potential for high-intensity fires that generate GHG emissions and put lives and properties at risk.

This report evaluates these challenges specific to Calaveras County, demonstrating how wildfires can impact the carbon cycle and GHG emissions, as well as how the WUI can both be put at risk by wildfires and increase opportunity for wildfire ignition. To understand the potential GHG emissions impact related to wildfire in Calaveras County a Natural and Working Lands (NWL) Carbon Inventory for the years 2010 and 2020 was developed, which demonstrates the total carbon storage in vegetation and soils. This analysis calculates the current available carbon storage (sequestration) in the County, how carbon storage has changed over time, and highlight regions and landcover where carbon storage value is high. Additionally, a case study has been developed for the 2015 Butte Fire to analyze both the local risks for wildfire and the potential magnitude of GHG emissions and carbon storage loss from a single wildfire event. The GHG emission analysis also includes an assessment of how forest management practices, such as thinning and prescribed burns, can significantly reduce wildfire GHG emissions and preserve long term carbon stocks that may be destroyed by high-intensity fires caused by overgrown forests.

Wildfires also present a significant threat to communities, assets, and resources (i.e., people, homes, businesses, public infrastructure/services, and the natural surroundings) in the County, which are expected to be exacerbated by the effects of climate change. This is addressed in the Wildfire Vulnerability Assessment included in this report, which was developed based on the most recent guidance from the California Governor's Office of Planning and Research (OPR). The assessment includes discussion of the County's vulnerabilities to wildfire specifically focused on the impacts associated with the WUI and the increased risk associated with higher temperatures and sever weather events resulting from climate change. This information is presented to inform decision makers and help implement action under the Greenhouse Gas Reduction Strategy.

A concerted effort will be required to mitigate the risks associated with wildfire, which is further exacerbated by climate change. This report intends to provide a basis for understanding the wildfire interactions with the carbon cycle and WUI, and to provide meaningful information that can be used to help secure grant funding for natural land management and climate change and resilience. The State has greatly increased the availability of funding for climate change, forest management and wildfire resilience projects, with an emphasis on GHG reduction, improved forest health, home hardening against fires, improvements in defensible space, and fire prevention workforce training. A portion of this funding will be obtained through the California Greenhouse Gas Reduction Fund, with grants available through the California Climate Investments Program.[8] The Climate Investment Program is intended to fund GHG reduction projects, therefore the connection between wildfire and GHG emissions in this report may improve the ability of the County to pursue funding. Projects that are initiated by the County would provide the dual benefit of both reducing the County's contribution to climate change through wildfire related GHG emissions reduction and increasing resilience to climate change through improved forest health.

[7] Bustic, et. al. 2015. Land Use and Wildfire: A Review of Local Interactions and Teleconnections. Land volume 4. Available: <https://www.researchgate.net/publication/272790284_Land_Use_and_Wildfire_A_Review_of_Local_Interactions_and_Teleconnections>. Accessed June 7, 2021.

[8] California Office of Governor Gavin Newsom. 2021. Governor Newsom, Legislative Leaders Announce Early Budget Action for Wildfire Prevention. Available: <https://www.gov.ca.gov/2021/04/08/governor-newsom-legislative-leaders-announce-early-budget-action-for-wildfire-prevention/>. Accessed June 7, 2021.

2 Natural and Working Lands Carbon Inventories (2010 and 2020)

This section explains the inventory methodology used to quantify the major natural and working lands GHG emissions sinks and sources for Calaveras County (County). The 2010 and 2020 NWL carbon inventories were developed based on the methodology outlined in Resilient Merced, California's 2017 Climate Change Scoping Plan, and the State's Natural and Working Lands Inventory.[9,10,11] The inventory of carbon stocks for natural and working lands (NWL carbon inventory) in Calaveras County covers the County's 662,838 acres.[12] Calaveras County includes large areas of natural and working lands and a diversity of land-cover types ranging from developed land to mixed forest. The development of NWL carbon inventories allows jurisdictions to evaluate land management activities that are designed to increase or protect carbon stocks and/or reduce GHG emissions. A NWL carbon inventory also plays an important role in prioritizing policy initiatives aimed at reducing GHG emissions or increasing carbon sequestration and can be a tool to examine how natural and human influences have impacted carbon storage in the past and monitor the progress of policy initiatives over time.

NWL carbon inventory (i.e., stock) is the total amount of carbon sequestered in woody and herbaceous material and in the soil (i.e., the biosphere). Some land management and natural activities can increase carbon stocks, for example through riparian restoration, while others can contribute to the emission of carbon dioxide (CO_2) into the atmosphere, such as wildfire. Live vegetation also provides continued sequestration of carbon via respiration while landcover consumed by wildfire would lose that sequestration ability for an extended period while the landcover recovered. The analyses below follow the Resilient Merced methodology and includes the development of land-based emissions. Land-based emissions exist in the form of methane and nitrous oxide, which are associated with wetlands and agricultural practices such as fertilizer application. However, these land-based emissions are not included in the 2010 and 2020 NWL carbon inventories due to the small contribution of wetlands in Calaveras County and because fertilizer emissions are already included in the County's 2018 Community GHG Emissions Inventory. Including these emissions in the NWL carbon inventories would result in double counting emissions.

The NWL carbon inventories estimate carbons stocks, by land-cover class (i.e., mixed forest, grassland, shrub, etc.) at two points in time (2010 and 2020), to determine historical changes in carbon stocks. This section includes the following:

- NWL Carbon Inventory Data Sources – a complete description of the data sources used to complete the carbon inventories
- NWL Carbon Inventory Methods and Findings

[9] California Department of Conservation. 2021. Terracount Materials. The Nature Conservancy, Tukman Geospatial, Climate Action Reserve, and Merced County. 2018. Resilient Merced. Available: <https://maps.conservation.ca.gov/TerraCount/downloads/>. Accessed May 26, 2021.

[10] CARB. 2017. California's 2017 Climate Change Scoping Plan. Available: <https://ww2.arb.ca.gov/sites/default/files/classic//cc/scopingplan/scoping_plan_2017.pdf>. Accessed May 26, 2021.

[11] CARB. 2018. An Inventory of Ecosystem Carbon in California's Natural and Working Lands. Available: <https://ww3.arb.ca.gov/cc/inventory/pubs/nwl_inventory.pdf>. Accessed May 26, 2021.

[12] Includes unincorporated County areas as well as the City of Angels Camp.

  - Land-cover Classification – methods and findings related to the land-cover classification process and derived carbon stock estimates for 2010 and 2020
  - Carbon Stock Estimates – methods and findings related to the calculation of carbon stock estimates for 2010 and 2020
- County NWL Carbon Inventory Summary – a summary of the results and utility of the NWL carbon inventories

2.1 NWL Carbon Inventories Data Sources

Jurisdictional NWL carbon inventories require the use of large-scale spatial data sets and carbon or biomass data. Geographic information system (GIS) is used to capture, store, manipulate, analyze, manage, and present spatial, or geographic, data across the county. The Calaveras NWL carbon inventories use publicly available data sources that are expected to be updated in the future. Table 1 includes the data sources used to complete the Calaveras 2010 and 2020 NWL carbon inventories.

Table 1 Data Sources Used

Land Type	Data	Publication Frequency	Year
Natural Lands (Forest, Shrubland, Grassland, etc.), and Cropland	LANDFIRE[1]	2 years	2010, 2020
Soil	National Cooperative Soil Survey (NCSS) Characterization Database, the National Soil Information System (NASIS), and the Rapid Carbon Assessment (RaCA) datasets[2]	Annual	2019

Sources:

[1] LANDFIRE. 2021. LANDFIRE: Existing Vegetation Cover, Height, and Type, United States Department of Agriculture and United States Department of the Interior. Available: <https://www.landfire.gov/>. Accessed May 26, 2021

[2] Nauman, et al. 2017. Soil Properties and Class 100m Grids United States. Available: <https://scholarsphere.psu.edu/resources/ea4b6c45-9eba-4b89-aba6-ff7246880fb1>. Accessed May 26, 2021.

LANDFIRE spatial land-cover data provides the foundation of the Calaveras NWL carbon inventories, similar to the Resilient Merced project completed for Merced County and the State's Natural and Working Lands Carbon Inventory developed for CARB.[13] The data sources used to develop the NWL carbon inventories are described below:

- The LANDFIRE data covers the county at a 30-meter resolution. The LANDFIRE layers used include Existing Vegetation Type, Cover, and Height.
- The soil data used includes three national United States soil point datasets: NCSS Characterization Database, the National Soil Information System (NASIS), and the Rapid Carbon Assessment (RaCA) datasets. These datasets include remote sensing images, predictions of soil properties (e.g., percent organic carbon, total nitrogen, bulk density, PH, etc.) and classes, conventional soil polygon maps from the Soil Survey Geographic database (SSURGO), and machine learning. Predictions were generated at 100-meter spatial resolution.

[13] California Department of Conservation. 2021.The Nature Conservancy, Tukman Geospatial, Climate Action Reserve, Merced County. 2018. Resilient Merced. Available: <https://maps.conservation.ca.gov/TerraCount/downloads/>. Accessed May 26, 2021.

2.2 NWL Carbon Inventories Methods and Findings

The Calaveras County NWL carbon inventory methodology is based on the Resilient Merced pilot project. The first step includes estimating carbon stocks by land-cover class (i.e., forest, grassland, shrub, etc.) using LANDFIRE. This step details changes in land-cover between the two years. The second step involves calculating carbon stored in different carbon pools (i.e., above- and below-ground live biomass, litter, soil, etc.) based on existing vegetation type, cover, and height. This step illustrates changes in carbon stock as a result of land-cover changes between 2010 and 2020. The sections below describe the methods and findings of the NWL carbon inventories for Calaveras County.

2.2.1 Land-cover Classification

The NWL carbon inventories are derived from the assignment of all land in the county to discrete land-cover classes, representing all land-use types in the County. The Existing Vegetation Type LANDFIRE dataset was used to determine the land-cover class. The land-cover classes assigned in the 2010 and 2020 NWL carbon inventories are:

- Barren
- Cultivated Crops
- Development
- Deciduous Forest
- Evergreen Forest
- Mixed Forest
- Grassland/Herbaceous
- Open Water
- Shrub/Scrub
- Wetland

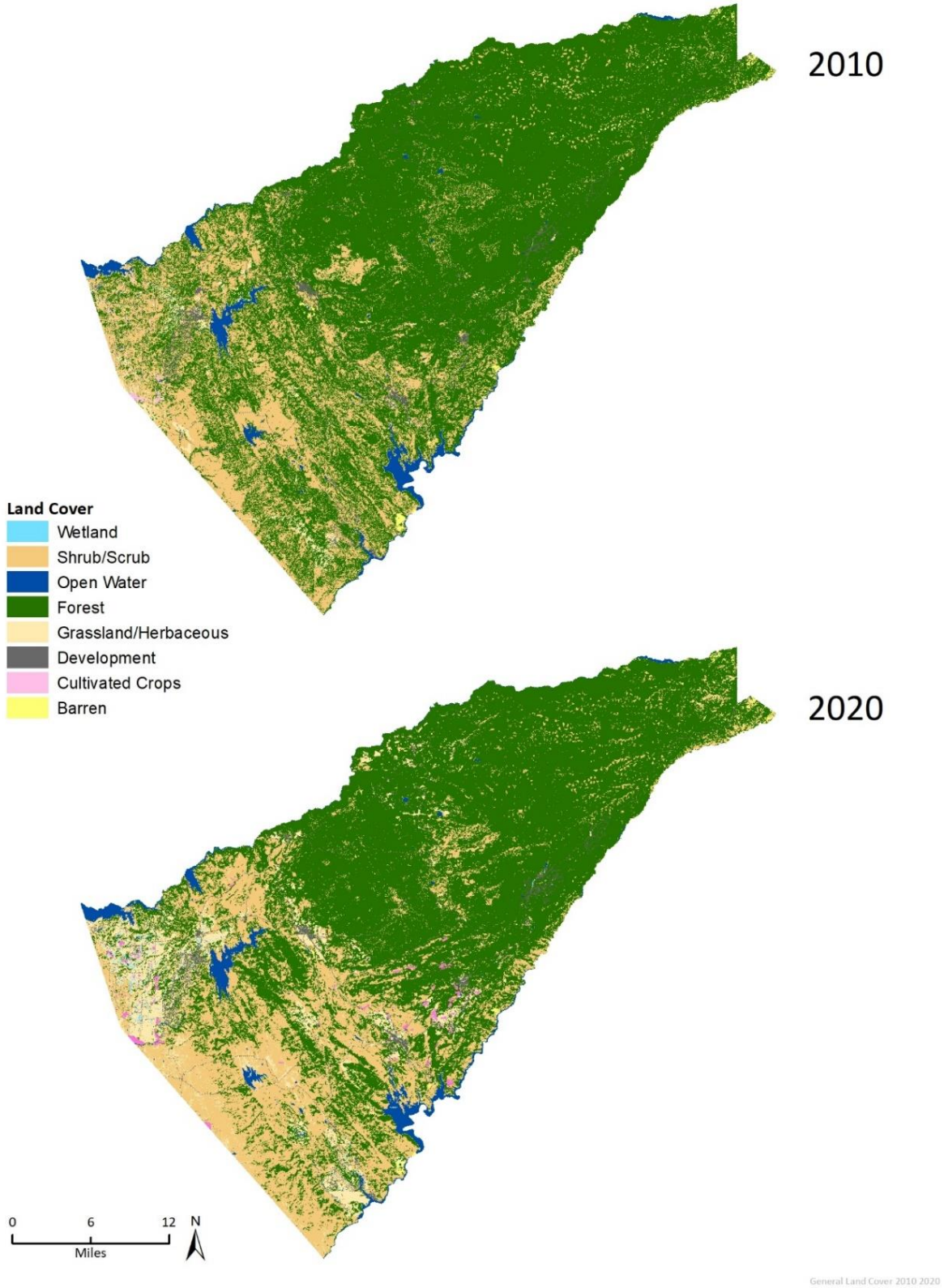
Examples of some of the land-cover classes common to Calaveras County are shown in Figure 1.

Figure 1 Land-cover Class Example Photos



Figure 2 and Table 2 detail the results of the land-cover classification in Calaveras for 2010 and 2020. The data between the two years show decreases in mixed forest and deciduous forest and an increase in evergreen forest. The loss in forested land is primarily being replaced by shrub/scrub and grassland/herbaceous landcover.

Figure 2 Calaveras County Land-cover Classes (2010 and 2020)



Source: LANDFIRE. 2021

Table 2 Calaveras County Land-cover Classes (2010 and 2020)

Land-cover Class	2010 Acres	2020 Acres	Percent Change
Barren	3,996	3,658	-8
Cultivated Crops	842	2,912	246
Deciduous Forest	43,748	37,636	-14
Development	11,717	12,259	5
Evergreen Forest	1,835	11,243	513
Grassland/Herbaceous	13,058	44,797	243
Mixed Forest	420,723	354,620	-16
Open Water	14,288	15,960	12
Shrub/Scrub	152,632	178,190	17
Wetland[1]	0	1,563	N/A
Total	**662,838**	**662,838**	**-**

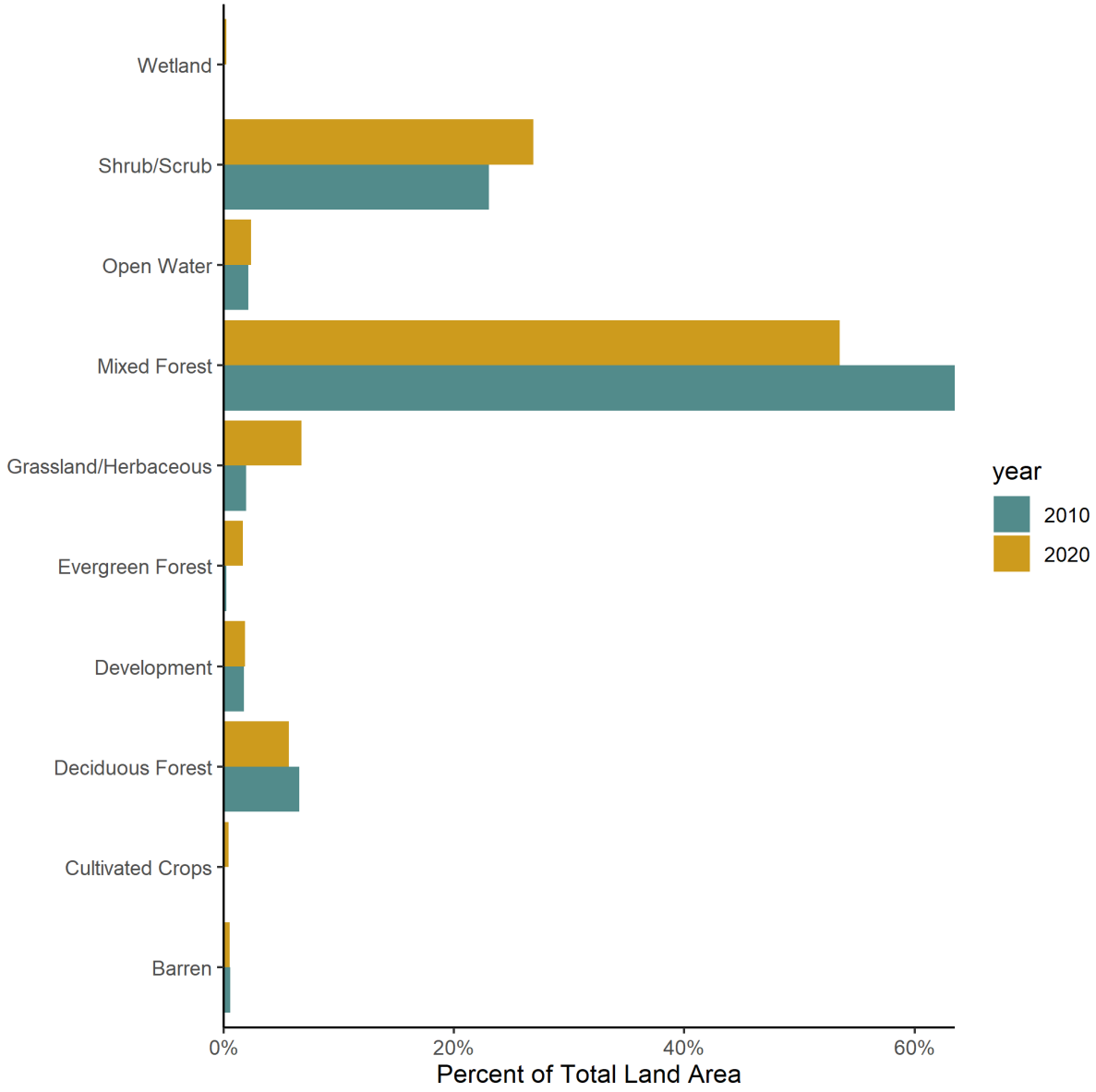
Notes:

[1] Though wetlands show a change from 0 to 1,563, this is likely due to inconsistencies in classification. For example, the same vegetation type could have been classified as grassland in one year and wetland the next year, without an actual change in land-cover.

Source: LANDFIRE. 2021

Table 2 above shows the number of acres in each land-cover class for 2010 and 2020 and the percent change between the two years. As previously described, mixed and deciduous forests decreased, and shrubland and grassland increased from 2010 to 2020. Other categories, such as evergreen forest, cultivated crops, and wetlands, show increases over time; however, these categories represent a very small portion of the total land area. These increases could be observed changes or may be attributed to a difference in classification between the two years, for example a forest classified by LANDFIRE as mixed forest 2010 could be classified as evergreen in 2020 with no actual change in landcover. Figure 3 illustrates the proportional land-cover changes between 2010 and 2020.

Figure 3 Calaveras County Proportional Land-cover by Vegetation Class (2010 and 2020)



Source: LANDFIRE. 2021

2.2.2 Carbon Stock Estimates

Carbon stock estimates are based on the sum of carbon stored in different carbon pools. This analysis includes carbon stored in the following carbon pools:

- above- and below-ground live biomass
- above- and below-ground dead standing trees
- lying dead wood (e.g., branches, logs, etc. lying on the ground surface)
- litter
- soil.

Carbon stored in all above- and below-ground biomass (including live, dead, and litter), was calculated using volumetric estimates of carbon mass (metric tons per hectare) provided by CARB. These estimates were provided for every combination of Existing Vegetation Type, Height, and Cover and assigned to each 30 by 30-meter cell in Calaveras.

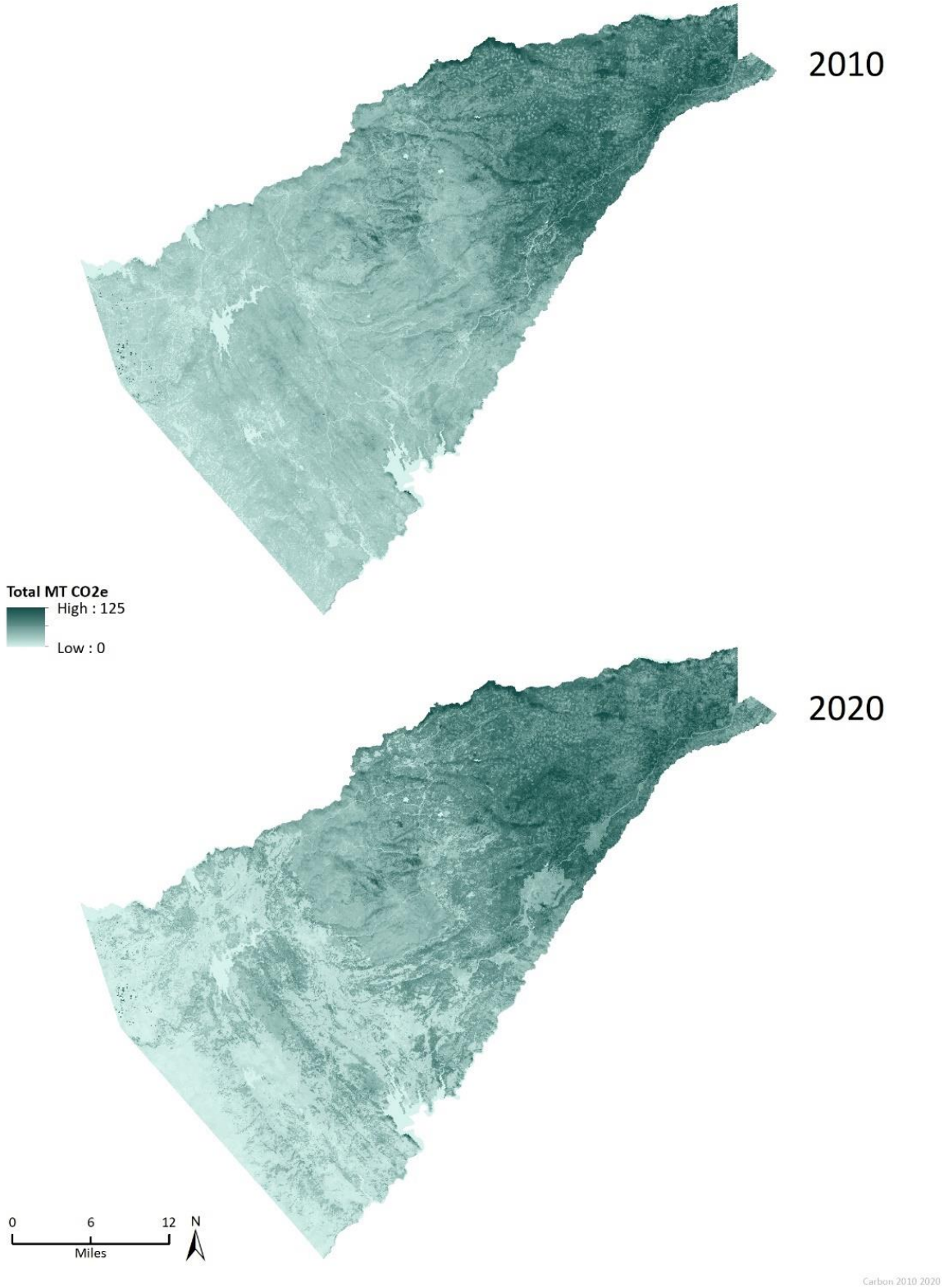
Soil carbon values were obtained using the combined NCSS Characterization Database, the National Soil Information System (NASIS), and the Rapid Carbon Assessment (RaCA) datasets described in the NWL Carbon Inventory Data Sources section of this report. The soil carbon inventory estimates were determined by using the values provided for soil organic carbon and soil bulk density at a depth of 0-30cm. Soil carbon was then estimated using Quantification Guidance for Forest Project Protocol Version 4.0[14] as shown in the following equation (the Conversion of Organic Matter to Carbon was skipped as the input data we had was already converted to Soil Organic Carbon):

Soil CO_2e	=	Organic Matter Value (Steps 2 or 4) **x** 0.58 (Conversion of Organic Matter to Carbon) **x** Bulk Density Value (Steps 3 or 5) **x** Soil Depth Sampled (30 cm) **x** 40,468,564.224 (Conversion of 1 cm^2 to 1 acre) **x** 10^{-6} (Conversion of 1 gram to 1 metric ton) **x** 3.67 (Conversion of Carbon to CO_2)

The NWL carbon inventories, which includes the sum of all above- and below-ground biomass and soil carbon for 2010 and 2020, are mapped in Figure 4 and provided in Table 3. The average carbon stock per acre for each vegetation class is provided in Table 4. All carbon stock values are presented in metric tons of carbon dioxide equivalent (MT CO_2e).

[14] Climate Action Reserve. 2017. Quantification Guidance for Use with Forest Carbon Projects. Available: <https://www.climateactionreserve.org/wp-content/uploads/2017/07/FPP_Quantification_Guidance_062817.pdf>. Accessed May 26, 2021.

Figure 4 Calaveras County Total Carbon Stock (2010 and 2020)



Sources: LANDFIRE. 2021; Nauman, et al, 2017; CARB. 2020. Volumetric estimates of carbon mass from Klaus I. Scott at the CARB Emission Inventory Analysis Section of the GHG & Toxics Emission Inventory Branch, AQPS Division. November 17, 2020.

Table 3 Calaveras County NWL Carbon Inventories (2010 and 2020)

Land-cover Class	2010 Total Carbon Stock (MT CO_2e)	2020 Total Carbon Stock (MT CO_2e)	Percent Change
Barren	304,138	283,840	-7
Cultivated Crops	47,803	161,695	238
Deciduous Forest	5,307,362	4,717,271	-11
Development	657,179	702,240	7
Evergreen Forest	265,045	1,181,379	346
Grassland/Herbaceous	746,009	2,190,346	194
Mixed Forest	57,446,504	53,696,781	-7
Open Water	137,051	231,711	69
Shrub/Scrub	11,828,226	11,115,216	-6
Wetland	10	71,293	745,417
Total	**76,739,325**	**74,351,771**	**-3**

Sources: LANDFIRE, 2021; CARB, 2020

Table 4 Calaveras County Average Carbon Stock per Acre (2010 and 2020)

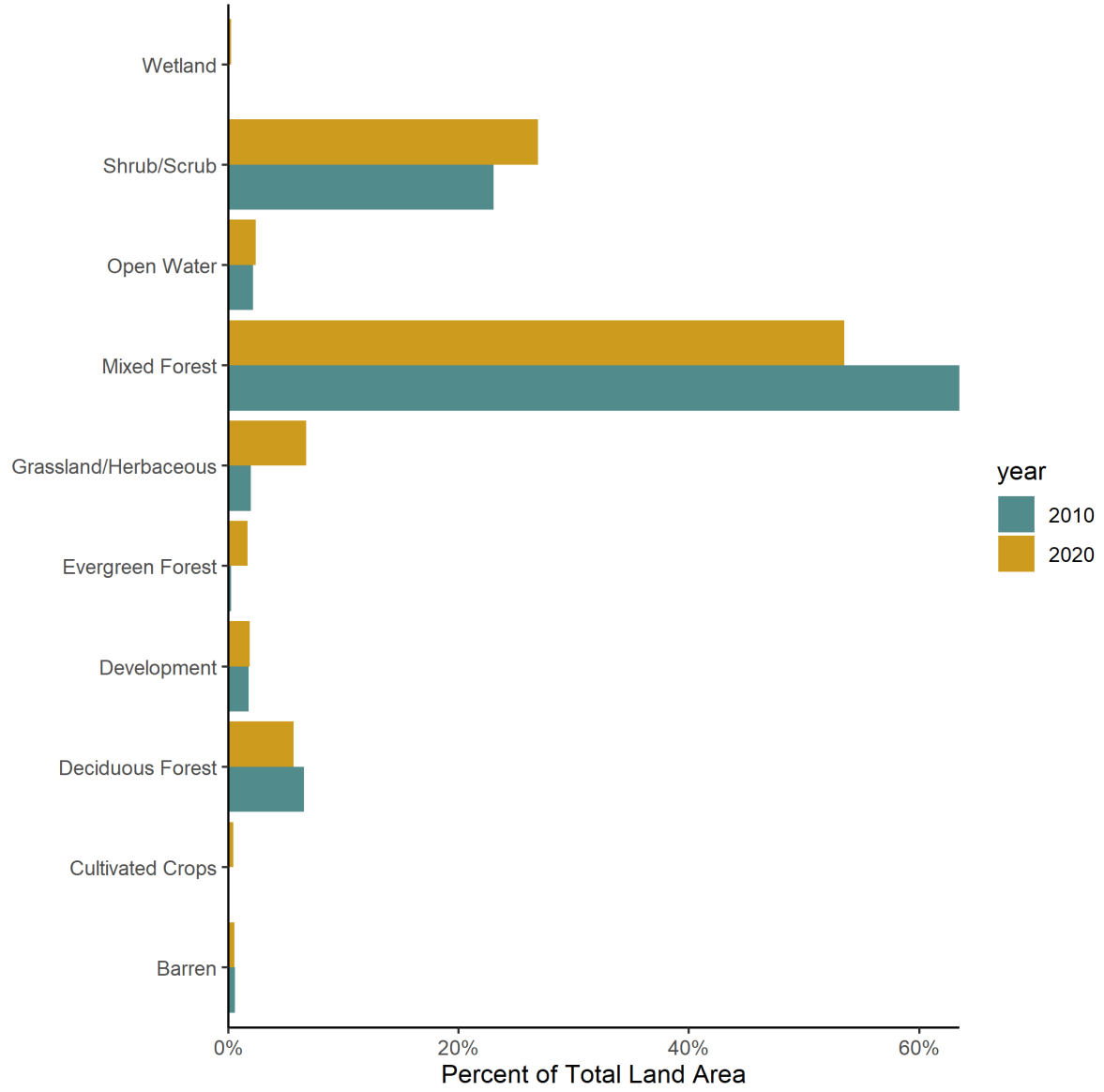
Land-cover Class	2010 Average Carbon Stock per Acre (MT CO_2e)	2020 Average Carbon Stock per Acre (MT CO_2e)
Barren	76	78
Cultivated Crops	57	56
Deciduous Forest	121	125
Development	56	57
Evergreen Forest	144	105
Grassland/Herbaceous	57	49
Mixed Forest	137	151
Open Water	10	15
Shrub/Scrub	77	62
Wetland	43	46

Sources: LANDFIRE, 2021; CARB, 2020

Table 3 includes the total carbon stock for 2010 and 2020 and the percent change between the two years. As described and illustrated in the Land-cover Classification section above, mixed and deciduous forest acreage decreased and shrubland and grassland cover increased. The mixed forest vegetation class encompassed approximately 63 percent of the total landcover area in 2010 and dropped to 54 percent in 2020. This vegetation class contains over 70 percent of the total carbon stocks in the County (75 percent in 2010 and 72 percent in 2020). Deciduous forests dropped from 7 percent to 6 percent from 2010 to 2020 in both landcover area and carbon stock. Shrubland is the second largest vegetation class in both landcover and carbon stock. From 2010 to 2020, shrubland increased from 23 percent to 27 percent and carbon stock hovered around approximately 15 percent, only increasing slightly in 2020 compared to 2010.

Categories, such as wetland, open water, and cultivated crops show large increases over time; however, such categories represent a very small portion of the total land areas. Although there was a slight decrease in carbon stocks in the County between 2010 and 2020, the magnitude of available carbon storage in the County is nearly 2,500 times the total GHG emissions generated by the County from transportation, enegy use and waste disposal. Figure 5 shows the proportional carbon stock changes between 2010 and 2020. The total carbon stock in the County decreased 3 percent from 2010 to 2020. Table 4 provides the average amount of carbon sequestered per acre in each of the vegetation classes. The forest categories hold the largest amount of carbon, ranging from 100 to 150 MT CO_2e per acre.

Figure 5 Calaveras County Proportional Carbon Stock by Vegetation Class (2010 and 2020)



Sources: LANDFIRE, 2021; CARB, 2020

2.3 County NWL Carbon Inventory Summary

The NWL carbon inventory provides a quantitative estimate of historical and existing carbon stored in the County as well as estimates of carbon stock, carbon stock changes, and resulting GHG flux in the landscape. These carbon stock changes result from disturbances, including conversion of natural lands to development and wildfire, among others. NWL carbon inventories are important for tracking how disturbances affect carbon stocks and GHG emissions, thereby informing how the County's land base contributes to local and State GHG emissions goals. Although the 2010 and 2020 NWL carbon inventories do not show a clear link between forest carbon stock decreases due to wildfire, CARBs Natural and Working Land Inventory Report attributed the Statewide decrease in forest and shrubland carbon stocks from 2001 to 2010 to large wildfires.[15] Between 2010 and 2020, Calaveras County experienced one large fire, the Butte Fire (in 2015), which burned approximately 70,868 acres, mostly in Calaveras County. The Butte Fire is ranked 18th on the California Department of Forestry and Fire Protection (Cal FIRE) list of the Top 20 Most Destructive California Wildfires.[16] The Butte Fire did not result in a permanent large loss of carbon stock, as indicated in the carbon inventory results between 2010 and 2020. However, studies indicate that large, intense fires brought on by fire suppression, drought, and other factors, may result in historically forested areas changing to shrubland in the future.[17] Section 3 discusses potential future emissions from carbon stock loss due to wildfire.

[15] CARB. 2018. An Inventory of Ecosystem Carbon in California's Natural & Working Lands. Available: < https://ww3.arb.ca.gov/cc/inventory/pubs/nwl_inventory.pdf>. Accessed June 2, 2021.

[16] California Department of Forestry and Fire Protection (CalFIRE). 2021. Top 20 Most Destructive California Wildfires. Available: <https://www.fire.ca.gov/media/t1rdhizr/top20_destruction.pdf>. Accessed June 10, 2021.

[17] Carroll. 2016. Severe fires turning forest to shrubland in California. Available: <https://phys.org/news/2016-04-severe-forest-shrubland-california.html#:~:text=A%20new%20study%20found%20that,the%20state%20changing%20to%20shrubland.&text=%22Basically%20we%20are%20switching%20forest,happen%20at%20very%20large%20scales>. Accessed May 26, 2021.

3 Potential GHG Emissions from Carbon Stock Loss Due to Wildfire

The GHG emissions from wildfires are inherently linked to the loss of carbon stocks in vegetated areas. As wildfires burn through forests, grasslands, and shrublands the carbon stored in the biomass is released to the atmosphere from the direct combustion of material, and from the resulting decay of biomass after a fire has killed vegetation.[18] In the past century, fire suppression has increased the accumulation of wildfire fuel, as natural, smaller, low-intensity fires that were at one-time natural have been prevented to protect lives and property.[19] As a result of this disruption of the natural carbon cycle and the influences of climate change, wildfires have become more severe, resulting in massive losses of carbon stocks and high levels of GHG emissions. The potential for carbon losses and subsequent GHG emissions resulting from wildfire can be diminished through land use planning and forest management practices, such as forest thinning and prescribed burns. This section provides an overview of the carbon/fire cycle, and an analysis of the potential GHG emissions from carbon stock loss due to wildfire in Calaveras County. In addition to an assessment of the overall emission potential, a case study for an estimate of the GHG emissions associated with 2015 Butte Fire is provided.

3.1 Carbon and Fire Cycle

The carbon cycle is an essential aspect for Earth to maintain the carbon balance required to sustain life. The cycle primarily consists of flows of carbon between the atmosphere, biosphere, oceans, and Earth's crust, through various natural processes. While the largest contributor to climate change is the human-influenced release of carbon that has long been sequestered in Earth's crust as fossil fuels (long-term carbon cycle), maintaining the carbon exchanges between the biosphere (i.e. plants, animals, insects) and atmosphere (short-term carbon cycle) is essential for reducing the impacts of climate change and preserving valuable ecosystem services.[20]

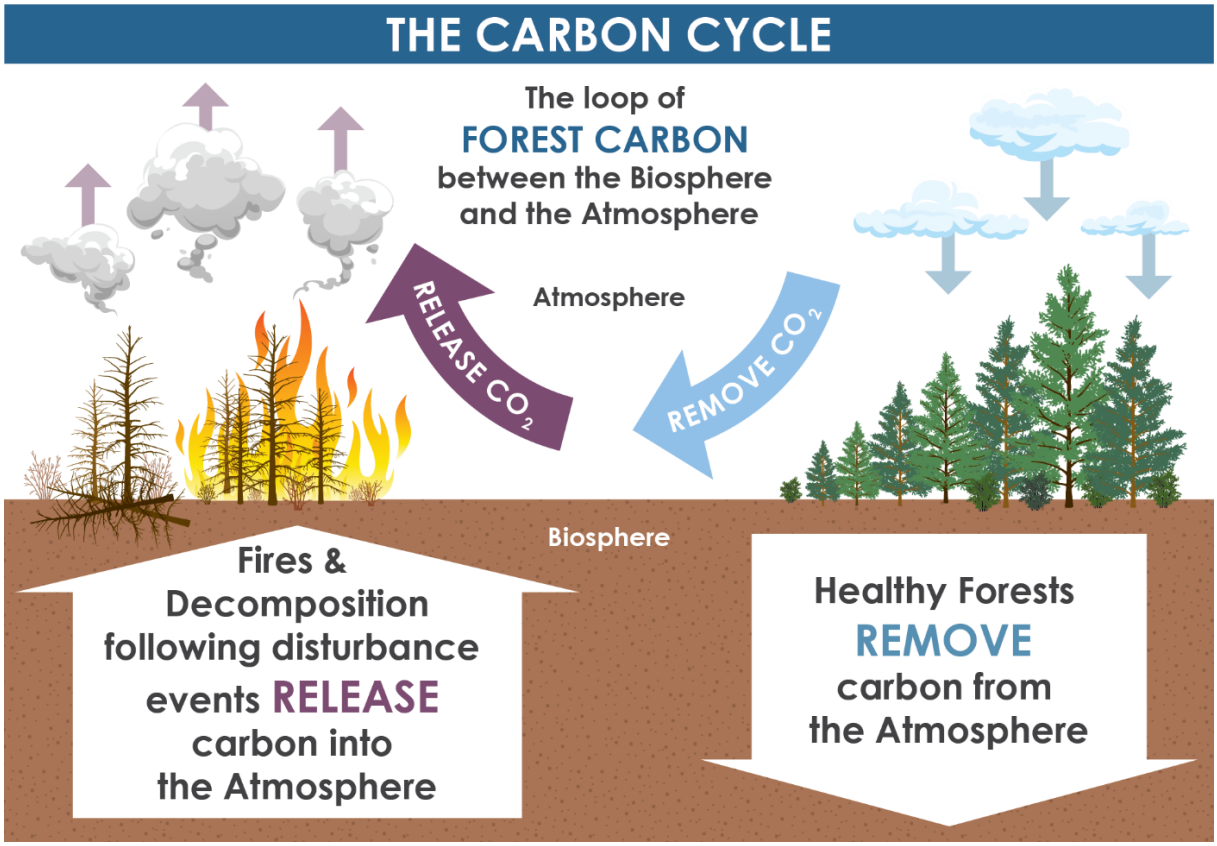
[18] Bonnicksen. 2008. Greenhouse Gas Emissions from Four California Wildfires: Opportunities to Prevent and Reverse Environmental and Climate Impacts. Available: <http://www.orww.org/Wildfires/References/Climate_&_Atmosphere/Bonnicksen_2008.pdf>. Accessed June 2, 2021

[19] CARB. 2021. Frequently Asked Questions: Wildfire Emissions. Available: <https://ww3.arb.ca.gov/cc/inventory/pubs/wildfire_emissions_faq.pdf>. Accessed June 7, 2021.

[20] CARB. 2021. Frequently Asked Questions: Wildfire Emissions. Available: <https://ww3.arb.ca.gov/cc/inventory/pubs/wildfire_emissions_faq.pdf>. Accessed June 7, 2021.

Figure 6 graphically details the carbon cycle exchange between the biosphere and atmosphere, including when 1) carbon stock loss occurs within the biosphere releasing GHG emissions into the atmosphere as a result of wildfire as well as 2) how carbon dioxide from the atmosphere is sequestered by vegetation in the biosphere.

Figure 6 Forest Carbon and Fire Cycle



Source: Rincon Consultants, Inc., 2021

The health of the majority California's ecosystems are dependent on wildfire, which can reduce buildup of organic debris that can fuel high-severity wildfires, release nutrients into the soil, and trigger changes in vegetation community composition.[21] Historically, indigenous people of California understood the interactions of wildfire and the natural lands, even using controlled burns to promote the health of natural lands. However, in the 20th century fire suppression became the guiding force for U.S. fire policy that was intended to protect communities and resources.[22] This has created a disruption in the natural carbon cycle of forests that arises from a lack of naturally occurring fires that serve to regularly clear undergrowth, enhance available nutrients, and promote the long-term health of mature trees.

Climate change has also contributed to this imbalance in the carbon cycle, where forests have become increasingly affected by drought and invasive species. This can turn forests into a carbon source, with decaying biomass emitting carbon to the atmosphere and becoming fuel for

[21] CARB. 2020. Public Comment Draft: Greenhouse Gas Emissions of Contemporary Wildfire, Prescribed Fire, and Forest Management Activities. Available: <https://ww3.arb.ca.gov/cc/inventory/pubs/ca_ghg_wildfire_forestmanagement.pdf>. Accessed June 7, 2021.

[22] Bruno. 2020. Indigenous tribes in California and other parts of the U.S. have been rekindling the ancient art of controlled burning. The Nature Conservancy. Available: <https://www.nature.org/en-us/magazine/magazine-articles/indigenous-controlled-burns-california/>. Accessed June 7, 2021.

wildfires.[23] The current state of many California forests is that of a carbon cycle imbalance, where more severe wildfires occur that burn hotter and more intense resulting in a higher loss of carbon storage in biomass and, in turn, generate a greater release of GHG emissions into the atmosphere from both the initial burning and later decay of burned trees. This loss of biomass also reduces the ability for forests to continue to absorb carbon generated by human activities, furthering the carbon imbalance seen in the atmosphere.

Carbon cycle imbalances between the atmosphere and biosphere create a feedback loop that exacerbates the impacts of wildfire. The increased carbon dioxide levels in the atmosphere contribute to climate change, which impacts forests by increasing tree mortality due to extreme heat events, droughts, and increased levels of invasive species.[24] The combination of climate change and the unhealthy forests that result from human policy and land use development are both contributing to high-severity wildfires (high present long term perturbations to ecosystems, biodiversity, and carbon storage potential) and increased GHG emissions from the direct loss of carbon stock during wildfire events.

3.2 Land Carbon Stock by Vegetation Type

GHG emissions from wildfire is dependent on the vegetation type, as vegetation types with higher carbon densities have a higher potential for GHG emissions (i.e. forests) and vegetation types with lower carbon densities have a lower potential for GHG emissions (i.e. grass and shrublands). The NWL carbon inventory performed in the previous section provides a basis for assessing the carbon emissions associated with different vegetation types based on their carbon storage potential. While there are many factors that can attribute to the degree which carbon storage is lost from a wildfire (i.e. fuel loading and fuel moisture), generally, areas with higher carbon storage values will see higher carbon emissions and higher losses of carbon storage in many wildfire scenarios.

Each land cover class discussed in the NWL carbon inventory provides a unique carbon storage value and accordingly a unique potential for carbon loss during wildfire. Biomass carbon densities were derived from the NWL inventory, using volumetric estimates of carbon mass provided by the CARB and the Calaveras specific Existing Vegetation Types, Heights, and Covers. As shown in Table 5, mixed forests have the largest biomass carbon densities and cover the largest land area in Calaveras County. Deciduous forests also have a relatively large biomass carbon density and contribute the second most to the overall biomass carbon stock in the County, even though land area covered is relatively small compared to shrub/scrub land cover and mixed forest. The deciduous forest and mixed forest land covers contribute the largest to the total biomass carbon stocks, and as such have the highest potential for carbon losses in the case of wildfire.

[23] Natural Resources Canada. 2020. Climate Change Impacts on Forests. Available: <https://www.nrcan.gc.ca/climate-change/impacts-adaptations/climate-change-impacts-forests/forest-carbon/13085>. Accessed June 7, 2021.

[24] CARB. 2021. Frequently Asked Questions: Wildfire Emissions. Available: <https://ww3.arb.ca.gov/cc/inventory/pubs/wildfire_emissions_faq.pdf>. Accessed June 7, 2021.

Table 5 Calaveras County NWL Biomass Carbon Density (2010 and 2020)

Land-cover Class	2010			2020		
	2010 Biomass Carbon Stock (MT CO_2)	2010 Acres	2010 Biomass Carbon Density (MT CO_2/acre)	2020 Biomass Carbon Stock (MT CO_2)	2020 Acres	2020 Biomass Carbon Density (MT CO_2/acre)
Barren	4,941	3,996	1.2	4,526	3,658	1.2
Cultivated Crops	3,773	842	4.5	10,373	2,912	3.6
Deciduous Forest	2,339,939	43,748	53.5	2,264,892	37,636	60.2
Development	0.0	11,717	0.0	0.0	12,259	0.0
Evergreen Forest	97,079	1,835	52.9	228,808	11,243	20.4
Grassland/ Herbaceous	29,751	13,058	2.3	118,491	44,797	2.6
Mixed Forest	26,028,502	420,723	61.9	25,851,098	354,620	72.9
Open Water	0.0	14,288	0.0	0.0	15,960	0.0
Shrub/Scrub	3,932,040	152,632	25.8	1,566,025	178,190	8.8
Wetland	0.0	0.0	0.0	4,259	1,563	2.7
Total	**32,436,025**	**662,838**	**49**	**30,048,472**	**662,838**	**45**

Sources: LANDFIRE, 2021; CARB, 2020

3.3 Potential Emissions from Carbon Stock Loss

Wildfires contribute significantly to carbon stock losses which result in GHG emissions as the carbon stocks are transferred from the biosphere to the atmosphere. While many factors contribute to the degree in which carbon is lost during a wildfire event, the analysis here is intended to provide a general estimate from theoretical fire scenarios and a review of the carbon stock loss and emissions potential from the 2015 Butte Fire. The primary focus of the GHG emissions analysis is on forested areas with larger potential for carbon storage losses.

It is difficult to accurately estimate GHG emission and carbon stock losses from wildfire, as each wildfire event has different characteristics that influence the degree to which carbon stocks are lost. The intensity of fires can vary greatly, even within areas of the same wildfire event. Some events can result in a nearly complete loss of all living biomass, whereas some may only burn undergrowth and leave longstanding trees relatively unharmed. These variables may greatly impact the degree to which carbon stocks are lost and GHG emissions are generated. Additionally, the decomposing deadfall that remains after live vegetation has been burned by wildfire also serves as an emissions

source for decades after the initial emissions impact of fuel burning, which further complicates the full understanding of GHG emissions and carbon stock loss impact.[25]

3.3.1 Cause, Vegetation Type, and Area of Emissions Impacts

Estimates for wildfire emissions potential for forested areas of Calaveras County are based on the 2010 study *High-severity wildfire effects on carbon stocks and emissions in fuels treated and untreated forest*.[26] This study surveyed the carbon stock loss and emissions impact of several fires throughout California in both treated areas, where forest management has occurred, and untreated areas. The American River Complex fire surveyed in the study occurred in a region of the western Sierra Nevada Mountains in Placer County, which is estimated to be the most characteristic of Calaveras County forests. While the live tree and surface fuel carbon stocks estimated from the study do not exactly match that those derived in from the NWL inventory in this study, different survey methods were used to estimate biomass carbon which is the likely source of this discrepancy.[27] The emission estimates reported from wildfire in the study area show that approximately 28.9 to 30.7 percent of the biomass carbon is converted to emissions in areas of the wildfire that were untreated, which decreased to a range of 12.7 to 12.9 percent for treated forests.

The emissions estimates based on the aforementioned 2010 study estimates the wildfire emissions that would occur in deciduous and mixed forests and can be used as a reference for similar land cover in Calaveras County, which represent 8 and 86 percent of above- and below-ground carbon stocks in Calaveras County in 2020, respectively. For untreated forests, an average of 29.8 percent of biomass carbon could be converted to carbon emissions from wildfire. Using 2020 biomass carbon densities for deciduous and mixed forest of 60.2 and 72.9 MT CO_2/acre, respectively, in Table 4, burning of this land during a wildfire has the potential to release emissions of 17.9 and 21.7 MT CO_2/acre burned. This value generally aligns with the CARB estimates for overall California annual wildfire emission per acre, which averages to about 20.6 MT CO_2e/acre between the years 2000 and 2019.[28,29] Given that the California wildfire emissions also include the burning of grasslands and shrublands, it is likely that the values derived here for Calaveras County is an underestimate. In the unlikely scenario that the majority of the deciduous and mixed forests in Calaveras County were to burn over multiple future wildfire events, the forested land of Calaveras County has an emissions potential of over 8 million MT CO_2 from the conversion of carbon stocks to atmospheric carbon.

The emissions estimates for wildfire in forested areas provided here are intended to provide a general estimate based on published relevant research. Fire emission modeling performed in other practices can take many additional considerations into account, including weather conditions, fuel moisture content, fire intensity, and smoldering time. However, this is beyond the scope of the analysis completed here-in.

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[25] North and Hurteau. 2011. High-severity wildfire effects on carbon stocks and emissions in fuels treated and untreated forest. Available: <https://www.fs.fed.us/psw/publications/north/psw_2011_north002.pdf>. Accessed June 3, 2021.

[26] North and Hurteau. 2011. High-severity wildfire effects on carbon stocks and emissions in fuels treated and untreated forest. Available: <https://www.fs.fed.us/psw/publications/north/psw_2011_north002.pdf>. Accessed June 3, 2021.

[27] North and Hurteau. 2011. provides a biomass carbon density of 84.7 and 82.3 MT CO_2/acre for the two survey areas, while the NWL inventory provides an estimate of 72.9 MT CO_2/acre for mixed forest.

[28] The average wildfire emissions per acre account for the burning of shrublands and grasslands, which have lower carbon storage values, as well as forests. Therefore, it is expected that the average value for all fires in California would be expected to be lower than the value for forests specifically.

[29] CARB. 2020. Public Comment Draft: Greenhouse Gas Emissions of Contemporary Wildfire, Prescribed Fire, and Forest Management Activities. Available: <https://ww3.arb.ca.gov/cc/inventory/pubs/ca_ghg_wildfire_forestmanagement.pdf>. Accessed June 7, 2021.

3.3.2 Wildfire-related GHG Emissions Case Study – Butte Fire

The Butte Fire that occurred in September 2015 is one of the top 20 most destructive California wildfires and was the most significant wildfire to occur in Calaveras County in the past century with 70,868 acres burned. [30] The fire was ignited by tree branches coming in contact with powerlines in Amador County in September of 2015, with high winds quickly spreading the fire into Calaveras County. Not only did this fire ignite in the WUI, nearly 30 percent of acreage burned was considered WUI land.[31] The Butte Fire occurred in the midst of California's historic drought, from 2012 to 2016. Increased potential for extended dry periods that fuel wildfires is expected with climate change.[32]

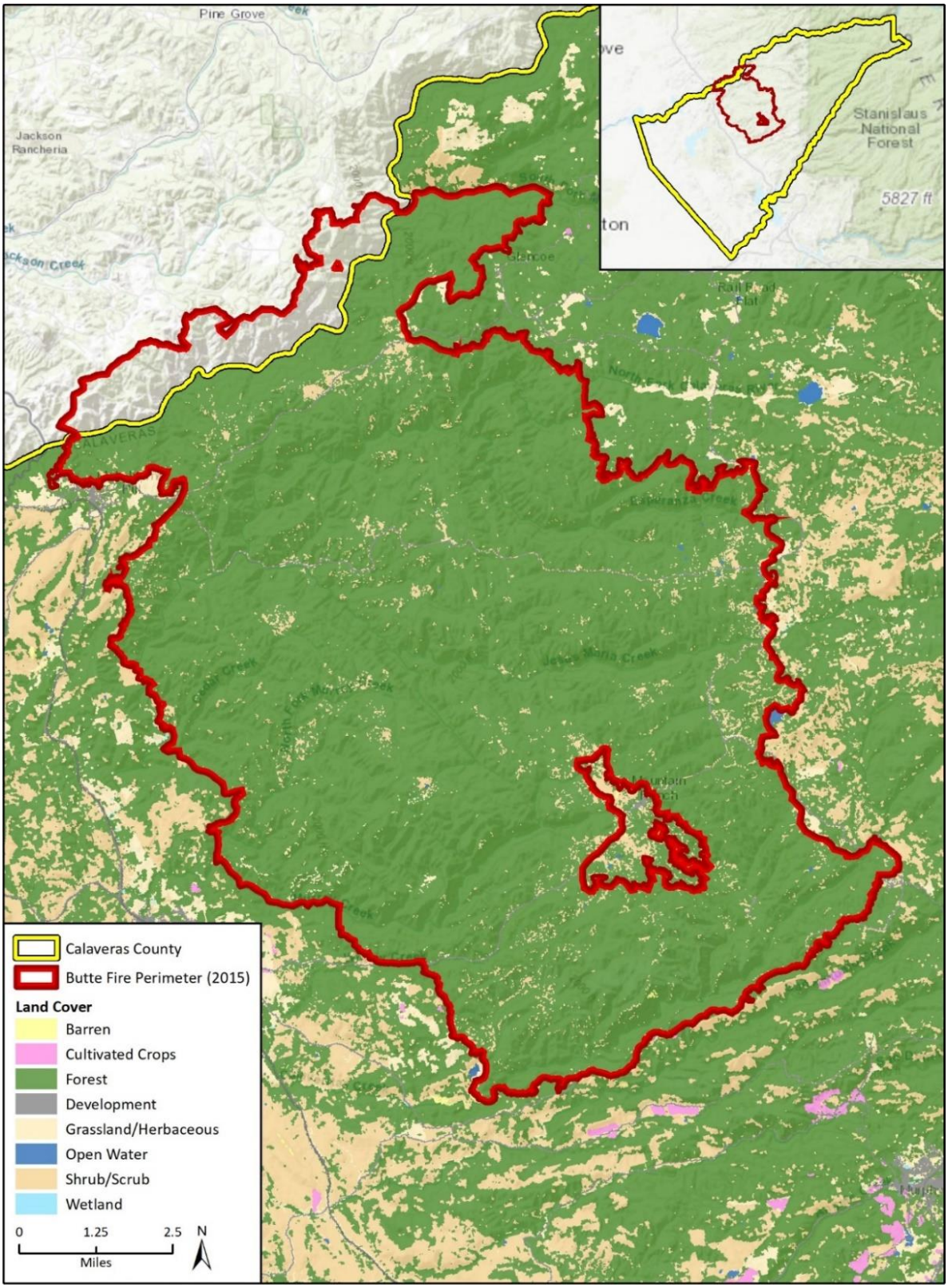
The Butte Fire burned through regions of the County with high carbon sequestration values, resulting in high GHG emissions and high carbon stock losses. As shown in Figure 7 and Table 6, the wildfire burned through primarily deciduous forest and mixed forest land-cover vegetation types in Calaveras County, as provided by the 2010 NWL inventory.

[30] CalFIRE. 2021. Top 20 Most Destructive California Wildfires. Available: <https://www.fire.ca.gov/media/t1rdhizr/top20_destruction.pdf>. Accessed May 26, 2021.

[31] Bay City News. 2018. Wildland Development Escalates California Fire Costs. Available: <https://www.kqed.org/news/11713393/wildland-development-escalates-california-fire-costs>. Accessed June 7, 2021.

[32] Diffenbaugh et al. 2015. Anthropogenic warming has increased drought risk in California. Available: <https://www.pnas.org/content/112/13/3931.short>. Accessed June 7, 2021.

Figure 7 2010 NWL Inventory and Butte Fire Perimeter



Sources: CalFIRE, 2020; ESRI, 2021; LANDFIRE 2021

Table 6 Butte Fire Footprint Land-cover Class from 2010 NWL Inventory

Land-cover Class	Butte Fire Footprint Area (acres)	Percentage of Footprint Area
Barren	61	<1%
Deciduous Forest	14,281	21%
Development	429	1%
Evergreen Forest	232	<1%
Grassland/Herbaceous	172	<1%
Mixed Forest	49,473	74%
Open Water	89	<1%
Shrub/Scrub	2,566	4%
Grand Total	**67,303**	**100%**

Sources: LANDFIRE, 2021; CARB, 2020

A general estimate of GHG emissions associated with the Butte Fire can be calculated using the deciduous forest and mixed forest emission factors of 17.9 and 21.7 MT CO_2/acre burned, derived above. As shown in Table 7, it has been estimated that the Butte Fire generated approximately 1.3 million MT CO_2 from direct fire emissions from the primary affected vegetation types, which only includes the direct emissions from conmustion and does not account for the additional future emission that occur as burned biomass decays and emits GHGs for decades after the event. This conversion of carbon, sequestered in biomass, to atmospheric carbon contributing to climate change impacts is nearly four times the GHG emission generated by the County from energy consumption, waste generation and transportation in one year.

Table 7 Butte Fire GHG Emission Estimates from Primary Land-cover Types

Land-cover Class	Butte Fire Footprint Area (acres)	Percentage of Footprint Area	GHG Emission Factor (MT CO_2/acre)	GHG Emissions (MT CO_2)
Deciduous Forest	14,281	21%	17.9	255,632
Mixed Forest	49,473	74%	21.7	1,073,557
Grand Total	**63,754**	**95%**		**1,329,188**

Sources: LANDFIRE, 2021; CARB, 2020; CalFIRE, 2020; MP North and MD Hureau. 2011

3.4 County Land Carbon Management Scenarios

The degree to which carbon is lost during a wildfire event is dependent on many variables, one of which is whether fire management practices have occurred in the affected area. It has been shown that fire management practices such as deadfall clearing, thinning, and prescribed burning have a significant influence on reducing the intensity and severity of wildfires resulting in more living trees remaining after a wildfire event.[33] While most forest management practices result in a net removal of carbon stocks from either the managed burning or removal of biomass material, the long-term benefits of protecting large trees with higher carbon storage values and preserving natural ecosystems may outweigh the short-term loss of carbon storage.

While wildfires are a natural process that will inevitably continue, management of forests in the County can significantly reduce the impacts of wildfires in both severity and GHG emission potential. Based on the results of the 2010 study *High-severity wildfire effects on carbon stocks and emissions in fuels treated and untreated forest* , forested areas that have been treated with mechanical and prescribed fire forest management show significantly less GHG emissions and tree mortality rates than areas that were untreated.[34] In the western Sierra Nevada wildfire scenario discussed in Section *3.3, Potential Emissions from Carbon Stock Loss*, wildfire in untreated forest areas converted approximately 29.8 percent of biomass carbon to GHG emissions, while treated forest areas had approximately 12.8 percent of biomass carbon converted to GHG emissions. Similarly, treated forests experienced far less tree mortality rates, with 58 to 63 percent tree mortality compared to 93 to 100 percent tree mortality in untreated forests. Based on these results, forest management to reduce the intensity and severity of wildfires can reduce GHG emissions from wildfire by approximately 57 percent. In the context of Calaveras County, this could reduce the GHG emissions potential per acre of forested land from 21.7 MT CO_2/acre burned down to 9.3 MT CO_2/acre burned.

While forest management practices result in a net loss of carbon in the County, the potential to preserve longstanding carbon reserves in larger trees reduces the potential for uncontrolled fires in the County.

3.5 County Emissions from Carbon Stock Loss Summary

The potential impact of GHG emissions from wildfire in forested areas of Calaveras County is significant and would result in a net loss of valuable carbon stocks that sequester GHG emissions that contribute to the impacts of climate change. Forest management practices such as thinning and prescribed burns can reduce both the GHG emission from wildfire and reduce the severity and intensity of wildfires, resulting in reduced tree mortality rates. While forest management practices result in a net loss of carbon in the County, the potential to preserve longstanding carbon reserves in larger trees reduces the potential for uncontrolled fires in the County. This connection between carbon stock loss and wildfire-related GHG emissions is essential for understanding the impact related to the County's potential contribution of GHG emissions related to wildfire occurrence. Section 4 discusses climate change vulnerability specific to wildfire.

[33] Halofsky et al. 2020. Changing wildfire, changing forests: the effects of climate change on fire regimes and vegetation in the Pacific Northwest, USA. Available:<https://fireecology.springeropen.com/articles/10.1186/s42408-019-0062-8#Sec27>. Accessed June 3, 2021.

[34] North and Hurteau. 2011. High-severity wildfire effects on carbon stocks and emissions in fuels treated and untreated forest. Available: <https://www.fs.fed.us/psw/publications/north/psw_2011_north002.pdf>. Accessed June 3, 2021.

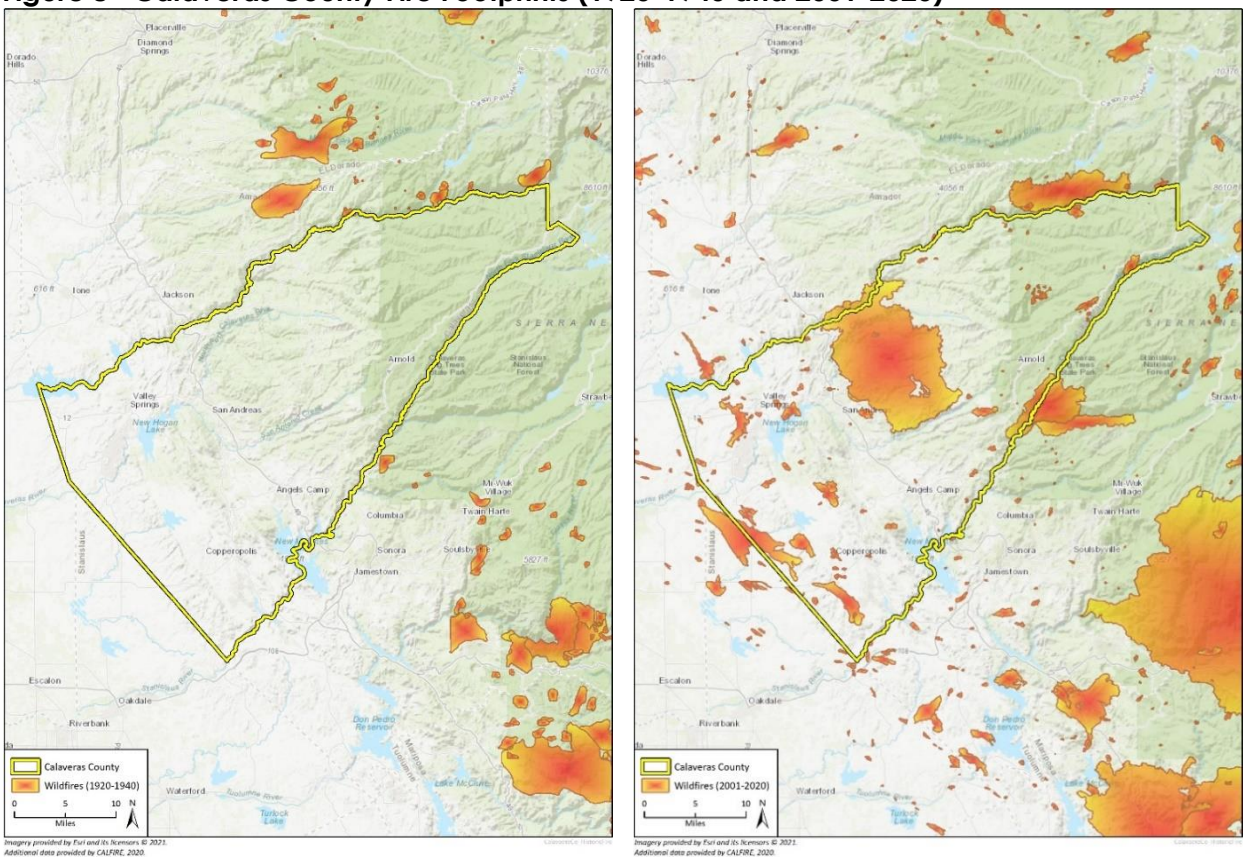
4 Climate Change Vulnerability Assessment Specific to Wildfire

The Calaveras County potential wildfire-related GHG emissions from carbon stock loss lends to a critical opportunity to assist in furthering thought leadership, especially when facing a challenge as daunting as adapting to changing fire frequency, intensity, and consequences that have been driven by climate change, development patterns, and land management practices. Thus, provided below is a Calaveras County climate change vulnerability assessment specific to the climate change hazard of wildfire. The increasing devastation and loss of life from wildfires in California's WUI must be mitigated to reverse this destructive trend and make California safer while improving the health of California's forests, shrublands, and grasslands.

4.1 Historical Wildfire

Calaveras County has experienced wildfire over the past century, as shown by the historical wildfire maps below in Figure 8. The most recent period from 2001 to 2020 shows a greater amount of County acreage affected by wildfire compared to the period from 1920-1940.

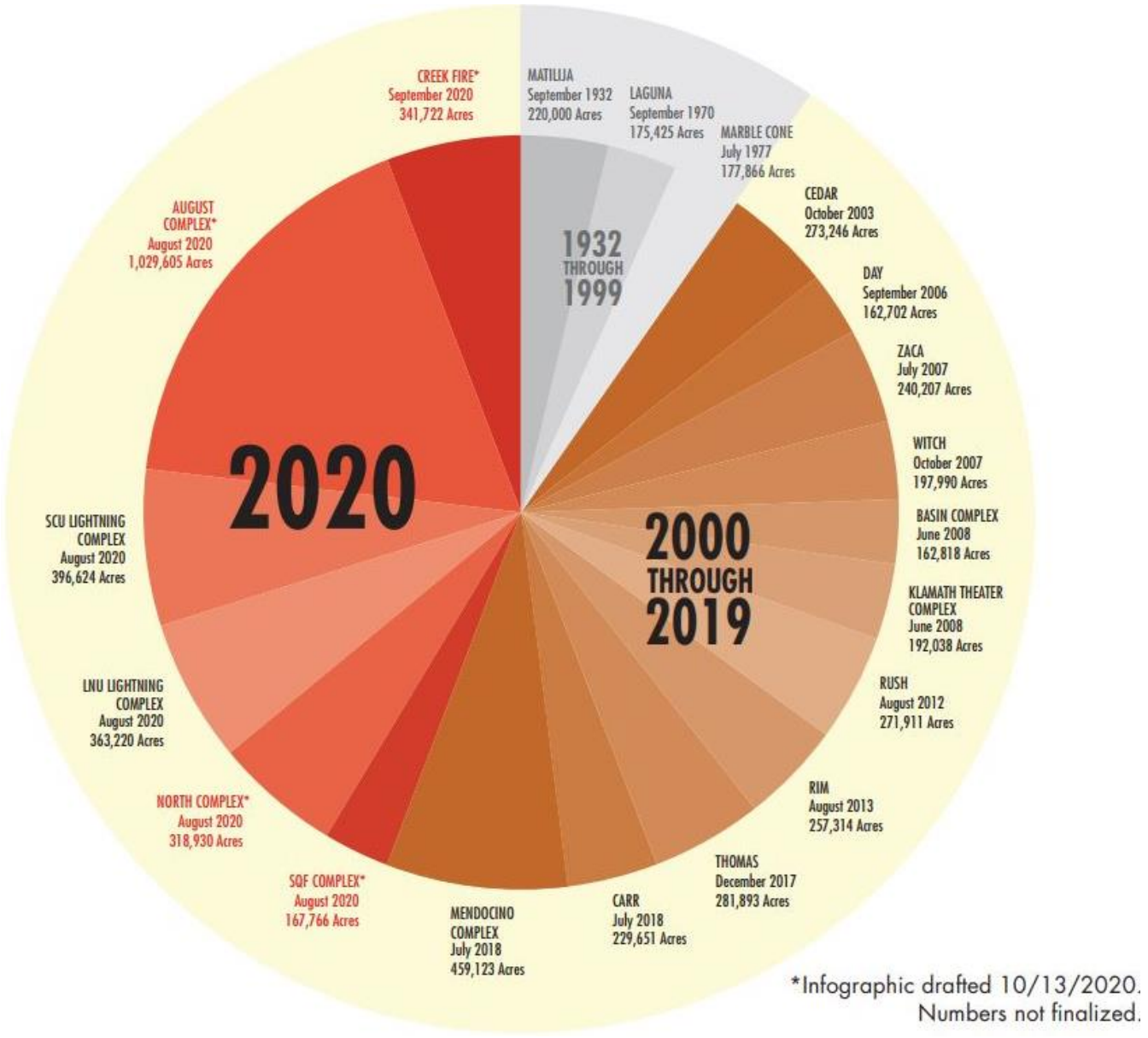
Figure 8 Calaveras County Fire Footprints (1920-1940 and 2001-2020)



Source: CalFIRE Fire and Resource Assessment Program (CalFIRE FRAP). 2021. California Fire Perimeters GIS dataset. Available: <https://frap.fire.ca.gov/mapping/gis-data/>. Accessed May 26, 2021.

However, as shown in Figure 9, over the approximate last century the majority of the top 20 largest California wildfires occurred since 2000. Specifically, five of the State's six largest fires burned more than four million acres during the same timeframe (double the previous record) in 2020, destroying thousands of buildings, forcing hundreds of thousands of people to flee their homes, and exposing millions of people across the State to dangerously unhealthy air.

Figure 9 Top 20 Largest California Wildfires



Source: CGFMTF. 2021. California Wildfire & Forest Resilience Action Plan. Available: <https://www.fire.ca.gov/media/ps4p2vck/californiawildfireandforestresilienceactionplan.pdf>. Accessed May 27, 2021.

Therefore, the expanse of acreage affected by wildfire has increased over time, and the frequency and intensity of wildfire has also increased over the past century throughout California.

