Sacramento County Climate Action Plan Administrative Draft

Commented [DK1]: Graphics and cover/title page will be added for the public draft.

Prepared for:
County of Sacramento

January 2021

Sacramento County Climate Action Plan
Administrative Draft

Prepared For:

County of Sacramento
Office of Planning and Environmental Review
827 7th Street, Room 225,
Sacramento, CA 95814

Prepared By:

Ascent Environmental
455 Capitol Mall, Suite 300
Sacramento, CA 95814

January 2021

TABLE OF CONTENTS

Section Page

Appendices

Figures

Tables

1 INTRODUCTION

1.1 CLIMATE ACTION PLAN OVERVIEW

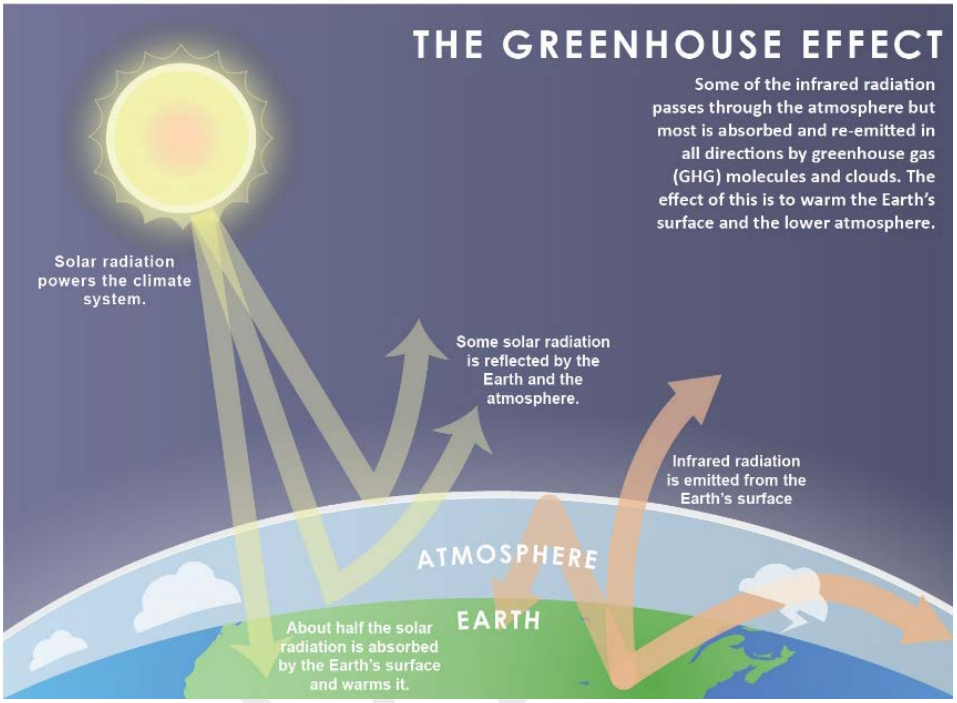
There is strong consensus among the scientific community that global climate change is occurring; average temperatures are increasing, precipitation levels are changing, and sea levels are rising. These changes are already adversely affecting human health and safety, provision of basic services, the availability of natural resources, and economic prosperity. While global climate change is happening worldwide, local efforts to reduce human-induced greenhouse gas (GHG) emissions and build resilience in the face of adverse climate change effects can make a difference. This Climate Action Plan (CAP) provides a comprehensive roadmap that outlines specific activities that will need to take place in Sacramento County (County) to reduce GHG emissions and address the impacts of climate change.

This CAP is organized into six chapters. Chapter 1 introduces climate change mitigation and adaptation, the need for a CAP to address local GHG emissions, and the CAP development process. Chapter 2 summarizes the County's 2015 communitywide and municipal baseline GHG emissions, estimates GHG emission forecasts for target years, and sets GHG reduction targets. Chapter 3 includes a description of strategies and measures the County will take to reduce communitywide GHG emissions. Chapter 4 includes a description of strategies and measures the County will take to reduce municipal GHG emissions. Chapter 5 assess the County's vulnerability to climate change and presents adaptation and resilience strategies. Chapter 6 provides an outline for how the City will implement GHG reduction and resilience strategies including guidelines for monitoring and updating the CAP.

1.2 WHAT IS CLIMATE CHANGE?

Climate change presents a significant threat to society. While natural variations have altered the climate significantly in the past, it is unlikely that the changes in climate observed since the mid-20th century can be explained by natural processes alone. Scientists agree that human activity, particularly the generation of GHGs, is contributing to our changing climate. The greenhouse effect, as outlined below in Figure 1-1, results from a collection of atmospheric gases called GHGs that insulate the Earth and help regulate its temperature. These gases, mainly water vapor, carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), ozone (O_3), and chlorofluorocarbons (CFCs) all act as effective global insulators, reflecting Earth's visible light and infrared radiation to keep temperatures on Earth conducive to life as we know it. The greenhouse effect is essential for the planet to support life.

Figure 1-1 The Greenhouse Effect



Source: Ascent Environmental, 2020.

In recent decades, human activities (e.g., burning of fossil fuels for transportation and energy, increasing rates of deforestation and development) have contributed to elevated atmospheric GHG concentrations. Human-caused (i.e., anthropogenic) emissions of GHGs above natural ambient concentrations are responsible for intensifying the greenhouse effect and leading to a trend of unnatural warming of the Earth's climate, known as global climate change, or global warming. There is strong scientific consensus that it is "extremely likely" that most of the changes in the world's climate during the last 50 years are a result of anthropogenic GHG emissions (IPCC 2014). Global climate change, in turn, is the driver behind changes in precipitation patterns, shrinking polar ice caps, sea level rise, and other impacts to biological resources and humans.

1.2.1 Climate Change Mitigation and Adaptation

Addressing climate change requires an integrated approach that targets both the sources and the potential effects of climate change. GHG emissions are responsible for causing climate change. The largest source of GHG emissions from human activities is from burning fossil fuels for electricity, heat, and transportation. Efforts that focus on reducing the sources of climate change are called climate change mitigation, GHG mitigation, or climate action planning. Chapters 2, 3, and 4 of this CAP focus on climate change mitigation. Efforts to reduce harm from the effects of climate change, such as impacts to

communities from flooding and from increased extreme heat events, are called climate adaptation or resilience. Chapter 5 of this CAP focuses on climate change adaptation.

Figure 1-2 illustrates the relationship between these two approaches (CalOES 2020).

Figure 1-2 Relationship between Climate Mitigation and Adaptation

Source: California Office of Emergency Services, 2020.

1.3 REGULATORY FRAMEWORK

In response to the threat of global climate change, federal and State regulations have been enacted to both reduce GHG emissions and adapt to climate change. Additionally, the County has also taken steps to address climate change. These efforts, briefly summarized below, provide important policy direction and context for the CAP.

1.3.1 Key State Regulations and Planning Efforts

In 2005, Governor Arnold Schwarzenegger signed Executive Order S-3-05, which directed California to reduce GHG emissions to 1990 levels by 2020, and to 80 percent below 1990 levels by 2050. A year later, in 2006, the Global Warming Solutions Act (Assembly Bill [AB] 32) was passed, establishing regulatory, reporting, and market mechanisms to achieve quantifiable reductions in GHG emissions. AB 32 put a cap on GHG emissions, setting a target of reducing GHG emissions to 1990 levels by 2020. As part of its implementation of AB 32 and Executive Order (EO) S-3-05, the California Air Resources Board (CARB)

developed a Scoping Plan in 2008 to describe the State's approach to achieving GHG reduction targets and goals.

On April 20, 2015, Governor Edmund G. Brown Jr. signed EO B-30-15, establishing a new GHG emissions reduction target of 40 percent below 1990 levels by 2030. This target aligns with those of leading international governments such as the 28-nation European Union which adopted the same target in October 2014. EO B-30-15 also directed CARB to update the AB 32 Scoping Plan to reflect the path to achieving the 2030 target. In September 2016, Governor Brown also signed Senate Bill (SB) 32, which codified into statute the mid-term 2030 target established by EO B-30-15. The 2030 GHG emissions reduction target places California on a trajectory towards meeting the goal of reducing statewide emissions to 80 percent below 1990 levels by 2050. EO B-55-18, signed in September 2018, furthers California's efforts to reduce GHG emissions by setting a goal to achieve carbon neutrality by 2045 and achieve net negative GHG emissions thereafter.

In November 2017, CARB published California's 2017 Climate Change Scoping Plan (2017 Scoping Plan), which lays out the framework for achieving the 2030 reductions as established in EO B-30-15 and SB 32. The 2017 Scoping Plan identifies GHG reductions by emissions sector to achieve a statewide emissions level that is 40 percent below 1990 levels by 2030.

To effectively address the challenges that a changing climate will bring, the State also prepared the 2009 California Climate Adaptation Strategy (Adaptation Strategy), which highlights climate risks and outlines possible solutions that can be implemented throughout California. This Adaptation Strategy was updated in 2014, and again in 2018, and is now known as Safeguarding California. Safeguarding California Plan 2018 Update is the State's roadmap to protect communities, infrastructure, services, and the natural environment from climate change impacts.

1.3.2 Sacramento County Planning Efforts

The County's 2030 General Plan is intended to guide growth and development within the unincorporated County. The plan addresses a wide variety of issues from land use and housing to open space and safety. The plan contains goals, objectives, and policies that are intended to enhance and preserve the quality of life for County residents, enhance economic strengths, and preserve agricultural heritage. Notably, many general plan goals and policies also serve to advance climate change mitigation and build countywide resiliency. For example, Safety Element policy SA-6b tasks the County with coordinating with federal and state agencies to update floodplain mapping, local hazard mitigation plans, and other emergency response plans to consider the impacts of climate change on long-term flood safety. Conservation Element policy CO-22 supports water management practices that are responsive to climate change such as groundwater banking. Energy Element Goal 2 focuses on reducing per capita consumption of energy and policy EN-9 emphasizes the importance of reducing auto travel and encouraging public transit and other energy efficient modes of travel, which would result in GHG reductions. For a detailed matrix of all General Plan goals and policies that relate to climate change mitigation and adaptation, see Appendix A.

The Sacramento County General Plan Update Final Environmental Impact Report (2010) also includes two mitigation measures that require the County to develop this CAP. Mitigation Measure CC-1 states: "*The following policy shall be added to the General Plan: It is the goal of the County to reduce greenhouse gas emissions to 1990 levels by the year 2020. This shall be achieved through a mix of State and local action*." Mitigation Measure CC-2 further specifies implementation measures including when the County must adopt a CAP, what elements the CAP must contain, and how often the County shall complete a GHG emissions inventory.

On November 9, 2011, the County Board of Supervisors adopted the Climate Action Plan – Strategy and Framework Document, which presented a framework for reducing GHG emissions and an overall strategy to address climate change. Additionally, it provided direction for developing the second phase of the CAP.

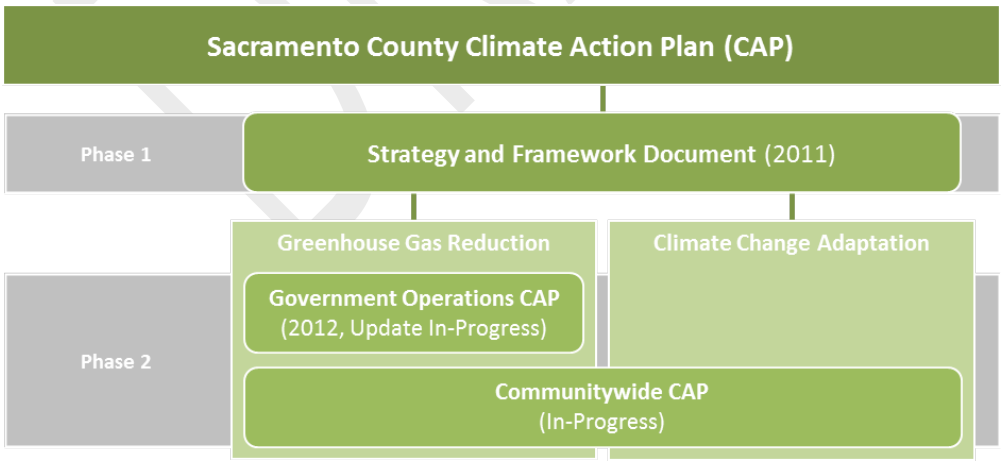
On September 11, 2012, the Board of Supervisors adopted the Climate Action Plan – Government Operations (Government Operations CAP), which quantified GHG emissions from the County's operations (e.g., County-owned facilities, vehicles, and equipment) and identified measures to reduce these emissions.

The County began work on this CAP in 2016 to update the Government Operations CAP and to achieve communitywide GHG reductions and resiliency. This CAP is intended to complete the second phase of the County's multi-phase CAP process, which includes communitywide GHG reduction strategies, government operations GHG reduction strategies, and climate change adaptation strategies, as shown in Figure 1-3.

Since adoption of the General Plan the County has initiated several programs designed to streamline housing production in infill areas. The County has adopted Green Zones for participation in SACOG's regional Green Means Go strategy. These green zones create areas targeted for infill and compact development, increasing housing and transportation options, and promoting shorter, fewer, and cleaner vehicle trips. The County was awarded Regional Early Action Planning (REAP) and Local Early Action Planning (LEAP) grants from SACOG, which are geared toward updating the Housing Element to bring to market affordable and "missing middle" housing. Funding from a Permanent Local Housing Allocation (FLHA) granted to the County pursuant to SB 2 has been used for a variety of actions including a complete a rezone program to increase the amount of multi-family zoned land available to construct affordable housing. General Plan and Development Code amendments to incentivize appropriate housing development, reduce certain development standards, and revise some processes with the overall objective of increasing housing production. The County has also assessed infill fees as part of two master plan development agreements, which require payment of an infill fee on a per dwelling unit equivalent basis, to incentivize infill development within the existing urban unincorporated area of the County.

Finally, the County updated an Environmental Justice (EJ) element for the General Plan engaging in community outreach to understand unique planning needs in neighborhoods throughout the County.

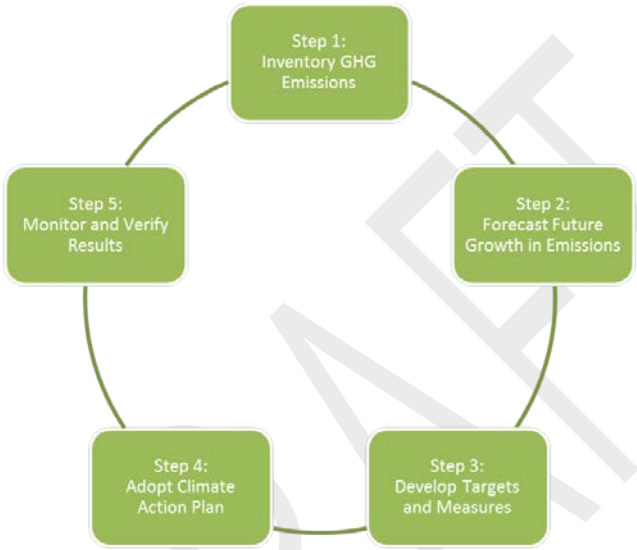
Figure 1-3 Sacramento County Communitywide CAP Components



1.4 PURPOSE OF THE CLIMATE ACTION PLAN

The purpose of this CAP is to identify pathways for the County to achieve GHG communitywide and municipal emissions reductions, in line with State targets, and identify measures the County can take to adapt to future climate change impacts. To accomplish these objectives, the CAP undertakes a step-by-step process depicted in Figure 1-4.

Figure 1-4 CAP Development Process



Source: Sacramento County, 2020.

Inventories provide a snapshot of annual GHG emissions generated by various sources within the unincorporated county for a given baseline year. The CAP includes a communitywide inventory that evaluates annual emissions from nine emissions sectors: Residential Energy, Commercial Energy, On-Road Vehicles, Off-Road Vehicles, Solid Waste, Agriculture, High-Global Warming Potential (GWP) Gases, Wastewater, and Water-Related. The CAP also includes a municipal inventory that evaluates annual emissions from the following internal government operations: Employee Commute, Vehicle Fleet, Buildings and Facilities, Airports (buildings and facilities), Water-Related, Streetlights and Traffic Signals, and Wastewater. It is important to identify municipal emissions because these are emissions that the County has more direct control over. The County can show leadership and set an example by reducing these emissions.

In order to plan for the future, the CAP includes several forecast scenarios to show predicted levels of future emissions based on population and employment growth, trends in emissions-generating activities, and federal and state legislation. The CAP has established communitywide and municipal reduction targets consistent with the 2017 Scoping Plan. To reach these targets, the CAP provides quantified strategies and measures that will close the gap between forecasted emissions and the County's reduction targets.

Climate change impacts are already occurring and projected to continue even as the County implements strategies and measures to reduce local GHG emissions. Climate change has the potential for a wide

variety of impacts such as wildfire risk, flooding, reduced air quality, and droughts. Thus, this CAP also includes strategies and measures to build resiliency and adapt to the impacts of climate change.

Lastly, the CAP is intended to be an actionable and living document. Reporting on the status of implementation of CAP strategies, periodic updates to the GHG emissions inventory, and other monitoring activities will help ensure that the CAP is making progress towards the identified reduction targets. The CAP concludes with a chapter focus on implementation and monitoring.

1.5 CO-BENEFITS

While the strategies and measures included in the CAP are generally geared towards reducing GHG emissions and adapting to climate change, many will also result in social, environmental, or economic "co-benefits." Co-benefits include improved air quality and water quality, protection of biological resources, improved public health outcomes, reduced reliance on fossil fuel, enhanced community character, cost savings, environmental justice, and increased availability of green jobs. The strategies and measures identified in Chapters 3, 4, and 5 of this CAP would provide a range of co-benefits within the County and region. For example, co-benefits associated with strategies in this CAP include:

- Improved air quality as a result of reducing the number of vehicles miles traveled (VMT) and associated criteria air pollutant emissions from fuel combustion.
- Increased energy efficiency in buildings and increased use of renewable energy sources resulting in reduced building heating and cooling costs, as well as reduced fossil fuel use.
- Improved public health through encouraging alternative transportation modes that allow people to drive less, save money, exercise, and enjoy a better quality of life.
- Enhanced community character and improved air quality from increased tree plantings in County rights-of-way, other public spaces, and new private developments.
- Improved community food security through measures that focus on increasing agricultural sector resiliency to climate-exacerbated extreme heat and drought.

1.6 SUMMARY OF PUBLIC INVOLVEMENT

Local action on climate change requires active and ongoing partnerships between residents, businesses, the County, agencies, and organizations. Starting in August 2016, the County has prioritized engagement and outreach throughout the CAP development process to ensure the CAP provides feasible, equitable, and implementable measures. The goals of the outreach process were to: (1) raise awareness of this CAP's development; (2) inform stakeholders and public and about the CAP; (3) gather input at the various steps of CAP development; and (4) provide opportunities to influence decision-making.

The County developed several engagement tools including notification lists, a dedicated project website, electronic mail notifications, and press releases. Additional outreach initiatives included establishing internal CAP workgroups with City staff, hosting four community workshops and a board workshop to engage the public in the planning process, and convened numerous targeted stakeholder meetings. A summary of stakeholder and public outreach events is included in Table 1-1.

Table 1-1 Summary of CAP Stakeholder Meetings and Public Workshops

Event	Date	Description

Stakeholder Meeting	August 24, 2016	Project kickoff meeting for stakeholders to understand the purpose of the CAP and CAP development process.
Public Workshop #1 and #2	November 15 and 16, 2016	Initial set of public workshops held at different locations within the County to raise awareness of the CAP and get feedback and ideas for GHG emissions reduction strategies.
Public Workshop #3 and #4	February 6 and 9, 2016	Set of public workshops held at different locations within the County to raise awareness of the CAP and get feedback and ideas for climate change adaptation and resiliency strategies.
Stakeholder Meeting	March 21, 2017	Meeting with the Sacramento Metropolitan Air Quality Management District to discuss strategies related to energy efficiency and consumption, VMT, and CH_4 emissions.
Board Workshop	May 24, 2017	Board of Supervisors workshop to discuss the 2015 GHG emissions inventory and forecasts and climate change vulnerability assessment.
Stakeholder Meeting	June 15, 2017	Meeting with the North State Building Industry Association.
Stakeholder Meeting	January 4, 2018	Meeting with the Sacramento Municipal Utilities District.
Stakeholder Meeting	February 23, 2018	Meeting with the Delta Stewardship Council.
Stakeholder Meeting	February 27, 2018	Meeting with the Pacific Gas & Electric Company.
Stakeholder Meeting	Mach 19, 2018	Meeting with Teichert.
Stakeholder Meeting	March 21, 2018	Meeting with the Sacramento Association of Realtors.
Stakeholder Meeting	March 28, 2018	Meeting with Region Business.
Stakeholder Meeting	March 29, 2018	Meeting with the North State Building Industry Association.
Stakeholder Meeting	April 19, 2018	Meeting with the Sacramento Metropolitan Fire District.
Stakeholder Meeting	April 19, 2018	Meeting with the Environmental Justice Advisory Committee.
Stakeholder Meeting	April 26, 2018	Meeting with the Sacramento Regional Builders Exchange.
Stakeholder Meeting	April 26, 2018	Meeting with the California Sierra Club.
Stakeholder Meeting	April 30, 2018	Meeting with the Sacramento Municipal Utilities District.
Stakeholder Meeting	May 1, 2018	Meeting with the Sacramento Association of Realtors.
Stakeholder Meeting	May 3, 2018	Meeting with the Sacramento Electric Vehicle Association.
Stakeholder Meeting	May 8, 2018	Meeting with the Capital Region Climate Readiness Collaborative.
Stakeholder Meeting	May 9, 2018	Meeting with the Sacramento Sierra Club.
Stakeholder Meeting	May 17, 2018	Meeting with 350 Sacramento.
Stakeholder Meeting	May 22, 2018	Meeting with the Environmental Council of Sacramento.
Stakeholder Meeting	May 22, 2018	Meeting with the Capital Region Climate Readiness Collaborative.
Stakeholder Meeting	August 16, 2018	Meeting with the Sacramento Sierra Club.
Stakeholder Meeting	October 29, 2018	Meeting with 350 Sacramento.
Stakeholder Meeting	December 3, 2018	Presentation to the American River College class.
Stakeholder Meeting	August 12, 2020	Meeting with Stakeholder Working Group[1]
Stakeholder Meeting	August 19, 2020	Meeting with Stakeholder Working Group
Stakeholder Meeting	November 19, 2020	Meeting with Stakeholder Working Group

Notes: CH_4 = methane CAP = Climate Action Plan, GHG = greenhouse gas, VMT = vehicle miles traveled. [1]Stakeholder Working Group is comprised of representatives from 350 Sacramento; Associated Builders and Contractors, Inc.; Capital Region Climate Readiness Collaborative; Environmental Council of Sacramento; Lewis Group of Companies; North State Building Industry Association; Sacramento Metropolitan Air Quality Management District; Sacramento Municipal Utility District; Sacramento Regional Builders' Exchange; and Sierra Club Mother Lode Chapter.

Source: Ascent Environmental 2021.

The City hosted four separate public workshops at various community locations to ensure that the CAP equitably captured the ideas and concerns of residents and businesses. Outreach media were produced in to advertise community events, solicit input on the CAP, and provide general information on the CAP development process.

Stakeholders and the public shaped the strategies and measures in this CAP in several ways, from suggesting GHG reduction and adaptation ideas to highlighting especially urgent and important issues that the CAP should prioritize. Themes that emerged from the outreach focused on GHG reduction included the need to reduce water consumption, consider zero-waste goals, prioritize food recovery before composting, incentivizing electric vehicles (EVs) and rooftop solar, encouraging signups for the Sacramento Municipal Utilities District's (SMUD) Greenergy program, improve transit connectivity, target transportation improvements in disadvantaged communities, reduce sprawl, protect farmland, and prioritize measures with co-benefits. Themes that emerged from the outreach relating to adaptation and resiliency included the importance of urban forestry, considering rain barrels and greywater as strategies to address changing precipitation patterns and drought, the need to specifically assess climate impacts to the Delta such as saltwater intrusion, and the urgency of increasing wildfire risk. These issues are addressed and discussed in greater detail in Chapters 3, 4, and 5.

2 GREENHOUSE GAS EMISSIONS INVENTORY, FORECASTS, AND REDUCTION TARGETS

2.1 INTRODUCTION

This chapter presents an accounting of greenhouse gas (GHG) emissions within Sacramento County (County), business as usual forecasting through 2030, and a path forward to reduce emissions by establishing emissions reduction targets for 2030.

2.2 INVENTORY

Preparing a GHG emissions inventory is an important first step in the climate action planning process. An emissions inventory provides a snapshot of the major sources of emissions in a single year, while also providing a baseline from which emission trends are projected. The inventory and forecasts are used to develop reduction targets consistent with State mandates. The resulting gap, referred to as the "emissions gap," between forecasted emissions and reduction targets serves as the foundation to determine the strategies and measures needed to reduce GHG emissions to meet the 2030 target. As part of future Climate Action Plan (CAP) updates and as emissions category data becomes available for more recent years, the County will prepare updated emissions inventories. These updated inventories can be compared to the baseline inventory to track the County's progress in CAP implementation.

Updated communitywide and municipal emissions inventories were prepared for the County, using a baseline year of 2015, for which the best available regionwide data was available. The baseline inventories provide detailed accounting of the sources and quantities of GHG emissions generated from activities occurring in the unincorporated county and from internal County operations for a defined set of gases that contribute to climate change. The three primary GHGs quantified include: carbon dioxide (CO_2), methane (CH_4), and nitrous oxide (N_2O). Emissions of these gases are converted to a comparable unit by multiplying each non-CO_2 gas by their global warming potential (GWP), reporting emissions in terms of carbon dioxide equivalent (CO_2e). This conversion allows consideration of all gases in comparable terms and makes it easier to communicate how various sources and types of GHG emissions contribute to global climate change. A metric ton of CO_2e ($MTCO_2e$) is the standard measurement of the amount of GHG emissions produced and released into the atmosphere.

The 2015 community GHG emissions inventory is summarized below in Table 2-1 and shown in Figure 2-1. The total 2015 emissions from all sectors in the unincorporated County inventory were 4,853,647 $MTCO_2e$.

Table 2-1 Sacramento County Community GHG Emissions Inventory - 2015

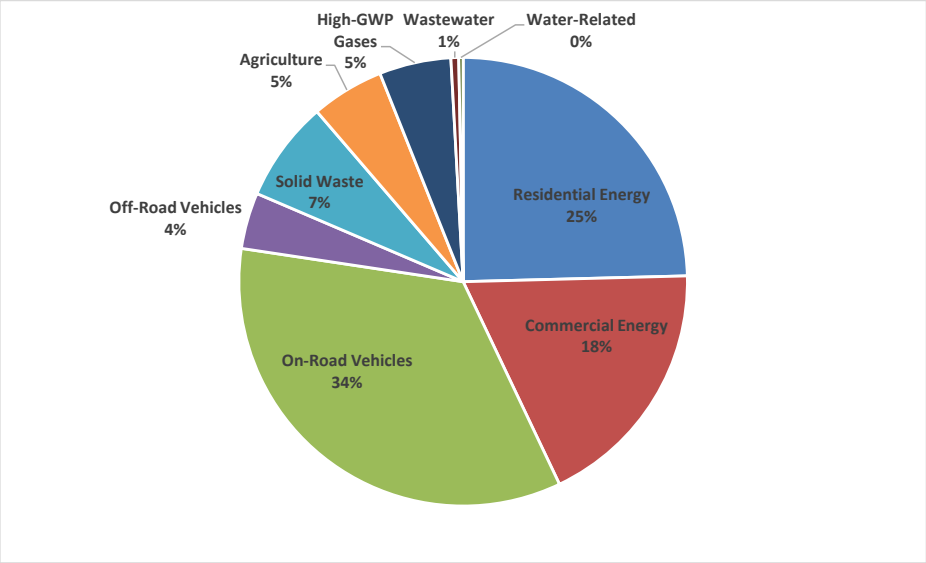
Sector	2015 GHG Emissions ($MTCO_2e$/year)
Residential Energy	1,193,311
Commercial Energy	890,603
On-Road Vehicles	1,671,596
Off-Road Vehicles	196,769
Solid Waste	352,909
Agriculture	254,899
High-GWP Gases	251,085

Wastewater	27,253
Water-Related	15,222
Total	**4,853,647**

Notes: Total may not add due to rounding. $MTCO_2e$ = metric tons of carbon dioxide equivalents, GHG = greenhouse gas, GWP = global warming potential.

Source: Ascent Environmental 2021.

Figure 2-1 Sacramento County Community GHG Emissions - 2015



Source: Ascent Environmental 2021.

The 2015 municipal GHG emissions inventory is summarized below in Table 2-2 and shown in Figure 2-2. The total 2015 emissions from all sectors in the County's internal operations inventory were 123,397 $MTCO_2e$.

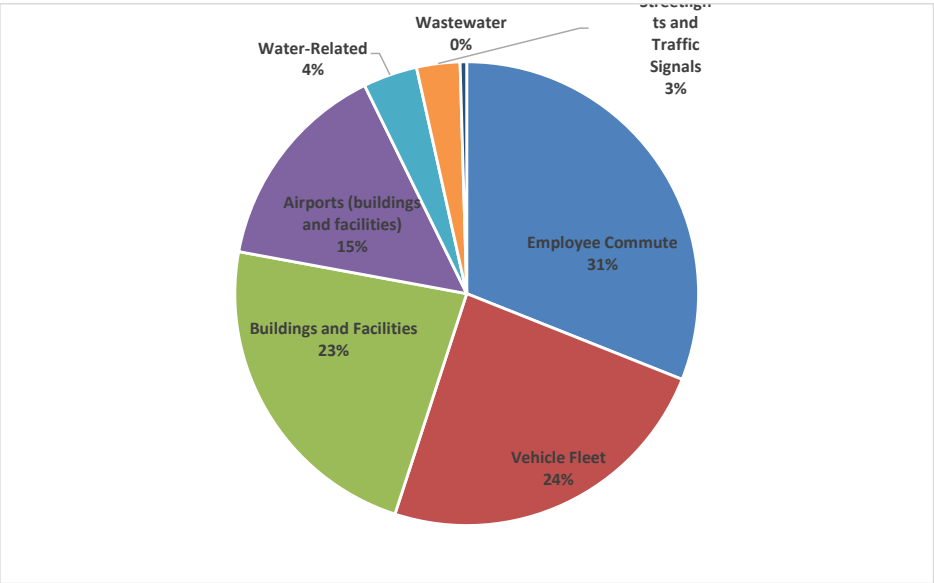
Table 2-2 Sacramento County Municipal GHG Emissions Inventory - 2015

Sector	2015 GHG Emissions ($MTCO_2e$/year)
Employee Commute	38,290
Vehicle Fleet	29,591
Buildings and Facilities	28,247
Airports (buildings and facilities)	18,310
Water-Related	4,665
Streetlights and Traffic Signals	3,729
Wastewater	565
Total	**123,397**

Notes: Total may not add due to rounding. $MTCO_2e$ = metric tons of carbon dioxide equivalents, GHG = greenhouse gas.

Source: Ascent Environmental 2021.

Figure 2-2 Sacramento County Municipal GHG Emissions Inventory - 2015



Source: Ascent Environmental 2021

2.3 FORECASTS

GHG emissions forecast provide an estimate of future levels based on a continuation of current trends in activity, population and job growth, and relevant regulatory actions by federal, state, and regional agencies (i.e., "legislative" actions) that have been adopted. Emissions forecasts provide insight into the scale of local reductions needed to achieve GHG emission reduction targets.

This CAP uses two forecast scenarios, referred to as the "business-as-usual" (BAU) and legislative-adjusted BAU scenarios. Both the BAU and legislative-adjusted BAU scenarios assume that population, employment, and transportation activity will grow over time, using the demographic data provided by the County and the Sacramento Area Council of Governments (SACOG). The BAU forecast scenario accounts for changes in emissions associated with future growth in the County, but without the adoption of a CAP or future reduction action by federal, state, or regional agencies. The legislative-adjusted BAU forecast scenario accounts for future changes in emissions associated with growth in the County, along with legislative reductions from federal, state, and regional regulations, policies, or other mandated actions.

2.3.1 Business-As-Usual Forecasts

An emissions forecast was prepared for BAU through 2030 for both the 2015 communitywide and municipal emissions inventories. This forecast year was selected because it is consistent with the horizon year of the Sacramento County General Plan and the State's GHG reduction target year established by

State law under Senate Bill (SB) 32. The BAU scenario assumes the continuation of conventional behaviors without the inclusion of any additional efforts or legislative actions beyond what has already been adopted at the time of the baseline year. Therefore, federal, state, and local policies, programs, and regulations designed to take effect in future benchmark years (e.g., 2030), and the GHG reductions that will occur with their implementation, are not considered in the BAU scenario.

As shown in Table 2-3 below, countywide emissions are forecasted to increase by 20 percent and municipal emissions by 33 percent by 2030.

LEGISLATIVE REDUCTIONS

The legislative-adjusted BAU forecast scenario accounts for a variety of approved federal, state, and regional legislative actions that will further reduce BAU emissions from the County. It estimates the impacts of these actions on the various GHG emissions producing sectors in the communitywide and municipal inventories CAP and adjusting emissions levels accordingly. While these projections include federal and state actions, they do not include local government actions such as the implementation of GHG emissions reduction measures identified in this CAP. The legislative actions applied to estimate this scenario include:

- Federal and State Vehicle Efficiency Standards: Federal and state agencies have set tailpipe emissions standards and fuel efficiency standards for medium-and heavy-duty engines and vehicles.
- Federal Off-Road Compression-Ignition Engine Standards: The U.S. Environmental Protection Agency (EPA) has established standards for phasing of EPA diesel engine tiers for off-road compression-ignition equipment.
- Federal Significant New Alternatives Policy: The EPA has established bans on refrigerants and refrigerant blends that contain ozone-depleting substances.
- California Renewables Portfolio Standards (RPS): The RPS requires energy utility providers to procure 33 percent of electricity from renewable sources by 2020, 50 percent renewable by 2026, 60 percent renewable by 2030, and 100 percent zero-carbon by 2045.
- California Building Energy Efficiency Standards: Requires all new buildings in California to comply with energy efficiency standards established by California Energy Commission (CEC).
- Assembly Bill (AB) 341: Requires California to achieve a 75 percent solid waste diversion target by 2020.
- Sacramento Municipal Utilities District (SMUD) Climate Emergency Declaration: SMUD requires carbon-neutral electricity to be provided regionwide by 2030.

A comparison of the 2015 communitywide baseline GHG emissions, the 2030 BAU forecast, and 2030 legislative adjusted BAU forecast is shown in Table 2-3. A comparison of the 2015 municipal baseline GHG emissions, the 2030 BAU forecast, and 2030 legislative adjusted BAU forecast is shown in Table 2-4. With the application of the legislative actions listed above, forecasted annual countywide and municipal emissions would decrease by 2030.

Table 2-3 Comparison of Sacramento County GHG Community Emissions Inventory, BAU Forecast, and Legislative-Adjusted BAU Forecast ($MTCO_2e$/year)

Sector	2015 GHG Emissions	2030 BAU Forecast	2030 Legislative-Adjusted BAU Forecast
Residential Energy	1,193,311	1,385,397	500,099
Commercial Energy	890,603	1,181,128	244,903

On-Road Vehicles	1,671,596	1,969,694	1,468,071
Off-Road Vehicles	196,769	253,855	253,857
Solid Waste	352,909	415,844	280,694
Agriculture	254,899	251,102	193,373
High-GWP Gases	251,085	295,861	245,175
Wastewater	27,253	32,113	17,139
Water-Related	15,222	17,937	0
Total	**4,853,647**	**5,802,930**	**3,202,311**
Percent change from 2015 (%)	**-**	**+20%**	**-16%**

Notes: Total may not add due to rounding. BAU = business-as-usual, $MTCO_2e$ = metric tons of carbon dioxide equivalents, GHG = greenhouse gas, GWP = global warming potential.

Source: Ascent Environmental 2020.

Table 2-4 Comparison of Sacramento County Municipal GHG Emissions Inventory, BAU Forecast, and Legislative-Adjusted BAU Forecast ($MTCO_2e$/year)

Sector	2015 GHG Emissions	2030 BAU Forecast	2030 Legislative-Adjusted BAU Forecast
Employee Commute	38,290	50,781	31,818
Vehicle Fleet	29,591	39,244	30,808
Buildings and Facilities	28,247	37,461	23,736
Airports (buildings and facilities)	18,310	24,283	15,920
Water-Related	4,665	6,187	3,498
Streetlights and Traffic Signals	3,729	4,945	2,796
Wastewater	565	749	597
Total	**123,397**	**163,651**	**109,172**
Percent change from 2015 (%)	**-**	**+33%**	**-12%**

Notes: Total may not add due to rounding. BAU = business-as-usual, $MTCO_2e$ = metric tons of carbon dioxide equivalents, GHG = greenhouse gas.

Source: Ascent Environmental 2020.

Based on the projections, countywide emissions with legislative actions applied would be 16 percent below 2015 levels by 2030 and municipal emissions with legislative actions applied would be 12 percent below 2015 levels by 2030. The legislative-adjusted BAU forecast scenarios provide the County with the information needed to focus efforts on certain emissions sectors and sources that have the most GHG reduction opportunities, considering what federal, state, and regional legislative reductions are already achieving or are expected to achieve in the future.

2.4 REDUCTION TARGETS

As directed in SB 32, the State aims to reduce annual GHG emissions to 40 percent below 1990 levels by 2030. The County aims to, at a minimum, reduce its emissions in proportion to the State's goals. GHG reduction targets were developed for both communitywide and municipal emissions.

2.4.1 Community Targets

Because the County's 1990 emissions levels for community were not estimated, a proportional per capita target for the CAP was developed that would be achieved in 2030 consistent with the State's goal. This is in alignment with the State's recommended per capita target of 6 $MTCO_2e$ by 2030, adopted by the California Air Resources Board (CARB) in California's 2017 Scoping Plan (CARB 2017). Applying the 2017 Scoping Plan's per capita target specifically to the sectors included in County's GHG emissions inventory results in an emissions of 4.8 $MTCO_2e$ per capita by 2030, or 3,205,398 $MTCO_2e$, as shown in Table 2-5. Comparing this figure to the County's 2030 legislative-adjusted BAU forecast of 3,202,311 $MTCO_2e$, shows a difference of 3,088 $MTCO_2e$. This means the County is on track to have GHG emissions lower than a target aligned with the 2017 Scoping Plan, without the addition of GHG mitigating strategies and measures contained in a CAP. This is due to the enactment of federal, state, and regional policies discussed in Section 2.3, "Forecasts," that followed the adoption of the County's General Plan Update and are expected to produce GHG reducing effects at the local level. One particular policy that has an effect on the reduction of local GHG emissions is the Sacramento Municipal Utility District's (SMUD's) adoption of a climate emergency resolution which aims to provide carbon-free electricity to all customers by 2030 (SMUD 2020). As the County's primary provider of electricity to residential and commercial customers, this change will eliminate GHG emissions associated with electricity consumption from new and existing buildings in the County by 2030. In addition, the availability of a carbon-free electricity sources will reduce emissions in water and wastewater sectors because electricity consumption for processing, treating, and conveying water is the main contributor to GHG emissions in this sector. The on-road transportation sector will also experience a decrease in emissions because of eliminated emissions associated with the charging of electric vehicles.

Table 2-5 Sacramento County GHG Emissions, State Reduction Target

Source	2015	2030
Baseline Emissions and Legislative-Adjusted BAU Forecast ($MTCO_2e$)	4,817,567	3,202,311
Population	576,007	668,726
Adjusted State Target Per Capita Emissions ($MTCO_2e$/ per person)	N/A	4.8
Per Capita Annual Emissions aligned with State Target ($MTCO_2e$)	N/A	3,205,398
Per Capita GHG Emissions with Legislative Reductions ($MTCO_2e$/ per person)	N/A	4.8
Reduction needed to meet Target ($MTCO_2e$)	N/A	-3,088

Notes: Negative values indicate a surplus in GHG reductions. $MTCO_2e$ = metric tons of carbon dioxide equivalent; N/A = not applicable; BAU = Business-As-Usual; GHG = greenhouse gases.

Source: Ascent Environmental 2020.

Because the County is already on track to meet the 2030 reduction target aligned with the 2017 Scoping Plan, the County has elected to go above and beyond aligning with the State's target to achieve further progress on reducing GHG emissions beyond the 2030 target. Although for the purposes for CEQA streamlining and local climate action planning there is no current requirement to go above and beyond the 2030 target, the choice to set a more stringent target acknowledges the latest scientific evidence available that accelerated timelines for GHG reduction are needed to avoid the most catastrophic effects of

climate change. It also takes into consideration the State's longer-term state goals for GHG reduction by 2050 and carbon neutrality by 2045 under EO's S-3-05 and B-30-15. Consistency with the latest scientific research and long-term plans are important factors to consider according to case law pertaining to CAPs, particularly the 2017 California Supreme Court decision *Cleveland National Forest Foundation v. San Diego Association of Governments (SANDAG)*. Setting a more aggressive target will also allow the County to get started on programs that could continue beyond a 2030 horizon year and inform future projects, programs, and plan updates. Thus, the County has chosen a more stringent per capita target of 4.0 MT CO_2e per capita. Based on the 4.0 MT CO_2e per capita limit, the County's 2030 GHG emissions target is 2,674,904 $MTCO_2e$, as shown in Table 2-6 and Figure 2-3. Legislative actions would account for a large proportion of the reductions needed to achieve this goal; however, the County would need to implement additional actions to achieve further reductions. This additional reduction needed at the local level to meet the reduction targets for each year is referred to as the "local emissions gap." To close this gap, the County would need to implement local actions that would result in an additional reduction of approximately 527,407 $MTCO_2e$ in 2030.

Commented [DK2]: County Reviewers: Target setting is a somewhat complex topic. Hopefully this explaination will be clear to the public but please let us know if you think it needs to be explained in a different way.

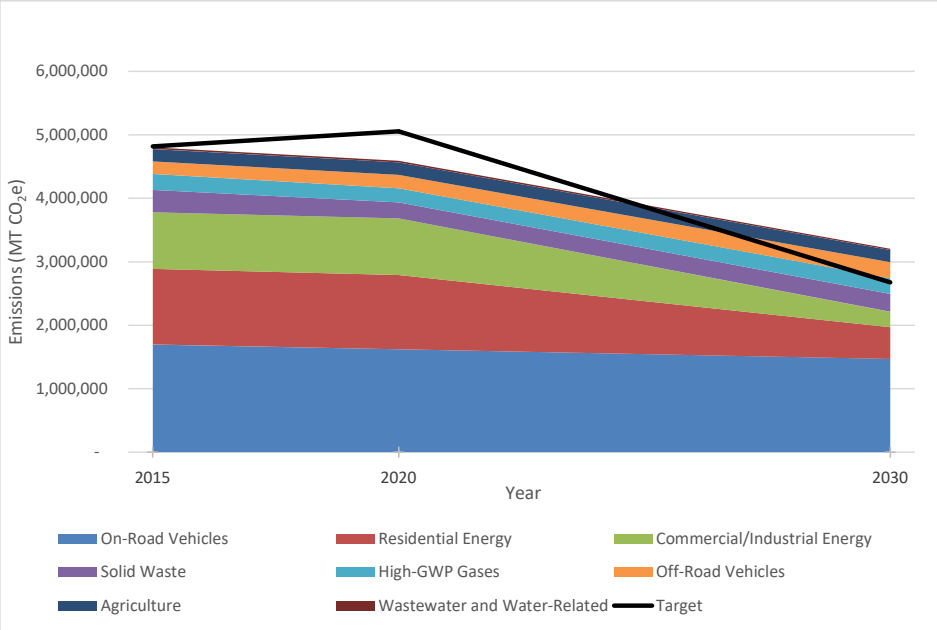
Table 2-6 Sacramento County GHG Emissions, Proposed Reduction Target

Source	2015	2030
Baseline Emissions and Legislative-Adjusted BAU Forecast ($MTCO_2e$)	4,817,567	3,202,311
Population	576,007	668,726
Proposed Local Target Per Capita Emissions ($MTCO_2e$)	N/A	4.0
Target Annual Emissions ($MTCO_2e$)	N/A	2,674,904
Reduction needed to meet Target ($MTCO_2e$)	N/A	527,407

Notes: Negative values indicate a surplus in GHG reductions. $MTCO_2e$ = metric tons of carbon dioxide equivalent; N/A = not applicable; BAU = Business-As-Usual; GHG = greenhouse gases.

Source: Ascent Environmental 2021.

Figure 2-3 Sacramento County GHG Proposed Reduction Target



Source: Ascent Environmental 2021.

2.4.2 Municipal Targets

Because the County's 1990 emissions levels for internal operations were not estimated, a proportional target for the CAP was developed to compare with the estimated 2015 emissions inventory. To determine the reduction needed from 2015 emissions levels that would be equivalent to the State's targeted reduction from 1990 levels, the State's GHG inventories for 1990 and 2015 were compared. According to the inventories from CARB, the State emitted approximately 431 million $MTCO_2e$ in 1990 and 440 million $MTCO_2e$ in 2015, an increase of 2 percent over 1990 levels. Consequently, to reach 40 percent below 1990 levels, 2015 levels would have to be reduced by 40 percent. Thus, the County's 2030 municipal GHG emissions target is 73,348 $MTCO_2e$, as shown in Table 2-7.

Table 2-7 Sacramento County Municipal GHG Emissions Reduction Targets

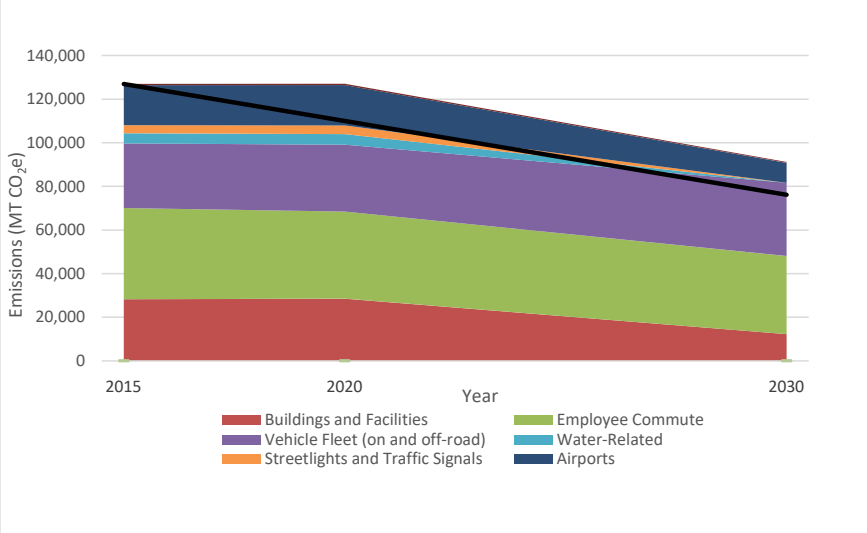
Source	2015	2030
Baseline Emissions and Legislative-Adjusted BAU Forecast ($MTCO_2e$)	122,247	109,172
Target Percent Reduction below Baseline (%)	N/A	40
Target Annual Emissions ($MTCO_2e$)	N/A	73,348
Reduction needed to meet Target ($MTCO_2e$)	N/A	35,824

Notes: $MTCO_2e$ = metric tons of carbon dioxide equivalent; N/A = not applicable; BAU = Business-As-Usual; GHG = greenhouse gases.

Source: Ascent Environmental 2021.

The County would need to reduce annual emissions by 35,824 $MTCO_2e$ in 2030, beyond the reductions provided by legislative actions at the federal, state, and regional levels. This gap in GHG reductions needed is shown in Figure 2-4 below.

Figure 2-4 Sacramento County Municipal Legislative-Adjusted BAU GHG Forecast and Reduction Targets



Source: Ascent Environmental 2021

3 COMMUNITYWIDE GREENHOUSE GAS REDUCTION STRATEGIES AND MEASURES

3.1 INTRODUCTION

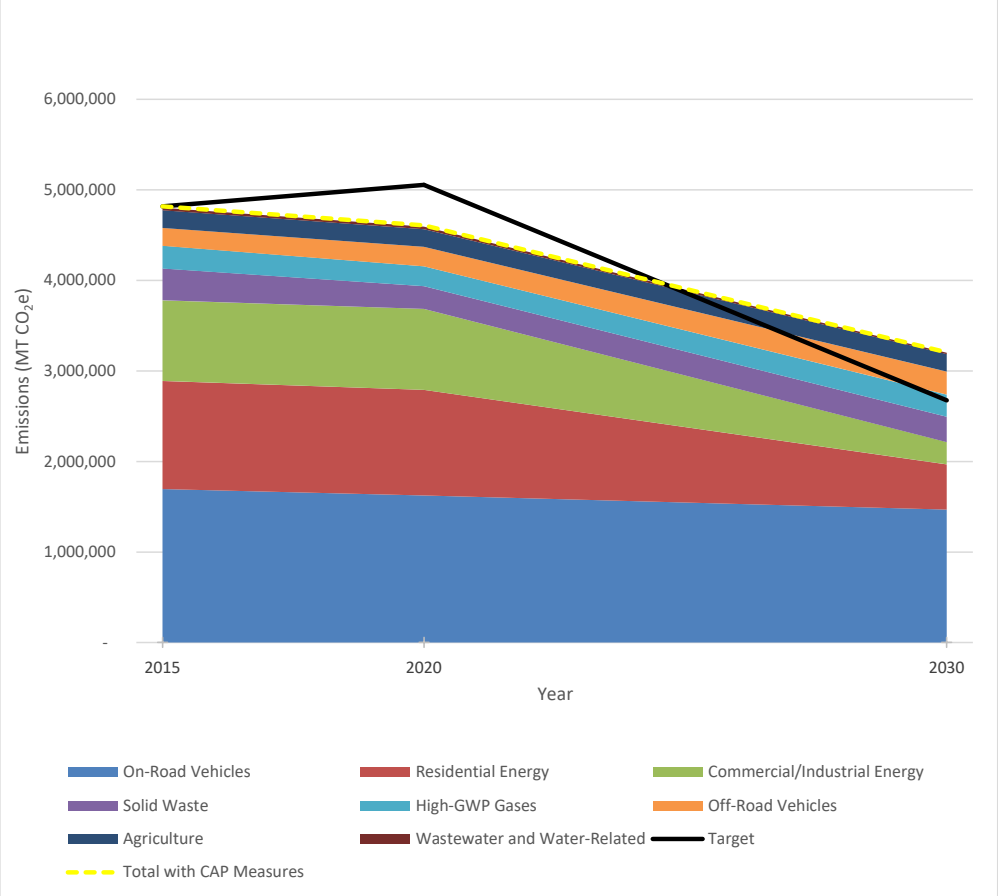
This chapter outlines specific greenhouse gas (GHG) reduction strategies and measures to be implemented within Sacramento County (County) to reduce communitywide emissions. The CAP includes six high-level strategies and 58 measures, developed in conjunction with County staff and stakeholder input, to reduce communitywide GHG emissions. Each high-level strategy represents a pathway that will lead to reduced GHG emissions from multiple sectors. The strategies are:

- Clean Energy: This strategy pathway focuses on providing clean and affordable sources of energy for the County by increasing the use of renewable sources of energy (e.g., the SMUD Greenergy Program, diverting organic waste to biomass energy facilities, methane capture from livestock), encouraging electrification of irrigation pumps, and through requirements to meet the CALGreen Tier 1 energy performance standards. Measures are listed in Section 3.3.1, "Clean Energy Measures."
- Clean Vehicles and Equipment: This strategy focuses on supporting the electrification of on- and off-road vehicles and equipment, as well as fuel efficiency measures that would reduce the amount of gasoline and diesel fuel consumed. Measures are listed in Section 3.3.2, "Clean Vehicles and Equipment Measures."
- Green Buildings: This strategy pathway addresses commercial and residential building energy use by encouraging electrification and energy efficiency in existing buildings and eliminating fossil fuel consumption in new buildings. This strategy also includes measures to reduce energy and water consumption through techniques such as rain capture, drought-tolerant landscaping, and reducing urban heat island affects leading to decreased need for air conditioning. Measures are listed in Section 3.3.3, "Green Buildings Measures."
- Inclusive Community Planning: This strategy pathway includes relationship-building and regional coordination measures, sustainability outreach and education, and a focus on ensuring a balance of housing and jobs. Although this strategy pathway does not result in quantifiable GHG reductions, the measures are crucial in fostering public understanding, building the partnerships needed to implement the CAP, and providing for the basic needs of communities that are most vulnerable to climate change. Measures are listed in Section 3.3.4, "Inclusive Community Planning Measures."
- Natural and Working Lands: This strategy pathway acknowledges the potential of natural and working lands to sequester carbon. Measures focus on habitat preservation, increasing urban forest and connected open space, smart growth, and carbon farming. Measures are listed in Section 3.3.5, "Natural and Working Lands Measures."
- Reduced Driving and Alternative Transportation Modes: This strategy pathway addresses the transportation sector, which is the largest contributor of GHG emissions to the County's inventory. While the Clean Vehicles and Equipment strategy addresses cleaner and more efficient fuels, this strategy pathway focuses on reducing the amount of emissions-generating activity: vehicle miles traveled (VMT). It includes measures to encourage public transit, alternative modes of transportation such as biking and walking, carpooling, and transit-oriented development. Measures are listed in Section 3.3.6, "Reduced Driving and Alternative Transportation Modes Measures."

3.2 COMMUNITYWIDE GREENHOUSE GAS REDUCTION SUMMARY

The total estimated GHG emission reduction from all quantifiable measures is 899,203 $MTCO_2e$ in 2030. Figure 3-1 shows the reductions that would be achieved by implementing the CAP strategies and measures relative to the Scoping Plan Target and BAU GHG Emissions.

Figure 3-1 GHG Reductions with Communitywide CAP Measures Relative to Scoping Plan Proposed Target and BAU GHG Emissions



Source: Ascent Environmental 2021

Additionally, although the primary purpose of these strategies and measures is to reduce GHG emissions, they will also result in additional co-benefits, which are discussed in Section 1.3, "Co-Benefits." Co-benefits

include benefits beyond GHG reductions that would occur through implementation, such as improved air quality, enhanced community character, and improved resilience to climate change impacts.

3.3 COMMUNITYWIDE GREENHOUSE GAS REDUCTION MEASURES

The CAP measure framework consists of measures descriptions, target indicators, and GHG reduction potential. Elements of the framework are described below. Target indicators and GHG reduction potentials are included for measures with quantified GHG reductions.

- Measure: A measure is a program, policy, or project the County will implement that will cause a direct and measurable reduction in GHG emissions.
- Target Indicator: Some measures have a target indicator that serves as the performance metric by which achievement will be measured in target years.
- GHG Reduction Potential: The GHG reduction potential represents the estimated reduction in GHG emissions from a specific measure if its performance metric is met. All GHG reduction potential values are shown in terms of $MTCO_2e$ reduced in the 2030 target year. Most, but not all, measure have an associated GHG reduction potential. Certain measures would not directly result in GHG reductions but may facilitate implementation of an action that reduces GHGs.

3.3.1 Clean Energy Measures

MEASURE CLS-01: INCREASE ENERGY EFFICIENCY IN NEW COMMERCIAL BUILDINGS

Develop a reach code requiring new commercial and high-rise residential buildings obtaining building permits after January 1, 2020 to meet CALGreen Tier 1 energy performance standards set forth in section A5.203.1 of the 2019 CALGreen Code.

Target Indicators:

- 100 percent of new commercial buildings to achieve CALGreen Tier 1 standards by 2030.

GHG Reduction Potential: 3,177 $MTCO_{2e}$/year by 2030

MEASURE CLS-02: INCREASE ORGANIC WASTE DIVERSION

The County will work with the Solid Waste Authority and other regional partners to achieve compliance with existing and future State regulations designed to achieve AB 1826 and SB 1383 goals. The County will reduce the disposal of organic waste in landfills using numerous alternatives such as composting programs, developing partnerships to expand or improve anaerobic digestion facilities, diverting organics for feedstock for use in such facilities, diverting organics for biomass energy facilities, diverting organics for use as feedstock in renewable fuels, and other appropriate applications.

Target Indicators

- 75 percent reduction in organic waste sent to landfills by 2025.

GHG Reduction Potential: 39,186 $MTCO_{2e}$/year by 2030

MEASURE CLS-03: SMUD GREENERGY - RESIDENTIAL

Encourage residential users to enroll in the Greenergy program, by providing a rebate of $72 to residents to offset the first year of enrollment in the program. To qualify, residents will be required to complete a form and submit one year of utility bills to the County to validate enrollment in the program.

MEASURE CLS-04: SMUD GREENERGY - COMMERCIAL

Encourage commercial users to enroll in the Greenergy program or the SMUD Solar Shares Program to obtain 100 percent of their electricity use from renewable energy sources. To encourage this participation the County will support SMUD with marketing this program. Additionally, the county can provide information to SMUD about locations where solar development may be preferred and provide outreach to businesses about opportunities to develop solar on empty lots, parking lots and on building rooftops.