4.2 Wildfire Exposure Potential

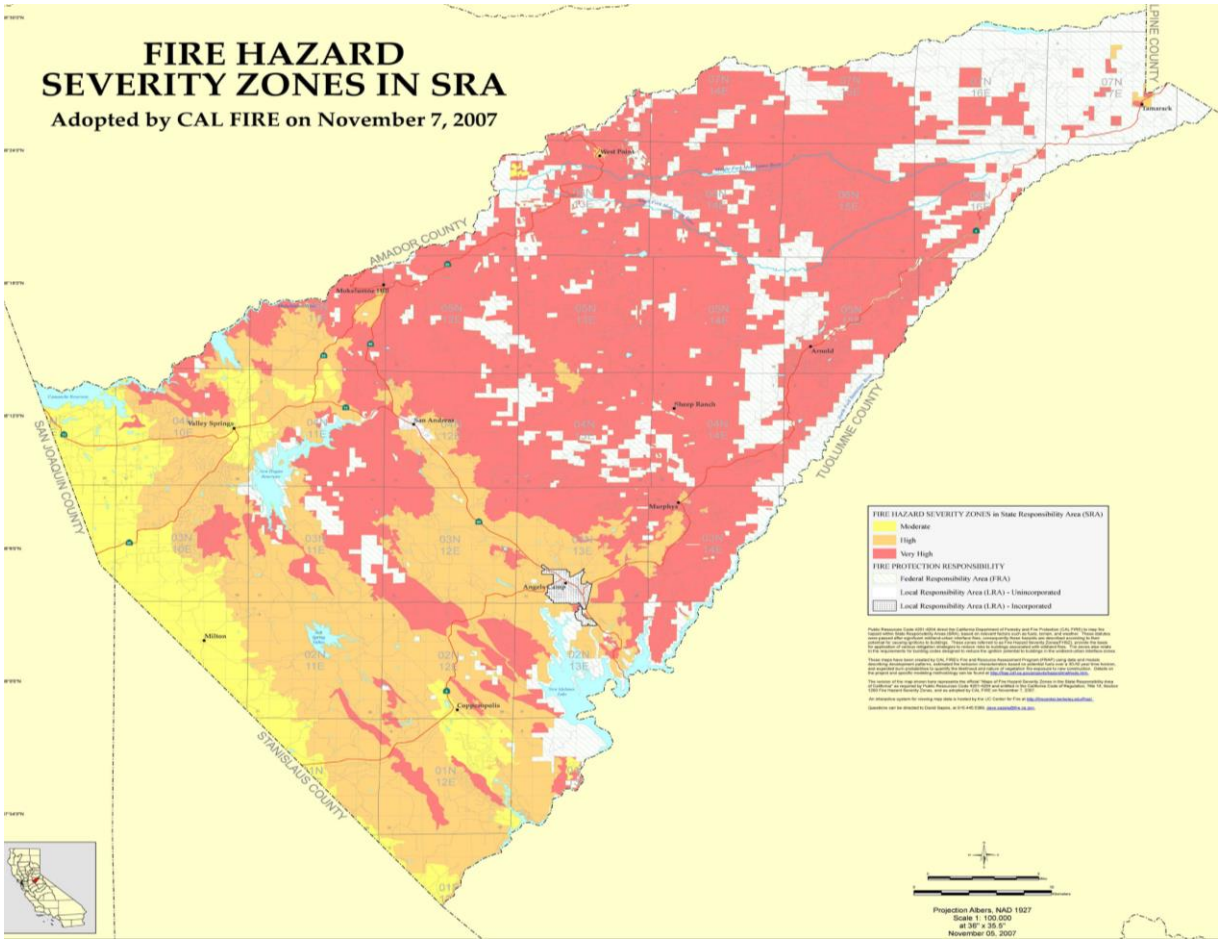
Wildfire exposure potential can be determined by looking at the existing and projected likelihood of certain areas to wildfire. The existing likelihood is discussed below in terms of existing mapped fire hazard severity zones for Calaveras county. The projected likelihood is discussed below in terms of projected wildfire exposure areas for Calaveras County.

4.2.1 Existing Fire Hazard Severity Zones

The California Department of Forestry and Fire Protection (CalFIRE) serves and safeguards the people and protects the property and resources over 31 million acres of California's privately owned wildlands. Preventing wildfires within the State Responsibility Area (SRA) is a pivotal part of CalFIRE's mission. Public Resources Code 4201-4204 direct CalFIRE to map fire hazard within SRA based on relevant factors such as fuels, terrain, and weather. Additionally, CalFIRE provides recommendations for Local Responsibility Area (LRA) lands for cities and unincorporated areas of counties. These statutes were passed after significant WUI fires occurred and, consequently, fire hazards are described according to their potential for causing ignition to buildings. The Fire Hazard Severity Zones (FHSZs) provide the basis for application of various strategies to reduce risks to buildings associated with wildland fires and also relate to the requirements for building codes designed to reduce ignition potential to buildings in WUI zones.[35] As shown in Figure 10, the majority of Calaveras County is mapped as a FHSZ. The eastern portion of the County is dominated by a category of Very High FHSZ, while the western portion of the County is mapped as a combination of Very High, High, and Moderate FHSZs. Figure 11 also shows the Very High FHSZs within the City of Angels Camp, as recommended by CalFIRE. These show Very High FHSZs in the northwestern, southern, and eastern regions of the City.

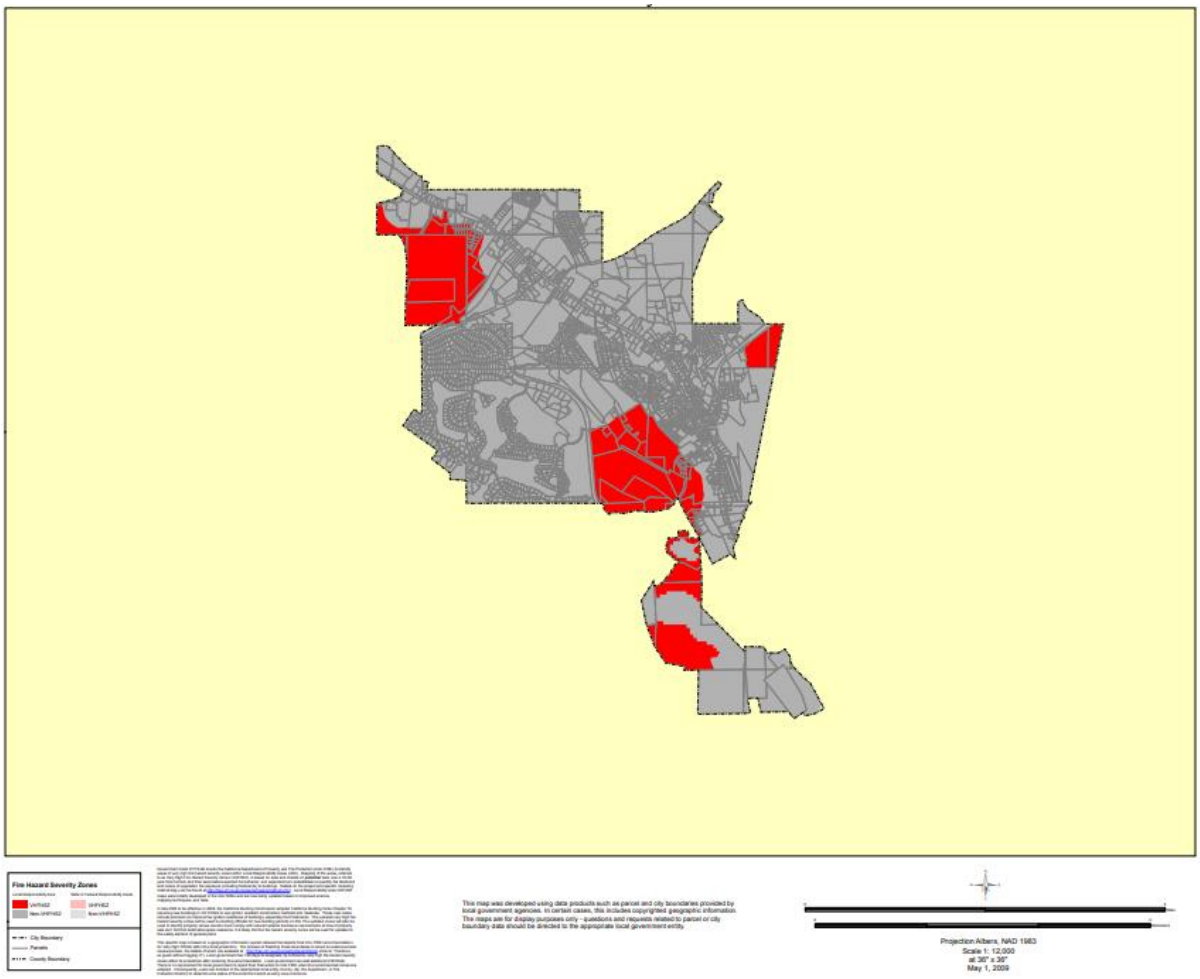
[35] California Office of the State Fire Marshal (COSFM). 2021. State Fire Hazard Severity Zones Maps. Available: <https://osfm.fire.ca.gov/divisions/wildfire-planning-engineering/wildland-hazards-building-codes/fire-hazard-severity-zones-maps/>. Accessed May 25, 2021.

Figure 10 Calaveras County Fire Hazard Severity Zones in SRA



Source: COSFM, 2021.

Figure 11 City of Angels Camp Fire Hazard Severity Zones in LRA



Source: COSFM, 2021.

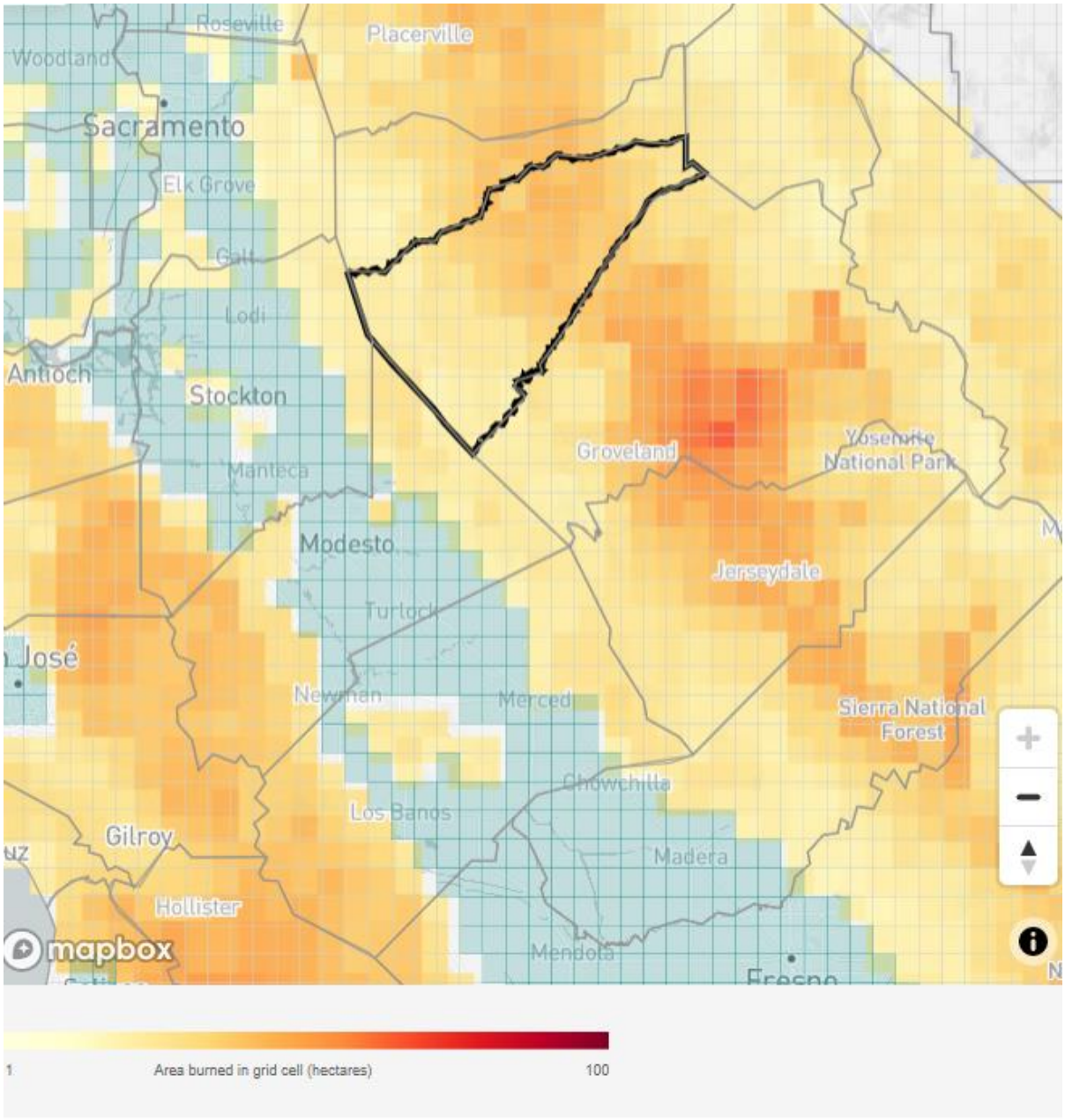
Projected Wildfire Exposure Due to Climate Change

Historical fire occurrence data and existing fire hazard severity zones in conjunction with climate change projections can be used to evaluate the relative probability of wildfire ignition and occurrence of large fires across the State and in Calaveras County.[36] Potential wildfire hazard due to climate change over the next approximate century is expected to continue to grow in the State and within Calaveras County. Per Cal-Adapt and as shown in Figure 12 and Figure 13, wildfire impacts are projected to further increase, especially within the eastern portions of Calaveras County, in terms of the number of acres burned over the next century.[37]

[36] Conservation Biology Institute. 2021. Modeling the Potential for Fire Ignition and Large Fire Occurrence.

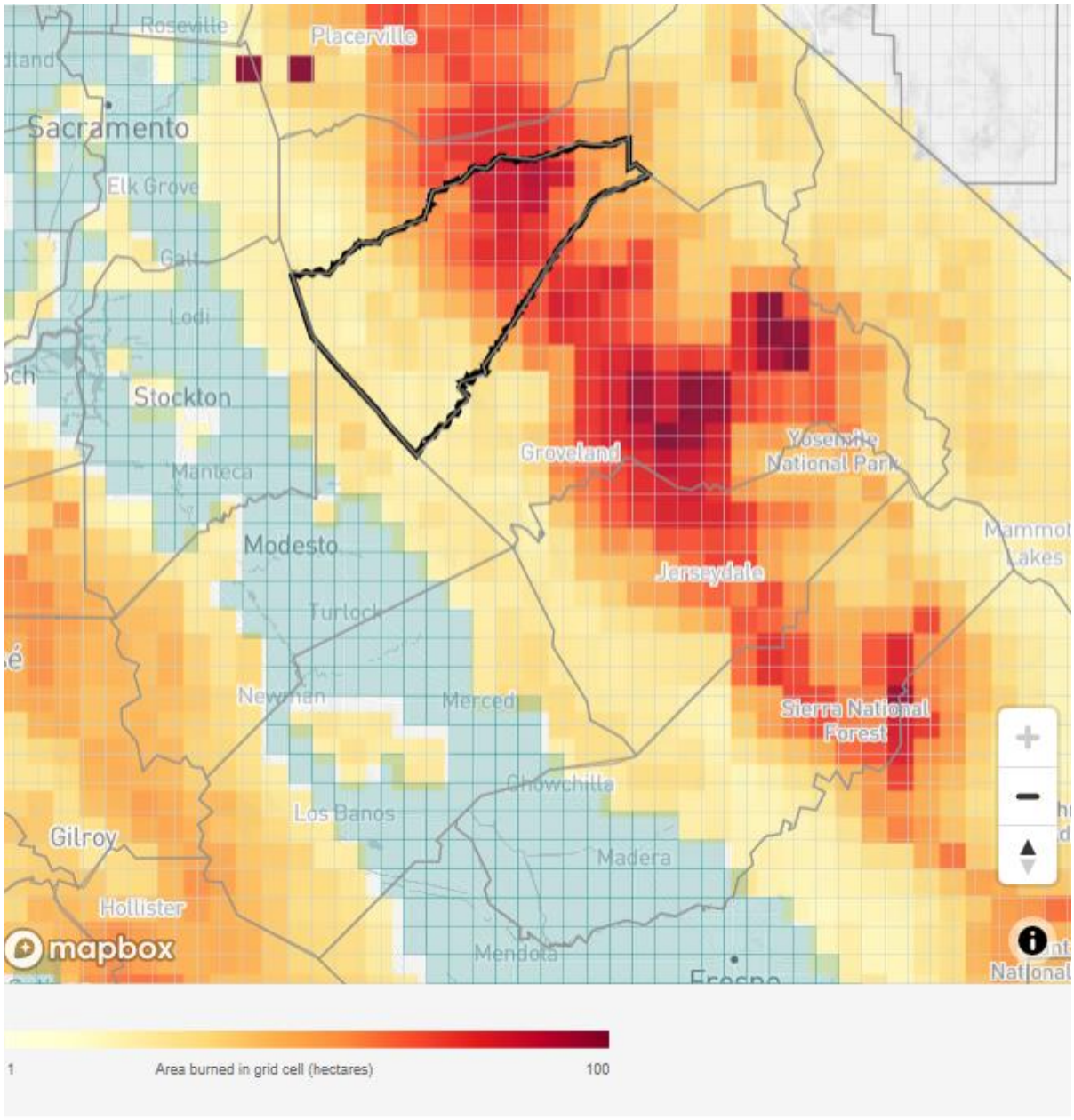
[37] These Cal-Adapt figures projecting wildfire acres burned over the next approximate century utilize the representative concentration pathway (RCP) 8.5 (high emissions scenario) per CalOES recommendation.

Figure 12 Calaveras County Projected Wildfire Exposure Areas (2020s)



Source: Cal-Adapt, 2021.

Figure 13 Calaveras County Projected Wildfire Exposure Areas (2090s)



Source: Cal-Adapt, 2021.

These resulting projected wildfire exposure area maps are intended to support a regional priority plan to reduce wildfire risk and improve forest health.

4.3 Wildfire Community Sensitivities

Communities will be affected by climate change to varying degrees depending on how sensitive the communities are to impacts and the severity of the impacts. Virtually all people and assets in a community will be affected by climate change in some way. However, it is not usually feasible to assess the vulnerability of every population group or every asset in the community. The sensitivity

of a community depends on the aspects of the community (i.e., specific populations and assets) most affected by anticipated climate impacts, and how prevalent they are in the community. The most likely impact of climate change that Calaveras County may experience is an increase in wildfire risk. This section of the vulnerability assessment identifies sensitive areas of the Calaveras community.

4.3.1 Populations

Population demographics are determined using the California Healthy Places Index (HPI) and United States Census Bureau unless otherwise noted. County level data are among the more comprehensive statistics available for understanding climate impacts on Sierra Nevada communities and show that 12 of the 20 counties in the Sierra Nevada qualify as disadvantaged or economically distressed; Calaveras County hovers at the threshold, though it is not considered distressed despite the community and landscape devastation caused by the 2015 Butte Fire.[38] However, of the 45,578 persons residing in Calaveras County, the following population groups may be disproportionately harmed by the climate change hazard of wildfire.

Older adults: Persons 65 years or older are more at risk for climate change impacts related to wildfire, especially those living alone, because aging can impair muscle strength, coordination, cognitive ability, immune system, and the regulation of body temperature. These conditions can be exacerbated by poor air quality resulting from wildfires and present challenges in evacuating older adult populations. Approximately 28 percent of County residents are over 65 years, which is more than the Statewide average of 15 percent of residents over 65 years.

Persons with chronic health conditions or disabilities: These are people who have a long-term or permanent health condition that can create regular challenges in their day-to-day lives. These health problems include cancer, heart disease, obesity, and arthritis. In addition, these are people with any kind of disability, including mobility challenges, hearing or vision impairments, behavioral disabilities, and challenges living independently or taking care of themselves. Chronic illnesses are exacerbated by climate change, with wildfire presenting additional risk through increased air pollution and difficulty in evacuating persons with mobility challenges and essential medical equipment. Approximately 15 percent of County residents have a disability.

Renters: These are people who live in homes that they (or the head of their household) do not own. Renters have less control over home improvements than homeowners and may not be able to adequately protect themselves from climate hazards such as wildfire by retrofitting their homes and adjusting their property's surroundings. Approximately 12 percent of housing units in the County are renter-occupied.

Uninsured individuals: People without health insurance have difficulty accessing quality health care and are more likely to have unmet health needs. Climate impacts such as wildfire and related elevated levels of air pollution are expected to cause direct and indirect health impacts, particularly for vulnerable populations with limited or no access to health services. Approximately 7 percent of County residents aged 18 to 64 are uninsured.

[38] OPR, CNRA, and California Energy Commission (CEC). 2021. California's Fourth Climate Change Assessment Report – Sierra Nevada Region Report. Available: <https://www.energy.ca.gov/sites/default/files/2019-11/Reg_Report-SUM-CCCA4-2018-004_SierraNevada_ADA.pdf>. Accessed May 28., 2021.

4.3.2 Buildings

Residential Structures: Residential structures in Calaveras County consist of single-family dwellings and multi-family units, totaling 27,995 housing units.

Public Safety Facilities: Public safety facilities include fire buildings and police stations. Calaveras County has 39 fire departments and fire stations owned and operated by nine local fire districts. The County is also served by the Calaveras County Sherriff's Office with a headquarters and four substations located within the County.[39]

Community Facilities and Government Buildings: Community and government facilities are public properties and are important to the residents as well as the operation of the County. The County seat is located in San Andreas. In addition, there are eight public libraries within the County, the San Andreas Central Library and seven additional branch libraries.[40]

Schools: Calaveras County has four school districts and a County Office of Education. There are ten elementary schools (one is K-8), two middle schools, two high schools, and several alternative schools. The total K-12 student population is approximately 5,300.[41] The schools are located primarily along access road corridors such as California Highway 49, California Highway 4, and California Highway 26, and the County Office of Education is located proximate to the intersection of California Highways 49 and 4 in Angels Camp.

4.3.3 Infrastructure

Access Roads: Access roads provide entry to and exit from communities and neighborhoods. A limited number of entry and exit points does not make a road itself more vulnerable than other roads, but disruption to access roads can effectively cut off large numbers of people from other areas of the County. California State Routes 49, 4, and 26 are the primary access roads into and out of the County.

Water System: The Calaveras County Water District supplies water to the County, including to about 13,080 municipal and residential/commercial customers in six service areas throughout the County.[42] Within the City of Angels Camp, the City provides water and sewer services to businesses and residents.

Electrical Utility Lines and Natural Gas Pipelines: These lines transmit and deliver electricity and natural gas from Pacific Gas & Electric to the County. The County has both underground and overhead electric utility lines as well as underground natural gas pipelines.

Electrical Substations: Electrical substations are facilities that convert electricity from one voltage to another, making it suitable for long-distance transmission or for use by homes, businesses, and other electrical customers. There is one electrical substation, the PG&E Valley Springs Substation, located within the County limits and owned and operated by Pacific Gas & Electric.

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[39] Calaveras County. 2021. County Sheriff's Office. <https://sheriff.calaverasgov.us/Outreach/Substations>. Accessed June 2, 2021.

[40] Calaveras County. 2021. County Library and All Branch Locations. Available: <https://library.calaverasgov.us/Locations-Hours>. Accessed June 2, 2021.

[41] Calaveras County Office of Education (CCOE). 2021. Calaveras County School Location and District Information. Available: <https://www.ccoe.k12.ca.us/apps/pages/index.jsp?uREC_ID=1175520&type=d&pREC_ID=1423925#:~:text=Calaveras%20Unified%20School%20District%20is,Road%20Flat%20and%20West%20Point.>. Accessed June 2, 2021.

[42] Calaveras County Water District (CCWD). 2021. Our History. Available: <https://ccwd.org/about/>. Accessed June 9, 2021.

4.3.4 Natural and Managed Resources

Forest Resources: Forests in Calaveras County represent a natural and economic resource. Forest lands provide natural habitats as well as opportunities for recreation. Calaveras County spans 663,290 acres (1,036 square miles). As shown in Table 2, a total of 403,499 acres of evergreen, deciduous, and mixed forest lands exist within the County. As such, forested areas represent approximately 61 percent of County land area. The forest supports a wide variety of wildlife and plant species due to its range in climate, elevation, and geology. The Stanislaus National Forest contains approximately 325,000 acres of commercial forest land and is also home to the Emigrant Wilderness, Mokelumne Wilderness, and the Carson-Iceberg Wilderness.

With approximately 159,000 acres of hardwood habitat (24 percent of land area in the County), including 2,000 acres of Blue Oak-Foothill Pine, 55,000 acres of Blue Oak Woodland, 102,000 acres of Montane Hardwood, and a small amount of Montane Riparian habitat, Calaveras County contains approximately 1.6 percent of California's nearly 10 million acres of hardwood rangeland and forests. It leads all other counties in the percentage of County land area in oak woodland within the State. And in Calaveras County, approximately 89 percent of the County's hardwood rangelands are privately held, and 75,901 acres is located within the Stanislaus National Forest. [43, 44]

Timber Resources: As of 2018, the County contained approximately 77,500 acres of land zoned as Timberland Production. Timber is the largest commodity industry in the County at $8,948,100 of revenue in 2018. Quality timber harvesting returned to the County with a good market. Crews also worked on fire breaks, and those sellable logs were utilized. The California Forest Practice Act was enacted to ensure that logging is done in a sustainable manner that will preserve and protect wildlife, forests, and streams. The CFPA is applicable to all commercial harvesting activities conducted by landowners of small parcels and large timber companies alike in the County. CalFire is responsible for enforcing the laws that regulate logging on privately-owned lands in California. [45]

Livestock Resources: As of 2018, the County contained approximately 198,000 acres of rangeland with 17,700 head of cattle/calves. Cattle/calves and poultry are the second and fourth largest commodity industries in the County at $7,852,537 and $3,338,100 of revenue, respectively, in 2018. Cattle grazing provides an additional benefit of reducing vegetated fuel load and maintaining open space to reduce fire hazard in the County.[46]

Crop Resources: As of 2018, the County contained approximately 711 acres of wine grape crops and 794 acres of walnuts crops. Wine grapes and walnuts are the third and fifth largest commodity industries in the County at $3,389,750 and $1,346,624 of revenue, respectively, in 2018. In addition to gross production value, wineries and tasting rooms provide added value to the wine grape yields and walnut sales to rangeland visitors provides added value to the walnut yields in the County. [47]

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[43] Calaveras County. 2018. Calaveras county General Plan Draft EIR Agricultural, Forest, and Mineral Resources Chapter. Available: <https://planning.calaverasgov.us/Portals/Planning/Documents/Draft%20General%20Plan%20Update/CEQA/4_2_Agricultural%20Forest%20and%20Mineral%20Resources.pdf>. Accessed June 3, 2021.

[44] Calaveras County. 2007. Voluntary Oak Woodland Management Plan. Available: <https://ema.calaverasgov.us/Portals/EMA/Documents/Ag/Oak_Woodland_Management_Plan.pdf>. Accessed June 3, 2021.

[45] Calaveras County. 2018. Calaveras County Crop Report.

[46] Calaveras County. 2018. Calaveras County Crop Report.

[47] Calaveras County. 2018. Calaveras County Crop Report.

4.4 Wildfire Impacts Due to Climate Change

Climate change hazards and impacts vary depending on location. Understanding local climate hazards and impacts allows communities to prepare for the future and increase their resilience. Climate change is projected to continue affecting Calaveras County in many ways, including increased wildfires and associated air pollution. Projected wildfire impacts for Calaveras County are described below based on information presented by Cal-Adapt and the Sierra Nevada Summary Report of California's Fourth Climate Change Assessment.

The combination of warmer temperatures and greater precipitation variability are expected to increase the prevalence of droughts in the State and Calaveras County and, thus, need for forest fuel management practices. These changes in climate pose daunting challenges to the region's landscapes, resources and communities, including wildfire risk. Fire is a major driver of the ecosystems of the Sierra Nevada region. The warming and drying trends are projected to increase the frequency and severity of wildfire. A progressively altered fire regime is a primary and acute risk to the flora, fauna, and persons of the Sierra Nevada region. High-severity wildfires have the potential to transform urban and natural landscapes, perhaps irreversibly, thereby threatening population communities with death, injury, and/or displacement, residential and other key buildings damage, and critical infrastructure in terms of access to access roads, water service, and power service. The smoke and air pollution produced by wildfire is also a serious threat to human health.[48] Furthermore, wildfires have the potential to damage the County's forest, timber, livestock, and crop resources, which could in turn adversely affect the County's valuable habitat and ecosystem services as well as timber, livestock (cattle and poultry), wine grape, and walnut industries.

Therefore, location of funding in terms of wildfire and specifically WUI fire risk will be important for the County to identify and obtain for ongoing forest fuel management practices and increased wildfire prevention.

4.5 Wildland Urban Interface Vulnerability

The WUI is the zone of transition between unoccupied land and human development. It is the line, area, or zone where structures and other human development meet or intermingle with undeveloped wildland or vegetative fuels. Communities adjacent to and surrounded by wildland are at varying degrees of risk from wildfires.

4.5.1 Wildfire Cause and Times of Year

Wildland fires are classified as either naturally occurring or human-caused. Common causes of wildfire, which are mostly due to humans, include:

- Equipment use and malfunctions
- Vehicle crashes and engine sparks
- Negligently discarded cigarettes
- Unattended campfires
- Burning of debris

[48] OPR, CNRA, and CEC. 2021. California's Fourth Climate Change Assessment Report – Sierra Nevada Region Report. Available: <https://www.energy.ca.gov/sites/default/files/2019-11/Reg_Report-SUM-CCCA4-2018-004_SierraNevada_ADA.pdf>. Accessed May 28., 2021.

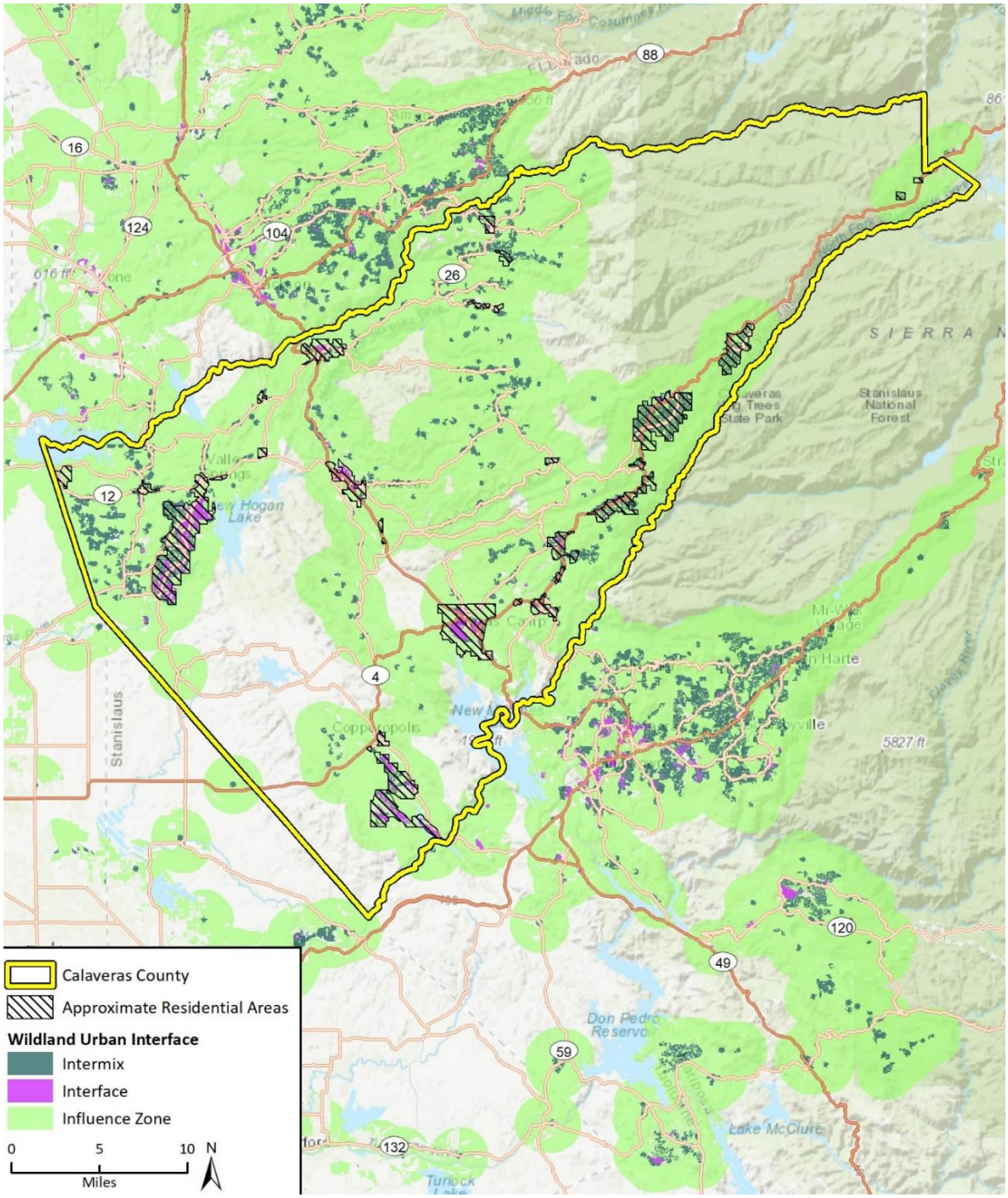
- Intentional acts of arson
- Lightning strikes

Peak wildfire season within California usually occurs between July and November, a time when hot, dry winds are most frequent and vegetated areas are dry, constituting a higher fuel load.

4.5.2 Developed Areas Impacted by Wildfire

As demonstrated in Figure 14, the majority of residents within the County live in intermix WUI areas or interface WUI areas. Intermix WUI refers to areas where housing and wildland vegetation intermingle, while interface WUI refers to areas where housing is in the vicinity of a large area of dense wildland vegetation. The WUI areas also primarily coincide with the major transportation corridors within the County (California State Routes 49, 4, and 26).

Figure 14 Calaveras County WUI Areas



Sources: CalFIRE, 2020; ESRI, 2021

4.5.3 Wildfire Climate Change Vulnerability Case Study – Butte Fire

The Butte Fire that occurred in September 2015 is one of the top 20 most destructive California wildfires. The fire was ignited by tree branches coming in contact with powerlines in Amador County in September of 2015, with high winds quickly spreading the fire into Calaveras County. As shown in

Figure 7 in Section 3, the wildfire burned through primarily mixed forest land-cover vegetation types, per the 2010 NWL inventory. The Butte Fire resulted in:

- 2 deaths (in the Mokelumne Hill and Mountain Ranch areas);
- 921 structures (including 549 homes) lost; and
- 70,868 acres burned.[49]

In addition, resources assigned to combat the fire included 4,865 personnel, 519 fire engines, 92 hand crews, 10 helicopters, and 94 dozers. And California Governor Jerry Brown declared a state of emergency in Calaveras County when the fire expanded to 65,000 acres in size.[50] The Butte Fire alone represented 8 percent of total area burned by wildfire in California in 2015, which was 893,362 acres in total.

Figure 15 shows WUI areas within the County in relation to the largest fire that has occurred in Calaveras County in recent history, the Butte Fire. It appears that the wildfire suppression effort was able to prevent the Butte Fire from spreading into all of the interface WUI areas and a majority of the intermix WUI areas. This prevented even greater human and structural loss, given that the wildfire perimeter was held from extending into a majority of the WUI areas for much of the County. However, major devastation still occurred within some WUI areas due to the Butte Fire.

Climate change resulted in the grape harvest starting two weeks earlier than normal and also exacerbated the Butte Fire given that California was in the midst of a five-year drought that lasted from 2012 to 2016.[51] Daniel Berlant with CalFIRE said that the State's historic multi-year drought was a factor in the Butte Fire, because such drought conditions allow for a simple spark, an ember, and any type of open flame to quickly ignite into a wildfire and spread very rapidly. CalFire called the growth of the Butte Fire "unprecedented."[52]

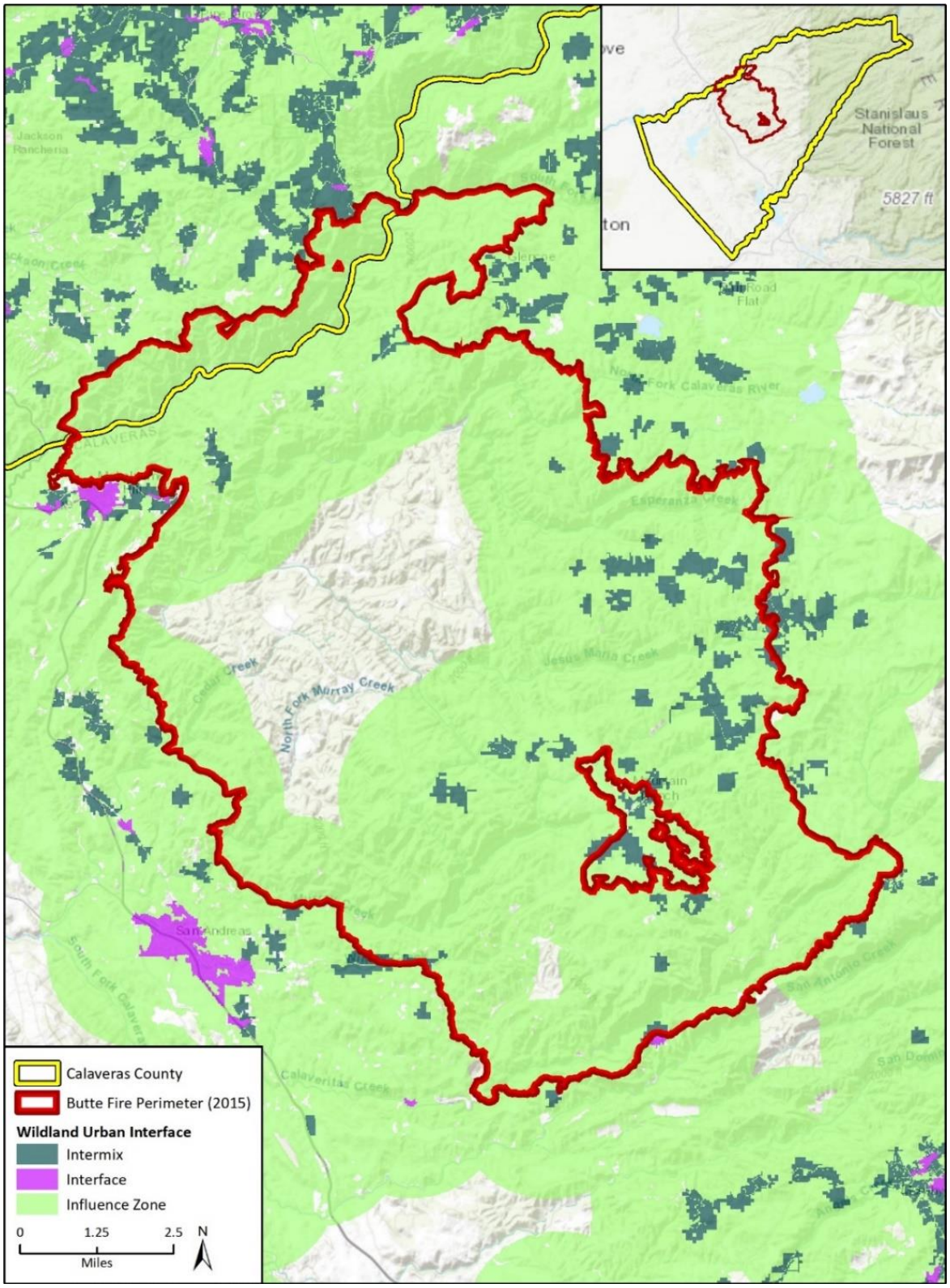
[49] CalFIRE. 2021. Top 20 Most Destructive California Wildfires. Available: <https://www.fire.ca.gov/media/t1rdhizr/top20_destruction.pdf>. Accessed May 26, 2021.

[50] Wildfire Today. 2021. Butte Fire Archives. Available: <https://wildfiretoday.com/tag/butte-fire/>. Accessed June 8, 2021.

[51] California Department of Water Resources (CDWR). 2021. Drought. Accessible: <https://water.ca.gov/water-basics/drought >. Accessed June 10, 2021.

[52] Capradio. 2021. Available: <https://www.capradio.org/articles/2015/09/14/california-drought-factor-in-rapid-growth-of-wildfires/>. Accessed June 9,2021.

Figure 15 Calaveras County WUI Areas and Butte Fire Perimeter



Sources: CalFIRE, 2020; ESRI, 2021

Steps that could possibly have prevented or at least minimized the spread of the Butte County Fire include:

- better management and maintenance of powerlines, including but not limited to undergrounding of powerlines;
- Better management and clearing of defensible space around powerlines that traverse forested areas as well as the buildings throughout the County that were lost and damaged from the wildfire; and
- Quicker notification and response of downed or malfunctioning powerlines by the electric provider to the local fire departments and stations.

In addition, in order to disrupt the feedback cycle of wildfires that threatens communities at the WUI, it is necessary to identify and assess both GHG emissions and climate change impacts posed by wildfire and to subsequently develop mitigation and adaptation strategies. In order to do so, planning, fire, and forest managers require information regarding where fires are likely to occur, the intensity at which they might occur, and with what impacts to communities, assets, and resources.

4.6 County Climate Change Vulnerability Summary

Climate change resulting in increased temperatures, drought, and dry fuel load throughout the State is anticipated to exacerbate the potential for wildfire hazard and impact within the County. Forest management practices such as thinning and prescribed burns can reduce the severity and intensity of wildfires, in turn reducing the potential for uncontrolled fires in the WUI where the majority of residences exist and providing net benefits to the County. This connection between climate change and related impacts in the WUI is essential for understanding the climate hazards specific to wildfire in terms of the potential impact to residents, businesses, the local economy, and ecosystem services. Section 5 discusses best practices for reducing wildfire impact.

5 Wildfire Impact Reduction Best Practices

Given Calaveras County vulnerability to wildfire and per best practices identified by State agencies in the State Wildfire and Resilience Action Plan and OPR Fire Hazard Planning Technical Advisory, in order to protect public health and minimize risks to existing and new land uses, there should be an acceleration of efforts within the County to:

- Restore the health and resilience of forests, grasslands, and natural places;
- Improve the fire safety of communities and land uses; and
- Sustain the economic vitality of rural forested areas.[53]

Since the scale of the potential wildfire problem is great, multiple routes of action need to be taken to accomplish wildfire resiliency.

5.1.1 Restored Forest/Shrub/Grassland Health and Resilience

5.1.1.1 Forest Health and Resilience Management

Activities to restore forest health and resilience should focus on thinning overgrown forests and dry fuel load within the Stanislaus National Forest and privately held forested areas of Calaveras County, with particular attention to areas along highways and roadways where wildfires are most likely to ignite at the WUI interface. Meadow restoration to improve water quantity and quality could also be part of shrubland and grassland resilience-building activities.[54] Thinning of overgrown forests and forests with large amounts of forest debris and decay can also be accomplished through prescribed burns that are carefully planned and closely watched by the local fire districts and CalFIRE.

Work to improve resilience to wildfire is currently being performed in Calaveras County through the efforts of multiple agencies. The Upper Mokelumne River Watershed Authority has been treating overgrown forests in the Stanislaus and El Dorado National Forests since 2006, under contract with the U.S. Forest Service, with activities focusing on areas along roadways. As of 2021, over 4,000 acres of overgrown forests in the Upper Mokelumne River Watershed have been treated through this effort, with plans to expand to efforts to include an additional 50,000 acres of permitted projects.[55] One such project was the Lily Gap Project, which included thinning of trees and brush on 157 acres near the town of West Point.[56] Additionally, prescribed burns are regularly performed within the Stanislaus National Forest and Calaveras Big Tree State Park, with 218 and 248 acres of prescribed burns planned for 2021 in each part, respectively.[57,58]

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[53] OPR. 2020. Fire Hazard Planning Technical Advisory.

[54] Calaveras County. 2007. Voluntary Oak Woodland Management Plan. Available: <https://ema.calaverasgov.us/Portals/EMA/Documents/Ag/Oak_Woodland_Management_Plan.pdf>. Accessed June 3, 2021.

[55] Upper Mokelumne River Watershed Authority (UMRWA). 2021. Forest Health Projects Reducing Risk of Catastrophic Wildfire. Available:<http://www.umrwa.org/uploads/UMRWA_BFF%20Press%20Release%20-%20final.pdf>. Accessed June 3, 2021.

[56] United States Department of the Interior, Bureau of Land Management (USDI BLM). ND. California Stewardship Contracting. Available: <https://www.blm.gov/programs/natural-resources/forests-and-woodlands/stewardship-contracting/california>. Accessed June 3, 2021.

[57] McCarty. 2021. Custodians of Stanislaus National Forest plan prescribed burns mid-May into June. The Union Democrat. Available: <https://www.uniondemocrat.com/news/article_fd01b854-b1c3-11eb-b138-cf0480ee59ee.html>. Accessed June 3, 2021.

[58] Pine Tree, The. 2021. California State Parks and CalFIRE Plan Prescribed Burns at Calaveras Big Trees State Park. Available: <http://thepinetree.net/new/?p=119052>. Accessed June 3, 2021.

5.1.1.2 Collaborative Forestry

Regional stakeholder collaborations and community-based organizations could improve capacity and options for County- and regional-scale forest management and restoration. Collaboration at the community and regional levels promote ecosystem restoration in a manner that improves the resilience of forests and capacity of such communities to respond to climate change. Collaboratives within the Sierra Nevada region are working to address pivotal barriers to forest restoration through development of tools and approaches aimed at maintaining healthy resilient forests and managing response and realignment in the face of climate change. And community organizations are also providing the local and social capital to enable forest restoration and health initiatives to move forward. Calaveras County can continue and expand upon the following collaborative forestry actions within the Sierra Nevada region:

- collaborative groups engaged in environmental planning for forest restoration helping the U.S. Forest Service as extension of staff in order to carry out
- State and federal agencies partnered as part of the Tahoe-Central Sierra Initiative to conduct fuel treatments along highway corridors, restoring ecosystem resilience and protecting communities; and
- A Master Stewardship Agreement established to collaboratively pursue projects that promote forest resilience within the Stanislaus National Forest. [59]

5.1.2 Improved Community and Land Use Fire Safety

5.1.2.1 Creation and Maintenance of Defensible Space

For people living in a wildfire-prone zone such as the Sierra Nevada region (including Calaveras County), CalFIRE and FEMA suggest creating at least a 100-foot defensible space around such homes. Defensible space is an area around a building or structure within which vegetation and other debris are completely cleared; this reduces the spread of fire and can save homes and other buildings from igniting. Specifically, as shown in Figure 16, defensible space is a multi-zone protection that homeowners can create around their homes to limit or slow the spread of fire, and it involves clearing dead brush and vegetation as well as keeping a distance between tree limbs and ground plants. In addition, maintaining a 100-foot defensible space buffer around buildings and structures is required by California Public Resources Code, Division 4, Part 2.[60]

[59] OPR, CNRA, and CEC. 2021. California's Fourth Climate Change Assessment Report – Sierra Nevada Region Report. Available: <https://www.energy.ca.gov/sites/default/files/2019-11/Reg_Report-SUM-CCCA4-2018-004_SierraNevada_ADA.pdf>. Accessed May 28., 2021.

[60] California Legislative Information (CLI). 2021. California Public Resources Code, Division 4, Part 2. Available: <https://leginfo.legislature.ca.gov/faces/codes_displayText.xhtml?lawCode=PRC&division=4.&title=&part=2.&chapter=1.&article=2.>. Accessed May 27, 2021.

Figure 16 Defensible Space Zones



Source: CalFIRE. 2021. Wildfire Defensible Space Guidance.

5.1.2.2 Emergency Response and Evacuation Planning

The majority of County residents live in WUI areas proximate to the major transportation corridors traversing the County (California State Routes 49, 4, and 26). As such, these transportation corridors are key to emergency response (for firefighters needing to access and protect residential areas during wildfire events) and emergency evacuation operations (residents fleeing their homes during wildfire events). Thus, regular maintenance and improvement of these transportation corridors is one of the primary wildfire defense actions that the County can take.

Per California Assembly Bill 747, county and city general plan safety elements are required to address evacuation routes related to identified fire hazards. The Calaveras County Office of Emergency Services (OES) strives to build a disaster-prepared and resilient County through emergency management and coordination with response partners and the community. County OES is responsible for wildfire preparedness, mitigation, and response and recovery and aims to create partnerships, plans, and systems to build capabilities and coordinate the preparedness, response, and recovery efforts of all County and regional stakeholders. [61] In conjunction with CalFire, Calaveras County OES and the Calaveras County Sheriff's Office has created an Emergency Evacuation System, which is divided into 60 grid pages and further divided into 307 2-mile by 2-mile evacuation zones.[62]

[61] Calaveras County Office of Emergency Services (CCOES). 2021. Available: <https://nextdoor.com/agency-post/ca/calaveras-county/calaveras-county-office-of-emergency-services/evacuation-map-113652600/>. Accessed June 9, 2021

[62] Calaveras County Public Evacuation Application (CCPEA). 2021. Available: <https://www.arcgis.com/apps/webappviewer/index.html?id=4792467f1b154c9da6ba04a2f8bc6ca3>. Accessed June 9, 2021

5.1.3 Sustained Rural Forested Area Economic Vitality

Stewardship Authority contracts allow the U.S. Forest Service to blend needed restoration work with commercially viable timber extraction work (objectives traditionally achieved through separate contracts) to achieve land management goals for the national forests and the public lands that also meet local and rural community economic needs. Small-scale bioenergy facilities and co-located businesses (e.g., post, pole, etc.), are logical complements to such Stewardship Authority contracts, providing local employment by making use of low-value end-products (i.e., small-diameter wood) and by-products (i.e., slash). In addition, pairing biomass energy production with community-scale manufacturing can increase the volume of fuel load removed from densely stocked forest stands and also create more jobs for local County residents. Such an approach would reduce likely exposure to high-severity wildfire as well as rebuild community capacity, creating a positive feedback loop between the environment and the economy that helps empower the County to address future climate impacts.[63]

[63] OPR, CNRA, and CEC. 2021. California's Fourth Climate Change Assessment Report – Sierra Nevada Region Report. Available: <https://www.energy.ca.gov/sites/default/files/2019-11/Reg_Report-SUM-CCCA4-2018-004_SierraNevada_ADA.pdf>. Accessed May 28., 2021.

6 Conclusion

Projected changes in climate change imperil the forest carbon balance. During the 21st century, increases in wildfire hazard, drought frequency, and forest vulnerability will represent threats to the survival and growth of trees as well as the safety and health of persons. Projected wildfire disturbances and land-use changes (i.e., development), indicate that, by the middle of the 21st century, the Sierra Nevada region will lose more than 25 percent of the carbon stored in living biomass.[64]

Fire managers, analysts, and resource specialists value wildfire vulnerability assessment and its role in terms of informing decision makers and helping implement action under the framework processes. It is the hope that this report discussing Calaveras County natural and working lands inventories, potential for future wildfire-related GHG emissions, climate change vulnerability assessment specific to wildfire, Butte Fire-specific case studies, and State-agency-supported wildfire impact reduction best practices will assist Calaveras County with both GHG emissions reduction planning as well as climate change wildfire hazard and forest resilience planning.

64 OPR, CNRA, and CEC. 2021. California's Fourth Climate Change Assessment Report – Sierra Nevada Region Report. Available: <https://www.energy.ca.gov/sites/default/files/2019-11/Reg_Report-SUM-CCCA4-2018-004_SierraNevada_ADA.pdf>. Accessed May 28, 2021.

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Appendix B

Greenhouse Gas Reduction Plan (GHGRP)

CITY OF ANGELS

GREENHOUSE GAS REDUCTION PLAN

2023

PUBLIC DRAFT

prepared by:

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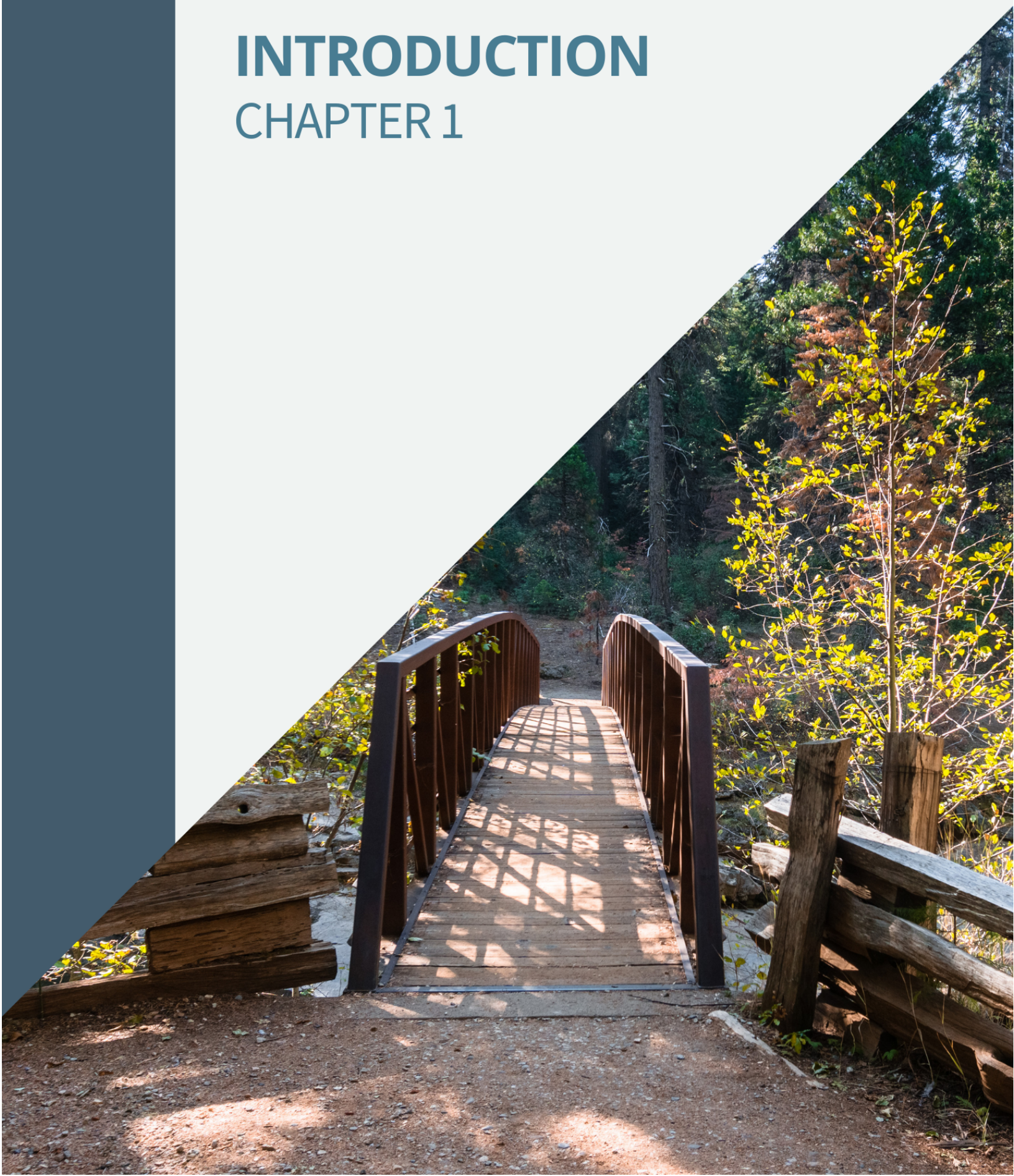
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Abbreviations

AB	Assembly Bill
ABAU	Adjusted Business-as-Usual
BAU	Business-as-Usual
CA LTAP	California Local Technical Assistance Program
CARB	California Air Resouces Board
CCAPCD	Calaveras County AIr Pollution Control District
CCI	California Climate Investments
CCOG	Calaveras Council of Governments
CEQA	California Environmental Quality Act
CO_2	Carbon dioxide
CPPA	Calaveras Public Power Agency
CSZEVRP	Central Sierra Zero Emission Vehicle Readiness Plan
DC	Direct current
DER	Distributed energy resources
EB	Existing building
EO	Education and outreach
EV	Electric vehicle
EVCS	Electric vehicle charging station
FHWA	Federal Highway Administration
GHG	Greenhouse gas
GHGRP	Greenhouse Gas Reduction Plan
HVAC	Heating, ventilation, and air conditioning
MT CO_2e	Metric tons of carbon dioxide equivalent
NEV	Neighborhood electric vehicle

NC	New construction
RCRC	Rural County Representatives of California
RE	Renewable energy
RPS	Renewables Portfolio Standard
SB	Senate Bill
SBC	Sierra Business Council
SORE	Small off-road equipment
SW	Solid waste
TR	Transportation
WW	Water and wastewater
WWTP	Wastewater treatment plant
ZEV	Zero-emission vehicle

INTRODUCTION
CHAPTER 1



Chapter 1. Introduction

Greenhouse Gas Reduction Plan Overview

The City of Angels (City) is committed to taking meaningful action to reduce greenhouse gas (GHG) emissions and build community resilience. The purpose of this Greenhouse Gas Reduction Plan (GHGRP) is to provide a roadmap for the City to achieve its greenhouse gas reduction goals and outline the steps to reduce its carbon footprint, promote sustainable development, and enhance community resilience. The City's GHGRP will focus on reducing GHG emissions in all sectors of the community, including energy, transportation, solid waste, and water and wastewater. These GHG emissions were detailed in the City of Angels Community-Wide and Government Operations 2018 Greenhouse Gas Emissions Inventories report, which was completed in 2021 and can be found in **Appendix B**. The inventory project also included an analysis of wildfire as an emissions source, however, the wildfire sector was not included in the GHGRP measures, as these emissions are beyond the control of the City.

The City recognizes that addressing GHG reductions is a complex challenge that requires a collaborative, integrated, and comprehensive approach. This GHGRP is the result of a coordinated effort between City staff, elected officials, and a community engagement process, and also builds off of the City's 2020 General Plan. It reflects a vision and commitment to sustainability and resilience and provides guidance for future actions and initiatives. The City views this plan as a starting point and recognizes that fast-evolving technology and data require that the GHGRP be considered a living document subject to ongoing updates and adjustments. These ongoing updates will reflect the best information available and provide the most constructive means for achieving City and state goals.

Climate Status in California and the Sierra Nevada

California Senate Bill (SB) 32[1] defines climate change impacts under the following language: "Global warming poses a serious threat to the economic well-being, public health, natural resources, and the environment of California. The potential adverse impacts of global warming include the exacerbation of air quality problems, a reduction in the quality and supply of water to the state from the Sierra snowpack, a rise in sea levels resulting in the displacement of thousands of coastal businesses and residences, damage to marine ecosystems and the natural environment, and an increase in the incidences of infectious diseases, asthma, and other human health-related problems. Global warming will have detrimental effects on some of California's largest industries, including agriculture, wine, tourism, winter sports, recreational and commercial fishing, and forestry. It will also increase the strain on electricity supplies necessary to meet the demand for summer air-conditioning in the hottest parts of the state."

The California Air Resources Board's (CARB) 2017 and 2022 Climate Change Scoping Plans[2,3] provide details on the specific threats of climate change, particularly relevant for rural, forested regions like the

[1] California Assembly Bill (AB) 32. 2006.
[2] California's 2017 Climate Change Scoping Plan. CARB. 2017.
[3] California's 2022 Climate Change Scoping Plan. CARB. 2022.

City. The 2022 plan includes more information on specific local actions. The CARB scoping plans state: In California, as in the rest of the world, climate change is contributing to an escalation of serious problems, including raging wildfires, coastal erosion, disruption of water supply, threats to agriculture, spread of insect-borne diseases, and continuing health threats from air pollution.

> The drought that plagued California for years devastated the state's agricultural and rural communities, leaving some of them with no drinking water. In 2015 alone, the drought cost agriculture in the Central Valley an estimated $2.7 billion, and more than 20,000 jobs.
>
> Changes include: A recorded increase in annual average temperatures, as well as increases in daily minimum and maximum temperatures. An increase in the occurrence of extreme events, including heat waves. A decrease in winter chill hours, necessary for the production of high-value fruit and nut crops.
>
> In recent years, California has experienced the deadliest wildfires in its history.
>
> Extensive tree mortality is already prevalent in California. The western pine beetle and other bark beetles have killed a majority of the ponderosa pine in the foothills of the central and southern Sierra Nevada.
>
> California will experience a reduction in spring runoff volumes, as a result of declining snowpack.
>
> While more intense dry periods are anticipated under warmer conditions, extremes on the wet end of the spectrum are also expected to increase due to more frequent warm, wet atmospheric river events and a higher proportion of precipitation falling as rain instead of snow.
>
> In recent years, atmospheric rivers have also been recognized as the cause of the large majority of major floods.
>
> Climate change is making events, like those listed above, more frequent, more catastrophic and more costly. Climate change impacts all Californians, and the impacts are often disproportionately borne by the state's most vulnerable and disadvantaged populations.

These are the many challenges associated with climate change that face the City, along with other communities in the Sierra Nevada. A healthy ecosystem provides cultural, social, and economic benefits that local communities rely on for agriculture, tourism, recreation, fishing, and other industries that are important to the City and its economic vitality.[4,5]

[4] Core Writing Team, Pachauri, R.K., Meyer, L.A.. (2014). Climate Change 2014: Synthesis Report. Fifth Assessment Report of the Intergovernmental Panel on Climate Change.
[5] Dettinger, M., Alpert, H., Battles, J., Kusel, J., Safford, H., Fougeres, D., Knight, C., Miller, L., Sawyer, S. (2018). Sierra Nevada Region Report. California's Fourth Climate Change Assessment.

Legislative Context

Since 2005, the State of California has responded to growing concerns over the effects of climate change by addressing emissions in the public and private sectors through legislative action. California mandates and guidance on measuring and reducing GHG emissions include:

- establishing renewable portfolio standards (SB 1078, 2002)[6]
- executive order on California global warming impacts and targets (EO S-3-05, 2005)[7],
- the California Global Warming Solutions Act (Assembly Bill (AB) 32, 2006)[8] and its successor bill (SB 32, 2016)[9],
- executive order for low carbon fuel standards (EO S-1-07, 2007)[10],
- the Sustainable Communities and Climate Protection Act (SB 375, 2008)[11],
- the Water Conservation Act (SB X7-7, 2009)[12],
- establishing mandatory commercial recycling (AB 341, 2012)[13],
- executive order on Advanced Clean Cars (B-12-016, 2012)[14] and successor order (N-79-20, 2022)[15],
- the California Clean Energy and Pollution Reduction Act (SB 350, 2015)[16],
- local government requirements for climate adaptation and resilience strategies (SB 379, 2015)[17],
- the California Short-Lived Climate Pollutant Reduction Strategy (SB 1383, 2016)[18],
- the CARB 2017[19] and 2022[20] Climate Change Scoping Plan,
- the 100% Clean Energy Act of 2018 (SB 100, 2018)[21],
- executive order to achieve carbon neutrality (EO B-55-18, 2018),[22] and
- the California Climate Crisis Act (AB 1279, 2022)[23].

[6] California SB 1078. 2002.
[7] California Executive Order S-03-05. 2005.
[8] California AB 32. 2006.
[9] California SB 32. 2016.
[10] California Executive Order EO S-1-07. 2007.
[11] California SB 375. 2008.
[12] California SB X7-7. 2009.
[13] California AB 341. 2012.
[14] California Executive Order B-12-016. 2012.
[15] California Executive Order N-79-20.
[16] California SB 350. 2015.
[17] California SB 379. 2015.
[18] California SB 1383. 2016.
[19] California's 2017 Climate Change Scoping Plan. CARB. 2017.
[20] California's 2022 Climate Change Scoping Plan. CARB 2022.
[21] California SB 100. 2018.
[22] California Executive Order B-55-18. 2018.
[23] California AB 1279. 2022.

All of the above legislation provides guidance and protocols for local governments to participate in the State's GHG reduction efforts.

In response, many communities in the United States are addressing emissions at the local level. As many of the major sources of GHG emissions can be directly or indirectly controlled through local policies and actions, local governments have an opportunity to play a key role in reducing GHG emissions within their boundaries. Through proactive measures related to land use, transportation demand management, energy efficiency, green building, waste diversion, and more, local governments can contribute to emissions reductions in their communities. This GHGRP will build capacity for the City to address local climate impacts, allowing them to set goals that will increase their resilience and comply with California's greater climate strategy and mandates.

GREENHOUSE GAS EMISSIONS INVENTORY

CHAPTER 2



Chapter 2. Greenhouse Gas Emissions Inventory

Overview of Emissions

In September 2021, the City of Angels 2018 GHG inventory was completed for community-wide and government operations emissions. The inventory is a critical component of the GHGRP, as it provides a baseline measurement of emissions that can be used to track progress toward greenhouse gas reduction goals. The inventory identifies and quantifies specific sources of emissions from within the City. By understanding the sources and respective quantities of GHG emissions, the City can identify opportunities for reducing emissions and developing targeted and effective mitigation strategies.

With support from the Calaveras Council of Governments (CCOG) and guidance from City staff, Sierra Business Council (SBC), along with the sub consultant team of Rincon Consultants, Inc. and Harris & Associates, completed all emissions estimates in accordance with the United States Community Protocol and the Local Government Operations Protocol. More details on inventory boundaries, protocols, and methodology can be found in the City's GHG Inventory Report in **Appendix B**.

After the City's inventory was completed, newer and more accurate data was released, and the City's inventory was updated to reflect changes in data sources, methodology, and assumptions. Updating the inventory helps to ensure that the data accurately reflects the current emissions profile and provides a solid foundation for developing effective climate action plans and policies. The updated inventory memo can be found in **Appendix A**.

This section outlines the key findings from the City's community-wide and government operations 2018 GHG emissions inventories.

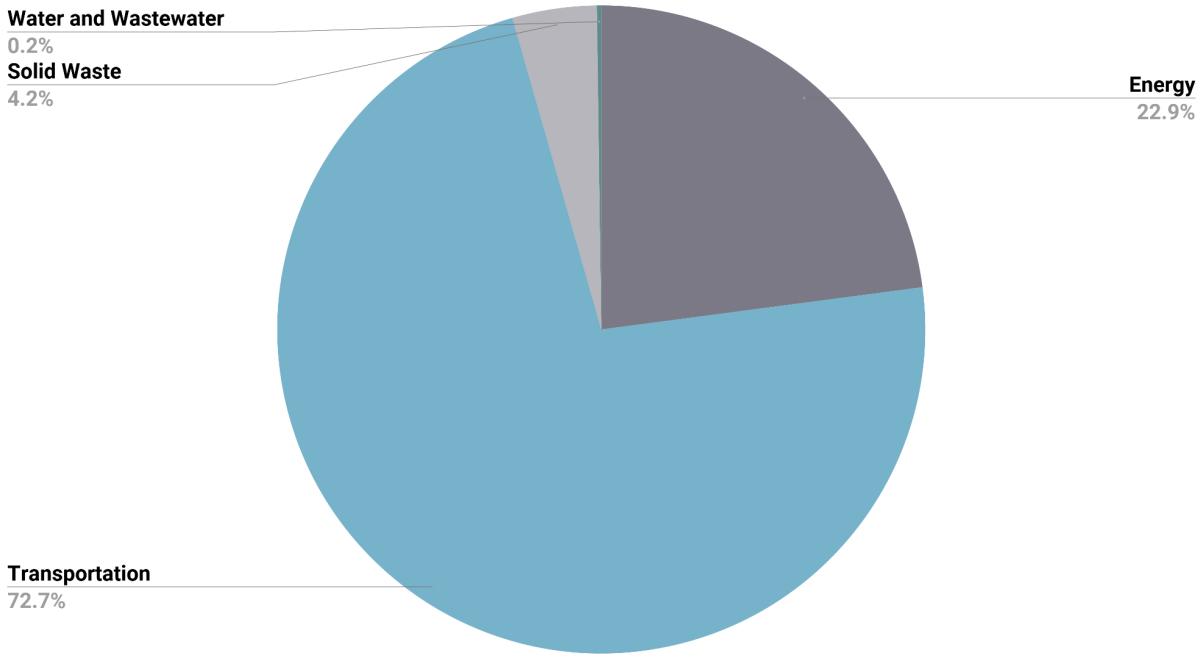
Community-Wide GHG Emissions Inventory

In 2018, sources within the City and activities of the City's residents, businesses, and visitors emitted 24,608 metric tons of carbon dioxide equivalent (MT CO_2e). These emissions are attributed to four different sectors: energy use, transportation, solid waste, and water and wastewater. The transportation sector was the most significant contributor of emissions. In summary[24]:

- Transportation accounted for 72.7% and 17,879 MT CO_2e
- Energy use accounted for 22.9% and 5,639 MT CO_2e
- Emissions from solid waste accounted for 4.2% and 1,037 MT CO_2e
- Water and wastewater accounted for 0.2% and 53 MT CO_2e

[24] Total percentages may not sum exactly due to independent rounding.