MEASURE CLS-05: ELECTRIC IRRIGATION PUMPS

The County will work with SMAQMD, SMUD, or provide incentives through existing programs such as CARB's FARMER program to convert stationary diesel- or gas-powered irrigation pumps to electric pumps that are either connected to the grid or use off-grid alternative/renewable energy sources, such as solar.

Target Indicators

- 40 percent of diesel-powered irrigation pumps to be converted to electric by 2030.

GHG Reduction Potential: 2,205 $MTCO_{2e}$/year by 2030

MEASURE CLS-07: PROMOTE ENERGY GENERATION, FLARING, AND METHANE CAPTURE

Work with SMAQMD, SMUD, dairies, ranches, and others to expedite permitting and promote energy generation, flaring, and methane capture systems at manure management facilities at cattle ranches and dairy farms.

3.3.2 Clean Vehicles and Equipment Measures

MEASURE CLV-01: ELECTRIC AGRICULTURAL EQUIPMENT

The County will work with SMAQMD, SMUD, U.S. Department of Agriculture, or others to provide incentives for replacing gas- or diesel-powered agricultural equipment with electric or alternatively fueled equivalents.

Target Indicators

- 25 percent of agricultural equipment converted to electric or alternative fuel by 2030.

GHG Reduction Potential: 15,963 $MTCO_{2e}$/year by 2030

MEASURE CLV-02: ELECTRIC VEHICLE INFRASTRUCTURE PROGRAM

The County will implement the Electric Vehicle Readiness and Infrastructure Plan to increase the electric vehicle (EV) network capacity through infrastructure, fleet changes, funding mechanisms, utility coordination, and education.

Target Indicators

- 390 chargers (4 percent Level 1, 80 percent Level 2, and 16 percent DC Fast Charge) installed by 2030.

GHG Reduction Potential: 8,657 $MTCO_{2e}$/year by 2030

MEASURE CLV-03: TIER 4 FINAL CONSTRUCTION EQUIPMENT

The County will require new development projects to use EPA-rated Tier 4 final diesel engines when electric-powered construction equipment is infeasible or unavailable. Project applicants will demonstrate Tier 4 final engines in construction list prior to receiving building permits.

Target Indicators

- 100 percent of diesel-fueled construction equipment achieve Tier 4 final-rated diesel engines by 2030.

GHG Reduction Potential: 6,370 $MTCO_{2e}$/year by 2030

MEASURE CLV-04: ELECTRIC OR ALTERNATIVELY FUELED CONSTRUCTION EQUIPMENT

The County will work with SMAQMD to require new development projects to use electrically powered construction equipment wherever feasible.

Target Indicators

- 10 percent of construction equipment converted to electric or renewable diesel by 2030.

GHG Reduction Potential: 1,409 $MTCO_{2e}$/year by 2030

MEASURE CLV-05: TIER 4 FINAL AGRICULTURAL EQUIPMENT

The County will work with SMAQMD to revise Rule 215 – Agricultural Permit Requirements to require any diesel powered agricultural off-road equipment to be EPA-rated Tier 4 final models by 2030, as feasible.

Target Indicators

- 5 percent of diesel-powered agricultural equipment achieve Tier 4 final-rated diesel engines by 2030.

GHG Reduction Potential: 120 $MTCO_{2e}$/year by 2030

MEASURE CLV-06: ELECTRIC LANDSCAPING EQUIPMENT

The County will work with SMAQMD to establish an incentive program to trade in fossil fuel-powered landscaping equipment with electric versions.

MEASURE CLV-07: ELECTRIC SCHOOL BUSES

The County will work with regional partners, such as the Board of Education, Sacramento Regional Transit District (RT), SMUD, SACOG, the SMAQMD, and local school districts, to find initial startup and continual operating funding for electric-powered school buses.

MEASURE CLV-08: ELECTRIFY LOADING DOCKS

The County will require projects with loading docks to provide electric outlets to power truck refrigeration units rather than allow trucks to idle while unloading.

MEASURE CLV-09: IMPROVED FUEL EFFICIENCY STANDARDS

The County's Legislative Analyst will continue work alongside staff from other cities and counties in the region to encourage new or revised state or federal legislation to promote manufacture, availability, and purchase of more fuel-efficient vehicles.

MEASURE CLV-10: EV RIDE SHARING AT AFFORDABLE HOUSING

The County will work with regional partners, such as SACOG, Sacrament Housing and Redevelopment Agency, and SMAQMD, to provide EV ride sharing at all new affordable housing developments.

MEASURE CLV-11: EV PARKING CODE

The County will amend County Zoning Code Development Standards 5.9.3.A.8 to require minimum EV charging capability in multi-family and nonresidential projects consistent with Tier 1 Standards contained in the CALGreen Code. For multi-family this requires that fifteen percent of parking spaces must support future Electric Vehicle Supply Equipment (EVSE) charging, consistent with section A4.106.8.2 the CALGreen code. For nonresidential this requires that a specific proportion of total required parking spaces must support future EVSE charging, consistent with section A5.106.5.3.1 of the CALGreen code. Additionally, adopting these specific CALGreen Tier 1 standards into the County Building Code would also ensure consistency between the County's Zoning and Building Codes.

MEASURE CLV-12: EV SIGNAGE

The County will amend County Zoning Code to include signage requirements for EV charging facilities both for wayfinding and parking restrictions.

3.3.3 Green Buildings Measures

MEASURE GRN-01: ENERGY EFFICIENCY AND ELECTRIFICATION OF EXISTING RESIDENTIAL BUILDINGS

The County will assist local utilities with increasing participation in residential retrofit programs to achieve a reduction in energy consumption. These retrofits will involve upgrading to EnergyStar™-certified appliances, more efficient HVAC systems, weatherization, and comprehensive whole home retrofitting.

Target Indicators

- 10 percent of existing residences participate in energy efficiency upgrades by 2030.

GHG Reduction Potential: 173,743 $MTCO_{2e}$/year by 2030

MEASURE GRN-02: LIMIT REFRIGERANTS IN STATIONARY AIR CONDITIONING WITH A GLOBAL WARMING POTENTIAL GREATER THAN 750

Support implementation of the State's regulation regarding refrigerants with global warming potential (GWP) values over 750.

MEASURE GRN-03: ELIMINATE FOSSIL FUEL CONSUMPTION IN NEW RESIDENTIAL BUILDINGS

The County will develop and adopt a building code requiring all new single-family and multi-family residential buildings obtaining building permits after January 1, 2023 to be designed as all-electric buildings.

Target Indicators

- The Sacramento County Building Department will deny building construction and occupancy permits for all new projects that do not comply with the described reach code.

GHG Reduction Potential: 113,324 $MTCO_{2e}$/year by 2030

MEASURE GRN-04: ENERGY EFFICIENCY AND ELECTRIFICATION OF EXISTING NONRESIDENTIAL BUILDINGS

The County will support local utilities with implementing commercial energy efficiency and electrification programs to achieve a reduction in energy consumption.

Target Indicators

- 10 percent of existing businesses participate in energy efficiency upgrades by 2030.

GHG Reduction Potential: 66,964 $MTCO_{2e}$/year by 2030

MEASURE GRN-05: RESIDENTIAL ENERGY CONSERVATION EDUCATION AND TRAINING

The County will develop and implement a program that provides education on behavioral strategies that enable residential energy conservation. Videos featuring energy savings tips will be recorded and hosted on the County's website and a marketing campaign will be developed to advertise the availability of this information. A video shall also be created that shows residents how to monitor their energy use through SMUD and PG&E web interfaces or share their energy use with third parties for more detailed analytics on energy use.

Target Indicators

- 15 percent of existing residences participate in outreach and monitoring program by 2030.

GHG Reduction Potential: 15,817 $MTCO_{2e}$/year by 2030

MEASURE GRN-06: DROUGHT TOLERANT LANDSCAPING

The County will coordinate with water districts to develop County-specific incentives for drought-tolerant landscaping in new and existing residential developments.

Target Indicators

- 50 percent of landscape in existing development converted to drought-tolerant by 2030.
- 80 percent of landscape in new development is drought-tolerant by 2030.

GHG Reduction Potential: 3,444 $MTCO_{2e}$/year by 2030

MEASURE GRN-07: COMMERCIAL ENERGY CONSERVATION EDUCATION AND TRAINING

The County will implement an outreach program that provides education on behavioral strategies that enable commercial energy conservation. This can be implemented developing and marketing online videos targeted toward building owners and tenants that are hosted on the county's website. In addition to education, video tutorials can explain to business owners how to enroll in real time energy use monitoring tools to track energy use compared to historic levels and within the community through the EnergyStar™ Portfolio Manager, or other tools offered by third-party providers.

Target Indicators

- 10 percent of existing businesses participate in outreach and monitoring program by 2030.

GHG Reduction Potential: 190 $MTCO_{2e}$/year by 2030

MEASURE GRN-09: EXISTING STRUCTURE REUSE

The County will encourage the retention of existing structures and promote their adaptive reuse and renovation with green building technologies.

MEASURE GRN-10: REDUCE URBAN HEAT ISLAND EFFECT

The County will reduce urban heat island effects through the following actions:

- Encourage solar parking canopies to provide shade in urban areas.
- Amend the Zoning Code to include a more robust shade requirement.
- Conduct parking lot shade enforcement through site inspection to ensure that 50 percent shading is achieved by 15 years (Zoning Code section 5.2.4.C).
- Work with business owners and residents to monitor and ensure landscaping and shading objectives are being met.

MEASURE GRN-11: EXPEDITE, REDUCE, AND EXEMPT PERMITS

The County will expedite the permit process, reduce or waive fees, or exempt permits associated with water conservation installations in existing facilities.

MEASURE GRN-12: RIVER-FRIENDLY LANDSCAPING

The County will collaborate with watershed organizations, school districts and others to seek funding to construct river-friendly community demonstration gardens throughout the Sacramento County Water Agency (SCWA) service area.

MEASURE GRN-13: RAIN CAPTURE

The County will promote the use of rain barrels and rain gardens, which allow for capture of rainwater for reuse in landscaping.

MEASURE GRN-14: LOW IMPACT DEVELOPMENT

The County will develop and adopt low impact development (LID) standards, policies, and update codes and ordinances to require LID for new development and redevelopment priority projects to reduce stormwater.

MEASURE GRN-15: WATER CONSERVATION REGULATIONS

The County will amend Section 5.2.4 of the Zoning Code to comply with the State MWELO to ensure new development increases water conservation, as is stated in General Plan Policy CO-16.

3.3.4 Inclusive Community Planning Measures

MEASURE INC-02: URBAN-RURAL AGRICULTURAL CONNECTIONS

The County will promote sustainable agricultural practices through working with and strengthening the existing agriculture and food organizations such as Farm to Fork. The County will also work with local grocers to encourage and promote locally grown products.

MEASURE INC-03: SUSTAINABILITY FOR ALL

The County will identify and work with existing groups, such as schools, neighborhood associations, and nonprofits, to identify issues and opportunities for engaging them in sustainability efforts and ensure that all possible segments of the community are included in the County's sustainability efforts and outreach through Implementation Program A11 of the General Plan Housing Element. The County will also collaborate with organizations already engaging in this work.

MEASURE INC-04: JOBS HOUSING BALANCE

The County will encourage a balance between job type, the workforce, and housing development to reduce the negative impacts of long commutes and provide a range of employment opportunities for all county residents through Policies ED-3 and ED-8 of the General Plan Economic Development Element and associated implementation measures.

MEASURE INC-05: REGIONAL CLIMATE ACTION COORDINATION

The County will continue to be an active participant of the Capital Region Climate Readiness Collaborative, or other regional forums, in sharing best practices or developing regional approaches to reducing GHG emissions and climate adaptation.

MEASURE INC-06: CIVIC LAB

The County will apply to participate in SACOG's annual Civic Lab to tackle issues affecting land use and transportation.

MEASURE INC-07: GREEN JOB TRAINING

The County will support the efforts of local colleges, universities, and community-based organizations to provide green job training in disadvantaged communities.

3.3.5 Natural and Working Lands Measures

MEASURE NWL-01: SOUTH SACRAMENTO HABITAT CONSERVATION PLAN

The County will implement the SSHCP to preserve 6,351 acres of land that would otherwise be developed for urban uses.

MEASURE NWL-03: URBAN FORESTRY

The County will maintain and enhance the urban forest through the following actions:

- Promote tree planting.
- Ensure that trees required to be planted through the Zoning Code are maintained.
- Provide incentives to existing uses to provide parking lot shade trees.
- Hire an urban forester.

- Coordinate with the Sacramento Tree Foundation.
- Conduct urban forest inventory.
- Partner with STF to develop new programs to increase tree canopy, including in redeveloping areas.
- Forge partnerships with community cooperatives to organize tree-planting and maintenance events.

Target Indicators

- 47,500 new trees planted by 2030.

GHG Removal Potential: 21,752 $MTCO_{2e}$/year by 2030

MEASURE NWL-04: CONNECTED OPEN SPACE SYSTEM

The County will ensure that new development increases connections and removes barriers to open space, and increases green and open spaces including trails, in all new communities, connecting with existing communities through Policies OS-11 and OS-12 of the General Plan Open Space Element and associated implementation measures.

MEASURE NWL-05: SMART GROWTH

The County will develop a comprehensive planning process to encourage smart growth. This will include: 1) identifying future stations/corridors in the General Plan, 2) working with RT on their Master Plan and designating transit-oriented development (TOD) areas in General Plan Land Use Map, and 3) discouraging development at the urban/agriculture interface.

MEASURE NWL-06: CARBON FARMING

The County will work with local farmers, ranchers, and land managers to promote and increase carbon sequestration on agricultural lands through the development of carbon farming plans.

Target Indicators

- Implementation of 100 carbon farming plans by 2024.
- Implementation of 250 carbon farming plans by 2027.
- Implementation of 500 carbon farming plans by 2030.

GHG Removal Potential: 1,681 $MTCO_{2e}$/year by 2030

MEASURE NWL-07: CARBON FARMING OUTREACH AND EDUCATION

The County will develop a program by 2022 that, through targeted outreach, provides carbon sequestration education and resources to relevant stakeholders (e.g., farmers, ranchers, and land managers). The program will focus on educating stakeholders about the co-benefits of implementing carbon sequestration practices and the variety of financial and technical resources that are currently available to assist farmers and ranchers in implementation.

Target Indicators

- 25 percent of stakeholders have been engaged by 2022.

- 50 percent of stakeholders have been engaged by 2024.
- As close to 100 percent of stakeholders as possible have been engaged by 2028.

GHG Removal Potential: 377,692 $MTCO_{2e}$/year by 2030

MEASURE NWL-08: GENERAL PLAN – LAND USE ELEMENT

For the next General Plan update, the County will explore ways to prioritize and maximize landscape carbon storage through land use planning.

3.3.6 Reduced Driving and Alternative Transportation Modes Measures

MEASURE VMT-01: REDUCE VEHICLE MILES TRAVELED FROM NEW DEVELOPMENT

The County will develop a protocol that requires all new projects to reduce VMT by a minimum of 15 percent pursuant to the goals of SB 743.

Target Indicators

- 15 percent reduction in VMT from new development by 2030.

GHG Reduction Potential: 22,037 $MTCO_{2e}$/year by 2030

MEASURE VMT-02: TRANSPORTATION SYSTEM MANAGEMENT PLAN

Implement Section 5.9.6.F of the Zoning Code, which requires a TSM Plan for qualifying projects.

GHG Reduction Potential: 15,570 $MTCO_{2e}$/year by 2030

MEASURE VMT-03: MINIMUM PARKING STANDARDS

The County will create a parking reduction plan to reduce minimum parking standards as a means to encourage alternative modes of transportation and increase shared parking.

Target Indicators

- 50 percent of the parking reduction plan realized by 2030.

GHG Reduction Potential: 4,634 $MTCO_{2e}$/year by 2030

MEASURE VMT-04: IMPROVED TRANSIT ACCESS

The County will support Sacramento RT in addressing identified gaps in public transit networks through implementation of the policies in the General Plan Circulation Element which seek to help by "promoting transit services, assuring that users are provided with adequate transportation choices, addressing user

needs, developing convenient transfers between transportation system, and ensuring adequate funding for the transit network" (Sacramento County 2011).

GHG Reduction Potential: 1,854 $MTCO_{2e}$/year by 2030

MEASURE VMT-05: IMPROVED PEDESTRIAN NETWORK AND FACILITIES

The County will update the Pedestrian Master Plan and will implement projects and programs identified in the Pedestrian Master Plan to reduce barriers to walking and increase mobility for all users of the roadways.

Target Indicators

- 75 percent of the Pedestrian Master Plan built out by 2030.

GHG Reduction Potential: 1,390 $MTCO_{2e}$/year by 2030

MEASURE VMT-06: TRAFFIC CALMING MEASURES

The County will implement traffic calming measures to improve traffic flow, pedestrian orientation, and bicycle use.

Target Indicators

- 25 percent of streets and 25 of intersections improved by 2030.

GHG Reduction Potential: 927 $MTCO_{2e}$/year by 2030

MEASURE VMT-07: PARK-AND-RIDE LOTS

The County will work with cities, SACOG, and neighboring regions to increase presence of park-and-ride facilities near residential centers, in order to increase ridesharing.

GHG Reduction Potential: 371 $MTCO_{2e}$/year by 2030

MEASURE VMT-08: UNBUNDLE PARKING COSTS

The County will amend Section 5.9.5 of the Zoning Code to require project applicants to unbundle the cost of parking from the cost of commercial and/or residential space in lease or sale agreements.

GHG Reduction Potential: 371 $MTCO_{2e}$/year by 2030

MEASURE VMT-09: IMPROVED BICYCLE NETWORK AND FACILITIES

The County will improve the bicycle network and facilities through the following actions:

- Implement projects and programs in the Bicycle Master Plan to reduce barriers to biking and increase mobility for all users of the roadways.
- Modify the preferred siting of both short-term and long-term employee bicycle parking to better encourage parking for commercial, multi-family, industrial or institutional uses.

- Participate in multi-jurisdictional bike share programs (i.e., JUMP) with SACOG, Sacramento, West Sacramento, and Davis.

Target Indicators

- 30 percent of the Bicycle Master Plan built out by 2030.

GHG Reduction Potential: 348 $MTCO_{2e}$/year by 2030

MEASURE VMT-10: CONNECTIONS TO TRANSIT STOPS

The County will provide and improve connections to transit stations by identifying, prioritizing, and seeking funding to plan and construct roadways, bikeways, and pedestrian improvements within a half-mile of existing and planned transit stations.

GHG Reduction Potential: 7 $MTCO_{2e}$/year by 2030

MEASURE VMT-11: INCREASED VEHICLE OCCUPANCY

The County will work with a broad range of agencies, including SACOG, to encourage and support programs that increase regional average vehicle occupancy.

MEASURE VMT-12: SECURE BIKE STORAGE FACILITIES

The County will modify the preferred siting of both short-term and long-term employee bicycle parking to better encourage parking for commercial, multi-family, industrial or institutional uses.

Target Indicators

- 30 percent of the Bicycle Master Plan built out by 2030.

MEASURE VMT-13: SAFE ROUTES TO SCHOOL

The County will implement the CAN Goes to School Program and work with local organizations such as WALKSacramento to improve safety among children traveling to school via walking, biking, or riding in a vehicle.

MEASURE VMT-14: UPDATE COMMUNITY AND CORRIDOR PLANS

The County will update Community Plans and finalize Corridor Plans to support infill development, transit-oriented development, and mixed-use development projects.

MEASURE VMT-15: CONNECTING KEY DESTINATIONS

The County will promote better connections by all travel modes between residential neighborhoods and key commercial, cultural, recreational, and other community-supportive destinations for all travel modes through Policies CI-3 and CI-4 of the General Plan Circulation Element and associated implementation measures.

4 MUNICIPAL GREENHOUSE GAS REDUCTON STRATEGIES AND MEASURES

4.1 INTRODUCTION

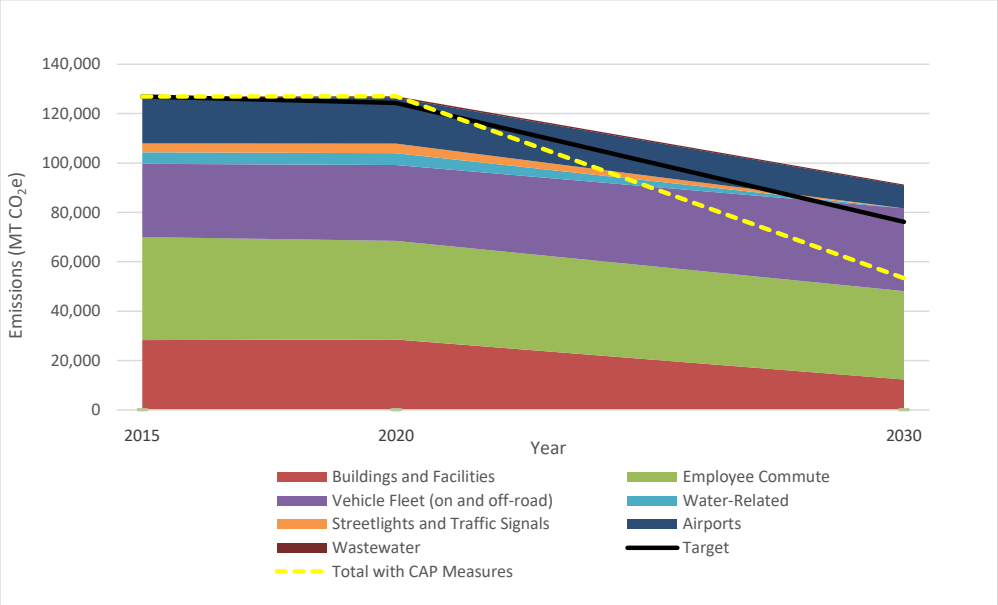
This chapter outlines specific greenhouse gas (GHG) reduction strategies and measures to be implemented by Sacramento County (County) to reduce emissions from internal operations. The CAP includes seven high-level strategies and 23 measures to reduce municipal GHG emissions. Each high-level strategy is associated with a specific municipal emissions sector. The strategies are:

- **Employee Commute**: Measures are listed in Section 4.3.1, "Employee Commute Measures."
- **Vehicle Fleet**: Measures are listed in Section 4.3.2, "Vehicle Fleet Measures."
- **Buildings and Facilities**: Measures are listed in Section 4.3.3, "Buildings and Facilities Measures."
- **Airports**: Measures are listed in Section 4.3.4, "Airports Measures."
- **Multi-Sector**: Measures are listed in Section 4.3.5, "Multi-Sector Measures."
- **Water-Related**: Measures are listed in Section 4.3.6, "Water-Related Measures."
- **Streetlights and Traffic Signals**: Measures are listed in Section 4.3.7, "Streetlights and Traffic Signals Measures."

4.2 MUNICIPAL GREENHOUSE GAS REDUCTION SUMMARY

The total estimated GHG emission reduction from all quantifiable internal operations measures is 37,876 $MTCO_2e$ in 2030. The total estimated reductions from all proposed GHG reduction measures would be sufficient to meet the 2030 target. As described in Section 2.4.2, "Municipal Targets," the County would need to reduce annual emissions by 35,824 $MTCO_2e$ in 2030, beyond the reductions provided by legislative actions at the federal, state, and regional levels. Thus, the municipal GHG reduction strategies would support the County in achieving its municipal GHG reduction target. Figure 4-1 shows the reductions that would be achieved by implementing the CAP strategies and measures relative to the 2017 Scoping Plan target and BAU GHG Emissions.

Figure 4-1 GHG Reductions with Municipal CAP Measures Relative to Scoping Plan Target and BAU GHG Emissions



Source: Ascent Environmental 2021

4.3 MUNICIPAL GREENHOUSE GAS REDUCTION MEASURES

4.3.1 Employee Commute Measures

EC-1: EMPLOYEE TRANSPORTATION PROGRAM

The County will reduce employee commute VMT through the following actions:

- Increase the visibility of the County Employee Transportation Program Coordinator and the number of employees participating;
- Consider expanding the program to encourage alternative modes of transportation for both home-to-work and at-work travel;
- Identify improvements to the program based on the feedback from the 2010 employee commute survey;
- Create a position under the Chief of Fleets (or CEO's office) to establish and operate a County Employee Transportation Demand Management Program;
- Promote and encourage employee participation in regional and national bike-to-work days/months;
- Provide incentives to employees who bike to work separate from the regional/national bike events;

- Waive parking fees for employees driving EVs at all county facilities, as feasible; and
- Allow full time staff to opt in to a 9/80 work schedule to reduce VMT, which shall be encouraged by County leadership.

EC-2: TRANSIT SUBSIDY PROGRAM

The County will increase participation in transit subsidy program for County employees through expanding the incentive to apply to all employees and providing information about the program regularly.

Target Indicators

- 10 percent participation in transit subsidy program by 2030, and
- 15 percent participation in transit subsidy program by 2050.

GHG Reduction Potential: 2,220 $MTCO_{2e}$/year by 2030

EC-3: EMPLOYEE SHUTTLE SYSTEM

The County will conduct a study of travel patterns by County employees to determine the feasibility of a shuttle system that would bring employees from major transit stations to County offices.

EC-4: DESIGNATED PARKING AND CHARGING FOR EVS AND OTHER ALTERNATIVELY- FUELED VEHICLES

The County will increase designated EV parking spaces and provide charging for EVs at these spaces through the following actions:

- Seek grant funding to pay for infrastructure upgrades or EV charging stations in County-owned parking lots (for use by employees, as well as visitors where appropriate);
- Install EV chargers at County facilities available for employee and visitor use; and
- Allow employees to be reimbursed for charging County-owned or leased vehicles overnight at home using the rates calculated by SMUD, similar to how gasoline-powered VMT are reimbursed.

Target Indicators

- 30 Level 2 EV chargers installed by 2030 at County-owned parking lots, and
- 12 DC Fast chargers and 38 Level 2 EV chargers installed by 2050 at County-owned parking lots.

GHG Reduction Potential: 249 $MTCO_{2e}$/year by 2030

EC-5: SECURE BICYCLE STORAGE FACILITIES

The County will site both short-term and long-term employee bicycle parking in convenient and secure locations at all County facilities to better encourage commuting via bicycle.

EC-6: EV ADOPTION PROGRAM

The County will participate in EV informational and test drive events open to the public. Further, the County will provide educational outreach events to County employees discussing the benefits of EVs.

EC-7: CARPOOL-AT-WORK INCENTIVES

The County will provide carpool-at-work incentives (incentives to encourage employees in all departments to carpool between County offices, to off-site meetings and to field activities).

4.3.2 Vehicle Fleet Measures

F-1: FLEET CONVERSION PROGRAM

The County will expand the existing light-duty fleet conversion policy/program with the goal of converting the entire County fleet to vehicles, trucks, and equipment powered by alternative low-carbon fuels, electricity, fuel cells, and/or other technologies as they become financially feasible and based on total cost of ownership life cycle analysis.

Target Indicators

- 30 percent of new fleet purchases are EVs by 2030, and
- 75 percent of new fleet purchases are EVs by 2050.

GHG Reduction Potential: 2,352 $MTCO_{2e}$/year by 2030

F-2: RENEWABLE CNG FOR ON- AND OFF-ROAD FLEETS

The County will replace traditional CNG fuel with renewable CNG in all County-owned natural-gas-powered vehicles.

Target Indicators

- 1 million gallons of renewable CNG purchased by 2030.

GHG Reduction Potential: 4,334 $MTCO_{2e}$/year by 2030

F-3: RENEWABLE DIESEL FOR ON- AND OFF-ROAD FLEETS

The County will replace traditional diesel fuel with renewable diesel in all County-owned diesel vehicles.

Target Indicators

- 500 gallons of renewable diesel purchased by 2030.

GHG Reduction Potential: 4,975 $MTCO_{2e}$/year by 2030

4.3.3 Building and Facilities Measures

BE-1: GREEN BUILDING POLICY

The County will develop and adopt an internal Green Building Policy that sets a 30 percent energy reduction target for all existing County buildings compared to current benchmarking. As part of this policy, the County will also design all new County-owned and operated buildings and additions to exceed the energy performance of the 2019 California Energy Code by 10 percent, consistent with CALGreen Tier 1 energy standards established in Section A5.203.1 of the code.

Target Indicators

- 30 percent energy use reduction in County-owned and operated buildings by 2030.

GHG Reduction Potential: 8,766 $MTCO_{2e}$/year by 2030

BE-2: SOLAR FOR COUNTY BUILDINGS

The County will offset 100 percent of its building electricity use with renewable energy by 2030 through continued participation in SMUD's SolarShares program, Greenergy, or though on-site solar installations at County facilities.

Target Indicators

- 100 percent of County building electricity use procured from renewable sources by 2030.

GHG Reduction Potential: 8,841 $MTCO_{2e}$/year by 2030

BE-3: EMPLOYEE GREEN BUILDING TRAINING

The County will support employees in the Office of Planning and Environmental Review and the Building Permits and Inspection Division (including the Planning Director and Chief Building Official) in receiving training on the review and enforcement of CALGreen standards, including the Tier 1 and Tier 2 reach codes. At a minimum, training will be required for all employees responsible for reviewing and approving plans and permits, as well as building inspection supervisors. Certain employees will also be required to be certified according to the International Code Council's CALGreen certification programs or other equivalent programs. Cross-training and certification in other energy code related programs, such the LEED Accredited Professionals program, California Building Officials (CALBO) Training Institute, and utility or state sponsored energy efficiency education programs will also be encouraged.

BE-4: SUSTAINABLE BUSINESS TRAINING

The County will ensure its buildings and facilities are in compliance with BERC's SSB Program, and through the process, recommend enhancements to the BERC program as warranted.

4.3.4 Airport Measures

AR-1: AIRPORT FLEET REPLACEMENT

The County will convert the airport vehicle fleet to vehicles, trucks, and equipment powered by alternative low-carbon fuels, electricity, fuel cells, and/or other technologies as they become financially feasible.

Target Indicators

- 15 zero-emission electric shuttle buses purchased by 2030, and
- 30 zero-emission electric shuttle buses purchased by 2050.

GHG Reduction Potential: 574 $MTCO_{2e}$/year by 2030

AR-2: SOLAR POWER AT SMF

The County will continue to procure at least 30 percent of its electricity demand from renewable energy sources.

GHG Reduction Potential: 2,019 $MTCO_{2e}$/year by 2030

AR-3: ENERGY-EFFICIENT TAXIWAY LIGHTING

The County will install and maintain LED taxiway lighting and signage during major taxiway renovations and upgrades.

GHG Reduction Potential: 10 $MTCO_{2e}$/year by 2030

AR-4: EV CHARGING AT SMF

The County will install EV chargers accessible to visitors at the Sacramento International Airport.

Target Indicators

- 36 Level 2 and 16 DC Fast EV chargers installed by 2030, and
- 50 Level 2 and 30 DC Fast EV chargers installed by 2050.

GHG Reduction Potential: 4,311 $MTCO_{2e}$/year by 2030

4.3.5 Multi-Sector Measures

MS-1: BUY CLEAN POLICY

The County will adopt a buy clean policy pursuant to AB 262 for the County to purchase construction materials from manufacturers that have invested in cutting their GHG emissions for all County projects.

4.3.6 Water-Related Measures

WA-1: WATER EFFICIENCY POLICY

The County will develop and implement a water efficiency policy that achieves a 20 percent reduction in water usage below 2015 levels for all County facilities by 2030.

Target Indicators

- 20 percent reduction in water consumption by 2030.

GHG Reduction Potential: 873 $MTCO_{2e}$/year by 2030

WA-2: TURF LANDSCAPE IRRIGATION AUDIT

The County will conduct water audits to evaluate irrigation practices in large turf landscapes around County facilities and modify irrigation practices and equipment accordingly (timers, sprinkler heads, etc.). The County will coordinate with appropriate water conservation coordinator with applicable water purveyor.

WA-3: WATER-EFFICIENT EQUIPMENT

The County will replace water-wasting equipment with more efficient equipment when grant funds are available from local water purveyor.

4.3.7 Streetlights and Traffic Lights Measures

ST-1: STREETLIGHT CONVERSION

The County will replace remaining high-pressure sodium (HPS) and mercury-vapor (MV) streetlights with energy-saving LED technology.

Target Indicators

- 10,533 LED streetlights installed by 2030.

GHG Reduction Potential: 516 $MTCO_{2e}$/year by 2030

5 CLIMATE CHANGE VULNERABILITY AND ADAPTATION

5.1 INTRODUCTION

Climate change is a global phenomenon that will result in short- and long-term consequences, including detrimental impacts on human health and safety, economic continuity, water security, provisions of basic services, and economic function. Indeed, the impacts of climate change are already being felt and are disproportionately impacting California's most vulnerable communities. According to the California Natural Resources Agency's (CNRA) Safeguarding California Plan: 2018 Update, the accelerating rate of climate change in this century will likely exceed that experienced by California's native peoples over past millennia (CNRA 2018). The magnitude and timing of climate change effects will vary by location; therefore, in order to develop effective strategies to address the impacts of climate change, jurisdictions must understand the projected severity of local climate impacts.

The purpose of climate adaptation planning is to seek strategies to reduce vulnerability to projected climate change impacts, increase adaptive capacity, and build resiliency. Resilience is defined as the ability of an individual, community, organization, or natural system to prepare for disruptions, to recover from shocks and stresses, and to adapt and grow from a disruptive experience. A climate resilient county is one that is prepared for the effects of climate change, can continue to provide essential services, protects the most vulnerable during hazard events, and continually learns and adjusts in the face of change and disruption.

The two basic components of climate adaptation planning are a vulnerability assessment and adaptation strategies. The vulnerability assessment presented below evaluates how climate change will impact Sacramento County (County). It identifies projected climate change exposures for the county at mid- and late century timescales. As climate change-related hazards become more frequent and intense over time, threats to population groups and physical assets will increase. This assessment identifies the county's populations and assets that are most vulnerable to climate change effects and the level of severity at which they may be impacted through a method known as "vulnerability scoring". This scoring helps the County understand which effects pose the greatest threats and should be prioritized in adaptation planning efforts. Lastly, this chapter presents adaptation strategies and measures to address the impacts of climate change, protect people and infrastructure that are the most vulnerable to its effects, and increase countywide resilience to climate change.

5.1.1 Guiding Documents

The following statewide planning guidance and documents were referred to in the preparation of the vulnerability assessment and adaptation strategies and measures:

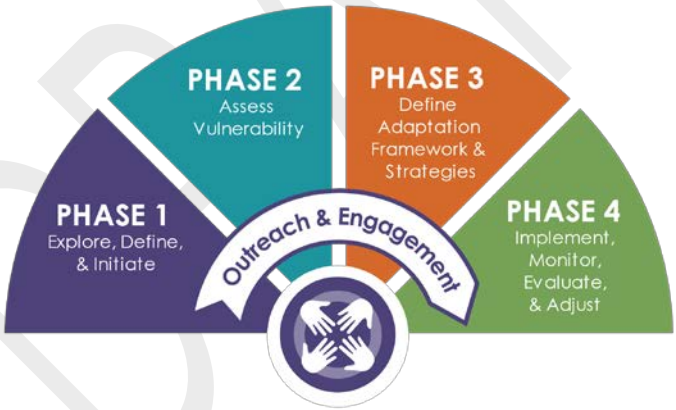
- California Adaptation Planning Guide: The California Office of Emergency Services (CalOES) and CNRA prepared the Adaptation Planning Guide (APG) in 2012 to provide vulnerability assessment and adaptation planning guidance for communities. CalOES released APG 2.0 (dated June 2020), an updated guidance document that includes bet practices and additional flexibility for jurisdictions. APG 2.0 lays out a framework for communities to identify potential climate change effects; important physical, social, and natural assets; create adaptation strategies to address climate change impacts; and develop a monitoring and implementation framework for climate change adaptation (CalOES 2020).

- California's Fourth Climate Assessment: CNRA, the Governor's Office of Planning and Research, and the California Energy Commission prepared California's Fourth Climate Assessment (Fourth Assessment) in 2018. The Fourth Assessment was designed to address critical information gaps that decision-makers at the state, regional, and local levels need to close in order to protect and build the resilience of people, infrastructure, natural systems, working lands, and waterways.
- Safeguarding California Plan: Alongside the update to the Fourth Assessment, CNRA released the Safeguarding California Plan: 2018 Update which provides a roadmap for State government action to build climate resiliency. The plan identifies actions the State government will take to protect communities, infrastructure, services, and the natural environment from climate change impacts and includes strategies for use as local examples for climate adaptation.

5.1.2 Adaptation Planning Process

APG 2.0 includes a four-phase adaptation planning process, illustrated in *Figure 5-1*, which supports communities in assessing their specific climate vulnerabilities and provides a menu of strategies to reduce climate-related risks and prepare for current and future climate change impacts. The County's vulnerability assessment and adaptation strategy development process is based off APG's recommended framework.

Figure 5-1 Adaptation Planning Process



Source: CalOES 2020.

Phase 1, "Explore, Define, and Initiate," includes scoping and defining the adaptation planning effort. A preliminary list of potential climate change effects and important physical, social, and natural assets in the community is identified for further analysis. Phase 1 also includes the preparation of an equitable outreach and engagement plan that will be used throughout the adaptation planning process. Phase 2, "Assess Vulnerability," is composed of four steps: exposure, sensitivity and potential impacts, adaptive capacity, and vulnerability scoring. The purpose of this phase is to identify the most urgent and critical climate impacts that the County must address. Phase 3, "Define Adaptation Framework and Strategies," focuses on creating an adaptation framework and developing adaptation strategies based on the results of the vulnerability assessment. Adaptation strategies identify how the community will address the potential for

harm based on the community's resources, goals, values, needs, and regional context. In Phase 4, "Implement, Monitor, Evaluate, and Adjust," the adaptation framework is implemented, consistently monitored and evaluated, and adjusted based on continual learning, feedback, or triggers. The adaptation planning process is intended to be cyclical in nature.

The ultimate goal of adaptation planning is to improve community resiliency in the face of a changing climate. Ongoing learning and monitoring allow for adjustments to be made in response to new information and opportunities, which is important for building resiliency.

5.2 VULNERABILITY ASSESSMENT

This section presents a vulnerability assessment for the county, focusing on direct and indirect climate change effects. The direct, or primary, effects analyzed for the county include changes in average temperature and annual precipitation amounts. Secondary effects, which can occur because of individual changes or a combination of changes in the primary effects, are also assessed. These include extreme heat, wildfire, drought, flooding, and sea-level rise. The vulnerability assessment follows the process outlined in Phase 2 of the APG and is composed of the following four steps:

- Exposure: The first step in the vulnerability assessment is to identify what climate change effects Sacramento County will experience in the future. To assess potential effects from climate change, the APG 2.0 recommends using Cal-Adapt, a tool developed by the California Energy Commission and the University of California Berkeley Geospatial Innovation Facility that uses global climate simulation model data to provide a view of how climate change might affect California. Cal-Adapt addresses the uncertainty in future greenhouse gas (GHG) emissions with the use of Representative Concentration Pathways (RCPs), which depict two different future emissions scenarios: RCP 4.5 represents a medium emissions scenario where communities attempt to reduce GHG emissions. This scenario predicts that GHG emissions will continue to rise until plateauing in the middle of the 21st century and would decrease to below 1990 levels by the end of the 21st century. RCP 8.5 represents a high emissions scenario, or business-as-usual (BAU) scenario, where GHG emissions continue to increase through the end of the 21st century. Because the efficacy of GHG reduction strategies is not known, a discussion of both emissions scenarios, and their associated impacts, is included in this vulnerability assessment (Bedsworth et al. 2018).
- Sensitivity and Potential Impacts: This step identifies and assesses how population groups, community functions, and physical assets may be affected by localized climate change effects.
- Adaptive Capacity: The County, partner agencies, and organizations within the county have already taken steps to build resiliency and protect sensitive populations and assets from hazards. Thus, the purpose of this step is to characterize the county's current ability to cope with climate impacts, by reviewing existing plans, policies, and programs.
- Vulnerability Scoring: Lastly, vulnerability scores are determined based on how severe projected climate exposures will be, the degree of sensitivity of population groups and assets to anticipated climate effects, and whether sufficient adaptive capacity exists to manage the potential impact.

Table 5-1 below includes a summary of the vulnerability scoring. It lists the direct and indirect impacts associated with climate change, the magnitude of risk posed to populations and assets (potential impact), and the County's existing adaptive capacity. An overall vulnerability score is determined based on the potential impact and adaptive capacity scores.

Table 5-1 Potential Impact, Adaptive Capacity, and Vulnerability Scoring for Sacramento County

Impact	Potential Impact	Adaptive Capacity	Vulnerability Score
Increased Temperatures and Extreme Heat Days and Heat Waves	High	Medium	4
Increased Wildfire Risk	Medium	Medium	3
Increased Drought	Medium	Medium	3
Increased Flooding	High	Low/Medium	4/5
Sea-Level Rise	High	Medium	4

5.2.1 Exposure

PRIMARY EFFECT: INCREASED TEMPERATURES

According to Cal-Adapt, the historic (1961-1990) annual average maximum temperature for the county was 74 degrees Fahrenheit (°F), and the historic annual average minimum temperature was 48.4 °F. As shown in *Table 5-2* and *Figures 5-2* and *5-3*, both are projected to increase by mid-century (2035-2064) and further increase by late century (2070-2099) under the medium and high emissions scenarios.

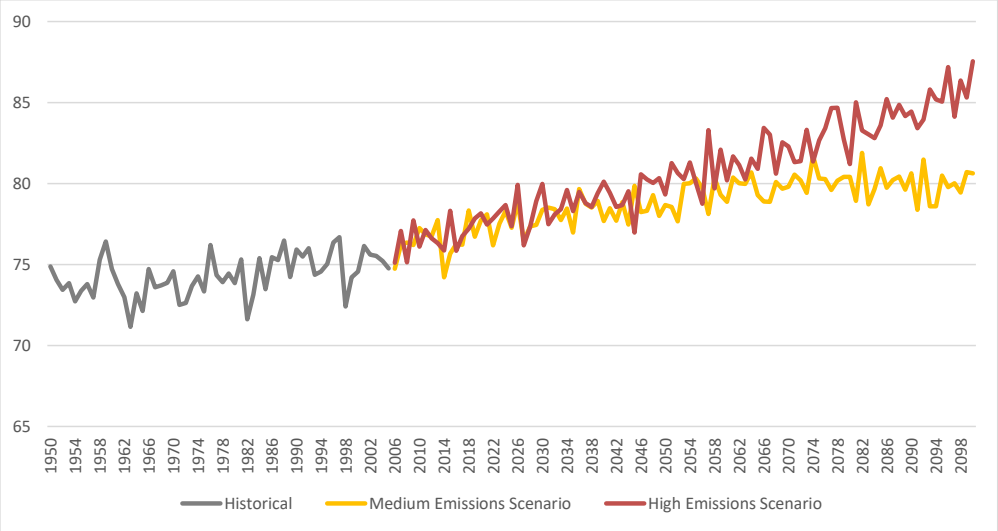
Table 5-2 Changes in Annual Average Temperature in Sacramento County

Annual Average Temperature (°F)	Historic Annual Average Temperature (1961-1990)	Medium Emissions Scenario (RCP 4.5)		High Emissions Scenario (RCP 8.5)	
		Mid-Century	Late Century	Mid-Century	Late Century
Maximum Temperature	74.0	78.3	79.8	79.4	82.7
Minimum Temperature	48.4	52.2	53.4	53.2	56.8

Notes: °F = degrees Fahrenheit, RCP = Representative Concentration Pathway

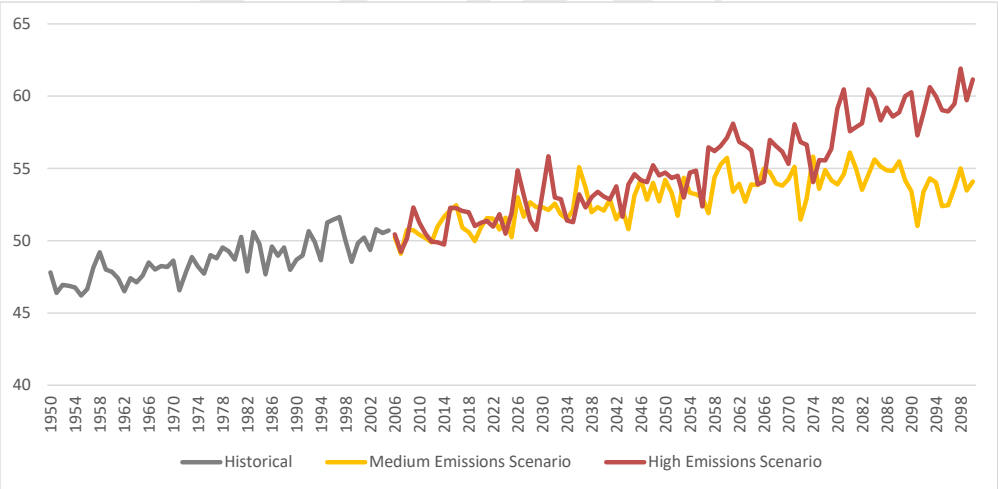
Source: CEC 2020a

Figure 5-2 Historical and Projected Annual Average Maximum Temperature in Sacramento County



Source: Data downloaded from Cal-Adapt in 2020; adapted by Ascent Environmental in 2020.

Figure 5-3 Historical and Projected Annual Average Minimum Temperature in Sacramento County



Source: Data downloaded from Cal-Adapt in 2020; adapted by Ascent Environmental in 2020.

Increased temperature in unincorporated county will influence secondary climate effects including extreme heat events, wildfires, drought, and sea-level rise.

PRIMARY EFFECT: CHANGES IN PRECIPITATION PATTERNS

According to California's Fourth Climate Change Assessment Sacramento Valley Region report, precipitation patterns in California oscillate between extremely dry and wet periods. Although annual precipitation figures in the Sacramento Valley region are expected to increase only slightly, climate change is likely to increase the intensity of extreme storms. Dry years are likely to become even drier, while wet years will become even wetter in the next several decades. Most critically, future wet seasons will have more precipitation as rain than snow, due to higher temperatures. The Northern Sierras, a primary water source for the Sacramento Valley, are expected to have almost no annual snowpack by the end of this century. This shift will affect the timing of streamflow into the Sacramento Valley from spring to winter (Houlton and Lund 2018).

According to Cal-Adapt, the historic annual average precipitation in the county has been 18.3 inches. As shown in *Table 5-3* and *Figure 5-4*, the total annual precipitation in county is projected to increase slightly by mid-century and late century under the medium and high emissions scenarios (CEC 2020a).

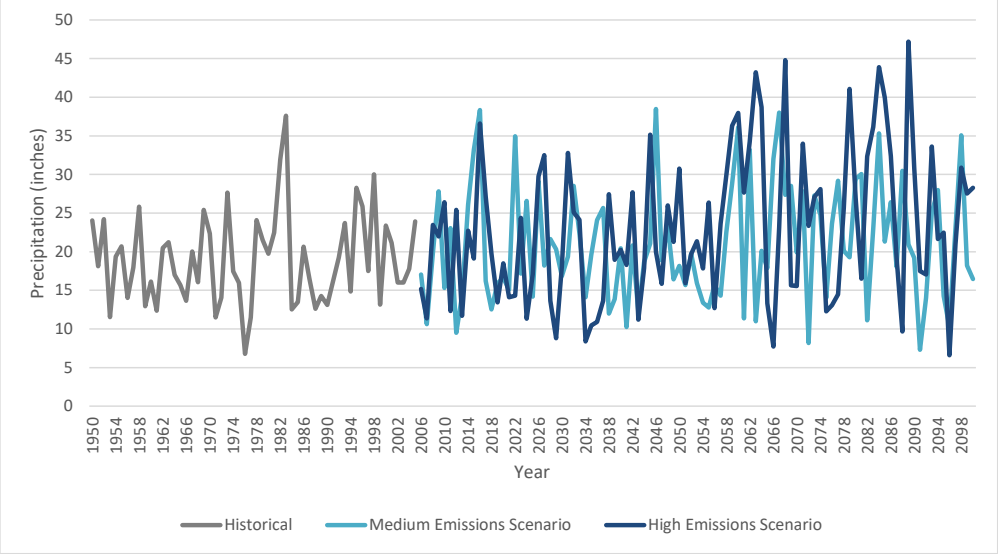
Table 5-3 Changes in Annual Average Precipitation in Sacramento County

Annual Average Precipitation	Historic Annual Average Precipitation (1961-1990)	Medium Emissions Scenario (RCP 4.5)		High Emissions Scenario (RCP 8.5)	
		Mid-Century	Late Century	Mid-Century	Late Century
Annual Average Precipitation (in)	18.3	20.3	20.3	20.5	22.1

Notes: in = inches, RCP = Representative Concentration Pathway

Source: CEC 2020a

Figure 5-4 Historical and Projected Precipitation in Sacramento County



Source: Data downloaded from Cal-Adapt in 2020; adapted by Ascent Environmental in 2020.

Changes in precipitation patterns will affect secondary climate effects including human health hazards, drought, extreme precipitation and flooding, landslides, and wildfires.

SECONDARY EFFECT: EXTREME HEAT

Cal-Adapt defines an extreme heat day as a day in a year when the daily maximum/minimum temperature exceeds the 98th historical percentile of daily maximum/minimum temperatures based on observed historical data from 1961–1990 between April and October. The extreme heat threshold for the county[1] is 103.8°F. Historically, the county experienced an average of four extreme heat days per year. Extreme heat days are already increasing in Sacramento County, with a current average of eight to nine extreme heat days per year from 2010 to 2016, including 18 extreme heat days in 2015. As a result of rising average maximum temperatures from climate change, the county is projected to experience up to 17 extreme heat days annually by mid-century and 24 extreme heat days by the late century under the medium emissions scenario. Under the high emissions scenario, the county is projected to experience up to 22 extreme heat days annually by mid-century and 40 extreme heat days by the late century (CEC 2020b).

Heat waves, which are defined as four or more consecutive extreme heat days, have been historically infrequent in Sacramento County; however, climate change will cause a substantial rise in the frequency of heat waves under both emissions scenarios. Under the medium emissions scenario, projections show an increase in heat waves to about 1.9 per year by mid-century and up to 2.8 per year by late century. Under the high emissions scenario, projections show an increase of 2.6 heat waves per year by mid-century and up to 5.8 per year by late century.

SECONDARY EFFECT: WILDFIRES

According to the 2016 Sacramento County Local Hazard Mitigation Plan (LHMP), rural wildfire and urban wildfire are ongoing concerns for the County. Currently, the major wildland fire hazards occur at the wildland urban interface where development is placed close to natural environments that support wildfire (Sacramento Metropolitan Fire District [Metro Fire] 2014).

Increased temperatures and changes in precipitation patterns associated with climate change are expected to increase the risk of wildfire in Sacramento County. Higher temperatures and reduced precipitation results in reduced average moisture in vegetation, which leads to the drying out of fuel loads that support more intense wildfires. The eastern portion of Sacramento County, where the topography includes more widespread steeper slopes, is most vulnerable to wildfire.

SECONDARY EFFECT: DROUGHT

Sacramento County is not located in an area where snow accumulates; however, major water districts and utilities in the County receive and depend on a substantial amount of water from watersheds that rely upon spring and early-summer snowmelt in the Sierra Nevada mountain range. The Sierra Nevada snowpack, which serves as a natural water supply reservoir for California during the dry months, is predicted to decline in area covered and water volume stored, as average temperatures rise and precipitation falls more frequently as rain instead of snow at mountain elevations. Further, increased temperatures will affect the timing of historical snowmelt such that the snowpack will typically melt earlier

[1] Cal-Adapt does not include countywide aggregated climate data for extreme heat. Thus, the geographic area surveyed for extreme heat relies on aggregated data from the City of Sacramento, which serves as a proxy for the County.

in the year, causing more rapid early spring flows in the Sacramento, American, Cosumnes, and Mokelumne Rivers and reduced late spring/summer flows.

Approximately 50 percent of Sacramento County is served by groundwater supplies. Changes in surface water flow will have a direct impact on groundwater recharge, including decreased periods of recharge when late spring/summer stream flows diminish. Further, groundwater usage is higher in periods of drought; therefore, groundwater supplies may be reduced during and after periods of limited surface water flows.

California (including Sacramento County) is prone to prolonged drought. The state experienced severe drought in 1973, 1976 through 1977, 1987 through 1991, 2007 through 2009, and 2012 through 2016. During the most recent severe drought period in June of 2015, statewide reservoir storage levels were between 18 and 67 percent of normal (State Water Resources Control Board [SWRCB] 2017). Climate change is expected to increase the number, duration, and severity of future droughts. Exacerbated drought conditions, early snowmelt, and reduced snowpack size, combined with increased demand as population and development increases, could result in water supply constraints in future years.

SECONDARY EFFECT: FLOODING

Climate change is likely to lead to changes in the frequency, intensity, and duration of extreme weather events, such as sustained periods of heavy precipitation, increased rainfall intensity during precipitation events, and increased risk of rain-on-snow events. Further, more winter-time precipitation that falls as rain instead of snow, and higher temperatures that will cause earlier snowmelt, which could produce substantial surface water flows over a short period of time and may potentially affect dams and spillways and overwhelm levee systems designed for historical precipitation patterns. Historically, the county[2] experienced an average of three extreme precipitation events per year. Under both the medium and high emissions scenarios, the county is expected to experience four extreme precipitation events per year by mid-century and five extreme precipitation events per year by the late century (CEC 2020c).

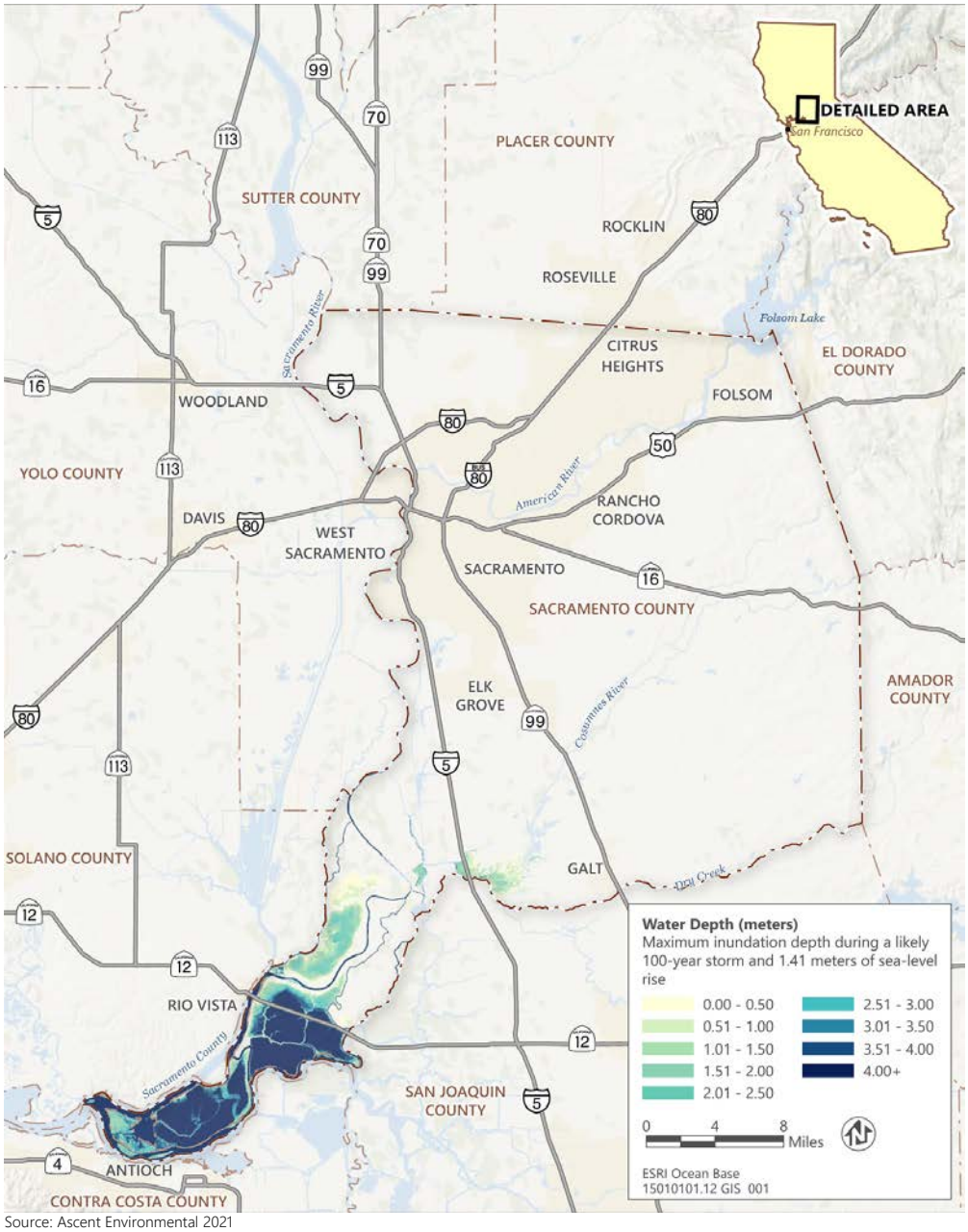
According to the LHMP, the County is "Highly Likely" to experience localized flooding (likelihood of occurrence every year or every other year), "Occasional" to experience a 100-year flood event (one to ten percent likelihood of occurrence every year), and "Unlikely" to experience a 200- and 500-year flood event (less than one percent chance of occurrence every year).