Figure 1. 2018 Community-Wide Emissions Summary



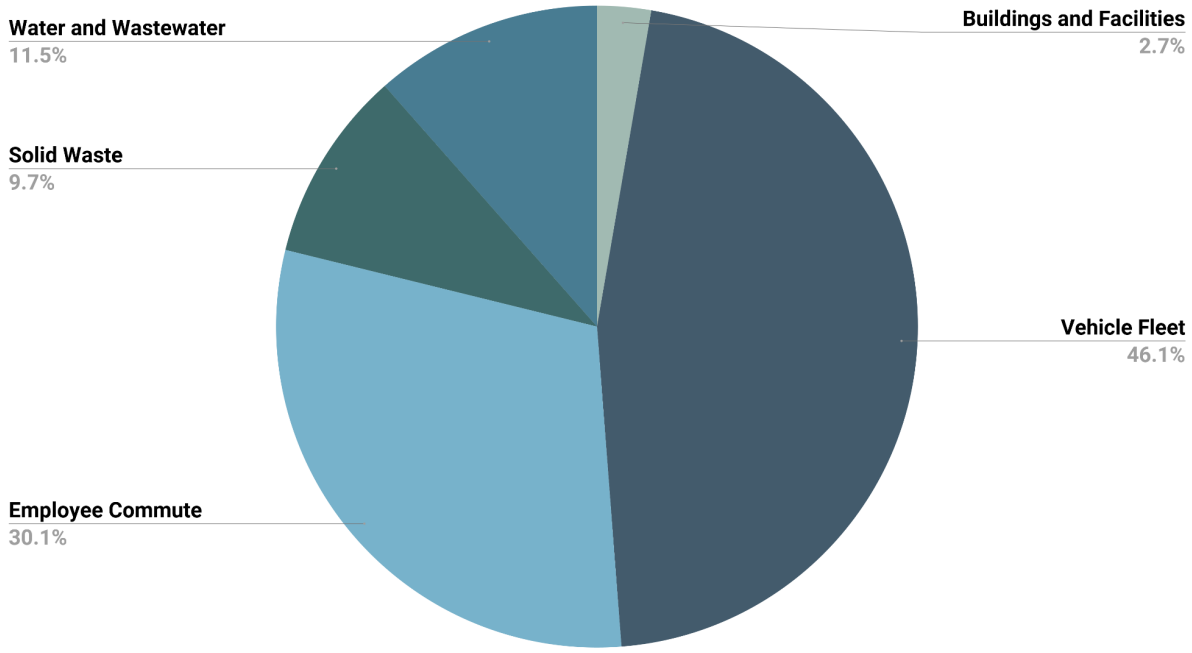
Government Operations GHG Emissions Inventory

In 2018, City government operations generated 456 MT CO_2e for the sectors reported in this inventory. The vehicle fleet sector was the most significant contributor of emissions[25].

- Emissions from the City's vehicle fleet accounted for 46.1% and 210 MT CO_2e
- Emissions from City employee commutes accounted for 30.1% and 137 MT CO_2e
- City-owned and operated water and wastewater facilities accounted for 11.5% and 52.4 MT CO_2e
- Emissions from City facility-generated solid waste accounted for 9.7% and 44 MT CO_2e
- Energy from the City's buildings and facilities accounted for 2.7% and 12.4 MT CO_2e

[25] Total percentages may not sum exactly due to independent rounding.

Figure 2. 2018 Government Operations Emissions Summary



Forecast

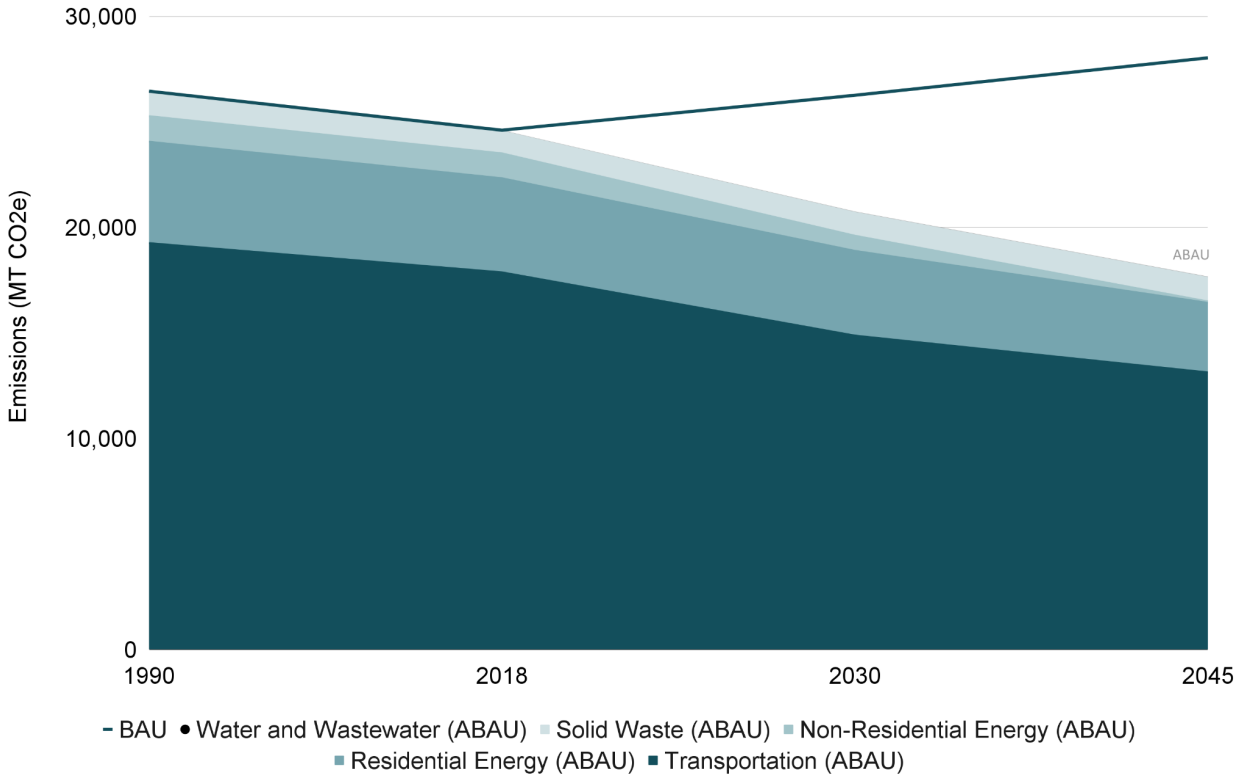
Two forecast scenarios were developed for the City: a business-as-usual (BAU) forecast and a legislative adjusted scenario forecast (ABAU) of community-wide GHG emissions. A BAU forecast is a projection of GHG emissions that would occur in the absence of any new GHG reduction measures or policies and accounts for expected changes in population, economic growth, energy use, and other factors that are likely to influence GHG emissions. An ABAU forecast is similar to a BAU forecast, but reflects the anticipated impacts of existing or upcoming state and federal climate policies. This includes regulations, mandates, or other policies that are expected to affect energy use, transportation, and other sources of GHG emissions. By including the anticipated impacts of climate policies, the ABAU forecast provides a more accurate estimate of emissions reductions that may be achieved. This projection serves as a baseline against which progress towards GHG reduction goals can be measured and allows for specific GHGRP measures to be prioritized.

The inventory projects the City's GHG emissions from 2018 out to 2045, based on a BAU forecast and an ABAU forecast of community-wide GHG emissions.[26] The 2045 forecasts project an increase for the BAU scenario and a decrease for the ABAU scenario from the 2018 baseline. Under the BAU scenario, emissions are projected to increase by 13.9%, equating to 28,039 MT CO_2e projected to be emitted in

[26] Note: this does not include forecasting projections for wildfire.

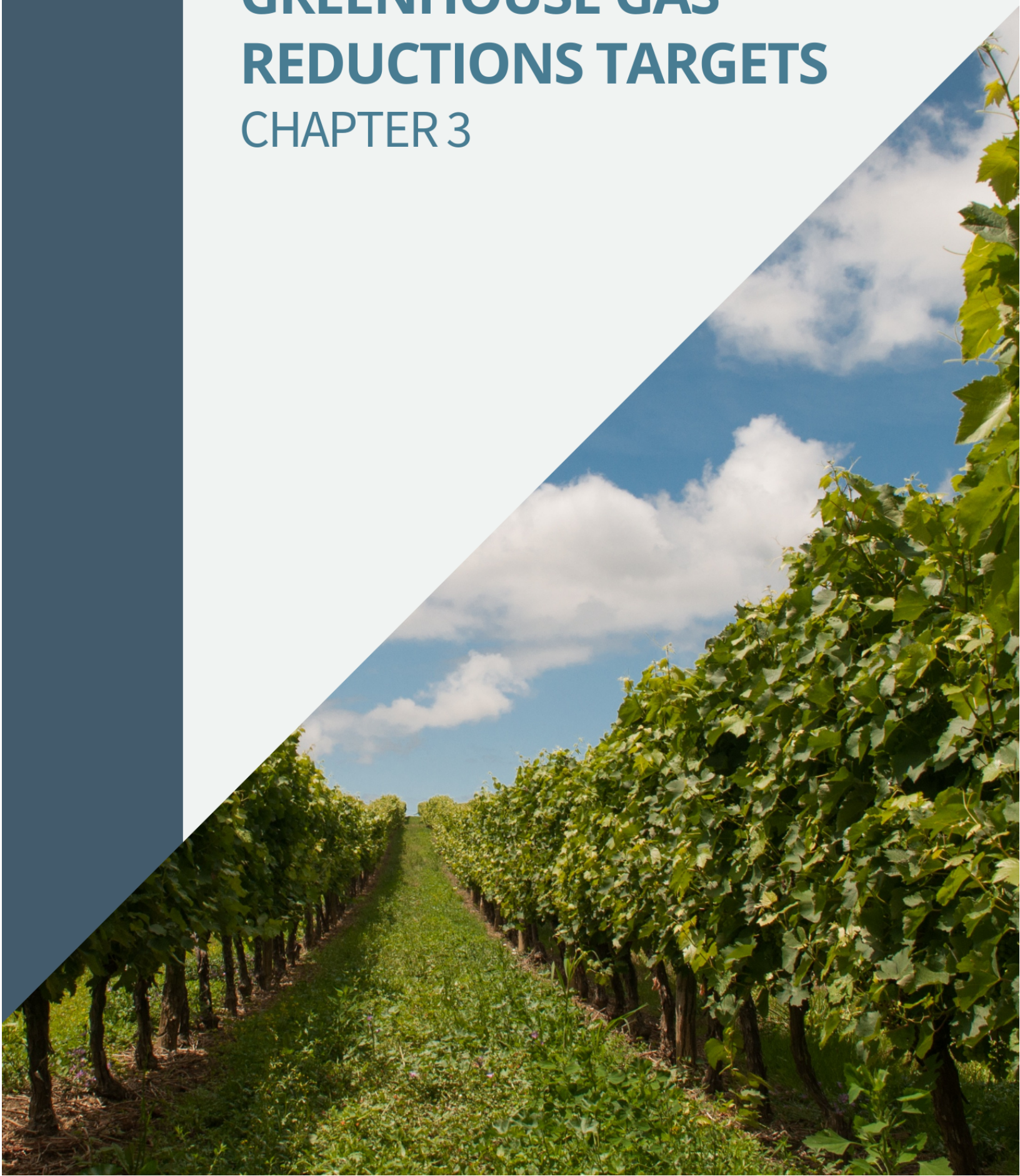
2045. Under the ABAU scenario, emissions are projected to decrease by 28.2%, equating to 17,674 MT CO_2e projected to be emitted in 2045.

Figure 3. BAU and ABAU Forecasts



GREENHOUSE GAS REDUCTIONS TARGETS

CHAPTER 3



Chapter 3. Greenhouse Gas Reduction Targets

Goals & Development Process

The first step in developing GHGRP goals was to conduct a GHG emissions inventory, outlined in **Chapter 2**, to identify the major sources of emissions within the City. This information was used to establish a baseline for emissions and to pinpoint how each sector contributed to emissions totals. Once the GHG emissions inventory was completed, the next step was for the City to adopt GHG reduction goals. These goals are based on a percentage reduction from the baseline emissions level and are outlined in the **Reduction Targets** section below.

During the process of developing GHGRP goals and measures, it was helpful to look to other jurisdictions for inspiration and guidance. Measures that have been successful in other Sierra Nevada communities, for example, can be adapted and implemented to suit the specific needs and circumstances of the City. The City considered and incorporated best practices from other jurisdictions in the development of the GHGRP. This collaborative approach helped ensure that the plan is comprehensive, effective, and tailored to the unique characteristics and challenges within the City. The measures that were developed will become the City's detailed plan for achieving its adopted emissions reduction targets.

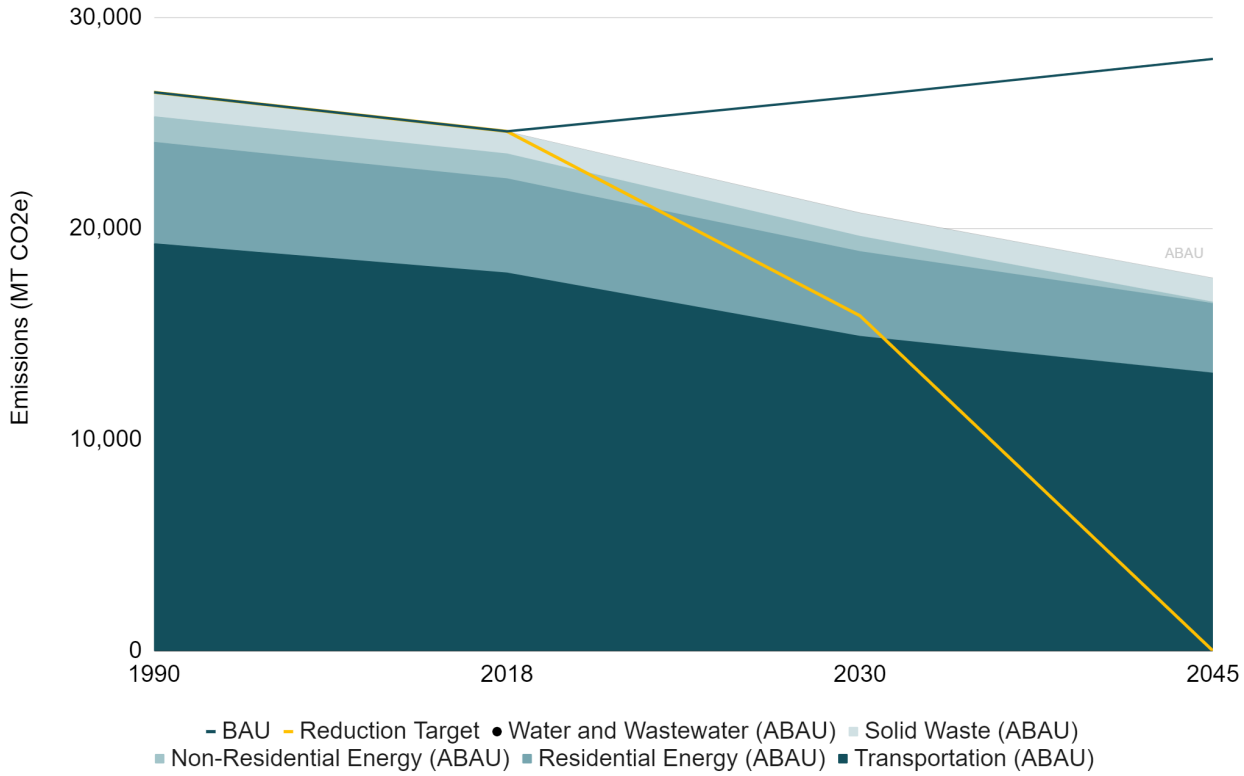
Reduction Targets

In California, local emissions reduction targets are often aligned with state goals to ensure that all jurisdictions are working towards the same overall target. The State of California has set ambitious emissions reduction targets to mitigate the impacts of climate change. Under SB 32, California has committed to reducing greenhouse gas emissions to 40% below 1990 levels by 2030. Under the state Executive Order B-55-18, the 2022 Scoping Plan, and AB 1279, California has committed to achieving carbon neutrality by 2045.

The City discussed and voted to approve GHG emission reduction targets at the Planning Commission meeting (October 14, 2021) and City Council meeting (November 2, 2021). The City adopted the SB 32 target, as well as the 2045 carbon neutrality goal in alignment with EO B-55-18. Adopting these targets means that emissions will need to drop to 15,875 MT CO2e by 2030 and 0 MT CO2e by 2045. The community emissions trend, forecast, and reduction targets are shown in **Figure 4** below.

The City has identified and prioritized specific strategies and actions to meet these targets, including increasing energy efficiency, expanding renewable energy, reducing waste, promoting sustainable transportation, and engaging with the community.

Figure 4. BAU and ABAU Forecasts with Target Reductions



PUBLIC PARTICIPATION

CHAPTER 4



Chapter 4. Public Participation

Stakeholder Engagement Process

Throughout the GHGRP development process, the City has been committed to engaging stakeholders and soliciting public feedback. Effective engagement with stakeholders and the public ensures that the GHGRP reflects the priorities and values of the community and helps to build support for its implementation. This section outlines the strategies used to engage stakeholders and gather public feedback.

In order to effectively engage with the public, the City released an online survey to collect feedback. The survey outlined draft measures that the City was initially considering including in the GHGRP. The measures were separated by sector: energy, transportation, solid waste, water and wastewater, wildfire, and carbon sequestration.

In addition to releasing an online survey to the commu | April & May 2022 on community workshop on May 12th, 2022 to gather feedback on the measures and the GHGRP development process. At the in person workshop, attendees ranked draft measures based on what they would like included or not included in the GHGRP. The City also held individual stakeholder meetings with local organizations interested in the process.

These engagement efforts provided opportunities for stakeholders to share their thoughts and ideas about the GHGRP measures and provide feedback on specific strategies and actions. The engagement process also helped to identify potential barriers to implementation and inform the development of more effective mitigation strategies. The City has considered all feedback received and has used it in the development of the GHGRP. In order to keep stakeholders informed, the City will provide regular updates to the public on the GHGRP's progress and seek ongoing feedback on implementation efforts.

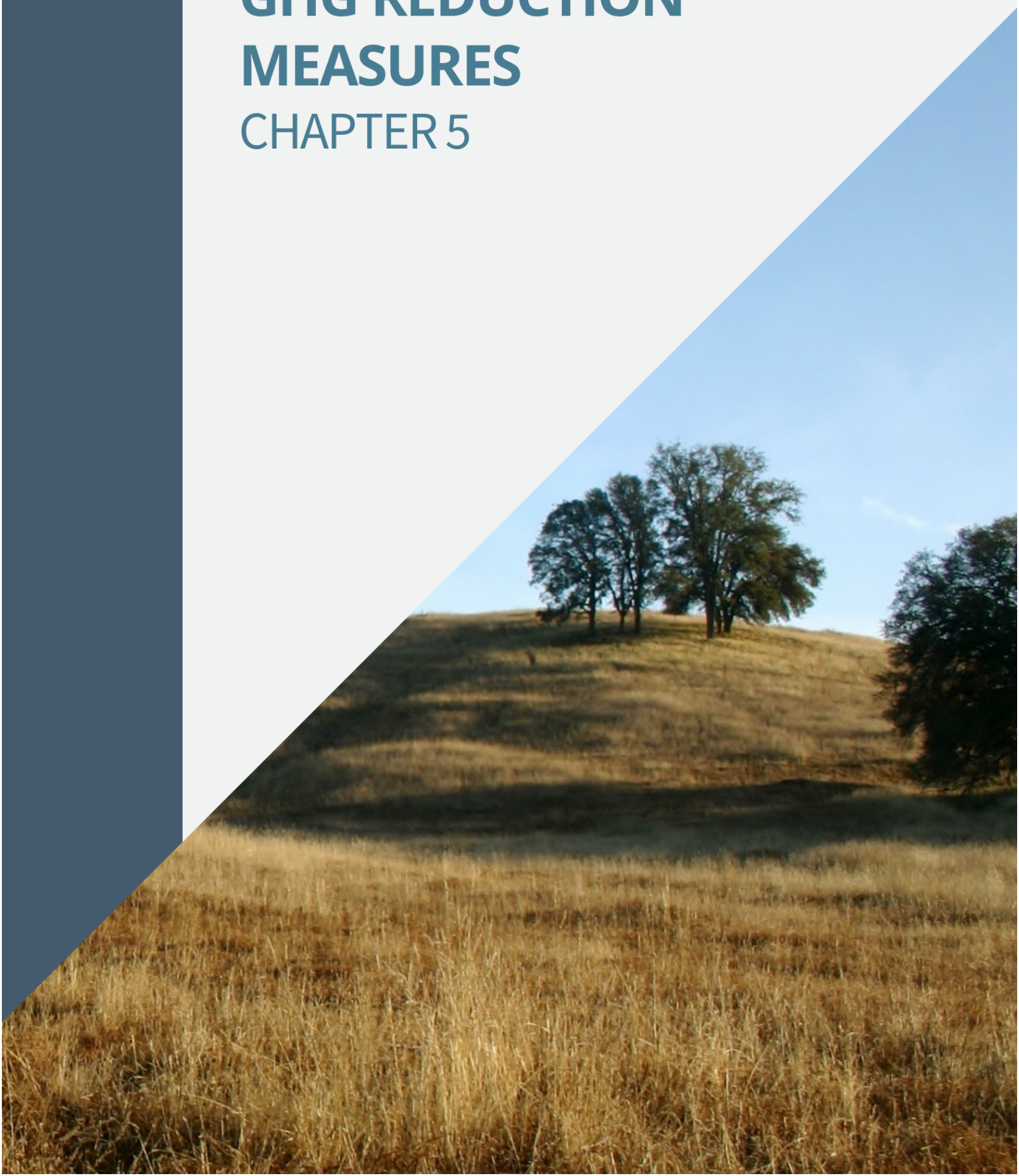
GREENHOUSE GAS REDUCTION PLAN PUBLIC OUTREACH

City of Angels Camp | April & May 2022



GHG REDUCTION MEASURES

CHAPTER 5



Chapter 5. GHG Reduction Measures

Overview

The quantified measures to reduce GHG emissions associated with energy, transportation, solid waste, and water and wastewater are included below. The GHG reduction impacts for each measure are included for target years 2030 and 2045. It is recommended that the City form a GHGRP measure implementation committee and seek funding to assist with community education and measure implementation.

Mitigation Measures & Actions

Energy

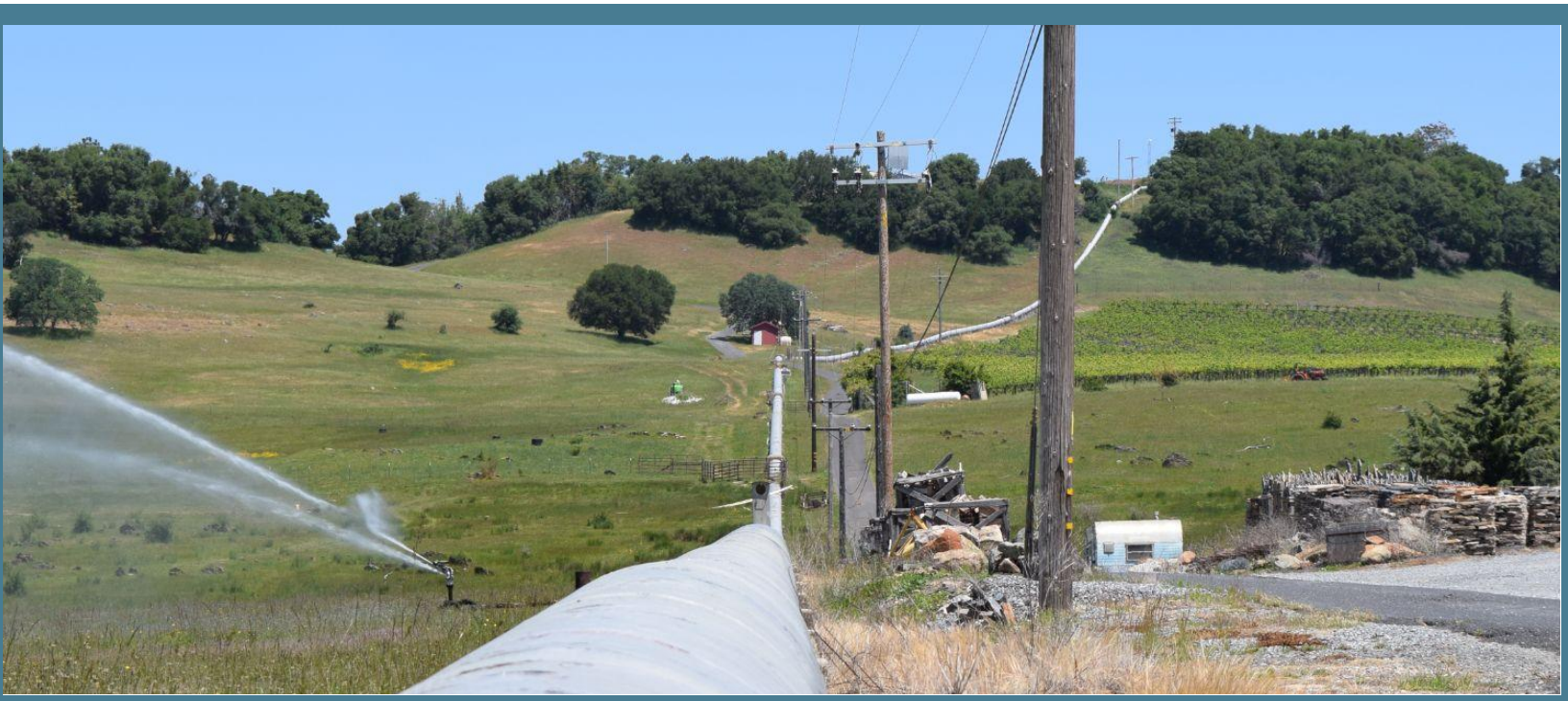
The following measures focus on reducing emissions associated with energy use in both residential and commercial buildings. Buildings consume a significant amount of energy. By implementing measures that will improve efficiency, increase renewables and storage, and decarbonize the built environment, emissions from this sector will decrease.

Renewable Energy (RE)

Measure RE-1: Increase Community Renewable Energy

Convert 50% of existing residential grid electricity and 30% of existing commercial grid electricity to renewable electricity by 2030.

Increase the use of renewable energy in the community and support efforts to increase renewable and carbon-free energy generation, including wind, solar, hydro, and biomass, and to ensure customer access to this renewable energy. Encourage on-site renewable energy generation and storage systems for residents and businesses. Develop a robust renewable energy program that provides outreach,



financing opportunities, and technical assistance to residents and businesses. Pursue community solar projects. Work with large energy users to transition towards renewable and zero net energy projects. Pursue distributed energy resources (DERs), microgrids, energy storage opportunities, and grid optimization projects.

*Quantification in **Table 1** accounts for the impacts of EB-3, EB-1, EO-1, and EB-2, in order of operations. Measure RE-2 is supportive of RE-1, and while it could not be quantified separately, it supports the reductions associated with RE-1. RE-1 does not contribute to 2045 reductions due to California's Renewable Portfolio Standard, which requires that all of the state's electricity will come from carbon-free sources by 2045.*

Table 1. Measure RE-1 GHG Reduction Impact (MT CO2e/Year)

	2030	2045
Total	**451**	**--**

Measure RE-2: Promote On-Site Renewable Energy Generation (Government Operations)
Support efforts on available government-owned land or buildings to increase renewable and carbon-free energy generation, including, wind, solar, hydro, and biomass. Promote on-site renewable energy generation and energy storage. Evaluate the renewable energy potential and assess barriers to increased renewable energy generation.

As a supportive measure, emissions for RE-2 have been included within the quantification of RE-1 in **Table 1**.

Education & Outreach (EO)

Measure EO-1: Conduct Energy Conservation Outreach and Education
Reduce existing and new residential and commercial energy use (all sources) by 12% in 2030 and 2045 through robust energy conservation outreach and education.

Conduct energy conservation and efficiency education and outreach to residents and businesses. Support and promote programs for lower-income and disadvantaged populations. Increase awareness of resources and financing opportunities for homes and businesses to (1) replace old appliances with energy-efficient models, (2) conduct retrofits to heating, ventilation, and air conditioning (HVAC) systems and building envelope, (3) upgrade to efficient lighting, (4) replace old and inefficient wood- and propane-burning heaters, and (5) add smart controls and sensors. This includes property owners (primary, vacation, and second homeowners), property management groups, and landlords. Through education and outreach, increase participation in voluntary residential and commercial energy efficiency programs. Educate citizens about low-income home weatherization programs (U.S Department of Energy's Weatherization Assistance Program, California's Low-Income Weatherization Program, utility-offered Energy Savings Assistance Program, local program). Educate about existing housing rehabilitation loan programs. Partner with the local utilities, Pacific Gas & Electric (PG&E) and

Calaveras Public Power Agency, to promote existing energy programs for residents and businesses.

*The EO-1 quantification in **Table 2** accounts for the impacts of EB-3 and EB-1 on existing energy use, in order of operations.*

Table 2. Measure EO-1 GHG Reduction Impact (MT CO_2e/Year)

	2030	2045
Total	**394**	**67**

Existing Buildings (EB)

Measure EB-1: Facilitate Energy Efficiency Retrofits

Reduce existing residential building energy use by 10% in 2030 and 25% in 2045 through energy efficiency retrofits. Reduce existing commercial buildings energy use by 15% in 2030 and 30% in 2045 through energy efficiency retrofits.

The City will pursue funding to help facilitate (i.e., incentivize) energy-efficient upgrades for homes and businesses, such as upgrading outdated wood-burning and propane appliances with more-efficient models, as discussed in EO-1.

*The EB-1 in **Table 3** quantification accounts for the impacts of EB-3, in order of operations.*

Table 3. Measure EB-1 GHG Reduction Impact (MT CO_2e/Year)

	2030	2045
Total	**380**	**138**

Measure EB-2: Establish a Green Business Program

Achieve participation of 5% of businesses in 2030 and 2045 within a Green Business Program. Reduce existing and new commercial energy use (all sources) by 10% in 2030 and 2045.

Establish a green business program that certifies businesses based on criteria such as energy efficiency, employee wellness, water and waste reduction, etc. Benefits to employee wellness could include active transportation, cleaner air, etc.

*The EB-2 quantification in **Table 4** accounts for the impacts of EB-3 and EB-1, in order of operations.*

Table 4. Measure EB-2 GHG Reduction Impact (MT CO_2e/Year)

	2030	2045
Total	**3**	**0**

Measure EB-3: Implement an Electrification Time-of-Replacement Ordinance

At equipment end of life, replace 45% of existing residential and commercial natural gas and propane water heaters with electric alternatives by 2030 and 90% by 2045 (based on 10-year life and 10% non-compliance). At equipment end of life, replace 23% of natural gas, propane, and wood space heaters with electric alternatives by 2030 and 90% by 2045 (based on 20-year life and 10% non-compliance).

By 2025, adopt an ordinance that requires residential and commercial fossil fuel-powered space and water heating appliances be replaced with electric alternatives at time of replacement.

Table 5. Measure EB-3 GHG Reduction Impact (MT CO_2e/Year)

	2030	2045
Total	**919**	**2,560**

Measure EB-4: Improve Building Energy Efficiency of Government Operations

Pursue grants to improve the energy efficiency of existing City-owned buildings and infrastructure whenever a project is undertaken to improve or maintain them. This includes maintenance or improvement of both interior and exterior (streetlight, parking lot lighting, traffic signals, and other outdoor area lighting) operations. Energy efficiency improvements include retrofits or commissioning/retro-commissioning to HVAC, lighting, controls, sensors, building envelope, and any other energy loads.

Emissions for EB-4 have been included within the quantification of EB-1 in **Table 3**.

New Construction (NC)

Measure NC-1: Implement Reach Codes

Achieve a 53% efficiency improvement for new residential buildings and a 30% efficiency improvement for new commercial buildings through the implementation of reach codes and green building standards by 2030 and 2045. This assumes ordinance adoption by 2025.

Pursue reach codes and green building standards that go beyond Title 24. Examples include: incentives for exceeding minimum building energy performance, requiring new construction to be fully electric (no propane), or requiring energy audits.

Table 6. Measure NC-1 GHG Reduction Impact (MT CO_2e/Year)

	2030	2045
Total	**62**	**92**

Measure NC-2: Incentivize Zero Net Energy New Construction

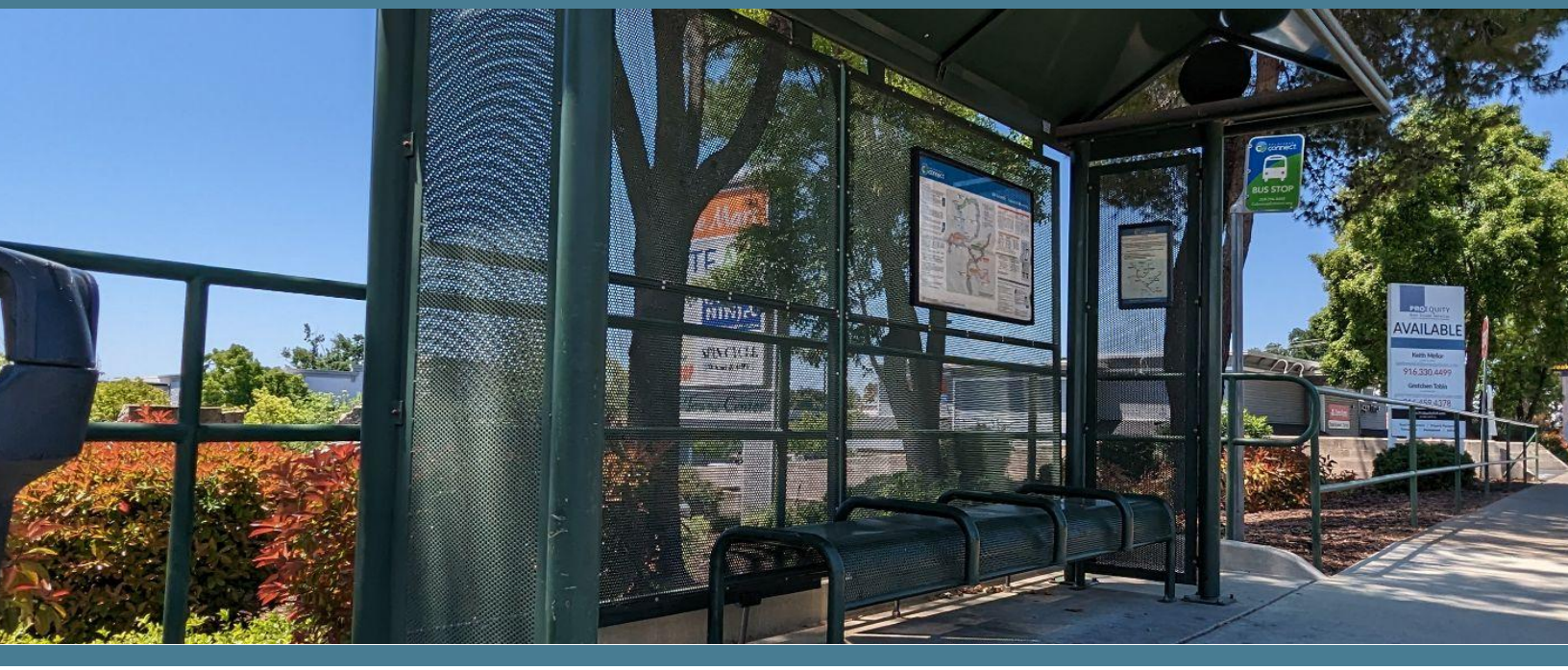
Achieve participation of zero net energy construction by 5% of new residential and commercial buildings by 2030 and 15% by 2045. This assumes ordinance adoption by 2025.

Incentivize new residential and nonresidential buildings to be built all-electric and install renewable energy generation and energy storage systems that can fully offset energy needs.

*The NC-2 quantification in **Table 7** accounts for the impacts of NC-1, in order of operations.*

Table 7. Measure NC-2 GHG Reduction Impact (MT CO_2e/Year)

	2030	2045
Total	**2**	**12**



Transportation

The following measures focus on reducing emissions associated with transportation, which is the largest source of emissions in the City. By implementing measures that encourage the use of low-emission and electric vehicles (EVs), promote active transportation, improve public transit systems, and reduce the need for single-occupancy vehicles, emissions from this sector can be significantly reduced. These measures will help to create a more sustainable transportation system that benefits all community members.

Transportation (TR)

Measure TR-1: Increase EV/ZEV Adoption

Increase EV and zero-emission vehicle (ZEV) adoption to 30% for passenger vehicles and 30% for commercial vehicles within the City by 2030.

1. Work with Calaveras County (County) to install 62 new publicly accessible EV charging ports in the City by 2030 to drive ZEV adoption and build a regionally-connected EV charging infrastructure network.
2. Develop and adopt an electric vehicle charging infrastructure reach code to require 50% of total parking spaces in new or remodeled commercial development to install Level 2 EV chargers exceeding the 2022 California Green Building Standards Code Tier 2 requirements.
3. Develop a list of prioritized locations for new EV charging stations within the City for inclusion in the County's Electric Vehicle Infrastructure Implementation Plan. Include locations recommended in the Central Sierra Zero Emission Vehicle Readiness Plan (CSZEVRP), including EV charging infrastructure for visitors at the recommended resorts and lodging locations, direct current (DC) fast chargers at the recommended highway corridor locations, and EV charging stations (EVCS) at the other recommended destinations.
4. Consistent with the Calaveras Streamlined Permitting Guidebook of the CSZEVRP, develop and maintain an expedited, streamlined permitting process for EVCS in accordance with AB 1236

and employ the example Plug-in EV Infrastructure Permitting Checklist in the Guidebook to assess installation projects for expedited review.

5. Investigate the feasibility of developing and adopting an electric vehicle charging infrastructure reach code for existing development, which requires existing buildings over 10,000 square feet to install 30% of EV Capable charging spaces during major renovations.
6. Work with the County to acquire a significant grant from Measures TR-6 through TR-10 to upgrade the EV charging and alternative fueling infrastructure to facilitate a robust and regionally-connected ZEV network throughout the City.
7. Work and collaborate with local businesses and employers (including hotels and shopping centers) to develop and implement a plan for City-supported accelerated business fleet electrification.
8. Support ZEV car share companies in coming to the City.
9. Coordinate with City communities-based organizations, agencies, and nonprofits to conduct ZEV education events for residents and business owners.
10. Work with the Calaveras County Air Pollution Control District (CCAPCD) to start a purchase rebate program and provide higher trade-in value for combustion vehicles to assist lower-income households in purchasing EVs.
11. Develop a Neighborhood Electric Vehicle (NEV) Transportation Plan to identify areas in the community where community members can safely operate, develop signage, and identify opportunities for implementation of compatible NEV infrastructure (including infrastructure for electric golf carts).

Table 8. Measure TR-1 GHG Reduction Impact (MT CO_2e/Year)

	2030	2045
Passenger EV/ZEV	2,324	5,021
Commercial EV/ZEV	1,019	162
Total	**3,344**	**5,183**

Measure TR-2: Decarbonize the City Municipal Fleet and Employee Commute

Decarbonize the City municipal fleet and related commuter vehicles to achieve a 40% ZEV fleet by 2030.

1. Adopt a city requirement that requires that new and replacement City municipal fleet vehicle purchases are EVs or ZEVs, where feasible.
2. Conduct a study to determine a timeframe and schedule to convert all City municipal fleet vehicles to EV/ZEVs and identify the EV charging/alternative fueling capacity needed to support a 100% ZEV fleet. Work with the County to incorporate needed EV/ZEV infrastructure installations into the County's Electric Vehicle Infrastructure Implementation Plan.

3. Secure funding from programs such as the CARB's Clean Vehicle Rebate Project, Clean Cars 4 All Program, and the Hybrid and Zero-Emission Truck and Bus Voucher Incentive Program to increase procurement of EV or ZEV cars, trucks, and other vehicles and installation of EV/ZEV charging and fueling infrastructure at City facilities.
4. Work with the County and the Regional Electric Vehicle Infrastructure Collaborative to lead the creation of best practices and the pursuit of funding for EV infrastructure as well as public and private ZEV fleets.
5. Coordinate with local agencies and community-based organizations to develop EV/ZEV educational materials that inform City employees on costs/benefits of owning EVs/ ZEVs and guidance on receiving funding for EVs/ZEVs.
6. Provide a transportation subsidy to City employees to assist with purchase of EVs or ZEVs used for their work commutes.
7. Allow eligible City employees to telecommute, with a target rate of 25% of eligible staff time utilizing telecommuting by 2030.

Table 9. Measure TR-2 GHG Reduction Impact (MT CO_2e/Year)

	2030	2045
Total	**84**	**210**

Measure TR-3: Increase Active Transportation Mode Share

Increase active transportation mode share within the City 2% by 2030.

1. Construct bikeway and pedestrian system connections within the City and connect with County, state, and federal infrastructure through integration of bicycle facilities as part of other roadway construction projects.
2. Conduct an annual review of collisions in order to identify and implement bicyclist and pedestrian infrastructure and safety improvements needed for the active transportation network and coordinate with the County to incorporate the improvements into the County's bicycle and pedestrian master plan updates.
3. Work with the County to pursue funding from Measures TR-6 through TR-10 to implement projects from the City of Angels Regional Bicycle, Pedestrian, and Safe Routes to School Master Plan.
4. Work and collaborate with local organizations and agencies, such as CCOG and theCounty, to promote bicycle and pedestrian travel as well as the Calaveras County Regional Bicycle, Pedestrian, and Safe Routes to School Master Plan.
5. Acquire grants to provide transportation subsidies to lower-income households to assist with purchase of bicycles used for their work commutes.
6. Coordinate with City communities-based organizations, agencies, and nonprofits to conduct bicycle and pedestrian education events for residents and business owners.

7. Pursue a public-private partnership to implement a shared e-bike/bike share program to provide low-cost micro-mobility options to visitors and residents of the City.
8. Expand and enhance the Calaveras County Green Streets Program to improve the walkability of streets by providing increased shade cover and increased carbon sequestration potential.
9. Add paid parking to key visitation locations to encourage transit use, carpooling, biking, and walking.

Table 10. Measure TR-3 GHG Reduction Impact (MT CO_2e/Year)

	2030	2045
Total	**35**	**139**

Measure TR-4: Increase Public Transit Mode Share

Increase public transit mode share to 10% by 2030.

1. Conduct a study to identify specific and systematic gaps and barriers to mobility and access in the current public transit system. Include direct outreach to members of disadvantaged communities, commuters, tourist destinations, and other underserved groups.
2. Work with the County to establish a regional transportation system that serves all City residents and visitors through a connected network of express and local fixed-route bus services, regional commuter services, public tourist shuttles, on-demand shuttles/microtransit, consistent active transportation connections (e.g., bike racks) and coordinated first-last mile commuting options that may include micro-mobility options.
3. Partner with the County to establish an EV rideshare program (similar to "Green Raiteros") that allows for people with limited mobility options to rent a vehicle or request a ride in an EV for low cost.
4. Work with the County to establish 'Park and Ride' facilities at locations convenient for commuters, residents, and visitors to transfer from a single occupancy vehicle to transit buses, commuter services, shuttles, or EV rideshare vehicles.
5. Work with the County to obtain significant funding from Measures TR-6 through TR-10 to fund a regional transportation system and build an EV charging infrastructure network to support the EV rideshare program.
6. Identify and direct a City department and staff to oversee and manage the EV rideshare program in partnership with the County.
7. Implement a promotion and education campaign to inform the community of the availability of the EV rideshare program and available transit routes and options. This may include but is not limited to: tabling at community events, bilingual mailers, social media posts, direct engagement with employers, and partnerships with Google Transit or a mobile application developer to bring real-time maps and schedules to residents and visitors.

8. Prioritize EV rideshare program implementation in low-income communities and develop pricing plans that make the public transportation system and EV rideshare program affordable for low-income residents.

Table 11. Measure TR-4 GHG Impact (MT CO_2e/Year)

	2030	2045
Total	**403**	**1,612**

Measure TR-5: Decarbonize Off-road Equipment and Vehicles

Decarbonize 25% of the off-road equipment and vehicles in the City by 2030.

1. Create a phased ordinance by 2024 to ban the local operation of gasoline and diesel-powered off-road equipment by type, including banning local operation of gasoline and diesel-powered small off-road equipment (SORE) by 2029. For those equipment types that cannot be decarbonized (aka., electrified or converted to biofuel) in the short-term, include a requirement for the use of renewable diesel (e.g., RD99 which is a drop-in renewable fuel and readily available on West Coast).
2. Establish an enforcement and implementation program to track transition of off-road equipment across the City.
3. Conduct an assessment of off-road equipment and vehicles in the City to inform feasible phases for the ordinance, identify fleets with high decarbonization potential and fleets that will require targeted support to decarbonize, and identify available electric/biofuel options for each type. The assessment shall include direct outreach to fleet operators.
4. Dedicate a City department and staff to support the County's Off-road Equipment Replacement Program to work directly with fleets identified in action TR-5.2 to decarbonize their off-road equipment and vehicles. The program shall include free consultations with fleet operators to identify equivalent alternatives to fossil-fueled off-road equipment, direct support to obtain rebates and incentives, and connections to qualified local repair services to maintain the replaced equipment.
5. Work with the County and CCAPCD to pursue funding from the Carl Moyer program and rely on funding from Measures TR-6 through TR-10 to support off-road decarbonization efforts via purchase of all-electric and/or biofuel off-road equipment and vehicles.
6. Work with the County and CCAPCD to develop a rebate and incentive program for upgrading off-road equipment and vehicles and switching to electric or biofuels. Develop the program with a focus on procedural equity and prioritize funding distribution to members of disadvantaged communities.
7. Partner with the County to develop a multilingual Off-road Equipment Replacement Outreach Campaign that educates fleet operators on the public health and safety benefits of alternative equipment technology and connects them with the Off-road Equipment Replacement Program.

8. In collaboration with the County, work with electric off-road equipment manufacturers (such as Solectrac and Monarch) to host workforce development workshops to train local agricultural equipment repair shops to service electric off-road equipment and off-road equipment utilizing biofuels and renewable diesel.
9. Partner with the CCAPCD to establish the enforcement and implementation program, create the Off-road Equipment Replacement Program, pursue funding, and develop the rebate and incentive program.

Table 12. Measure TR-5 GHG Reduction Impact (MT CO_2e/Year)

	2030	2045
Total	**212**	**593**

Measure TR-6: Create a Tourism Economy

Partner with the County to develop a tourism economy to help fund the decarbonization of the transportation sector.

1. Establish a tourism/hotel tax with revenue earmarked for the decarbonization of transportation within the City.
2. Work with the County to develop a plan to help brand and market Calaveras County and the City as a sustainable tourist destination and conduct a study to determine the price options and applicability for the tax.
3. Secure funding from Visit California's Rural Marketing Program to market Calaveras County and the City as a sustainable tourist destination.
4. Partner with the Calaveras Visitors Bureau to secure funding from Visit California's Rural Marketing Program, and partner with both the Calaveras Visitors Bureau and existing members of the City's tourism industry to develop the plan, develop the tax, and implement the marketing efforts.
5. Work with partners and businesses to implement the plan/marketing campaigns to market Calaveras County, the City, and appropriate local businesses as sustainable tourist destinations.
6. Directly engage members of disadvantaged communities in the development of the plan and tax to understand and plan for equity concerns.

Emissions for TR-6 have been included within the quantification of TR-1 through TR-5.

Measure TR-7: Establish the City of Angels as a Pilot Program

Partner with the Rural County Representatives of California (RCRC) to establish the County and the City as a pilot program for the decarbonization of the transportation sector in rural communities.

1. Work with the County to establish a regional community foundation with neighboring rural communities to fund the decarbonization of the transportation sector in rural California.

2. Partner with the County to develop a vision and strategy for the regional community foundation to serve as a first-mover/pilot in the State in the decarbonization of America's rural transportation systems.
3. As a first-mover in rural America, partner with the County to pursue funding from large philanthropy such as the Bezos Earth Fund, Rockefeller Foundation, Bill & Melinda Gates Foundation, etc. to fund the development of a decarbonized rural transportation system.
4. Work with the County to advocate for and promote the regional community foundation as a first-mover in the decarbonization of America's rural transportation systems to the Federal Government and state and regional governments and philanthropic organizations.
5. Directly engage members of disadvantaged communities in the development of the vision and strategy to convey a clear vision that aims to benefit all members of rural communities.
6. Partner with RCRC and/or other regional organizations to develop the foundation, advocate for it, lobby state and federal agencies for funding, and establish a network of private and public partners/members.

Emissions for TR-7 have been included within the quantification of TR-1 through TR-5.

Measure TR-8: Develop a Biofuel Industry

Partner with the County, local utilities, and state agencies to develop a biofuel industry to fund the decarbonization of the transportation sector.

1. Work with the County to establish a memorandum of understanding with PG&E, CARB, California Department of Forestry and Fire Protection (CAL FIRE), the Department of Agriculture, forest owners, and waste management companies to establish a plan to manage biomass and organic waste through the development of biofuel infrastructure in the County to position Calaveras County and the City as a first-mover in active forest management to support California's carbon-free future.
2. Pre-zone and clear specific areas in the City for development of biofuel generation facilities.
3. Partner with the County, PG&E, and state agencies to develop a green bond to help fund the development of biofuel infrastructure in Calaveras County and the City and explore revenue options through the Low Carbon Fuel Standard.
4. Work with the County, local utilities, and state agencies to pursue grants earmarked for biofuel infrastructure from the Inflation Reduction Act.
5. Establish partnerships with organic waste haulers to collect biowaste from residential and nonresidential sources.
6. Establish a campaign to educate the waste haulers and the community on the economic and wildfire risk benefits of active forest management for bioenergy and work with the County to establish a working group/committee to involve local community members and businesses in the planning process.
7. Work with the County to create workforce development programs to train the City's local workforce for biofuel jobs. Specifically target training towards members of disadvantaged

communities and establish criteria in the planning process that prioritizes/requires the employment of Calaveras residents and businesses in the industry.

8. Establish a biofuel tax with revenue earmarked for the decarbonization of transportation or earmarked to provide incentives to purchase biofuel or carbon-neutral vehicles within the City.

Emissions for TR-8 have been included within the quantification of TR-1 through TR-5.

Measure TR-9: Obtain State Funding

Establish the City and Calaveras County as a pilot program for a rural carbon-free transportation system through State investment and grants such as California Climate Investments (CCI).

1. Partner with the County to develop a report highlighting the City's and Calaveras County's unique opportunity to become a pilot for the decarbonization of rural transportation systems in California.
2. Work with the County to secure funding from CCI and develop an investment program with private partners, including local utilities and local employers, to secure local match funding for the grants.
3. Partner with local agencies such as CCAPCD and Calaveras Connect to plan for, secure, and implement CCI grant funding.
4. Directly engage members of disadvantaged communities to analyze and convey transportation barriers in the report development.

Emissions for TR-9 have been included within the quantification of TR-1 through TR-5.

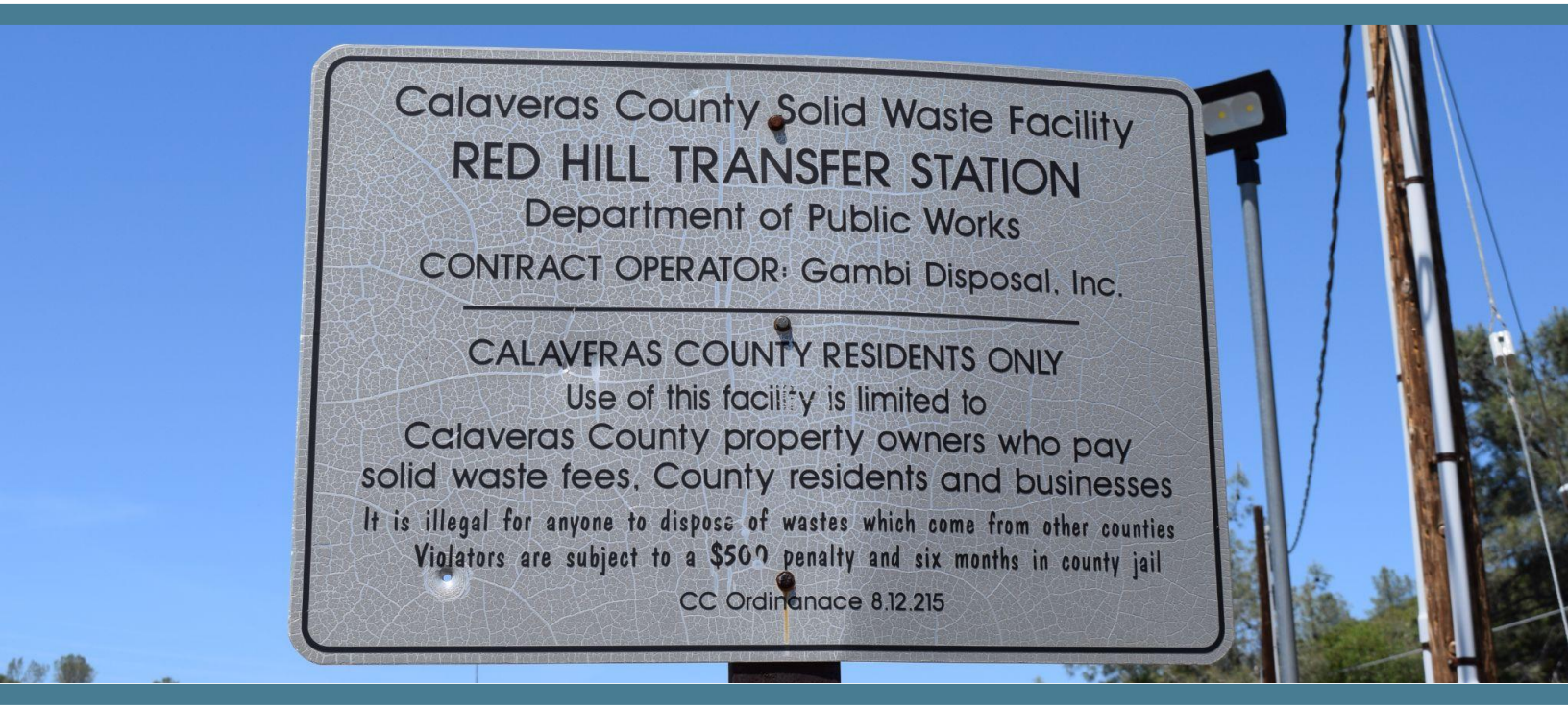
Measure TR-10: Obtain Federal Funding

Work with the County to secure federal funding from the Charging and Fueling Infrastructure Discretionary Grant Program to decarbonize the transportation sector.

1. Coordinate with the County to develop the Electric Vehicle Infrastructure Implementation Plan with a focus on expanding access to EV infrastructure disadvantaged communities, in low- and moderate-income neighborhoods, and in communities with a low ratio of private parking spaces to households or a high ratio of multi-unit dwellings to single-family homes in the City.
2. Work with the County to secure significant funding from the Charging and Fueling Infrastructure Discretionary Grant Program's Community Grants by leveraging the Electric Vehicle Infrastructure Implementation Plan and the City's and County's ability to expand access to EV infrastructure within rural areas, low- and moderate-income neighborhoods, and communities with a low ratio of private parking spaces to households or a high ratio of multi-unit dwellings to single-family homes.
3. Partner with the Federal Highway Administration (FHWA) California Division, California Local Technical Assistance Program (CA LTAP), and/or the Office of Planning and Research to obtain technical support and train staff to help develop a successful federal grant application.

4. Develop an Equity First Program to provide early funding opportunities for members of disadvantaged communities, low- and moderate-income neighborhoods, and communities with a low ratio of private parking spaces to households or a high ratio of multi-unit dwellings to single-family homes in the City.

Emissions for TR-10 have been included within the quantification of TR-1 through TR-5.



Solid Waste

The measures outlined in this section aim to reduce the emissions associated with solid waste. The decomposition of organic waste in landfills and the transportation of waste to disposal facilities contribute to these emissions. To combat this issue, strategies to decrease waste generation, improve recycling and composting, and encourage sustainable materials management practices will help reduce emissions.

Solid Waste (SW)

Measure SW-1: Organic Waste Diversion

The City will implement waste management practices to support organics diversion. Programs may include providing green waste collection programs, utilizing public/private partnerships to utilize green waste in alternative uses and waste-to-energy facilities, reviewing zoning ordinance and Air Pollution Control District regulations and amendments as necessary to facilitate the development of green waste-to-energy projects and other projects that convert green waste to products, and investigating and incentivizing community composting. In addition, in accordance with General Plan Conservation and Open Space Element Policy 4.B.4 and Implementation Program 4.B.j, the City will coordinate with individuals, community groups, and publicly funded and privately managed recycling and composting providers to educate the public about the benefits of composting. Through a combination of these programs, the City will divert 75% of food and green yard waste from landfills and reduce short-lived climate pollutants compared to baseline conditions in accordance with SB 1383.

Table 13. Measure SW-1 GHG Reduction Impact (MT CO_2e/Year)

	2030	2045
Total	**463**	**516**

Measure SW-2: Divert from Forward to Rock Creek Landfill

Reduce truck vehicle miles traveled by diverting to Rock Creek Landfill or recycling an additional 5% of total City solid waste disposal that would otherwise be disposed at Forward Landfill.

Table 14. Measure SW-2 GHG Reduction Impact (MT CO_2e/Year)

	2030	2045
Total	**0.29**	**0.3**



Water & Wastewater

The following measures aim to reduce emissions associated with water distribution and wastewater treatment. Energy-intensive treatment processes and the distribution of water and wastewater contribute to emissions in this sector. By implementing measures that improve the energy efficiency of treatment processes, and reduce water loss and treatment demands, emissions from this sector can be reduced.

Water & Wastewater (WW)

Measure WW-1: Wastewater Treatment Plant Energy Efficiency

The City will reduce energy demand per gallon treated at City-operated water and wastewater treatment facilities by 5% by 2030.

Table 15. Measure WW-1 GHG Reduction Impact (MT CO_2e/Year)

	2030	2045
Total	**0.33**	**0.34**

Measure WW-2: Use of Reclaimed (Non-Potable) Water

The City will expand use of reclaimed (non-potable) water to irrigate the 106 acres of landscaping at the City's wastewater treatment plant (WWTP).

Table 16. Measure WW-2 GHG Reduction Impact (MT CO_2e/Year)

	2030	2045
Total	**0.02**	**0.02**

Measure WW-3: Use of Reclaimed (Non-Potable) Water

In addition to the specific project listed above in Measure WW-2, the City will work with local/regional agencies to recognize appropriate uses for reclaimed water as an alternative for various land uses and keep apprised of the latest developments in the use of reclaimed water. In accordance with General Plan Land Use Element Implementation Program 1.E.d, revise landscaping standards and incorporate those standards as conditions of project approval to facilitate the use of gray water and reclaimed water systems for landscape irrigation. Additionally, the City will work with other wastewater service providers to expand the use of recycled wastewater for agricultural uses, and create incentives and rebates for greywater systems, composting toilets, or other residential retrofits in new and existing homes. Through a combination of efforts, the City will achieve a 10% reduction in total potable water use.

Table 17. Measure WW-3 GHG Reduction Impact (MT CO_2e/Year)

	2030	2045
Total	**5**	**5**

Measure WW-4: Require Low-Flow Water Use Fixtures

The City will adopt a reach code to exceed state-level requirements by 5% for the installation of water-conserving appliances in all new residential and non-residential buildings, and the City will require design plans of new development projects to include water-saving features.

Table 18. Measure WW-4 GHG Reduction Impact (MT CO_2e/Year)

	2030	2045
Total	**0.34**	**0.35**

Summary

The City adopted target for the year 2030 is 40% below 1990 levels, in accordance with SB 32. The City adopted target for the year 2045 is carbon neutrality in accordance with EO B-55-18, and now AB 1279, as well. The emissions reduction targets for the City are provided in **Table 19** below. Qualified plans that meet California Environmental Quality Act (CEQA) requirements include ones that meet or exceed SB 32.

Table 19. Forecast and Target Values

Target Year	Business-as-Usual Emissions	Adjusted Business-as-Usual Forecast	Target Emissions
1990	26,458	--	--
2030	26,265	20,758	15,875
2045	28,039	17,674	0

The City's GHGRP covers measures to reduce GHG emissions associated with the following sectors: Energy, Transportation, Solid Waste, Water and Wastewater. **Table 20** summarizes the impact of each GHG reduction measure by sector and calculates the amount of GHG emissions that will be reduced by the target years: 2030 and 2045. Unquantified supportive measures were not included in the table.

Table 20. GHG Reduction Summary (MT CO_2e)

Measure	Description	2030	2045
Energy			
RE-1	Increase Community Renewable Energy	451	-
EO-1	Conduct Energy Conservation Outreach and Education	394	67
EB-1	Facilitate Energy Efficiency Retrofits	380	138
EB-2	Establish a Green Business Program	3	0
EB-3	Implement an Electrification Time-of-Replacement Ordinance	919	2,560
NC-1	Implement Reach Codes	62	92
NC-2	Incentivize Zero Net Energy New Construction	2	12
Energy Sector Total		***2,211***	***2,869***
Transportation			
TR-1	Increase EV/ZEV Adoption	3,344	5,183
TR-2*	Decarbonize the City Municipal Fleet and Employee Commute	84	210
TR-3	Increase Active Transportation Mode Share	35	139
TR-4	Increase Public Transit Mode Share	403	1,612
TR-5	Decarbonize Off-Road Equipment and Vehicles	212	593
Transportation Sector Total		***3,993***	***7,527***
Solid Waste			
SW-1	Organic Waste Diversion	463	516
SW-2	Divert from Forward to Rock Creek Landfill	0.3	0.3
Solid Waste Sector Total		***464***	***517***
Water and Wastewater			
WW-1	Wastewater Treatment Plant Energy Efficiency	0.3	0.3
WW-2	Use of Reclaimed (Non-Potable) Water	0.02	0.02
WW-3	Use of Reclaimed (Non-Potable) Water	5	5
WW-4	Require Low-Flow Water Use Fixtures	0.3	0.4
Water and Wastewater Sector Total		***6***	***6***
Total GHG Reductions for All Sectors		**6,674**	**10,919**

**Not included in sector total to avoid double counting.*

The GHG reduction impacts per measure are summarized by sector above, then totaled to calculate the total reduction of GHG emissions via the GHGRP. The reduced total GHG emissions resulting from implementation of the GHGRP are then compared to the emissions reduction goals for each target year.

Table 21 below summarizes the total emissions under an ABAU scenario, the reduced total emissions with the implementation of the GHG reduction measures, and the emissions gap between the reduced total emissions from the GHGRP and the emissions reduction goal for each target year. The emissions gap represents the difference between where GHG emissions are predicted to be with plan implementation and where GHG emissions should be based on the City's target setting. For example, a positive (greater than zero) value for the emissions gap means that the reduced total emissions will still exceed the emissions reduction goal; in other words, the emissions gap is the amount of reduction that is still needed to meet the targets.

Based on the total reductions provided by the GHGRP, the City would achieve its adopted 2030 target with the above measures. Additional measure planning and discussion would be required to achieve the 2045 target.

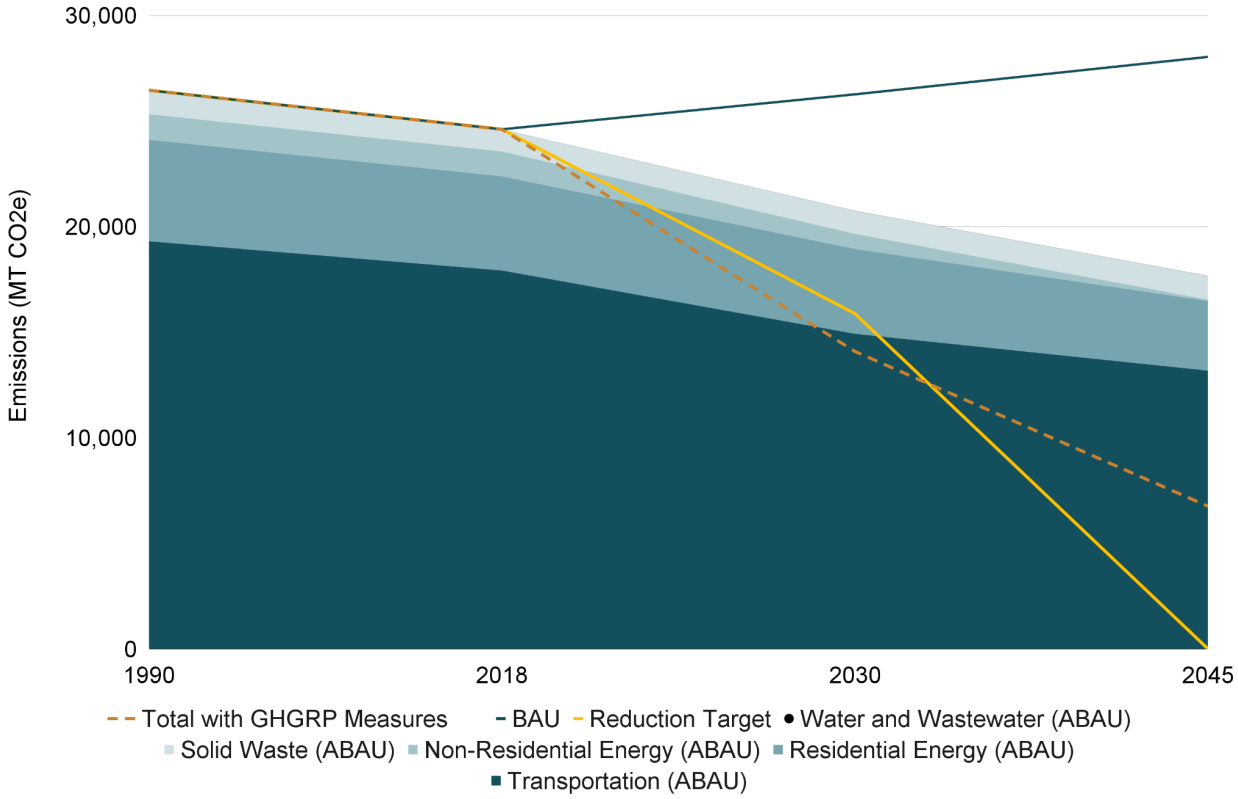
Table 21. City Inventory, Forecast, and Reduction Targets (MT CO_2e)

	1990	2018	2030	2045
Emissions Inventory and ABAU Forecast (MT CO_2e)	26,458	24,608	20,758	17,674
Target Percent Reduction below 1990 Levels	--	--	40%	100%
Target Emissions Level (MT CO_2e)	--	--	15,875	0
Reductions from ABAU Forecast Needed to Achieve Target (MT CO_2e)	--	--	4,883	17,674
Total Emissions Reductions from GHGRP	**--**	**--**	**6,674**	**10,920**
Remaining Emissions Gap to Achieve Target (MT CO_2e)	**--**	**--**	**(1,790)**	**6,754**

Notes: Totals may not sum exactly due to independent rounding. The emissions gap value in parentheses indicates the target has been achieved with a surplus of emissions reductions.

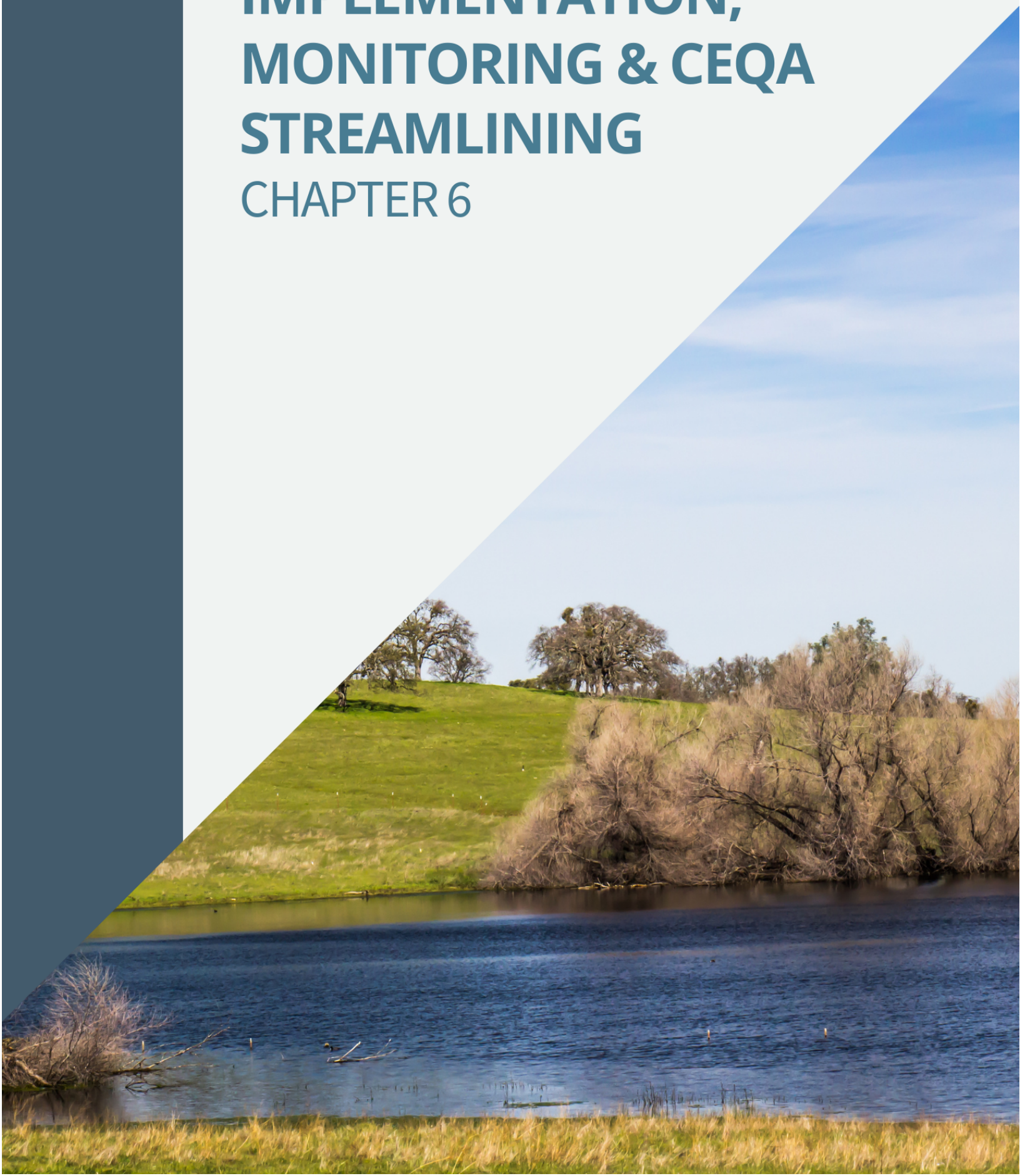
Figure 5 provides a snapshot of the emissions projections for the City from 1990 through 2045, broken down by sector, and in relation to these emissions, the reduction target (solid yellow line) against the implementation of the GHGRP measures (dashed yellow line). The reduction measures demonstrate a path to achieve the 2030 target.

Figure 5. ABAU Forecast with Reductions from Mitigation Measures



IMPLEMENTATION, MONITORING & CEQA STREAMLINING

CHAPTER 6



Chapter 6. Implementation, Monitoring & CEQA Streamlining

Implementation & Monitoring

This chapter outlines how the City will implement the GHGRP measures described above and monitor progress towards achieving the 2030 and 2045 GHG emission reduction targets. The City has committed to reducing GHG emissions to 40% below 1990 levels by 2030 and to achieving carbon neutrality by 2045.