SECONDARY EFFECT: SEA-LEVEL RISE

Another outcome of global climate change is sea-level rise. As shown in *Figure 5-5*, the southwestern portion of the County, which includes the lower reaches of the Sacramento River as it approaches the Sacramento-San Joaquin Delta, is the area of the county vulnerable to the effects of sea-level rise. Land uses in this area of the County are primarily rural and agricultural.

[2] Cal-Adapt does not include countywide aggregated climate data for extreme precipitation. Thus, the geographic area surveyed for extreme precipitation relies on aggregated data from the City of Sacramento, which serves as a proxy for the County.

Figure 5-5 Sea-Level Rise Projections for Sacramento County, 1.41 Meter Rise Scenario



Source: Ascent Environmental 2021

Sea-level rise may also result in greater saltwater incursion up the Sacramento River. Increased municipal and agricultural demand for fresh water, rising sea levels in the Delta, and reduced freshwater flow in the Sacramento River may affect water quality within the river. Water quality is dependent on a complex interaction of several variables, however, so the risk of future climate change implications on water quality in the Sacramento River is uncertain.

5.2.2 Sensitivity and Potential Impacts

Climate change effects will impact some population groups, community functions, and physical assets more severely than others.

- **Population** includes both the general human population and segments of the population that are most likely to be sensitive or vulnerable to climate change impacts. Vulnerable populations within the county include linguistically isolated populations, the elderly, persons experiencing homelessness, outdoor workers, some tribal nations, low-income communities, and disadvantaged communities who already bear disproportionate pollution burden.
- **Functions** are essential services that provide for public health and safety, ecosystem functioning, and the economy. These include hospitals, medical facilities, police and fire stations, emergency operations centers, evacuation shelters, and schools. Transportation networks and lifeline utility systems are also critical to public health and safety. Functions also include economic systems such as agriculture, recreation, and tourism, as well as natural resources.
- **Structures** are physical assets in a community such as residential and commercial buildings, institutions (i.e., schools, churches, hospitals, prisons, etc.), recreational facilities, transportation infrastructure, parks, dikes and levees, and water and wastewater treatment infrastructure. It also includes high potential loss facilities, where damage would have large environmental, economic, or public safety considerations (e.g., nuclear power plants, dams, military installations, hazardous materials facilities).

This step in the vulnerability assessment involves identification of populations, functions, and structures that may be affected in the county by projected exposures to climate change impacts and their degree of sensitivity. A summary of potential impact scores is included in *Table 5-4* below. "Low" designates impacts that are unlikely based on projected exposure and would result in minor consequences to public health, safety, and/or other metrics of concern. "Medium" potential impacts are those that are somewhat likely based on projected exposure and would result in some consequences to public health, safety, and/or other metrics of concern. "High" potential impacts are those that are highly likely based on projected exposure and would result in substantial consequences to public health, safety, and/or other metrics of concern (CalOES 2020).

Table 5-4 Potential Impact Scoring for Sacramento County

Impact	Potential Impact
Increased Temperatures and Extreme Heat Days and Heat Waves	High
Increased Wildfire Risk	Medium
Increased Drought	Medium
Increased Flooding	High
Sea-Level Rise	High

INCREASED TEMPERATURES AND EXTREME HEAT DAYS AND HEAT WAVES

Higher frequency of extreme heat days and heat waves can cause serious public health impacts, increasing the risk of conditions such as heat cramps, heat exhaustion, heat stroke, and dehydration. Higher temperatures also worsen air quality through the increased air pollution. Developed areas are especially at risk, as extreme heat events will exacerbate the phenomenon known as the urban heat island effect (UHIE). In built-up areas vegetation is sparse, roofs and asphalt pavement dominate the landscape, absorbing and retaining heat during the day and releasing it at night. Climate change poses significant challenges for achieving health equity, because populations that are socially and economically vulnerable often bear a disproportionate burden of climate effects. People in low-income areas, some of which are communities of color; people with existing health issues, such as chronic diseases and mental health conditions; young children and the elderly; people experiencing homelessness; outdoor workers, including farmers; immigrants; some tribal nations; and socially or linguistically isolated people are most vulnerable to the impacts of climate change. Vulnerable populations are less likely to have air conditioning to cool homes or shade from trees in their neighborhoods, more likely to experience infrastructure limitations, more likely to have one or more chronic medical conditions, and less likely to own cars that can provide mobility to avoid deleterious climate effects.

Extreme heat can also affect the functioning of essential services, economic systems, and ecosystems. High temperatures decrease the efficiency of power transmission lines, while demand for electricity simultaneously goes up as operation of air conditioners and cooling equipment increases. This results in more frequent blackouts and could affect the operation of infrastructure (SACOG 2015:23). Increased temperatures also leave to greater rates of evapotranspiration, leading to increased demand for outdoor watering and increasing stressors on the county's water supply. Extreme heat events can also impact outdoor activities like recreation, tourism, and agriculture. Increased temperatures and warmer nights as a result of climate change will likely reduce yield of some of California's most valuable specialty crops, result in heat stress to livestock, and alter the range of crop-damaging pests (CNRA 2014:24). Rising temperatures will also affect natural resources in Sacramento County. Temperature-sensitive terrestrial plant and animal species exposed to higher temperatures may shift their existing ranges to higher latitudes and elevations, cooler coastal environments, or local microclimate refuges. Vernal pool ecosystems, in particular, are vulnerable to increases temperatures and prolonged periods of heat.

Prolonged exposure to extreme heat can damage physical assets and infrastructure, resulting in roadway degradation, bridge expansion and contraction, and rail track buckling.

INCREASED RISK OF WILDFIRE

Increased frequency and intensity of wildfires will directly affect the safety of populations living within or near wildland areas (i.e., wildland-urban interface) prone to wildfire. Wildfires also result in the release of harmful air pollutants into the atmosphere, which dissipate and can affect the respiratory health of residents across a broad geographical scope.

Wildfires affect the functioning of transportation systems, emergency services, recreation and tourism, and healthy ecosystems. Roadway closures during a wildfire may result in poor emergency vehicle access and the isolation of rural and remote populations throughout the County (Valley Vision 2014). Hospitals may incur additional strain on their resources to accommodate an influx in emergency room visits during wildfire events. Wildfires impede recreational uses as well as the associated tourism revenue (Valley Vision 2014). Damage to ecological functions may also result due to catastrophic wildfire. When rain falls in burn

scarred areas, there is a higher potential for soil erosion and mud flows into roads, ditches, and streams, which reduces water quality.

Lastly, wildfires can damage and destroy physical assets and infrastructure. In particular, critical transmission lines and hydroelectric infrastructure may be vulnerable to damage or temporary shutdown caused by wildfires (SMUD 2012).

INCREASED DROUGHT

Although the county has yet to face a critical loss in water resources, it is possible that climate-induced drought and increased water demand due to population growth could result in future water shortages wherein residents must implement severe cutback strategies. Those relying on wells or groundwater may also face challenges in meeting water demands as rates of groundwater recharge decline (CalBRACE 2015). Drought conditions can also affect public health by increasing the spread of vector-borne illnesses. Vulnerable populations susceptible to these diseases include the elderly and people with compromised immune systems or chronic illness (Capitol Region Climate Readiness Collaborative [CRCRC] 2014).

Energy production, agriculture, recreation, and ecosystem functions are especially vulnerable to drought. A declining volume of snowmelt coupled with earlier periods of melting could have severe consequences for the region's hydro-electricity generation. Drought and increased agricultural demand for water during extreme heat conditions could result in water insecurity for the sector. Reduced surface water flow in the county's watersheds could affect river-based economic and recreational opportunities such as the fishing industry, recreational fishing, rafting, camping, and backpacking, and swimming activities in the tributaries of the Sacramento, American, Cosumnes, and Mokelumne rivers. Reduced streamflow combined with increased human demand for water could lower the availability of water for wildlife and alter the composition and structure of riparian communities (CDFW 2015).

In terms of damage to physical assets, drought conditions can increase in dependence on groundwater supplies and result in overdraft of groundwater basins. The Sacramento and San Joaquin groundwater basins have experienced "historical overdraft," where groundwater extraction exceeded rates of groundwater recharge (CA DWR 1980). Overdraft can lead to land subsidence wherein a gradual settling or sudden sinking of the earth's surface occurs. The effects of subsidence could impact houses and other structures such as transportation infrastructure, water well casing failures, and changes to the elevation and gradient of stream channels, drains, and other water transport structures (CNRA 2014:235).

INCREASED FLOODING

Increased flooding due to climate change will most adversely affect vulnerable populations living in floodplains. Low-income populations suffer higher mortality rates, and their homes sustain greater damage due to the housing stock, location, and inability to afford structural upgrades or flood insurance to mitigate the effects of flooding (Burton and Cutter 2008:144). Low-income households may also lack transportation and other resources to respond to or evacuate during a flood event. Race, class, ethnicity, and immigration status are also drivers of flood-related social vulnerability, as these may impose cultural and language barriers that affect emergency communications and access to post-disaster resources for recovery. Additionally, floodwater can interact with sources of pollution and distribute hazardous pollutants locally and regionally, resulting in water contamination and human health impacts.

Floods can disrupt transportation networks, cause economic losses through closure of businesses and government facilities, disrupt communications, disrupt the provision of utilities such as water and sewers,

result in excessive expenditures for emergency response, and generally disrupt the normal function of a community (Sacramento County 2016). Roadway closures due to extended periods of flooding could prevent residents from accessing key supplies, such as food, electricity, fuel, and potable water. Flooding may also threaten ecosystem functioning and agricultural resources: unlike natural flooding regimes that deposits useful sediment resulting in increased soil fertility as well as groundwater recharge, catastrophic flooding from levee overtopping could lead to soil erosion and loss of viable cropland. It could also release sewage and hazardous materials into the environment if wastewater treatment plants are inundated, storage tanks are damaged, and pipelines severed.

Lastly, severe flooding is capable of destroying building and infrastructure such as bridges, roadways, electrical boxes, drainage systems, and levees. Extreme weather events could weaken or collapse levees in the Delta and could breach Sacramento and American river levees especially where they have not yet been upgraded or do not meet the minimum National Flood Insurance Program requirements.

SEA-LEVEL RISE

Portions of the county susceptible to sea-level rise are the low-lying lands near the Sacramento River in the southwest portion of the county. This area of the County is moderately disadvantaged according to the California Health Disadvantaged Index developed by the Public Health Alliance. As discussed above under the heading, "Increased Flooding," populations of high social vulnerability face challenges in responding or mitigating against flood events, including those associated with sea-level rise, due to low socioeconomic status, language barriers, educational status, and limited mobility (Climate Central n.d.).

Sea-level rise impacts to community functions and physical assets are similar to those described above in "Increased Flooding." The portion of the county susceptible to sea-level rise will face a greater threat of flooding because of the aging levees in the Delta and predicted increase in storm intensity affecting the American and Sacramento River watersheds (Curtis and Schneider 2011). Additionally, sea-level rise may affect the salinity of the Sacramento-San Joaquin Delta and cause saltwater intrusion into the Sacramento River, affecting water quality and supply throughout the region and state (CA DWR 2008, Water Education Foundation 2016).

5.2.3 Adaptive Capacity

The County, partner agencies, and organizations within the county have already taken steps to build resiliency and protect sensitive populations, functions, and assets from hazards. Review of existing local policies, plans, programs, resources, or institutions provides a good snapshot of the County's ability to adapt to climate change and reduce vulnerability. Based on this information, the County's adaptive capacity for each climate impact can be rated high, medium, or low. High adaptive capacity indicates that sufficient measures are already in place to address the points of sensitivity and impacts associated with climate change, while a low rating indicates a community is unprepared (CNRA 2012a:26). Major plans and initiatives that address climate-related hazards include the following:

- Sacramento County General Plan of 2005 – 2030: includes policies to encourage sustainable building practices, efficient use of resources (i.e., water, land, and energy), and ecological stewardship. It also includes policies aimed at protecting its aging population, which are more vulnerable to health-related effects of climate change impacts and require better access to public services and housing (Sacramento County 2011a)

- 2016 Sacramento Countywide Local Hazard Mitigation Plan Update: addresses current and future impacts related to existing natural hazards such as flooding, levee failure, and wildfires (Sacramento County 2016). The LHMP is currently undergoing an update to address an updated list of hazards, impacts to the people and assets, and to establish updated goals and prioritize projects to reduce the impacts of future disasters on people and property as well as to critical facilities and infrastructure. It is anticipated that a draft of the updated LHMP will be available late spring 2021.
- Capital Region Climate Readiness Collaborative (CRCRC): the County is an active member of the CRCRC, which works across multiple sectors to advance resiliency across the region and the state. The CRCRC works regionally and across the state with other similar collaboratives, under the Alliance of Regional Collaboratives for Climate Adaptation, to address climate change, understand and inform the region on best practices for resiliency and adaptation to build strong, resilient, healthy, equitable, and sustainable communities across California.
- Adaptive Efforts Related to Increased Temperature: the Sacramento County Office of Emergency Services (SacOES) provides community-wide information for how to stay safe during periods of extreme heat through their Sacramento Ready Program, the County participates in the Property Assessed Clean Energy financing programs to help homeowners finance home energy and water efficiency upgrades, and numerous organizations within the County support urban greening and forestry efforts. The Sacramento Municipal Utility District (SMUD) implements a Cool Roof Incentive program.
- Adaptive Efforts Related to Wildfire: the County adopted the 2013 California Fire Code, which includes defensible space requirements and provisions to help prevent the accumulation of combustible vegetation. Metro Fire's Community Wildfire Protection Plan is a comprehensive plan to protect human life and reduce loss of property, critical infrastructure, and natural resources associated with wildfire. Through the CWPP, Metro Fire implements strategies to prevent and combat wildfire within its jurisdictional boundaries (Metro Fire 2014).
- Adaptive Efforts Related to Drought: the County adopted a Water Efficient Landscape Ordinance and participates in stormwater quality education and management. The Sacramento County Water Agency (SCWA) support water conservation programs and participates in the Sacramento Area Water Forum, which aims to provide a reliable and safe water supply for the region's economic health and planned development through the year 2030 and to preserve the fishery, wildlife, recreational, and aesthetic values of the lower American River (Sacramento County 2011b).
- Adaptive Efforts Related to Increased Flooding: Countywide Design Guidelines require flood protection and drainage facilities to be designed to provide multiple public benefits wherever possible. The County has also completed concrete-lined creek naturalization projects to restore habitat and increase climate resiliency. Other agencies such as the Delta Stewardship Council, Sacramento Area Flood Control Agency (SAFCA), the Central Valley Flood Protection District, and the U.S. Army Corps of Engineers (USACE) has programs in place to improve flood protection infrastructure.
- Adaptive Efforts Related to Sea-Level Rise: while there are few sea-level-rise focused efforts, existing programs and strategies that address flood risk can also mitigate the impacts of sea-level rise.

A summary of the County's adaptive capacity scores is included in *Table 5-5* below. "Low" adaptive capacity means the population or asset lacks capacity to manage climate impact and major changes would be required. "Medium" adaptive capacity means the population or asset has some capacity to manage

climate impact and some changes would be required. "High" adaptive capacity means the population or asset has high capacity to manage climate impact and no changes are required.

Table 5-5 Adaptive Capacity Scoring for Sacramento County

Impact	Adaptive Capacity
Increased Temperatures and Extreme Heat Days and Heat Waves	Medium
Increased Wildfire Risk	Medium
Increased Drought	Medium
Increased Flooding	Low/Medium
Sea-Level Rise	Medium

5.2.4 Vulnerability Scoring

Vulnerability scores are determined based on how severe projected climate exposures will be, the degree of sensitivity of population groups and assets to anticipated climate effects, and whether sufficient adaptive capacity exists to manage the potential impact. This scoring can help the County understand which effects pose the greatest threats and should be prioritized in future planning efforts. *Table 5-6* below shows the County's vulnerability scores on a scale of 1 to 5, in accordance with the APG's guidance. The highest scoring climate impacts are those where the potential impact is high and existing adaptive capacity is low.

Table 5-6 Vulnerability Scoring for Sacramento County

Impact	Vulnerability Score
Increased Temperatures and Extreme Heat Days and Heat Waves	4
Increased Wildfire Risk	3
Increased Drought	3
Increased Flooding	4/5
Sea-Level Rise	4

5.3 ADAPTATION STRATEGIES AND MEASURES

This section describes the adaptation framework and presents the strategies and measures that the County will take to address climate vulnerabilities and increase countywide resiliency. The adaptation framework follows the process outlined in Phase 3 of the APG and relies on the vulnerability assessment to inform the preparation of the adaptation framework and strategies. Many climate adaptation measures may also reduce GHG emissions, improve public health, and achieve other co-benefits that further the County's sustainability goals and improve community resilience.

The adaptation measures are grouped under five overarching strategies to address each climate impact:

- Prepare for Increases in Temperatures and Extreme Heat Days and Heat Waves
- Prepare for Increased Risk of Wildfire
- Prepare for Increased Drought

- Prepare for Increased Flooding
- Prepare for Sea-Level Rise

The measures within each strategy define the programs, policies, and regulations that the County will need to implement to anticipate and adapt to the challenges created by climate change. Consideration for how likely and how soon impacts are expected to occur are included, with specific attention given to those exposures that pose the most serious threats to the County and its residents. This includes identifying responsible County departments and implementation timeframe for each measure. Implementation of many of climate adaptation strategies contained herein will be dependent on partnerships with local, regional, state, and federal agencies and non-government organizations. Where Sacramento County does not have jurisdictional authority (e.g., surface water storage capacity), the appropriate roles of agencies with authority, organizations, and Sacramento County are identified.

5.3.1 Prepare for Increased Temperatures and Extreme Heat Days and Heat Waves

MEASURE TEMP-1: PROTECT CRITICAL INFRASTRUCTURE VULNERABLE TO EXTREME HEAT EVENTS

- Action Temp-1.1: Map locations of communication, energy, public service, and transportation facilities and infrastructure that are vulnerable to extreme heat events due to high sun exposure or proximity to heavily paved areas.
- Action Temp-1.2: In cases where existing communication, energy, public service, and transportation facilities and infrastructure are found to be vulnerable to extreme heat, bolster, and/or upgrade associated infrastructure to be more resilient to periods of high heat (e.g., use of heat-tolerant materials).

  Benefits: Reinforced and bolstered infrastructure and facilities can reduce the frequency of power outages that can interrupt the functions of business, industry, and residences.

MEASURE TEMP-2: PARTNER WITH LOCAL AGENCIES AND UTILITIES ON HEAT-RELATED CLIMATE CHANGE INITIATIVES AND EFFORTS

- Action Temp-2.1: Partner with the CRCRC, SMUD, Pacific Gas & Electric (PG&E), and Sacramento Area Council of Governments (SACOG) to implement future and on-going heat-related climate change initiatives. The County's partnership in ongoing programs and future initiatives could include helping other organizations increase participation in existing programs through education and promotion, and by using and integrating them in County programs and activities, where feasible.

  Examples include (but are not limited to): the CRCRC's Regional Urban Heat Island Initiative, scheduled to launch in 2017; SMUD's Cool Roof Incentive and the SMUD/Sacramento Tree Foundation Shade Tree Program; PG&E's Energy Efficient Cool Roof program; and SACOG's Complete Streets GHG reduction measures, which will improve Sacramento County's resiliency to extreme heat events.

  Action Temp-2.1 would support and complement other temperature and heat-related adaptation measures and action items described herein.

Benefits: Implementation of this action, which includes both leveraging and supporting existing programs, as well as partnering on the development of future initiatives, can mitigate the effects of the UHIE, which produces excess heat from surfaces that absorb heat. Reducing the UHIE results in less reliance on air conditioning, which decreases energy use, susceptibly to heat-borne illness, and exposure to poor air quality.

MEASURE TEMP-3: DEVELOP OUTREACH PROGRAMS FOR OUTDOOR WORKERS

- Action Temp-3.1: Work with labor organizations, the agricultural community, and County and state health and safety agencies to publicize or improve programs and standards for preventing heat-related illness in employees who primarily work outdoors including, but not limited to, scheduling outdoor work in the morning or evening when temperatures are lower. Improved standards to promote a safe outdoor working environment include:
  - adequate water supplies,
  - sufficient shading,
  - frequent rest breaks, and
  - training on heat-related risks and symptoms (California Climate Action Team [CAT] 2012).
- Action Temp-3.2: Establish a temperature threshold for extreme heat and enforce restrictions on outdoor labor when those conditions arise.

  Benefits: Improved conditions and restrictions on outdoor labor will decrease the occurrences of heat-stroke, heat exhaustion, and heat-caused death among outdoor workers.

MEASURE TEMP-4: EDUCATE RESIDENTS OF DISADVANTAGED COMMUNITIES ON HEAT-RELATED RISKS AND STRATEGIES TO PREVENT HEAT-RELATED ILLNESS

- Action Temp-4.1: Develop robust, multi-lingual education and outreach materials accessible across multiple media forms (e.g., radio, text messaging) to publicize the symptoms and dangers of heat-related illness, where cooling centers are located, how to sign up for Sacramento Alert Emergency Notification System, and practical methods for preventing heat-related illness during periods of high heat. Methods to reduce exposure to heat-related illness include:
  - limiting sun and heat exposure and avoiding sunburns;
  - seeking refuge (e.g., cooling centers, natural shade);
  - turning on air conditioners or fans;
  - taking cold showers;
  - drinking plenty of water while avoiding very cold drinks;
  - avoiding strenuous activity;
  - limiting errands, shopping, and other appointments to the mornings and evenings;
  - wearing loose, lightweight clothing, and

  - monitoring vulnerable individuals within your vicinity (e.g., neighbors) and community.
- Action Temp-4.2: Work with the California Department of Public Health to track heat-related illness, hospitalizations, and deaths in order to target education and outreach efforts.
- Action Temp-4.3: Expand partnerships with local governments, non-government organizations, churches, and businesses to provide additional cooling centers within disadvantaged communities, where households and residents may not have access to air conditioning during periods of extreme heat.
- Action Temp-4.4: Deploy surveyors in disadvantaged communities to collect data regarding the appropriate location and accessibility of cooling centers, based on community preference and proximity to public transit.

  Benefits: Improved outreach regarding safety during extreme heat and establishment of more cooling centers in disadvantaged areas will reduce exposure to heat-related illness. Inclusion in the Sacramento Alert Emergency Notification System informs Sacramento County residents of upcoming heat waves and the locations of cooling centers, which will allow residents to plan ahead for extreme weather.

MEASURE TEMP-5: ENCOURAGE THE INSTALLATION OR USE OF COOL-ROOF TECHNOLOGIES, PASSIVE SOLAR HOME DESIGN, GREEN ROOFS, AND ROOFTOP GARDENS

- Action Temp-5.1: Adopt a mandatory Green Building code that requires installation of cool roof technologies for new development consistent with the 2016 Building Energy Efficiency Standards for Residential and Nonresidential Buildings (California Building Code, Title 24, Part 6). Cool roofs are designed to maintain a lower roof temperature than traditional roofs that are heated through sun exposure and contribute to the UHIE. Cool roofs are composed of surfaces that reflect sunlight and absorb less heat, which reduces heat flow into buildings and lowers energy usage and associated costs (U.S. Department of Energy [DOE] 2010).
- Action Temp-5.2: Develop incentive programs including, but not limited to, permit streamlining, permit fee reductions, or tax rebates for developers and landowners to apply passive solar home design to future residential buildings. A home that employs passive solar home design has windows oriented toward the south, is composed of materials of high heat absorption, and is built to distribute heat and cold air throughout the home. Use of these design elements provides natural cooling and heating and reduces energy demand.
- Action Temp-5.3: Develop incentive programs including, but not limited to permit streamlining, permit fee reductions, or tax rebates to encourage the use of rooftop gardens and green roofs in residential and commercial buildings. Rooftop gardens are gardens on rooftops and green roofs (or living roofs) are roof tops that are partially or completely covered by vegetation. These forms of roofing lower the amount of heat absorbed by a building and reduces energy demand associated with air conditioning.

  Benefits: The use of cool roofs, passive design, rooftop gardens, and green roofs will mitigate the effects of UHIE, lower energy consumption, and improve air quality. This measure will also have co-benefits related to water conservation and addressing air quality impacts from increased wildfire risk.

MEASURE TEMP-6: ESTABLISH AN UNDERGROUND UTILITIES PROGRAM

- Action Temp-6.1: Partner with SMUD and PG&E to establish an Underground Utilities Program to underground overhead power lines in appropriate areas of the unincorporated County to increase the resiliency of the energy grid, particularly in existing communities.

  Benefits: The undergrounding of power lines would help to reduce the frequency of black-outs and power-outages during extreme heat events. It would also increase Sacramento County's resilience to wildfire-related impacts (see Measure Fire-7 in Section 2.3, "Prepare for Increased Risk of Wildfire"). Instances of human-caused wildfire can be attributed to overhead power lines that slacken with exposure to heat and ignite nearby vegetation. If power lines are undergrounded, the risk of ignition occurrences would be reduced (California Department of Forestry and Fire Protection [CAL FIRE] 2008).

MEASURE TEMP-7: INCREASE PARTICIPATION IN THE SACRAMENTO AREA SUSTAINABLE BUSINESS PROGRAM

- Action Temp-7.1: Increase funding and staff resources for the Sacramento Area Sustainable Business Program through the County's Business Environmental Resources Center (BERC), with the goal of increasing overall participation and certification in the program and implementing annual monitoring of businesses that adopt practices to reduce energy consumption and promote energy efficiency, along with other sustainability measures.

  Benefits: Increasing participation and monitoring of the existing Sustainable Business Program will result in reduced energy usage. This measure will have co-benefits related to water conservation, as well as other actions with respect to transportation, solid waste, and other actions that will contribute to GHG emissions reductions.

MEASURE TEMP-8: PARTNER WITH VALLEY VISION TO EXPAND THE BUSINESS RESILIENCY INITIATIVE

- Action Temp-8.1: Partner with Valley Vision to increase small to medium business participation in the Business Resiliency Initiative (BRI) by training businesses to use the BRI toolkit to prepare for weather-related risks to daily operations. Aspects of the BRI toolkit include:
  - preparation of a hazard vulnerability assessment, which identifies the greatest risks and hazards facing individual businesses;
  - review of existing resiliency;
  - development of a business continuity plan;
  - testing of business continuity plans through drills and exercises; and
  - engagement in community outreach (Valley Vision n.d.).

  Benefits: Increased participation in the BRI and use of the toolkit would result in increased resiliency on a business-by-business basis during power outages induced by extreme heat events. Businesses would be responsible for conducting self-evaluations to identify assets at risk or vulnerable to weather-related disturbances that include extreme heat events, but also other extreme events such storms, floods, or fires. This measure will have co-benefits related to changes in precipitation, wildfire, and flood risk.

MEASURE TEMP-9: USE COOL PAVEMENT TECHNOLOGY AND REDUCE THE AMOUNT OF PAVED SURFACES

- Action Temp-9.1: Require the use of cool pavement technology in both the regular maintenance of existing and construction of new roads, sidewalks, parking areas, and bikeways. Cool pavement reduces the effects of UHIE by reflecting sunlight and absorbing less heat as compared to traditional pavement. Pavement reflectance can be enhanced through the use of reflective aggregate, reflective or clear cinder, or a reflective surface coating (Heat Island Group 2017).
- Action Temp-9.2: Develop and incorporate cool pavement standards into the County's roadway design manual for use in public rights-of-ways.
- Action Temp-9.3: Develop and incorporate cool pavement standards into the County's development standards for private development projects, in both new construction and changes to existing on-site paved surface areas (e.g., parking lots, private roadways, or other hardscape areas).
- Action Temp-9.4: Apply cool pavement standards when constructing new County-owned facilities or modifying existing County-owned facilities.
- Action Temp-9.5: Collaborate with the CRCRC, the California Environmental Protection Agency (CalEPA), the UC Davis Cool Pavement Research Center, and other regional partners to obtain guidance, explore pilot projects, or other technical support for implementation of actions under Measure Temp-9. (Note: this action could also be achieved collaboratively with others as part of the regional UHIE initiative described earlier under Action Temp-2.1).

  Benefits: Incorporation of cool pavements into maintenance of existing and construction of new paved surfaces would lower the amount of heat absorbed compared to traditional paving materials. Cool pavements would lessen the impacts of UHIE, which would result in reduced exposure to heat-related illness, decreased building energy consumption and associated GHG emissions, and improved air quality. This measure will have co-benefits related to flood risk.

MEASURE TEMP-10: INCREASE PARKING LOT SHADING, LANDSCAPING, AND URBAN GREENING, PRIORITIZING COMMUNITIES WITH LESS TREE COVER

- Action Temp-10.1: Enforce the existing parking lot shading coverage requirements (i.e., 30 percent coverage for 5-24 parking spaces, 40 percent coverage for 25-29 parking spaces, and 50 percent coverage for 50+ parking spaces) for new development projects that include parking, and revised parking lot shading standards to provide larger minimum sizes for tree planters to improve tree health.
- Action Temp-10.2: Enforce existing standards for tree shading and landscaping in existing parking lots not in compliance and establish a compliance program to ensure that trees are maintained properly.
- Action Temp-10.3: Amend the County Zoning Code to increase the existing minimum container sizes for trees from 24-inch box for 35 percent of trees and 15-gallon boxes for the remainder of trees to 36-inch boxes for 50 percent of trees and 20-gallow boxes for the remainder of trees.
- Action Temp-10.4: Establish rebate programs, permit fee reductions, or tax deductions to incentivize the installation of solar photovoltaic (PV) carports in existing and future parking lots. Solar PV carports provide shade in parking lots while simultaneously converting solar energy into electricity that can be used to charge electric vehicle and plug-in hybrid-electric vehicles.

- Action Temp-10.5: Amend the County Zoning Code to allow solar PV carports to fulfill a portion or all of the existing parking lot shading requirements and provide guidance on the appropriate mix between the use of trees and PV carports.
- Action Temp-10.6: Develop standards for the inclusion of solar PV carports in County-owned parking lots.
- Action Temp-10.7: Collaborate with CRCRC, the Sacramento Tree Foundation, SMUD, PG&E, or other regional partners to identify incentives, grants, or other resources for the purposes of commercial and residential greening actions including, but not limited to, planting of parking lot or street trees, maintaining tree health, and establishing community gardens.

  Benefits: Enforcement of County standards regarding shading requirements for parking lots, minimum standards for planter box sizes, incorporation of solar PV on carports, and urban greening programs will provide shade during extreme heat events and further reduce the effects of the UHIE, which will lower temperatures in urban areas and improve air quality.

MEASURE TEMP-11: ENGAGE IN RESEARCH ON THE EFFECTS OF A WARMER CLIMATE ON THE AGRICULTURAL INDUSTRY

- Action Temp-11.1: Engage in research on the potential effects of a warmer climate on the agricultural industry as well as the resulting challenges and opportunities with existing organizations and groups including, but not limited to, the California Climate and Agriculture Network (CalCAN). Challenges facing the agricultural industry are loss of chill hours, increased populations of or new species of pests, and higher rates of evapotranspiration. Conversely, a warmer climate could produce opportunities for Sacramento County to grow crops that were previously unsuitable to the historical climate.
- Action Temp-11.2: Subsidize efforts to breed crops that are resilient to high heat and low-chill winters, shading of crops and installation of light reflectors, and reducing rates of tilling to promote soil health and combat increased temperatures as recommended by the Climate Change Consortium and CalCAN, (California Department of Food and Agriculture [CDFA] 2013; CalCAN 2011).

  Benefits: Engaging in research and efforts to improve the agricultural industry's vulnerability to the challenges associated with a warmer climate (e.g., loss of chill hours, increased pests) will help enable agriculture to continue to be a leading economic industry in Sacramento County. Climate-resilient agriculture will contribute to combatting potential food shortages. This measure will have co-benefits related to water conservation.

MEASURE TEMP-12: UNDERSTAND THE TOLERANCE OF CURRENT CROP MIXES TO WITHSTAND INCREASED TEMPERATURES

- Action Temp-12.1: Actively engage with the agricultural sector to understand the tolerance of current crop mixes to withstand increased temperatures, disease, and pests, and explore options to diversify and shift to drought-tolerant crops that can be cultivated in a warmer environment.

  Benefits: Diversifying Sacramento County's crops will reduce the potential for crop loss from excessive pests, disease, and increased temperatures and will improve the industry's adaptive capacity.

Measures related to temperature are described below and summarized in *Table 5-7*, "Summary of Temperature-Related Measures."

Table 5-7 Summary of Temperature-Related Measures

Measure	Action	Responsibility	Timeframe
Temp-1: Protect Critical Infrastructure Vulnerable to Extreme Heat Events	Action Temp-1.1: Map locations of communication, energy, public service, and transportation facilities and infrastructure that are vulnerable to extreme heat events due to high sun exposure or proximity to heavily paved areas	SacOES, GIS, Various County agencies, DWR	Near-Term
	Action Temp-1.2: In cases where existing communication, energy, public service, and transportation facilities and infrastructure are found to be vulnerable to extreme heat, bolster, and/or upgrade associated infrastructure to be more resilient to periods of high heat.	DGS, SACDOT, SMUD, PG&E, SACOG, PER	
Temp-2: Partner with Local Agencies and Utilities on Heat-Related Climate Change Initiatives and Efforts	Action Temp-2.1: Partner with the CRCRC, SMUD, PG&E, and SACOG to implement future and on-going heat-related climate change initiatives. The County's partnership in ongoing programs and future initiatives could include helping other organizations increase participation in existing programs through education and promotion, and by using and integrating them in County programs and activities where feasible.	SM, SACOG, PG&E, SMUD	Near-Term
Temp-3: Develop Outreach Programs for Outdoor Workers	Action Temp-3.1: Work with labor organizations, the agricultural community, and County and state health and safety agencies to publicize or improve programs and standards for preventing heat-related illness in employees who primarily work outdoors including, but not limited to, scheduling outdoor work in the morning or evening when temperatures are lower.	SM, DHHS	Near-Term
Temp-4: Educate Residents of Disadvantaged Communities on Heat-Related Risks and Strategies to Prevent Heat-Related Illness	Action Temp-4.1: Develop a robust multi-lingual education and outreach materials accessible across multiple media forms (e.g., radio, text messaging) to publicize the symptoms and dangers of heat-related illness, where cooling centers are located, how to sign up for Sacramento Alert Emergency Notification System, and practical methods for preventing heat-related illness during periods of high heat.	SM, DHHS, SacOES	Near-Term
	Action Temp-4.2: Work with the State Department of Public Health to track heat related illness, hospitalizations, and deaths in order to target education and outreach efforts.	DHHS, Department of Public Heath	
	Action Temp-4.3: Expand partnerships with local governments, non-government organizations, churches, and businesses to provide additional cooling centers within disadvantaged communities, where households and residents may not have access to air conditioning during periods of extreme heat.	SM, DHHS, SacOES	
	Action Temp-4.4: Deploy surveyors in disadvantaged communities to collect data	SM, DHHS, SacOES	

Measure	Action	Responsibility	Timeframe
	regarding the appropriate location and accessibility of cooling centers based on community preference and proximity to public transit.		
Temp-5: Encourage the Installation of Cool Roof Technologies, Passive Solar Home Design, Green Roofs, and Rooftop Gardens	Action Temp-5.1: Adopt a mandatory Green Building code that requires installation of cool roof technologies for new development consistent with the 2016 Building Energy Efficiency Standards for Residential and Nonresidential Buildings (California Building Code, Title 24, Part 6).	PER, BP&I	Near-Term
	Action Temp-5.2: Develop incentive programs including, but not limited to, permit streamlining, permit fee reductions, or tax rebates for developers and landowners to apply passive solar home design to future residential buildings.	PER, BP&I	
	Action Temp-5.3: Develop incentive programs including, but not limited to permit streamlining, permit fee reductions, or tax rebates to encourage the use of rooftop gardens and green roofs in residential and commercial buildings.	PER, BP&I	
Temp-6: Establish an Underground Utilities Program	Action Temp-6.1: Partner with SMUD and PG&E to establish an Underground Utilities Program to underground overhead power lines in appropriate areas of the unincorporated County to increase the resiliency of the energy grid, particularly in existing communities.	SM, PER, PG&E, SMUD	Near-Term
Temp-7: Increase Participation in the Sacramento Area Sustainable Business Program	Action Temp-7.1: Increase funding and staff resources for the Sacramento Area Sustainable Business Program through BERC, with the goal of increasing overall participation and certification in the program and implementing annual monitoring of businesses that adopt practices to reduce energy consumption and promote energy efficiency, along with other sustainability measures.	Sacramento County Finance Department, BERC	Near-Term
Temp-8: Assist Valley Vision's Business Resiliency Initiative	Action Temp-8.1: Partner with Valley Vision to increase small to medium business participation in the BRI by training businesses to use the BRI toolkit to prepare for weather-related risks to daily operations. Aspects of the BRI toolkit include.	Sacramento County Finance Department, Valley Vision	Near-Term
Temp-9: Implement Cool Pavement Technology and Reduce the Amount of Paved Surfaces	Action Temp-9.1: Require the use of cool pavement technology in both the regular maintenance of existing and construction of new roads, sidewalks, parking areas, and bikeways.	PER, SACDOT	Mid-Term
	Action Temp-9.2: Develop and incorporate cool pavement standards into the County's roadway design manual for use in public rights-of-ways.	PER, SACDOT	
	Action Temp-9.3: Develop and incorporate cool pavement standards into the County's development standards for private development projects, in both new construction and changes to existing on-site paved surface.	PER, SACDOT	

Measure	Action	Responsibility	Timeframe
	Action Temp-9.4: Apply cool pavement standards when constructing new County-owned facilities or modifying existing County-owned facilities.	PER, SACDOT	
	Action Temp-9.5: Collaborate with the CRCRC, CalEPA, the UC Davis Cool Pavement Research Center, and other regional partners to obtain guidance, explore pilot projects, or other technical support for implementation of actions under Measure Temp-9.	PER, SACDOT	
Temp-10: Increase Parking Lot Shading, Landscaping, and Urban Greening, Prioritizing Communities with Less Tree Cover	Action Temp-10.1: Enforce the existing parking lot shading coverage requirements (i.e., 30 percent coverage for 5-24 parking spaces, 40 percent coverage for 25-29 parking spaces, and 50 percent coverage for 50+ parking spaces) for new development projects that include parking, and revised parking lot shading standards to provide larger minimum sizes for tree planters to improve tree health	PER, DGS	Mid-Term
	Action Temp-10.2: Enforce existing standards for tree shading and landscaping in existing parking lots not in compliance and establish a compliance program to ensure that trees are maintained properly.	PER, DGS	
	Action Temp-10.3: Amend the County Zoning Code to increase the existing minimum container sizes for trees from 24-inch box for 35 percent of trees and 15-gallon boxes for the remainder of trees to 36-inch boxes for 50 percent of trees and 20-gallow boxes for the remainder of trees.	PER, DGS	
	Action Temp-10.4: Establish rebate programs, permit fee reductions, or tax deductions to incentivize the installation of solar PV carports in existing and future parking lots. Solar PV carports provide shade in parking lots while simultaneously converting solar energy into electricity that can be used to charge electric vehicle and plug-in hybrid-electric vehicles.	PER, DGS	
	Action Temp-10.5: Amend the County Zoning Code to allow solar PV carports to fulfill a portion or all of the existing parking lot shading requirements and provide guidance on the appropriate mix between the use of trees and PV carports.	PER, DGS	
	Action Temp-10.6: Develop Standards for the inclusion of solar PV carports in County-owned parking lots.	PER, DGS	
	Action Temp-10.7: Collaborate with CRCRC, the Sacramento Tree Foundation, SMUD, PG&E, or other regional partners to identify incentives, grants, or other resources for the purposes of commercial and residential greening actions including, but not limited to, planting of parking lot	PER, DGS, CRCRC, Sacramento Tree Foundation, SMUD, PG&E	

Measure	Action	Responsibility	Timeframe
	or street trees, maintaining tree health, and establishing community gardens.		
Temp-11: Engage in Research on the Effects of a Warmer Climate on the Agricultural Industry	Action Temp-11.1: Engage in research on the potential effects of a warmer climate on the agricultural industry as well as the resulting challenges and opportunities with existing organizations and groups including, but not limited to, CalCAN.	CalCAN, SM, Agricultural Commissioner's Office	Mid-Term
	Action Temp-11.2: Subsidize efforts to breed crops that are resilient to high heat and low-chill winters, shading of crops and installation of light reflectors, and reducing rates of tilling to promote soil health and combat increased temperatures as recommended by the Climate Change Consortium and CalCAN.	Agricultural Commissioner's Office	
Temp-12: Understand the Tolerance of Current Crop Mixes to Withstand Increased Temperatures	Action Temp-12.1: Actively engage with the agricultural sector to understand the tolerance of current crop mixes to withstand increased temperatures, disease, and pests, and explore options to diversify and shift to drought-tolerant crops that can be cultivated in a warmer environment.	SM, Agricultural Commissioner's Office	Mid-Term

Notes: Near-Term=1-5 years, Mid-Term=5-10 years, Long-Term=10+ years, SacOES=Sacramento County Office of Emergency Services, GIS=Sacramento County Geographic Information Services, DGS=Sacramento County Department of General Services, SACDOT=Sacramento County Department of Transportation, PER=Sacramento County Planning & Environmental Review, SM=Sustainability Manager, DWR=Sacramento County Department of Water Resources, SACOG=Sacramento Area Council of Government, PG&E=Pacific Gas and Electric, SMUD=Sacramento Municipal Utilities District, DHHS=Sacramento Department of Health and Human Services, BP&I=Sacramento County Building Permits and Inspections, BERC=Business Environment Resource Center, CRCRC=Capital Region Climate Readiness Collaborate, CalCAN=California Climate and Agricultural Network, BRI=Business Resiliency Initiative, PV=photovoltaic

5.3.2 Prepare For Increased Risk of Wildfire

MEASURE FIRE-1: MAP AND IDENTIFY LOCATIONS THAT ARE NEWLY AT RISK, OR AT HIGHER RISK FOR FIRE HAZARDS

- Action Fire-1.1: Work with the U.S. Forest Service (USFS), CAL FIRE, Metro Fire, and any other fire department operating within and beyond the boundaries of the County to map and identify locations within the County that are newly at risk, or at higher risk, for wildfire hazards as a result of climate change and its impacts. Wildfire hazards may include direct damage to electrical, transportation, and communication infrastructure; increased rates of erosion, landslide, and water quality degradation; and ecological disturbance.

  Benefits: Mapping and identifying locations that are at already at high risk or will be with climate change would advise the implementation of Measure Fire-2 listed below.

MEASURE FIRE-2: MAP CRITICAL INFRASTRUCTURE IN PREVIOUSLY BURNED AREAS AND IN LOCATIONS VULNERABLE TO WILDFIRES AND UPGRADE INFRASTRUCTURE WHERE APPLICABLE

- Action Fire-2.1: Map locations of communication, energy, public service, and transportation infrastructure in previously burned areas and in areas that are vulnerable to wildfires.
- Action Fire-2.2: In cases where existing communication, energy, public service, and transportation infrastructure are located in previously burned areas, work with providers to allocate resources to repair infrastructure (e.g., replace signage and guardrails, repair roads, reconnect electrical wiring).
- Action Fire-2.3: In cases where existing communication, energy, public service, and transportation infrastructure are found to be vulnerable to wildfires, work with providers to bolster and/or upgrade associated infrastructure to be more resilient to wildfire damage (e.g., use of materials that are resistant to high heat levels).

  Benefits: Past wildfire events may have damaged communication, energy, public service, and transportation infrastructure. Further, communication, energy, public service, and transportation infrastructure located within potentially high-hazard fire areas, as identified in Measure Fire-1, may require additional upgrades to mitigate wildfire-related impacts.

MEASURE FIRE-3: COORDINATE WITH FEDERAL, STATE, AND LOCAL AGENCIES TO ESTABLISH ECOLOGICAL RECOVERY PROGRAMS

- Action Fire-3.1: Coordinate with USFS, CAL FIRE, Metro Fire and other similar agencies to establish ecological recovery programs to support ecological restoration efforts (e.g., the Southern Sacramento Mountain Restoration Project) for existing burned areas or future burned areas (USFS 2011).

  Benefits: Implementation of ecological restoration strategies in existing burned or potentially future burned areas would encourage the regrowth of natural ecosystems that may have been damaged during wildfire events. Ecological restoration would include establishment of native ecological systems and processes that would reduce the potential for high-intensity wildfires and improve ecological resiliency to wildfire events.

MEASURE FIRE-4: UPDATE TREE PLANNING GUIDELINES TO SELECT WILDFIRE RESISTANT SPECIES

- Action Fire-4.1: Consult with the Sacramento Tree Foundation and SelecTree to identify wildfire resistant species and the appropriate species of trees for particular fire hazard severity zones. Incorporate such recommendations into updates to landscaping standards and tree planting guidelines in County Code or other appropriate documents.

  Benefits: Selecting wildfire-resistant or fire hazard severity zone appropriate species would help mitigate wildfire risk while allowing the County to continue to expand tree planting efforts that result in improved air quality and urban heat island mitigation.

MEASURE FIRE-5: COORDINATE AND IMPROVE EMERGENCY PREPAREDNESS SYSTEMS

- Action Fire-5.1: Coordinate with Metro Fire, CAL FIRE, and CalOES to identify strategies to ensure capacity and resilience of escape routes potentially compromised by wildfire, including emergency evacuation and supply transportation routes.
- Action Fire 5.2: Improve upon educational outreach regarding emergency supplies, evacuation routes, pet protection, and key terminology (e.g., controlled/prescribed burn, fuel load), as well as frequently updating the Sacramento Ready webpage to include current information.
- Action Fire 5.3: Provide input to Metro Fire and CAL FIRE to establish reliable wildfire monitoring systems that provide early warning of high wildfire risk and wildfire occurrence and include evaluation of ecological and human impacts of wildfire.

  Benefits: Coordination with Metro Fire, CAL FIRE, CalOES, and SacOES regarding emergency preparedness to future wildfire events would improve the efficacy of evacuation procedures, reliability of emergency supplies, and distribution of wildfire risk information. Establishment of wildfire monitoring systems would provide up-to-date data with respect to areas considered at high risk for wildfire breakouts and improve Sacramento County's ability to prepare and combat wildfire-related impacts.

MEASURE FIRE-6: ESTABLISH AN UNDERGROUND UTILITIES PROGRAM

- Action Fire-6.1: Partner with SMUD and PG&E to establish an Underground Utilities Program to underground overhead utility lines in appropriate geographic areas of the County to increase the resiliency of the energy grid, particularly in existing communities.

  Benefits: The undergrounding of utilities in appropriate areas would improve the County's resilience against power outages and energy disruption associated with fire (see Measure Temp-6).

MEASURE FIRE-7: AVOID NEW DEVELOPMENT IN VERY-HIGH FIRE HAZARD SEVERITY ZONES

- Action Fire-7.1: Avoid new development in Very-High Fire Hazard Severity Zones according to the most recent and available CAL FIRE Fire Hazard Severity Zones maps and consider projections of future climate change when planning future land uses.

  Benefits: Avoiding locating new developing in CAL FIRE designated Very-High Fire Hazard Severity Zones would limit human exposure to potential wildfire.

MEASURE FIRE-8: COLLABORATE WITH AGENCIES AND ORGANIZATIONS ON PROGRAMS TO REDUCE WILDFIRE HAZARDS

- Action Fire-8.1: Collaborate with Sacramento County Regional Parks Department, Metro Fire, and other Sacramento County-based fire districts to continue to reduce wildfire hazards, including but not limited to, enforcing defensible space guidelines for existing and new development, restoring wildfire-resilient conditions by thinning and removing live or dead vegetation and implementing wildfire fuel reduction action plans, and retaining healthy native trees.

- Action Fire-8.2: Collaborate with the Bureau of Land Management (BLM), CRCRC, the American River Parkway Foundation, the Sacramento County Regional Parks Department, the Sacramento River Watershed Program, and other local stakeholders in developing Resource Management Plans (RMPs) for the Sacramento and American Rivers.

  Benefits: An integrated approach among agencies and organizations to reduce wildfire hazards within the County would ensure that effective fire management extends to a broad geographical area resulting in a more comprehensive protection against future wildfire events.

All wildfire-related measures are described below. Summaries of the measure are included in *Table 5-8*, "Summary of Wildfire-Related Measures."

Table 5-8 Summary of Wildfire-Related Measures

Measure	Action	Responsibility	Timeframe
Fire-1: Map and Identify Locations that are Newly at Risk, or at Higher Risk for Fire Hazards	Action Fire-1.1: Work with the USFS, CAL FIRE, Metro Fire, and any other fire department operating within and beyond the boundaries of the County to map and identify locations within the County that are newly at risk, or at higher risk, for wildfire hazards as a result of climate change and its impacts.	PER, USFS, CAL FIRE, Metro Fire, other fire districts	Near-Term
Fire-2: Map Critical Infrastructure in Previously Burned Areas and in Locations Vulnerable to Wildfires and Upgrade Infrastructure Where Applicable	Action Fire-2.1: Map locations of communication, energy, public service, and transportation infrastructure in previously burned areas and in areas that are vulnerable to wildfires.	PED, SacEOS, GIS	Near-Term
	Action Fire-2.2: In cases where existing communication, energy, public service, and transportation infrastructure are located in previously burned areas, work with providers to allocate resources to repair infrastructure.	PED, PUCs	
	Action Fire-2.3: In cases where existing communication, energy, public service, and transportation infrastructure are found to be vulnerable to wildfire, work with providers to bolster and/or upgrade associated infrastructure to be more resilient to wildfire damage.	PED, PUCs	
Fire-3: Coordinate with Federal, State, and Local Agencies to Establish Ecological Recovery Programs	Action Fire-3.1: Partner with USFS, CAL FIRE, Metro Fire and other similar agencies to establish ecological recovery programs to support ecological restoration efforts (e.g., the Southern Sacramento Mountain Restoration Project) for existing burned areas or future burned areas	USFS, CAL FIRE, Metro Fire	Near-Term
Fire-4: Update Tree Planning Guidelines to Select Appropriate Species to Help Improve Air Quality	Action Fire-4.1: Consult with the Sacramento Tree Foundation and SelecTree to identify the appropriate species of trees known to improve air quality and incorporate such recommendations into updates to landscaping standards and tree planting guidelines in County Code or other appropriate documents.	PER, Sacramento Tree Foundation	Near-Term
Fire-5: Coordinate and Improve Emergency Preparedness Systems	Action Fire-5.1: Coordinate with Metro Fire, CAL FIRE, and CalOES to identify strategies to ensure capacity and resilience of escape routes potentially	CalOES, Metro Fire, CAL FIRE, other fire districts	Near-Term

Measure	Action	Responsibility	Timeframe
	compromised by wildfire, including emergency evacuation and supply transportation routes.		
	Action Fire-5.2: Improve upon educational outreach regarding emergency supplies, evacuation routes, pet protection, and key terminology, as well as frequently updating the Sacramento Ready webpage to include current information.	SacOES	
	Action Fire-5.3: Provide input to Metro Fire and CAL FIRE to establish reliable fire monitoring systems that provide early warning of high fire risk and fire occurrence and include evaluation of ecological and human impacts of fire.	Metro Fire, CAL FIRE	
Fire-6: Establish an Underground Utilities Program	Action Fire-6.1: Partner with SMUD and PG&E to establish an Underground Utilities Program to underground overhead utility lines in appropriate geographic areas of the County to increase the resiliency of the energy grid, particularly in existing communities.	SM, PER, PG&E, SMUD	Near-Term
Fire-7: Avoid New Development in Very-High Fire Hazard Severity Zones	Action Fire-7.1: Avoid new development in Very-High Fire Hazard Severity Zones according to the most recent and available CAL FIRE Fire Hazard Severity Zones maps and consider projections of future climate change when planning future land uses.	PER	Mid-Term
Fire-8: Collaborate with Agencies and Organizations on Programs to Reduce Fire Hazards	Action Fire-8.1: Collaborate with Sacramento County Regional Parks Department, Metro Fire, and other Sacramento County-based fire districts to continue to reduce wildfire hazards, including but not limited to, enforcing defensible space guidelines for existing and new development, restoring wildfire-resilient conditions by thinning and removing live or dead vegetation and implementing wildfire fuel reduction action plans, and retaining healthy native trees.	PER, Sacramento County Code Enforcement, CAL FIRE, Metro Fire, other fire districts	Mid-Term
	Action Fire-8.2: Collaborate with BLM, CRCRC, the American River Parkway Foundation, the Sacramento County Regional Parks Department, the Sacramento River Watershed Program, and other local stakeholders in developing RMPs for the Sacramento and American Rivers.	BLM, CRCRC, American River Parkway Foundation, Sacramento County Regional Parks Department, Sacramento River Watershed Program, others	

Notes: Near-Term=1-5 years, Mid-Term=5-10 years, Long-Term=10+ years; PER=Sacramento County Planning and Environmental Review, USFS=U.S. Forest Service, Metro Fire=Sacramento Metropolitan Fire District, CAL FIRE=California Department of Forestry and Fire Protection, GIS=Sacramento County Geographic Information System, SacOES=Sacramento County Office of Emergency Services, CalOES=California Office of Emergency Services, PUCs=Public Utility Companies, SMUD=Sacramento Municipal Utility District, PG&E=Pacific Gas and Electric, SACOG=Sacramento Area Council of Governments, CRCRC=Capital Regional Climate Readiness Collaborative, Sierra CAMP=Sierra Climate Adaptation and Mitigation Partnership, BLM=Bureau of Land Management, RMPs=resource management plans

5.3.3 Prepare for Increased Drought

MEASURE WATER-1: EVALUATE VULNERABILITIES OF WATER SUPPLY SYSTEMS AND NETWORKS AND DEVELOP STRATEGIES TO IMPROVE RESILIENCE

- Action Water-1.1: Establish a schedule to routinely evaluate the vulnerability of the water supply systems and networks to climate change-related impacts and develop strategies to add resilience to these systems. Resilient water supply systems must be able to deliver services during disruptive events (e.g., storms, drought).
- Action Water-1.2: Adopt municipal codes to enforce standards of resiliency for water-related infrastructure for all future development. Municipal codes may include, but are not limited to, standards related to elevation of electrical generators and/or tanks and containers of hazardous materials, increased capacity of water storage tanks, and improved deployment of backflow preventers to impede contamination of drinking water following an extreme weather event (e.g., storms).
- Action Water-1.3: Continue to participate in and support the efforts of the Sacramento Water Forum to promote comprehensive and effective water management and support aquatic ecosystem protection.
- Action Water-1.4: Collaborate with experts and other agencies to identify potential hazards (e.g., floods, drought) in sites of new infrastructure, assess the vulnerabilities associated with identified hazards, and use appropriate materials and establish adequate capacities for new infrastructure.
- Action Water-1.5: Support the projects of the Sacramento River Watershed Program aimed to improve water quality, streamflow, flood management, and watershed stewardship in the Sacramento River and the Lower American River Watersheds.
- Action Water-1.6: Conduct ongoing maintenance of existing water supply-related infrastructure to identify potential weaknesses and deterioration.

  Benefits: Resiliency improvements made to Sacramento County's water supply systems and networks would also serve to improve the County's resiliency to flooding.

MEASURE WATER-2: INCREASE ON-SITE GREYWATER AND RAINWATER REUSE, STORMWATER REUSE, AND RECYCLED WATER SYSTEMS

- Action Water-2.1: Partner with the Regional Water Authority (RWA) and other water districts to establish incentive programs that promote the deployment of on-site rainwater catchment systems, such as rain barrels, rain gardens, cisterns, and other mechanisms to capture and store rainwater for use during the dry season for water customers.
- Action Water-2.2: Continue and expand on the Sacramento County's Environmental Management Department's educational outreach regarding the safe and proper installation of rainwater catchment and storage systems.
- Action Water-2.3: Coordinate with the Sacramento Regional County Sanitation District (Regional San) or other appropriate agencies to develop a standard to deploy innovative options to meet future water demand for all County-owned facilities (e.g., reclaim and purify wastewater, on-site graywater reuse systems, or use of recycled water from the regional or local treatment plants).

- Action Water-2.4: Develop an integrated network of rainwater and greywater catchment systems within the County's agricultural sector through incentive and rebate programs to further increase water storage capacity.
- Action Water-2.5: Establish a regional stormwater harvest program and construct the related infrastructure (e.g., piping, storage basins and reservoirs, pumps) in existing rural and urban portions of the County as well as new development.

  Benefits: Deployment of on-site and regional rainwater capture and stormwater harvest technology would expand Sacramento County's existing water storage capacity and thereby improve the County's resiliency to periods of drought or cases where water distribution infrastructure is damaged. This measure will have co-benefits related to flood risk.

MEASURE WATER-3: CREATE INCENTIVES AND PROGRAMS TO TRANSFER KNOWLEDGE AND TECHNOLOGIES TO ASSIST FARMERS WITH NEW PRODUCTION METHODS AND DROUGHT TOLERANCE SPECIES

- Action Water-3.1: Create programs that facilitate communication between farmers of specialty crops and other climate-sensitive crops and agricultural specialists to advise future agricultural practices in light of a potentially drier and hotter climate.
- Action Water-3.2: Provide financial support to farmers of specialty crops and other climate-sensitive crops for changes to irrigation systems associated with drought-tolerant crops, which may be cultivated more under future climate conditions.
- Action Water-3.3: Subsidize research on indoor farming practices to be used in periods of prolonged drought. Indoor farming is a developing agricultural practice that allows farmers to cultivate and harvest crops with limited sunlight and water supply.
- Action Water-3.4: Incent water conservation and efficiency in the agricultural sector through incentive and rebate programs for practices that could include, but are not limited to, drip irrigation, tailwater return systems, covered canals, reduced tillage, and covered crops.