Successful implementation of the GHGRP measures will determine whether the GHG emissions reduction targets are met. As a result, measures must be regularly assessed and continuously monitored to ensure: 1) All measures include clearly defined steps necessary for implementation; 2) Individual measures are contributing to the overall GHG reduction target; 3) The GHGRP is on track to achieve its overall GHG reduction targets; and 4) Beneficial community outcomes are attained. This Implementation & Monitoring section summarizes the GHGRP Measures and assigns a City Department lead and support, and implementation timeline for a successful outcome.

Implementation of the GHGRP includes a combination of regulations, programs, incentives, capital improvements, and educational activities. City efforts complement and build on other federal and State efforts. Because City efforts align with federal and State priorities, it is anticipated that the City will be able to take advantage of public funding opportunities, such as funding programs made available through the Inflation Reduction Act. Regular monitoring will allow the City to track the effectiveness of the GHGRP measures, update the emissions inventory, and make adjustments to keep on track toward achieving the GHG emissions reduction targets. The GHGRP may need to be updated to reflect and respond to changing technology, federal and state regulations, demographics, funding opportunities, and market conditions to be effective.

After adoption, the GHGRP will continue to be maintained by the Community Development Department. Ideally, the City can form an oversight committee for implementing the measures with the partners identified. Budgeting for implementation of GHGRP measures will occur as part of the annual budgeting process for each lead and supporting department and grants will be pursued as applicable. The City commits to preparing an annual progress report on the progress of each measure annually and conducting comprehensive GHG emissions inventories at least every two years. Staff will track progress against the expected quantified outcome of each GHGRP measure. Departments responsible for contributing to the implementation of each GHGRP measure are listed below in **Table 22**. **Table 22** includes a relative cost associated with each measure represented by dollar signs as follows: $ = Low Cost; $$ = Medium Cost; and $$$ = High Cost. **Table 22** also includes an estimated timeframe to implement each measure. It is anticipated that a comprehensive update to the GHGRP will occur approximately every five years to respond to changes in federal and state regulations, reflect

major changes to emissions sources and opportunities for emissions reduction, and for consistency with other City land use planning efforts.

Table 22. GHGRP Implementation Plan

Summary of GHGRP Measure	Type of Action Needed	City Lead/Supporting Departments and Partners	Implementation Timeframe	Relative Cost
Energy				
Measure RE-1: Increase Community Renewable Energy Convert 50% of existing residential grid electricity and 30% of existing commercial grid electricity to renewable electricity by 2030.	Education Funding/Grant writing Technical Assistance Incentive Programs Capital Improvements	City Administration Community Development Partners: Utica Water and Power Authority, Yosemite Clean Energy	2023-2030	$$$
Measure RE-2: Promote On-Site Renewable Energy Generation (Government Operations) Support efforts on available government-owned land or buildings to increase renewable and carbon-free energy generation, including, wind, solar, hydro, and biomass. Promote on-site renewable energy generation and energy storage. Evaluate the renewable energy potential and assess barriers to increased renewable energy generation.	Education Feasibility Study Funding/Grant Writing Capital Improvements	City Administration Community Development Partners: Utica Water and Power Authority, Yosemite Clean Energy, Calaveras Council of Governments	2023-2030	$$ - $$$
Measure EO-1: Conduct Energy Conservation Outreach and Education Reduce existing and new residential and commercial energy use (all sources) by 12% in 2030 and 2045 through robust energy conservation outreach and education.	Education Regional Collaboration Incentive Programs	Community Development Partners: Habitat for Humanity, Amador Tuolumne Community Action Agency, PG&E	2023-2045	$

Summary of GHGRP Measure	Type of Action Needed	City Lead/Supporting Departments and Partners	Implementation Timeframe	Relative Cost
Measure EB-1: Facilitate Energy Efficiency Retrofits Reduce existing residential building energy use by 10% in 2030 and 25% in 2045 through energy efficiency retrofits. Reduce existing commercial buildings energy use by 15% in 2030 and 30% in 2045 through energy efficiency retrofits.	Funding/Grant Writing Education Incentive Programs	Community Development Partners: Habitat for Humanity, Amador Tuolumne Community Action Agency, PG&E	2023-2045	$$
Measure EB-2: Establish a Green Business Program Achieve participation of 5% of businesses in 2030 and 2045 within a Green Business Program. Reduce existing and new commercial energy use (all sources) by 10% in 2030 and 2045.	Technical Assistance Education Incentive Programs	Community Development	2023-2045	$
Measure EB-3: Implement an Electrification Time-of-Replacement Ordinance At equipment end of life, replace 45% of existing residential and commercial natural gas and propane water heaters with electric alternatives by 2030 and 90% by 2045 (based on 10-year life and 10% non-compliance). At equipment end of life, replace 23% of natural gas, propane, and wood space heaters with electric alternatives by 2030 and 90% by 2045 (based on 20-year life and 10% non-compliance).	Ordinance Incentive Programs Funding/Grant Writing	Community Development Partners: Habitat for Humanity, Amador Tuolumne Community Action Agency, PG&E	2025-2045	$

Summary of GHGRP Measure	Type of Action Needed	City Lead/Supporting Departments and Partners	Implementation Timeframe	Relative Cost
Measure EB-4: Improve Building Energy Efficiency of Government Operations Pursue grants to improve the energy efficiency of existing City-owned buildings and infrastructure whenever a project is undertaken to improve or maintain them. This includes maintenance or improvement of both interior and exterior (streetlight, parking lot lighting, traffic signals, and other outdoor area lighting) operations. Energy efficiency improvements include retrofits or commissioning/retro-commissioning to HVAC, lighting, controls, sensors, building envelope, and any other energy loads.	Funding/Grant Funding Capital Improvements	Community Development Public Works City Administration Angels Camp Fire Department Angels Camp Police Department Angels Camp Museum	2023-2045	$-$$
Measure NC-1: Implement Reach Codes Achieve a 53% efficiency improvement for new residential buildings and 30% efficiency improvement for new commercial buildings through the implementation of reach codes and green building standards by 2030 and 2045. This assumes ordinance adoption by 2025.	Ordinance Technical Assistance Funding/Grant Writing Incentive Programs	Community Development City Administration Partners: Habitat for Humanity, Amador Tuolumne Community Action Agency, PG&E	2025-2045	$-$$
Measure NC-2: Incentivize Zero Net Energy New Construction Achieve participation of zero net energy construction by 5% of new residential and commercial buildings by 2030 and 15% by 2045. This assumes ordinance adoption by 2025.	Funding/Grant Writing Ordinance Technical Assistance Incentive Programs	Community Development Partners: Habitat for Humanity, PG&E	2025-2045	$-$$

Summary of GHGRP Measure	Type of Action Needed	City Lead/Supporting Departments and Partners	Implementation Timeframe	Relative Cost
Transportation				
Measure TR-1: Increase EV/ZEV Adoption Implement items 1 through 12 described in Chapter 5. GHG Reduction Measures, to increase the ownership and use of EVs and ZEVs by installing EV charging ports and supporting a regionally-connected EV charging infrastructure network. Increase EV and ZEV adoption to 30% for passenger vehicles and 30% for commercial vehicles within the City by 2030.	Funding/Grant Writing Feasibility Study Capital Improvements Ordinance Education Regional Collaboration EV/NEV Plan	Community Development City Administration Partners: Calaveras Council of Governments, Calaveras Visitor's Bureau	2023-2030	$$
Measure TR-2: Decarbonize the City Municipal Fleet and Employee Commute Implement items 1 through 8 described in Chapter 5. GHG Reduction Measures, to decarbonize the City's municipal fleet and related commuter vehicles to achieve a 40% ZEV fleet by 2030.	Policy Funding/Grant Writing Feasibility Study Capital Improvements Regional Collaboration Education Incentive Programs	City Administration Public Works	2023-2045	$$
Measure TR-3: Increase Active Transportation Mode Share Implement items 1 through 10 described in Chapter 5. GHG Reduction Measures, to increase active transportation mode share within the City 2% by 2030.	Funding/Grant Writing Capital Improvements Education Program Regional Collaboration	Community Development City Administration Partner: Calaveras Council of Governments	2023-2045	$$
Measure TR-4: Increase Public Transit Mode Share Implement items 1 through 8 described in Chapter 5. GHG Reduction Measures, to increase public transit mode share to 10% by 2030.	Funding/Grant Writing Feasibility Study Education Program Regional Collaboration	Community Development City Administration Partners: Calaveras Council of	2023-2045	$$

Summary of GHGRP Measure	Type of Action Needed	City Lead/Supporting Departments and Partners	Implementation Timeframe	Relative Cost
		Governments, local school districts		
Measure TR-5: Decarbonize Off-road Equipment and Vehicles Implement items 1 through 9 described in Chapter 5. GHG Reduction Measures, to decarbonize 25% of the off-road equipment and vehicles in the City by 2030.	Feasibility Study Ordinance Technical Assistance Education Funding/Grant Writing Regional Collaboration Training	Public Works City Administration	2024-2045	$$
Measure TR-6: Create a Tourism Economy Implement items 1 through 6 as described in Ch.5 GHG Reduction Measures, to partner with the County to develop a tourism economy to help fund the decarbonization of the transportation sector.	New Transient Occupancy or Gas Tax Education Regional Collaboration Funding/Grant Writing	City Administration Partners: County Administration, Calaveras Visitor's Bureau	2023-2045	$
Measure TR-7: Establish Angels Camp as a Pilot Program Implement items 1 through 6 as described in Ch.5 GHG Reduction Measures, to partner with RCRC to establish Calaveras County and Angels Camp as a pilot program for the decarbonization of the transportation sector in rural communities	Regional Collaboration Funding/Grant Writing Education	City Administration Community Development Partners: County Administration,RCRC, Calaveras Visitor's Bureau, Calaveras Chamber of Commerce	2023-2045	$
Measure TR-8: Develop a Biofuel Industry Implement items 1 through 8 as described in Ch.5 GHG Reduction Measures, to partner with the County, local utilities, and state agencies to develop a biofuel industry to	Regional Collaboration Funding/Grant Writing Education	City Administration Community Development Partners: County Administration, Yosemite Clean	2023-2045	$$$

Summary of GHGRP Measure	Type of Action Needed	City Lead/Supporting Departments and Partners	Implementation Timeframe	Relative Cost
fund the decarbonization of the transportation sector.		Energy, Calaveras Council of Governments		
Measure TR-9: Obtain State Funding Implement items 1 through 4 in Ch.5 GHG Reduction Measures, to establish Angels Camp and Calaveras County as a pilot program for a rural carbon-free transportation system through State investment and grants such as CCI.	Regional Collaboration Funding/Grant Writing Education	City Administration Community Development Partners: Calaveras County Administration, Yosemite Clean Energy, Calaveras Council of Governments	2023-2045	$
Measure TR-10: Obtain Federal Funding Implement items 1 through 4 in Ch.5 GHG Reduction Measures, to work with the County to secure federal funding from the Charging and Fueling Infrastructure Discretionary Grant Program to decarbonize the transportation sector.	Regional Collaboration Funding/Grant Writing Education Technical Assistance Lobbying	City Administration Community Development Partners: Calaveras Council of Governments; Federal elected officials	2023-2045	$
Solid Waste				
Measure SW-1: Organic Waste Diversion The City will implement waste management practices to support organics	Regional Collaboration Funding/Grant Writing Education	Community Development/Public Works	2023-2045	$

Summary of GHGRP Measure	Type of Action Needed	City Lead/Supporting Departments and Partners	Implementation Timeframe	Relative Cost
diversion to reduce the amount of organic materials in the waste stream and divert 75% of food and green yard waste from landfills while reducing short-lived climate pollutants compared to baseline conditions in accordance with SB 1383.	Technical Assistance	City Administration Partners: CalWaste, Local businesses		
Measure SW-2: Divert from Forward to Rock Creek Landfill Reduce truck vehicle miles traveled by diverting to Rock Creek Landfill or recycling an additional 5% of total City solid waste disposal that would otherwise be disposed at Forward Landfill.	Policy	County Solid Waste City Administration Partner: CalWaste	2023-2045	$
Water & Wastewater				
Measure WW-1: Wastewater Treatment Plant Energy Efficiency The City will reduce energy demand per gallon treated at City-operated water and wastewater treatment facilities by 5% by 2030.	Capital Improvements Funding/Grant Writing	Public Works	2023-2045	$$
Measure WW-2: Use of Reclaimed (Non-Potable) Water The City will expand use of reclaimed (non-potable) water to irrigate the 106 acres of landscaping at the City's WWTP.	Capital Improvements Funding/Grant Writing	Public Works	2023-2045	$$
Measure WW-3: Use of Reclaimed (Non-Potable) Water In addition to the specific project listed above in Measure WW-2, the City will work	Regional Collaboration Ordinance Funding/Grant Writing Incentive Programs	Public Works City Administration	2023-2045	$$

Summary of GHGRP Measure	Type of Action Needed	City Lead/Supporting Departments and Partners	Implementation Timeframe	Relative Cost
with local/regional agencies to recognize appropriate uses for reclaimed water as an alternative for various land uses and keep apprised of the latest developments in the use of reclaimed water to achieve a 10% reduction in total potable water use.		Partners: Local development Community		
Measure WW-4: Require Low-Flow Water Use Fixtures The City will adopt a reach code to exceed state-level requirements by 5% for the installation of water-conserving appliances in all new residential and non-residential buildings, and the City will require design plans of new development projects to include water-saving features.	Ordinance Education Incentive Programs	City Administration Community Development Partner: Habitat for Humanity	2023-2045	$

CEQA Streamlining

The City has prepared this GHGRP to be consistent with Section 15183.5 of CEQA Guidelines, Tiering and Streamlining the Analysis of Greenhouse Gas Emissions. Plans for reducing GHG emissions that are determined adequate for CEQA tiering are typically referred to as a "qualified plan". A qualified plan allows a lead agency to analyze and mitigate potential environmental impacts related to GHG emissions at the programmatic level. Future projects can tier from the plan analysis; that is, the proposed project may incorporate by reference or rely on the programmatic analysis to evaluate project impacts. A public or private project that demonstrates consistency with the qualified plan and incorporates applicable reduction measures would also be determined to have a less than significant cumulative impact related to GHG emissions. A qualified plan streamlines individual project analysis and allows for consistency across project analysis to achieve Citywide goals, rather than determining GHG emissions significance on a case-by-case basis. To be considered a qualified plan, the GHGRP must meet the following criteria outlined in CEQA Guidelines Section 15183.5(b)(1):

a) Quantify greenhouse gas emissions, both existing and projected over a specified time period, resulting from activities within a defined geographic area;
b) Establish a level, based on substantial evidence, below which the contribution to GHG emissions from activities covered by the plan would not be cumulatively considerable;
c) Identify and analyze the GHG emissions resulting from specific actions or categories of actions anticipated within the geographic area;
d) Specify measures or a group of measures, including performance standards, that substantial evidence demonstrates, if implemented on a project-by-project basis, would collectively achieve the specified emissions level;
e) Establish a mechanism to monitor the plan's progress toward achieving the level and to require amendment if the plan is not achieving specified levels;
f) Be adopted in a public process following environmental review.

Chapter 2 of this GHGRP includes the inventory of existing and projected GHG emissions from community actions in the City. Chapter 5 outlines the suite of GHG reduction measures that would reduce community emissions to achieve the SB 32 statewide emissions reduction goal of 40% below 1990 levels by 2030, and put the City on the path to achieving its fair share contribution to achieve carbon neutrality by 2045. As such, this GHGRP is consistent with Criteria a, c, and d. This chapter outlines how the City would monitor plan progress in accordance with Criteria e. The appropriate CEQA document will be prepared for this GHGRP and adopted by the City, as required by Criteria f. Finally, in accordance with Criteria b, the City will outline a process for individual projects to determine consistency with the GHGRP.

The City will develop a Greenhouse Gas Reduction Plan Consistency Checklist for consistency with the GHGRP. The Consistency Checklist will apply to discretionary projects that are subject to CEQA. A project that is consistent with the land use assumptions in the GHGRP (i.e., consistent with the General Plan) and demonstrates consistency with applicable GHGRP reduction strategies can be determined to be consistent with the GHGRP without a project-specific quantitative GHG analysis. As such, public and

private discretionary projects may use this GHGRP to evaluate the potential significance of project-related GHG emissions in the CEQA process. Following the CEQA process and development of the GHGRP Consistency Checklist, a project that demonstrates consistency with the GHGRP as outlined in the process above would be determined to have a less than significant cumulative impact related to GHG emissions. If, and until, the GHGRP Consistency Checklist is developed, a discretionary project must show consistency with the GHGRP if streamlining using this qualified plan.

Appendices

Appendix A. City of Angels Revised Inventory and Forecast Amendment

Introduction

The *City of Angels Community-Wide and Government Operations 2018 Greenhouse Gas Inventories Report* (hereafter referred to as "original report") was adopted by the City of Angels (City) in November 2021. Since the adoption of the original report, the consultant team recognized that the availability of new data and techniques, as well as the use of best practices aligned with State of California's (State's) GHG emissions inventories, could be used to refine the City's emissions estimates for the 2018 inventory and 2030 and 2045 ABAU forecasts. This *City of Angels Revised Inventory and Forecast Amendment* technical memorandum (hereafter referred to as "revised report") summarizes the original and updated GHG emissions estimates, describes the changes that were made to the original report, and explains the rationale behind the revisions.

Summary of Emissions

The City's GHG emissions estimates in the original report and revised report for 2018, 2030, and 2045 are displayed in **Tables A-1** and **A-2** below. **Table A-2** reflects the update to the Government Operations Inventory, which does not have a corresponding forecast, so only 2018 numbers were included. The percent change in total GHG emissions between the two reports is also shown. The GHG emissions for the forecast years (i.e., 2030 and 2045) reflect the ABAU scenario. Specific descriptions of the revisions that resulted in changes to emissions are described in the following section. Total percentages may not sum exactly due to independent rounding.

Table A-1. Original Report and Revised Report Community-Wide GHG Emissions Inventory and ABAU Forecasts by Sector Summary ($MTCO_2e$)

Sector	2018		2030		2045	
	Original	Revised	Original	Revised	Original	Revised
Energy	*5,667*	5,639	*4,289*	4,733	*3,363*	3,362
Transportation	*18,437*	17,879	*15,386*	14,881	*13,594*	13,136
Solid Waste	*1,037*	1,037	*1,089*	1,089	*1,120*	1,120
Water & Wastewater	*53*	52.4	*55*	55	*57*	57
Total	***25,193***	**24,608**	***20,819***	**20,758**	***18,134***	**17,674**
Percent Change	***-2.3%***		***-0.3%***		***-2.5%***	

Table A-2. Original Report and Revised Report Government Operations GHG Emissions Inventory by Sector Summary ($MTCO_2e$)

Sector	2018	
	Original	Revised
Buildings & Facilities	*38*	12
Vehicle Fleet	*210*	210
Employee Commute	*137*	137
Solid Waste	*44*	44
Water & Wastewater	*82*	53
Total	***511***	**456**
Percent Change	***-10.8%***	

Overview of Revisions

Off-Road Vehicles and Equipment Data

When the GHG emissions analyses for the original report were conducted, CARB's OFFROAD2017 model provided the best available data for off-road vehicles and equipment. To provide more accurate data associated with off-road vehicles and equipment, CARB updated the previous models and released a new version, OFFROAD2021. The revised report incorporates the updated data obtained from OFFROAD2021 to improve the accuracy of off-road-related emissions estimates for the city.

Additionally, OFFROAD2021 provides data at the countywide level, rather than at the level of individual jurisdictions (e.g., City of Angels). The data obtained from OFFROAD2021 for the revised report included certain classes of off-road vehicles and equipment that are not relevant to the city, including agricultural, forestry, industrial, oil drilling, and pleasure craft vehicles and equipment. Because activities associated with these classes are nonexistent or very minimal in the city, they were excluded from the revised report.

The revisions described above resulted in significant reductions in GHG emissions from off-road vehicles and equipment, particularly in 2018, but total transportation sector emissions (i.e., on-road transportation and off-road vehicles and equipment) only decreased slightly.

Table A-3 below displays off-road vehicles and equipment and total transportation sector GHG emissions in the original and revised reports.

Table A-3. Original Report and Revised Report Off-Road Vehicles and Equipment and Transportation Sector Community-Wide GHG Emissions Inventory and ABAU Forecasts ($MTCO_2e$)

Report and Source/Sector	2018	2030	2045
Original Report: Off-Road Vehicles and Equipment	1200	1,354	1,386
Revised Report: Off-Road Vehicles and Equipment	642	848	988
Original Report: Total Transportation	***18,436***	***15,386***	***13,594***
Revised Report: Total Transportation	***17,879***	***14,881***	**13,136**

Calaveras Public Power Agency Emissions Factor

To estimate emissions from Calaveras Public Power Agency (CPPA) electricity, the original report used a carbon dioxide (CO_2) emissions factor of 40.79 pounds of CO_2 per megawatt-hour (lb CO_2/MWh) obtained from the International Hydropower Association. To better align with the methodology that is used by CARB to prepare the State's annual statewide GHG emissions inventories, the CPPA electricity emissions factor for CO_2 was revised to 0 lb CO_2/MWh for both Community-Wide and Government Operations inventories. CPPA supplies the City with electricity that is generated from hydroelectric sources, and hydroelectric power is considered a renewable (i.e., zero-emission) source in California.[27]

This revision contributed to a minor reduction in commercial energy GHG emissions in 2018 and 2030 due to the elimination of emissions associated with CPPA electricity; however, additional revisions associated with forecasted electricity emissions factors, described in the "Electricity Adjusted Business-as-Usual Forecast" section below, offset these minor reductions, resulting in a net increase in total commercial energy GHG emissions in the revised report in 2030.

Tables A-4 and **A-5** below display CPPA electricity and total commercial energy sector GHG emissions in the original and revised reports for both community-wide and government operations.

[27] https://ww2.arb.ca.gov/sites/default/files/classic/cc/inventory/2000-2020_ghg_inventory_trends.pdf

Table A-4. Original Report and Revised Report CPPA Electricity and Commercial Energy Sector Community-Wide GHG Emissions Inventory and ABAU Forecasts ($MTCO_2e$)

Report and Source/Sector	2018	2030	2045
Original Report: CPPA Commercial Electricity	27	16	0
Revised Report: CPPA Commercial Electricity	0	0	0
Original Report: Total Commercial Energy	***1,207***	***520***	***64***
Revised Report: Total Commercial Energy	***1,180***	***718***	**64**

Table A-5. Original Report and Revised Report CPPA Electricity Government Operations GHG Emissions Inventory and ABAU Forecasts ($MTCO_2e$)

Report and Source/Sector	2018
Original Report: CPPA Electricity from Buildings & Facilities	25.9
Revised Report: CPPA Electricity from Buildings & Facilities	0
Original Report: Total Buildings & Facilities Emissions	***38.3***
Revised Report: Total Buildings & Facilities Emissions	***12.4***
Original Report: CPPA Electricity from Water & Wastewater	29.6
Revised Report: CPPA Electricity from Water & Wastewater	0
Original Report: Total Water & Wastewater Emissions	***82.3***
Revised Report: Total Water & Wastewater Emissions	***52.8***

Electricity Adjusted Business-as-Usual Forecast

The ABAU forecasts in the original report accounted for the impact of the Renewables Portfolio Standard (RPS) included in SB 100. The RPS sets continuously escalating renewable energy procurement requirements for electricity utilities in California, with targets to achieve 60% and 100%renewable electricity by 2030 and 2045, respectively. These requirements were incorporated into the ABAU forecasts by calculating future electricity emissions factors based on the anticipated change in the share of renewable sources between the 2018 baseline year and the 2030 and 2045 forecast years.

During the process of developing GHG emissions reduction measure quantifications, the consultant team discovered that the methodology used in the original report's ABAU forecasts needed to be

revised slightly to more accurately reflect the impact of the RPS requirement. The original report slightly overestimated the decrease in electricity emissions factors that are anticipated to result from the RPS. Therefore, the revised methodology resulted in an increase in electricity-related emissions in the 2030 ABAU forecast.

Table A-6 below displays electricity and total energy sector GHG emissions in the original and revised reports.

Table A-6. Original Report and Revised Report Community-Wide Electricity and Energy Sector GHG Emissions Inventory and ABAU Forecasts ($MTCO_2e$)

Report and Source/Sector	2018	2030	2045
Original Report: Electricity (all sources)	2,557	1,023	0
Revised Report: Electricity (all sources)	2,529	1,467	0
Original Report: Total Energy	***5,667***	***4,289***	***3,362***
Revised Report: Total Energy	***5,639***	***4,733***	***3,362***

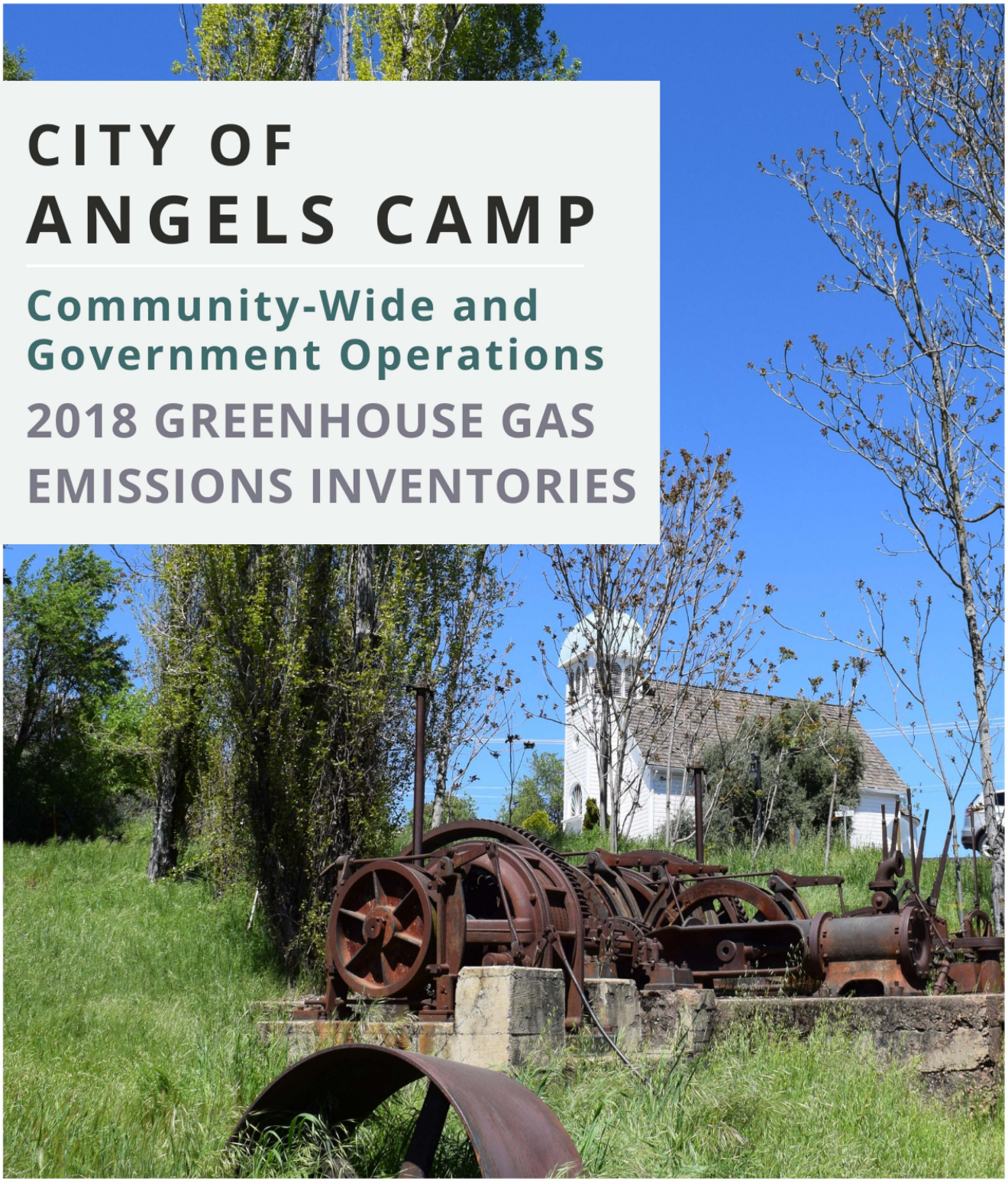
Appendix B. Original GHG Inventory and Forecast: City of Angels Community-Wide and Government Operations 2018 Greenhouse Gas Emissions Inventories

DOCUMENT ATTACHED BELOW

CITY OF ANGELS CAMP

Community-Wide and Government Operations

2018 GREENHOUSE GAS EMISSIONS INVENTORIES



September 2021

SIERRA BUSINESS COUNCIL

Harris

rincon

CALAVERAS COUNCIL of GOVERNMENTS

ANGELS CAMP CALIFORNIA

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Executive Summary

The City of Angels Camp (City) is addressing reducing greenhouse gas (GHG) emissions by taking climate planning action. This report serves as a guidepost to local GHG emissions reduction efforts, including future development of the City's GHG Reduction Plan that will address emissions resulting from energy use[1], transportation, solid waste disposal, treatment and transport of potable water and wastewater. Through these planning efforts, the City can achieve benefits beyond reducing emissions, including saving money – both community members' and the City's, improving economic vitality, public health, and the quality of life for residents and other community members.

This project has been split into two phases. Phase I establishes a replicable methodology for analyzing current and projected GHG emissions, develops a baseline measurement to benchmark progress over time, and proposes initial reduction targets. Phase II of this project includes developing emissions reduction plans outlining strategies, goals, and priority actions to reduce emissions consistent with state requirements, as well as communicating progress to the public, stakeholders, and policymakers. These actions will help to implement the City's General Plan goals, air quality goals, facilitate new development, and other compliance issues related to GHG emissions reductions.

This report documents the results of community-wide and government operations GHG emissions inventories from sources within the City in 2018. Community-wide activities resulted in the emissions of 25,193 metric tons of carbon dioxide equivalent (MT CO_2e), which equates to a per capita emissions value of 6.46 MT CO_2e per year. City government operations generated 511 MT CO_2e. Key findings from each inventory are listed below. More detailed discussion of each inventory is provided in the **Community-Wide Inventory Results** and the **Government Operations Inventory Results** sections.

In addition, the inventory projects the City's GHG emissions from 2018 out to 2045, based on a business-as-usual (BAU) forecast and an adjusted scenario forecast (ABAU) of community-wide GHG emissions[2]. The 2045 forecasts project an increase for the BAU scenario and a decrease for the ABAU scenario from the 2018 baseline. Under the BAU scenario, emissions are projected to increase by 12.7%, equating to 28,378 MT CO_2e projected to be emitted in 2045. Under the ABAU scenario, emissions are projected to

[1] As of the published date of this report, the specific impacts of Public Safety Power Shutoff (PSPS) events on GHG emissions in Calaveras County are unknown. The first PSPS event took place in 2019, which is after the baseline year of 2018 used for this report. As energy sector data from 2019 and on becomes available, this can be used for future inventories and re-inventories of community-wide and government operations GHG emissions.

[2] Note: this does not include forecasting projections for wildfire.

decrease by 28.0%, equating to 18,133 MT CO_2e projected to be emitted in 2045. The report also includes emissions reduction target recommendations for the City to consider. More detailed information is provided in the **Emissions Forecasting** and **GHG Reduction Targets** sections.

The Calaveras County and Angels Camp GHG inventories and reduction plans project also includes a wildfire report, a separate assessment that analyzes the carbon storage inventories for the County's and City's natural and working lands, potential GHG emissions impact from wildfires, climate change vulnerability assessment related to wildfire, and wildfire impact reduction best practices. The 2020 Calaveras County natural and working lands total carbon stock inventories was calculated to be 74 million MT CO_2e. In the unlikely scenario that the majority of the deciduous and mixed forests in Calaveras County were to burn over multiple future wildfire events, the forested land has an emissions potential of over 8 million MT CO_2 from the conversion of carbon stocks to atmospheric carbon. Forest management can reduce the intensity and severity of wildfires in Calaveras County, reducing the GHG emissions potential per acre of forested land from 21.7 MT CO_2/acre burned down to 9.3 MT CO_2/acre burned. The full wildfire report can be viewed in **Appendix O**, Wildfire-related Greenhouse Gas Emissions from Natural Lands Carbon Stock Loss and Climate Change Vulnerability Assessment.

With support from the Calaveras Council of Governments (CCOG) and guidance from City staff, Sierra Business Council (SBC), along with subconsultant team of Rincon Consultants and Harris & Associates, completed all emissions estimates in accordance with the United States Community Protocol[3] (USCP) and the Local Government Operations Protocol[4] (LGOP). Details on the inventory boundaries and the protocols can be found in the **Inventory Methodologies** section of this report.

Key Findings of the Community-Wide GHG Emissions Inventory

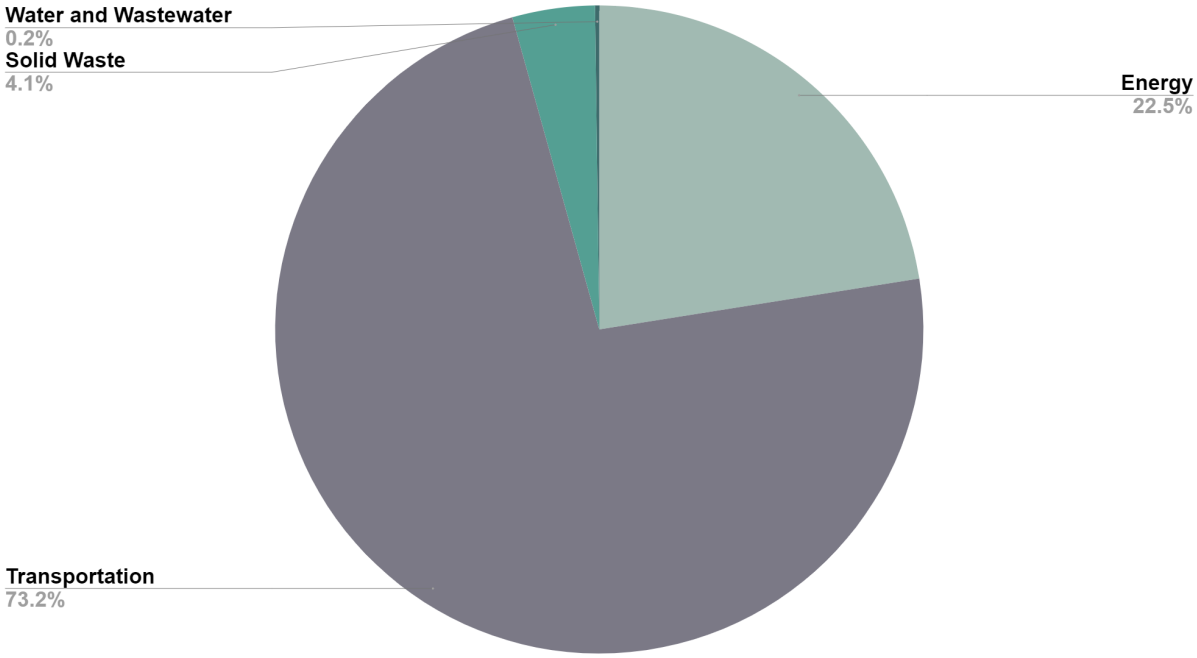
In 2018, sources within the City, and activities of the City's residents, businesses, and visitors emitted 25,193 MT CO_2e. These emissions are attributed to four different sectors: energy use, transportation, solid waste, and water and wastewater. The transportation sector was the most significant contributor of emissions. In summary:

- Transportation accounted for 73.2%

[3] U.S. Community Protocol for Accounting and Reporting of Greenhouse Gas Emissions (2021). ICLEI - Local Governments for Sustainability USA.
[4] Local Government Operations Protocol (2021). The Climate Registry.

- Energy use accounted for 22.5%
- Emissions from solid waste accounted for 4.1%
- Water and wastewater accounted for 0.2%

Figure ES-1: 2018 Emissions Summary

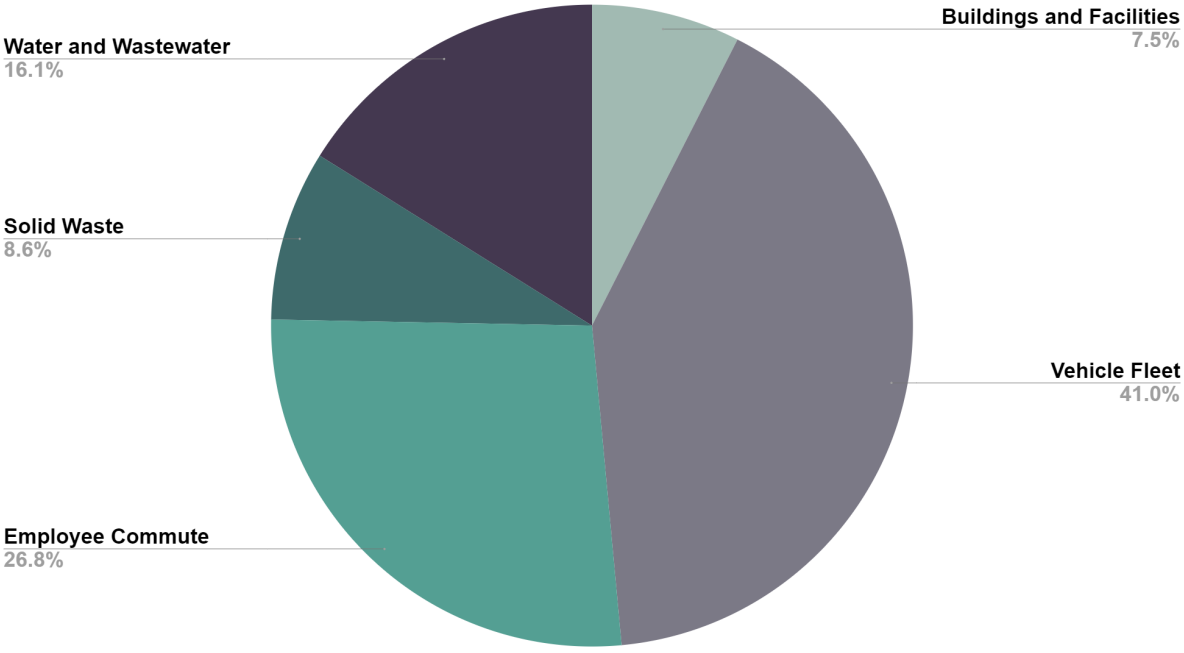


Key Findings of the Government Operations GHG Emissions Inventory

In 2018, City government operations generated 511 MT CO_2e for the sectors reported in this inventory. The vehicle fleet sector was the most significant contributor of emissions.

- Emissions from the City's vehicle fleet accounted for 41.0%
- Emissions from City employee commutes accounted for 26.8%
- City-owned and operated water and wastewater facilities accounted for 16.1%
- Emissions from City facility-generated solid waste accounted for 8.6%
- Energy from the City's buildings and facilities accounted for 7.5%

Figure ES-2: 2018 Emissions Summary



Introduction

California's legislature and regulatory agencies have established policies relating to greenhouse gas (GHG) emissions reductions, including the California Global Warming Solutions Act (AB 32, 2006) and others discussed in more detail in the **California Climate & Policy Goals** section of the report. Due to these drivers and other motivations, many of California's local governments and communities are quantifying and reducing their GHG emissions. The City of Angels Camp (City) has responded to California's climate action planning process by developing goals and policies for GHG emissions reductions in its 2020 General Plan Update and subsequently developing community-wide and government operations inventories for the year 2018 to implement those policies. This report documents the findings and methodologies of those inventories. With support from Calaveras Council of Governments (CCOG) and guidance from City staff, Sierra Business Council (SBC), along with the subconsultant team of Rincon Consultants and Harris & Associates, completed emissions estimates in accordance with the United States Community Protocol (USCP) and the Local Government Operations Protocol (LGOP). These protocols outline widely adopted and accepted methods for performing GHG inventories and are recommended by state agencies for local governments. More information on the inventory boundaries and the protocols used to develop the inventories is provided in the **Inventory Methodologies** section of the report.

GHG emissions are air pollutants as defined by the U.S. Supreme Court and subject to regulation by the U.S. Environmental Protection Agency under the federal Clean Air Act and the State of California under the Global Warming Solutions Act of 2006 (AB 32). These gases include carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), sulfur hexafluoride (SF_6), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and nitrogen trifluoride (NF_3). It is important to note that each of these gases has different potency, or ability to contribute to global warming. For the purposes of this inventory and in accordance with USCP and LGOP, all gases have been converted to their equivalent in carbon dioxide or CO_2e.

The City's inventory report presents a detailed accounting of GHGs emitted by source. In addition, the inventory projects the City's community-wide GHG emissions from 2018 to 2030, 2035, and 2045 based on business-as-usual (BAU) and adjusted scenario (ABAU) forecasts of changes in energy use, transportation, solid waste management, and wastewater treatment. These factors are influenced over time by changes in climate, population demographics, land-use and transportation patterns, the adoption of new technologies, and measures adopted to reduce GHG emissions.

This report is the first step toward measuring emissions reduction progress, planning future climate action, and developing strategies for reducing GHG emissions over time. The purpose of this report is to establish a baseline measurement or foundation to benchmark progress over time and guide City-wide climate planning and action. The second step of this process includes developing and prioritizing strategies to reduce GHG emissions consistent with state mandates, and involve and communicate progress to the public, stakeholders, and policymakers.

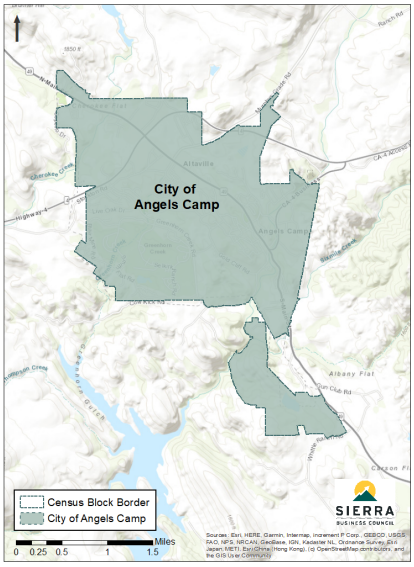
The first phase of the Calaveras County and Angels Camp GHG inventory and reduction plan project also included a comprehensive wildfire GHG analysis, designed to be consistent with the California Air Resources Board's "Report on Greenhouse Gas Emissions of Contemporary Wildfire, Prescribed Fire, and Forest Management Activities".

Rincon Consultants developed an in-depth analysis of the carbon sequestration value of wildlands and the fire emissions potential from these lands. The report includes an inventory of all the carbon sequestered in both the soils and vegetation of the County, including the City, to understand areas that have high carbon sequestration value, consistent with California's Natural and Working Lands Inventory. This will provide the City an understanding of the specific regions that would generate more GHG emissions and loss of vegetation carbon storage in a wildfire event. Furthermore, the wildfire assessment included an evaluation of areas that are likely to have a high fire return interval and overlap with these high carbon storage areas, and what the potential reduction in GHG emissions could be from forest management practices. The results of the report can be used to better understand the potential shifts in carbon stocks during wildfire events, and how forest management activities can reduce the loss of valuable carbon sequestration in the City's natural lands. The full report has been attached under **Appendix O**, Wildfire-related Greenhouse Gas Emissions from Natural Lands Carbon Stock Loss and Climate Change Vulnerability Assessment.

Community Profile

Located at 1,378 feet in elevation and home to approximately 4,000 residents, the City of Angels Camp is an iconic Gold Country town nestled in the Sierra Nevada foothills. It is well known as the place Samuel Clemens first heard the story and wrote "The Celebrated Jumping Frog of Calaveras County" giving rise to his fame as Mark Twain. Today, it is well loved for the Jumping Frog Jubilee and Calaveras County Fair, its gold rush history, high country recreation, local wineries, golf courses, and notable small town charm.

Originally inhabited by Indigenous Miwok people, Angels Camp was one of the earliest important mining communities along the Mother Lode region of California. Situated in southwestern County of Calaveras (County), on State Routes 49 and 4, it is traversed by Angels Creek, China Gulch, Greenhorn Creek, Cherokee Creek, Indian Creek, Six-Mile Creek, and several Gold-Rush era miner's ditches. Nearby is the New Melones Reservoir, which was created by the construction of the New Melones Dam in 1979 by the U.S. Army Corps of Engineers, replacing the original 1926 dam.



California Climate Policy & Goals

Since 2005, the State of California has responded to growing concerns over the effects of climate change by addressing emissions in the public and private sectors through legislative action. California mandates and guidance on measuring and reducing GHG emissions include:

- executive order on California global warming impacts and targets (EO S-3-05, 2005)[5],
- the California Global Warming Solutions Act (AB 32, 2006)[6] and its successor bill (SB 32, 2016)[7],
- the Sustainable Communities and Climate Protection Act (SB 375, 2008)[8],
- the California Clean Energy and Pollution Reduction Act (SB 350, 2015)[9],
- local government requirements for climate adaptation and resilience strategies (SB 379, 2015)[10],
- the California Air Resources Board (CARB) 2017 Climate Change Scoping Plan[11],
- the 100 Percent Clean Energy Act of 2018 (SB 100, 2018)[12], and
- executive order to achieve carbon neutrality (EO B-55-18, 2018).[13]

[5] http://static1.squarespace.com/static/549885d4e4b0ba0bff5dc695/t/54d7f1e0e4b0f0798cee3010/1423438304744/California+Executive+Order+S-3-05+(June+2005).pdf
[6] Global Warming Solutions Act of 2006 (AB 32). California Air Resources Board.
[7] Global Warming Solutions Act of 2006: Emissions Limit (SB 32). (2016). California Legislative Information.
[8] Transportation Planning: Travel Demand Models: Sustainable Communities Strategy: Environmental Review (SB 375). (2008). Institute for Local Government.
[9] Clean Energy and Pollution Reduction Act (SB 350). (2015). California Energy Commission.
[10] SB 379, Jackson. Land use: general plan: safety element (2015). California Legislative Information.
[11] https://ww2.arb.ca.gov/sites/default/files/classic//cc/scopingplan/scoping_plan_2017.pdf
[12] https://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=201720180SB100
[13] https://www.ca.gov/archive/gov39/wp-content/uploads/2018/09/9.10.18-Executive-Order.pdf

All of the above legislation provides guidance and protocols for local governments to participate in the State's GHG reduction efforts.

In response, many communities in the United States are addressing emissions at the local level. California state climate policies and mandates both encourage and require local governments and public agencies to develop solutions at the local level. As many of the major sources of GHG emissions can be directly or indirectly controlled through local policies and actions, local governments have an opportunity to play a key role in reducing GHG emissions within their boundaries. Through proactive measures related to land use, transportation demand management, energy efficiency, green building, waste diversion, and more, local governments can contribute to emissions reductions in their communities. This GHG inventory will build capacity for the City to better understand and address local climate impacts, allowing them to set goals that will increase their resilience and comply with California's greater climate strategy and mandates.

Climate Change in the Sierra Nevada

The California Assembly Bill 32[14] defines climate change impacts under the following language: Global warming poses a serious threat to the economic well-being, public health, natural resources, and the environment of California. The potential adverse impacts of global warming include the exacerbation of air quality problems, a reduction in the quality and supply of water to the state from the Sierra snowpack, a rise in sea levels resulting in the displacement of thousands of coastal businesses and residences, damage to marine ecosystems and the natural environment, and an increase in the incidences of infectious diseases, asthma, and other human health-related problems. Global warming will have detrimental effects on some of California's largest industries, including agriculture, wine, tourism, winter sports, recreational and commercial fishing, and forestry. It will also increase the strain on electricity supplies necessary to meet the demand for summer air-conditioning in the hottest parts of the state.

The CARB 2017 Climate Change Scoping Plan[15] provides additional details on the specific threats of climate change, particularly relevant for rural, forested regions like the City. The CARB scoping plan states: In California, as in the rest of the world, climate change is contributing to an escalation of serious problems, including raging wildfires, coastal erosion, disruption of water supply, threats to agriculture, spread of insect-borne diseases, and continuing health threats from air pollution.

[14] https://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=200520060AB32
[15] https://ww2.arb.ca.gov/sites/default/files/classic//cc/scopingplan/scoping_plan_2017.pdf

- The drought that plagued California for years devastated the state's agricultural and rural communities, leaving some of them with no drinking water. In 2015 alone, the drought cost agriculture in the Central Valley an estimated $2.7 billion, and more than 20,000 jobs.
- Changes include: A recorded increase in annual average temperatures, as well as increases in daily minimum and maximum temperatures. An increase in the occurrence of extreme events, including heat waves. A decrease in winter chill hours, necessary for the production of high-value fruit and nut crops.
- In recent years, California has experienced the deadliest wildfires in its history.
- Extensive tree mortality is already prevalent in California. The western pine beetle and other bark beetles have killed a majority of the ponderosa pine in the foothills of the central and southern Sierra Nevada Mountains.
- California will experience a reduction in spring runoff volumes, as a result of declining snowpack.
- While more intense dry periods are anticipated under warmer conditions, extremes on the wet end of the spectrum are also expected to increase due to more frequent warm, wet atmospheric river events and a higher proportion of precipitation falling as rain instead of snow.
- In recent years, atmospheric rivers have also been recognized as the cause of the large majority of major floods.
- Climate change is making events, like these listed above, more frequent, more catastrophic and more costly. Climate change impacts all Californians, and the impacts are often disproportionately borne by the state's most vulnerable and disadvantaged populations.

These are the many challenges associated with climate change that face the City, along with communities in the Sierra Nevada. To learn more about how climate change might impact the City, state agencies in California created a new public tool, Cal-Adapt, which provides relevant data, resources, and future projections.[16] A healthy ecosystem provides cultural, social, and economic benefits that local communities rely on for agriculture, tourism, recreation, fishing, and other industries that are important to the City and its economic vitality.[17,18]

[16] Cal-Adapt. California Energy Commission. (2021).
[17] Core Writing Team, Pachauri, R.K., Meyer, L.A.. (2014). Climate Change 2014: Synthesis Report. Fifth Assessment Report of the Intergovernmental Panel on Climate Change.
[18] Dettinger, M., Alpert, H., Battles, J., Kusel, J., Safford, H., Fougeres, D., Knight, C., Miller, L., Sawyer, S. (2018). Sierra Nevada Region Report. California's Fourth Climate Change Assessment.

Inventory Development

Aligning with established methodology and protocols, the inventory development process involved a number of key steps and decision-making points:

- **Identify Emissions Sources and Activities**: In consultation with CCOG and City staff, the team assessed 2018 GHG emissions from four different sectors: energy (energy use in buildings), transportation, solid waste, and water and wastewater. Within each sector, activities that occur in the City that release emissions outside of the City, as well as sources that generate emissions directly within the City, were accounted for. Emissions associated with government operations were also identified and included.
- **Inventory Boundaries**: The geographic scope of the inventory is referred to as "the City of Angels Camp" and is defined by the City's jurisdictional boundaries.
- **Data Collection and Inventory Years**: This inventory used data collected from the year 2018. This allows the inventory to be comparable to other nationwide inventories which typically include assessments from 2018 data, while also providing the best data available from the City, CCOG, and relevant special districts. The team worked closely with City staff and CCOG to identify and review available data for the baseline inventory and forecast of GHG emissions for the City. Data sets used for the findings in this report are highlighted throughout, as well as detailed in the appendices.
- **Inventory Tools**: For the community-wide and government operations inventories, ClearPath[19] was used. ClearPath, available through ICLEI, calculates, monitors, and forecasts GHG emissions based on reported activity data and demographic information. ClearPath was developed to assist in the preparation of USCP and LGOP-compliant GHG inventories.

More details about specific tools and methodologies are highlighted in their respective sections throughout this report.

[19] ClearPath. (2021). ICLEI - Local Governments for Sustainability USA.

GHG Emissions Inventory

Inventory Methodologies

Understanding a GHG Emissions Inventory

Achieving tangible greenhouse gas (GHG) emissions reductions in order to impact climate change requires identifying baseline emissions levels, sources, and activities that generate emissions in the community. Warming trends across the region have increased the frequency and severity of catastrophic wildfire, diminished snowpack, rain-on-snow and flooding events, low reservoirs and water supply, and decreased biodiversity. These effects are beginning to take hold locally, threatening not only the environment but also the City of Angels Camp's (City's) way of life.

This report presents emissions from the City as a whole, where the government operations emissions are a subset of community-wide emissions and should not be added to community emissions totals since they are already included in the community-wide data. The inventory uses the latest methodology and modeling to develop a 2018 inventory, looking at GHG emissions generated by energy, transportation, solid waste, and water and wastewater. Emissions from carbon dioxide (CO_2), methane (CH_4), and nitrous oxide (N_2O) are accounted for and calculated as the carbon dioxide equivalent (CO_2e). The government operations inventory only includes emissions from sources and activities over which the City has influence.

As local governments and public agencies have continued to join the greater climate action movement, the need for standardized approaches to quantifying GHG emissions has proven essential. The inventory utilizes the approach and methods provided by the U.S. Community Greenhouse Gas Emissions Protocol, in addition to the Local Government Operations Protocol.

Emissions Protocols

U.S. Community Protocol[20]

The City's community-wide GHG inventory was conducted in accordance with the U.S. Community Protocol (USCP) released by the organization ICLEI in October 2012 (updated in 2019) and represents the current national standard in guidance for community-wide GHG emissions inventories. The USCP improved on earlier protocols by establishing additional

[20] U.S. Community Protocol for Accounting and Reporting of Greenhouse Gas Emissions (2021). ICLEI - Local Governments for Sustainability USA.

reporting requirements for community-wide inventories and providing improved accounting guidance for quantifying emissions. The improvements include the addition of electricity transmission and distribution losses, the delineation of community wastewater and potable water energy use emissions, improved methods to estimate residential non-utility fuel use emissions, and improved methods to estimate wastewater process emissions. The State of California Governor's Office of Planning and Research recommends that California local governments follow the USCP when undertaking their GHG emissions inventories.

Local Government Operations Protocol[21]

The Local Government Operations Protocol (LGOP) was released in 2008 (updated in 2010), by ICLEI, the California Air Resources Board (CARB), and the California Climate Action Registry (CCAR) to serve as the national standard for quantifying and reporting GHG emissions from local government operations. The purpose of the LGOP is to provide the principles, approach, methodology, and procedures needed to develop a government operations GHG emissions inventory. The LGOP was used to guide the government operations inventory.

Greenhouse Gas Global Warming Potential

GHG emissions are commonly aggregated and reported in terms of equivalent-carbon-dioxide-units, or CO_2e. This carbon dioxide equivalent combines the three different gaseous emissions types into one single unit based on the Global Warming Potential (GWP) of each gas, which is a measure of the amount of warming a GHG may cause over the span of 100 years, measured against the amount of warming caused by carbon dioxide. Converting all emissions to equivalent-carbon-dioxide-units allows for the comparison of different GHGs in similar terms. For example, methane is 28 times more powerful than carbon dioxide in its warming effect over 100 years, so one metric ton (MT) of methane emissions is equal to 28 MT of carbon dioxide equivalents. **Table 1** presents the GWPs of the commonly occurring GHGs according to the Intergovernmental Panel on Climate Change's 5th Assessment Report, reflecting the most recent scientific consensus. Of those seven, this inventory focused on three main GHGs: carbon dioxide (CO_2), methane (CH_4), and nitrous oxide (N_2O).

[21] Local Government Operations Protocol (2021). The Climate Registry.

Table 1. Greenhouse Gas Global Warming Potentials

Greenhouse Gas	Chemical Formula	IPCC 5th Assessment Global Warming Potential[22]
Carbon Dioxide	CO_2	1
Methane	CH_4	28
Nitrous Oxide	N_2O	265
Hydrofluorocarbons	Various	4 - 12,400
Perfluorocarbons	Various	6,630 - 11,100
Sulfur Hexafluoride	SH_6	23,500
Nitrogen Trifluoride	NF_3	16,100

Quantifying Greenhouse Gas Emissions

Sources and Activities

Communities contribute to GHG emissions in a number of ways: 1) GHG emissions that are produced by sources located within the defined boundary, and 2) GHG emissions produced as a consequence of community activities. All of the emissions in this report have been quantified using calculation-based methodologies. Calculation-based methodologies look at GHG-emitting activities and determine how much of each activity occurred in the City. Then an emissions factor is developed or cited from literature for each specific activity and the two figures are multiplied together to arrive at the total emissions produced by each activity within the City:

Activity or Source Data x Emissions Factor = Emissions Produced by Activity.

Activity or source data refers to the relevant measurement of energy use or other GHG-generating processes such as fuel consumption by fuel type, metered annual electricity consumption, or annual vehicle miles traveled (VMT). Standard emissions factors are applied to activity or source data to determine the associated emissions. Emissions factors are typically expressed as emissions per unit of activity or source data (e.g. lbs CO_2/kWh of electricity). ICLEI's ClearPath toolkit was used to complete these quantifications.

The report for community-wide emissions measures GHG emissions in four primary areas: energy use, including propane and electricity used to heat and cool buildings; transportation, including emissions from vehicle operations; solid waste, including materials deposited in landfills that will later decompose; and wastewater treatment. The

[22] Global Warming Potential Values. (2014). Greenhouse Gas Protocol. IPCC.

report measures both emissions occurring within the City and emissions originating outside the City for use inside the City, in order to create a measure of total emissions.

The second part of this report, focused on emissions from government operations, measures emissions in five primary areas: energy use from buildings and facilities, vehicle fleet, employee commutes, solid waste generation, and water and wastewater.

The basic process followed for the inventory is to measure sources of emissions (such as power generation) and activities that create emissions (such as vehicle operations), and convert those sources and activities into equivalent GHG emissions. The observed emissions allow for measurement over time of progress toward meeting climate policy goals. The report also uses assumptions in City-wide growth to create a forecast of changes to occur in GHG emissions, which can aid in decision making.

Information only items are GHG emissions that are not included in the GHG emissions totals, though are reported to provide context. Information items are reported separately from the totals either to avoid overlap with other reported emissions or because they are excluded from GHG inventories by protocol guidance. Information items can include emissions such as:

- Emissions associated with electric vehicles. The emissions are included in residential and non-residential electricity emissions totals, and reported as an information item in the transportation sector.
- Emissions associated with energy used to distribute water and collect wastewater, as they are included in commercial community-wide electricity usage totals.

Forecast Methodology

After the completion of the emissions inventories, forecasts of emissions were developed under business-as-usual (BAU) and adjusted business-as-usual scenarios (ABAU). A BAU scenario does not account for any local, state, or federal policy that would impact future GHG emissions. The BAU forecasts estimate future community-wide GHG emissions in the years 2030, 2035, and 2045. BAU forecasts are based on two inputs — current emissions data and growth rates. Baseline emissions data came from the 2018 inventory. Growth rates were calculated based on projected growth of relevant indicator variables.

BAU projections are intended to demonstrate the expected growth in GHG emissions if no reduction measures are taken. The BAU forecast is beneficial in that it allows for comparison between forecasted and actual observed emissions to determine what

emissions reduction progress has been made to date. BAU forecasts also can help assess whether the City can achieve its emissions reduction targets through current efforts.

An adjusted scenario forecast, or adjusted BAU (ABAU), accounts for legislative adjustments and projected emissions reductions resulting from legislative action. This includes future updates to statewide vehicle fleet standards and renewable portfolio standards. ABAU forecasts are developed using two inputs - current emissions data and either BAU projections or adjusted rates of growth or decay.

Community-Wide Inventory Results

The community-wide inventory is an assessment of the City of Angels Camp's (City) greenhouse gas (GHG) emissions resulting from activities by City residents, businesses and visitors for the year 2018. The community-wide inventory includes:

1. Use of electricity
2. Use of fuel in buildings or other stationary use
3. Use of fuel for on-road transportation by passenger and freight vehicles
4. Use of energy for potable water and wastewater distribution and treatment processes
5. Generation of solid waste by the community

Based on the methodologies outlined above, inventory results provide information on the sources of GHG emissions, the relative magnitude of those emissions by source, and emissions trends in the City over time.

Community-Wide GHG Emissions Summary

Key Findings

- In 2018, the community, including residents and businesses, of Angels Camp emitted an estimated 25,193 metric tons (MT) CO_2e.
- The largest contributor to community emissions in the inventory is community-wide transportation (73%), which includes on-road and off-road vehicle emissions.
- In combination, the transportation and energy sectors produce roughly 96% of the community-wide emissions in the City, and therefore have the most potential for emissions reductions.
- By conducting periodic GHG emissions inventories as data becomes more robust and methodologies improve, the City can get an even clearer picture of the GHG emissions in the community, and monitor and evaluate any reduction efforts taken.

Overview of 2018 Community-Wide Inventory

In 2018, the City emitted 25,193 MT CO_2e.[23] The transportation sector was the largest source of emissions, followed by energy, solid waste, and water and wastewater, as shown in **Figure 1**. On a per capita basis, emissions were 6.46 MT CO_2e per City resident annually. Note that per capita emissions, however, may not be directly comparable to inventories from other jurisdictions, as overall inventory methodologies can differ.

Figure 1. 2018 Emissions Summary

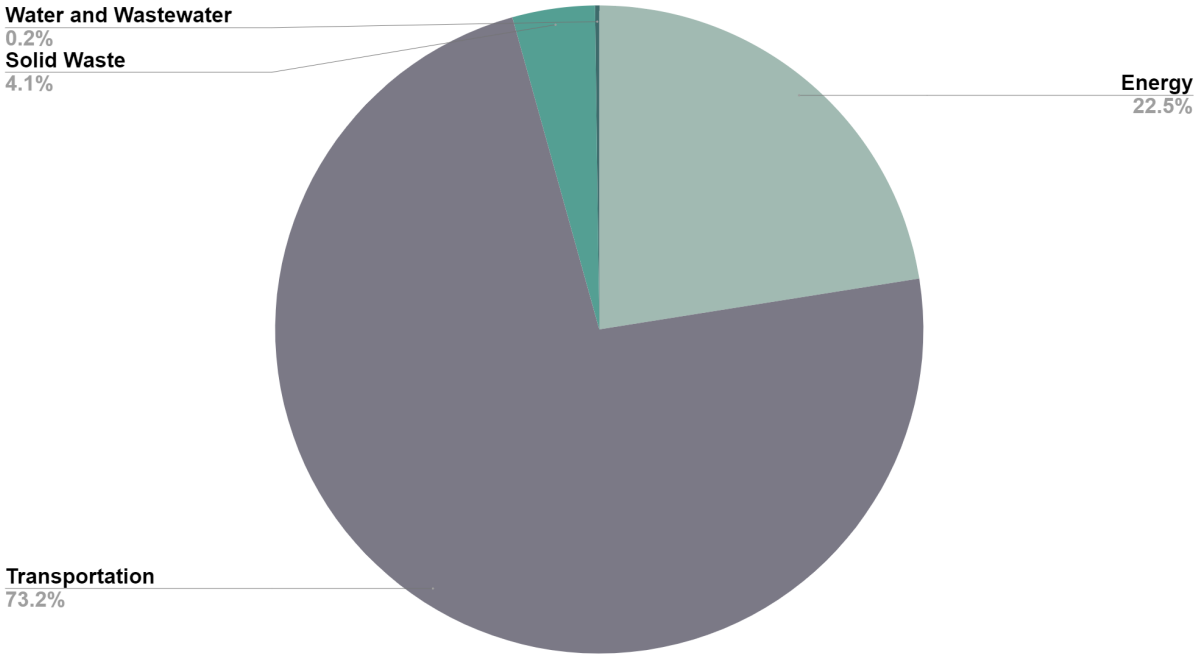


Table 2. 2018 Emissions Summary

Sector	MT CO_2e	% of Total Emissions
Energy	5,667	22.49%
Transportation	18,437	73.18%
Solid Waste	1,037	4.12%
Water and Wastewater	52.78	0.21%
Total	**25,193**	**100%**

[23] Community-Master-Data-Workbook. (2021). Sierra Business Council.

Energy

The energy sector consists of building electricity and other fuel use (propane and wood), as noted below **Table 3.** Aggregated electricity use data was provided by Pacific Gas & Electric Company (PG&E) and Calaveras Public Power Agency (CPPA)[24] and is shown in **Figure 2** below. **Figure 2** below shows emissions by energy type, and it is important to note that there are very little emissions coming from electricity provided by CPPA, as CPPA electricity is generated through various hydroelectric projects.

While there is no natural gas usage in the City, propane significantly contributed to emissions for the energy sector. Propane and wood usage estimates for 2018 were taken from the U.S. Energy Information Administration (EIA) and scaled using household energy use estimates from the U.S. Census American Community Survey.[25] These estimates are shown in **Figure 2**.

The electricity use and emissions metrics include transmission and distribution (T&D) losses for 2018. T&D losses are slight losses in electrical energy as a result of transmission across power lines. T&D losses were measured at 4.8% of end use consumption in 2018 according to the eGRID gross loss rates for the Western Region.[26]

Refer to the **Appendices A and B** for data on 2018 emissions factors.

[24] Electricity data provided by PG&E and CPPA. Located in the Community-Master-Data-Workbook.
[25] Propane and wood data estimated using data from the U.S. Energy Information Administration and U.S. Census Bureau American Community Survey.
[26] Transmission and distribution loss rates were provided by the U.S. Environmental Protection Agency eGRID Data Explorer.

Figure 2. Emissions by Energy Type

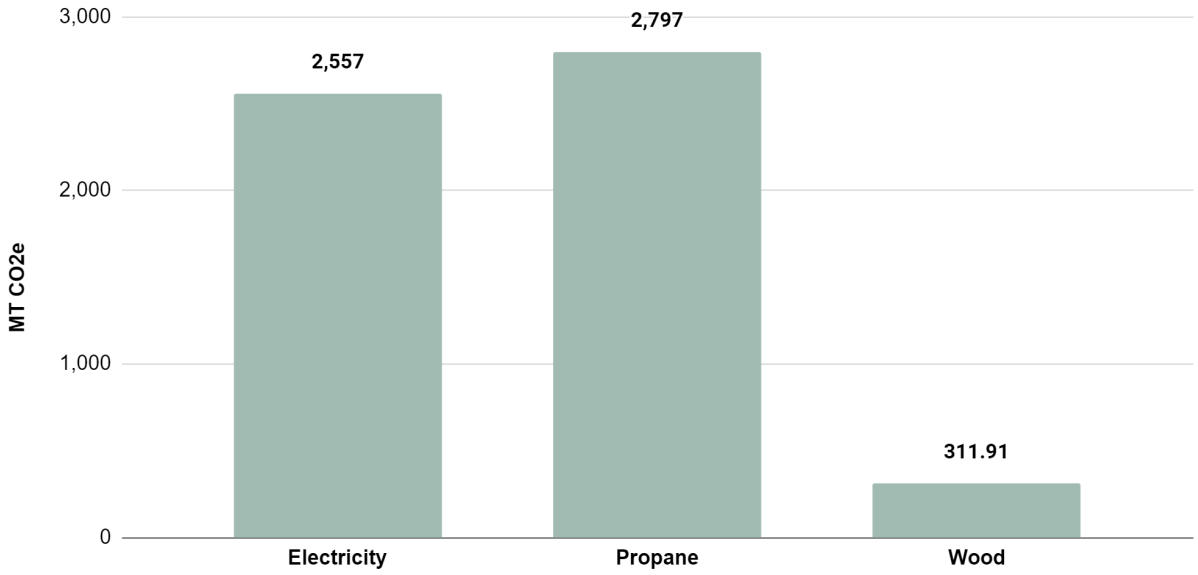


Table 3. Energy Activity Data and Emissions

Energy Type	Amount	Unit	Emissions (MT CO_2e)	Data Source
Residential Electricity (PG&E)	13,351,915	kWh	1,260	PG&E
Residential T&D Loss Rate	4.80	%	144.93	eGRID
Residential Propane	485,623	gallons	2,743	EIA / ACS
Residential Wood	31,313	MMBtu	311.91	EIA / ACS
Commercial Electricity (PG&E)	10,691,523	kWh	1,009	PG&E
Commercial Electricity (CPPA)	1,399,724	kWh	25.90	CPPA
Commercial Electricity T&D Loss Rate	4.80	%	117.29	eGRID
Commercial Propane	9,735.85	gallons	54.98	EIA / ACS
Total Emissions			**5,667**	

Transportation

In 2018, on-road vehicle miles traveled (VMT) data was provided for the Calaveras Council of Governments' (CCOG) travel demand model and scaled to the City from aggregated

County data using population.[27] The breakdown of VMT and emissions by trip type is noted in **Table 4** below. Off-road fuel usage data was provided by the California Air Resources Board's OFFROAD2017 model, including fuel usage data from off-road activity relating to construction and other industrial and light commercial activities. The off-road vehicle data was originally calculated for the County and was scaled down to City usage using population. On- and off-road activity and emissions data are shown in **Figure 3** and **Table 4** below.

Figure 3. On-Road and Off-Road Emissions

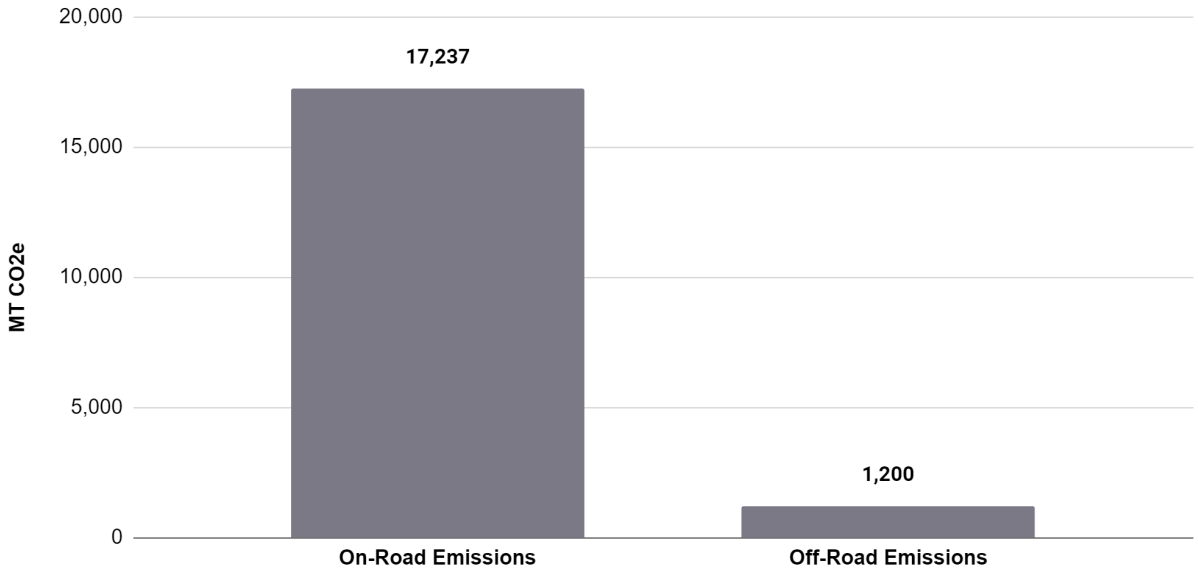


Table 4. Vehicle Miles Traveled and Emissions from Transportation

Activity / Source	Miles Traveled (Miles)	Gasoline Use (Gallons)	Diesel Use (Gallons)	Liquid Propane Gas Use (Gallons)	Emissions (MT CO_2e)
On-Road Vehicles	34,937,859				**17,237**
Trip Starts and Ends In Boundary	15,370,293				7,583
Trip Starts In and Ends Out of Boundary	9,783,783				4,827
Trip Starts Out and Ends In Boundary	9,783,783				4,827
Off-Road Vehicles		14,087	102,319	3,003	**1,200**
Total Emissions					**18,437**

[27] On-Road data provided by CCOG. Off-Road data provided by CARB OFFROAD2017 Model, EPA Emissions Factors, and 5th Assessment Global Warming Potentials.

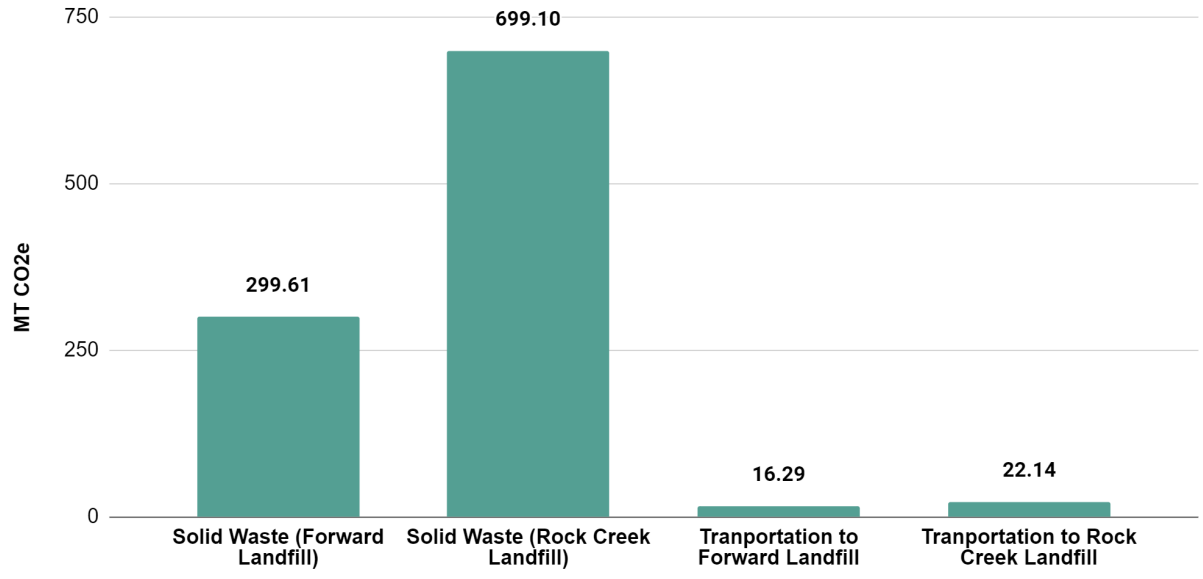
Solid Waste

In 2018, total City-wide solid waste sent to the landfill was approximately 3,519 tons.[28] Solid waste generated in the City is primarily sent to Forward Landfill in Manteca and Rock Creek Landfill in Farmington. The figure below lists the total solid waste tonnage sent to both Forward and Rock Creek Landfills. Both landfills have methane collection systems in place. Solid waste tonnage data was provided by Calaveras County Integrated Waste Management and scaled down to City usage. Emissions from transportation of solid waste were also calculated using the annual tonnage and the distance to and from each landfill.

Table 5. Solid Waste Generation Data and Emissions

Landfill	Solid Waste (Tons)	Emissions (MT CO_2e)	Distance to Landfill (Miles)	Emissions (MT CO_2e)	Data Source
Forward Landfill	1,056	299.61	55.10	16.29	Calaveras County Integrated Waste Management, CalRecycle, and Google Maps
Rock Creek Landfill	2,463	699.10	32.10	22.14	
Total	**3,519**	**998.71**		**38.43**	

Figure 4. Solid Waste Emissions



[28] Solid waste data provided by Calaveras County Integrated Waste Management. Located in Community-Master-Data-Workbook.

Water and Wastewater

Emissions from water and wastewater for the year 2018 were 52.78 MT CO_2e.[29] Electricity emissions from water distribution and wastewater collection and treatment were accounted for in the City-wide calculations for the energy sector and were considered "information only" items in this section to avoid double counting. Wastewater emissions are primarily associated with the City's treatment processes.

Table 6. Electricity Use for Potable Water Supply - Information Item

Energy Type	Electricity Use (kWh)	Water Treated (Gallons)	Data Source
Electricity (CPPA)	197,600	321,800,000	CPPA, USCP, City of Angels Camp

Table 7. Electricity Use for Wastewater Treatment - Information Item

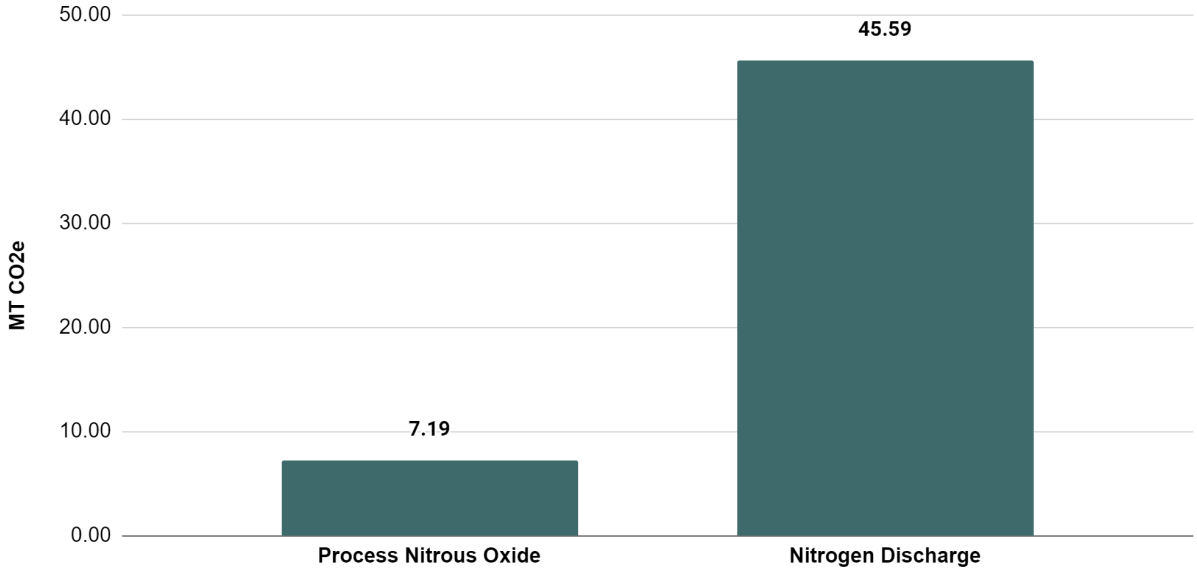
Energy Type	Electricity Use (kWh)	Water Treated (Gallons)	Data Source
Electricity (CPPA)	1,400,000	168,000,000	CPPA, USCP, City of Angels Camp

Table 8. Wastewater Treatment Process Data

Treatment Process	Emissions (MT CO_2e)
Nitrogen Discharge	45.59
Process N_2O	7.19
Total Emissions	**52.78**

[29] Water and wastewater data provided by the City of Angels Camp. Located in Community-Master-Data-Workbook.

Figure 5. Water and Wastewater Emissions



Government Operations Inventory Results

This section presents a detailed analysis of greenhouse gas (GHG) emissions resulting from the City of Angel's Camp's (City) government operations. The government operations emissions are a subset of community-wide emissions and should not be added to community emissions totals since they are already included in the community-wide data. The emissions included in this inventory were determined using the operational control framework. Included are emissions from buildings, facilities and lighting energy use, water distribution and wastewater treatment emissions, and vehicle fleet fuel use emissions. These are emissions sources and activities for which the City has the full authority to introduce and implement operating policies. The government operations inventory also includes two additional emissions sectors for which the City has limited control: emissions from employee-generated solid waste and emissions from employees' personal commutes to work. Including these optional sources is recommended strongly by the Local Government Operations Protocol (LGOP) even though the City does not have full operational control.

Based on the methodologies previously outlined, inventory results provide information on the sources of GHG emissions and the relative magnitude of those emissions by source for the City operations.

Government Operations GHG Emissions Summary

Key Findings

- In 2018, the City's government operations emitted an estimated 511 metric tons (MT) CO_2e, which includes emissions sources and activities for which the City has the authority to introduce and implement operational policies.
- The largest contributor to government operations emissions in the inventory is the vehicle fleet (41%), which includes on-road and off-road vehicle emissions.
- In combination, the vehicle fleet and employee commute sectors produce more than 67% of the government operations emissions in the City, and therefore have the most potential for emissions reductions.
- Emissions from government operations account for 2.0% of total community-wide emissions.
- By conducting periodic GHG emissions inventories as data becomes more robust and methodologies improve, the City can get an even clearer picture of the government operations GHG emissions, and monitor and evaluate any reduction efforts taken.

Overview of 2018 Government Operations Inventory

In 2018, City facilities and operations emitted 511 MT CO_2e.[30] The vehicle fleet sector was the largest source of emissions, followed by employee commute, water and wastewater, solid waste, and buildings and facilities.

[30] LGO-Master-Data-Workbook. (2021). Sierra Business Council.

Figure 6. 2018 Emissions Summary

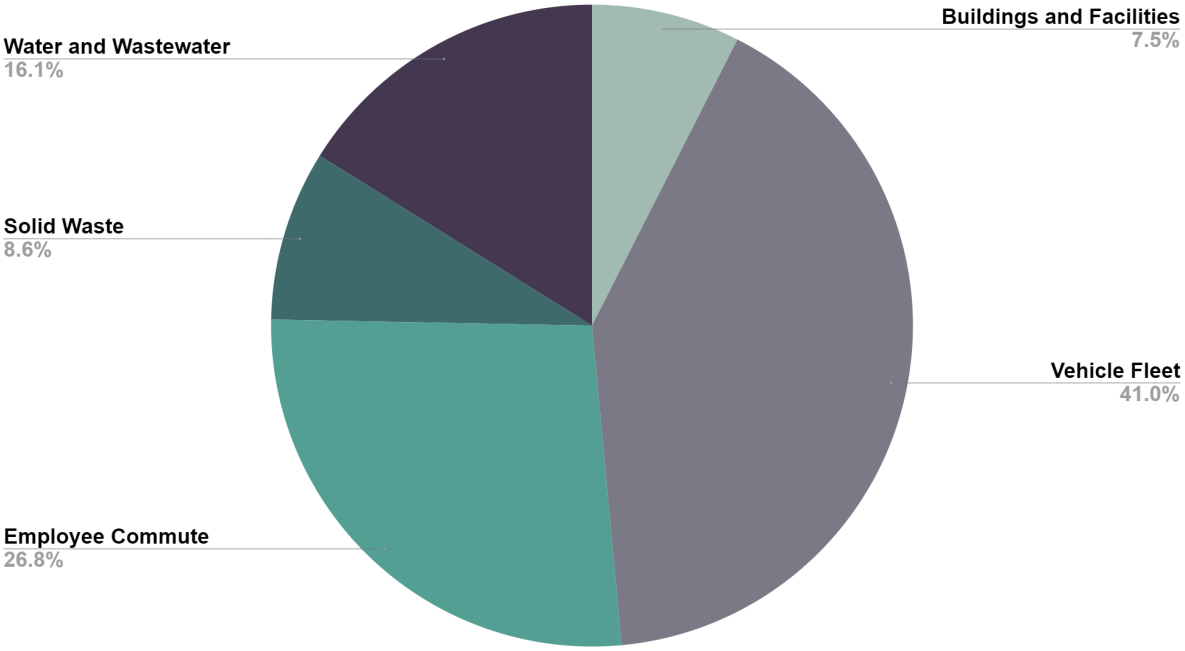


Table 9. 2018 Emissions Summary

Sector	MT CO_2e	% of Total Emissions
Buildings and Facilities	38	7.49%
Vehicle Fleet	210	41.04%
Employee Commute	137	26.77%
Solid Waste	44	8.58%
Water and Wastewater	82	16.12%
Total	**511**	**100%**

Buildings and Facilities

The buildings and facilities sector consists of building electricity and propane in City buildings and facilities, as noted below **Table 10**. Aggregated electricity use data was provided by Pacific Gas & Electric Company (PG&E) and Calaveras Public Power Agency (CPPA)[31] and is shown in **Figure 7** below. There are very little emissions coming from

[31] Electricity data provided by PG&E and CPPA. Located in the LGO-Master-Data-Workbook.

electricity provided by CPPA, as CPPA electricity is generated through various hydroelectric projects. There is no natural gas used within City operations.

Figure 7. Emissions from Buildings and Facilities Energy Use

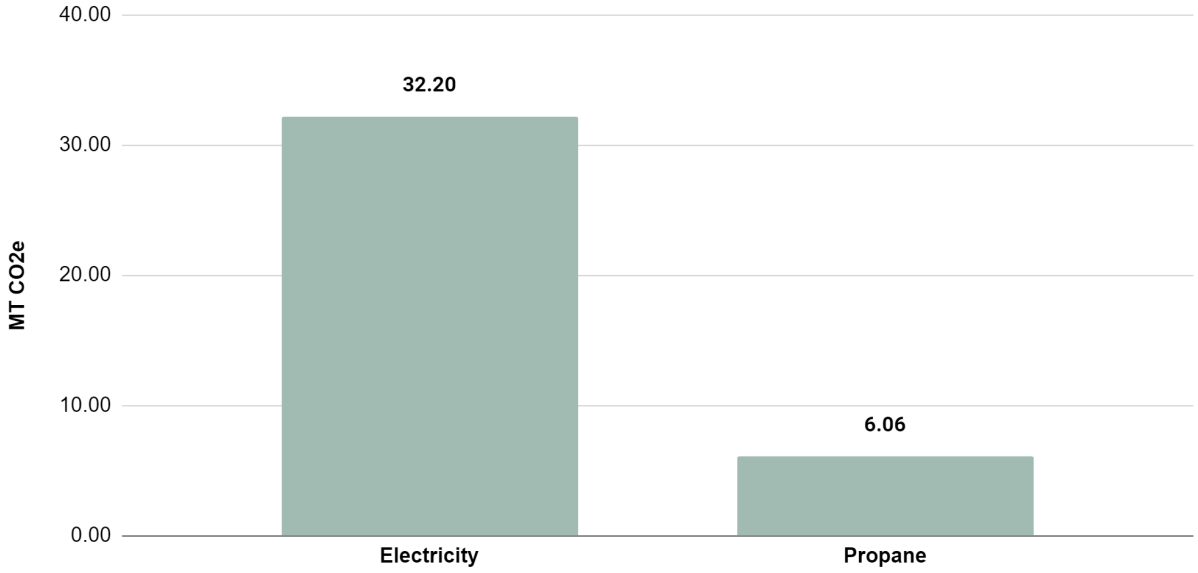


Table 10. Energy Use and Emissions from City Buildings and Facilities

Energy Type	Amount	Unit	Emissions (MT CO_2e)	Data Source
Electricity (PG&E)	66,725	kWh	6.30	PG&E
Electricity (CPPA)	1,399,724	kWh	25.90	CPPA
Propane	1,073	gallons	6.06	EIA / ACS
Total Emissions			**38.26**	

Vehicle Fleet

Vehicle fleet data for 2018 was provided by the City's Public Works, Police, and Fire Departments.[32] This data set included vehicle type, fuel type, total annual miles traveled, and gallons of fuel or hours used. All off-road vehicles were categorized as small utility vehicles in ClearPath. **Table 11** below shows breakdown of passenger, light duty, and heavy duty vehicles, in addition to fuel usage by type.

[32] Vehicle fleet data provided by the City of Angels Camp. Located in LGO-Master-Data-Workbook.

Figure 8. Vehicle Fleet Emissions

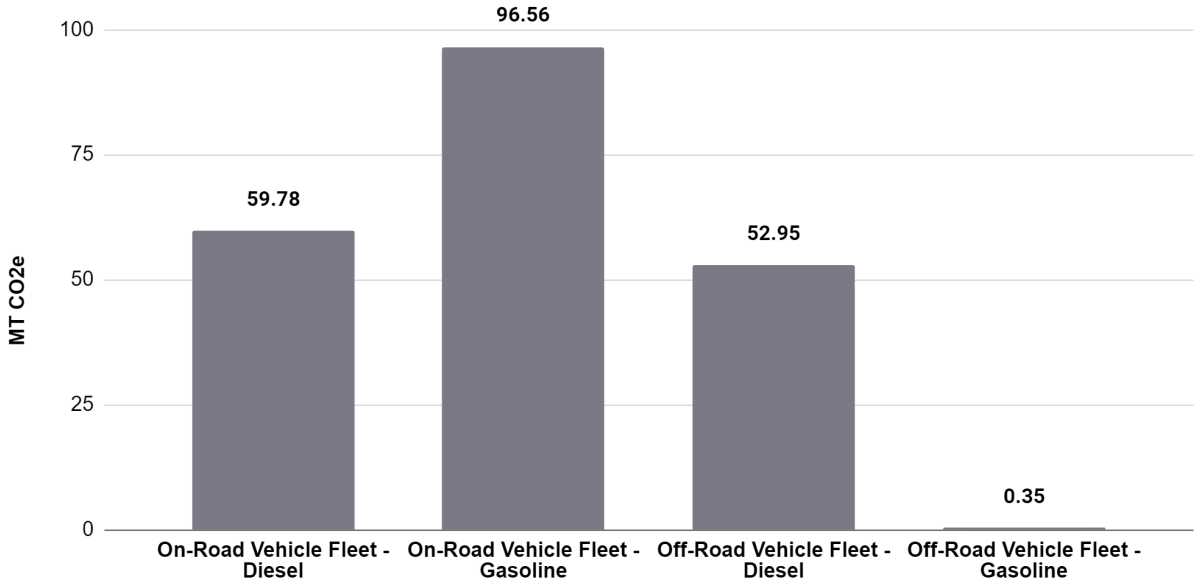


Table 11. Vehicle Fleet Breakdown and Emissions

Activity / Source	Annual VMT	Fuel Used (Gallons)	Emissions (MT CO_2e)
On-Road Vehicle Fleet - Diesel	49,144	5,849	59.78
On-Road Vehicle Fleet - Gasoline	185,102	10,905	96.56
Off-Road Vehicle Fleet - Diesel	N/A	5,186	52.95
Off-Road Vehicle Fleet - Gasoline	N/A	39	0.35
Total Emissions			**209.64**

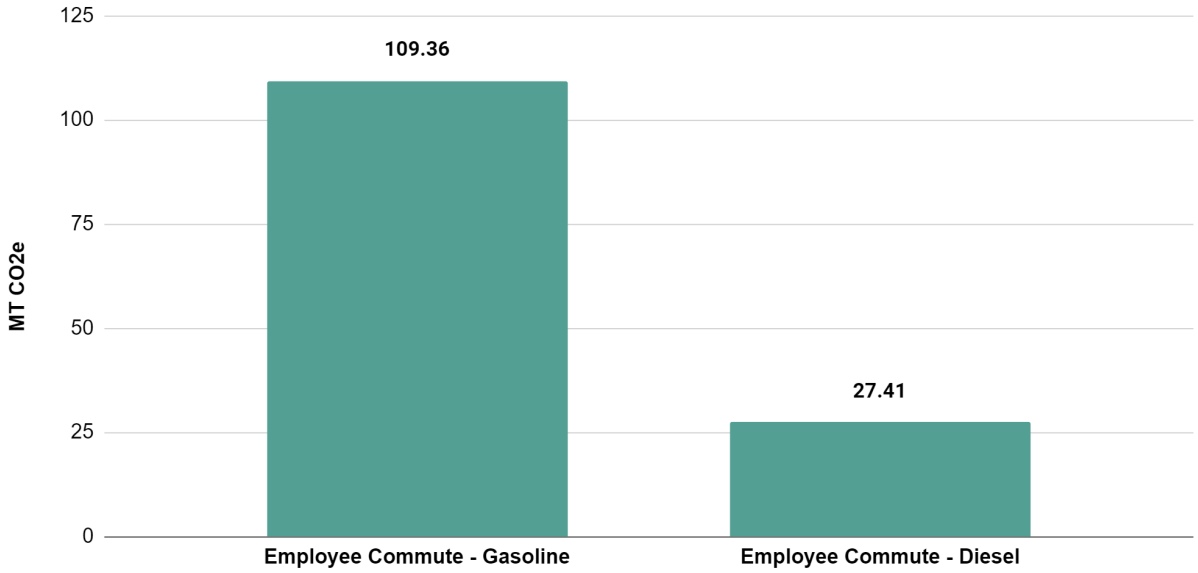
Employee Commute

In order to compile an employee commute data set, a survey was distributed both electronically and by hard copy to all City employees. The survey included questions regarding mileage to and from work, how many days per week were spent driving to work, vehicle type, and fuel type. It was asked that employees fill out this survey for their "pre-COVID-19" commutes. There were 36 employees and 4 contractors in 2018. In total, there were 40 responses, and it was shown that all employees drive alone to work. Total vehicle miles traveled are categorized by gasoline and diesel, as well as by passenger vehicle or light duty truck. The City Employee Commute survey is included in **Appendix I.**

Table 12. Employee Commute VMT Breakdown and Emissions

Activity / Source	Annual VMT	Emissions (MT CO_2e)
Employee Commute - Gasoline	254,250	109.36
Employee Commute - Diesel	49,271	27.41
Total Emissions		**136.77**

Figure 9. Employee Commute Emissions



Solid Waste

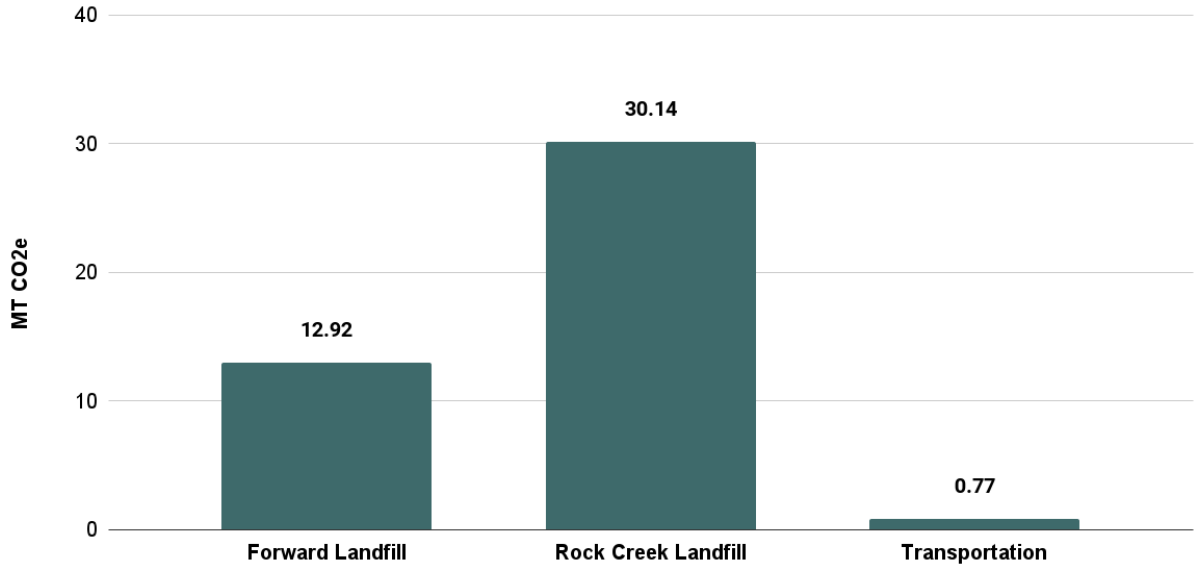
In 2018, solid waste generated by City government operations was approximately 73 tons.[33] Solid waste generated by City facilities is sent to Forward Landfill in Manteca and Rock Creek Landfill in Farmington. In **Figure 10** below, you can see total solid waste tonnage sent to both Forward and Rock Creek Landfills. Both landfills have methane collection systems in place. Solid waste tonnage data was provided by the City. Emissions from transportation of solid waste were also calculated using the annual tonnage and the distance to and from each landfill.

[33] Solid waste data provided by the City of Angels Camp. Located in LGO-Master-Data-Workbook.

Table 13. City Facility-Generated Solid Waste

Landfill	Solid Waste (Tons)	Emissions (MT CO_2e)	Distance to Landfill (Miles)	Emissions (MT CO_2e)	Data Source
Forward Landfill	22.00	12.92	55.10	0.31	Calaveras County Integrated Waste Management, CalRecycle, and Google Maps
Rock Creek Landfill	51.34	30.14	32.10	0.46	
Total	**73.34**	**43.06**		**0.77**	

Figure 10. Emissions from City Facility-Generated Solid Waste



Water and Wastewater

Emissions from City-operated water and wastewater facilities for the year 2018 totaled 82.3 MT CO_2e.[34] Water and wastewater emissions are primarily associated with energy used to distribute water, collect wastewater, and the City's treatment processes. Data was provided by the City and is outlined below in **Table 14, Table 15** and **Table 16**. Under the LGOP, these emissions are included in the government operations inventory because they are owned and operated by the City.

[34] Water and wastewater data provided by the City of Angels Camp. Located in LGO-Master-Data-Workbook.

Table 14. City-Operated Potable Water Supply Electricity

Energy Type	Electricity Use (kWh)	Water Treated (Gallons)	Emissions (MT CO_2e)	Data Source
Electricity (CPPA)	197,600	321,800,000	3.66	CPPA, USCP, City of Angels Camp
Total Emissions			**3.66**	

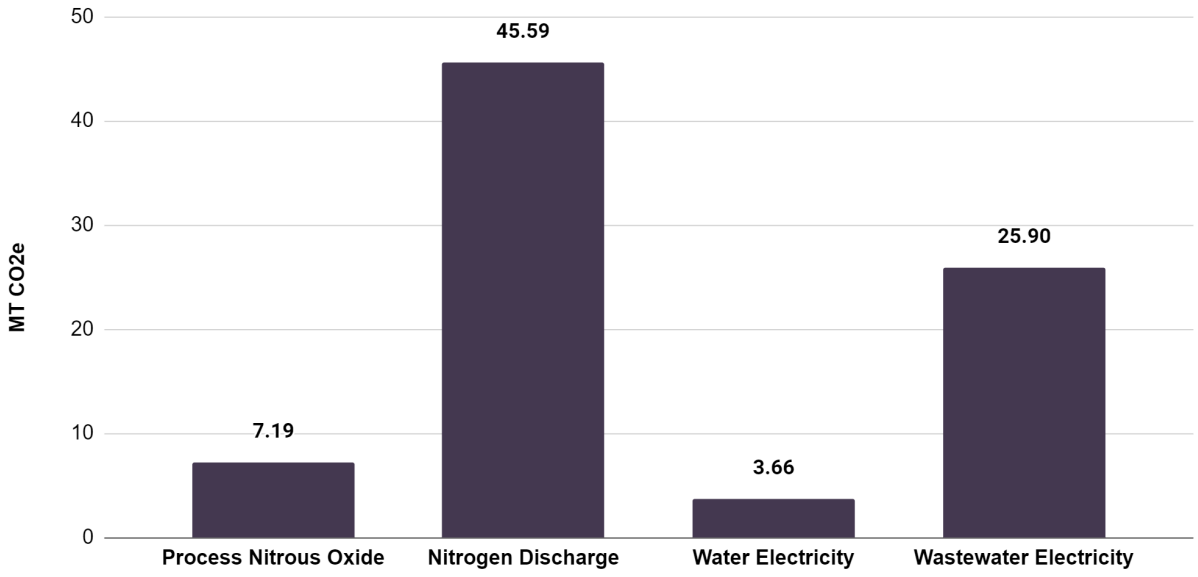
Table 15. City-Operated Wastewater Treatment Electricity

Energy Type	Electricity Use (kWh)	Wastewater Treated (Gallons)	Emissions (MT CO_2e)	Data Source
Electricity (CPPA)	1,400,000	168,000,000	25.90	CPPA, USCP, City of Angels Camp
Total Emissions			**25.90**	

Table 16. Wastewater Treatment Process Data

Treatment Process	Emissions (MT CO_2e)
Nitrogen Discharge	45.59
Process N_2O	7.19
Total Emissions	**52.78**

Figure 11. Water and Wastewater Emissions



Emissions Forecasting

Business-as-Usual Forecasts

Business-as-usual (BAU) forecasts were conducted for the City of Angels Camp (City) after the completion of the emissions inventory to provide an estimate of future emissions in each sector.[35] The BAU scenarios take the emissions from a snapshot in time and project them out over time, assuming no other changes or variables that might otherwise affect emissions. In general, BAU emissions forecasting does not account for any local, state, or federal policy that would impact future GHG emissions, nor does it account for potential changes in technology or individual consumption behavior. The BAU forecasts estimate how annual emissions would change from 2018 to 2030, to 2035, and to 2045. These years align with existing regional, local, and statewide emissions reduction goals.

The BAU forecast is based on two inputs, baseline emissions data and growth rates, both of which are presented in **Appendix M** and **Appendix N**. Growth rates were calculated using projections of population, employment rates, and several other indicator variables. For the City forecasts, two forecast scenarios were calculated due to differences in population growth rates from differing years (one references an increasing population growth rate from 2018 data and the other a declining population growth rate from 2021 data). Both of these forecasts and more detailed information on the reasoning behind including two BAU forecasts are provided in **Appendix M**. Only the forecasts using 2018 DOF data are included in this section of the report.

Calculating the emissions forecast is achieved by isolating an indicator variable for the various sectors and sub-sectors that were evaluated in the inventory, then assessing how that indicator variable is projected to increase or decrease into the future, and applying that rate of change to the emissions from that sector or sub-sector.

For example, to forecast residential energy, the team looked at the different projected rates of change for Calaveras County population out to 2045 (from 2021 and 2018 Department of Finance population projection data), then applied those rates of change to the emissions coming from the City's residential energy sector to arrive at our BAU forecasts. This process was applied to each sector and sub-sector using associated growth indicators.

Table 17 below displays the various indicator variables and their data sources for each sector. Forecasts are based on projections provided by commonly-used sources, however

[35] Data located in the City of Angels Camp Forecasts spreadsheet.

like other predictive modeling, there is inherent uncertainty in these predictions. Likewise, significant events, like the 2020-2021 COVID pandemic, can disrupt a projection in unexpected ways. As this inventory was based on data from before the pandemic, resulting impacts are not accounted for as they are as of yet unknown. Additionally, data that is specific and robust for small rural regions, like Calaveras County, can be difficult to obtain. Regardless, forecasting can be a useful tool to help understand the actions needed to reach emissions reduction targets.

Table 17. Business-as-Usual Emissions Forecast Variables & Data Sources

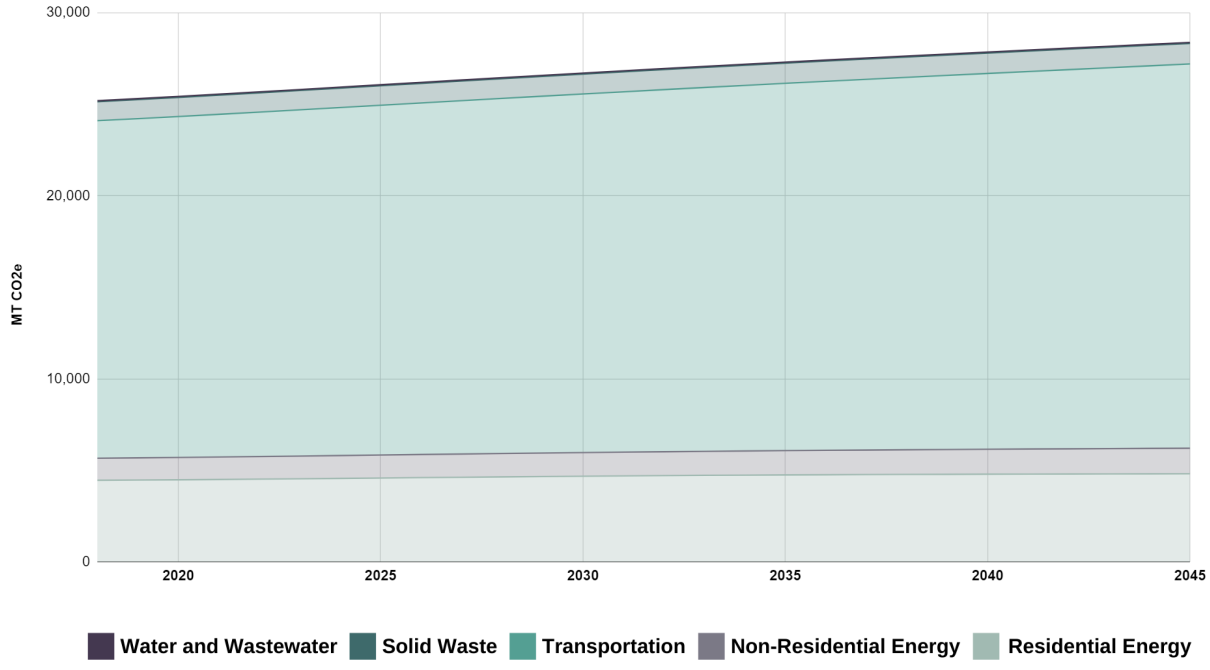
Sector	Sub-sector	Indicator Variable	Data Source
Energy	Residential Energy	Population (2018 Projections)	California Department of Finance
	Non-Residential Energy	Employment	California Employment Development Department
Transportation	On-Road Transportation	VMT Projections	Calaveras Council of Governments
	Off-Road Emissions	Population (2018 Projections)	U.S. Census, American Community Survey
Solid Waste	Solid Waste	Population (2018 Projections)	California Department of Finance
Water and Wastewater	Water and Wastewater	Population (2018 Projections)	California Department of Finance

The BAU forecast showed an overall increase in emissions. Under the BAU scenario, emissions are forecast to increase by 6.0% from 2018 to 2030, by 8.4%, from 2018 to 2035, and by 12.7% from 2018 to 2045, for a total increase in emissions from 2018 to 2045 of 12.7%. This equates to 28,378 MT CO_2e projected to be emitted in 2045. **Table 18** and **Figure 12** display the forecast trends.

Table 18. Business-as-Usual Forecasted Emissions by Sector (MT CO_2e) (2018 California Department of Finance Population Projections)

Year	Residential Energy	Non-Residential Energy	Transportation	Solid Waste	Water and Wastewater	Total Emissions and %
2018	4,459	1,207	18,437	1,037	52.78	25,193
2030	4,681	1,291	19,589	1,089	55.41	26,706 **+6.01%**
2035	4,753	1,326	20,064	1,106	56.26	27,305 **+8.39%**
2045	4,815	1,396	20,991	1,120	56.99	28,378 **+12.65%**
Net % Change	**+7.97%**	**+15.66%**	**+13.85%**	**+7.97%**	**+7.97%**	**+12.65%**

Figure 12. City-Wide Business-as-Usual Greenhouse Gas Emissions Forecast (2018 California Department of Finance Population Projections)



Adjusted Business-as-Usual Forecasts

The adjusted scenario forecast, or adjusted BAU (ABAU), projects emissions out to 2045 and accounts for adjustments and projected emissions reductions resulting from legislative

action. This includes projections that include statewide vehicle fleet standards and renewable portfolio standards. ABAU forecasts are developed using two inputs - current emissions data and either BAU projections or adjusted rates of growth or decay. The ABAU forecast illustrates the difference between and forecasted emissions reductions as a result of state policies' emissions reductions targets. This difference represents the reductions that must be made by the jurisdiction in order to reach reduction targets. These factors are influenced over time by changes in climate, population demographics, land-use and transportation patterns, the adoption of new technologies, and measures adopted to reduce greenhouse gas emissions.

As with the BAU forecasts, two forecast scenarios were calculated due to differences in population growth rates from differing years (one references an increasing population growth rate from 2018 data and the other a declining population growth rate from 2021 data). Both of these forecasts and more detailed information on the reasoning behind including two ABAU forecasts is provided in **Appendix M**. Only the forecasts using 2018 DOF data are included in this section of the report.

The below table displays the legislative adjustments that are applied to each emissions sector to calculate the ABAU forecasts.

Table 19. Adjusted Business-as-Usual Emissions Forecast Variables & Data Sources

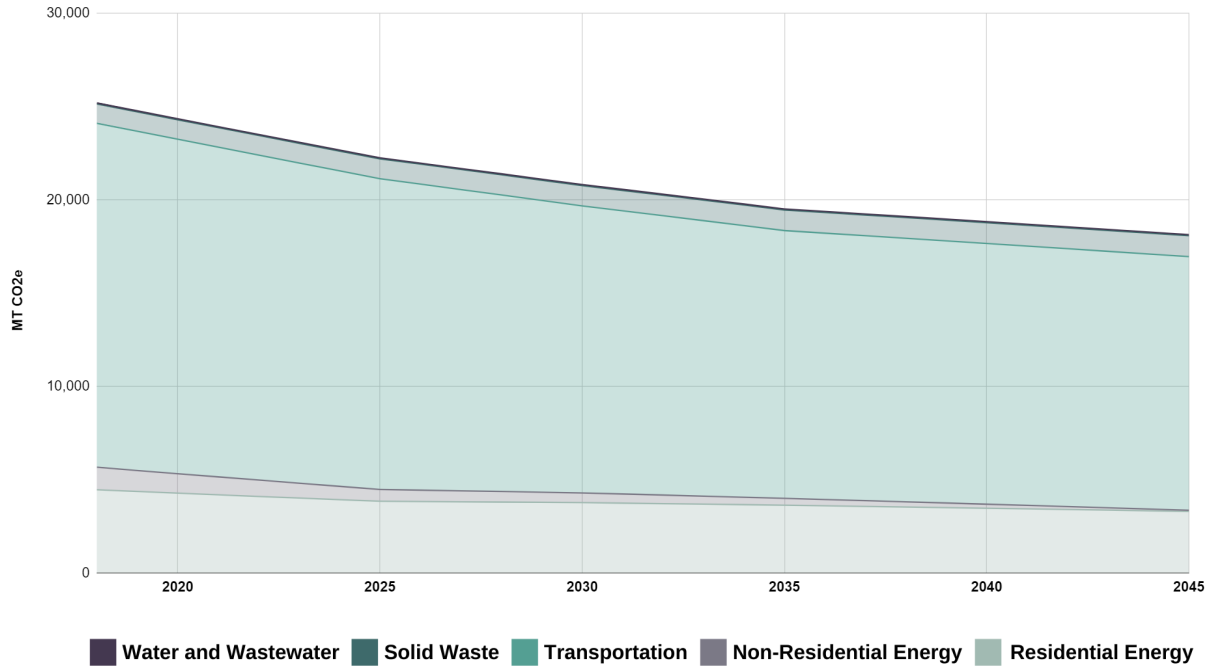
Sector	Sub-sector	Indicator Variable	Data Source
Energy	Residential Energy	Electricity - Renewable Portfolio Standard Other Fuels - Population (2018 Projections)	SB 100 California Department of Finance
	Non-Residential Energy	Electricity - Renewable Portfolio Standard Other Fuels - Employment	SB 100 California Employment Development Department
Transportation	On-Road Transportation	Emissions Rates (EMFAC 2021)	California Air Resources Board
	Off-Road Emissions	Emissions Rates (OFFROAD 2017)	California Air Resources Board
Solid Waste	Solid Waste	Population (2018 Projections)	California Department of Finance
Water and Wastewater	Water and Wastewater	Population (2018 Projections)	California Department of Finance

Under the ABAU scenario, emissions are forecast to decrease by 17.4% from 2018 to 2030, by 22.6% from 2018 to 2035, and by 28.0% from 2018 to 2045, for a total decrease in emissions from 2018 to 2045 of 28.0%. This equates to 18,133 MT CO_2e projected to be emitted in 2045. **Table 20** and **Figure 13** display the forecast trends.

Table 20. Adjusted Business-as-Usual Forecasted Emissions by Sector (MT CO_2e) (2018 California Department of Finance Population Projections)

Year	Residential Energy	Non-Residential Energy	Transportation	Solid Waste	Water and Wastewater	Total Emissions and %
2018	4,460	1,207	18,436	1,037	52.78	25,193
2030	3,769	520	15,386	1,089	55.41	20,819 **-17.36%**
2035	3,631	368	14,352	1,106	56.26	19,513 **-22.55%**
2045	3,299	64	13,594	1,120	56.99	18,133 **-28.02%**
Net % Change	**-26.04%**	**-94.73%**	**-26.26%**	**+7.97%**	**+7.97%**	**-28.02%**

Figure 13. City-Wide Adjusted Business-as-Usual Greenhouse Gas Emissions Forecast (2018 California Department of Finance Population Projections)



GHG Reduction Targets

An important part of the climate action planning process is setting greenhouse gas (GHG) emissions reduction targets. These targets help guide local governments in developing and adopting appropriate energy action policies and programs. Emissions reduction targets also provide a performance metric by which jurisdictions can evaluate progress.

Targets can be set using different methods. Many cities and counties have chosen to follow California state-wide GHG reduction targets codified in Senate Bill 32, to reduce emissions to 40% below 1990 levels by 2030, or the Executive Order S-3-05, to reduce emissions to 80% below 1990 levels by 2050. More recently, others may choose to adopt Executive Order B-55-18, with the goal of reaching carbon neutrality by 2045. ICLEI recommends adopting an 80% below 1990 levels by 2050 target for both community-wide and government operations, or to consider leading by example and setting a more aggressive goal.[36]

Another target setting method applied by local governments is to align their reduction targets with those of nearby jurisdictions. This tactic can provide jurisdictions an opportunity to leverage regional influence and achieve economies of scale when pursuing GHG reduction projects that are cross-jurisdictional.[37]

The City of Angels Camp (City) may also want to take into consideration target setting compliance in regards to the California Environmental Quality Act (CEQA). CEQA section 15183.5 provides guidance on how a GHG plan can be designed to be consistent and comply with criteria for CEQA requirements. Qualified plans that meet CEQA requirements include ones that meet or exceed SB 32, to reduce emissions to 40% below 1990 levels by 2030.

The following table lays out examples of emissions reduction targets adopted by neighboring rural jurisdictions to Calaveras County. The City can reference these targets to help guide their decision on selecting appropriate emissions reduction goals for their community.

[36] ICLEI Guide for Setting a Greenhouse Gas Reduction Target, 2010.

[37] ICLEI Guide for Setting a Greenhouse Gas Reduction Target, 2010.

Table 21. GHG Emissions Reduction Targets

Jurisdiction	Reduction Target
City of Merced	GHG reductions to 1990 levels by 2020
Placer County	GHG reductions of 15% below 2005 levels by 2020, 39% below 2005 levels by 2030, and 69% below 2005 levels by 2050
San Joaquin Valley	GHG reductions of 8% of 2005 levels in 2020, 15.7% in 2035, and 21.2% in 2042
City of South Lake Tahoe	GHG reductions of 50% below 2015 levels by 2030 and 80% below 2015 levels by 2040
Town of Truckee	GHG reductions of 80% below 2008 levels by 2040
Tuolumne County	GHG reductions of 40% below 1990 levels by 2030 and 80% below 1990 levels by 2050

Conclusion

This report provides an accounting of the City of Angels Camp's (City) community-wide and government operations greenhouse gas (GHG) emissions by source and activity. Business-as-usual (BAU) and adjusted business-as-usual (ABAU) forecasts are also provided to demonstrate the expected growth in GHG emissions, aid in assessing progress, and support GHG emissions reduction target development. These inventories set the stage for ongoing monitoring of the City's progress in achieving national, statewide, regional, and local GHG emissions reduction and other goals. It also provides analysis to inform future planning, policy development, and climate-related actions in the City. And finally, it provides practical information – including key findings, graphs, charts, and maps – that can be used by the City and other agencies to communicate needs and progress to the public, stakeholders, and policymakers.

This analysis found that in 2018, the community as a whole emitted 25,193 metric tons (MT) of CO_2e, which equates to a per capita emissions value of 6.46 MT CO_2e per year. The City's government operations emitted 511 MT of CO_2e in 2018. These are emissions sources and activities for which the City has authority to introduce and implement reduction policies. **Figures 14** and **15** below summarize the City's 2018 GHG emissions.

The City should continue to update these inventories every five years to monitor and assess progress. By conducting periodic GHG emissions inventories as data becomes more robust and methodologies improve, the City can create a clear picture of the GHG emissions in the community, and monitor and evaluate any reduction efforts taken.

Additional key findings from this analysis include:

- The largest contributor to community emissions in the inventory is community-wide transportation, which includes on-road and off-road vehicle emissions. In combination, the transportation (73.2%) and energy (22.5%) sectors produce roughly 96% of the community-wide emissions in the City, and therefore have the most potential for emissions reductions.
- The largest contributor to government operations emissions in the inventory is the vehicle fleet, which includes on-road and off-road vehicle emissions. In combination, the vehicle fleet and employee commute sectors produce more than 67% of the government operations emissions in the City, and therefore have the most potential for emissions reductions.

- The 2045 forecasts project an increase for the BAU scenario and a decrease for the ABAU scenario from the 2018 baseline. Under the BAU scenario, from 2018 to 2045 emissions are projected to increase by 12.7%. This equates to 28,378 MT CO_2e projected to be emitted in 2045. Under the ABAU scenario, emissions are projected to decrease by 28.0%, equating to 18,133 MT CO_2e projected to be emitted in 2045.
- Many cities and counties have chosen to follow California state-wide GHG reduction targets codified in Senate Bill 32, to reduce emissions to 40% below 1990 levels by 2030, or the Executive Order S-3-05, to reduce emissions to 80% below 1990 levels by 2050.

Figure 14. 2018 Community-Wide GHG Emissions

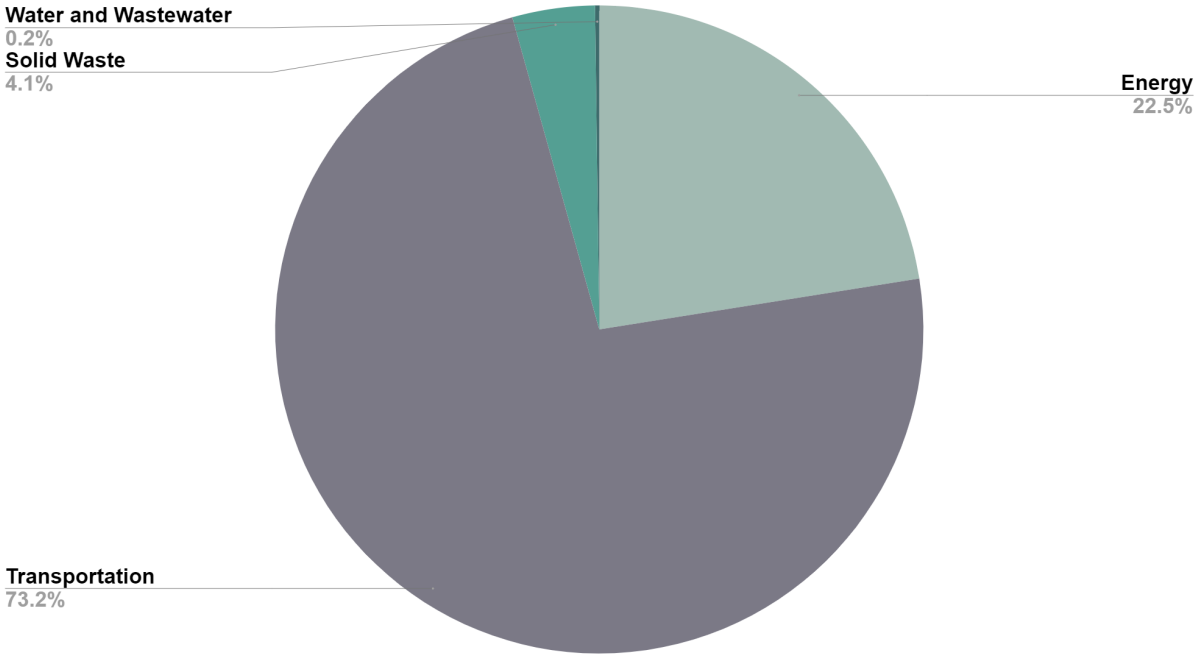
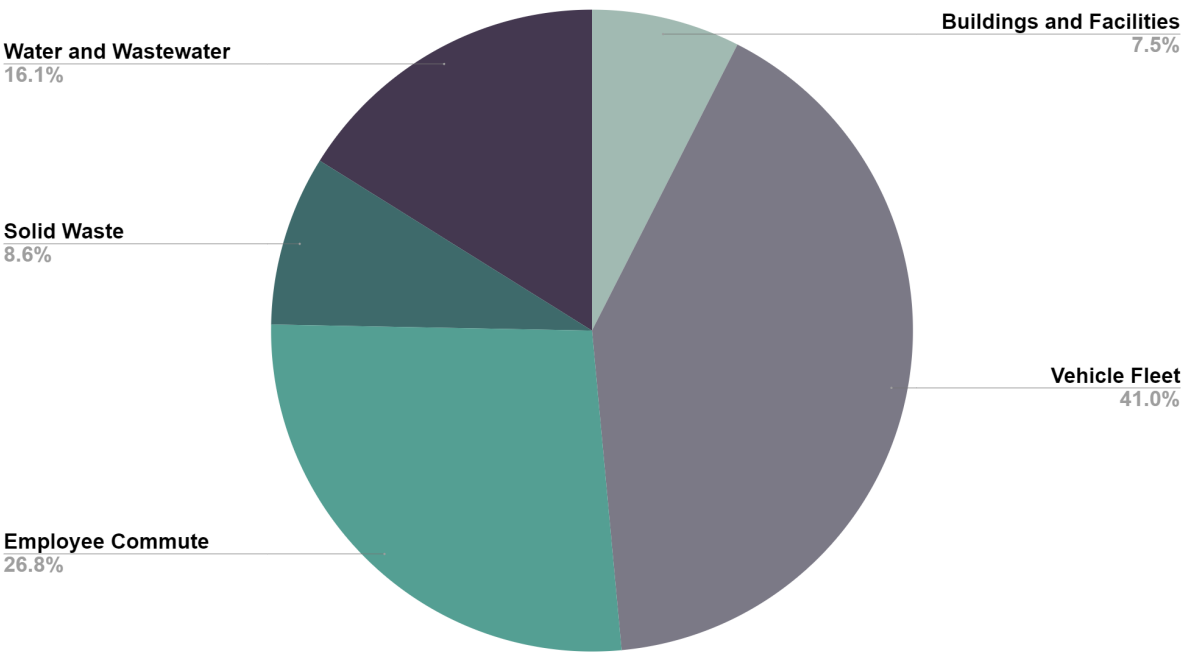


Figure 15. 2018 Government Operations GHG Emissions



Wildfire Assessment Findings

The Calaveras County and Angels Camp GHG inventories and reduction plans project also included a separate wildfire assessment report, which has been appended to this GHG inventory report. The wildfire report evaluated the challenges specific to the County, which includes the City, demonstrating how wildfires can impact the carbon cycle and GHG emissions, as well as how the wildland urban interface can both be put at risk by wildfires and increase opportunity for wildfire ignition. To understand the potential GHG emissions impact related to wildfire in the County and the City a Natural and Working Lands Carbon Inventory for the years 2010 and 2020 was developed, which demonstrates the total carbon storage in vegetation and soils. The analysis calculated the current available carbon storage (sequestration) in the County region, how carbon storage has changed over time, and highlighted regions and landcover where carbon storage value is high. Additionally, a case study was developed for the 2015 Butte Fire to analyze both the local risks for wildfire and the potential magnitude of GHG emissions and carbon storage loss from a single wildfire event. The wildfire analysis also encompassed an assessment of how forest management practices, such as thinning and prescribed burns, can significantly reduce wildfire GHG emissions and preserve long term carbon stocks that may be destroyed by high-intensity fires caused by overgrown forests.

Key findings from the wildfire assessment include:

- The 2020 Calaveras County natural and working lands total carbon stock inventories was calculated to be 74 million MT CO_2e.
- In the unlikely scenario that the majority of the deciduous and mixed forests in Calaveras County were to burn over multiple future wildfire events, the forested land has an emissions potential of over 8 million MT CO_2 from the conversion of carbon stocks to atmospheric carbon.
- Forest management can reduce the intensity and severity of wildfires in Calaveras County, reducing the GHG emissions potential per acre of forested land from 21.7 MT CO_2/acre burned down to 9.3 MT CO_2/acre burned.

The full wildfire report can be viewed in **Appendix O**, Wildfire-related Greenhouse Gas Emissions from Natural Lands Carbon Stock Loss and Climate Change Vulnerability Assessment.

GHG emissions reduction efforts require the creation of clear, actionable, and feasible implementation plans informed by local context, robust data, and proven solutions. To build upon the findings of these GHG inventories, a secondary project phase will include the development of a comprehensive GHG reduction plan for the City. This plan will develop measures to reduce emissions resulting from energy use, transportation, solid waste disposal, and treatment and transport of water and wastewater.

As the City moves forward with emissions reduction strategies and uses this data to inform planning efforts, the City should identify the benefits from strategies including: energy efficiency and conservation, renewable energy, vehicle fuel type and efficiency improvements, alternative transportation, vehicle trip reduction, land use and transit planning, waste reduction, and others. The City can achieve benefits beyond reducing emissions, including saving money, improving economic vitality, and ultimately increasing the quality of life for its residents, businesses, and visitors.

The consultant team of Sierra Business Council, Rincon Consultants, and Harris & Associates wishes to thank the project staff at the City of Angels Camp and the Calaveras Council of Governments who lent their knowledge to this project.

Appendices

Community-Wide Inventory Appendices

Appendix A. Residential Energy

Table A-1. Residential Activity Data

Activity / Source	2018	Units	Data Source
Electricity (PG&E)	13,351,915	kWh	Pacific Gas & Electric Company (PG&E)
PG&E Transmission & Distribution (T&D) Losses	640,891.92	kWh	U.S. Environmental Protection Agency eGRID (Western, CAMX, 2018)
T&D Grid Loss Factor	4.80	%	U.S. Environmental Protection Agency eGRID (Western, CAMX, 2018)
Total Electricity	**13,956,807**	**kWh**	**Data Source**
Natural Gas (PG&E)	0	Therms	Pacific Gas & Electric Company
Propane (LPG)	485,623	Gallons	U.S. Environmental Protection Agency, U.S. Energy Information Administration, and U.S. Census Bureau American Community Survey
Fuel Oil / Kerosene	0	Gallons	
Wood	31,313	MMBtu	

Methods

Utility-Derived Data

Utility-provided activity data is shown in **Table A-1**. Electricity and other stationary fuel consumption data were collected from Pacific Gas and Electric Company (PG&E), Calaveras Public Power Agency (CPPA), U.S Energy Information Administration (EIA), U.S. Census American Community Survey (ACS), and the U.S. Environmental Protection Agency eGRID (EPA eGRID) for all residences within City limits. The data was categorized as residential or non-residential and entered into ClearPath, where the GHG emissions were calculated using utility-reported and calculated grid emissions factors for electricity. The calculation methods and emissions factors are shown in **Table A-2**.

Table A-2. Residential GHG Calculation Methods & Emissions Factors

Activity / Source	Method	CO_2 lbs/MWh	CH_4 lbs/GWh	N_2O lbs/GWh	Source
2018 Electricity – PG&E	BE.2.2	206	34	4	2018 PG&E (CO_2) & 2018 U.S. EPA eGRID CAMX (CH_4 and N_2O)
2018 Electricity – CPPA	BE.2.2	40.79	0	0	2018 CPPA (Hydroelectric Project), International Hydropower Association
2018 Electricity – PG&E T&D Losses	BE.4.1	496.54	34	4	2018 U.S. EPA eGRID CAMX (CO_2, CH_4, and N_2O)
2018 Electricity – CPPA T&D Losses	BE.4.1	40.79	0	0	2018 CPPA (Hydroelectric Project), International Hydropower Association
Activity / Source	**Method**	**CO_2 lbs/MWh**	**CH_4 lbs/GWh**	**N_2O lbs/GWh**	**Source**
Natural Gas	BE.1.1	53.02 kg/MMBtu	0.005 kg/MMBtu	0.0001 kg/MMBtu	USCP Appendix C - Table B.1 and Table B.3
Propane (LPG)	BE.1.2	5.79 kg/Gallon	0.001 kg/Gallon	0.0001 kg/Gallon	USCP Appendix C - Table B.1 LPG and Table B.4 Residential LPG
Fuel Oil/Kerosene	BE.1.2	10.15 kg/Gallon	0.0015 kg/Gallon	0.0001 kg/Gallon	USCP Appendix C - Table B.1 Kerosene and Table B.4 Residential Kerosene
Wood	BE.1.2	93.80 kg/MMBtu	0.316 kg/MMBtu	0.0042 kg/MMBtu	USCP Appendix C - Table B.2 Wood and Wood Residuals and Table B.3 Biomass Fuels Solid Residential

Table A-3. 2018 Residential Non-Utility Home Heating Fuel Use Calculations (EIA/ACS)

Fuel Type	Propane	Fuel Oil / Kerosene	Wood	Data Source
California Fuel Use in 2018	263,298,000	55,44,000	21,900,000	Energy Information Administration (EIA) State Energy Data System (SEDS) 2018 California Residential Energy Use Estimates
Units	Gallons	Gallons	MMBtu	
# of 2018 California Households	419,110	31,744	205,621	U.S. Census Bureau, 2018 American Community Survey

Per Household Fuel Use	628.23	174.65	106.51	(ACS) 1-year estimates. California Households using Non-Utility Fuels for Home Heating
Units	Gallons	Gallons	MMBtu	
# of 2018 City of Angels Camp Households using Non-Utility Heating Fuels	773	0	294	U.S. Census Bureau, 2018 American Community Survey (ACS) 1-year estimates.

Non-Utility Derived Data

Non-utility activity data is shown in Table A-1. Propane and wood used in the City for home heating were estimated using EIA and ACS data. The EIA State Energy Data System California residential energy use estimates and the ACS 2018 1-year estimates of California households using non-utility fuels for home heating were used to calculate California per household fuel use. This per household fuel use factor was applied to the number of households using non-utility fuels for home heating in the City.

Table A-1 shows the activity data for home heating use. **Table A-3** above shows the EIA/ACS propane and wood for 2018. Activity data was then entered into ClearPath using the calculation methods and emissions factors shown in **Table A-2**.

Electricity Transmission and Distribution (T&D) Losses Data

Electricity transmission and distribution (T&D) losses activity data is shown in **Table A-1**. T&D losses were calculated for residential electricity following EPA guidance, using EPA eGRID region grid gross loss (ggl) factors shown in **Table A-2**. EPA recommends multiplying electricity consumption by ggl/(1-ggl). The calculated T&D losses were entered into ClearPath, where the GHG emissions were calculated using the EPA eGRID Western CAMX sub-region grid-average emissions factors.

Appendix B. Non-Residential (Commercial) Energy Use Sector Notes

Table B-1. Non-Residential Activity Data

Activity / Source	2018	Units	Data Source
Electricity (PG&E)	10,691,523	kWh	Pacific Gas & Electric Company (PG&E)
Electricity (CPPA)	1,399,724	kWh	Calaveras Public Power Agency (Hydroelectric Project)

PG&E T&D Losses	513,193	kWh	U.S. Environmental Protection Agency eGRID (Western, CAMX, 2018)
CPPA T&D Losses	67,187	kWh	U.S. Environmental Protection Agency eGRID (Western, CAMX, 2018)
T&D Grid Loss Factor	4.80	%	U.S. Environmental Protection Agency eGRID (Western, CAMX, 2018)
Total Electricity		**kWh**	**Data Source**
Natural Gas (PG&E)	0	Therms	Pacific Gas & Electric Company
Propane (LPG)	9,736	Gallons	U.S. Environmental Protection Agency, U.S. Energy Information Administration, and U.S. Census Bureau American Community Survey

Methods

Utility-Derived Data

Utility-provided activity data is shown in **Table B-1**. Electricity, natural gas and other stationary fuel consumption data were collected from Pacific Gas and Electric Company (PG&E), Calaveras Public Power Agency (CPPA), and the U.S. Environmental Protection Agency eGRID (EPA eGRID) for all commercial facilities within City limits. The activity data was entered into ClearPath, where the GHG emissions were calculated using utility and EPA reported grid emissions factors. The calculation methods and emissions factors are shown in **Table B-2**.

Table B-2. Non-Residential GHG Calculation Methods & Emissions Factors

Activity / Source	Method	CO_2 lbs/MWh	CH_4 lbs/GWh	N_2O lbs/GWh	Source
2018 Electricity – PG&E	BE.2.2	206	34	4	2018 PG&E (CO_2) & 2018 U.S. EPA eGRID CAMX (CH_4 and N_2O)
2018 Electricity – CPPA	BE.2.2	40.79	0	0	2018 CPPA (Hydroelectric Project), International Hydropower Association
2018 Electricity – PG&E T&D Losses	BE.4.1	496.54	34	4	2018 U.S. EPA eGRID CAMX (CO_2, CH_4, and N_2O)
2018 Electricity – CPPA T&D Losses	BE.4.1	40.79	0	0	2018 CPPA (Hydroelectric Project), International Hydropower Association

Activity / Source	Method	CO_2 lbs/MWh	CH_4 lbs/GWh	N_2O lbs/GWh	Source
Natural Gas	BE.1.1	53.02 kg/MMBtu	0.005 kg/MMBtu	0.0001 kg/MMBtu	USCP Appendix C - Table B.1 and Table B.3
Propane (LPG)	BE.1.2	5.79 kg/Gallon	0.001 kg/Gallon	0.0001 kg/Gallon	USCP Appendix C - Table B.1 LPG and Table B.4 Residential LPG

Table B-3. 2018 Non-Residential Non-Utility Heating Fuel Use Calculations (EIA)

Activity / Source	Propane Data	Data Source
U.S. Propane Use	1,923,497,268	Energy Information Administration (EIA) 2018 U.S. Commercial Energy Use Estimates (SEDS)
Units	Gallons	
2018 U.S. Commercial Square Footage	97,000,000,000	Energy Information Administration (EIA) 2018 Commercial Square Footage Estimates (CBECS)
Per Square Foot Use	0.0198	
Units	Gallons	
2018 City of Angels Camp Commercial Square Footage	490,969	City of Angels Camp

Non-Utility Derived Data

Propane is widely used throughout the City for heating purposes. Propane data was estimated using commercial propane usage data and commercial square footage data from the EIA. This data was then scaled using commercial square footage within the City and is shown in **Table B-3**.

Electricity Transmission and Distribution (T&D) Losses Data

Electricity transmission and distribution (T&D) losses activity data is shown in **Table B-1**. T&D losses were calculated for commercial electricity following EPA guidance, using EPA eGRID region grid gross loss (ggl) factors shown in **Table B-2**. EPA recommends multiplying electricity consumption by ggl/(1-ggl). The calculated T&D losses were entered into ClearPath, where the GHG emissions were calculated using the EPA eGRID Western CAMX sub-region grid-average emissions factors.

Appendix C. Community Transportation Sector Notes

Table C-1. Community Transportation Activity Data

On-Road Activity / Source (Scaled)	Vehicle Miles Traveled (VMT)	Data Source
Gasoline Vehicles	29,915,729	Calaveras Council of Governments (CCOG) U.S. Census Bureau Population Data (for Population Scaling) California Air Resources Board (CARB) EMFAC 2017
Diesel Vehicles	4,825,165	
Electric Vehicles	41,507	
Natural Gas Vehicles	7,092	
Plug-In Hybrid Vehicles	148,365	
Total City of Angels Camp Annual VMT	34,937,859	
EMFAC City of Angels Camp VMT	109,494	

Off-Road Vehicles (Scaled) Direct ClearPath Input	Unit	Data Source
1,182	CO_2 (Metric Tons)	CARB OFFROAD 2017, U.S EPA Emissions Factors, and IPCC 5th Assessment Global Warming Potential
0.13	CH_4 (Metric Tons)	
0.053	N_2O (Metric Tons)	

Table C-2. Community Transportation GHG Calculation Methods & Emissions Factors

Activity / Source	Method	CO_2	CH_4	N_2O	Emissions Factor Source
Gasoline Vehicles (g/mile)	TR.1.B	420.20	0.0164	0.0184	CARB EMFAC 2017
Diesel Vehicles (g/mile)	TR.1.B	889.75	0.0130	0.14	
Electric Vehicles (g/mile)	TR.1.B	0	0	0	
Natural Gas Vehicles (g/mile)	TR.1.B	990.45	0.5803	0.2019	
Plug-In Hybrid Vehicles (g/mile)	TR.1.B	165.04	0.0006	0.00075	

Methods

On-Road Vehicles

On-road transportation emissions for the City were calculated using vehicle miles traveled (VMT) estimated by Calaveras Council of Governments' Travel Demand Model and EMFAC2017 data for the County, which was scaled to the City using population data. The CCOG analysis included all miles traveled within the County in 2018, as well as trips that started in boundary and ended out of boundary and trips that started out of boundary and ended in boundary. On-road transportation activity data is shown in **Table C-1**. Activity data was entered into ClearPath, where City-level fuel and vehicle-specific emissions factors, shown in **Table C-2**, were applied to calculate the GHG emissions associated with community on-road transportation. The methodology for collecting and conditioning this data is as follows:

Fuel / Vehicle Type Breakdown and Emissions Calculations

VMT and emissions percentages by fuel type are estimated for the County using the CARB's EMFAC 2017 model, run for 2018 and scaled to the City using population. Data from this model was used to derive county-specific per-mile emissions factors and vehicle fuel efficiencies for gas, diesel, natural gas, hybrid, and electric fuels for passenger cars, light-duty trucks and heavy-duty trucks. These were applied to the City's VMT estimates to derive emissions by fuel type.

EMFAC 2017 reports CO_2, CH_4, and N_2O emissions factors for different vehicle type and fuel combinations for every county in California, informed by California Department of Motor Vehicles registrations, the Smog Check program and other data sources. Average CO_2, CH_4, and N_2O emissions factors were calculated for passenger vehicles, light trucks, and heavy trucks.

Off-Road Emissions

Off-road emissions for the City were obtained from the California Air Resources Board's (CARB) OFFROAD 2017 model. Included were emissions attributed to off-road, fuel-consuming equipment categories including Industrial, Light Commercial, and Construction vehicles. These are equipment types that are thought to have significant operation within the County and were scaled to the City using population. Emissions data, shown in **Table C-1**, was entered into ClearPath.

Appendix D. Community Solid Waste Sector Notes

Table D-1. Community Solid Waste Activity Data

Landfill	2018 Waste Generation (Tons)	Landfill Gas Capture?	2018 Distance to Facility (Miles)	Data Source
Forward Landfill	1,056	Yes	55.10	Calaveras County Integrated Waste Management, CalRecycle, and Google Maps
Rock Creek Landfill	2,463	Yes	32.10	

Table D-2. Community Solid Waste GHG Calculation Methods & Emissions Factors

Activity / Source	Method	Type	Emissions Factor	Emissions Factor Source
Transportation of Solid Waste	SW.6	Solid Waste Transportation	0.00014 Metric Tons CO_2e / Wet Short Ton / Mile	USCP Appendix E

Activity / Source	Method	Type	%	Metric Tons CH_4 / Wet Short Ton	Emissions Factor Source
Community-Generated Solid Waste Characterization	12.2.2	Newspaper	1.20	0.043	CalRecycle Calaveras County Waste Characterization Study for 2018 USCP Appendix E
		Office Paper	1.80	0.203	
		Corrugated Cardboard	5.20	0.120	
		Magazines/Third Class Mail	8.40	0.049	
		Food Scraps	18.20	0.078	
		Grass	1.15	0.038	
		Leaves	2.70	0.013	
		Branches	3.05	0.062	
		Dimensional Lumber	23.70	0.062	
		All Other (Non-Organic)	34.60	0	

Methods

Community-Generated Solid Waste

Solid waste generated in the City of Angels Camp and disposed of in landfills emits GHGs. Emissions reported for 2018 occur at the landfills over the entire period that waste decomposes, estimated to be 100 years. The tonnage of landfilled waste generated by City residents, businesses, and visitors was collected from the Calaveras County Integrated Waste Management and scaled to the City using population.

Waste characterization percentages from CalRecycle, shown in **Table D-2**, were applied to the tonnage of community-generated waste that was landfilled. The waste tonnage and characterization data were entered into ClearPath, where GHG emissions were calculated based on standard factors for organic content and methane-generating potential for each waste type. Emissions were adjusted based on the presence of landfill gas capture systems.

Solid Waste Transportation

Solid waste transportation emissions include emissions from the trucks used to transport the waste to the regional landfills. The tonnage of waste collected and the distance to the landfills were entered into ClearPath to calculate GHG emissions using default per-ton-mile CO_2e emissions (the GHGs emitted to transport one ton of waste one mile).

It is important to acknowledge the benefits of recycling and composting that lower waste volumes and emissions. When waste volumes are reduced, transportation emissions are likewise reduced, and when incoming organic waste is diverted, landfill emissions are also reduced. Finally, upstream emissions from materials manufacturing are reduced when recycled materials displace virgin materials.

Appendix E. Community Potable Water Use Sector Notes

Table E-1. Community Potable Water Electricity Use Activity Data - Information Item

Year	Service	Electricity Use (kWh)	Potable Water Provided (Gallons)	Energy Intensity (kWh / Million Gallons)	Population Served	Data Source
2020	CPPA	197,600	321,800,000	614.05	3,875	USCP, City of Angels Camp

Table E-2. Community Potable Water GHG Calculation Methods & Emissions Factors

Activity / Source	Method	CO_2 lbs/MWh	CH_4 lbs/GWh	N_2O lbs/GWh	Emissions Factor Source
2018 Electricity - CPPA	BE.2.2	40.79	0	0	2018 CPPA (Hydroelectric Project), International Hydropower Association

Methods

Community Potable Water Electricity Use

The City's potable water use activity data is shown in **Table E-1**. Data was collected from the City of Angels Camp. Even though the wastewater treatment plant is located outside of City limits, it is included in this analysis because it is owned and operated by the City. The electricity use was marked as an "information only" item to prevent double counting. The electricity use was entered into ClearPath, where the GHG emissions were calculated using relevant emissions factors for electricity shown in **Table E-2**. T&D losses were calculated by applying the EPA eGRID grid loss factors to the electricity used and then entering the loss into ClearPath, where the GHG emissions were calculated using the relevant emissions factors. All of this data was marked as "information only" to prevent double counting.