  Benefits: Increased communication and financial support within the agricultural sector of the County would allow farmers to transition and adapt to a hotter and potentially drier climate. As a major source of revenue for the County as well as contributor to the food security of the County and state, it will be imperative that the agricultural sector adapt quickly to a changing climate. Implementation of the aforementioned Actions would improve the sector's resiliency.

MEASURE WATER-4: REDUCE POTABLE WATER USE IN OUTDOOR LANDSCAPING

- Action Water-4.1: Amend the Sacramento County Water Efficient Landscaping Ordinance to require that 80 percent of landscaping area is dedicated to low-water, drought-tolerant species for new residential and non-residential buildings and 90 percent for all County-owned facilities.
- Action Water-4.2: Partner with RWA and other water districts in the County to improve existing rebate programs (e.g., SCWA's Cash for Grass Program) to incent the incorporation of low-water, drought-tolerant species in lieu of water-intensive lawns and high-water vegetation in existing residential areas.

- Action Water-4.3: Partner with Regional San to expand the existing recycled water system service areas by 50 percent.

  Benefits: Revising the County's landscaping standards as defined by the Sacramento County Water Efficient Landscaping Ordinance and County Zoning Code, improving rebates to residential water users to incorporate drought-tolerant landscaping, and increasing the size of the recycled water system would reduce the amount of water used for landscaping. These savings could be allocated to other more vital purposes (e.g., agriculture, potable water). These actions would also result in reductions in pumping energy and associated GHG emissions reductions.

MEASURE WATER-5: EXPAND UPON EXISTING WATER CONSERVATION EDUCATION OUTREACH PROGRAMS FOR RESIDENTS AND BUSINESSES

- Action Water-5.1: Expand communication of water conservation-related education and tips through multiple media platforms (e.g., radio, television, social media) to increase awareness of indoor and outdoor conservation methods.

  Benefits: Many Sacramento County-based water districts provide educational material to water users; however, to reduce wasteful use of water, water districts should dedicate additional efforts to expand the reach of these educational resources. This would result in more informed water users, who may implement on-site water conservation strategies.

MEASURE WATER-6 COLLABORATE WITH FEDERAL, STATE, AND LOCAL AGENCIES AND ORGANIZATIONS TO IDENTIFY FUTURE WATER SUPPLIES, EXPLORE ALTERNATIVE SUPPLY SOURCES, AND IMPROVE CAPACITY

- Action Water-6.1: Pursue grant funding opportunities from SWRCB, the California Department of Water Resources (CA DWR), U.S. Bureau of Reclamation (USBR), USACE and other state and federal agencies related to water recycling projects, and/or other water resource planning projects.
- Action Water-6.2: Engage with RWA, other water districts in the County, SWRCB, CA DWR, USBR, USACE, and other local, state and federal agencies to identify water supply options for the future and collaborate on water conservation strategies to improve supply capacity throughout the Sacramento and American River Watersheds.
- Action Water-6.3: Collaborate with Sierra Climate Adaptation and Mitigation Partnership (Sierra CAMP), Sierra Nature Conservancy, Water Forum, and CRCRC, and other local, regional, and state organizations to explore regional sustainability and conservation strategies for Sacramento County's water resources (i.e., Sacramento, American, Mokelumne, and Cosumnes Rivers; groundwater).
- Action Water-6.4: Invest in programs within Sacramento County and/or locations within or in proximity to the Sacramento Valley Groundwater Basin to artificially recharge groundwater supplies through recharge ponds and injection wells to improve Sacramento County's water storage capacity.

  Benefits: On-going communication and collaboration with other water-related stakeholders (e.g., agencies, organizations, businesses) would facilitate planning efforts to ensure that potentially limited water resources are allocated fairly and appropriately both upstream and downstream of Sacramento County. It is imperative that Sacramento County and its surrounding communities adapt to shifts in precipitation patterns associated with climate change. This measure will have co-benefits related to flood risk.

All measures related to water supply and quality are described below and summarized in *Table 5-9*, "Summary of Precipitation-Related Measures."

Table 5-9 Summary of Drought-Related Measures

Measure	Action	Responsibility	Timeframe
Water-1: Evaluate Vulnerabilities of Water Supply Systems and Networks	Action Water-1.1: Establish a schedule to routinely evaluate the vulnerability of the water supply systems and networks to climate change-related impacts and develop strategies to add resilience to these systems.	CA DWR, DWR, SCWA, Regional water agencies, other water districts, GSAs	Near-Term
	Action Water--1.2: Adopt municipal codes to enforce standards of resiliency for water-related infrastructure for all future development.	PER	
	Action Water-1.3: Continue to participate in and support the efforts of the Sacramento Water Forum to promote comprehensive and effective water management and support aquatic ecosystem protection.	Water Forum	
	Action Water-1.4: Collaborate with experts and other agencies to identify potential hazards in sites of new infrastructure, assess the vulnerabilities associated with identified hazards, and use appropriate materials and establish adequate capacities for new infrastructure.	PER, EMD, FEMA	
	Action Water-1.5: Support the projects of the Sacramento River Watershed Program aimed to improve water quality, streamflow, flood management, and watershed stewardship in the Sacramento River and the Lower American River Watersheds	Sacramento River Watershed Program	
	Action Water-1.6: Conduct ongoing maintenance of existing water supply-related infrastructure to identify potential weaknesses and deterioration.	PER, EMD	
Water-2: Increase the Use of On-Site Greywater and Rainwater Reuse, Stormwater Reuse, and Recycled Water Systems	Action Water-2.1: Partner with the RWA and other water districts to establish incentive programs that promote the deployment of on-site rainwater catchment systems, such as rain barrels, rain gardens, cisterns, and other mechanisms to capture and store rainwater for use during the dry season for water customers	EMD, SCWA, other water districts	Near-Term
	Action Water-2.2: Continue and expand on EMD's educational outreach regarding the safe and proper installation of rainwater catchment and storage systems.	EMD	
	Action Water-2.3: Coordinate with Regional San or other appropriate agencies to develop a standard to deploy innovative options to meet future water demand for all County-owned facilities.	DWR, SCWA, other water districts, Regional San	
	Action Water-2.4: Develop an integrated network of rainwater and greywater catchment systems within the County's agricultural sector through incentive	DWR, Agricultural Commissioner's Office	

Measure	Action	Responsibility	Timeframe
	and rebate programs to further increase water storage capacity.		
	Action Water-2.5: Establish a regional stormwater harvest program and construct the related infrastructure (e.g., piping, storage basins and reservoirs, pumps) in existing rural and urban portions of the County as well as new development.	DWR, SCWA, other water districts	
Water-3: Create Incentives and Programs to Transfer Knowledge and Technologies to Assist Farmers with New Production Methods and Drought Tolerance Species	Action Water-3.1: Create programs that facilitate communication between farmers of specialty crops and other climate-sensitive crops and agricultural specialists to advise future agricultural practices in light of a potentially drier and hotter climate.	Agricultural Commissioner's Office	Near-Term
	Action Water-3.2: Provide financial support to farmers of specialty crops and other climate-sensitive crops for changes to irrigation systems associated with drought-tolerant crops, which may be cultivated more under future climate conditions.	Agricultural Commissioner's Office	
	Action Water-3.3: Subsidize research on indoor farming practices to be used in periods of prolonged drought. Indoor farming is a developing agricultural practice that allows farmers to cultivate and harvest crops with limited sunlight and water supply.	Agricultural Commissioner's Office	
	Action Water-3.4: Incent water conservation and efficiency in the agricultural sector through incentive and rebate programs for practices that could include, but are not limited to, drip irrigation, tailwater return systems, covered canals, reduced tillage, and covered crops.	Agricultural Commissioner's Office, DWR, SCWA, other water districts	
Water-4: Reduce Potable Water Use in Outdoor Landscaping	Action Water-4.1: Amend the Sacramento County Water Efficient Landscaping Ordinance to require that 80 percent of landscaping area is dedicated to low-water, drought-tolerant species for new residential and non-residential buildings and 90 percent for all County-owned facilities.	PER	Near-Term
	Action Water-4.2: Partner with RWA and other water districts to improve existing rebate programs (e.g., SCWA's Cash for Grass Program) to incent the incorporation of low-water, drought-tolerant species in lieu of water-intensive lawns and high-water vegetation in existing residential areas.	DWR, RWA, other water districts, PER	
	Action Water-4.3: Partner with Regional San to expand the existing recycled water system service areas by 50 percent.	DWR, Regional San	
Water-5: Expand Upon Existing Water Conservation Education Outreach Programs for Residents and Businesses	Action Water-5.1: Expand communication of water conservation-related education and tips through multiple media platforms (e.g., radio, television, social media) to increase awareness of indoor and outdoor conservation methods.	DWR, SCWA, other water districts, Regional San	Near-Term
Water-6: Collaborate with Federal, State, and Local	Action Water-6.1: Pursue grant funding opportunities from SWRCB, CA DWR, USBR, USACE,	DWR SWRCB, CA DWR, USBR, USACE	Mid-Term

Measure	Action	Responsibility	Timeframe
Agencies and Organizations to Identify Future Water Supplies, Explore Alternative Supply Sources, and Improve Capacity	and other state and federal agencies related to water recycling projects, and/or other water resource planning projects.		
	Action Water-6.2: Engage with the RWA, other water districts in the County and region, SWRCB, CA DWR, USBR, USACE, and other local, state and federal agencies to identify water supply options for the future and collaborate on water conservation strategies to improve supply capacity throughout the Sacramento and American River Watersheds.	DWR, SCWA, other water districts, SWRCB, CA DWR, USBR, USACE, other agencies	
	Action Water-6.3: Collaborate with Sierra CAMP, Sierra Nature Conservancy, Water Forum, and CRCRC, and other local, regional, and state organizations to explore regional sustainability and conservation strategies for Sacramento County's water resources.	DWR, Sierra CAMP, Sierra Nature Conservancy, Water Forum, CRCRC, other organizations	
	Water-6.4: Invest in programs within Sacramento County and/or locations within or in proximity to the Sacramento Valley Groundwater Basin to artificially recharge groundwater supplies through recharge ponds and injection wells to improve Sacramento County's water storage capacity.	DWR, GSAs	

Notes: Near-Term=1-5 years, Mid-Term=5-10 years, Long-Term=10+ years, CA DWR=California Department of Water Resources, DWR=Sacramento County Department of Resources, SCWA=Sacramento County Water Agency, PED=Sacramento County Planning and Environmental Review, EMD=Sacramento County Emergency Management Department, FEMA=Federal Emergency Management Agency, BERC=Business Environmental Resource Center, Regional San=Sacramento Regional County Sanitation District, SWRCB=State Water Resources Control Board, USBR=U.S. Bureau of Reclamation, USACE=U.S. Army Corps of Engineers, Sierra CAMP=Sierra Climate Adaptation and Mitigation Partnership, CRCRC=Capital Region Climate Readiness Collaborative, GSAs=Groundwater Sustainability Agencies, RWA=Regional Water Authority

5.3.4 Prepare for Increased Flooding

MEASURE FLOOD-1: EVALUATE AND IMPROVE CAPACITY OF STORMWATER INFRASTRUCTURE FOR HIGH-INTENSITY RAINFALL EVENTS

- Action Flood-1.1: Invest in upgrades to existing stormwater infrastructure to accommodate high-volumes of runoff during extreme storm events to reduce risk of localized flooding.
- Action Flood-1.2: Invest in green infrastructure such as rain gardens, bioswales, stormwater tree trenches, green roofs, detention basins, and rain barrels to reduce peak runoff, filter stormwater, and increase groundwater recharge.
- Action Flood-1.3: Increase maintenance and cleaning of gutters, drainage ditches, and culverts to maximize drainage capacity.

  Benefits: Improving existing stormwater infrastructure combined with investing in green infrastructure would reduce instances of localized flooding in the County.

MEASURE FLOOD-2: IMPROVE SEWAGE AND SOLID-WASTE MANAGEMENT INFRASTRUCTURE

- Action Flood-2.1: Improve sewage and solid-waste management infrastructure to reduce vulnerabilities to flooding and inundation, especially within older portions of the County where infrastructure is undersized or inadequate.

  Benefits: Evaluation and improvement of existing undersized or inadequate sewage and solid-waste management infrastructure would lessen the occurrences of floodwater contamination, thereby reducing the spread of pollution and degraded water quality.

MEASURE FLOOD-3: IDENTIFY NEW LOCATIONS FOR FLOOD CONTROL, PRIORITIZING GREEN INFRASTRUCTURE SOLUTIONS

- Action Flood-3.1: Identify new locations suitable for multi-benefit flood control (e.g., underused agricultural areas, small streams) that encourage groundwater recharge, aquaculture, and habitat restoration (e.g., wetlands).

  Benefits: Historically, Sacramento County has relied on the Yolo Bypass for flood control; however, if high climate-change caused volumes of water exceed the capacity of the River and Yolo Bypass, Sacramento County would be dependent on additional flood control areas. Identification of these locations that would mitigate potential flood events and also provide other benefits including, but not limited to, groundwater recharge, aquaculture, and habitat restoration.

MEASURE FLOOD-4: COORDINATE WITH FEDERAL, STATE, AND LOCAL AGENCIES TO IMPROVE EMERGENCY EVACUATION AND SUPPLY TRANSPORTATION ROUTES

- Action Flood-4.1: Coordinate with CalEOS, SAFCA, CA DWR, and the Federal Emergency Management Agency (FEMA) in improving emergency evacuation and supply transportation routes during flood events.
- Action Flood-4.2: Identify locations of limited evacuation and supply transport capacity (e.g., bridges) and explore innovative alternative routes (e.g., American River bike trails, light-rail).

  Benefits: Evacuation out of Sacramento County could be restricted by limited bridge crossings. Development of a comprehensive plan and multiple routes for evaluation and supply transport will be necessary to protect Sacramento County residents during flood events.

MEASURE FLOOD-5: INVEST IN USE OF PERVIOUS PAVEMENTS AND LANDSCAPING IN DEVELOPED AREAS AND RESTRICT THE USE OF PAVED SURFACES

- Action Flood-5.1: Increase the use of pervious pavements and landscaped areas to allow for better infiltration and reduced stormwater overflow in developed areas.

- Action Flood-5.2: Restrict the use of paved surfaces where applicable to mitigate high stormwater flow rates. The County will consider reducing minimum parking requirements in appropriate land use designations and/or increasing minimum tree or landscaping planter sizes (see also Measure Temp-10).

  Benefits: Use of pervious pavements and landscaping combined with restricting the overall square footage of paved surfaces within development areas would minimize surface runoff and rates of urban flooding. As such, the capacity of stormwater infrastructure would be maintained, and cases of localized flooding would be less frequent.

MEASURE FLOOD-6: MAP CRITICAL FACILITIES AND INFRASTRUCTURE LOCATIONS VULNERABLE TO FLOODING AND UPGRADE AND/OR RELOCATE INFRASTRUCTURE WHERE APPLICABLE

- Action Flood-6.1: Map locations of communication, energy, public service, and transportation facilities and infrastructure that are vulnerable to flooding.
- Action Flood-6.2: In cases where existing communication, energy, public service, and transportation infrastructure and facilities are found to be vulnerable to flooding, assess and upgrade associated infrastructure to be more resilient to inundation and/or relocate critical infrastructure and related-elements to higher ground (e.g., generators relocated to upper floors of hospitals).

  Benefits: Public facilities and infrastructure, particularly energy infrastructure, located within the 100-year, 200-year, and 500-year floodplain may be subject to several feet of inundation. Contact with floodwaters could damage the efficacy of such infrastructure resulting in black-outs, loss of communication, and impeded public services. To combat these potential impacts, Sacramento County will need to identify the locations of existing vulnerable facilities and infrastructure, and upgrade or relocate such infrastructure to withstand potential flood events. This measure will also have co-benefits related to sea-level rise.

MEASURE FLOOD-7: ESTABLISH AN UNDERGROUND UTILITIES PROGRAM RESISTANT TO FLOODING

- Action Flood-7.1: Partner with SMUD and PG&E to establish a flood-resistant Underground Utilities Program that would underground overhead utility lines in appropriate areas to increase the resiliency of the energy grid, particularly in existing communities.

  Benefits: The undergrounding of electrical utilities would increase Sacramento County's resilience to temperature- and wildfire-related impacts (see Temp-6 and Fire-7); however, in flood-prone areas, such as Sacramento County, underground utilities may be damaged during periods of inundation or rising groundwater. The County should partner with SMUD and PG&E to develop watertight, flood-resilient underground utility designs to minimize flood impacts to this infrastructure.

MEASURE FLOOD-8: PARTNER WITH SAFCA AND LOCAL AGENCIES, UTILITIES, AND OTHER ORGANIZATIONS TO SUPPORT FUTURE AND ON-GOING FLOOD-RELATED CLIMATE CHANGE INITIATIVES

- Action Flood-8.1: Partner with SAFCA, SMUD, PG&E, CRCRC, Sierra CAMP, and others to support future and on-going flood-related climate change initiatives such as efforts such as SMUD's Sacramento

Resilient Grid Initiative, Flood Data Analysis and Preparedness Planning, and other initiatives designed to increase Sacramento County's resilience to flooding.

- Action Flood-8.2: Partner with SAFCA, SMUD, PG&E, CRCRC, Sierra CAMP and others in advancing upstream and downstream regional water management solutions that reduce flood risks by: increasing storage capacity in upstream reservoirs (similar to improvements recently made to Folsom Dam), storing, and slowing snow melt until later in the season, and increasing capacity of the Yolo bypass areas.
- Action Flood-8.3: Advance projects to stabilize and reinforce shorelines and levees along the American River to accommodate 160,000 cubic feet per second flows during high release flood protection events.

Benefits: Coordination with agencies and organizations would enable Sacramento County to use and benefit from additional resources and experts. Comprehensive upstream and downstream management of the Sacramento and American River Watersheds is integral to preventing catastrophic flooding in the region. This measure will have co-benefits related to sea-level rise.

MEASURE FLOOD-9: RESEARCH THE TOLERANCE OF CURRENT CROP MIXES TO WITHSTAND INCREASED FLOODING AND SUPPORT AQUACULTURE AND FISH HABITAT

- Action Flood-9.1: Work with the agricultural sector to understand the tolerance of current crop mixes to withstand increased flooding and explore options to shift crop types to suit changing conditions.
- Action Flood-9.2: Support the efforts of the California Trout's Nigiri Project and other similar projects to incentivize farmers to manage fields for fish habitat and aquatic food production (e.g., rice).
- Action Flood-9.3: Coordinate with the U.S. Department of Agriculture (USDA), CDFA, CA DWR, Sacramento County Department of Water Resources (DWR), California Trout, California Department of Fish and Wildlife (CDFW), and others to identify and implement actions local farmers can take to anticipate increased flooding.

Benefits: Historically, during period when the Sacramento River's reaches a threshold elevation, water is diverted into the Yolo Bypass Area, which has five times the capacity of the Sacramento River. Investing in options to use this water for aquaculture and fish and wildlife restoration habitat would benefit the County's economy and native ecosystems. This measure will have co-benefits related to preparations for sea-level rise.

MEASURE FLOOD-10: EXPAND VACCINATION AND EDUCATIONAL PROGRAMS TO ADDRESS VECTOR AND WATERBORNE DISEASES

- Action Flood-10.1: Expand existing immunization programs that monitor and prepare for the appearance of vector and waterborne diseases following floods and storms, provide education materials regarding vector-borne diseases and risks, and strengthen vaccination campaigns and programs for economically disadvantaged residents.
- Action Flood-10.2: Coordinate with the Sacramento-Yolo Mosquito and Vector Control District in the design and installation of underground cisterns and other drainage facilities to reduce and treat vectors.

- Action Flood-10.3: Expand public outreach and education through multiple forms of media (e.g., radio, television, social media) to reduce standing water in areas that attract mosquitos. Include information regarding methods of protection (e.g., covering up, use of sprays).

  Benefits: Stagnant water following flood events provides excellent breeding grounds for mosquitoes and other insects that may carry vector-borne diseases (e.g., West Nile virus, Zika virus). Expending greater resources to expand upon existing vaccination and educational programs would reduce the deleterious effects these diseases may have on Sacramento County residents.

MEASURE FLOOD-11: IDENTIFY CONCRETE CHANNEL RESTORATION AREAS

- Action Flood-11.1: Identify concrete channels along the Sacramento and American Rivers that could be naturalized by stabilizing stream banks and planting appropriate vegetation to buffer buildings, roads, and crops from flooding similar to the Cordova Creek Naturalization Project.

  Benefits: Naturalizing these existing concrete channels would create natural buffers to flood protection. The planting of native trees, shrubs, and other vegetation increases water absorption and allows for groundwater recharge, which moderates the volume of water entering rivers and streams, thereby minimizing flood events.

MEASURE FLOOD-12: REPLANT BARE OR DISTURBED AREAS

- Action Flood-12.1: Replant bare or disturbed areas to reduce runoff, improve water uptake, and reduce erosion and sedimentation in streams.

  Benefits: Vegetation acts as a natural buffer to protect water quality during flood events by filtering contaminants and reducing flows of sedimentation through soil stabilization. Replanting bare or disturbed areas would reduce flood-related water quality impacts in Sacramento County.

MEASURE FLOOD-13: UPDATE AND IMPLEMENT THE COUNTY'S LOCAL HAZARD MITIGATION PLAN TO ADDRESS CLIMATE CHANGE-RELATED FLOODING IMPACTS

- Action Flood-13.1: Ensure that all future updates to the County's LHMP incorporate comprehensive strategies to address the increasing likelihood of flooding as a result of the hazards of climate change.
- Action Flood-13.2: Fund implementation of the 2016 County LHMP Multi-Hazard Mitigation Actions related to flood protection and continue to fund Multi-Hazard Mitigation Actions contained in all future updates.

  Benefits: In accordance with federal law, the Sacramento County LHMP will be updated periodically to adapt to potential changes in hazard conditions, including climate change influences. As the effects of global climate change continue to manifest, Sacramento County's adaptation strategies and mitigation actions may need to evolve to accommodate changing conditions. Regular updates to the LHMP would include adjustments to Sacramento County's adaptation strategies and mitigation actions, so they are deployed accurately and in a timely manner. This measure will have co-benefits related to sea-level rise.

MEASURE FLOOD-14: SAFEGUARD FRESHWATER SUPPLY AGAINST CONTAMINATION, DEGRADATION, OR LOSS

- Action Flood-14.1: Invest in new and/or upgraded existing infrastructure to ensure that freshwater supplies are not contaminated, degraded, or lost during flood events.

  Benefits: Floodwaters may interact with sources of pollution and disperse hazardous substances locally or regionally potentially impairing freshwater supplies. Safeguarding freshwater supply sources through infrastructure improvements (e.g., backflow preventers) would improve Sacramento County's ability to provide drinking water to its residents during flood events.

MEASURE FLOOD-15: IMPROVE FLOOD WARNING AND INFORMATION DISSEMINATION

- Action Flood-15.1: Develop robust multi-lingual education and outreach materials accessible across multiple media forms (e.g., radio, text messaging) to publicize the potential flood risk day-to-day, how to sign up for Sacramento Alert Emergency Notification System, emergency supplies, pet protection, key terminology, electrical safety, and evacuation routes in the case of flooding.
- Action Flood-15.2: Invest resources and personnel to regularly update the Sacramento Ready webpage to include current information.

  Benefits: Improving Sacramento County's outreach and educational programs to be more accessible to non-English speaking persons, residents living within floodplains, and disadvantaged communities would provide Sacramento County residents with real-time information of flood danger as well as useful resources regarding steps to protect against human and property damage. This measure will have co-benefits related to sea-level rise.

Measures related to flooding are described below and summarized in *Table 5-10*, "Summary of Flood Risk Measures."

Table 5-10 Summary of Flood-Related Measures

Measure	Action	Responsibility	Timeframe
Flood-1: Evaluate and Improve Capacity of Stormwater Infrastructure for High-Intensity Rainfall Events	Action Flood-1.1: Invest in upgrades to existing stormwater infrastructure to accommodate high-volumes of runoff during extreme storm events to reduce risk of localized flooding.	DWR	Near-Term
	Action Flood-1.2: Invest in green infrastructure such as rain gardens, bioswales, stormwater tree trenches, green roofs, detention basins, and rain barrels to reduce peak runoff, filter stormwater, and increase groundwater recharge.	DWR	
	Action Flood-1.3: Increase maintenance and cleaning of gutters, drainage ditches, and culverts to maximize drainage capacity.	DWR	
Flood-2: Improve Sewage and Solid-Waste Management Infrastructure	Action Flood-2.1: Improve sewage and solid-waste management infrastructure to reduce vulnerabilities to flooding and inundation, especially within older portions of the County where infrastructure is undersized or inadequate.	Regional San, DWR	Near-Term

Measure	Action	Responsibility	Timeframe
Flood-3: Identify New Locations for Flood Control, Prioritizing Green Infrastructure Solutions	Action Flood-3.1: Identify new locations suitable for multi-benefit flood control that encourage groundwater recharge, aquaculture, and habitat restoration.	DWR, SAFCA, various reclamation districts	Near-Term
Flood-4: Coordinate with Federal, State, and Local Agencies to Improve Emergency Evacuation and Supply Transportation Routes	Action Flood-4.1: Coordinate with CalEOS, SAFCA, DWR, and FEMA in improving emergency evaluation and supply transportation routes during flood events.	CalOES, SacOES, DWR, CA DWR, SAFCA, FEMA	Near-Term
	Action Flood-4.2: Identify locations of limited evacuation and supply transport capacity and explore innovative alternative routes.	SacOES CalOES, FEMA	
Flood-5: Invest in Use of Pervious Pavements and Landscaping in Developed Areas and Restrict the Use of Paved Surfaces	Action Flood-5.1: Increase the use of pervious pavements and landscaped areas to allow for better infiltration and reduced stormwater overflow in developed areas.	PER, DWR, SacDOT	Near-Term
	Action Flood-5.2: Restrict the use of paved surfaces where applicable to mitigate high stormwater flow rates.	PER, DWR, SacDOT	
Flood-6: Map Critical Facilities and Infrastructure Locations Vulnerable to Flooding and Upgrade and/or Relocate Infrastructure Where Applicable	Action Flood-6.1: Map locations of communication, energy, public service, and transportation facilities and infrastructure that are vulnerable to flooding.	PER, SacDOT, GIS	Near-Term
	Action Flood-6.2: In cases where existing communication, energy, public service, and transportation infrastructure and facilities are found to be vulnerable to flooding, assess and upgrade associated infrastructure to be more resilient to inundation and/or relocate critical infrastructure and related-elements to higher ground.	PER, SMUD, PG&E, privately owned businesses	
Flood-7: Establish an Underground Utilities Program Resistant to Flooding	Action Flood-7.1: Partner with SMUD and PG&E to establish a flood-resistant Underground Utilities Program that would underground overhead utility lines in appropriate areas to increase the resiliency of the energy grid, particularly in existing communities.	SM, PER, PG&E, SMUD	Near-Term
Flood-8: Partner with SAFCA and Local Agencies, Utilities, and Other Organizations to Support Future and On-Going Flood-Related Climate Change Initiatives	Action Flood-8.1: Partner with SAFCA, SMUD, PG&E, CRCRC, Sierra CAMP, and others to support future and on-going flood-related climate change initiatives such as efforts such as SMUD's Sacramento Resilient Grid Initiative, Flood Data Analysis and Preparedness Planning, and other initiatives designed to increase Sacramento County's resilience to flooding.	DWR, SAFCA, SMUD, PG&E, CRCRC, Sierra CAMP, others	Near-Term
	Action Flood-8.2: Partner with SAFCA, SMUD, PG&E, CRCRC, Sierra CAMP and others in advancing upstream and downstream regional water management solutions that reduce flood risks by: increasing storage capacity in upstream reservoirs, storing, and slowing snow melt until later in the season, and increasing capacity of the Yolo bypass areas.	DWR, SAFCA, SMUD, PG&E, CRCRC, Sierra CAMP, others	