Appendix F. Community Wastewater Treatment Sector Notes

Table F-1. Community Wastewater Treatment Electricity Use Activity Data - Information Item

Year	Service	Electricity Use (kWh)	Water Treated (Gallons)	Energy Intensity (kWh / Million Gallons)	Population Served	Data Source
2020	CPPA	1,400,000	168,000,000	8,333	3,875	USCP, City of Angels Camp

Table F-2. Community Wastewater Treatment GHG Calculation Methods & Emissions Factors

Activity / Source	Method	CO_2 lbs/MWh	CH_4 lbs/GWh	N_2O lbs/GWh	Emissions Factor Source
2018 Electricity – CPPA	BE.2.2	40.79	0	0	2018 CPPA (Hydroelectric Project), International Hydropower Association
Activity / Source	**Method**	**CO_2**	**CH_4**	**N_2O**	**Emissions Factor Source**
Central Plants - with Nitrification / Denitrification (Population-Based)	WW.7	N/A	N/A	7 g N_2O / person / year	USCP Appendix F
Central Plants - without Nitrification / Denitrification (Population-Based)	WW.8	N/A	N/A	3.2 g N_2O / person / year	USCP Appendix F
Effluent (Population-Based)	WW.12	N/A	N/A	0.005 kg N_2O-N/kg sewage-N discharged	USCP Appendix F
Lagoons - No Primary Treatment (Population-Based)	WW.6	N/A	0.6 kg CH_4 / kg BOD_5	N/A	USCP Appendix F
Septic Systems (Population-Based)	WW.11	N/A	0.6 kg CH_4 / kg BOD_5	N/A	USCP Appendix F

Methods

Community Wastewater Treatment Electricity Use

Community-generated wastewater treatment activity data for 2018 is shown in **Table F-1**. Data on electricity use, wastewater treated, and population served by the plants and systems were collected from City staff and Calaveras County Public Power Agency (CPPA). Because the wastewater treatment infrastructure lies within the City, the electricity use is marked as "information only" to prevent double counting. The electricity use was entered into ClearPath, where the GHG emissions were calculated using utility-reported grid emissions factors for electricity shown in **Table F-2.** T&D losses were calculated by applying the EPA eGRID regional grid loss factors to the total electricity use and then entered into

ClearPath, where the GHG emissions were calculated using the EPA eGRID Western CAMX sub-region grid average emissions factors. All of this data was marked as "information only" to prevent double counting.

Table F-3. Community Wastewater Treatment Operations Activity Data

2018 Facility	Wastewater Treated (MG)	Population Served	Commercial / Industrial Factor	Nitrification / Denitrification?	Aerobic?	Data Source
City of Angels Camp	168	3,875	1	Yes	Yes	City of Angels Camp

Community Wastewater Treatment Facility Process and Fugitive Emissions

There are two emissions associated with wastewater treatment processes: methane (CH_4) and nitrous oxide (N_2O), which together account for a small part of total community-based GHG emissions. Calculating the makeup and amount of emissions depends on the processes involved and the management practices employed.

City wastewater treatment is operated by one central treatment facility. Operational parameters of the wastewater treatment systems are delineated in **Table F-3**. The plant is aerobic with nitrification / denitrification nutrient-removal systems. The wastewater treatment activity data were entered into ClearPath, where GHG emissions were calculated using the standard methods and emissions factors from the United States Community Protocol (USCP) and Local Government Operations Protocol (LGOP) that are shown in **Table F-2**.

Uncertainties

According to the EPA national inventory of greenhouse gas emissions, considerable uncertainty exists within any of the EPA/IPCC-based methodologies used to estimate wastewater process and fugitive emissions. EPA states that population-based methane emissions could be underestimated by 37% or overestimated by 47% while nitrous oxide emissions could be underestimated by 76% or overestimated by 93%. Emissions estimates based on direct source measurements can possibly have higher accuracy and less uncertainty. This extreme degree of uncertainty exists because these methodologies were originally developed for international countrywide inventories that were mainly population-based. By necessity, these methodologies were generalized "top-down"

approaches that sought to provide emissions estimates for countries where detailed information would be impractical to obtain. Although these methodologies had the advantage of being relatively simple to calculate, the trade-off was a compromised level of accuracy. Nevertheless, the methodologies in this Appendix reflect the evolution of knowledge since the development of the LGOP and rely upon direct measurement where possible.

Methods are evolving but especially where the emissions are based on population and default inputs, communities should exercise caution in drawing conclusions or establishing policies based on these calculations.

Government Operations Inventory Appendices

Appendix G. Buildings and Facilities Sector Notes

Table G-1. Buildings and Facilities Electricity and Natural Gas Activity Data

Building / Facility	Activity / Source	kWh	Unit	Source
City of Angels Camp Facilities	Electricity (PG&E)	66,725	kWh	Pacific Gas & Electric Company (PG&E)
City of Angels Camp Facilities	Electricity (CPPA)	1,399,724	kWh	Calaveras Public Power Agency (CPPA)
City of Angels Camp Facilities	Propane	1,073	gallons	EIA

Table G-2. Buildings and Facilities GHG Calculation Methods & Emissions Factors

Activity / Source	Method	CO_2 lbs/MWh	CH_4 lbs/GWh	N_2O lbs/GWh	Source
2018 Electricity – PG&E	6.2	206	34	4	2018 PG&E (CO_2) & 2018 U.S. EPA eGRID CAMX (CH_4 and N_2O)
2018 Electricity – CPPA	6.2	40.79	0	0	2018 CPPA (Hydroelectric Project), International Hydropower Association

Activity / Source	Method	CO_2 lbs/MWh	CH_4 lbs/GWh	N_2O lbs/GWh	Source
Natural Gas	BE.1.1	53.02 kg/MMBtu	0.005 kg/MMBtu	0.0001 kg/MMBtu	USCP Appendix C - Table B.1 and Table B.3
Propane (LPG)	BE.1.2	5.79 kg/Gallon	0.001 kg/Gallon	0.0001 kg/Gallon	USCP Appendix C - Table B.1 LPG and Table B.4 Residential LPG

Methods

Buildings and facilities electricity and propane data, shown in **Table G-1**, was collected from Pacific Gas & Electric Company, Calaveras Public Power Agency, and the U.S. Energy Information Administration. The propane data was scaled to City facility square footage using estimates from national commercial energy use and national commercial square footage data. The activity data was entered into ClearPath, where GHG emissions were calculated using the calculation methods and emissions factors shown in **Table G-2**.

Appendix H. Vehicle Fleet Sector Notes

Table H-1. Vehicle Fleet Activity Data

Activity / Source On-Road Unless Noted Off-Road	Total Fuel Use (Gallons)	Annual Miles Traveled (VMT)	VMT % Passenger Vehicles	VMT % Light Trucks	VMT % Heavy Trucks	Data Source
Gasoline Vehicles	10,905	185,102	48.62	48.85	2.53	City of Angels Camp (Public Works, Police, and Fire Departments)
Diesel Vehicles	5,849	49,144	0	13.86	86.14	
Off Road Gasoline	39.00	N/A	N/A	N/A	N/A	
Off Road Diesel	5,186	N/A	N/A	N/A	N/A	

Table H-2. Vehicle Fleet GHG Calculation Methods & Emissions Factors

Activity / Source	Method	CO_2 kg / gallon	CH_4 grams / mile	N_2O grams / mile	Emissions Factor Source
On-Road Passenger Gasoline	7.1.1.1 and 7.1.3.3	8.78	0.0186	0.0093	LGOP Appendix G - Table G.11 (CO_2) and U.S. National Transportation Defaults (CH_4 and N_2O)
On-Road Light Trucks Gasoline	7.1.1.1 and 7.1.3.3	8.78	0.0201	0.0167	

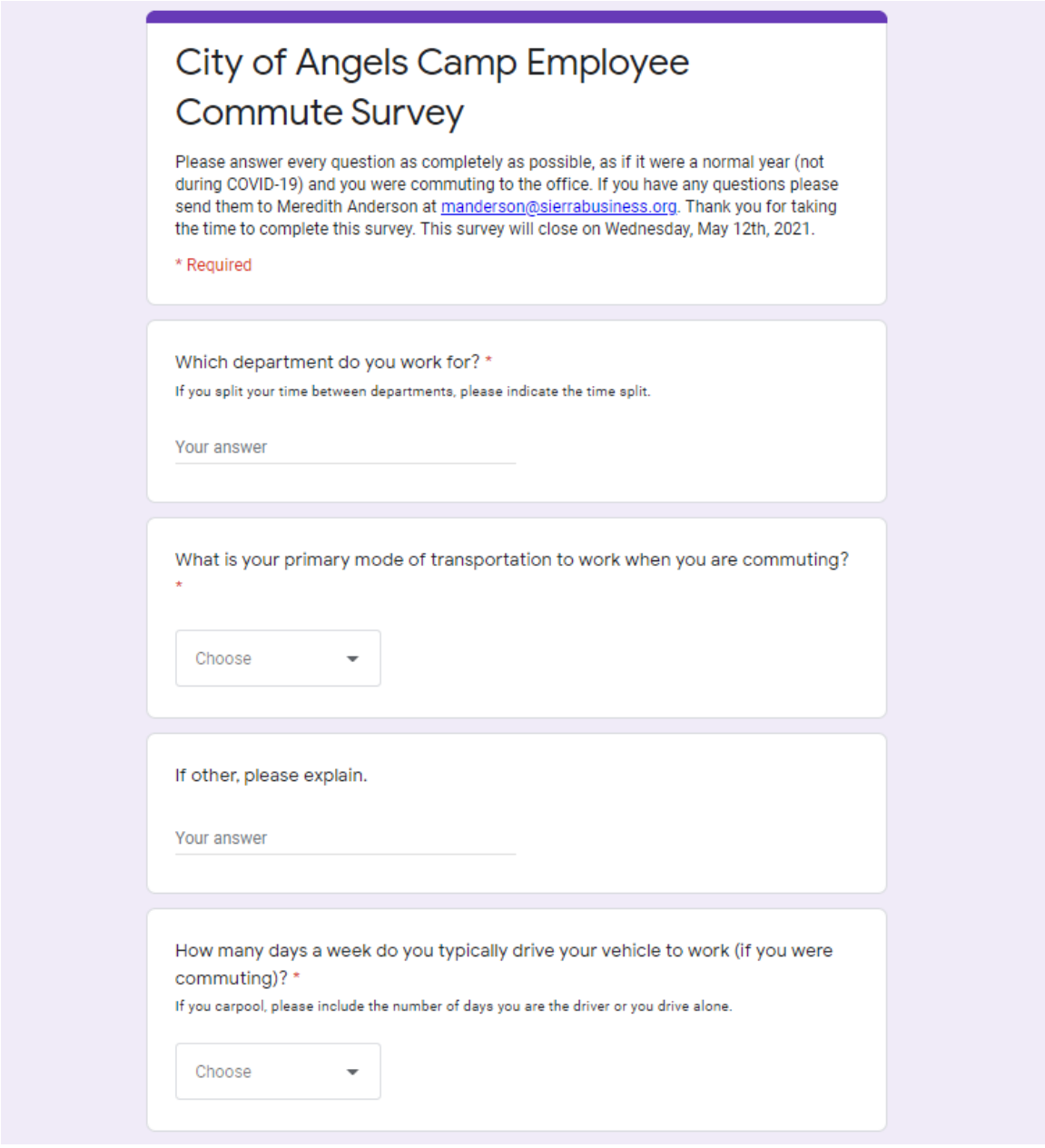
On-Road Heavy Trucks Gasoline	7.1.1.1 and 7.1.3.3	8.78	0.086	0.0664	
On-Road Passenger Diesel	7.1.1.1 and 7.1.3.3	10.21	0.0005	0.001	
On-Road Light Trucks Diesel	7.1.1.1 and 7.1.3.3	10.21	0.001	0.0015	
On-Road Heavy Trucks Diesel	7.1.1.1 and 7.1.3.3	10.21	0.0051	0.0048	
Off-Road Large Utility Diesel	7.1.1.1 and 7.2	10.21	0.58 grams / gallon		LGOP Appendix G - Table G.11 (CO_2) & G.14 (CH_4 and N_2O)

Methods

The 2018 vehicle fleet information, including vehicles miles traveled (VMT) and fuel use (by type and department) was collected from City staff. Vehicle fleet-specific 2018 miles per gallon (MPG) data was used to calculate annual mileage and fuel use for each vehicle. Vehicle breakdown and fuel use were entered into ClearPath.

Appendix I. Employee Commute Sector Notes

Figure I-1. Employee Commute Survey



City of Angels Camp Employee Commute Survey

Please answer every question as completely as possible, as if it were a normal year (not during COVID-19) and you were commuting to the office. If you have any questions please send them to Meredith Anderson at manderson@sierrabusiness.org. Thank you for taking the time to complete this survey. This survey will close on Wednesday, May 12th, 2021.

* Required

Which department do you work for? *

If you split your time between departments, please indicate the time split.

Your answer

What is your primary mode of transportation to work when you are commuting? *

Choose

If other, please explain.

Your answer

How many days a week do you typically drive your vehicle to work (if you were commuting)? *

If you carpool, please include the number of days you are the driver or you drive alone.

Choose

How many days a week do you typically work? *

Choose

What is the average number of vacation days, sick days, holidays and office closures (combined) you observe in a typical YEAR? *

Please enter the number not including weekends.

Your answer

When you drive your own vehicle to work, What is the one-way distance on your commute? *

Please enter a whole number. Enter mileage for one direction only.

Your answer

If you drive to work, what type of vehicle do you drive?

Choose

What is the make and model of your vehicle?

Your answer

What is the model year of your vehicle?

Your answer

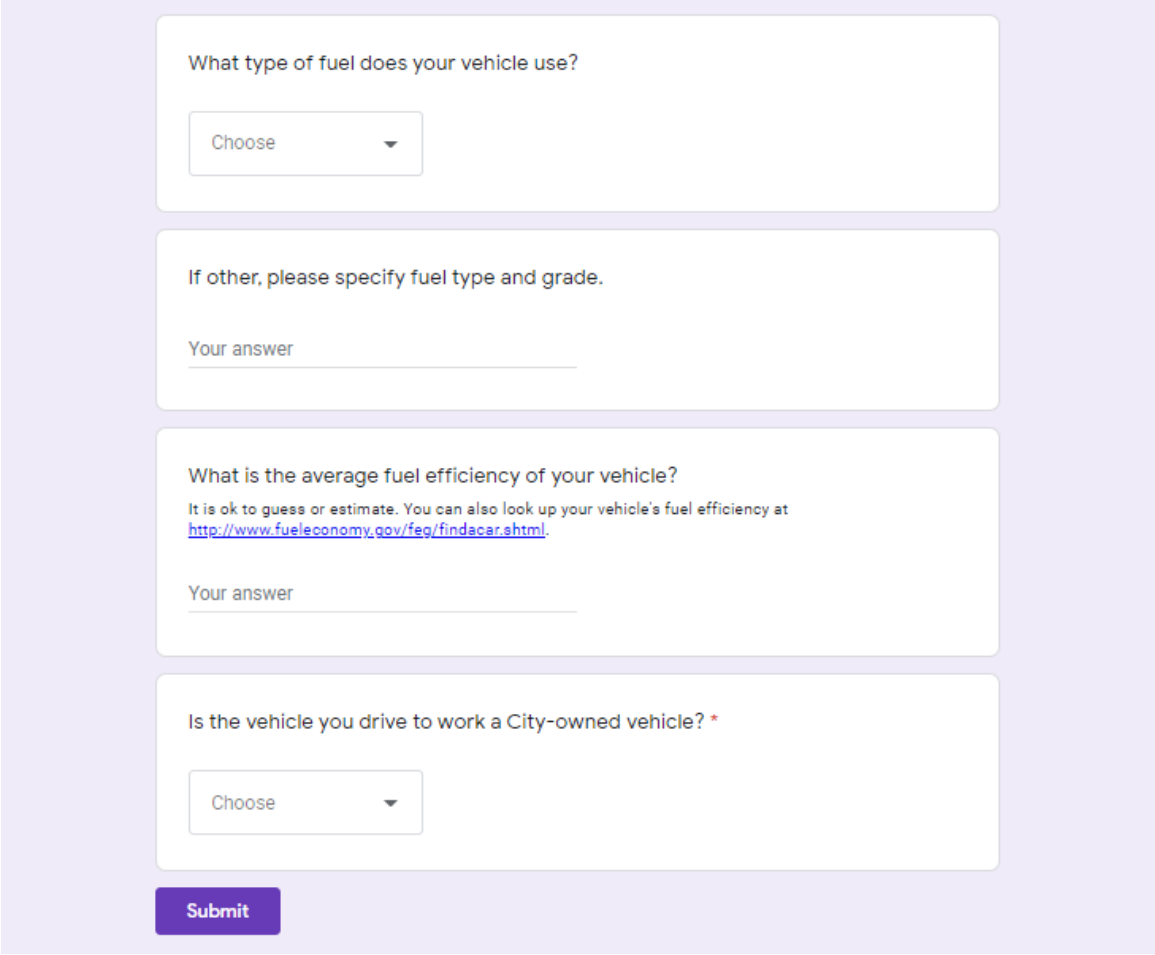


Table I-1. Employee Commute Activity Data

Fuel	Vehicle Type	2018 Vehicle Miles Traveled	%	Data Source
Number of Employees	N/A	40	N/A	City of Angels Camp
Gasoline	Passenger Cars	254,250	49.73	City of Angels Camp, 2021 Employee Commute Surveys
	Light Trucks		50.27	
	Heavy Trucks		0	
Diesel	Passenger Cars	49,271	10.23	
	Light Trucks		89.77	
	Heavy Trucks		0	
Total	**All Types**	**303,521**	**N/A**	

Table I-2: Employee Commute GHG Calculation Methods & Emissions Factors

Activity / Source	Method	CO_2 kg / gallon	CH_4 grams / mile	N_2O grams / mile	Emissions Factor Source
Passenger Vehicles - Gasoline	7.1.1.1 and 7.1.3.3	8.78	0.0186	0.0093	LGOP Appendix G - Table G.11 (CO_2) and U.S. National Transportation Defaults (CH_4 and N_2O)
Light Trucks - Gasoline		8.78	0.0201	0.0167	
Heavy Trucks - Gasoline		8.78	0.086	0.0664	
Passenger Vehicles - Diesel		10.21	0.0005	0.001	
Light Trucks - Diesel		10.21	0.001	0.0015	
Heavy Trucks - Diesel		10.21	0.0051	0.0048	

Methods

Employee commute emissions were calculated using employee surveys conducted in 2021 to use as a proxy for the year 2018. There were 40 respondents out of the 40 total employees. The survey collected information regarding travel distances, modes, and frequency. Business travel is not delineated in the surveys, but emissions from business travel in City vehicles is captured in the Vehicle Fleet sector. The VMT activity data, shown in **Table I-1**, was then entered into ClearPath, where GHG emissions were calculated using the methods and emissions factors shown in **Table I-2**. The fuel efficiencies were used to convert VMT to fuel use for the emissions calculations.

Appendix J. Solid Waste Sector Notes

Table J-1. Government Operations Solid Waste Activity Data

Landfill Name	2018 Wet Tons	Density (lbs / Cubic Yard)	Data Source
Forward Landfill	22	194.5	City of Angels Camp
Rock Creek Landfill	51.34	194.5	
Total Government Operations Waste	**73.34**		

Table J-2. Solid Waste Calculation Methods & Emissions Factors

Activity / Source	Method	Type	Emissions Factor	Emissions Factor Source
Transportation of Solid Waste	SW.6	Solid Waste Transportation	0.00014 Metric Tons CO_2e / wet short ton / mile	USCP Appendix E

Activity / Source	Method	Type	%	Metric Tons CH_4 / Wet Short Ton	Percentages and Emissions Factor Source
Government Operations Solid Waste Characterization	12.2.2	Newspaper	2.59	0.043	CalRecycle Calaveras County Public Administration 2018 Waste Characterization Study
		Office Paper	27.80	0.203	
		Corrugated Cardboard	4.70	0.120	
		Magazines / Third Class Mail	5.47	0.049	
		Food Scraps	14.60	0.078	
		Grass	1.35	0.038	
		Leaves	1.35	0.013	LGOP Chapter 12
		Branches	0.04	0.062	
		Dimensional Lumber	14.12	0.062	USCP Appendix E
		All Other (Non-Organic)	27.98	0	

Methods

The City facility-generated solid waste data was collected from City staff in the form of cubic yards. The tonnage of solid waste, shown in **Table J-1**, was calculated using a density of 89 lbs per cubic yard, provided by the California Integrated Waste Management Board (CalRecycle) specifically tailored to public administration waste, and 300 lbs per cubic yard for community-generated waste. The average of these two values was used (194.5 lbs per cubic yard), as some of the waste was generated from community facilities where the City pays for the solid waste disposal. The solid waste was transferred to managed landfills for disposal, which have landfill-gas capture systems in place. The emissions associated with this waste occur at the landfill sites over the entire period of decomposition (estimated to be about 100 years).

The solid waste tonnage activity data was entered into ClearPath, where GHG emissions were calculated using CalRecycle's public administration and City-wide percentages, coupled with standard emissions factors adopted by the California Air Resources Board, the California Climate Action Registry, ICLEI - Local Governments for Sustainability and The Climate Registry and shown in **Table J-2**.

Appendix K. City Operations Potable Water Electricity Use

Table K-1. City Operations Potable Water Electricity Use Activity Data

Year	Service	Electricity Use (kWh)	Potable Water Provided (Gallons)	Energy Intensity (kWh / Million Gallons)	Population Served	Data Source
2020	CPPA	197,600	321,800,000	614.05	3,875	USCP, City of Angels Camp

Table K-2. City Operations Potable Water GHG Calculation Methods & Emissions Factors

Activity / Source	Method	CO_2 lbs/MWh	CH_4 lbs/GWh	N_2O lbs/GWh	Emissions Factor Source
2018 Electricity - CPPA	BE.2.2	40.79	0	0	2018 CPPA (Hydroelectric Project), International Hydropower Association

Methods

City Operations Potable Water Electricity Use

The City's potable water use activity data is shown in **Table K-1**. Data was collected from the City of Angels Camp. Even though the treatment plant is located outside of City limits, it is included in this analysis because it is owned and operated by the City. The electricity use was entered into ClearPath, where the GHG emissions were calculated using relevant emissions factors for electricity shown in **Table K-2**.

Appendix L. City Operations Wastewater Treatment Sector Notes

Table L-1. City Operations Wastewater (WW) Electricity Use Activity Data

Year	Service	Electricity Use (kWh)	Water Treated (Gallons)	Energy Intensity (kWh / Million Gallons)	Population Served	Data Source
2020	CPPA	1,400,000	168,000,000	8,333	3,875	USCP, City of Angels Camp

Table L-2. Energy Use GHG Calculation Methods & Emissions Factors

Activity / Source	Method	CO_2 lbs/MWh	CH_4 lbs/GWh	N_2O lbs/GWh	Emissions Factor Source
2018 Electricity – CPPA	BE.2.2	40.79	0	0	2018 CPPA (Hydroelectric Project), International Hydropower Association

Activity / Source	Method	CO_2	CH_4	N_2O	Emissions Factor Source
Central Plants - with Nitrification / Denitrification (Population-Based)	WW.7	N/A	N/A	7 g N_2O / person / year	USCP Appendix F
Central Plants - without Nitrification / Denitrification (Population-Based)	WW.8	N/A	N/A	3.2 g N_2O / person / year	USCP Appendix F
Effluent (Population-Based)	WW.12	N/A	N/A	0.005 kg N_2O-N/kg sewage-N discharged	USCP Appendix F
Lagoons - No Primary Treatment (Population-Based)	WW.6	N/A	0.6 kg CH_4 / kg BOD_5	N/A	USCP Appendix F
Septic Systems (Population-Based)	WW.11	N/A	0.6 kg CH_4 / kg BOD_5	N/A	USCP Appendix F

Table L-3. City Operations Wastewater Treatment Facility Data

2018 Facility	Wastewater Treated (MG)	Population Served	Commercial / Industrial Factor	Nitrification / Denitrification?	Aerobic?	Data Source
City of Angels Camp	168	3,875	1	Yes	Yes	City of Angels Camp

Methods

Wastewater Treatment Energy Use

Wastewater treatment activity data for 2018 is shown in **Table L-1**. Data on electricity use and water volumes were collected from City staff. Transmission and distribution losses were calculated by applying the EPA eGRID regional grid loss factors to the total electricity use and then entered into ClearPath, where the GHG emissions were calculated using the EPA eGRID Western CAMX sub-region grid average emissions factors. This data was marked as "information only" to prevent double counting.

Wastewater Treatment Facility Process and Fugitive Emissions

City wastewater treatment is operated by one central treatment facility. Operational parameters of the wastewater treatment systems are delineated in **Table L-3**. The plant is aerobic with nitrification / denitrification nutrient-removal systems. The wastewater treatment activity data were entered into ClearPath, where GHG emissions were calculated using the standard methods and emissions factors from the United States Community Protocol (USCP) and Local Government Operations Protocol (LGOP) that are shown in **Table L-2**.

Forecast Data & Growth Rate Appendices

Appendix M. Forecast

Methods

BAU projections are intended to demonstrate the expected growth in GHG emissions if no reduction measures are taken. The BAU forecast is beneficial in that it allows for comparison between forecasted and actual observed emissions to determine what emissions reduction progress has been made to date, as well as to assess whether or not

future reduction goals could be met by the reduction efforts made to date. BAU forecast estimates future community-wide GHG emissions in the years 2030, 2035, and 2045. A BAU forecast is based on two inputs — current emissions data and growth rates. Baseline emissions data came from the 2018 inventory. Growth rates were calculated based on projected growth of relevant indicator variables.

An adjusted scenario forecast, or adjusted BAU (ABAU), accounts for legislative adjustments and projected emissions reductions resulting from legislative action. This includes future updates to statewide vehicle fleet standards and renewable portfolio standards. ABAU forecasts are developed using two inputs — current emissions data and either BAU projections or adjusted rates of growth or decay.

Calculating the emissions forecast is achieved by isolating an indicator variable for the various sectors and sub-sectors that were evaluated in the inventory and then assess how that indicator variable is projected to increase or decrease into the future and apply that rate of change to the emissions from that sector or sub-sector.

For example, agricultural emissions forecasts are based on projecting forward current trends in agricultural activities. This includes the number of livestock and crop production acreage as provided in recent Calaveras County Agriculture Production Reports. The previous ten years of reported data were used to develop growth factors for the emissions forecast. A slight growth in acres of farmland was shown and a growth rate was calculated. Additionally, livestock numbers show no evidence of trend over the 10 year period between 2010 and 2019. Accordingly, livestock population was assumed to remain constant through the emissions forecast period. The forecast was developed out to 2045 using a number of indicator variables for different sectors and subsectors to arrive at our BAU forecast. This process was applied to each sector and sub-sector.

For the City forecasts, two different scenarios were included for both BAU and ABAU forecasts in order to paint a more holistic picture of what might happen in the County in the future. For both BAU and ABAU forecasts, there are two different scenarios: a growth scenario that is aligned with the 2019 Calaveras County General Plan (General Plan)[38], using 2018 California Department of Finance (DOF) data[39], and a declining growth scenario that uses current 2021 DOF population projections (as of this report, pulled in June 2021). The 2018 projection data with a population growth resulted in increasing emissions for BAU forecast and decreasing emissions for the ABAU forecast. The 2021 projection data with a

[38] Calaveras County General Plan. (2019). Calaveras County.
[39] Projections. (2021). California Department of Finance.

population decline resulted in decreasing emissions for BAU forecast and decreasing emissions for the ABAU forecast.

Sierra Business Council (SBC) also investigated the Regional Housing Needs Allocation[40], through California's Department of Housing and Community Development (HCD). HCD is based off of DOF population projection data, where the values from the 2018 Housing Element were most likely pulled from 2017 DOF population projection data and HCD applied an adjusted DOF population value. SBC also discovered and resolved discrepancies among DOF projections across different data sets, resulting in the DOF instructing us to use P2A population projections.

The project clients (CCOG and Calaveras County) and the consultants determined using the 2018 DOF population projection data may likely yield the most representative forecast scenario. It is the closest data set that aligns to the General Plan.

The rate of change for the Calaveras County VMT projections was applied to the on-road transportation sector. We did not use DOF household data for any of the sectors in the forecast scenarios. As the household projection rate is similar to the population projection rate, we felt comfortable applying the population projection rate in lieu of the household projection rate. The sources for all of the growth rate indicators are located in **Tables N-1** and **N-2**.

Table M-1. Greenhouse Gas Emissions Forecast Data for Business-as-Usual Forecast (2021 California Department of Finance Population Projections)

Year	Residential Energy	Non-Residential Energy	Transportation	Solid Waste	Water and Wastewater	Total Emissions
2018	4,459	1,207	18,437	1,037	52.78	25,193
2019	4,442	1,214	18,523	1,033	52.58	25,265
2020	4,431	1,221	18,611	1,030	52.44	25,346
2021	4,417	1,228	18,699	1,027	52.28	25,423
2022	4,417	1,235	18,790	1,027	52.28	25,521
2023	4,424	1,242	18,883	1,029	52.37	25,630
2024	4,434	1,249	18,976	1,031	52.49	25,744
2025	4,446	1,256	19,071	1,034	52.63	25,860
2026	4,457	1,263	19,165	1,037	52.76	25,974

[40] Calaveras Final Regional Housing Need Determination. (2018). California Department of Housing and Community Development.

2027	4,470	1,270	19,259	1,040	52.90	26,091
2028	4,484	1,277	19,354	1,043	53.08	26,211
2029	4,490	1,284	19,446	1,044	53.14	26,318
2030	4,494	1,291	19,539	1,045	53.19	26,422
2031	4,505	1,298	19,633	1,048	53.32	26,537
2032	4,510	1,305	19,725	1,049	53.39	26,643
2033	4,512	1,312	19,817	1,049	53.41	26,744
2034	4,513	1,319	19,908	1,050	53.41	26,842
2035	4,511	1,326	19,998	1,049	53.39	26,938
2036	4,512	1,333	20,090	1,049	53.41	27,038
2037	4,508	1,340	20,180	1,048	53.35	27,129
2038	4,503	1,347	20,270	1,047	53.30	27,220
2039	4,492	1,354	20,358	1,045	53.16	27,301
2040	4,488	1,361	20,448	1,044	53.12	27,394
2041	4,473	1,368	20,535	1,040	52.94	27,469
2042	4,465	1,375	20,624	1,038	52.85	27,555
2043	4,454	1,382	20,712	1,036	52.72	27,636
2044	4,448	1,389	20,801	1,034	52.64	27,725
2045	4,439	1,396	20,890	1,032	52.54	27,809

Table M-2. Greenhouse Gas Emissions Forecast Data for Business-as-Usual Forecast (2018 California Department of Finance Population Projections)

Year	Residential Energy	Non-Residential Energy	Transportation	Solid Waste	Water and Wastewater	Total Emissions
2018	4,459	1,207	18,437	1,037	52.78	25,193
2019	4,471	1,214	18,531	1,040	52.92	25,308
2020	4,485	1,221	18,626	1,043	53.09	25,428
2021	4,502	1,228	18,721	1,047	53.29	25,552
2022	4,521	1,235	18,817	1,051	53.51	25,678
2023	4,540	1,242	18,914	1,056	53.74	25,806
2024	4,562	1,249	19,011	1,061	54.00	25,936
2025	4,583	1,256	19,107	1,066	54.25	26,067

2026	4,604	1,263	19,204	1,071	54.49	26,196
2027	4,624	1,270	19,301	1,076	54.74	26,325
2028	4,645	1,277	19,397	1,080	54.98	26,455
2029	4,664	1,284	19,493	1,085	55.20	26,581
2030	4,681	1,291	19,589	1,089	55.41	26,706
2031	4,698	1,298	19,685	1,093	55.61	26,830
2032	4,714	1,305	19,780	1,096	55.80	26,951
2033	4,729	1,312	19,875	1,100	55.97	27,071
2034	4,742	1,319	19,970	1,103	56.12	27,189
2035	4,753	1,326	20,064	1,106	56.26	27,305
2036	4,762	1,333	20,157	1,108	56.36	27,416
2037	4,771	1,340	20,251	1,110	56.47	27,528
2038	4,779	1,347	20,344	1,111	56.56	27,638
2039	4,786	1,354	20,437	1,113	56.65	27,747
2040	4,792	1,361	20,530	1,115	56.73	27,855
2041	4,798	1,368	20,622	1,116	56.80	27,962
2042	4,803	1,375	20,714	1,117	56.85	28,066
2043	4,807	1,382	20,807	1,118	56.90	28,170
2044	4,811	1,389	20,899	1,119	56.94	28,274
2045	4,815	1,396	20,991	1,120	56.99	28,378

Table M-3. Greenhouse Gas Emissions Forecast Data for Adjusted Business-as-Usual Forecast (2021 California Department of Finance Population Projections)

Year	Residential Energy	Non-Residential Energy	Transportation	Solid Waste	Water and Wastewater	Total Emissions
2018	4,460	1,207	18,436	1,037	52.78	25,193
2019	4,348	1,125	18,182	1,033	52.58	24,741
2020	4,240	1,043	17,928	1,030	52.44	24,294
2021	4,130	961	17,674	1,027	52.28	23,845
2022	4,030	879	17,420	1,027	52.28	23,408
2023	3,934	797	17,165	1,029	52.37	22,978
2024	3,841	715	16,911	1,031	52.49	22,551

2025	3,749	633	16,657	1,034	52.63	22,126
2026	3,728	611	16,403	1,037	52.76	21,831
2027	3,708	588	16,149	1,040	52.90	21,537
2028	3,690	565	15,894	1,043	53.08	21,246
2029	3,666	542	15,640	1,044	53.14	20,946
2030	3,641	520	15,386	1,045	53.19	20,645
2031	3,611	489	15,179	1,048	53.32	20,380
2032	3,577	459	14,972	1,049	53.39	20,111
2033	3,541	428	14,765	1,049	53.41	19,838
2034	3,504	398	14,559	1,050	53.41	19,563
2035	3,465	368	14,352	1,049	53.39	19,287
2036	3,428	337	14,276	1,049	53.41	19,144
2037	3,388	307	14,200	1,048	53.35	18,997
2038	3,347	276	14,125	1,047	53.30	18,849
2039	3,302	246	14,049	1,045	53.16	18,695
2040	3,262	216	13,973	1,044	53.12	18,548
2041	3,214	185	13,897	1,040	52.94	18,390
2042	3,171	155	13,821	1,038	52.85	18,239
2043	3,126	124	13,746	1,036	52.72	18,085
2044	3,084	94	13,670	1,034	52.64	17,935
2045	3,041	64	13,594	1,032	52.54	17,784

Table M-4. Greenhouse Gas Emissions Forecast Data for Adjusted Business-as-Usual Forecast (2018 California Department of Finance Population Projections)

Year	Residential Energy	Non-Residential Energy	Transportation	Solid Waste	Water and Wastewater	Total Emissions
2018	4,460	1,207	18,436	1,037	52.78	25,193
2019	4,367	1,125	18,182	1,040	52.92	24,767
2020	4,277	1,043	17,928	1,043	53.09	24,344
2021	4,188	961	17,674	1,047	53.29	23,924
2022	4,101	879	17,420	1,051	53.51	23,504
2023	4,014	797	17,165	1,056	53.74	23,086

2024	3,928	715	16,911	1,061	54.00	22,669
2025	3,842	633	16,657	1,066	54.25	22,253
2026	3,828	611	16,403	1,071	54.49	21,967
2027	3,814	588	16,149	1,076	54.74	21,681
2028	3,801	565	15,894	1,080	54.98	21,395
2029	3,785	542	15,640	1,085	55.20	21,107
2030	3,769	520	15,386	1,089	55.41	20,819
2031	3,743	489	15,179	1,093	55.61	20,560
2032	3,717	459	14,972	1,096	55.80	20,300
2033	3,689	428	14,765	1,100	55.97	20,039
2034	3,661	398	14,559	1,103	56.12	19,776
2035	3,631	368	14,352	1,106	56.26	19,513
2036	3,599	337	14,276	1,108	56.36	19,377
2037	3,568	307	14,200	1,110	56.47	19,241
2038	3,536	276	14,125	1,111	56.56	19,105
2039	3,504	246	14,049	1,113	56.65	18,968
2040	3,471	216	13,973	1,115	56.73	18,831
2041	3,437	185	13,897	1,116	56.80	18,693
2042	3,403	155	13,821	1,117	56.85	18,553
2043	3,368	124	13,746	1,118	56.90	18,413
2044	3,333	94	13,670	1,119	56.94	18,273
2045	3,299	64	13,594	1,120	56.99	18,133

Appendix N. Growth Rates

Table N-1. Growth Rate Indicators & Sources for Business-as-Usual Forecast

Sector	Indicator	Source
Residential Energy	Population (2018 & 2021 Projections)	California Department of Finance
Non-Residential Energy	Employment	California Employment Development Department
On-Road Transportation	VMT Projections	Calaveras Council of Governments

Off-Road Transportation	Population (2018 & 2021 Projections)	U.S. Census Bureau, American Community Survey
Solid Waste	Population (2018 & 2021 Projections)	California Department of Finance
Water and Wastewater	Population (2018 & 2021 Projections)	California Department of Finance

Table N-2. Growth Rate Indicators & Sources for Adjusted Business-as-Usual Forecast

Sector	Indicator	Source
Residential Energy	Electricity - Renewable Portfolio Standard Other Fuels - Population (2018 & 2021 Projections)	SB 100 California Department of Finance
Non-Residential Energy	Electricity - Renewable Portfolio Standard Other Fuels - Employment	SB 100 California Department of Finance
On-Road Transportation	Emissions Rates (EMFAC 2021)	California Air Resources Board
Off-Road Transportation	Emissions Rates (OFFROAD 2017)	California Air Resources Board
Solid Waste	Population (2018 & 2021 Projections)	California Department of Finance
Water and Wastewater	Population (2018 & 2021 Projections)	California Department of Finance

Table N-3. Population, Employment, and VMT Projections (County Data*)

Year	Population (DOF, 2018)	Population (DOF, 2021)	Employment (CEDD)	VMT Projections (CCOG)
2018	44,692	44,572	57,414	316,278,459
2019	44,808	44,403		
2020	44,953	44,286		
2021	45,126	44,153		
2022	45,308	44,150		
2023	45,507	44,222		
2024	45,721	44,325		
2025	45,934	44,443		
2026	46,142	44,551		
2027	46,349	44,677		
2028	46,557	44,824	60,982	
2029	46,741	44,877		

2030	46,920	44,919	
2031	47,091	45,031	
2032	47,246	45,085	
2033	47,393	45,102	
2034	47,523	45,106	
2035	47,642	45,087	608,147,022
2036	47,725	45,100	
2037	47,816	45,057	
2038	47,896	45,011	
2039	47,969	44,896	
2040	48,033	44,860	
2041	48,093	44,711	
2042	48,135	44,628	
2043	48,177	44,520	
2044	48,215	44,456	
2045	48,256	44,368	

**The above data represents the Calaveras County projections. There was no data available for the City of Angels Camp specifically, so the above data was used to represent the rate of change for the City through 2045.*

Appendix O. Wildfire-related Greenhouse Gas Emissions from Natural Lands Carbon Stock Loss and Climate Change Vulnerability Assessment

Attached as a separate document.

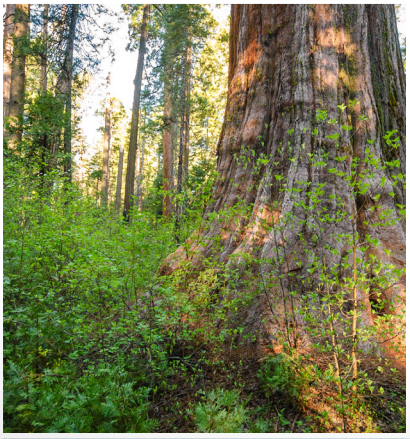
Calaveras County

Greenhouse Gas Emissions Reduction Plan

Wildfire-related Greenhouse Gas Emissions from Natural Lands Carbon Stock Loss and Climate Change Vulnerability Assessment











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1 Introduction

California has experienced record-breaking wildfires in recent years, with 2020 setting the all-time record for acres burned of over 4 million acres in the State, more than double the previous state record set in 2018.[1] This significant increase in the severity and extent of wildfires, highlights the importance of understanding the full extent of these impacts in order to guide policy development. In 2018 pursuant to Executive Order (EO) B-52-18, the State established the California Fuel Management Task Force , which was in charge of developing a holistic integrated approach toward forest management. In January 2021, this effort culminated in the development and adoption of California's Wildfire and Forest Resilience Action Plan, which integrates key findings and recommendations from various plans, studies, and assessments into a single coordinated and comprehensive strategy for forest management and wildfire resilience.[2] In parallel with this effort, the California Air Resources Board (CARB) has developed methodology regarding quantification of the carbon cycle and greenhouse gas (GHG) emission impacts of wildfire and forest management strategies in order to better understand wildfire implications in terms of the State's contribution to climate change.[3] This report intends to provide detail relative to these State level efforts in the context of Calaveras County, including the City of Angels Camp, by assessing the changes in carbon stocks from land use and fire related activities, the GHG emissions impact of wildfire in the County, and the wildfire-related climate change vulnerabilities, while presenting relevant best practices in wildfire impact reduction related to Calaveras County specific to climate change vulnerabilities.

A combination of a changing climate and hundreds of years of unnatural fire suppression has led to increases in fuels that contribute to catastrophic fires. Wildfires are not only an effect of a changing climate that influences drought and the disease that turns living vegetation into dry fuel, but they are also a major contributor to GHG emissions by converting natural land carbon stocks into atmospheric carbon.[4] This feedback cycle is a symptom of unhealthy forests and wildlands that result from fire suppression, insufficient investment in wildland fire risk management and misguided land use planning.[5] Regular wildfires are part of the natural cycle of forests, grasslands, and shrublands, in which old decaying vegetation is cleared out by low-intensity fires so that mature trees can continue to thrive and provide valuable habitat and ecosystem services. Such regular wildfires are typically lower-intensity, preserving the primary carbon stocks that are already in place, allowing for continued carbon sequestration associated with living vegetation and minimal release of these carbon stocks as GHG emissions during wildfires.[6] However, land use planning has included

[1] Roman et al. 2020. Greetings from the 2020 Wildfire Season. National Fire Protection Association Journal. Available: <https://www.nfpa.org/News-and-Research/Publications-and-media/NFPA-Journal/2020/November-December-2020/Features/Wildfire>. Accessed June 7, 2021.

[2] California Governor's Forest Management Task Force (CGFMTF). 2021. California Wildfire & Forest Resilience Action Plan. Available: <https://www.fire.ca.gov/media/ps4p2vck/californiawildfireandforestresilienceactionplan.pdf>. Accessed May 27, 2021.

[3] CARB. 2020. Public Comment Draft: Greenhouse Gas Emissions of Contemporary Wildfire, Prescribed Fire, and Forest Management Activities. Available: <https://ww3.arb.ca.gov/cc/inventory/pubs/ca_ghg_wildfire_forestmanagement.pdf>. Accessed June 7, 2021.

[4] California Natural Resources Agency (CNRA). 2018. California Forest Carbon Plan: Managing Our Forest Landscapes in a Changing Climate. Available: <https://resources.ca.gov/CNRALegacyFiles/wp-content/uploads/2018/05/Forest-Carbon-Plan-One-Pager-May-2018.pdf>. Accessed June 7, 2021.

[5] Bustic, et. al. 2015. Land Use and Wildfire: A Review of Local Interactions and Teleconnections. Land volume 4. Available: <https://www.researchgate.net/publication/272790284_Land_Use_and_Wildfire_A_Review_of_Local_Interactions_and_Teleconnections>. Accessed June 7, 2021.

[6] CGFMTF. 2021. California Wildfire & Forest Resilience Action Plan. Available: <https://www.fire.ca.gov/media/ps4p2vck/californiawildfireandforestresilienceactionplan.pdf>. Accessed May 27, 2021.

development in areas that would naturally have recurring fires, leading to an increased population in the wildland urban interface (WUI), and an increased need to suppress fire in these areas.[7] Now California faces the challenge of managing natural lands and land use patterns to reduce potential for high-intensity fires that generate GHG emissions and put lives and properties at risk.

This report evaluates these challenges specific to Calaveras County, demonstrating how wildfires can impact the carbon cycle and GHG emissions, as well as how the WUI can both be put at risk by wildfires and increase opportunity for wildfire ignition. To understand the potential GHG emissions impact related to wildfire in Calaveras County a Natural and Working Lands (NWL) Carbon Inventory for the years 2010 and 2020 was developed, which demonstrates the total carbon storage in vegetation and soils. This analysis calculates the current available carbon storage (sequestration) in the County, how carbon storage has changed over time, and highlight regions and landcover where carbon storage value is high. Additionally, a case study has been developed for the 2015 Butte Fire to analyze both the local risks for wildfire and the potential magnitude of GHG emissions and carbon storage loss from a single wildfire event. The GHG emission analysis also includes an assessment of how forest management practices, such as thinning and prescribed burns, can significantly reduce wildfire GHG emissions and preserve long term carbon stocks that may be destroyed by high-intensity fires caused by overgrown forests.

Wildfires also present a significant threat to communities, assets, and resources (i.e., people, homes, businesses, public infrastructure/services, and the natural surroundings) in the County, which are expected to be exacerbated by the effects of climate change. This is addressed in the Wildfire Vulnerability Assessment included in this report, which was developed based on the most recent guidance from the California Governor's Office of Planning and Research (OPR). The assessment includes discussion of the County's vulnerabilities to wildfire specifically focused on the impacts associated with the WUI and the increased risk associated with higher temperatures and sever weather events resulting from climate change. This information is presented to inform decision makers and help implement action under the Greenhouse Gas Reduction Strategy.

A concerted effort will be required to mitigate the risks associated with wildfire, which is further exacerbated by climate change. This report intends to provide a basis for understanding the wildfire interactions with the carbon cycle and WUI, and to provide meaningful information that can be used to help secure grant funding for natural land management and climate change and resilience. The State has greatly increased the availability of funding for climate change, forest management and wildfire resilience projects, with an emphasis on GHG reduction, improved forest health, home hardening against fires, improvements in defensible space, and fire prevention workforce training. A portion of this funding will be obtained through the California Greenhouse Gas Reduction Fund, with grants available through the California Climate Investments Program.[8] The Climate Investment Program is intended to fund GHG reduction projects, therefore the connection between wildfire and GHG emissions in this report may improve the ability of the County to pursue funding. Projects that are initiated by the County would provide the dual benefit of both reducing the County's contribution to climate change through wildfire related GHG emissions reduction and increasing resilience to climate change through improved forest health.

[7] Bustic, et. al. 2015. Land Use and Wildfire: A Review of Local Interactions and Teleconnections. Land volume 4. Available: <https://www.researchgate.net/publication/272790284_Land_Use_and_Wildfire_A_Review_of_Local_Interactions_and_Teleconnections>. Accessed June 7, 2021.

[8] California Office of Governor Gavin Newsom. 2021. Governor Newsom, Legislative Leaders Announce Early Budget Action for Wildfire Prevention. Available: <https://www.gov.ca.gov/2021/04/08/governor-newsom-legislative-leaders-announce-early-budget-action-for-wildfire-prevention/>. Accessed June 7, 2021.

2 Natural and Working Lands Carbon Inventories (2010 and 2020)

This section explains the inventory methodology used to quantify the major natural and working lands GHG emissions sinks and sources for Calaveras County (County). The 2010 and 2020 NWL carbon inventories were developed based on the methodology outlined in Resilient Merced, California's 2017 Climate Change Scoping Plan, and the State's Natural and Working Lands Inventory.[9,10,11] The inventory of carbon stocks for natural and working lands (NWL carbon inventory) in Calaveras County covers the County's 662,838 acres.[12] Calaveras County includes large areas of natural and working lands and a diversity of land-cover types ranging from developed land to mixed forest. The development of NWL carbon inventories allows jurisdictions to evaluate land management activities that are designed to increase or protect carbon stocks and/or reduce GHG emissions. A NWL carbon inventory also plays an important role in prioritizing policy initiatives aimed at reducing GHG emissions or increasing carbon sequestration and can be a tool to examine how natural and human influences have impacted carbon storage in the past and monitor the progress of policy initiatives over time.

NWL carbon inventory (i.e., stock) is the total amount of carbon sequestered in woody and herbaceous material and in the soil (i.e., the biosphere). Some land management and natural activities can increase carbon stocks, for example through riparian restoration, while others can contribute to the emission of carbon dioxide (CO_2) into the atmosphere, such as wildfire. Live vegetation also provides continued sequestration of carbon via respiration while landcover consumed by wildfire would lose that sequestration ability for an extended period while the landcover recovered. The analyses below follow the Resilient Merced methodology and includes the development of land-based emissions. Land-based emissions exist in the form of methane and nitrous oxide, which are associated with wetlands and agricultural practices such as fertilizer application. However, these land-based emissions are not included in the 2010 and 2020 NWL carbon inventories due to the small contribution of wetlands in Calaveras County and because fertilizer emissions are already included in the County's 2018 Community GHG Emissions Inventory. Including these emissions in the NWL carbon inventories would result in double counting emissions.

The NWL carbon inventories estimate carbons stocks, by land-cover class (i.e., mixed forest, grassland, shrub, etc.) at two points in time (2010 and 2020), to determine historical changes in carbon stocks. This section includes the following:

- NWL Carbon Inventory Data Sources – a complete description of the data sources used to complete the carbon inventories
- NWL Carbon Inventory Methods and Findings

[9] California Department of Conservation. 2021. Terracount Materials. The Nature Conservancy, Tukman Geospatial, Climate Action Reserve, and Merced County. 2018. Resilient Merced. Available: <https://maps.conservation.ca.gov/TerraCount/downloads/>. Accessed May 26, 2021.

[10] CARB. 2017. California's 2017 Climate Change Scoping Plan. Available: <https://ww2.arb.ca.gov/sites/default/files/classic//cc/scopingplan/scoping_plan_2017.pdf>. Accessed May 26, 2021.

[11] CARB. 2018. An Inventory of Ecosystem Carbon in California's Natural and Working Lands. Available: <https://ww3.arb.ca.gov/cc/inventory/pubs/nwl_inventory.pdf>. Accessed May 26, 2021.

[12] Includes unincorporated County areas as well as the City of Angels Camp.

  - Land-cover Classification – methods and findings related to the land-cover classification process and derived carbon stock estimates for 2010 and 2020
  - Carbon Stock Estimates – methods and findings related to the calculation of carbon stock estimates for 2010 and 2020
- County NWL Carbon Inventory Summary – a summary of the results and utility of the NWL carbon inventories

2.1 NWL Carbon Inventories Data Sources

Jurisdictional NWL carbon inventories require the use of large-scale spatial data sets and carbon or biomass data. Geographic information system (GIS) is used to capture, store, manipulate, analyze, manage, and present spatial, or geographic, data across the county. The Calaveras NWL carbon inventories use publicly available data sources that are expected to be updated in the future. Table 1 includes the data sources used to complete the Calaveras 2010 and 2020 NWL carbon inventories.

Table 1 Data Sources Used

Land Type	Data	Publication Frequency	Year
Natural Lands (Forest, Shrubland, Grassland, etc.), and Cropland	LANDFIRE[1]	2 years	2010, 2020
Soil	National Cooperative Soil Survey (NCSS) Characterization Database, the National Soil Information System (NASIS), and the Rapid Carbon Assessment (RaCA) datasets[2]	Annual	2019

Sources:

[1] LANDFIRE. 2021. LANDFIRE: Existing Vegetation Cover, Height, and Type, United States Department of Agriculture and United States Department of the Interior. Available: <https://www.landfire.gov/>. Accessed May 26, 2021

[2] Nauman, et al. 2017. Soil Properties and Class 100m Grids United States. Available: <https://scholarsphere.psu.edu/resources/ea4b6c45-9eba-4b89-aba6-ff7246880fb1>. Accessed May 26, 2021.

LANDFIRE spatial land-cover data provides the foundation of the Calaveras NWL carbon inventories, similar to the Resilient Merced project completed for Merced County and the State's Natural and Working Lands Carbon Inventory developed for CARB.[13] The data sources used to develop the NWL carbon inventories are described below:

- The LANDFIRE data covers the county at a 30-meter resolution. The LANDFIRE layers used include Existing Vegetation Type, Cover, and Height.
- The soil data used includes three national United States soil point datasets: NCSS Characterization Database, the National Soil Information System (NASIS), and the Rapid Carbon Assessment (RaCA) datasets. These datasets include remote sensing images, predictions of soil properties (e.g., percent organic carbon, total nitrogen, bulk density, PH, etc.) and classes, conventional soil polygon maps from the Soil Survey Geographic database (SSURGO), and machine learning. Predictions were generated at 100-meter spatial resolution.

[13] California Department of Conservation. 2021.The Nature Conservancy, Tukman Geospatial, Climate Action Reserve, Merced County. 2018. Resilient Merced. Available: <https://maps.conservation.ca.gov/TerraCount/downloads/>. Accessed May 26, 2021.

2.2 NWL Carbon Inventories Methods and Findings

The Calaveras County NWL carbon inventory methodology is based on the Resilient Merced pilot project. The first step includes estimating carbon stocks by land-cover class (i.e., forest, grassland, shrub, etc.) using LANDFIRE. This step details changes in land-cover between the two years. The second step involves calculating carbon stored in different carbon pools (i.e., above- and below-ground live biomass, litter, soil, etc.) based on existing vegetation type, cover, and height. This step illustrates changes in carbon stock as a result of land-cover changes between 2010 and 2020. The sections below describe the methods and findings of the NWL carbon inventories for Calaveras County.

2.2.1 Land-cover Classification

The NWL carbon inventories are derived from the assignment of all land in the county to discrete land-cover classes, representing all land-use types in the County. The Existing Vegetation Type LANDFIRE dataset was used to determine the land-cover class. The land-cover classes assigned in the 2010 and 2020 NWL carbon inventories are:

- Barren
- Cultivated Crops
- Development
- Deciduous Forest
- Evergreen Forest
- Mixed Forest
- Grassland/Herbaceous
- Open Water
- Shrub/Scrub
- Wetland

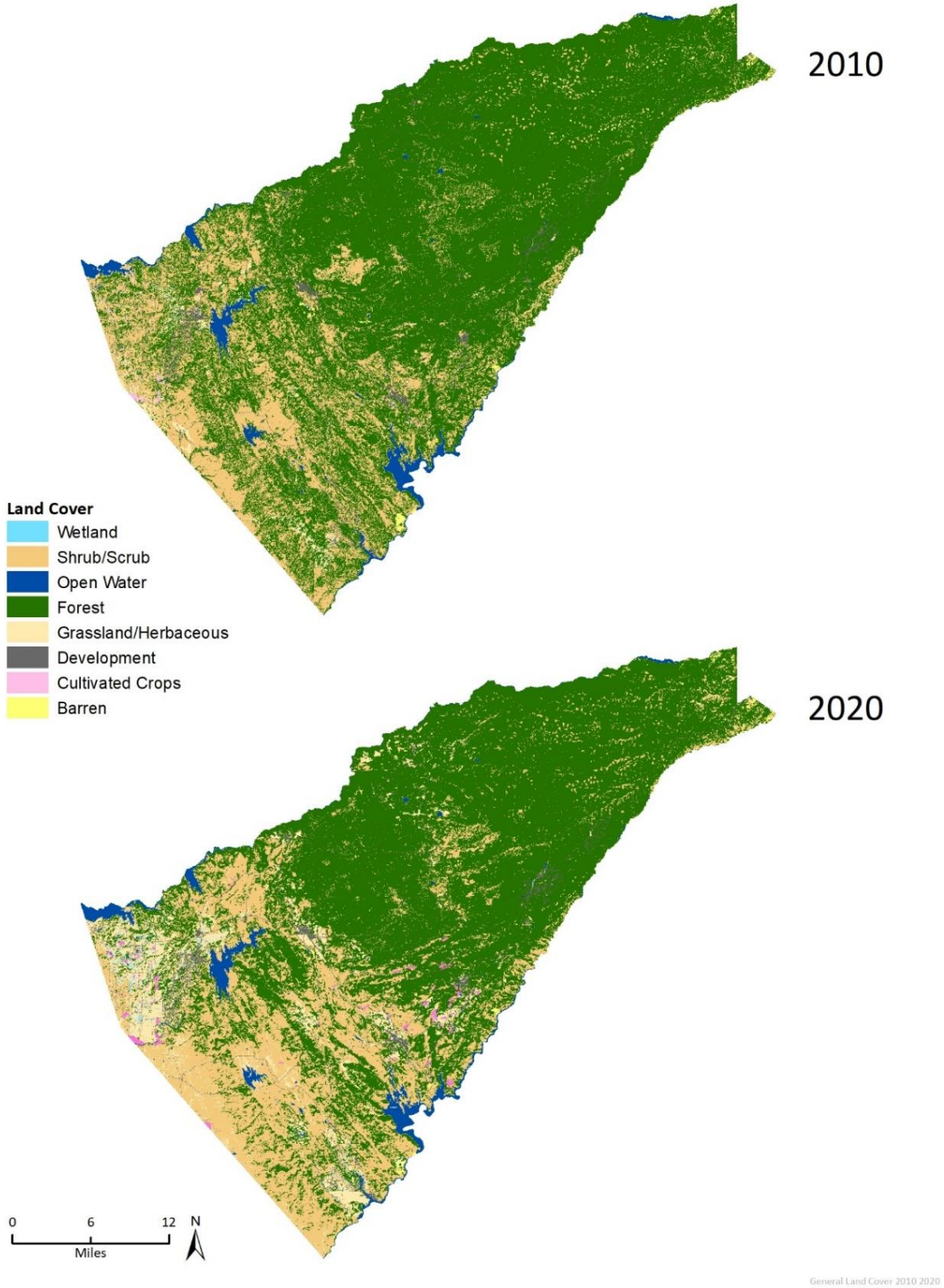
Examples of some of the land-cover classes common to Calaveras County are shown in Figure 1.

Figure 1 Land-cover Class Example Photos



Figure 2 and Table 2 detail the results of the land-cover classification in Calaveras for 2010 and 2020. The data between the two years show decreases in mixed forest and deciduous forest and an increase in evergreen forest. The loss in forested land is primarily being replaced by shrub/scrub and grassland/herbaceous landcover.

Figure 2 Calaveras County Land-cover Classes (2010 and 2020)



Source: LANDFIRE. 2021

Table 2 Calaveras County Land-cover Classes (2010 and 2020)

Land-cover Class	2010 Acres	2020 Acres	Percent Change
Barren	3,996	3,658	-8
Cultivated Crops	842	2,912	246
Deciduous Forest	43,748	37,636	-14
Development	11,717	12,259	5
Evergreen Forest	1,835	11,243	513
Grassland/Herbaceous	13,058	44,797	243
Mixed Forest	420,723	354,620	-16
Open Water	14,288	15,960	12
Shrub/Scrub	152,632	178,190	17
Wetland[1]	0	1,563	N/A
Total	**662,838**	**662,838**	**-**

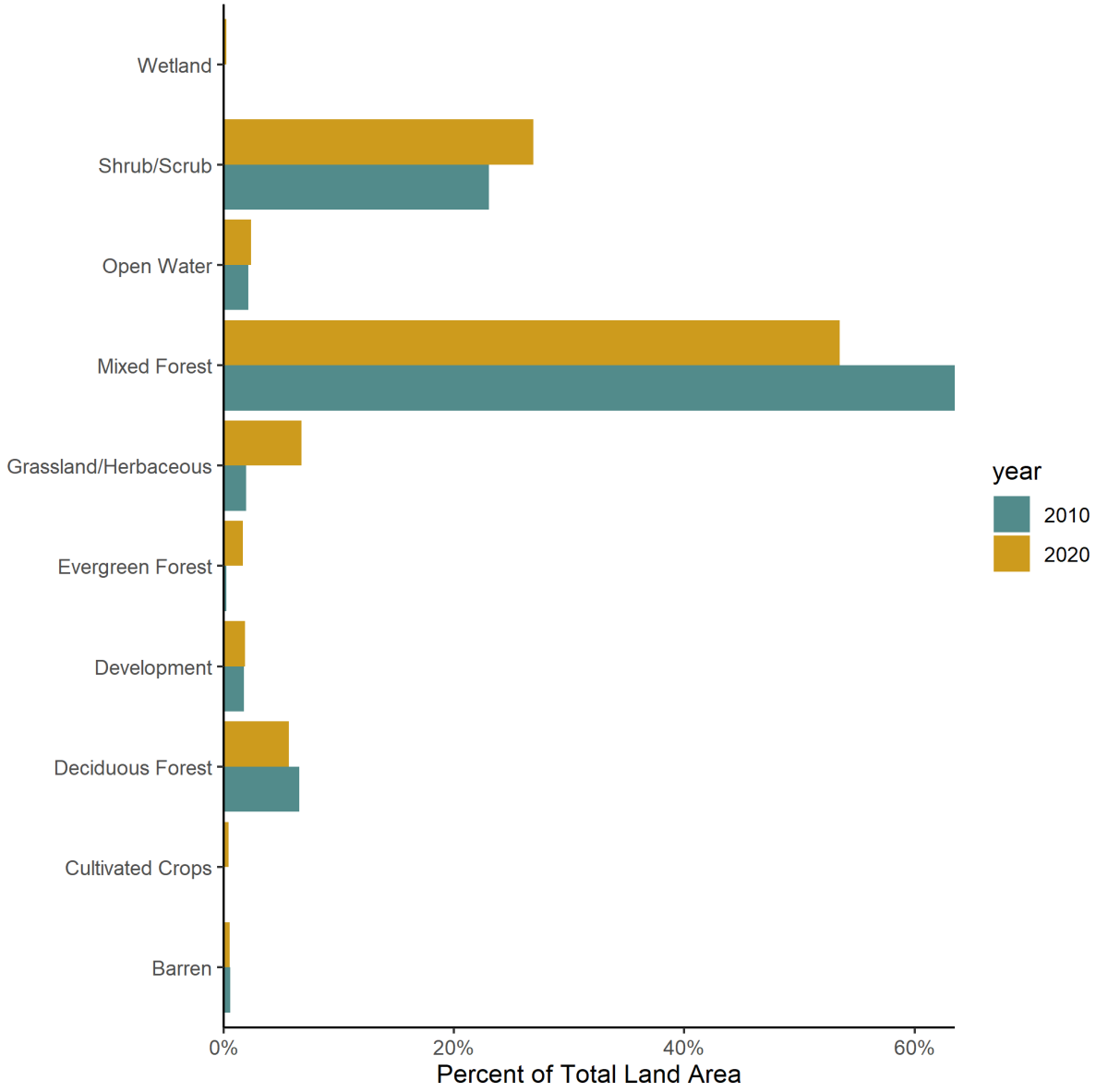
Notes:

[1] Though wetlands show a change from 0 to 1,563, this is likely due to inconsistencies in classification. For example, the same vegetation type could have been classified as grassland in one year and wetland the next year, without an actual change in land-cover.

Source: LANDFIRE. 2021

Table 2 above shows the number of acres in each land-cover class for 2010 and 2020 and the percent change between the two years. As previously described, mixed and deciduous forests decreased, and shrubland and grassland increased from 2010 to 2020. Other categories, such as evergreen forest, cultivated crops, and wetlands, show increases over time; however, these categories represent a very small portion of the total land area. These increases could be observed changes or may be attributed to a difference in classification between the two years, for example a forest classified by LANDFIRE as mixed forest 2010 could be classified as evergreen in 2020 with no actual change in landcover. Figure 3 illustrates the proportional land-cover changes between 2010 and 2020.

Figure 3 Calaveras County Proportional Land-cover by Vegetation Class (2010 and 2020)



Source: LANDFIRE. 2021

2.2.2 Carbon Stock Estimates

Carbon stock estimates are based on the sum of carbon stored in different carbon pools. This analysis includes carbon stored in the following carbon pools:

- above- and below-ground live biomass
- above- and below-ground dead standing trees
- lying dead wood (e.g., branches, logs, etc. lying on the ground surface)
- litter
- soil.

Carbon stored in all above- and below-ground biomass (including live, dead, and litter), was calculated using volumetric estimates of carbon mass (metric tons per hectare) provided by CARB. These estimates were provided for every combination of Existing Vegetation Type, Height, and Cover and assigned to each 30 by 30-meter cell in Calaveras.

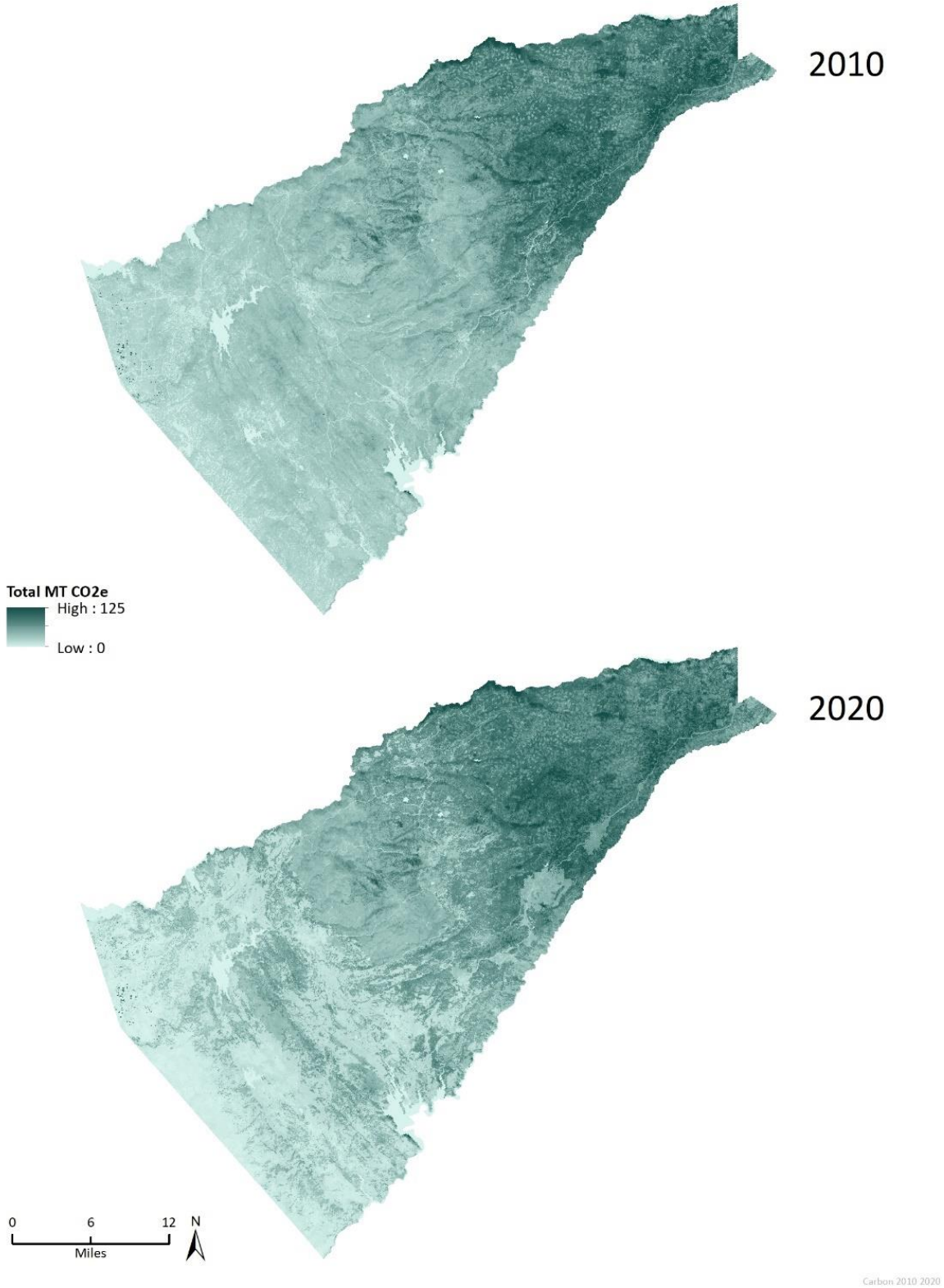
Soil carbon values were obtained using the combined NCSS Characterization Database, the National Soil Information System (NASIS), and the Rapid Carbon Assessment (RaCA) datasets described in the NWL Carbon Inventory Data Sources section of this report. The soil carbon inventory estimates were determined by using the values provided for soil organic carbon and soil bulk density at a depth of 0-30cm. Soil carbon was then estimated using Quantification Guidance for Forest Project Protocol Version 4.0[14] as shown in the following equation (the Conversion of Organic Matter to Carbon was skipped as the input data we had was already converted to Soil Organic Carbon):

Soil CO_2e	=	Organic Matter Value (Steps 2 or 4) **x** 0.58 (Conversion of Organic Matter to Carbon) **x** Bulk Density Value (Steps 3 or 5) **x** Soil Depth Sampled (30 cm) **x** 40,468,564.224 (Conversion of 1 cm^2 to 1 acre) **x** 10^{-6} (Conversion of 1 gram to 1 metric ton) **x** 3.67 (Conversion of Carbon to CO_2)

The NWL carbon inventories, which includes the sum of all above- and below-ground biomass and soil carbon for 2010 and 2020, are mapped in Figure 4 and provided in Table 3. The average carbon stock per acre for each vegetation class is provided in Table 4. All carbon stock values are presented in metric tons of carbon dioxide equivalent (MT CO_2e).

[14] Climate Action Reserve. 2017. Quantification Guidance for Use with Forest Carbon Projects. Available: <https://www.climateactionreserve.org/wp-content/uploads/2017/07/FPP_Quantification_Guidance_062817.pdf>. Accessed May 26, 2021.

Figure 4 Calaveras County Total Carbon Stock (2010 and 2020)



Sources: LANDFIRE. 2021; Nauman, et al, 2017; CARB. 2020. Volumetric estimates of carbon mass from Klaus I. Scott at the CARB Emission Inventory Analysis Section of the GHG & Toxics Emission Inventory Branch, AQPS Division. November 17, 2020.