Measure	Action	Responsibility	Timeframe
	Action Flood-8.3: Advance projects to stabilize and reinforce shorelines and levees along the American River to accommodate 160,000 cubic feet per second flows during high release flood protection events.	DWR, SAFCA	
Flood-9: Research the Tolerance of Current Crop Mixes to Withstand Increased Flooding and Support Aquaculture and Fish Habitat	Action Flood-9.1: Work with the agricultural sector to understand the tolerance of current crop mixes to withstand increased flooding and explore options to shift crop types to suit changing conditions.	SM, Office of Agricultural Commissioner	Near-Term
	Action Flood-9.2: Support the efforts of the California Trout's Nigiri Project and other similar projects to incentivize farmers to manage fields for fish habitat and aquatic food production.	SM, DWR, Office of the Agricultural Commissioner, California Trout, other organizations	
	Action Flood-9.3: Coordinate with USDA, CDFA, CA DWR, DWR, California Trout, CDFW, and others to identify and implement actions local farmers can take to anticipate increased flooding.	SM, DWR, USDA, CDFA, CA DWR, Office of the Agricultural Commissioner	
Flood-10: Expand Vaccination and Educational Programs to Address Vector and Waterborne Diseases	Action Flood-10.1: Expand existing immunization programs that monitor and prepare for the appearance of vector and waterborne diseases following floods and storms, provide education materials regarding vector-borne diseases and risks, and strengthen vaccination campaigns and programs for economically disadvantaged residents.	DHHS	Near-Term
	Action Flood-10.2: Coordinate with SYMVCD in the design and installation of underground cisterns and other drainage facilities to reduce and treat vectors.	SYMVCD, DHHS	
	Action Flood-10.3: Expand public outreach and education through multiple forms of media (e.g., radio, television, social media) to reduce standing water in areas that attract mosquitos. Include information regarding methods of protection.	DHHS	
Flood-11: Identify Concrete Channel Restoration Areas	Action Flood-11.1: Identify concrete channels along the Sacramento and American Rivers that could be naturalized by stabilizing stream banks and planting appropriate vegetation to buffer buildings, roads, and crops from flooding similar to the Cordova Creek Naturalization Project.	DWR, Regional Parks, SAFCA, Water Forum, various reclamation districts and local agencies	Near-Term
Flood-12: Replant Bare or Disturbed Areas	Action Flood-12.1: Replant bare or disturbed areas to reduce runoff, improve water uptake, and reduce erosion and sedimentation in streams.	PER, DWR	Near-Term
Flood-13: Update and Implement the County's Local Hazard Mitigation Plan to Address Climate Change-Related Flooding Impacts	Action Flood-13.1: Ensure that all future updates to the County's LHMP incorporate comprehensive strategies to address the increasing likelihood of flooding as a result of the hazards of climate change.	DWR	Near-Term

Measure	Action	Responsibility	Timeframe
	Action Flood 13.2: Fund implementation of the 2016 County LHMP Multi-Hazard Mitigation Actions related to flood protection and continue to fund Multi-Hazard Mitigation Actions contained in all future updates.		
Flood-14: Safeguard Freshwater Supply Against Contamination, Degradation, or Loss	Action Flood 14.1: Invest in new and/or upgraded existing infrastructure to ensure that freshwater supplies are not contaminated, degraded, or lost during flood events.	SCWA, DWR, Other Water Districts	Near-Term
Flood-15: Improve Flood Warning and Information Dissemination	Action Flood 15.1: Develop robust multi-lingual education and outreach materials accessible across multiple media forms to publicize the potential flood risk day-to-day, how to sign up for Sacramento Alert Emergency Notification System, emergency supplies, pet protection, key terminology, electrical safety, and evacuation routes in the case of flooding.	DHHS, SacOES, DWR	Near-Term
	Action Flood 15.2: Invest resources and personnel to regularly update the Sacramento Ready webpage to include current information.	SacOES, DWR	

Notes: Near-Term=1-5 years, Mid-Term=5-10 years, Long-Term=10+ years, DWR=Sacramento County Department of Water Resources, Regional San=Sacramento Regional County Sanitation District, SAFCA=Sacramento Area Flood Control Agency, SacOES=Sacramento Office of Emergency Services, CA DWR=California Department of Water Resources, FEMA=Federal Emergency Management District, PER=Sacramento County Planning and Environmental Review, SacDOT=Sacramento County Department of Transportation, GIS=Sacramento County Geographic Information Services, SMUD=Sacramento Municipal Utilities District, PG&E=Pacific Gas and Electric, SM=Sustainability Manager, CRCRC=Capital Regional Climate Readiness Collaborate, Sierra CAMP=Sierra Climate Adaptation and Mitigation Program, USDA=U.S. Department of Agriculture, CDFA=California Department of Food and Agriculture, SCWA=Sacramento County Water Agencies, DHHS=Sacramento County Department of Health and Human Services, SYMVCD=Sacramento Yolo Mosquito Vector Control District

5.3.5 Prepare for Sea-Level Rise

MEASURE SLR-1: COORDINATE WITH OTHER AGENCIES ON FLOODPLAIN MAPPING UPDATES AND IDENTIFICATION OF IMPROVEMENTS TO PROTECT VULNERABLE POPULATIONS, FUNCTIONS, AND STRUCTURES

- Action SLR-1.1: Coordinate with the applicable Reclamation Districts (RDs), FEMA, and CA DWR to regularly update floodplain mapping for potentially affected areas to reflect changes in Base Flood Elevations that account for sea-level rise.
- Action SLR-1.2: Partner with the applicable RDs (i.e., RD 214, RD 341, RD 1601, RD 2067, RD 317, RD 563, RD 556, and RD 3) to establish measures to protect populations, functions, and structures within the affected areas including continued maintenance of RD levee systems and relocation of vulnerable communities, infrastructure, and facilities where applicable.

  Benefits: Updates to floodplain mapping that include changes in Base Flood Elevations with sea-level rise inputs would inform future planning and investment decisions. Recognizing that the impact of sea-level rise will manifest gradually over the course of the century, and that according to current projections, 8 percent of Sacramento County is at risk of inundation from a 1.41-meter rise in sea level coupled with a 100-year flood event, Sacramento County should rely on partnerships with agencies and organizations

conducting sea-level rise research to identify actions that protect the County and areas within the proximity of the County. (see Measure SLR-6 below).

MEASURE SLR-2: SUPPORT AND MONITOR ONGOING ANALYSIS OF SEA-LEVEL RISE DATA

- Action SLR-2.1: Support and monitor ongoing collection and analysis of sea-level rise, storm surge, and tidal data by existing institutions, including, but not limited to: FEMA and the National Oceanic and Atmospheric Administration (NOAA).
- Action SLR-2.2: Support research and analysis of saltwater intrusion and degraded water quality in the Sacramento River, as well as surrounding freshwater inlets and wells, as a result of sea-level rise.

  Benefits: Gathering information on sea-level rise effects on Sacramento County (e.g., saltwater intrusion) would help the County and local water districts prepare for potentially more adverse hydrologic and water quality conditions.

MEASURE SLR-3: UPDATE THE COUNTY'S LOCAL HAZARD MITIGATION PLAN TO INCORPORATE SEA-LEVEL RISE

- Action SLR-3.1: Require that future updates to the County's LHMP incorporate a comprehensive evaluation of sea-level rise in the County and associated risk management processes as the degree of sea-level rise manifests and as more data becomes available.

  Benefits: Future updates to the County's LHMP to include sea-level rise hazards would increase Sacramento County's resilience to higher sea levels, because future LHMPs would assess the geographic extent, probability of future occurrences, magnitude/severity, significance, and climate change influence of sea-level rise as it relates to the County. The LHMP's assessment of these factors would advise the development of future Mitigation Actions.

MEASURE SLR-4: INCORPORATE SEA-LEVEL RISE EFFECTS INTO CAPITAL IMPROVEMENT PLANS

- Action SLR-4.1: Following the completion of Measures SLR-1 and SLR—3, update capital improvement plans for critical infrastructure to address the effects of future sea-level rise and associated hazards in potentially affected areas.

  Benefits: Using sea-level rise data, the County would be able to design and locate future infrastructure projects accordingly. In areas where sea-level rise effects will likely occur, the County would bolster or relocate future infrastructure.

MEASURE SLR-5: GUIDE FUTURE DEVELOPMENT OUT OF AREAS VULNERABLE TO SEA-LEVEL RISE

- Action SLR-5.1: Following the completion of Measures SLR-1 and SLR-3, guide future development out of areas that are vulnerable to sea-level rise and associated hazards.

Benefits: Guiding development out of areas vulnerable to sea-level rise would reduce future flooding impacts to people and property. This measure will have co-benefits related to flood risk.

MEASURE SLR-6 CREATE A COMPREHENSIVE OUTREACH STRATEGY

- Action SLR-6.1: Develop robust multi-lingual education and outreach materials accessible across multiple media forms (e.g., radio, television, social media) to publicize potential sea-level rise impacts and how to sign up for Sacramento Alert Emergency Notification System and adequately protect and increase community resiliency to sea-level rise.

  Benefits: Improving Sacramento County's outreach and educational programs to be more accessible to non-English speaking persons, residents living within areas vulnerable to sea-level rise, and disadvantaged communities would provide Sacramento County residents with real-time information of flood danger as well as useful resources regarding steps to protect against human and property damage. This measure will have co-benefits related to flood risk.

Measures related to sea-level rise are described below and summarized in *Table 5-11*, "Summary of Sea-Level Rise Measures."

Table 5-11 Summary of Sea-Level Rise-Related Measures

Measure	Action	Responsibility	Timeframe
SLR-1 Coordinate with Other Agencies on Floodplain Mapping Updates and Identification of Improvements to Protect Vulnerable Populations, Functions, and Structures	Action SLR-1.1: Coordinate with the applicable RDs, FEMA, and DWR to regularly update floodplain mapping for potentially affected areas to reflect changes in Base Flood Elevations that account for sea-level rise	DWR, FEMA, applicable RDs	Ongoing
	Action SLR-1.2: Partner with the applicable RDs (i.e., RD 214, RD 341, RD 1601, RD 2067, RD 317, RD 563, RD 556, and RD 3) to establish measures to protect populations, functions, and structures within the affected areas including continued maintenance of RD levee systems and relocation of vulnerable communities, infrastructure, and facilities where applicable	DWR, applicable RDs	Near-Term
SLR-2: Support and Monitoring Ongoing Analysis of Sea-Level Rise Data	Action SLR-2.1: Support and monitor ongoing collection and analysis of sea-level rise, storm surge, and tidal data by existing institutions, including, but not limited to: FEMA and NOAA.	DWR	Ongoing
	Action SLR-2.2: Support research and analysis of saltwater intrusion and degraded water quality in the Sacramento River, as well as surrounding freshwater inlets and wells, as a result of sea-level rise.	DWR	
SLR-3: Update the County's Local Hazard Mitigation Plan to Incorporate Sea-Level Rise	Action SLR-3.1: Require that future updates to the County's LHMP incorporate a comprehensive evaluation of sea-level rise in the County and associated risk management processes as the degree of sea-level rise manifests and as more data becomes available	DWR	Mid-Term / Ongoing

Measure	Action	Responsibility	Timeframe
SLR-4: Incorporate Sea-Level Rise Effects into Capital Improvement Plans	Action SLR-4.1: Update capital improvement plans for critical infrastructure to address the effects of future sea-level rise and associated hazards in potentially affected areas	DWR, DOT, Regional San, SCWA, other water districts	Mid-Term
SLR-5: Guide Future Development Out of Areas Vulnerable to Sea-Level Rise	Action SLR-5.1: Following the completion of Measures SLR-1 and SLR-3, guide future development out of areas that are vulnerable to sea-level rise and associated hazards.	PER, DWR	Near-Term / Ongoing
SLR-6: Create a Comprehensive Outreach Strategy	Action SLR-6.1: Develop robust multi-lingual education and outreach materials accessible across multiple media forms to publicize potential sea-level rise impacts and how to sign up for Sacramento Alert Emergency Notification System and adequately protect and increase community resiliency to sea-level rise.	SacOES, DWR, DHHS	Mid-Term

Notes: Near-Term=1-5 years, Mid-Term=5-10 years, Long-Term=10+ years, CCC=California Coastal Commission, DWR= Sacramento County Department of Water Resources, RD=Reclamation District, SWRCB=State Water Resources Control District, LHMP=Local Hazard Mitigation Plan, FEMA=Federal Emergency Management Agency, NOAA=National Oceanic and Atmospheric Administration, PER=Sacramento County Planning and Environmental Review, SacOES=Sacramento County Office of Emergency Services, DHHS=Sacramento County Department of Health and Human Services

6 IMPLEMENTATION AND MONITORING

6.1 INTRODUCTION

This chapter outlines in detail how the County will implement, monitor, and update CAP strategies and measures over time to reduce greenhouse gas (GHG) emissions and adapt to climate change. To achieve the Communitywide GHG emissions reductions described in Chapter 3 measures must also be continuously assessed and monitored to ensure that: (1) the measures are effective; (2) the CAP is on track to achieve the GHG reduction targets; and (3) desired community outcomes are attained.

6.2 IMPLEMENTATION STRATEGY

Achieving the 2030 GHG reduction target will require ongoing implementation of the strategies and measures identified in the CAP. Ensuring that the measures translate to on-the-ground results and reductions in GHG emissions is critical to success. It requires careful consideration of the operational and capital resources needed to implement the CAP, as well as the overall timing, phasing, and monitoring of implementation. The implementation strategy serves as initial guidance for County staff in monitoring progress towards established goals. This CAP will serve as the County's plan for the reduction of greenhouse gases, pursuant to section 15183.5 of California's CEQA Guidelines which provides the opportunity for tiering and streamlining CEQA review and mitigation of project-level GHG emissions for certain types of discretionary projects that are consistent with the CAP. Thus, the Communitywide GHG reduction strategy in this CAP fulfills a regulatory obligation under CEQA to disclose and mitigate potential impacts, while also providing a streamlining pathway for future projects. Monitoring and assessment of the CAP implementation process will provide key insights into which strategies and measures have been most successful in terms of implementation and GHG reductions and will inform policy and strategy development for future CAP updates. Measure implementation will be assigned to County departments as shown in Table 6-1.

Table 6-1 Agencies Responsible for Implementation

GHG Reduction Measure	County Department(s) Responsible for Implementation
CLS-01	BP&I
CLS-02	DWMR, SWA
CLS-03	PER, Sustainability Program
CLS-04	PER, Sustainability Program
CLS-05	Sustainability Manager
CLE-07	PER, Agricultural Commissioner
CLV-01	Agricultural Commissioner, Sustainability Manager
CLV-02	Sustainability Manager
CLV-03	PER, BP&I
CLV-04	PER
CLV-05	Sustainability Manager
CLV-06	PER
CLV-07	PER

GHG Reduction Measure	County Department(s) Responsible for Implementation
CLV-08	PER
CLV-09	CEO, Legislative Analyst
CLV-10	DHHS
CLV-11	PER
CLV-12	PER
GRN-01	PER
GRN-02	BP&I, Sustainability Program
GRN-03	BP&I
GRN-04	PER
GRN-05	PER, Sustainability Program
GRN-06	SCWA, Sustainability Manager
GRN-07	PER, Sustainability Program
GRN-08	Sustainability Manager
GRN-09	BP&I, SWA, DWMR
GRN-10	Code Enforcement, PER - Tree Coordinator, Sustainability Manager, ED
GRN-11	BP&I, EMD
GRN-12	SCWA, Sustainability Manager, Regional Parks
GRN-13	Sustainability Manager
GRN-14	DWR
GRN-15	Sustainability Manager, PER
INC-02	Sustainability Manager, Agricultural Commissioner
INC-03	Sustainability Manager
INC-04	PER
INC-05	CEO, Sustainability Manager
INC-06	PER
INC-07	CEO, Sustainability Manager
NWL-01	PER
NWL-03	Code Enforcement, PER - Tree Coordinator, Sustainability Manager, ED
NWL-04	PER, SACDOT, Regional Parks
NWL-05	PER, SHRA
NWL-06	PER
NWL-07	PER
VMT-01	PER
VMT-02	PER
VMT-03	PER
VMT-04	PER, SACDOT
VMT-05	SACDOT
VMT-06	SACDOT
VMT-07	SACDOT
VMT-08	PER
VMT-09	SACDOT
VMT-10	SACDOT
VMT-11	SACDOT

GHG Reduction Measure	County Department(s) Responsible for Implementation
VMT-12	PER
VMT-13	SACDOT
VMT-14	PER
VMT-15	PER, SACDOT, Regional Parks

Notes: BPI = Building Permits and Inspections, CEO = Office of the County Executive, DHHS = Department of Health and Human Services, DWMR = Department of Waste Management and Recycling, ED = Economic Development, EMD = Environmental Management Department, PER = Planning and Environmental Review, SACDOT = Sacramento County Department of Transportation, SCWA = Sacramento County Water Agency, SHRA = Sacramento Housing and Redevelopment Agency, SWA = Sacramento Regional Solid Waste Authority.

Source: Ascent Environmental, 2021

6.2.1 Climate Emergency Declaration

On December 16, 2020, the Sacramento County Board of Supervisors adopted a resolution declaring a climate emergency. Under this resolution it is stated that the Communitywide CAP shall explain the County's approach to reduce GHG emissions to achieve carbon neutrality by 2030.

While a definition for carbon neutrality was not adopted by the County as part of the resolution, scientific research and state policies provide insight into the strategies needed for achieving this goal. The Intergovernmental Panel on Climate Change (IPCC) Special Report: Global Warming of 1.5°C, defines carbon neutrality as net zero carbon dioxide (CO_2) emissions, which are "achieved when anthropogenic CO_2 emissions are balanced globally by anthropogenic CO_2 removals over a specified period." California Executive Order (EO) B-55-18[3] which calls for statewide carbon neutrality by 2045 states that "the achievement of carbon neutrality will require both significant reduction in carbon pollution and removal of carbon dioxide from the atmosphere including sequestration in forests, soils and other natural landscapes." The commonality between both definitions is that achieving carbon neutrality entails a combination of carbon dioxide *reduction*, as well as *removal* from the atmosphere. This Communitywide CAP includes strategies and measures for both.

As shown in Chapter 3, section 3, the CAP contains numerous quantified GHG strategies that *reduce* CO_2 . In addition, the Natural and Working Lands Strategy described in section 3.3.5 also contains specific measures aimed at *removing* CO_2 from the atmosphere. These include Urban Forestry under NWL-03 and Carbon Farming demonstration, outreach, and education under NWL-06 and NWL-07. While the County's adopted resolution and this CAP emphasize the role of GHG emissions reductions in achieving carbon neutrality, it is envisioned that carbon removal will play an important role, initially through the foundational measures established in this CAP and then though expanded measures in future updates to the CAP that are aligned with other state and local agencies.

A phased approach to implementing carbon removal at the local acknowledges direction in the County's climate emergency resolution that "development and implementation of the plan shall be guided by science, data, best practices and equity concerns." These considerations pertaining to carbon removal and achieving carbon neutrality are currently being investigated by a consortium of California state agencies under direction EO N-82-20[4], enacted in October 2020. Under this order agencies are tasked with

[3] https://www.ca.gov/archive/gov39/wp-content/uploads/2018/09/9.10.18-Executive-Order.pdf
[4] https://www.gov.ca.gov/wp-content/uploads/2020/10/10.07.2020-EO-N-82-20-signed.pdf

identifying and implementing near- and long-term actions to accelerate natural removal of carbon and build climate resilience in forests, wetlands, urban greenspaces, agricultural soils, and land conservation activities in ways that serve all communities and low-income, disadvantaged, and vulnerable communities. In addition, the order specifies that by October 2021 the California Natural Resources Agency in collaboration with other State agencies, shall develop a Natural and Working Lands (NWL) Climate Smart Strategy that serves as a framework to advance the State's carbon neutrality goal and build climate resilience. CARB is then directed to take into consideration this NWL Climate Smart Strategy and science-based data to update the target for the NWL sector in achieving the State's carbon neutrality goal.

With expanded actions and framework recommendations for carbon removal currently on the horizon, the County's approach to carbon neutrality by 2030 is to proceed with aggressive GHG reductions, complemented by carbon removal measures under this Plan and then expand carbon removal programs as part of a CAP update following publication of the Natural and Working Lands Climate Smart Strategy.

7 REFERENCES

Bedsworth et al. 2018. *Statewide Summary Report. California's Fourth Climate Change Assessment*. Publication number: SUMCCCA4-2018-013.

Burton, Christopher and Susan L. Cutter. 2008 (August). Levee Failures and Social Vulnerability in the Sacramento-San Joaquin Delta Area, California. Natural Hazards Review. Pp 136-149. Available: https://www.researchgate.net/profile/Christopher_Burton3/publication/228756947_Levee_failures_and_social_vulnerability_in_the_Sacramento-San_Joaquin_Delta_area_California/links/00b4953c3a884f3878000000.pdf. Accessed: August 4, 2016.

CA DWR. *See* California Department of Water Resources.

CAL FIRE. *See* California Department of Forestry and Fire Protection.

CalBRACE. 2015 (December). *Public Health Planning for Climate Change Adaption in California*. Available: http://www.cdph.ca.gov/programs/Documents/VAReportSection2_Sacramento_12-21-2015.pdf. Accessed: September 21, 2016.

CalCAN. *See* California Climate and Agriculture Network.

California Climate and Agriculture Network. 2011 (March). *Ready…Or Not? An Assessment of California Agriculture's Readiness for Climate Change.* Available: http://calclimateag.org/wp-content/uploads/2011/03/ready-or-not-full-report.pdf. Accessed: January 12, 2017.

California Climate Action Team. 2012 (August). *Extreme Heat Adaption Interim Guidance Document*. Available: https://www.arb.ca.gov/cc/ab32publichealth/meetings/091012/extremeheatadaptationinterimguidance.pdf. Accessed: January 13, 2017.

California Department of Fish and Wildlife. 2015. *California State Wildlife Action Plan 2015 Update: A Conservation Legacy for Californians*. Available: https://www.wildlife.ca.gov/SWAP/Final. Accessed: September 20, 2016.

California Department of Food and Agriculture. 2013. *Climate Change Consortium for Specialty Crops: Impacts and Strategies for Resilience*. Available: https://www.cdfa.ca.gov/environmentalstewardship/pdfs/ccc-report.pdf. Accessed: January 12, 2017.

California Department of Forestry and Fire Protection. 2008 (November). *Power Line Fire Prevention Field Guide*. Available: http://cdfdata.fire.ca.gov/pub/fireplan/fpupload/fppguidepdf126.pdf. Accessed: March 22, 2017.

California Department of Water Resources. 1980. *Ground Water Basins in California: A Report to the Legislature in Response to Water Code Section 12924*. Available: http://www.water.ca.gov/pubs/groundwater/bulletin_118/ground_water_basins_in_california__bulletin_118-80_/b118_80_ground_water_ocr.pdf. Accessed: November 9, 2016.

———. 2008. *Managing an Uncertain Future: Climate Change Adaption Strategies for California's Water*. Available: http://www.water.ca.gov/climatechange/docs/ ClimateChangeWhitePaper.pdf. Accessed: June 15, 2016.

California Energy Commission. 2020a. *Cal-Adapt Annual Averages Tool*. Available: https://cal-adapt.org/tools/annual-averages/. Accessed November 25, 2020.

———. 2020b. *Cal-Adapt Extreme Heat Tool.* Available: https://cal-adapt.org/tools/extreme-heat/. Accessed November 25, 2020.

———. 2020c. *Cal-Adapt Extreme Precipitation Tool*. Available: https://cal-adapt.org/tools/extreme-precipitation/. Accessed November 25, 2020.

California Natural Resources Agency. 2012. *Our Changing Climate 2012: Vulnerability and Adaptation to the Increasing Risk from Climate Change in California*.

———. 2014. *Safeguarding California: Reducing Climate Risk—An Update to the 2009 California Climate Adaption Strategy*.

———. 2018. *Safeguarding California Plan: 2018 Update*. Available: https://files.resources.ca.gov/climate/safeguarding/. Accessed November 30, 2020.

CalOES. *See* Governor's Office of Emergency Services.

Capital Region Climate Readiness Collaborative. 2014 (November). *Climate Change Risks and Solutions for the Capital Region*. Available: http://www.climatereadiness.info/wp-content/uploads/2014/04/Sacramento-Climate-Change-Risks-Nov-2014.pdf. Accessed: August 2, 2016.

CAT. *See* California Climate Action Team.

CDFA. *See* California Department of Food and Agriculture.

CDFW. *See* California Department of Fish and Wildlife.

CEC. *See* California Energy Commission.

Climate Central. No Date. *Sacramento and Stockton Face Biggest Seal Level Rise Threat in California: Host State's Largest City Population on Low-Lying Lands*. Available: http://www.climatecentral.org/pdfs/SLR-CA-SS-PressRelease.pdf. Accessed: August 25, 2016.

CNRA. *See* California Natural Resources Agency.

CRCRC. *See* Capital Region Climate Readiness Collaborative.

Curtis, Katherine J. and Annemarie Schneider. 2011 (April). *Understanding the Demographic Implications of Climate Change: Estimate of Localized Population Prediction under Future Scenarios of Sea-Level Rise*. Springer Science and Business Media, LLC. Available: https://www.researchgate.net/profile/Annemarie_Schneider/publication/227203534_Understanding_the_demographic_implications_of_climate_change_Estimates_of_localized_population_predictions_under_future_scenarios_of_sea-level_rise/links/004635351a192319d4000000.pdf. Accessed: August 4, 2016.

Governor's Office of Emergency Services. 2020. *California Adaptation Planning Guide*. Available: https://www.caloes.ca.gov/HazardMitigationSite/Documents/CA-Adaptation-Planning-Guide-FINAL-June-2020-Accessible.pdf. Accessed August 20, 2020.

Heat Island Group. 2017. *Cool Pavements*. Available: https://heatisland.lbl.gov/coolscience/cool-pavements. Accessed: January 13, 2017.

Houlton, Benjamin and Jay Lund. (University of California, Davis). 2018. *Sacramento Summary Report. California's Fourth Climate Change Assessment.* Publication number: SUM-CCCA4-2018-002.

Metro Fire. *See* Sacramento Metropolitan Fire District.

SACOG. *See* Sacramento Area Council of Governments.

Sacramento Area Council of Governments. 2015. *Sacramento Region Transportation Climate Adaptation Plan*. Available: http://www.sacog.org/sites/main/files/file-attachments/ fullplanwithappendices.pdf/. Accessed: June 15, 2016.

Sacramento Metropolitan Fire District. 2014 (June). *Communitywide Wildfire Protection Plan*. Available: https://metrofire.ca.gov/phocadownloadpap/CWPP/appacwpp.pdf. Accessed: January 19, 2017.

Sacramento Municipal Utilities District. 2012 (November). *Climate Readiness Strategy Overview and Summary Findings*. Available: http://www.hackingsolar.org/library/images/a/a5/ SMUD_Climate_Readiness_Report_2012.pdf. Accessed: June 16, 2016.

SMUD. *See* Sacramento Municipal Utilities District.

State Water Resources Control Board. 2017.

SWRCB. *See* State Water Resources Control Board.

USFS. *See* U.S. Forest Service.

U.S. Department of Energy. 2010 (July). *Guidelines for Selecting Cool Roofs V 1.2. Building Technologies Program*. Available: https://heatisland.lbl.gov/sites/all/files/coolroofguide_0.pdf. Accessed: January 12, 2017.

U.S. Forest Service. 2011 (February). *Southern Sacramento Mountains Restoration Project*. Available: https://www.fs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb5270095.pdf. Accessed: April 4, 2017.

Valley Vision. 2014 (November). *Business Resiliency Initiative El Dorado County Wildfire: Too Close to Home*. Available: http://valleyvision.org/sites/files/pdf/edc_learning_paper_nov_2014_1.pdf. Accessed: September 20, 2016.

———. No Date. *Capitol Region Business Resiliency Initiative: The Toolkit*. Available: http://resilientbusiness.org/the-toolkit/. Accessed: January 13, 2017.

Water Education Foundation. 2016. *Sacramento-San Joaquin Delta Levees*. Available: http://www.watereducation.org/aquapedia/sacramento-san-joaquin-delta-levees. Accessed: August 4, 2016.

Sacramento County. 2011a. *Sacramento County General Plan of 2005-2030*. Adopted December 15, 1993. Available: http://www.per.saccounty.net/PlansandProjectsIn-Progress/Documents/ General%20Plan%202030/2030%20General%20Plan%20Adopted%2011.9.11_sm.pdf. Accessed: May 31, 2016.

———. 2011b (November). *Sacramento County Climate Action Plan: Strategy and Framework Document*. Adopted November 9, 2011. Available: http://www.ca-ilg.org/sites/main/files/file-attachments/ sac_030843.pdf. Accessed: August 24, 2016.

———. 2016. *2016 Sacramento Countywide Local Hazard Mitigation Plan Update*. Available: https://waterresources.saccounty.net/Local%20Hazard%20Mitigation%20Plan%202017/Executive%20Summary.pdf. Accessed November 30, 2020.