Table 3 Calaveras County NWL Carbon Inventories (2010 and 2020)

Land-cover Class	2010 Total Carbon Stock (MT CO_2e)	2020 Total Carbon Stock (MT CO_2e)	Percent Change
Barren	304,138	283,840	-7
Cultivated Crops	47,803	161,695	238
Deciduous Forest	5,307,362	4,717,271	-11
Development	657,179	702,240	7
Evergreen Forest	265,045	1,181,379	346
Grassland/Herbaceous	746,009	2,190,346	194
Mixed Forest	57,446,504	53,696,781	-7
Open Water	137,051	231,711	69
Shrub/Scrub	11,828,226	11,115,216	-6
Wetland	10	71,293	745,417
Total	**76,739,325**	**74,351,771**	**-3**

Sources: LANDFIRE, 2021; CARB, 2020

Table 4 Calaveras County Average Carbon Stock per Acre (2010 and 2020)

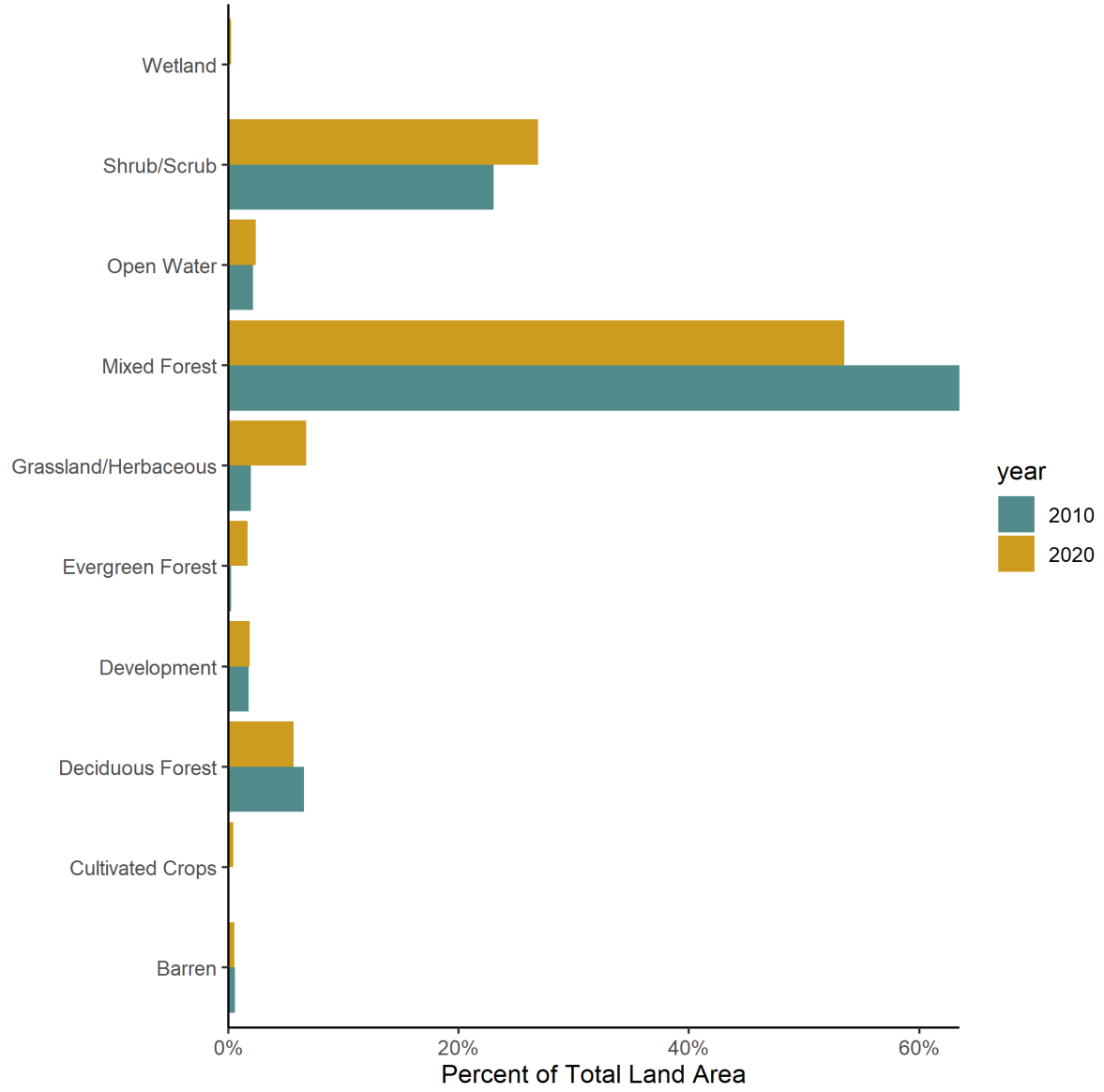
Land-cover Class	2010 Average Carbon Stock per Acre (MT CO_2e)	2020 Average Carbon Stock per Acre (MT CO_2e)
Barren	76	78
Cultivated Crops	57	56
Deciduous Forest	121	125
Development	56	57
Evergreen Forest	144	105
Grassland/Herbaceous	57	49
Mixed Forest	137	151
Open Water	10	15
Shrub/Scrub	77	62
Wetland	43	46

Sources: LANDFIRE, 2021; CARB, 2020

Table 3 includes the total carbon stock for 2010 and 2020 and the percent change between the two years. As described and illustrated in the Land-cover Classification section above, mixed and deciduous forest acreage decreased and shrubland and grassland cover increased. The mixed forest vegetation class encompassed approximately 63 percent of the total landcover area in 2010 and dropped to 54 percent in 2020. This vegetation class contains over 70 percent of the total carbon stocks in the County (75 percent in 2010 and 72 percent in 2020). Deciduous forests dropped from 7 percent to 6 percent from 2010 to 2020 in both landcover area and carbon stock. Shrubland is the second largest vegetation class in both landcover and carbon stock. From 2010 to 2020, shrubland increased from 23 percent to 27 percent and carbon stock hovered around approximately 15 percent, only increasing slightly in 2020 compared to 2010.

Categories, such as wetland, open water, and cultivated crops show large increases over time; however, such categories represent a very small portion of the total land areas. Although there was a slight decrease in carbon stocks in the County between 2010 and 2020, the magnitude of available carbon storage in the County is nearly 2,500 times the total GHG emissions generated by the County from transportation, enegy use and waste disposal. Figure 5 shows the proportional carbon stock changes between 2010 and 2020. The total carbon stock in the County decreased 3 percent from 2010 to 2020. Table 4 provides the average amount of carbon sequestered per acre in each of the vegetation classes. The forest categories hold the largest amount of carbon, ranging from 100 to 150 MT CO_2e per acre.

Figure 5 Calaveras County Proportional Carbon Stock by Vegetation Class (2010 and 2020)



Sources: LANDFIRE, 2021; CARB, 2020

2.3 County NWL Carbon Inventory Summary

The NWL carbon inventory provides a quantitative estimate of historical and existing carbon stored in the County as well as estimates of carbon stock, carbon stock changes, and resulting GHG flux in the landscape. These carbon stock changes result from disturbances, including conversion of natural lands to development and wildfire, among others. NWL carbon inventories are important for tracking how disturbances affect carbon stocks and GHG emissions, thereby informing how the County's land base contributes to local and State GHG emissions goals. Although the 2010 and 2020 NWL carbon inventories do not show a clear link between forest carbon stock decreases due to wildfire, CARBs Natural and Working Land Inventory Report attributed the Statewide decrease in forest and shrubland carbon stocks from 2001 to 2010 to large wildfires.[15] Between 2010 and 2020, Calaveras County experienced one large fire, the Butte Fire (in 2015), which burned approximately 70,868 acres, mostly in Calaveras County. The Butte Fire is ranked 18th on the California Department of Forestry and Fire Protection (Cal FIRE) list of the Top 20 Most Destructive California Wildfires.[16] The Butte Fire did not result in a permanent large loss of carbon stock, as indicated in the carbon inventory results between 2010 and 2020. However, studies indicate that large, intense fires brought on by fire suppression, drought, and other factors, may result in historically forested areas changing to shrubland in the future.[17] Section 3 discusses potential future emissions from carbon stock loss due to wildfire.

[15] CARB. 2018. An Inventory of Ecosystem Carbon in California's Natural & Working Lands. Available: < https://ww3.arb.ca.gov/cc/inventory/pubs/nwl_inventory.pdf>. Accessed June 2, 2021.

[16] California Department of Forestry and Fire Protection (CalFIRE). 2021. Top 20 Most Destructive California Wildfires. Available: <https://www.fire.ca.gov/media/t1rdhizr/top20_destruction.pdf>. Accessed June 10, 2021.

[17] Carroll. 2016. Severe fires turning forest to shrubland in California. Available: <https://phys.org/news/2016-04-severe-forest-shrubland-california.html#:~:text=A%20new%20study%20found%20that,the%20state%20changing%20to%20shrubland.&text=%22Basically%20we%20are%20switching%20forest,happen%20at%20very%20large%20scales>. Accessed May 26, 2021.

3 Potential GHG Emissions from Carbon Stock Loss Due to Wildfire

The GHG emissions from wildfires are inherently linked to the loss of carbon stocks in vegetated areas. As wildfires burn through forests, grasslands, and shrublands the carbon stored in the biomass is released to the atmosphere from the direct combustion of material, and from the resulting decay of biomass after a fire has killed vegetation.[18] In the past century, fire suppression has increased the accumulation of wildfire fuel, as natural, smaller, low-intensity fires that were at one-time natural have been prevented to protect lives and property.[19] As a result of this disruption of the natural carbon cycle and the influences of climate change, wildfires have become more severe, resulting in massive losses of carbon stocks and high levels of GHG emissions. The potential for carbon losses and subsequent GHG emissions resulting from wildfire can be diminished through land use planning and forest management practices, such as forest thinning and prescribed burns. This section provides an overview of the carbon/fire cycle, and an analysis of the potential GHG emissions from carbon stock loss due to wildfire in Calaveras County. In addition to an assessment of the overall emission potential, a case study for an estimate of the GHG emissions associated with 2015 Butte Fire is provided.

3.1 Carbon and Fire Cycle

The carbon cycle is an essential aspect for Earth to maintain the carbon balance required to sustain life. The cycle primarily consists of flows of carbon between the atmosphere, biosphere, oceans, and Earth's crust, through various natural processes. While the largest contributor to climate change is the human-influenced release of carbon that has long been sequestered in Earth's crust as fossil fuels (long-term carbon cycle), maintaining the carbon exchanges between the biosphere (i.e. plants, animals, insects) and atmosphere (short-term carbon cycle) is essential for reducing the impacts of climate change and preserving valuable ecosystem services.[20]

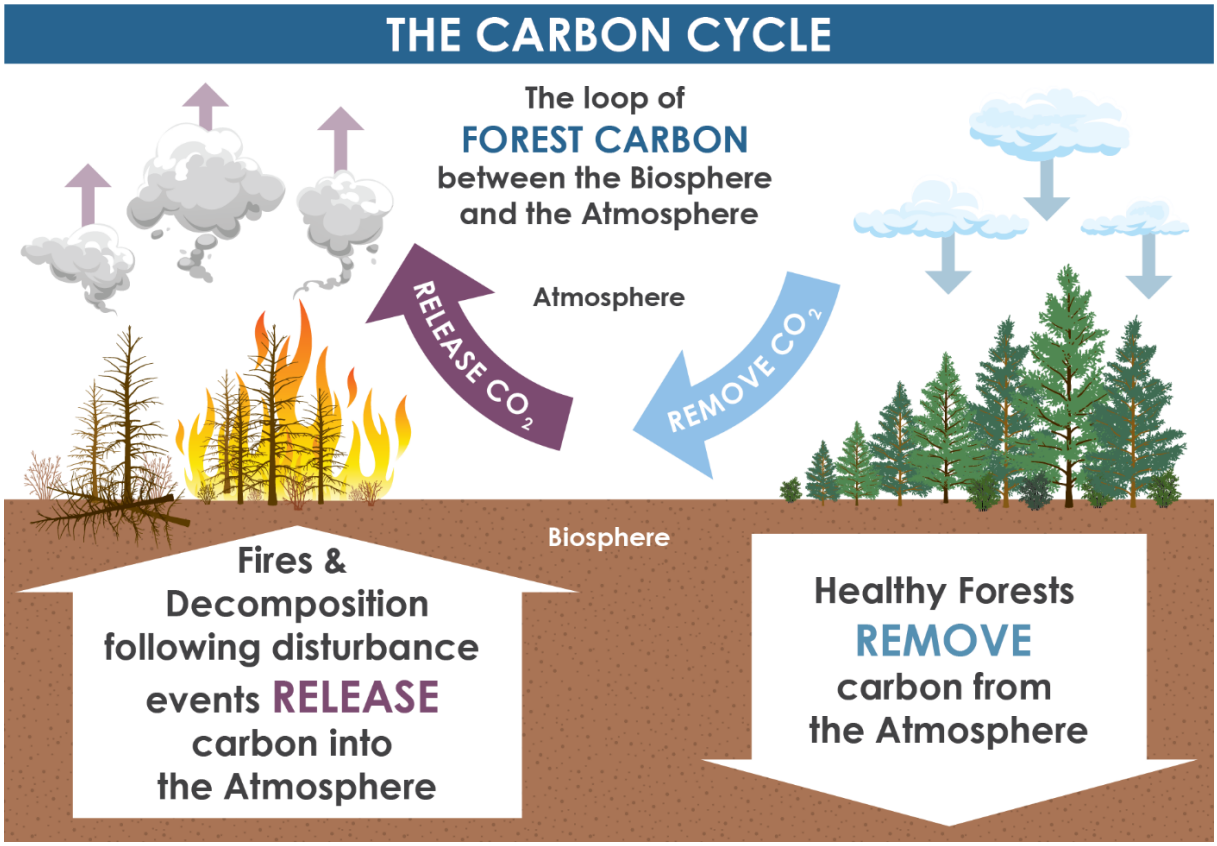
[18] Bonnicksen. 2008. Greenhouse Gas Emissions from Four California Wildfires: Opportunities to Prevent and Reverse Environmental and Climate Impacts. Available: <http://www.orww.org/Wildfires/References/Climate_&_Atmosphere/Bonnicksen_2008.pdf>. Accessed June 2, 2021

[19] CARB. 2021. Frequently Asked Questions: Wildfire Emissions. Available: <https://ww3.arb.ca.gov/cc/inventory/pubs/wildfire_emissions_faq.pdf>. Accessed June 7, 2021.

[20] CARB. 2021. Frequently Asked Questions: Wildfire Emissions. Available: <https://ww3.arb.ca.gov/cc/inventory/pubs/wildfire_emissions_faq.pdf>. Accessed June 7, 2021.

Figure 6 graphically details the carbon cycle exchange between the biosphere and atmosphere, including when 1) carbon stock loss occurs within the biosphere releasing GHG emissions into the atmosphere as a result of wildfire as well as 2) how carbon dioxide from the atmosphere is sequestered by vegetation in the biosphere.

Figure 6 Forest Carbon and Fire Cycle



Source: Rincon Consultants, Inc., 2021

The health of the majority California's ecosystems are dependent on wildfire, which can reduce buildup of organic debris that can fuel high-severity wildfires, release nutrients into the soil, and trigger changes in vegetation community composition.[21] Historically, indigenous people of California understood the interactions of wildfire and the natural lands, even using controlled burns to promote the health of natural lands. However, in the 20th century fire suppression became the guiding force for U.S. fire policy that was intended to protect communities and resources.[22] This has created a disruption in the natural carbon cycle of forests that arises from a lack of naturally occurring fires that serve to regularly clear undergrowth, enhance available nutrients, and promote the long-term health of mature trees.

Climate change has also contributed to this imbalance in the carbon cycle, where forests have become increasingly affected by drought and invasive species. This can turn forests into a carbon source, with decaying biomass emitting carbon to the atmosphere and becoming fuel for

[21] CARB. 2020. Public Comment Draft: Greenhouse Gas Emissions of Contemporary Wildfire, Prescribed Fire, and Forest Management Activities. Available: <https://ww3.arb.ca.gov/cc/inventory/pubs/ca_ghg_wildfire_forestmanagement.pdf>. Accessed June 7, 2021.

[22] Bruno. 2020. Indigenous tribes in California and other parts of the U.S. have been rekindling the ancient art of controlled burning. The Nature Conservancy. Available: <https://www.nature.org/en-us/magazine/magazine-articles/indigenous-controlled-burns-california/>. Accessed June 7, 2021.

wildfires.[23] The current state of many California forests is that of a carbon cycle imbalance, where more severe wildfires occur that burn hotter and more intense resulting in a higher loss of carbon storage in biomass and, in turn, generate a greater release of GHG emissions into the atmosphere from both the initial burning and later decay of burned trees. This loss of biomass also reduces the ability for forests to continue to absorb carbon generated by human activities, furthering the carbon imbalance seen in the atmosphere.

Carbon cycle imbalances between the atmosphere and biosphere create a feedback loop that exacerbates the impacts of wildfire. The increased carbon dioxide levels in the atmosphere contribute to climate change, which impacts forests by increasing tree mortality due to extreme heat events, droughts, and increased levels of invasive species.[24] The combination of climate change and the unhealthy forests that result from human policy and land use development are both contributing to high-severity wildfires (high present long term perturbations to ecosystems, biodiversity, and carbon storage potential) and increased GHG emissions from the direct loss of carbon stock during wildfire events.

3.2 Land Carbon Stock by Vegetation Type

GHG emissions from wildfire is dependent on the vegetation type, as vegetation types with higher carbon densities have a higher potential for GHG emissions (i.e. forests) and vegetation types with lower carbon densities have a lower potential for GHG emissions (i.e. grass and shrublands). The NWL carbon inventory performed in the previous section provides a basis for assessing the carbon emissions associated with different vegetation types based on their carbon storage potential. While there are many factors that can attribute to the degree which carbon storage is lost from a wildfire (i.e. fuel loading and fuel moisture), generally, areas with higher carbon storage values will see higher carbon emissions and higher losses of carbon storage in many wildfire scenarios.

Each land cover class discussed in the NWL carbon inventory provides a unique carbon storage value and accordingly a unique potential for carbon loss during wildfire. Biomass carbon densities were derived from the NWL inventory, using volumetric estimates of carbon mass provided by the CARB and the Calaveras specific Existing Vegetation Types, Heights, and Covers. As shown in Table 5, mixed forests have the largest biomass carbon densities and cover the largest land area in Calaveras County. Deciduous forests also have a relatively large biomass carbon density and contribute the second most to the overall biomass carbon stock in the County, even though land area covered is relatively small compared to shrub/scrub land cover and mixed forest. The deciduous forest and mixed forest land covers contribute the largest to the total biomass carbon stocks, and as such have the highest potential for carbon losses in the case of wildfire.

[23] Natural Resources Canada. 2020. Climate Change Impacts on Forests. Available: <https://www.nrcan.gc.ca/climate-change/impacts-adaptations/climate-change-impacts-forests/forest-carbon/13085>. Accessed June 7, 2021.

[24] CARB. 2021. Frequently Asked Questions: Wildfire Emissions. Available: <https://ww3.arb.ca.gov/cc/inventory/pubs/wildfire_emissions_faq.pdf>. Accessed June 7, 2021.

Table 5 Calaveras County NWL Biomass Carbon Density (2010 and 2020)

Land-cover Class	2010			2020		
	2010 Biomass Carbon Stock (MT CO_2)	2010 Acres	2010 Biomass Carbon Density (MT CO_2/acre)	2020 Biomass Carbon Stock (MT CO_2)	2020 Acres	2020 Biomass Carbon Density (MT CO_2/acre)
Barren	4,941	3,996	1.2	4,526	3,658	1.2
Cultivated Crops	3,773	842	4.5	10,373	2,912	3.6
Deciduous Forest	2,339,939	43,748	53.5	2,264,892	37,636	60.2
Development	0.0	11,717	0.0	0.0	12,259	0.0
Evergreen Forest	97,079	1,835	52.9	228,808	11,243	20.4
Grassland/ Herbaceous	29,751	13,058	2.3	118,491	44,797	2.6
Mixed Forest	26,028,502	420,723	61.9	25,851,098	354,620	72.9
Open Water	0.0	14,288	0.0	0.0	15,960	0.0
Shrub/Scrub	3,932,040	152,632	25.8	1,566,025	178,190	8.8
Wetland	0.0	0.0	0.0	4,259	1,563	2.7
Total	**32,436,025**	**662,838**	**49**	**30,048,472**	**662,838**	**45**

Sources: LANDFIRE, 2021; CARB, 2020

3.3 Potential Emissions from Carbon Stock Loss

Wildfires contribute significantly to carbon stock losses which result in GHG emissions as the carbon stocks are transferred from the biosphere to the atmosphere. While many factors contribute to the degree in which carbon is lost during a wildfire event, the analysis here is intended to provide a general estimate from theoretical fire scenarios and a review of the carbon stock loss and emissions potential from the 2015 Butte Fire. The primary focus of the GHG emissions analysis is on forested areas with larger potential for carbon storage losses.

It is difficult to accurately estimate GHG emission and carbon stock losses from wildfire, as each wildfire event has different characteristics that influence the degree to which carbon stocks are lost. The intensity of fires can vary greatly, even within areas of the same wildfire event. Some events can result in a nearly complete loss of all living biomass, whereas some may only burn undergrowth and leave longstanding trees relatively unharmed. These variables may greatly impact the degree to which carbon stocks are lost and GHG emissions are generated. Additionally, the decomposing deadfall that remains after live vegetation has been burned by wildfire also serves as an emissions

source for decades after the initial emissions impact of fuel burning, which further complicates the full understanding of GHG emissions and carbon stock loss impact.[25]

3.3.1 Cause, Vegetation Type, and Area of Emissions Impacts

Estimates for wildfire emissions potential for forested areas of Calaveras County are based on the 2010 study *High-severity wildfire effects on carbon stocks and emissions in fuels treated and untreated forest*.[26] This study surveyed the carbon stock loss and emissions impact of several fires throughout California in both treated areas, where forest management has occurred, and untreated areas. The American River Complex fire surveyed in the study occurred in a region of the western Sierra Nevada Mountains in Placer County, which is estimated to be the most characteristic of Calaveras County forests. While the live tree and surface fuel carbon stocks estimated from the study do not exactly match that those derived in from the NWL inventory in this study, different survey methods were used to estimate biomass carbon which is the likely source of this discrepancy.[27] The emission estimates reported from wildfire in the study area show that approximately 28.9 to 30.7 percent of the biomass carbon is converted to emissions in areas of the wildfire that were untreated, which decreased to a range of 12.7 to 12.9 percent for treated forests.

The emissions estimates based on the aforementioned 2010 study estimates the wildfire emissions that would occur in deciduous and mixed forests and can be used as a reference for similar land cover in Calaveras County, which represent 8 and 86 percent of above- and below-ground carbon stocks in Calaveras County in 2020, respectively. For untreated forests, an average of 29.8 percent of biomass carbon could be converted to carbon emissions from wildfire. Using 2020 biomass carbon densities for deciduous and mixed forest of 60.2 and 72.9 MT CO_2/acre, respectively, in Table 4, burning of this land during a wildfire has the potential to release emissions of 17.9 and 21.7 MT CO_2/acre burned. This value generally aligns with the CARB estimates for overall California annual wildfire emission per acre, which averages to about 20.6 MT CO_2e/acre between the years 2000 and 2019.[28,29] Given that the California wildfire emissions also include the burning of grasslands and shrublands, it is likely that the values derived here for Calaveras County is an underestimate. In the unlikely scenario that the majority of the deciduous and mixed forests in Calaveras County were to burn over multiple future wildfire events, the forested land of Calaveras County has an emissions potential of over 8 million MT CO_2 from the conversion of carbon stocks to atmospheric carbon.

The emissions estimates for wildfire in forested areas provided here are intended to provide a general estimate based on published relevant research. Fire emission modeling performed in other practices can take many additional considerations into account, including weather conditions, fuel moisture content, fire intensity, and smoldering time. However, this is beyond the scope of the analysis completed here-in.

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[25] North and Hurteau. 2011. High-severity wildfire effects on carbon stocks and emissions in fuels treated and untreated forest. Available: <https://www.fs.fed.us/psw/publications/north/psw_2011_north002.pdf>. Accessed June 3, 2021.

[26] North and Hurteau. 2011. High-severity wildfire effects on carbon stocks and emissions in fuels treated and untreated forest. Available: <https://www.fs.fed.us/psw/publications/north/psw_2011_north002.pdf>. Accessed June 3, 2021.

[27] North and Hurteau. 2011. provides a biomass carbon density of 84.7 and 82.3 MT CO_2/acre for the two survey areas, while the NWL inventory provides an estimate of 72.9 MT CO_2/acre for mixed forest.

[28] The average wildfire emissions per acre account for the burning of shrublands and grasslands, which have lower carbon storage values, as well as forests. Therefore, it is expected that the average value for all fires in California would be expected to be lower than the value for forests specifically.

[29] CARB. 2020. Public Comment Draft: Greenhouse Gas Emissions of Contemporary Wildfire, Prescribed Fire, and Forest Management Activities. Available: <https://ww3.arb.ca.gov/cc/inventory/pubs/ca_ghg_wildfire_forestmanagement.pdf>. Accessed June 7, 2021.

3.3.2 Wildfire-related GHG Emissions Case Study – Butte Fire

The Butte Fire that occurred in September 2015 is one of the top 20 most destructive California wildfires and was the most significant wildfire to occur in Calaveras County in the past century with 70,868 acres burned. [30] The fire was ignited by tree branches coming in contact with powerlines in Amador County in September of 2015, with high winds quickly spreading the fire into Calaveras County. Not only did this fire ignite in the WUI, nearly 30 percent of acreage burned was considered WUI land.[31] The Butte Fire occurred in the midst of California's historic drought, from 2012 to 2016. Increased potential for extended dry periods that fuel wildfires is expected with climate change.[32]

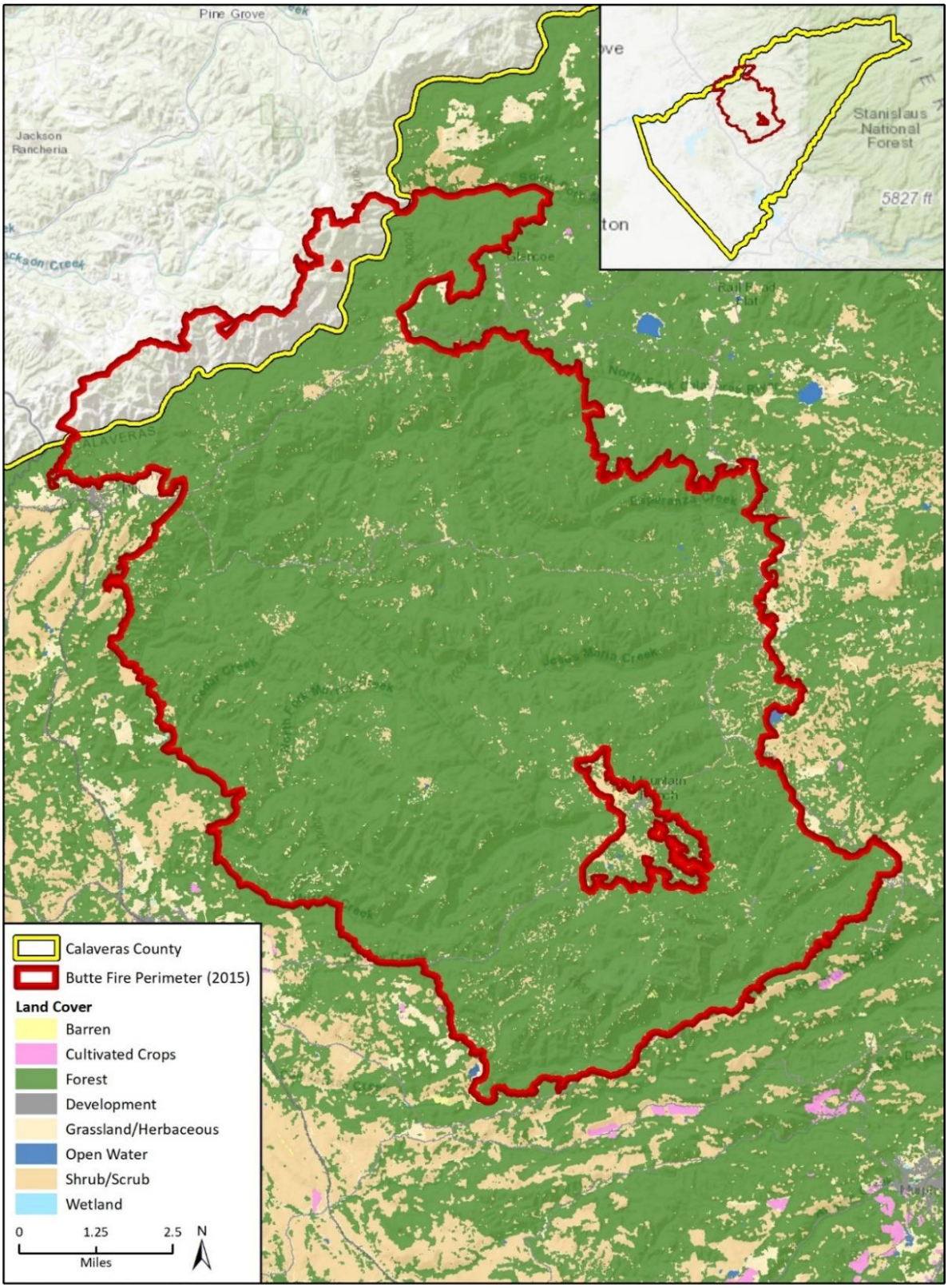
The Butte Fire burned through regions of the County with high carbon sequestration values, resulting in high GHG emissions and high carbon stock losses. As shown in Figure 7 and Table 6, the wildfire burned through primarily deciduous forest and mixed forest land-cover vegetation types in Calaveras County, as provided by the 2010 NWL inventory.

[30] CalFIRE. 2021. Top 20 Most Destructive California Wildfires. Available: <https://www.fire.ca.gov/media/t1rdhizr/top20_destruction.pdf>. Accessed May 26, 2021.

[31] Bay City News. 2018. Wildland Development Escalates California Fire Costs. Available: <https://www.kqed.org/news/11713393/wildland-development-escalates-california-fire-costs>. Accessed June 7, 2021.

[32] Diffenbaugh et al. 2015. Anthropogenic warming has increased drought risk in California. Available: <https://www.pnas.org/content/112/13/3931.short>. Accessed June 7, 2021.

Figure 7 2010 NWL Inventory and Butte Fire Perimeter



Sources: CalFIRE, 2020; ESRI, 2021; LANDFIRE 2021

Table 6 Butte Fire Footprint Land-cover Class from 2010 NWL Inventory

Land-cover Class	Butte Fire Footprint Area (acres)	Percentage of Footprint Area
Barren	61	<1%
Deciduous Forest	14,281	21%
Development	429	1%
Evergreen Forest	232	<1%
Grassland/Herbaceous	172	<1%
Mixed Forest	49,473	74%
Open Water	89	<1%
Shrub/Scrub	2,566	4%
Grand Total	**67,303**	**100%**

Sources: LANDFIRE, 2021; CARB, 2020

A general estimate of GHG emissions associated with the Butte Fire can be calculated using the deciduous forest and mixed forest emission factors of 17.9 and 21.7 MT CO_2/acre burned, derived above. As shown in Table 7, it has been estimated that the Butte Fire generated approximately 1.3 million MT CO_2 from direct fire emissions from the primary affected vegetation types, which only includes the direct emissions from conmustion and does not account for the additional future emission that occur as burned biomass decays and emits GHGs for decades after the event. This conversion of carbon, sequestered in biomass, to atmospheric carbon contributing to climate change impacts is nearly four times the GHG emission generated by the County from energy consumption, waste generation and transportation in one year.

Table 7 Butte Fire GHG Emission Estimates from Primary Land-cover Types

Land-cover Class	Butte Fire Footprint Area (acres)	Percentage of Footprint Area	GHG Emission Factor (MT CO_2/acre)	GHG Emissions (MT CO_2)
Deciduous Forest	14,281	21%	17.9	255,632
Mixed Forest	49,473	74%	21.7	1,073,557
Grand Total	**63,754**	**95%**		**1,329,188**

Sources: LANDFIRE, 2021; CARB, 2020; CalFIRE, 2020; MP North and MD Hureau. 2011

3.4 County Land Carbon Management Scenarios

The degree to which carbon is lost during a wildfire event is dependent on many variables, one of which is whether fire management practices have occurred in the affected area. It has been shown that fire management practices such as deadfall clearing, thinning, and prescribed burning have a significant influence on reducing the intensity and severity of wildfires resulting in more living trees remaining after a wildfire event.[33] While most forest management practices result in a net removal of carbon stocks from either the managed burning or removal of biomass material, the long-term benefits of protecting large trees with higher carbon storage values and preserving natural ecosystems may outweigh the short-term loss of carbon storage.

While wildfires are a natural process that will inevitably continue, management of forests in the County can significantly reduce the impacts of wildfires in both severity and GHG emission potential. Based on the results of the 2010 study *High-severity wildfire effects on carbon stocks and emissions in fuels treated and untreated forest* , forested areas that have been treated with mechanical and prescribed fire forest management show significantly less GHG emissions and tree mortality rates than areas that were untreated.[34] In the western Sierra Nevada wildfire scenario discussed in Section *3.3, Potential Emissions from Carbon Stock Loss*, wildfire in untreated forest areas converted approximately 29.8 percent of biomass carbon to GHG emissions, while treated forest areas had approximately 12.8 percent of biomass carbon converted to GHG emissions. Similarly, treated forests experienced far less tree mortality rates, with 58 to 63 percent tree mortality compared to 93 to 100 percent tree mortality in untreated forests. Based on these results, forest management to reduce the intensity and severity of wildfires can reduce GHG emissions from wildfire by approximately 57 percent. In the context of Calaveras County, this could reduce the GHG emissions potential per acre of forested land from 21.7 MT CO_2/acre burned down to 9.3 MT CO_2/acre burned.

While forest management practices result in a net loss of carbon in the County, the potential to preserve longstanding carbon reserves in larger trees reduces the potential for uncontrolled fires in the County.

3.5 County Emissions from Carbon Stock Loss Summary

The potential impact of GHG emissions from wildfire in forested areas of Calaveras County is significant and would result in a net loss of valuable carbon stocks that sequester GHG emissions that contribute to the impacts of climate change. Forest management practices such as thinning and prescribed burns can reduce both the GHG emission from wildfire and reduce the severity and intensity of wildfires, resulting in reduced tree mortality rates. While forest management practices result in a net loss of carbon in the County, the potential to preserve longstanding carbon reserves in larger trees reduces the potential for uncontrolled fires in the County. This connection between carbon stock loss and wildfire-related GHG emissions is essential for understanding the impact related to the County's potential contribution of GHG emissions related to wildfire occurrence. Section 4 discusses climate change vulnerability specific to wildfire.

[33] Halofsky et al. 2020. Changing wildfire, changing forests: the effects of climate change on fire regimes and vegetation in the Pacific Northwest, USA. Available:<https://fireecology.springeropen.com/articles/10.1186/s42408-019-0062-8#Sec27>. Accessed June 3, 2021.

[34] North and Hurteau. 2011. High-severity wildfire effects on carbon stocks and emissions in fuels treated and untreated forest. Available: <https://www.fs.fed.us/psw/publications/north/psw_2011_north002.pdf>. Accessed June 3, 2021.

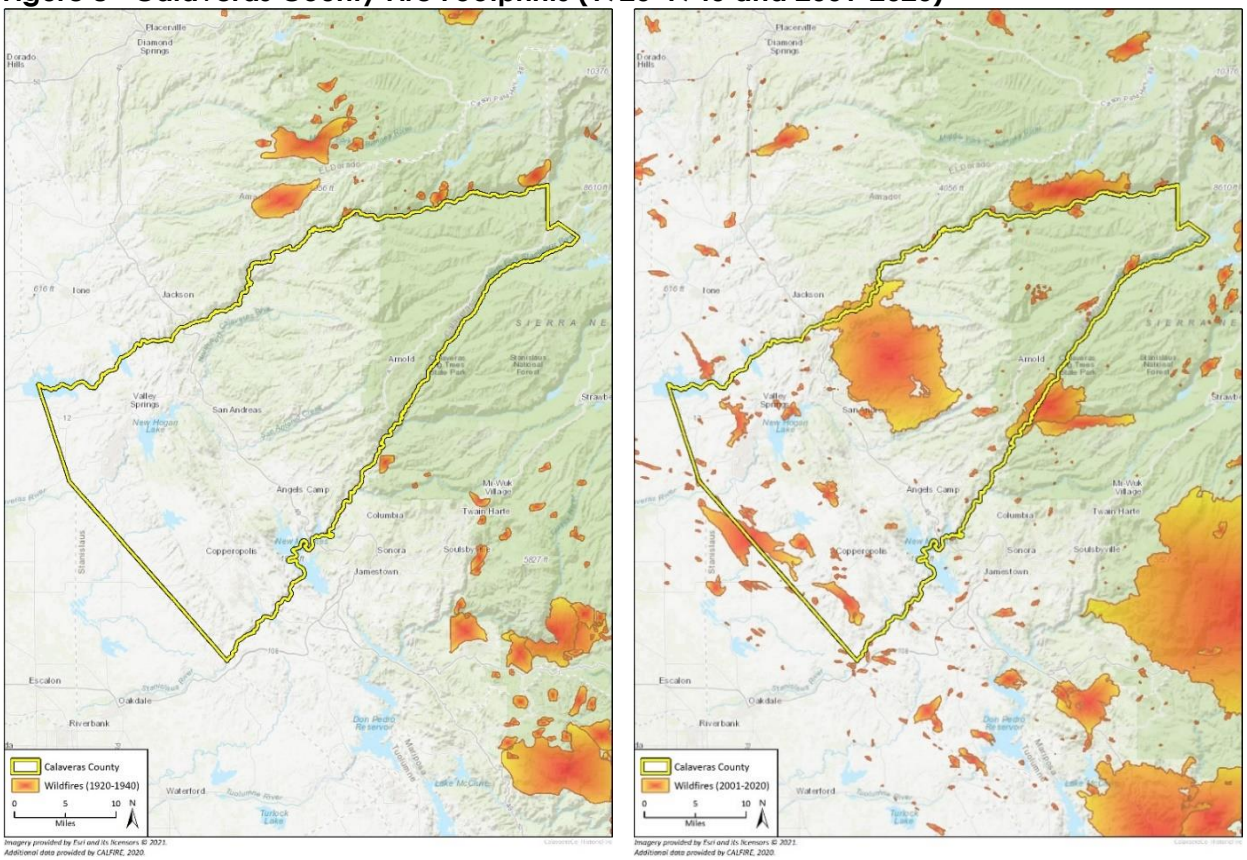
4 Climate Change Vulnerability Assessment Specific to Wildfire

The Calaveras County potential wildfire-related GHG emissions from carbon stock loss lends to a critical opportunity to assist in furthering thought leadership, especially when facing a challenge as daunting as adapting to changing fire frequency, intensity, and consequences that have been driven by climate change, development patterns, and land management practices. Thus, provided below is a Calaveras County climate change vulnerability assessment specific to the climate change hazard of wildfire. The increasing devastation and loss of life from wildfires in California's WUI must be mitigated to reverse this destructive trend and make California safer while improving the health of California's forests, shrublands, and grasslands.

4.1 Historical Wildfire

Calaveras County has experienced wildfire over the past century, as shown by the historical wildfire maps below in Figure 8. The most recent period from 2001 to 2020 shows a greater amount of County acreage affected by wildfire compared to the period from 1920-1940.

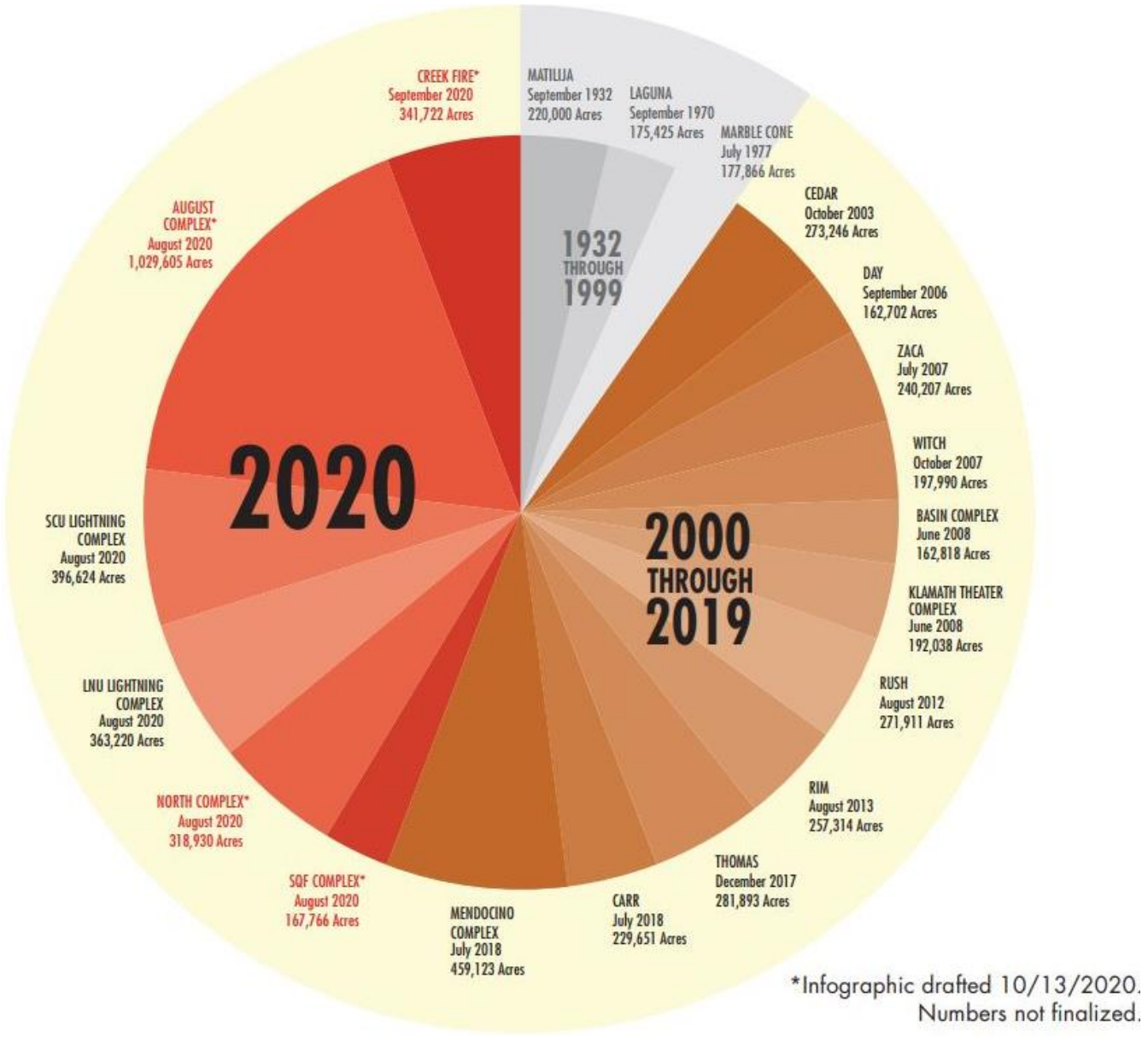
Figure 8 Calaveras County Fire Footprints (1920-1940 and 2001-2020)



Source: CalFIRE Fire and Resource Assessment Program (CalFIRE FRAP). 2021. California Fire Perimeters GIS dataset. Available: <https://frap.fire.ca.gov/mapping/gis-data/>. Accessed May 26, 2021.

However, as shown in Figure 9, over the approximate last century the majority of the top 20 largest California wildfires occurred since 2000. Specifically, five of the State's six largest fires burned more than four million acres during the same timeframe (double the previous record) in 2020, destroying thousands of buildings, forcing hundreds of thousands of people to flee their homes, and exposing millions of people across the State to dangerously unhealthy air.

Figure 9 Top 20 Largest California Wildfires



Source: CGFMTF. 2021. California Wildfire & Forest Resilience Action Plan. Available: <https://www.fire.ca.gov/media/ps4p2vck/californiawildfireandforestresilienceactionplan.pdf>. Accessed May 27, 2021.

Therefore, the expanse of acreage affected by wildfire has increased over time, and the frequency and intensity of wildfire has also increased over the past century throughout California.

4.2 Wildfire Exposure Potential

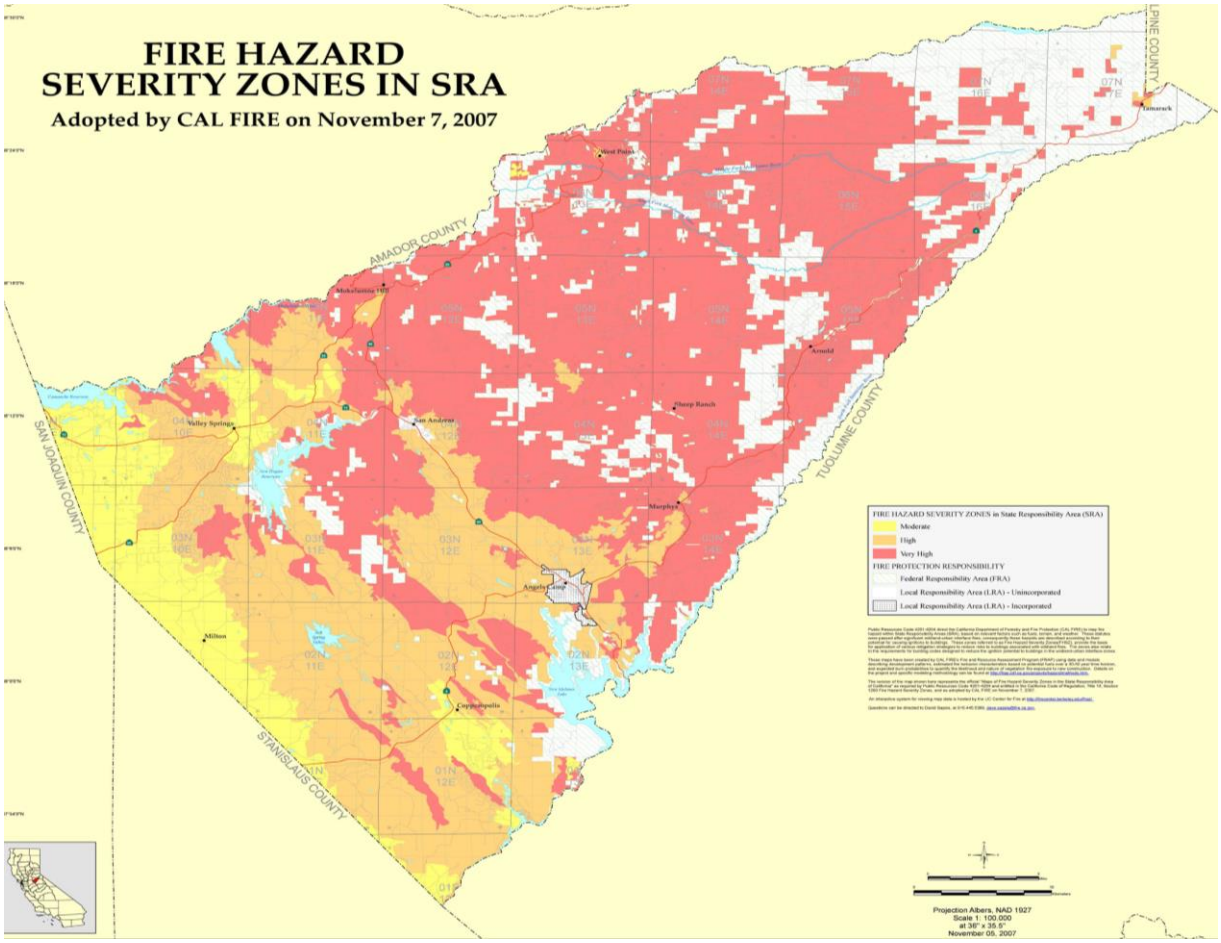
Wildfire exposure potential can be determined by looking at the existing and projected likelihood of certain areas to wildfire. The existing likelihood is discussed below in terms of existing mapped fire hazard severity zones for Calaveras county. The projected likelihood is discussed below in terms of projected wildfire exposure areas for Calaveras County.

4.2.1 Existing Fire Hazard Severity Zones

The California Department of Forestry and Fire Protection (CalFIRE) serves and safeguards the people and protects the property and resources over 31 million acres of California's privately owned wildlands. Preventing wildfires within the State Responsibility Area (SRA) is a pivotal part of CalFIRE's mission. Public Resources Code 4201-4204 direct CalFIRE to map fire hazard within SRA based on relevant factors such as fuels, terrain, and weather. Additionally, CalFIRE provides recommendations for Local Responsibility Area (LRA) lands for cities and unincorporated areas of counties. These statutes were passed after significant WUI fires occurred and, consequently, fire hazards are described according to their potential for causing ignition to buildings. The Fire Hazard Severity Zones (FHSZs) provide the basis for application of various strategies to reduce risks to buildings associated with wildland fires and also relate to the requirements for building codes designed to reduce ignition potential to buildings in WUI zones.[35] As shown in Figure 10, the majority of Calaveras County is mapped as a FHSZ. The eastern portion of the County is dominated by a category of Very High FHSZ, while the western portion of the County is mapped as a combination of Very High, High, and Moderate FHSZs. Figure 11 also shows the Very High FHSZs within the City of Angels Camp, as recommended by CalFIRE. These show Very High FHSZs in the northwestern, southern, and eastern regions of the City.

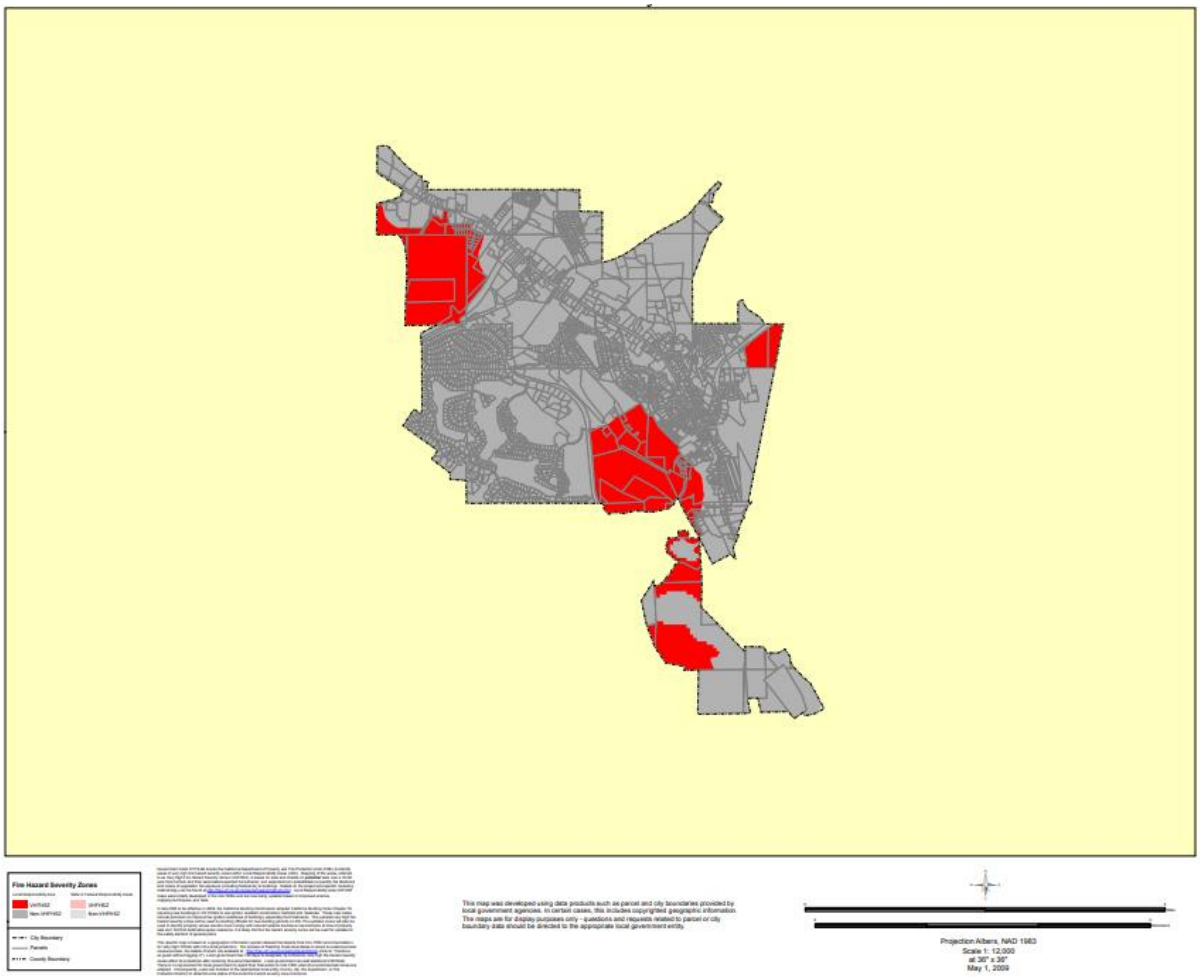
[35] California Office of the State Fire Marshal (COSFM). 2021. State Fire Hazard Severity Zones Maps. Available: <https://osfm.fire.ca.gov/divisions/wildfire-planning-engineering/wildland-hazards-building-codes/fire-hazard-severity-zones-maps/>. Accessed May 25, 2021.

Figure 10 Calaveras County Fire Hazard Severity Zones in SRA



Source: COSFM, 2021.

Figure 11 City of Angels Camp Fire Hazard Severity Zones in LRA



Source: COSFM, 2021.

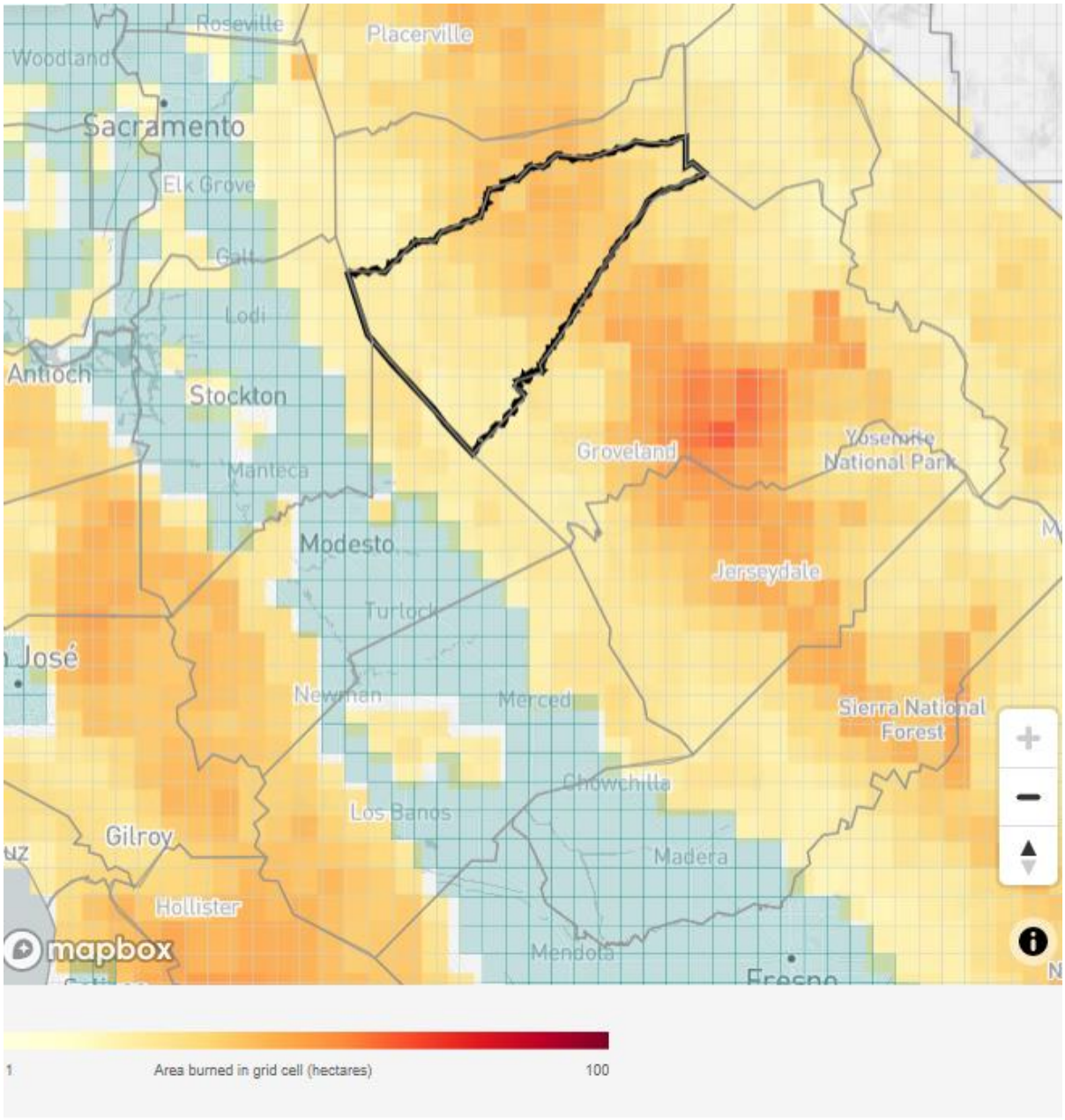
Projected Wildfire Exposure Due to Climate Change

Historical fire occurrence data and existing fire hazard severity zones in conjunction with climate change projections can be used to evaluate the relative probability of wildfire ignition and occurrence of large fires across the State and in Calaveras County.[36] Potential wildfire hazard due to climate change over the next approximate century is expected to continue to grow in the State and within Calaveras County. Per Cal-Adapt and as shown in Figure 12 and Figure 13, wildfire impacts are projected to further increase, especially within the eastern portions of Calaveras County, in terms of the number of acres burned over the next century.[37]

[36] Conservation Biology Institute. 2021. Modeling the Potential for Fire Ignition and Large Fire Occurrence.

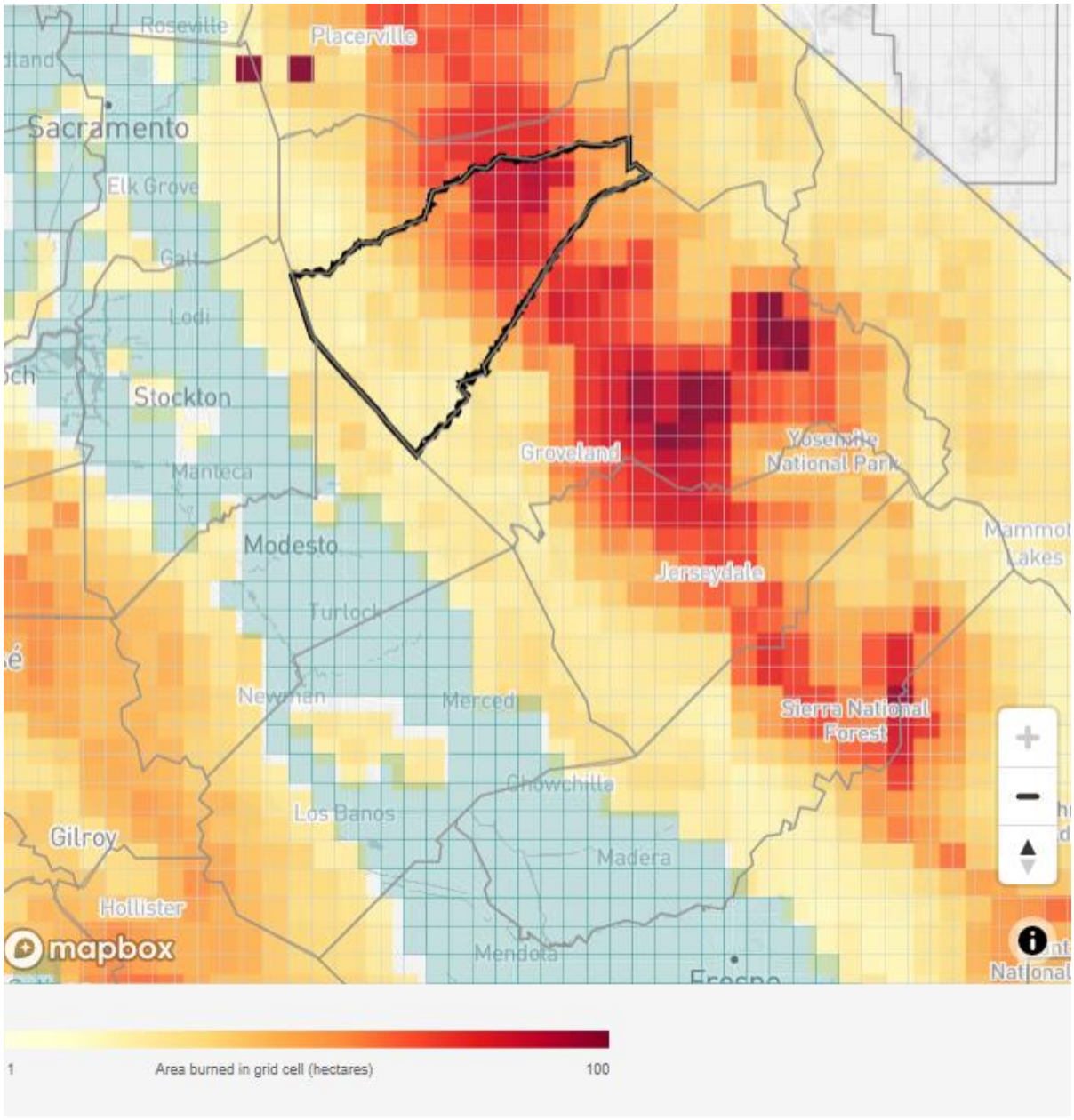
[37] These Cal-Adapt figures projecting wildfire acres burned over the next approximate century utilize the representative concentration pathway (RCP) 8.5 (high emissions scenario) per CalOES recommendation.

Figure 12 Calaveras County Projected Wildfire Exposure Areas (2020s)



Source: Cal-Adapt, 2021.

Figure 13 Calaveras County Projected Wildfire Exposure Areas (2090s)



Source: Cal-Adapt, 2021.

These resulting projected wildfire exposure area maps are intended to support a regional priority plan to reduce wildfire risk and improve forest health.

4.3 Wildfire Community Sensitivities

Communities will be affected by climate change to varying degrees depending on how sensitive the communities are to impacts and the severity of the impacts. Virtually all people and assets in a community will be affected by climate change in some way. However, it is not usually feasible to assess the vulnerability of every population group or every asset in the community. The sensitivity

of a community depends on the aspects of the community (i.e., specific populations and assets) most affected by anticipated climate impacts, and how prevalent they are in the community. The most likely impact of climate change that Calaveras County may experience is an increase in wildfire risk. This section of the vulnerability assessment identifies sensitive areas of the Calaveras community.

4.3.1 Populations

Population demographics are determined using the California Healthy Places Index (HPI) and United States Census Bureau unless otherwise noted. County level data are among the more comprehensive statistics available for understanding climate impacts on Sierra Nevada communities and show that 12 of the 20 counties in the Sierra Nevada qualify as disadvantaged or economically distressed; Calaveras County hovers at the threshold, though it is not considered distressed despite the community and landscape devastation caused by the 2015 Butte Fire.[38] However, of the 45,578 persons residing in Calaveras County, the following population groups may be disproportionately harmed by the climate change hazard of wildfire.

Older adults: Persons 65 years or older are more at risk for climate change impacts related to wildfire, especially those living alone, because aging can impair muscle strength, coordination, cognitive ability, immune system, and the regulation of body temperature. These conditions can be exacerbated by poor air quality resulting from wildfires and present challenges in evacuating older adult populations. Approximately 28 percent of County residents are over 65 years, which is more than the Statewide average of 15 percent of residents over 65 years.

Persons with chronic health conditions or disabilities: These are people who have a long-term or permanent health condition that can create regular challenges in their day-to-day lives. These health problems include cancer, heart disease, obesity, and arthritis. In addition, these are people with any kind of disability, including mobility challenges, hearing or vision impairments, behavioral disabilities, and challenges living independently or taking care of themselves. Chronic illnesses are exacerbated by climate change, with wildfire presenting additional risk through increased air pollution and difficulty in evacuating persons with mobility challenges and essential medical equipment. Approximately 15 percent of County residents have a disability.

Renters: These are people who live in homes that they (or the head of their household) do not own. Renters have less control over home improvements than homeowners and may not be able to adequately protect themselves from climate hazards such as wildfire by retrofitting their homes and adjusting their property's surroundings. Approximately 12 percent of housing units in the County are renter-occupied.

Uninsured individuals: People without health insurance have difficulty accessing quality health care and are more likely to have unmet health needs. Climate impacts such as wildfire and related elevated levels of air pollution are expected to cause direct and indirect health impacts, particularly for vulnerable populations with limited or no access to health services. Approximately 7 percent of County residents aged 18 to 64 are uninsured.

[38] OPR, CNRA, and California Energy Commission (CEC). 2021. California's Fourth Climate Change Assessment Report – Sierra Nevada Region Report. Available: <https://www.energy.ca.gov/sites/default/files/2019-11/Reg_Report-SUM-CCCA4-2018-004_SierraNevada_ADA.pdf>. Accessed May 28., 2021.

4.3.2 Buildings

Residential Structures: Residential structures in Calaveras County consist of single-family dwellings and multi-family units, totaling 27,995 housing units.

Public Safety Facilities: Public safety facilities include fire buildings and police stations. Calaveras County has 39 fire departments and fire stations owned and operated by nine local fire districts. The County is also served by the Calaveras County Sherriff's Office with a headquarters and four substations located within the County.[39]

Community Facilities and Government Buildings: Community and government facilities are public properties and are important to the residents as well as the operation of the County. The County seat is located in San Andreas. In addition, there are eight public libraries within the County, the San Andreas Central Library and seven additional branch libraries.[40]

Schools: Calaveras County has four school districts and a County Office of Education. There are ten elementary schools (one is K-8), two middle schools, two high schools, and several alternative schools. The total K-12 student population is approximately 5,300.[41] The schools are located primarily along access road corridors such as California Highway 49, California Highway 4, and California Highway 26, and the County Office of Education is located proximate to the intersection of California Highways 49 and 4 in Angels Camp.

4.3.3 Infrastructure

Access Roads: Access roads provide entry to and exit from communities and neighborhoods. A limited number of entry and exit points does not make a road itself more vulnerable than other roads, but disruption to access roads can effectively cut off large numbers of people from other areas of the County. California State Routes 49, 4, and 26 are the primary access roads into and out of the County.

Water System: The Calaveras County Water District supplies water to the County, including to about 13,080 municipal and residential/commercial customers in six service areas throughout the County.[42] Within the City of Angels Camp, the City provides water and sewer services to businesses and residents.

Electrical Utility Lines and Natural Gas Pipelines: These lines transmit and deliver electricity and natural gas from Pacific Gas & Electric to the County. The County has both underground and overhead electric utility lines as well as underground natural gas pipelines.

Electrical Substations: Electrical substations are facilities that convert electricity from one voltage to another, making it suitable for long-distance transmission or for use by homes, businesses, and other electrical customers. There is one electrical substation, the PG&E Valley Springs Substation, located within the County limits and owned and operated by Pacific Gas & Electric.

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[39] Calaveras County. 2021. County Sheriff's Office. <https://sheriff.calaverasgov.us/Outreach/Substations>. Accessed June 2, 2021.

[40] Calaveras County. 2021. County Library and All Branch Locations. Available: <https://library.calaverasgov.us/Locations-Hours>. Accessed June 2, 2021.

[41] Calaveras County Office of Education (CCOE). 2021. Calaveras County School Location and District Information. Available: <https://www.ccoe.k12.ca.us/apps/pages/index.jsp?uREC_ID=1175520&type=d&pREC_ID=1423925#:~:text=Calaveras%20Unified%20School%20District%20is,Road%20Flat%20and%20West%20Point.>. Accessed June 2, 2021.

[42] Calaveras County Water District (CCWD). 2021. Our History. Available: <https://ccwd.org/about/>. Accessed June 9, 2021.

4.3.4 Natural and Managed Resources

Forest Resources: Forests in Calaveras County represent a natural and economic resource. Forest lands provide natural habitats as well as opportunities for recreation. Calaveras County spans 663,290 acres (1,036 square miles). As shown in Table 2, a total of 403,499 acres of evergreen, deciduous, and mixed forest lands exist within the County. As such, forested areas represent approximately 61 percent of County land area. The forest supports a wide variety of wildlife and plant species due to its range in climate, elevation, and geology. The Stanislaus National Forest contains approximately 325,000 acres of commercial forest land and is also home to the Emigrant Wilderness, Mokelumne Wilderness, and the Carson-Iceberg Wilderness.

With approximately 159,000 acres of hardwood habitat (24 percent of land area in the County), including 2,000 acres of Blue Oak-Foothill Pine, 55,000 acres of Blue Oak Woodland, 102,000 acres of Montane Hardwood, and a small amount of Montane Riparian habitat, Calaveras County contains approximately 1.6 percent of California's nearly 10 million acres of hardwood rangeland and forests. It leads all other counties in the percentage of County land area in oak woodland within the State. And in Calaveras County, approximately 89 percent of the County's hardwood rangelands are privately held, and 75,901 acres is located within the Stanislaus National Forest. [43, 44]

Timber Resources: As of 2018, the County contained approximately 77,500 acres of land zoned as Timberland Production. Timber is the largest commodity industry in the County at $8,948,100 of revenue in 2018. Quality timber harvesting returned to the County with a good market. Crews also worked on fire breaks, and those sellable logs were utilized. The California Forest Practice Act was enacted to ensure that logging is done in a sustainable manner that will preserve and protect wildlife, forests, and streams. The CFPA is applicable to all commercial harvesting activities conducted by landowners of small parcels and large timber companies alike in the County. CalFire is responsible for enforcing the laws that regulate logging on privately-owned lands in California. [45]

Livestock Resources: As of 2018, the County contained approximately 198,000 acres of rangeland with 17,700 head of cattle/calves. Cattle/calves and poultry are the second and fourth largest commodity industries in the County at $7,852,537 and $3,338,100 of revenue, respectively, in 2018. Cattle grazing provides an additional benefit of reducing vegetated fuel load and maintaining open space to reduce fire hazard in the County.[46]

Crop Resources: As of 2018, the County contained approximately 711 acres of wine grape crops and 794 acres of walnuts crops. Wine grapes and walnuts are the third and fifth largest commodity industries in the County at $3,389,750 and $1,346,624 of revenue, respectively, in 2018. In addition to gross production value, wineries and tasting rooms provide added value to the wine grape yields and walnut sales to rangeland visitors provides added value to the walnut yields in the County. [47]

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[43] Calaveras County. 2018. Calaveras county General Plan Draft EIR Agricultural, Forest, and Mineral Resources Chapter. Available: <https://planning.calaverasgov.us/Portals/Planning/Documents/Draft%20General%20Plan%20Update/CEQA/4_2_Agricultural%20Forest%20and%20Mineral%20Resources.pdf>. Accessed June 3, 2021.

[44] Calaveras County. 2007. Voluntary Oak Woodland Management Plan. Available: <https://ema.calaverasgov.us/Portals/EMA/Documents/Ag/Oak_Woodland_Management_Plan.pdf>. Accessed June 3, 2021.

[45] Calaveras County. 2018. Calaveras County Crop Report.

[46] Calaveras County. 2018. Calaveras County Crop Report.

[47] Calaveras County. 2018. Calaveras County Crop Report.

4.4 Wildfire Impacts Due to Climate Change

Climate change hazards and impacts vary depending on location. Understanding local climate hazards and impacts allows communities to prepare for the future and increase their resilience. Climate change is projected to continue affecting Calaveras County in many ways, including increased wildfires and associated air pollution. Projected wildfire impacts for Calaveras County are described below based on information presented by Cal-Adapt and the Sierra Nevada Summary Report of California's Fourth Climate Change Assessment.

The combination of warmer temperatures and greater precipitation variability are expected to increase the prevalence of droughts in the State and Calaveras County and, thus, need for forest fuel management practices. These changes in climate pose daunting challenges to the region's landscapes, resources and communities, including wildfire risk. Fire is a major driver of the ecosystems of the Sierra Nevada region. The warming and drying trends are projected to increase the frequency and severity of wildfire. A progressively altered fire regime is a primary and acute risk to the flora, fauna, and persons of the Sierra Nevada region. High-severity wildfires have the potential to transform urban and natural landscapes, perhaps irreversibly, thereby threatening population communities with death, injury, and/or displacement, residential and other key buildings damage, and critical infrastructure in terms of access to access roads, water service, and power service. The smoke and air pollution produced by wildfire is also a serious threat to human health.[48] Furthermore, wildfires have the potential to damage the County's forest, timber, livestock, and crop resources, which could in turn adversely affect the County's valuable habitat and ecosystem services as well as timber, livestock (cattle and poultry), wine grape, and walnut industries.

Therefore, location of funding in terms of wildfire and specifically WUI fire risk will be important for the County to identify and obtain for ongoing forest fuel management practices and increased wildfire prevention.

4.5 Wildland Urban Interface Vulnerability

The WUI is the zone of transition between unoccupied land and human development. It is the line, area, or zone where structures and other human development meet or intermingle with undeveloped wildland or vegetative fuels. Communities adjacent to and surrounded by wildland are at varying degrees of risk from wildfires.

4.5.1 Wildfire Cause and Times of Year

Wildland fires are classified as either naturally occurring or human-caused. Common causes of wildfire, which are mostly due to humans, include:

- Equipment use and malfunctions
- Vehicle crashes and engine sparks
- Negligently discarded cigarettes
- Unattended campfires
- Burning of debris

[48] OPR, CNRA, and CEC. 2021. California's Fourth Climate Change Assessment Report – Sierra Nevada Region Report. Available: <https://www.energy.ca.gov/sites/default/files/2019-11/Reg_Report-SUM-CCCA4-2018-004_SierraNevada_ADA.pdf>. Accessed May 28., 2021.

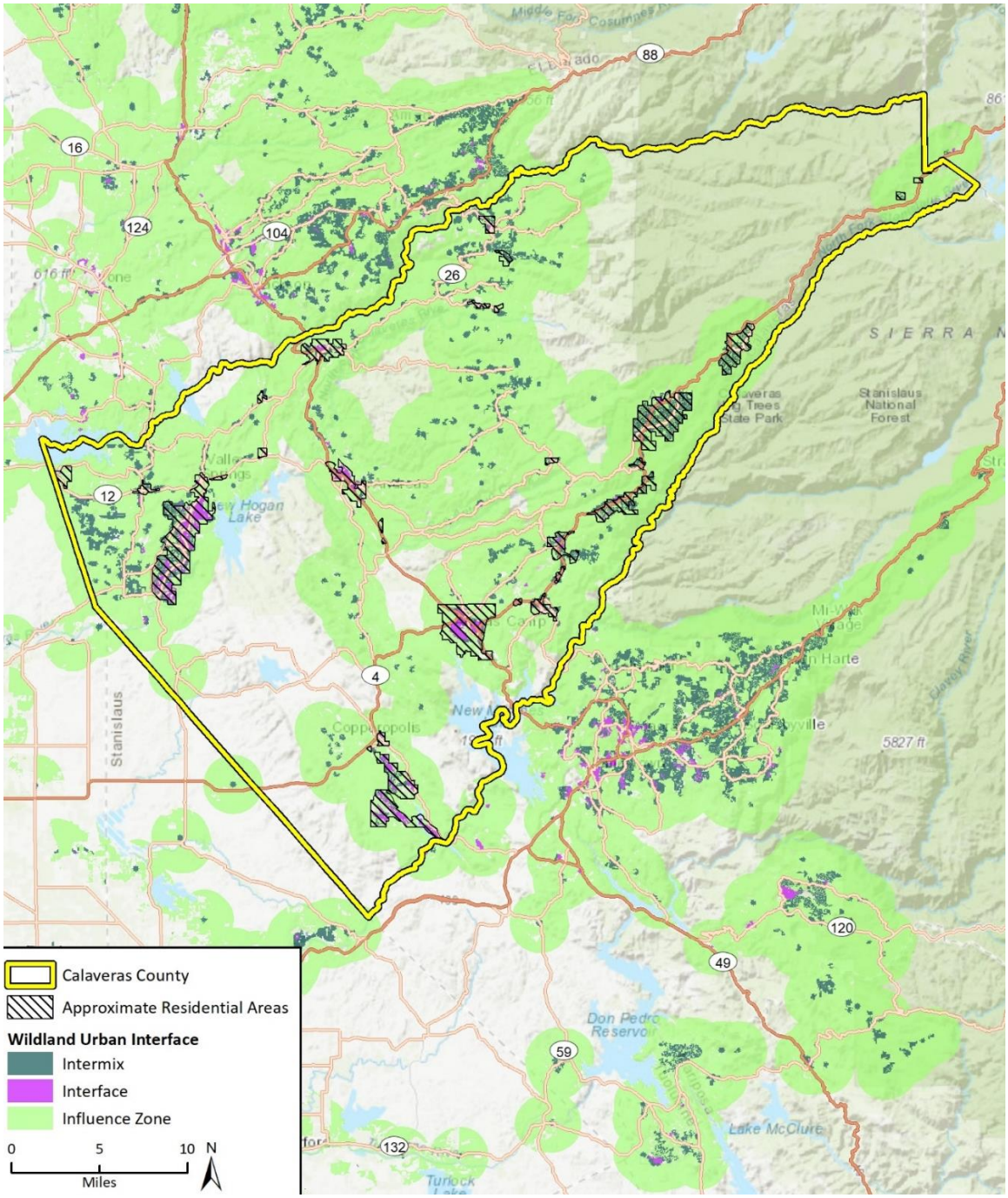
- Intentional acts of arson
- Lightning strikes

Peak wildfire season within California usually occurs between July and November, a time when hot, dry winds are most frequent and vegetated areas are dry, constituting a higher fuel load.

4.5.2 Developed Areas Impacted by Wildfire

As demonstrated in Figure 14, the majority of residents within the County live in intermix WUI areas or interface WUI areas. Intermix WUI refers to areas where housing and wildland vegetation intermingle, while interface WUI refers to areas where housing is in the vicinity of a large area of dense wildland vegetation. The WUI areas also primarily coincide with the major transportation corridors within the County (California State Routes 49, 4, and 26).

Figure 14 Calaveras County WUI Areas



Sources: CalFIRE, 2020; ESRI, 2021

4.5.3 Wildfire Climate Change Vulnerability Case Study – Butte Fire

The Butte Fire that occurred in September 2015 is one of the top 20 most destructive California wildfires. The fire was ignited by tree branches coming in contact with powerlines in Amador County in September of 2015, with high winds quickly spreading the fire into Calaveras County. As shown in

Figure 7 in Section 3, the wildfire burned through primarily mixed forest land-cover vegetation types, per the 2010 NWL inventory. The Butte Fire resulted in:

- 2 deaths (in the Mokelumne Hill and Mountain Ranch areas);
- 921 structures (including 549 homes) lost; and
- 70,868 acres burned.[49]

In addition, resources assigned to combat the fire included 4,865 personnel, 519 fire engines, 92 hand crews, 10 helicopters, and 94 dozers. And California Governor Jerry Brown declared a state of emergency in Calaveras County when the fire expanded to 65,000 acres in size.[50] The Butte Fire alone represented 8 percent of total area burned by wildfire in California in 2015, which was 893,362 acres in total.

Figure 15 shows WUI areas within the County in relation to the largest fire that has occurred in Calaveras County in recent history, the Butte Fire. It appears that the wildfire suppression effort was able to prevent the Butte Fire from spreading into all of the interface WUI areas and a majority of the intermix WUI areas. This prevented even greater human and structural loss, given that the wildfire perimeter was held from extending into a majority of the WUI areas for much of the County. However, major devastation still occurred within some WUI areas due to the Butte Fire.

Climate change resulted in the grape harvest starting two weeks earlier than normal and also exacerbated the Butte Fire given that California was in the midst of a five-year drought that lasted from 2012 to 2016.[51] Daniel Berlant with CalFIRE said that the State's historic multi-year drought was a factor in the Butte Fire, because such drought conditions allow for a simple spark, an ember, and any type of open flame to quickly ignite into a wildfire and spread very rapidly. CalFire called the growth of the Butte Fire "unprecedented."[52]

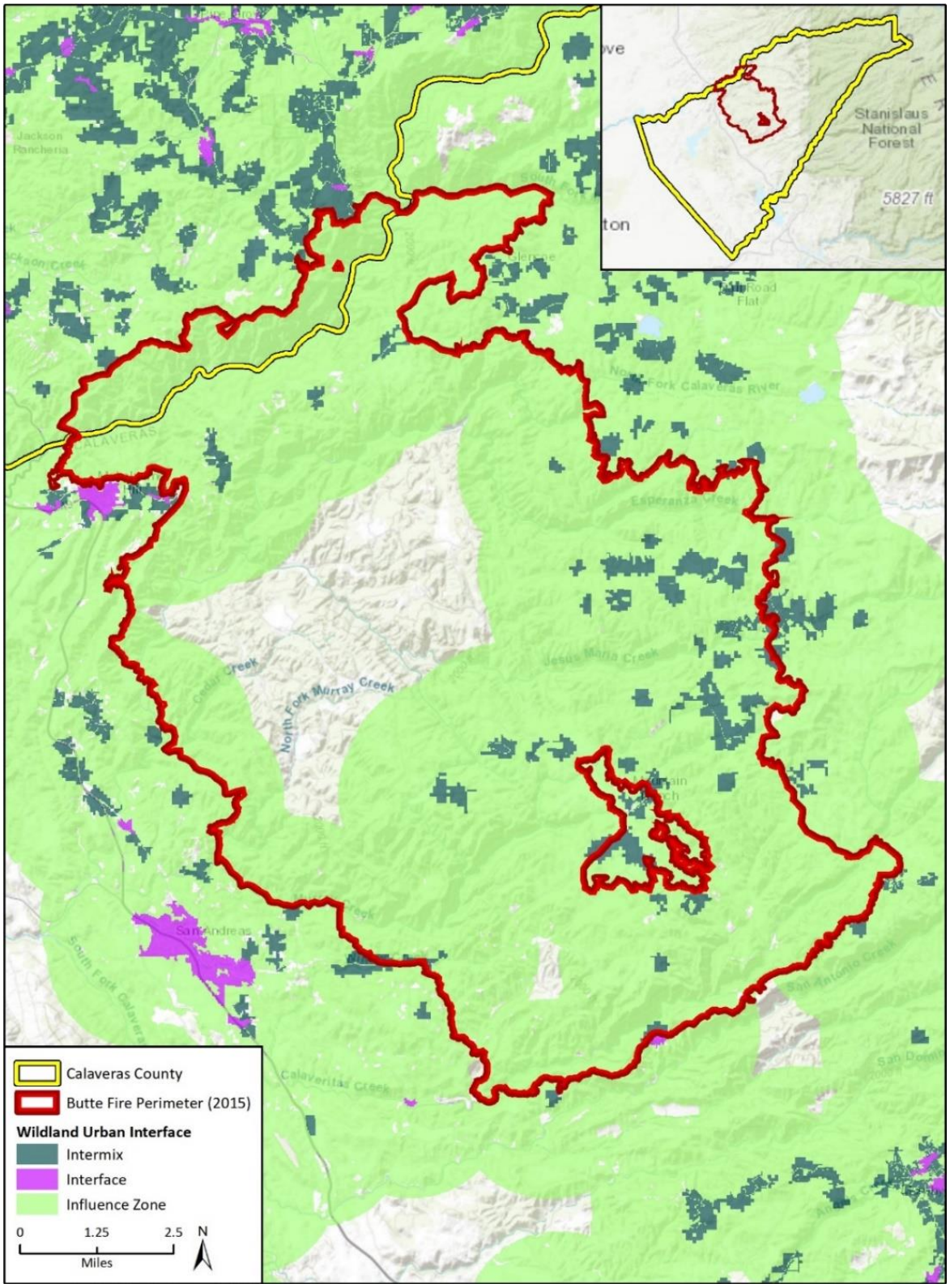
[49] CalFIRE. 2021. Top 20 Most Destructive California Wildfires. Available: <https://www.fire.ca.gov/media/t1rdhizr/top20_destruction.pdf>. Accessed May 26, 2021.

[50] Wildfire Today. 2021. Butte Fire Archives. Available: <https://wildfiretoday.com/tag/butte-fire/>. Accessed June 8, 2021.

[51] California Department of Water Resources (CDWR). 2021. Drought. Accessible: <https://water.ca.gov/water-basics/drought >. Accessed June 10, 2021.

[52] Capradio. 2021. Available: <https://www.capradio.org/articles/2015/09/14/california-drought-factor-in-rapid-growth-of-wildfires/>. Accessed June 9,2021.

Figure 15 Calaveras County WUI Areas and Butte Fire Perimeter



Sources: CalFIRE, 2020; ESRI, 2021

Steps that could possibly have prevented or at least minimized the spread of the Butte County Fire include:

- better management and maintenance of powerlines, including but not limited to undergrounding of powerlines;
- Better management and clearing of defensible space around powerlines that traverse forested areas as well as the buildings throughout the County that were lost and damaged from the wildfire; and
- Quicker notification and response of downed or malfunctioning powerlines by the electric provider to the local fire departments and stations.

In addition, in order to disrupt the feedback cycle of wildfires that threatens communities at the WUI, it is necessary to identify and assess both GHG emissions and climate change impacts posed by wildfire and to subsequently develop mitigation and adaptation strategies. In order to do so, planning, fire, and forest managers require information regarding where fires are likely to occur, the intensity at which they might occur, and with what impacts to communities, assets, and resources.

4.6 County Climate Change Vulnerability Summary

Climate change resulting in increased temperatures, drought, and dry fuel load throughout the State is anticipated to exacerbate the potential for wildfire hazard and impact within the County. Forest management practices such as thinning and prescribed burns can reduce the severity and intensity of wildfires, in turn reducing the potential for uncontrolled fires in the WUI where the majority of residences exist and providing net benefits to the County. This connection between climate change and related impacts in the WUI is essential for understanding the climate hazards specific to wildfire in terms of the potential impact to residents, businesses, the local economy, and ecosystem services. Section 5 discusses best practices for reducing wildfire impact.

5 Wildfire Impact Reduction Best Practices

Given Calaveras County vulnerability to wildfire and per best practices identified by State agencies in the State Wildfire and Resilience Action Plan and OPR Fire Hazard Planning Technical Advisory, in order to protect public health and minimize risks to existing and new land uses, there should be an acceleration of efforts within the County to:

- Restore the health and resilience of forests, grasslands, and natural places;
- Improve the fire safety of communities and land uses; and
- Sustain the economic vitality of rural forested areas.[53]

Since the scale of the potential wildfire problem is great, multiple routes of action need to be taken to accomplish wildfire resiliency.

5.1.1 Restored Forest/Shrub/Grassland Health and Resilience

5.1.1.1 Forest Health and Resilience Management

Activities to restore forest health and resilience should focus on thinning overgrown forests and dry fuel load within the Stanislaus National Forest and privately held forested areas of Calaveras County, with particular attention to areas along highways and roadways where wildfires are most likely to ignite at the WUI interface. Meadow restoration to improve water quantity and quality could also be part of shrubland and grassland resilience-building activities.[54] Thinning of overgrown forests and forests with large amounts of forest debris and decay can also be accomplished through prescribed burns that are carefully planned and closely watched by the local fire districts and CalFIRE.

Work to improve resilience to wildfire is currently being performed in Calaveras County through the efforts of multiple agencies. The Upper Mokelumne River Watershed Authority has been treating overgrown forests in the Stanislaus and El Dorado National Forests since 2006, under contract with the U.S. Forest Service, with activities focusing on areas along roadways. As of 2021, over 4,000 acres of overgrown forests in the Upper Mokelumne River Watershed have been treated through this effort, with plans to expand to efforts to include an additional 50,000 acres of permitted projects.[55] One such project was the Lily Gap Project, which included thinning of trees and brush on 157 acres near the town of West Point.[56] Additionally, prescribed burns are regularly performed within the Stanislaus National Forest and Calaveras Big Tree State Park, with 218 and 248 acres of prescribed burns planned for 2021 in each part, respectively.[57,58]

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[53] OPR. 2020. Fire Hazard Planning Technical Advisory.

[54] Calaveras County. 2007. Voluntary Oak Woodland Management Plan. Available: <https://ema.calaverasgov.us/Portals/EMA/Documents/Ag/Oak_Woodland_Management_Plan.pdf>. Accessed June 3, 2021.

[55] Upper Mokelumne River Watershed Authority (UMRWA). 2021. Forest Health Projects Reducing Risk of Catastrophic Wildfire. Available:<http://www.umrwa.org/uploads/UMRWA_BFF%20Press%20Release%20-%20final.pdf>. Accessed June 3, 2021.

[56] United States Department of the Interior, Bureau of Land Management (USDI BLM). ND. California Stewardship Contracting. Available: <https://www.blm.gov/programs/natural-resources/forests-and-woodlands/stewardship-contracting/california>. Accessed June 3, 2021.

[57] McCarty. 2021. Custodians of Stanislaus National Forest plan prescribed burns mid-May into June. The Union Democrat. Available: <https://www.uniondemocrat.com/news/article_fd01b854-b1c3-11eb-b138-cf0480ee59ee.html>. Accessed June 3, 2021.

[58] Pine Tree, The. 2021. California State Parks and CalFIRE Plan Prescribed Burns at Calaveras Big Trees State Park. Available: <http://thepinetree.net/new/?p=119052>. Accessed June 3, 2021.

5.1.1.2 Collaborative Forestry

Regional stakeholder collaborations and community-based organizations could improve capacity and options for County- and regional-scale forest management and restoration. Collaboration at the community and regional levels promote ecosystem restoration in a manner that improves the resilience of forests and capacity of such communities to respond to climate change. Collaboratives within the Sierra Nevada region are working to address pivotal barriers to forest restoration through development of tools and approaches aimed at maintaining healthy resilient forests and managing response and realignment in the face of climate change. And community organizations are also providing the local and social capital to enable forest restoration and health initiatives to move forward. Calaveras County can continue and expand upon the following collaborative forestry actions within the Sierra Nevada region:

- collaborative groups engaged in environmental planning for forest restoration helping the U.S. Forest Service as extension of staff in order to carry out
- State and federal agencies partnered as part of the Tahoe-Central Sierra Initiative to conduct fuel treatments along highway corridors, restoring ecosystem resilience and protecting communities; and
- A Master Stewardship Agreement established to collaboratively pursue projects that promote forest resilience within the Stanislaus National Forest. [59]

5.1.2 Improved Community and Land Use Fire Safety

5.1.2.1 Creation and Maintenance of Defensible Space

For people living in a wildfire-prone zone such as the Sierra Nevada region (including Calaveras County), CalFIRE and FEMA suggest creating at least a 100-foot defensible space around such homes. Defensible space is an area around a building or structure within which vegetation and other debris are completely cleared; this reduces the spread of fire and can save homes and other buildings from igniting. Specifically, as shown in Figure 16, defensible space is a multi-zone protection that homeowners can create around their homes to limit or slow the spread of fire, and it involves clearing dead brush and vegetation as well as keeping a distance between tree limbs and ground plants. In addition, maintaining a 100-foot defensible space buffer around buildings and structures is required by California Public Resources Code, Division 4, Part 2.[60]

[59] OPR, CNRA, and CEC. 2021. California's Fourth Climate Change Assessment Report – Sierra Nevada Region Report. Available: <https://www.energy.ca.gov/sites/default/files/2019-11/Reg_Report-SUM-CCCA4-2018-004_SierraNevada_ADA.pdf>. Accessed May 28., 2021.

[60] California Legislative Information (CLI). 2021. California Public Resources Code, Division 4, Part 2. Available: <https://leginfo.legislature.ca.gov/faces/codes_displayText.xhtml?lawCode=PRC&division=4.&title=&part=2.&chapter=1.&article=2.>. Accessed May 27, 2021.

Figure 16 Defensible Space Zones



Source: CalFIRE. 2021. Wildfire Defensible Space Guidance.

5.1.2.2 Emergency Response and Evacuation Planning

The majority of County residents live in WUI areas proximate to the major transportation corridors traversing the County (California State Routes 49, 4, and 26). As such, these transportation corridors are key to emergency response (for firefighters needing to access and protect residential areas during wildfire events) and emergency evacuation operations (residents fleeing their homes during wildfire events). Thus, regular maintenance and improvement of these transportation corridors is one of the primary wildfire defense actions that the County can take.

Per California Assembly Bill 747, county and city general plan safety elements are required to address evacuation routes related to identified fire hazards. The Calaveras County Office of Emergency Services (OES) strives to build a disaster-prepared and resilient County through emergency management and coordination with response partners and the community. County OES is responsible for wildfire preparedness, mitigation, and response and recovery and aims to create partnerships, plans, and systems to build capabilities and coordinate the preparedness, response, and recovery efforts of all County and regional stakeholders. [61] In conjunction with CalFire, Calaveras County OES and the Calaveras County Sheriff's Office has created an Emergency Evacuation System, which is divided into 60 grid pages and further divided into 307 2-mile by 2-mile evacuation zones.[62]

[61] Calaveras County Office of Emergency Services (CCOES). 2021. Available: <https://nextdoor.com/agency-post/ca/calaveras-county/calaveras-county-office-of-emergency-services/evacuation-map-113652600/>. Accessed June 9, 2021

[62] Calaveras County Public Evacuation Application (CCPEA). 2021. Available: <https://www.arcgis.com/apps/webappviewer/index.html?id=4792467f1b154c9da6ba04a2f8bc6ca3>. Accessed June 9, 2021

5.1.3 Sustained Rural Forested Area Economic Vitality

Stewardship Authority contracts allow the U.S. Forest Service to blend needed restoration work with commercially viable timber extraction work (objectives traditionally achieved through separate contracts) to achieve land management goals for the national forests and the public lands that also meet local and rural community economic needs. Small-scale bioenergy facilities and co-located businesses (e.g., post, pole, etc.), are logical complements to such Stewardship Authority contracts, providing local employment by making use of low-value end-products (i.e., small-diameter wood) and by-products (i.e., slash). In addition, pairing biomass energy production with community-scale manufacturing can increase the volume of fuel load removed from densely stocked forest stands and also create more jobs for local County residents. Such an approach would reduce likely exposure to high-severity wildfire as well as rebuild community capacity, creating a positive feedback loop between the environment and the economy that helps empower the County to address future climate impacts.[63]

[63] OPR, CNRA, and CEC. 2021. California's Fourth Climate Change Assessment Report – Sierra Nevada Region Report. Available: <https://www.energy.ca.gov/sites/default/files/2019-11/Reg_Report-SUM-CCCA4-2018-004_SierraNevada_ADA.pdf>. Accessed May 28., 2021.

6 Conclusion

Projected changes in climate change imperil the forest carbon balance. During the 21st century, increases in wildfire hazard, drought frequency, and forest vulnerability will represent threats to the survival and growth of trees as well as the safety and health of persons. Projected wildfire disturbances and land-use changes (i.e., development), indicate that, by the middle of the 21st century, the Sierra Nevada region will lose more than 25 percent of the carbon stored in living biomass.[64]

Fire managers, analysts, and resource specialists value wildfire vulnerability assessment and its role in terms of informing decision makers and helping implement action under the framework processes. It is the hope that this report discussing Calaveras County natural and working lands inventories, potential for future wildfire-related GHG emissions, climate change vulnerability assessment specific to wildfire, Butte Fire-specific case studies, and State-agency-supported wildfire impact reduction best practices will assist Calaveras County with both GHG emissions reduction planning as well as climate change wildfire hazard and forest resilience planning.

64 OPR, CNRA, and CEC. 2021. California's Fourth Climate Change Assessment Report – Sierra Nevada Region Report. Available: <https://www.energy.ca.gov/sites/default/files/2019-11/Reg_Report-SUM-CCCA4-2018-004_SierraNevada_ADA.pdf>. Accessed May 28, 2021.

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Appendix C. GHGRP Measure Quantifications & Substantial Evidence

DOCUMENTS ATTACHED BELOW

Strategy	Measure Number	Measure	Description	Annual Reductions from Electricity in 2030 (MTCO2e)	Annual Reductions from Propane & Wood in 2030 (MTCO2e)	Total Annual Reductions in 2030 (MTCO2e)	Annual Reductions from Electricity in 2045 (MTCO2e)	Annual Reductions from Propane & Wood in 2045 (MTCO2e)	Total Annual Reductions in 2045 (MTCO2e)
Increase Renewable Energy	RE-1	Increase Community Renewable Energy	Convert 50% of existing residential grid electricity and 30% of existing commercial grid electricity to renewable electricity by 2030. - Increase the use of renewable energy in the community and support efforts to increase renewable and carbon-free energy generation, including wind, solar, hydro, and biomass, and to ensure customer access to this renewable energy. - Encourage on-site renewable energy generation and storage systems for residents and businesses. - Develop a robust renewable energy program that provides outreach, financing opportunities, and technical assistance to residents and businesses. - Pursue community solar projects. - Work with large energy users to transition towards renewable and zero net energy projects. - Pursue distributed energy resources (DERs), microgrids, energy storage opportunities, and grid optimization projects.	451		451	-		-
	RE-2	Implement On-Site Renewable Energy Generation (Government Operations)	Support efforts on available government-owned land or buildings to increase renewable and carbon-free energy generation, including, wind, solar, hydro, and biomass. Promote on-site renewable energy generation and energy storage. Evaluate the renewable energy potential and assess barriers to increased renewable energy generation.			Not quantified - reductions accounted for under RE-1.			Not quantified - reductions accounted for under RE-1.
Perform Energy Education and Outreach	EO-1	Conduct Energy Conservation Outreach and Education	Conduct energy conservation and efficiency education and outreach to residents and businesses. Support and promote programs for lower-income and disadvantaged populations. Increase awareness of resources and financing opportunities for homes and businesses to: (1) replace old appliances with energy-efficient models, (2) conduct retrofits to HVAC systems and building envelope, (3) upgrade to efficient lighting, (4) replace old and inefficient wood- and propane-burning heaters, and (5) add smart controls and sensors. This includes property owners (primary, vacation, and second homeowners), property management groups, and landlords. Increase participation in voluntary residential and commercial energy efficiency programs. Provide opportunities for homes and businesses to complete energy audits and pursue rebates and financing options to implement energy efficiency measures. Educate citizens about low income home weatherization programs (DOE Weatherization Assistance Program, California's Low-Income Weatherization Program, utility-offered Energy Savings Assistance Program, local program). Educate about existing housing rehabilitation loan programs. Partner with the local utilities (PG&E and Calaveras Public Power Agency) to promote existing energy programs for residents and businesses.	154	240	394	-	67	67
Retrofit Existing Buildings	EB-1	Facilitate Energy Efficiency Retrofits	The City will pursue funding to help facilitate (i.e., incentivize) energy-efficient upgrades for homes and businesses, such as upgrading outdated wood-burning and propane appliances with more-efficient models, as discussed in EO-1.	168	212	380	-	138	138
	EB-2	Establish a Green Business Program	Establish a green business program that certifies businesses based on criteria such as energy efficiency, employee wellness, water and waste reduction, etc. Benefits to employee wellness could include active transportation, cleaner air, etc.	3	0	3	-	0	0
	EB-3	Implement an Electrification Time-of-Replacement Ordinance	By 2025, adopt an ordinance that requires residential and commercial fossil fuel-powered space and water heating appliances be replaced with electric alternatives at time of replacement.	-89	1,008	919	-	2,560	2,560
	EB-4	Improve Building Energy Efficiency of Government Operations	Pursue grants to improve the energy efficiency of existing city buildings and infrastructure whenever a project is undertaken to improve or maintain them. This includes maintenance or improvement of both interior and exterior (streetlight, parking lot lighting, traffic signals, and other outdoor area lighting) operations. Energy efficiency improvements include retrofits or commissioning/retrocommissioning to HVAC, lighting, controls, sensors, building envelope, and any other energy loads.			Not quantified - reductions accounted for under EB-1.			Not quantified - reductions accounted for under EB-1.
Efficient New Construction	NC-1	Implement Reach Codes	Pursue reach codes and green building standards that go beyond Title 24. Examples include: incentives for exceeding minimum building energy performance, requiring new construction to be fully electric (no propane), or requiring energy audits.	20	41	62	-	92	92
	NC-2	Incentivize ZNE New Construction	Incentivize new residential and nonresidential buildings to be built all-electric and install renewable energy generation and energy storage systems that can fully offset energy needs.		2	2		12	12
			Total Annual Energy GHG Reductions (MTCO2e)	**706**	**1,504**	**2,210**	**-**	**2,870**	**2,870**

Emissions Reductions by Sector		
Sector	**2030**	**2045**
Residential	1,897	2,824
Nonresidential	314	46
Total	**2,210**	**2,870**

RE-1: Increase Community Renewable Energy **Convert 50% of existing residential grid electricity and 30% of existing commercial grid electricity to renewable electricity by 2030.**	**2018**	**2030**	**2045**
Existing energy use in residential buildings			
Existing residential grid electricity usage (MWh) (after EB-3, EB-1, and EO-1)	13,993	12,438	12,485
Assumed percent increase in residential renewable energy [1]		50%	90%
Reduced grid electricity usage (MWh)		6,219	11,236
PG&E electricity emissions factor (MTCO2e/MWh)		0.05170	0
GHG reductions from existing residential renewable energy (MTCO2e)		322	0
Existing energy use in commercial buildings*			
Existing commercial PG&E electricity usage (MWh) (after EB-3, EB-1, EO-1, and EB-2)	11,205	8,344	6,887
Existing commercial CPPA electricity usage (MWh) (after EB-3, EB-1, EO-1, and EB-2)	1,467	1,092	902
Target percent increase in commercial renewable energy [1]		30%	90%
Reduced PG&E grid electricity usage (MWh)		2,503	6,198
Reduced CPPA grid electricity usage (MWh)		328	811
PG&E electricity emissions factor (MTCO2e/MWh)		0.05170	0
CPPA electricity emissions factor (MTCO2e/MWh)		0.00000	0
GHG emissions reductions from PG&E electricity (MTCO2e)		129	0
GHG emissions reductions from CPPA electricity (MTCO2e)		0	0
GHG reductions from existing commercial retrofits (MTCO2e)		129	0
GHG Reductions from RE-1: Increase Community Renewable Energy (MTCO2e)		**451**	**-**

Sources:

[1] City communications - based on permit data, assumes a residential and commercial solar insall rate of approximately 6% and 3.5% per year through 2030, respectively. City expects 50% residential installation by 2030. Assumes declining annual rate reaching 90% by 2045.

EO-1: Conduct Energy Conservation Outreach and Education			
Reduce existing and new residential and commercial energy use (all sources) by 12% in 2030 and 2045 through robust energy conservation outreach and education.	**2018**	**2030**	**2045**
Existing energy use in residential buildings			
Existing residential PG&E electricity usage (MWh) (after EB-3 and EB-1)	13,993	14,134	14,187
Existing residential propane usage (gallons) (after EB-3 and EB-1)	485,623	289,553	65,923
Existing residential wood usage (MMBtu) (after EB-3 and EB-1)	31,313	21,841	2,348
Target percent energy conservation in existing residential buildings [1 2 3]*		12%	12%
Reduced electricity usage (MWh)		1,696	1,702
Reduced propane usage (gallons)		34,746	7,911
Reduced wood usage (MMBtu)		2,621	282
PG&E electricity emissions factor (MTCO2e/MWh)		0.05170	0.00000
Propane emissions factor (MTCO2e/gal)		0.00565	0.00565
Wood emissions factor (MTCO2e/MMBtu)		0.00996	0.00996
GHG emissions reductions from electricity (MTCO2e)		87.69	0
GHG emissions reductions from propane (MTCO2e)		196.23	45
GHG emissions reductions from wood (MTCO2e)		26.11	3
GHG reductions from energy conservation in existing residential buildings (MTCO2e)		310	47
Existing energy use in commercial buildings			
Existing commercial PG&E electricity usage (MWh) (after EB-3 and EB-1)	11,205	9,536	7,871
Existing commercial CPPA electricity usage (MWh) (after EB-3 and EB-1)	1,467	1,248	1,030
Existing commercial propane usage (gallons) (after EB-3 and EB-1)	9,736	6,413	2,644
Target percent energy conservation in existing commercial buildings [1 2 3]*		12%	12%
Reduced PG&E electricity usage (MWh)		1,144	944
Reduced CPPA electricity usage (MWh)		150	124
Reduced propane usage (gallons)		770	317
PG&E electricity emissions factor (MTCO2e/MWh)		0.05170	0.00000
CPPA electricity emissions factor (MTCO2e/MWh)		0.00000	0.00000
Propane emissions factor (MTCO2e/gal)		0.00565	0.00565
GHG emissions reductions from PG&E electricity (MTCO2e)		59.16	0
GHG emissions reductions from CPPA electricity (MTCO2e)		0.00	0
GHG emissions reductions from propane (MTCO2e)		4.35	2
GHG reductions from energy conservation in existing commercial buildings (MTCO2e)		64	2
New energy use in residential buildings	**2018**	**2030**	**2045**
Forecast residential electricity usage (MWh) (after ZNE-1)	13,993	14,506	14,702
Forecast residential propane usage (gallons) (after ZNE-1 and ZNE-2)	485,623	503,132	508,363
Forecast residential wood usage (MMBtu) (after ZNE-1 and ZNE-2)	31,313	32,442	32,779
New residential electricity usage (MWh)		513	709
New residential propane usage (gallons)		17,509	22,740
New residential wood usage (MMBtu)		1,129	1,466
Target percent energy conservation in new residential buildings [1 2 3]*		12%	12%
Reduced electricity usage (MWh)		62	85
Reduced propane usage (gallons)		2,101	2,729
Reduced wood usage (MMBtu)		135	176

PG&E electricity emissions factor (MTCO2e/MWh)		0.05170	0.00000
Propane emissions factor (MTCO2e/gal)		0.00565	0.00565
Wood emissions factor (MTCO2e/MMBtu)		0.00996	0.00996
GHG emissions reductions from electricity (MTCO2e)		3.18	0
GHG emissions reductions from propane (MTCO2e)		11.87	15
GHG emissions reductions from wood (MTCO2e)		1.35	2
GHG reductions from energy conservation in new residential buildings (MTCO2e)		16	17
New energy use in commercial buildings	**2018**	**2030**	**2045**
Forecast commercial PG&E electricity usage (MWh) (after ZNE-1)	11,205	11,778	12,236
Forecast commercial CPPA electricity usage (MWh) (after ZNE-1)	1,467	1,542	1,602
Forecast commercial propane usage (gallons) (after ZNE-1 and ZNE-2)	9,736	10,226	10,548
New commercial PG&E electricity usage (MWh)		573	1,031
New commercial CPPA electricity usage (MWh)		75	135
New commercial propane usage (gallons)		490	813
Target percent energy conservation in new commercial buildings [1 2 3]*		12%	12%
Reduced PG&E electricity usage (MWh)		69	124
Reduced CPPA electricity usage (MWh)		9	16
Reduced propane usage (gallons)		59	98
PG&E electricity emissions factor (MTCO2e/MWh)		0.05170	0
CPPA electricity emissions factor (MTCO2e/MWh)		0.00000	0
Propane emissions factor (MTCO2e/gal)		0.00565	0.00565
GHG emissions reductions from PG&E electricity (MTCO2e)		3.56	0
GHG emissions reductions from CPPA electricity (MTCO2e)		0.00	0
GHG emissions reductions from propane (MTCO2e)		0.33	1
GHG reductions from energy conservation in new commercial buildings (MTCO2e)		4	1
GHG Reductions from EO-1: Conduct Energy Conservation Outreach and Education (MTCO2e)		**394**	**67**

Sources:

[1] https://www.aceee.org/files/proceedings/2000/data/papers/SS00_Panel8_Paper10.pdf

[2] https://19january2017snapshot.epa.gov/sites/production/files/2015-08/documents/national_action_plan_for_energy_efficiency_report_chapter_6_energy_efficiency_program_best_practices.pdf

[3] https://www.aceee.org/sites/default/files/publications/researchreports/e063.pdf

**Suggested target percent energy reduction from retrofits for City's consideration*

EB-1: Facilitate Energy Efficiency Retrofits			
The City will pursue funding to help facilitate (i.e., incentivize) energy-efficient upgrades for homes and businesses, such as upgrading outdated wood-burning and propane appliances with more-efficient models, as discussed in EO-1.	**2018**	**2030**	**2045**
Existing energy use in residential buildings			
Existing residential electricity usage (MWh) (after EB-3)	13,993	15,705	18,916
Existing residential propane usage (gallons) (after EB-3)	485,623	321,725	87,898
Existing residential wood usage (MMBtu) (after EB-3)	31,313	24,268	3,131
Target percent energy reduction for existing residential buildings [1]*		10%	25%
Reduced electricity usage (MWh)		1,570	4,729
Reduced propane usage (gallons)		32,173	21,974
Reduced wood usage (MMBtu)		2,427	783
PG&E electricity emissions factor (MTCO2e/MWh)		0.05170	0
Propane emissions factor (MTCO2e/gal)		0.00565	0.00565
Wood emissions factor (MTCO2e/MMBtu)		0.00996	0.00996
GHG emissions reductions from electricity (MTCO2e)		81	0
GHG emissions reductions from propane (MTCO2e)		182	124
GHG emissions reductions from wood (MTCO2e)		24	8
GHG reductions from existing residential energy efficiency retrofits (MTCO2e)		287	132
Existing energy use in commercial buildings			
Existing commercial PG&E electricity usage (MWh) (after EB-3)	11,205	11,219	11,244
Existing commercial CPPA electricity usage (MWh) (after EB-3)	1,467	1,469	1,472
Existing commercial propane usage (gallons) (after EB-3)	9,736	7,545	3,778
Target percent energy reduction for existing commercial buildings [2 3]*		15%	30%
Reduced PG&E electricity usage (MWh)		1,683	3,373
Reduced CPPA electricity usage (MWh)		220	442
Reduced propane usage (gallons)		1,132	1,133
PG&E electricity emissions factor (MTCO2e/MWh)		0.05170	0
CPPA electricity emissions factor (MTCO2e/MWh)		0.00000	0
Propane emissions factor (MTCO2e/gal)		0.00565	0.00565
GHG emissions reductions from PG&E electricity (MTCO2e)		87	0
GHG emissions reductions from CPPA electricity (MTCO2e)		0	0
GHG emissions reductions from propane (MTCO2e)		6	6
GHG reductions from existing commercial energy efficiency retrofits (MTCO2e)		93	6
GHG Reductions from EB-1: Facilitate Energy Efficiency Retrofits (MTCO2e)		**380**	**138**

Sources:

[1] California Energy Commission. 2014. Impact Evaluation of the California Comprehensive Residential Retrofit Programs.

[2] https://www.pnnl.gov/main/publications/external/technical_reports/PNNL-20761.pdf.

[3] https://www.pnnl.gov/main/publications/external/technical_reports/PNNL-20814.pdf

**Suggested target percent energy reduction from retrofits for City's consideration*

EB-2: Establish a Green Business Program			
Establish a green business program that certifies businesses based on criteria such as energy efficiency, employee wellness, water and waste reduction, etc.	**2018**	**2030**	**2045**
Existing energy use in commercial buildings			
Existing commercial PG&E electricity usage (MWh) (after EB-3 and EB-1)	11,205	9,536	7,871
Existing commercial CPPA electricity usage (MWh) (after EB-3 and EB-1)	1,467	1,248	1,030
Existing commercial propane usage (gallons)	9,736	6,413	2,644
Target participation rate*		5%	5%
Target percent energy reduction for existing commercial buildings*		10%	10%
Reduced PG&E electricity usage (MWh)		48	39
Reduced CPPA electricity usage (MWh)		6	5
Reduced propane usage (gallons)		32	13
PG&E electricity emissions factor (MTCO2e/MWh)		0.05170	0
CPPA electricity emissions factor (MTCO2e/MWh)		0.00000	0
Propane emissions factor (MTCO2e/gal)		0.00565	0.00565
GHG emissions reductions from PG&E electricity (MTCO2e)		2	0
GHG emissions reductions from CPPA electricity (MTCO2e)		0	0
GHG emissions reductions from propane (MTCO2e)		0	0
GHG reductions from existing green businesses (MTCO2e)		3	0
New energy use in commercial buildings	**2018**	**2030**	**2045**
New commercial PG&E electricity usage (MWh) (after ZNE-1)	11,205	11,778	12,236
New commercial CPPA electricity usage (MWh) (after ZNE-1)	1,467	1,542	1,602
New commercial propane usage (gallons) (after ZNE-1 and ZNE-2)	9,736	10,226	10,548
New commercial PG&E electricity usage (MWh)		573	1,031
New commercial CPPA electricity usage (MWh)		75	135
New commercial propane usage (gallons)		490	813
Target participation rate*		5%	5%
Target percent energy reduction for new commercial buildings*		10%	10%
Reduced PG&E electricity usage (MWh)		3	5
Reduced CPPA electricity usage (MWh)		0	1
Reduced propane usage (gallons)		2	4
PG&E electricity emissions factor (MTCO2e/MWh)		0.05170	0.00000
CPPA electricity emissions factor (MTCO2e/MWh)		0.00000	0.00000
Propane emissions factor (MTCO2e/gal)		0.00565	0.00565
GHG emissions reductions from PG&E electricity (MTCO2e)		0	0
GHG emissions reductions from CPPA electricity (MTCO2e)		0	0
GHG emissions reductions from propane (MTCO2e)		0	0
GHG reductions from new green businesses (MTCO2e)		0	0
GHG Reductions from EB-2: Establish a Green Business Program (MTCO2e)		**3**	**0**

Sources:

**Suggested target participation rate and percent energy reduction from green businesses for City's consideration*

EB-3: Implement an Electrification Time-of-Replacement Ordinance			
By 2025, adopt an ordinance that requires residential and commercial fossil fuel-powered space and water heating appliances be replaced with electric alternatives at time of replacement.	**2018**	**2030**	**2045**
Existing non-electricity energy use in residential buildings			
Existing residential propane usage (gallons)	485,623	485,623	485,623
Existing residential wood usage (MMBtu)	31,313	31,313	31,313
Percentage of homes with replaced propane water heating [1]*		45%	90%
Percentage of residential propane usage used for water heating [2]		59%	59%
Reduced propane usage from water heating (gallons)		128,933	257,866
Percentage of homes with replaced propane and wood space heating [3 4 5]*		23%	90%
Percentage of residential propane usage used for space heating [2]		32%	32%
Percentage of residential wood usage used for space heating**		100%	100%
Reduced propane usage from space heating (gallons)		34,965	139,859
Reduced wood usage from space heating (MMBtu)		7,045	28,182
Propane emissions factor (MTCO2e/gal)		0.00565	0.00565
Wood emissions factor (MTCO2e/MMBtu)		0.00996	0.00996
GHG emissions reductions from propane (MTCO2e)		926	2,246
GHG emissions reductions from wood (MTCO2e)		70	281
GHG reductions from residential time-of-replacement electrification (MTCO2e)		996	2,527
Additional residential electricity use and emissions			
Assumed average efficiency of propane heating [6]		80%	80%
Assumed average efficiency of wood heating [7]		71%	71%
Assumed average efficiency of electric heating [8]		300%	300%
MWh per gallon propane conversion		0.0280	0.0280
MWh per MMBtu wood conversion		0.2931	0.2931
Total propane use reduced from electrification (gallons)		163,898	397,725
Total PG&E electricity needed to offset propane (MWh)		1,223	2,969
Total wood use reduced from electrification (MMBtu)		7,045	28,182
Total PG&E electricity needed to offset wood (MWh)		489	1,955
Total additional PG&E electricity needed (MWh)		1,712	4,924
PG&E electricity emissions factor (MTCO2e/MWh)		0.05170	0
Additional GHG emissions from residential electricity use (MTCO2e)		89	0
Existing energy use in commercial buildings	**2018**	**2030**	**2045**
Existing commercial propane usage (gallons)	9,736	9,736	9,736
Percentage of businesses with replaced propane water heating [1]*		45%	90%
Percentage of commercial propane usage used for water heating [9]		32%	32%
Reduced propane usage from water heating (gallons)		1,402	2,804
Percentage of businesses with replaced propane space heating [3 4 5]*		23%	90%
Percentage of commercial propane usage used for space heating [9]		36%	36%
Reduced propane usage from space heating (gallons)		789	3,154
Propane emissions factor (MTCO2e/gal)		0.00565	0.00565

GHG emissions reductions from propane (MTCO2e)	12	34
GHG reductions from commercial time-of-replacement electrification (MTCO2e)	12	34
Additional commercial electricity use and emissions		
Assumed average efficiency of propane heating [6]	80%	80%
Assumed average efficiency of electric heating [8]	300%	300%
MWh per gallon propane conversion	0.0280	0.0280
Total propane use reduced from electrification (gallons)	2,191	5,958
Total PG&E electricity needed to offset propane (MWh)***	14.46	39.32
Total CPPA electricity needed to offset propane (MWh)***	1.89	5.15
PG&E electricity emissions factor (MTCO2e/MWh)	0.05170	0
CPPA electricity emissions factor (MTCO2e/MWh)	0.00000	0
GHG emissions reductions from PG&E electricity (MTCO2e)	1	0
GHG emissions reductions from CPPA electricity (MTCO2e)	0	0
Additional GHG emissions from commercial electricity use (MTCO2e)	1	0
GHG Reductions from EB-3: Implement an Electrification Time-of-Replacement Ordinance (MTCO2e)	**919**	**2,560**

Sources:

[1] https://www.lowes.com/n/how-to/when-to-replace-a-water-heater
[2] https://www.energy.ca.gov/sites/default/files/2021-08/CEC-200-2021-005-PO.pdf
[3] https://www.hud.gov/sites/documents/EUL_FOR_CNA_E_TOOL.PDF
[4] https://docs.cpuc.ca.gov/published/Final_decision/11474-13.htm
[5] https://www.caetrm.com/measure/SWHC031/03/#life-cycle
[6] https://www.aceee.org/sites/default/files/publications/researchreports/a1803.pdf
[7] https://19january2021snapshot.epa.gov/burnwise/frequent-questions-about-wood-burning-appliances_.html
[8] U.S. DOE. 2023. Air Source Heat Pumps. Available: https://www.energy.gov/energysaver/air-source-heat-pumps
[9] California Commercial End-Use Survey. 2006. https://planning.lacity.org/eir/CrossroadsHwd/deir/files/references/C19.pdf

**Accounts for an assumed non-compliance rate of 10%*

***Assumes that residential wood is used soley for space heating*

****Commercial electricity apportioned between utilities using forecasted electricity consumption*

NC-1: Implement Reach Codes				
Pursue reach codes and green building standards that go beyond Title 24.	**2018**	**2024**	**2030**	**2045**
New energy use in residential buildings				
Forecast residential electricity usage (MWh)	13,993	14,342	14,690	15,109
Forecast residential propane usage (gallons)	485,623	497,728	509,832	524,349
Forecast residential wood usage (MMBtu)	31,313	32,094	32,874	33,810
New residential electricity usage starting in 2025 (MWh)			349	767
New residential propane usage starting in 2025 (gallons)			12,105	26,622
New residential wood usage starting in 2025 (MMBtu)			781	1,717
Percent efficiency improvement for new residential construction [1]			53%	53%
Reduced electricity usage (MWh)			185	407
Reduced propane usage (gallons)			6,416	14,109
Reduced wood usage (MMBtu)			414	910
PG&E electricity emissions factor (MTCO2e/MWh)			0.05170	0
Propane emissions factor (MTCO2e/gal)			0.00565	0.00565
Wood emissions factor (MTCO2e/MMBtu)			0.00996	0.00996
GHG emissions reductions from electricity (MTCO2e)			10	0
GHG emissions reductions from propane (MTCO2e)			36	80
GHG emissions reductions from wood (MTCO2e)			4	9
GHG reductions from residential reach codes (MTCO2e)			50	89
New energy use in commercial buildings	**2018**	**2024**	**2030**	**2045**
Forecast commercial PG&E electricity usage (MWh)	11,205	11,595	11,985	12,959
Forecast commercial CPPA electricity usage (MWh)	1,467	1,518	1,569	1,697
Forecast commercial propane usage (gallons)	9,736	10,075	10,413	11,260
New commercial PG&E electricity usage starting in 2025 (MWh)			390	1,365
New commercial CPPA electricity usage starting in 2025 (MWh)			51	179
New commercial propane usage starting in 2025 (gallons)			339	1,186
Percent efficiency improvement for new commercial construction [2]			30%	30%
Reduced PG&E electricity usage (MWh)			207	723
Reduced CPPA electricity usage (MWh)			27	95
Reduced propane usage (gallons)			180	628
PG&E electricity emissions factor (MTCO2e/MWh)			0.05170	0
CPPA electricity emissions factor (MTCO2e/MWh)			0.00000	0
Propane emissions factor (MTCO2e/gal)			0.00565	0.00565
GHG emissions reductions from PG&E electricity (MTCO2e)			11	0
GHG emissions reductions from CPPA electricity (MTCO2e)			0	0
GHG emissions reductions from propane (MTCO2e)			1	4
GHG reductions from commercial reach codes (MTCO2e)			12	4
GHG Reductions from NC-1: Implement Reach Codes (MTCO2e)			**62**	**92**

Sources:

[1] https://energycodeace.com/download/35132/file_path/fieldList/Whats%20New.2019%20Residential%20Code.pdf

[2] https://energycodeace.com/download/35133/file_path/fieldList/Whats%20New.2019%20Nonresidential%20Code

NC-2: Incentivize ZNE New Construction

Incentivize new residential and nonresidential buildings to be built all-electric and install renewable energy generation and energy storage systems that can fully offset energy needs.	**2018**	**2024**	**2030**	**2045**
New non-electricity energy use in residential buildings				
Forecast residential propane usage (gallons) (after NC-1)	485,623	497,728	503,417	510,240
Forecast residential wood usage (MMBtu) (after NC-1)	31,313	32,094	32,460	32,900
New residential propane usage starting in 2025 (gallons)			5,689	12,512
New residential wood usage starting in 2025 (MMBtu)			367	807
Target percent new residential construction that is ZNE*			5%	15%
Reduced propane usage (gallons)			284	1,877
Reduced wood usage (MMBtu)			18	121
Propane emissions factor (MTCO2e/gal)			0.00565	0.00565
Wood emissions factor (MTCO2e/MMBtu)			0.00996	0.00996
GHG emissions reductions from propane (MTCO2e)			2	11
GHG emissions reductions from wood (MTCO2e)			0	1
GHG reductions from new residential ZNE buildings (MTCO2e)			2	12
New non-electricity energy use in commercial buildings	**2018**	**2024**	**2030**	**2045**
Forecast commercial propane usage (gallons) (after NC-1)	9,736	10,075	10,234	10,632
New commercial propane usage starting in 2025 (gallons)			159	557
Target percent new commercial construction that is ZNE*			5%	15%
Reduced propane usage (gallons)			8	84
Propane emissions factor (MTCO2e/gal)			0.00565	0.00565
GHG emissions reductions from propane (MTCO2e)			0	0
GHG reductions from new commercial ZNE buildings (MTCO2e)			0	0
GHG Reductions from NC-2: Incentivize ZNE New Construction (MTCO2e)			**2**	**12**

Sources:

**Suggested target percent new construction that is ZNE for City's consideration*

Measure TR-1: Increase electric vehicle (EV)/zero-emission vehicle (ZEV) adoption to 30% for passenger vehicles and 30% for commercial vehicles within the City by 2030.

Inputs and Assumptions		Source
Total registered vehicles in Angels Camp (2018)	4,970	https://www.dmv.ca.gov/portal/uploads/2020/09/MotorVehicleFuelTypes_City_01012020.pdf
Registered EVs in Angels Camp (2018)	33	https://www.dmv.ca.gov/portal/uploads/2020/09/MotorVehicleFuelTypes_City_01012020.pdf
2018 population	3,897	Population provided by SBE
Cars per capita	1.28	
EV cars per public EV charger	20	In line with leading EV cities in California (Cupertino, San Francisco, LA)
EV chargers in Angel Camp	3	https://www.plugshare.com/directory/us/california
Population Scaling factor	0.086150105	

Inputs	**2025**	**2030**	**2035**	**2040**	**2045**	
Percentage of passenger vehicles that are electric (%)	10.0%	30.0%	30.0%	50.0%	75.0%	*Suggested EV goals for city's consideration
Percentage of commercial vehicles that are electric (%)	5.0%	30.0%	25.0%	30.0%	35.0%	*Suggested EV goals for city's consideration
Baseline EV adoption from EMFAC	**2025**	**2030**	**2035**	**2040**	**2045**	
Passenger EV (%)	3.56%	5.99%	7.77%	8.78%	9.31%	** From EMFAC2021 Analysis
Commercial EV (%)	0.34%	3.96%	12.40%	21.77%	29.12%	** From EMFAC2021 Analysis

Calculations						
Passenger EV						
Year	**2025**	**2030**	**2035**	**2040**	**2045**	
Passenger VMT after mode shift to active transit (miles)	31,426,746	31,751,903	29,411,945	29,592,804	29,644,170	** Assume reductions from active transportation and public transit happen first
Passenger EF (MT CO2e/VMT)	0.0003409	0.0003049	0.0002798	0.0002695	0.0002579	** From EMFAC2021 Analysis
EV adoption beyond baseline	6.4%	24.0%	22.2%	41.2%	65.7%	
Total Reductions (MT CO2e)	**690**	**2,324**	**1,829**	**3,287**	**5,021**	
Commercial EV						
Year	**2025**	**2030**	**2035**	**2040**	**2045**	
Commercial VMT after mod shift to active transit (miles)	4,559,915	3,965,310	3,634,041	3,491,095	3,485,958	
On-road EF (MT CO2e/VMT)	0.00100	0.00099	0.00092	0.00086	0.00079	** From EMFAC2021 Analysis
EV adoption beyond baseline	4.7%	26.0%	12.6%	8.2%	5.9%	
Total Reductions (MT CO2e)	**213**	**1,019**	**420**	**246**	**162**	
EV Charger Count Calculations						
Year	**2025**	**2030**	**2035**	**2040**	**2045**	
Population	3,957	4,042	4,104	4,138	4,157	
Total estimated registered vehicles	5,047	5,155	5,234	5,277	5,302	
Additional registered EVs	325	1,238	1,164	2,175	3,483	
Additional public EV chargers needed to support EV goal	16	62	58	109	174	

Measure TR-2: Decarbonize the City municipal fleet

Inputs and Assumptions						
Inputs	**2025**	**2030**	**2035**	**2040**	**2045**	
Percentage reduction in municipal fleet emissions (%)	20.0%	40.0%	60.0%	80.0%	100.0%	*Suggested municipal fleet goals for city's consideration

Calculations						
Year	**2025**	**2030**	**2035**	**2040**	**2045**	
Municipal Fleet Emissions (MT CO2e)	210	210	210	210	210	*Emissions pulled from the City's 2018 GHG Inventory Report and are assumed constant through 2045
Total Reductions (MT CO2e)	**42**	**84**	**126**	**168**	**210**	**To be applied to municipal inventory only to avoid double counting (the commuter VMT is already accounted for in the community inventory and Measure TR-1)

Measure TR-3: Increase active transportation mode share within the City 2% by 2030.

Inputs and Assumptions		Source
Existing bicycle mode share (2018)	0.0%	https://data.census.gov/table?t=Commuting&g=160XX00US0602112&tid=ACSST5Y2018.S0801
Existing walk mode share (2018)	3.5%	https://data.census.gov/cedsci/table?t=Commuting&g=1600000US0602113
Average bike trip length (miles)	1.5	Caltrans California Household Travel Survey (2013)/CARB Bike Path Reductions Technical Documentation (2019)
Average walking trip length (miles)	0.3	https://ww2.arb.ca.gov/sites/default/files/auction-proceeds/pedestrian_facilities_technical_041519.pdf

Inputs	**2025**	**2030**	**2035**	**2040**	**2045**	
Total Active Mode Share Goal	4.0%	5.5%	8.0%	10.0%	12.0%	*Suggested active mode share goals for city's consideration
Bicycle mode share target	0.5%	2.0%	4.5%	6.5%	8.5%	*Suggested active mode share gaols for city's consideration
Walk mode share target	3.5%	3.5%	3.5%	3.5%	3.5%	** Assume walking mode share won't get much higher
Passenger trips/mile	0.1177	0.1152	0.1148	0.1156	0.1159	** From EMFAC2017 Analysis

Calculations						
Year	**2025**	**2030**	**2035**	**2040**	**2045**	
Bike mode share increase from baseline	1%	2%	5%	7%	9%	
Walk mode share increase from baseline	0%	0%	0%	0%	0%	
Passenger VMT	31,669,927	33,187,377	34,441,491	35,507,282	36,435,264	*Total Passenger VMT, including VMT from EVs
Passenger trips	3,726,966	3,821,796	3,954,378	4,105,891	4,223,076	
New bike trips substituted for vehicle trips	18,634.83	76,435.91	177,946.99	266,882.93	358,961.49	
New walk trips substituted for vehicle trips	-	-	-	-	-	
Passenger VMT reduced with bike trips (Miles)	27,952	114,654	266,920	400,324	538,442	
Passenger VMT reduced with walk trips (Miles)	-	-	-	-	-	
Total VMT reduced with bike and walk trips (miles)	27,952	114,654	266,920	400,324	538,442	
Passenger EF (MT CO2e/VMT)	0.000341	0.000305	0.000280	0.000269	0.000258	** From EMFAC2021 Analysis
Total Reductions (MT CO2e)	**10**	**35**	**75**	**108**	**139**	
% reduction in passenger VMT from Measure	0.1%	0%	1%	1%	1%	

Measure TR-4: Increase public transit mode share to 10% by 2030.

Inputs and Assumptions		Source				
Existing public transit mode share (2018)	7.6%	https://data.census.gov/table?t=Commuting&g=160XX00US0602112&tid=ACSST5Y2018.S0801				
Average bike trip length (miles)	14.5	Used average of commuter bus length (25.1 miles) and regular bus length (3.8 miles): https://www.apta.com/wp-content/uploads/Resources/resources/statistics/Documents/FactBook/2018-APTA-Fact-Book.pdf				
Inputs	**2025**	**2030**	**2035**	**2040**	**2045**	
Public transit mode share target (%)	8%	10%	16%	17%	18%	*Suggested active mode share gaols for city's consideration
Passenger trips/mile	0.1177	0.1152	0.1148	0.1156	0.1159	** From EMFAC2021 Analysis

Calculations						
Year	**2025**	**2030**	**2035**	**2040**	**2045**	
Public transit mode share increase from baseline	0%	2%	8%	9%	10%	
Passenger VMT	31,641,974	33,072,723	34,174,570	35,106,958	35,896,821	*Total Passenger VMT, including VMT from Evs minus VMT reduced from active transportation measure
Passenger trips	3,723,676	3,808,592	3,923,731	4,059,600	4,160,667	
New bike trips substituted for vehicle trips	14,894.71	91,406.21	329,593.43	381,602.37	432,709.42	
Passenger VMT reduced with bike trips (Miles)	215,228	1,320,820	4,762,625	5,514,154	6,252,651	
Passenger EF (MT CO2e/VMT)	0.000341	0.000305	0.000280	0.000269	0.000258	** From EMFAC2021 Analysis
Total Reductions (MT CO2e)	**73**	**403**	**1,332**	**1,486**	**1,612**	
% reduction in passenger VMT from Measure	0.7%	4.0%	13.8%	15.5%	17.2%	

Measure TR-5:

Decarbonize 25% of the off-road equipment and vehicles in the City by 2030.

Inputs and Assumptions		Source				
Inputs	**2025**	**2030**	**2035**	**2040**	**2045**	
Percent decarbonized (%)	15%	25%	40%	50%	60%	*Suggested off-road decarbonization for city's consideration

Calculations					
Year	**2025**	**2030**	**2035**	**2040**	**2045**
ABAU Off-road and boating emissions		848			988
Total Reductions (MT CO2e)	**-**	**212**	**-**	**-**	**593**

Measure TR-6:

Partner with the County to develop a tourism economy to help fund the decarbonization of the transportation sector.

Not quantifiable (supportive of Measures TR-1 through TR-5)

Measure TR-7:

Partner with the Rural County Representatives of California (RCRC) to establish Calaveras County and Angels Camp as a pilot program for the decarbonization of the transportation sector in rural communities.

Not quantifiable (supportive of Measures TR-1 through TR-5)

Measure TR-8:

Partner with the County, local utilities, and state agencies to develop a biofuel industry to fund the decarbonization of the transportation sector.

Not quantifiable (supportive of Measures TR-1 through TR-5)

Measure TR-9:

Establish Angeles Camp and Calaveras County as a pilot program for a rural carbon-free transportation system through State investment and grants such as California Climate Investments.

Not quantifiable (supportive of Measures TR-1 through TR-5)

Measure TR-10:

Work with the County to secure federal funding from the Charging and Fueling Infrastructure Discretionary Grant Program to decarbonize the transportation sector.

Not quantifiable (supportive of Measures TR-1 through TR-5)

TR Measures Summary

Year	**2025**	**2030**	**2035**	**2040**	**2045**
ABAU Transporation Emissions (MT CO2e)		14,881			13,136
Total Reductions (MT CO2e)		3,993			7,527
Emissions After Reductions (MT CO2e)		10,887			5,609

SW1. Organic Waste Diversion

Reduction Measure SW1:	The City will coordinate with government-funded and privately sponsored recycling and composting programs to divert 50 percent of food and green yard waste from landfills and reduce short-lived climate pollutants in accordance with Senate Bill (SB) 1383.

Default Assumptions

Methane Recovery Factor:	75%
Oxidation Rate	10%
US Protocol Equation SW4.1 Methane Emissions:	CH4 emissions = GWP*(1-Recovery Factor)*(1-Oxidation Rate)*Total Mass*Sum(Mass

Data Inputs

Applicable Measure	Data Needed	Input				Source of Data	Capture Rate
		2030	2035	2045	EF		
	BAU Tons of Waste (Total tons)	3,694	3,882	4,116			
	BAU Emissions (Total disposal)	1,048	1,065	1,078			
	BAU Methane Recovery Rate	0.62	0.62	0.62		Conservatively Revised to Clear Path Efs	
	BAU Oxidation Rate	0.10	0.10	0.10			
BAU Waste Composition	% of Waste Attributable to Food waste	18%	18%	18%	0.06	(MT CH4/wet short ton)	0.60
	% of Waste Attributable to Grass	1%	1%	1%	0.02	(MT CH4/wet short ton)	0.50
	% of Waste Attributable to Leaves	3%	3%	3%	0.03	(MT CH4/wet short ton)	0.58
	% of Waste Attributable to Branches	3%	3%	3%	0.06	(MT CH4/wet short ton)	0.59
	Food Waste Emissions	439	462	489	0.05		
	Grass Emissions	35	36	39			
	Leaves Emissions	68	72	76			
	Branches Emissions	75	79	84			
	Total Organics CO2 Emissions	**618**	**649**	**688**			
	% Diverted	75%	75%	75%			

Measure Impact

	2030	2035	2045
Solid Waste Reduction (Tons)	695.48	730.82	774.93
% Waste Reduction	19%	19%	19%
Total Emissions Reduction (MT CO2e)	(463)	(487)	(516)

SW2. Divert from Forward to Rock Creek Landfill

Reduction Measure SW2:	The City will divert an additional 5 percent of total City solid waste disposal from Forward Landfill to Rock Creek Landfill.

Default Assumptions

Distance to Forward Landfill (Miles)	55
Distance to Rock Creek Landfill (Miles)	32

Data Inputs

Applicable Measure	Data Needed	Input				Source of Data
		2030	2035	2045	EF	
	Forward Landfill Disposal (tons)	900	914	926		Assumes reduction from SW1
	Rock Creek Landfill Disposal (tons)	2,099	2,238	2,416		Assumes reduction from SW1
	Transport EF	0.00014	0.00014	0.00014	MT CO2e/ton/mile	
	Reduction in Miles for Rock Creek	23.00	23.00	23.00		
Waste Diversion	% Diverted	5%	5%	5%		
	Waste Diverted	45	46	46		
	Miles for Diverted Waste	2,070	2,102	2,129		Assume 2-way trip

Measure Impact

	2030	2035	2045
Diverted Miles	2,070	2,102	2,129
Total Emissions Reduction (MT CO2e)	(0.29)	(0.29)	(0.30)

WW1. Wastewater Treatment Plant Energy Efficiency

Reduction Measure WW1	The City will reduce energy demand per gallon treated at City-operated water and wastewater treatment facilities by 5 percent by 2030.

BAU Information

	2030	2035	2045
BAU Wastewater Energy Use	1,469,793	1,492,410	1,511,644
BAU Wastewater Treatmeant Energy Emissions	6.61	6.72	6.80

Data Input:

	Year	Energy Use Reduction
Reduction Target	2030	5%
	2035	5.00%
	2045	5%

Measure Impact:

	2030	2035	2045
Energy Savings (kwh)	73,489.66	74,620.51	10,284,133.62
Reduced GHG Emissions (MT CO2e)	**(0.33)**	**(0.34)**	**(0.34)**

WW2. Use of Reclaimed (Non-Potable) Water

Reduciton Measure WW-2	The City will expand use of reclaimed (non-potable) water to serve the 106 acres of landscaping at the City's WWTP.

BAU Information

	2018	2030	2035	2045
BAU Potable Water Use	321,800,000	337,842,477	360,142,560	388,862,423
BAU Potable Water Energy	197,600	207,451	210,643	213,358
BAU Emissions	6.53	6.85	6.96	7.05

Data Input:

Input		Unit
Acres to Use Reclaimed Water	106	Acre
Convert to SF	4,617,360	SF
ETAF	0.45	Per CCR Title 23, Division 2, Chapter 2.7
Plant Factor	0.8	Assume General Turf grass
Conversion Factor	0.623	
Water Demand	1,035,582	Gallons

Source for Water Demand: SLIDE to Estimate Landscape Water Requirements" https://ucanr.edu/sites/UrbanHort/Water_Use_of_Turfgrass_and_Landscape_Plant_Materials/SLIDE__Simplified_Irrigation_Demand_Estimation/

Measure Impact:

	All Years
Potable Water Savings Compared to Existing	0.3%
Reduced GHG Emissions (MT CO2e)	**(0.02)**

WW3. Use of Reclaimed (Non-Potable) Water

Reduciton Measure WW-3	The City will work with local/regional agencies to create incentives and rebates for greywater systems to achieve retrofits for 10 percent of existing homes, and grey water systems in 50 percent of new homes. This quantifiable portion used to calculate County-wide goal, which may also be achieve with use of recyled water on public or agricultural lands.

Data Inputs

Applicable Measure	Data Needed	Input			Source of Data	Notes
		2030	2035	2045		
	BAU Emissions	48.56	49.30	49.94		
	Emissions Attributable to Households	38.8452679	39.44116174	39.95292939	Assumes Default ClearPath Commercial/Industrial Multiplier	
	Housing	1724	1750	1773		
	New Housing	82	108	131		
	% of New population using grey water	50%	50%	50%		
	% of old population served by greywater	24%	24%	24%		
WSW-3	Proportion of household water used for gray water	50%	50%	50%	US DOE	60% is maximum

Measure Impact

	Reduction in wastewater treatment		
	2030	2035	2045
WSW-3 (new)	1%	2%	2%
WSW-3 (retrofit))	11%	11%	11%
Total Wastewater Treatment Reducti	**13%**	**13%**	**13%**
Total Emissions Reduction	**(4.90)**	**(5.05)**	**(5.18)**
Total Reduction % From all Water	-10%	-10%	-10%

WW4. Low Water Use Fixtures

WW-4: Require Low-Flow Water Fixtures	The City will adopt a reach code to exceed state-level requirements by 5 percent for the installation of water-conserving appliances in all new residential and non-residential buildings, and the City will require design plans of new development projects to include water-saving features.

Default Assumptions No change in water efficiency requirements between 2019 and 2022 CalGreen. Assumes 2019 is BAU.

Data Inputs

Applicable Measure	Data Needed	Input			Source of I	Notes
		2030	2035	2045		
	BAU Emissions	6.85	6.96	7.05		
WW-4	% Reduction in Water Demand	5%	5%	5%		

Measure Impact

	Reduction in wastewater treatment		
	2030	2035	2045
Total Emissions Reduction	**(0.34)**	**(0.35)**	**(0.35)**

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